DRAGONAIR

A320/A321

OPERATIONS MANUAL

FLIGHT CREW OPERATING MANUAL

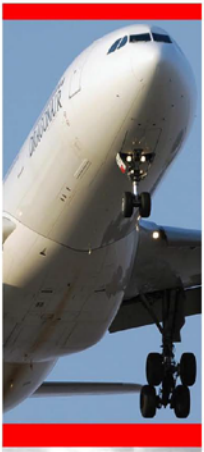
This volume forms part of the Operations Manual. It is issued by the Operations Department and is authorised by the General Manager (Operations).

Signed : 

Peter SANDERSON
General Manager Operations

The holder of this volume is responsible for its revision.

DRAGONAIR
港龍航空





安全、質量及保安政策

安全、質量及保安是港龍航空的核心價值。藉著各員工絕不妥協地致力推行各種持續提升質量、保安及安全管理系統計劃，我們務求在這些方面均達到最高的水平。

港龍航空一直以來均十分重視及鼓勵任何有關運作安全及保安事件的報告。我們有既定政策，鼓勵每一位員工向公司匯報任何可能影響航班及地勤營運安全及保安的情況及資料，並積極推動這種文化。我們更製訂了一套程序，適用於航空安全報告、機鑰安全報告、地勤安全報告、品質審計報告及保安審查報告所收集紀錄及發放的資訊，確保溝通可以在不受拘束的情況下進行。

我們亦確立機制，以量度及訂立在所有有關安全、質量及保安方面的主要表現水平，並以嚴謹的風險評審，按其重要性訂定改善指施的優先次序。

爲建立互信關係，港龍航空推行公平文化的政策，決不會紀律處分任何匯報有關航班安全事件的員工。但如果有關資訊是來自其他來源，或員工刻意漠視既定的政策及程序，此項政策則不適用。我們希望從錯誤中學習，以不斷提升水平。

作爲行政總裁，我自然責無旁貸，除致力履行承諾提供安全的運作及工作環境，我務請大家積極負責，讓港龍航空繼續在安全、品質及保安方面均達致最高的水平，讓顧客、員工及商業夥伴均受惠，並保持公司在這方面的業界領導地位。

楊偉添

行政總裁　楊偉添
二〇一一年八月

SAFETY, QUALITY AND SECURITY POLICY

Safety, quality and security are core values of Dragonair. We are dedicated to achieving the highest standards in these disciplines by the uncompromising efforts and vigilance of every employee in implementing continuous quality improvement, security and safety management system programmes that are in place in Dragonair.

It is imperative that we have uninhibited reporting of all incidents and occurrences which compromise the safe and secure conduct of our operations. We have a policy of an open reporting culture where every employee is encouraged to communicate any information that may affect the integrity of flight and ground safety and security. Such communication is free of reprisal. Our method of collecting, recording and disseminating information obtained from Air Safety Reports, Cabin Safety Reports, Ground Safety Reports, Quality Audits and Security Inspections has been developed to achieve this aim.

We have established methods to measure and set key performance standards in all the safety, quality and security disciplines coupled with a rigorous process of risk assessment in order to prioritise the deployment of corrective actions in a timely and efficient manner.

To engender mutual trust, Dragonair has a just culture policy where it will not take disciplinary action against any employee who discloses an incident or occurrence involving safety. This policy shall not apply to information received by the company from a source other than the employee, or when the employee knowingly disregards established policies and procedures. We constantly improve our standards by learning from our own mistakes and errors as well as those made by others.

As the Chief Executive Officer I am ultimately accountable and fully committed to providing a safe operational and working environment. However I require you all to take responsibility to ensure Dragonair maintain its industry position as a leader in providing our customers, employees and business partners with the highest level of safety, quality and security.

Patrick Yeung
Chief Executive Officer
August 2011

KASCSPDMS-201108-REV2

DRAGONAIR

POLICY STATEMENTS

COMMANDER/PILOT IN COMMAND/PIC

The term "Commander" throughout the Operations manuals is synonymous with "Pilot in Command (PIC)"

CREW RESOURCE MANAGEMENT (CRM)

Dragonair is committed to the application of modern Crew Resource Management principles in Flight Operations. CRM principles of today are considered by Hong Kong Dragon Airlines to provide the most proven methods of achieving effective leadership and communication, aimed at the promotion of safe and efficient flight. While traditional high standards of technical excellence remain the cornerstone of the airline, it is recognised that effective team management is essential. This must involve the promotion of a comfortable and understanding working environment, especially in multi-cultural crew situations, through clear and unambiguous communication and task sharing. It is Company Policy that CRM principles will be promoted and adopted by all persons in Flight Operations.

AUTOMATION

It is Dragonair policy to regard Automation as a tool to be used, but not blindly relied upon. At all times, flight crew must be aware of what automation is doing, and if not understood , or not requested, reversion to basic modes of operation must be made immediately without analysis or delay. Trainers must ensure that all flight crew are taught with emphasis how to quickly revert to basic modes when necessary. In the man-machine interface, man is still in charge.

QUALITY MANAGEMENT

Dragonair is committed to the application of a Quality Management System in Flight Operations. To this end the management system is defined in OM Part A and shall be complied with for all future policy and procedural development.

GENDER

Masculine terms in all the operations manuals, such as he, him or his also imply the female gender.

ELECTRONIC MANUALS

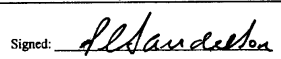
Electronic manuals are an established means of communicating information and data in support of a wide range of FOP activities.
Access to electronic manuals is available to all approved users via Dragonet. All FOP staff are encouraged to utilise electronic manuals on a routine and ongoing basis. Electronic manuals posted on Dragonet represent the latest revised versions and, where differences exist with physical documentation, are considered to be the master source. In some cases manuals can be downloaded directly onto storage devices for offline use. Persons utilising information and data in this manner must be careful to ensure that it represents the latest in-use version available on Dragonet.

STANDARD OPERATING PROCEDURES

Airbus customized FCOM chapters and QRH as well as Dragonair customized FCOM and QRH chapters are accepted as the Standard operating Procedures for Dragonair. Where there is a difference between Airbus and Dragonair customized material, the latter is the overriding authority.

DESIGNATED COMMON LANGUAGE

It is Dragonair Policy that English shall be the designated common language for Flight Operations. All communications pertaining to Flight Operations, whether oral or written will be conducted in English. This includes all oral communications between Flight Crew within the Cockpit, and between the Flight Crew and all other staff (includes the Cabin Crew, Ground Handling Personnel, Passengers, Air Traffic Control and any other ground station or aircraft). All operational documentation including training materials shall be written in English. All Flight Crew and Cabin Crew training activities and evaluations shall be conducted in English.

Signed: 

General Manager Operations

(01 OCT 10)

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TRANSMITTAL LETTER

Issue date: 03 AUG 12

This is the FLIGHT CREW OPERATING MANUAL at issue date 03 AUG 12 for the A320/A321 and replacing last issue dated 30 MAR 12

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FILING INSTRUCTIONS

Please incorporate the revision as follow:

Localization Subsection Title	Remove	Insert Rev. Date
GEN **General Information**	ALL	30 MAY 12
DSC-20-10 **Introduction**	ALL	30 MAY 12
DSC-20-20 **General Arrangement**	ALL	30 MAY 12
DSC-21-10-10 **General**	ALL	30 MAY 12
DSC-21-10-20 **Main Components**	ALL	30 MAY 12
DSC-21-10-30 **Temperature and Flow Regulation**	ALL	30 MAY 12
DSC-21-10-40 **System Operation under Failure Condition**	ALL	30 MAY 12
DSC-21-10-50 **Controls and Indicators**	ALL	30 MAY 12
DSC-21-10-60 **Warnings and Cautions**	ALL	30 MAY 12
DSC-21-10-70 **Electrical Supply**	ALL	30 MAY 12
DSC-21-20-10 **General**	ALL	30 MAY 12
DSC-21-20-20 **Main Components**	ALL	30 MAY 12
DSC-21-20-40 **Controls and Indicators**	ALL	30 MAY 12
DSC-21-30-10 **General**	ALL	30 MAY 12
DSC-21-30-20 **Avionics Ventilation**	ALL	30 MAY 12
DSC-21-30-50 **Lavatory and Galley Ventilation**	ALL	30 MAY 12
DSC-21-30-60 **Controls and Indicators**	ALL	30 MAY 12
DSC-21-40-10 **General**	ALL	30 MAY 12
DSC-21-40-35 **ECAM Cond Page**	ALL	30 MAY 12
DSC-21-40-50 **Electrical Supply**	ALL	30 MAY 12

Localization Subsection Title	Remove	Insert Rev. Date
DSC-22_10-10 **Description**	ALL	30 MAY 12
DSC-22_10-30 **FMGS Modes of Operation**	ALL	30 MAY 12
DSC-22_10-40-10 **MCDU**	ALL	30 MAY 12
DSC-22_10-40-20 **FCU**	ALL	30 MAY 12
DSC-22_10-40-30 **Thrust Levers**	ALL	30 MAY 12
DSC-22_10-40-40 **Primary Flight Display**	ALL	30 MAY 12
DSC-22_10-40-50 **Navigation Display**	ALL	30 MAY 12
DSC-22_10-50 **Warnings and Cautions**	ALL	30 MAY 12
DSC-22_20-20-10 **Position Computation**	ALL	30 MAY 12
DSC-22_20-20-20 **Evaluation of Position Accuracy**	ALL	30 MAY 12
DSC-22_20-20-30 **Radio Navigation Tuning**	ALL	30 MAY 12
DSC-22_20-20-40 **Alignment of Inertial Reference System**	ALL	30 MAY 12
DSC-22_20-30-10-05 **General**	ALL	30 MAY 12
DSC-22_20-30-10-10 **FMS LEGACY**	ALL	30 MAY 12
DSC-22_20-30-10-15 **FMS2 HONEYWELL**	ALL	30 MAY 12
DSC-22_20-30-20-05 **General**	ALL	30 MAY 12
DSC-22_20-30-20-20 **FMS Legacy**	ALL	30 MAY 12
DSC-22_20-30-20-25 **FMS2 Honeywell**	ALL	30 MAY 12
DSC-22_20-40-10 **Optimization**	ALL	30 MAY 12
DSC-22_20-40-30 **Predictions**	ALL	30 MAY 12
DSC-22_20-50-10-20 **FMS Legacy**	ALL	30 MAY 12

FILING INSTRUCTIONS

Localization Subsection Title	Remove	Insert Rev. Date
DSC-22_20-50-10-25 **FMS2 Honeywell**	ALL	30 MAY 12
DSC-22_20-50-20-35 **FMS2 Honeywell**	ALL	30 MAY 12
DSC-22_20-50-30 **MCDU - Data Format List**	ALL	30 MAY 12
DSC-22_20-60-10 **Effect of Baro Reference Setting**	ALL	30 MAY 12
DSC-22_20-60-20 **Clear Key (Clearing Function)**	ALL	30 MAY 12
DSC-22_20-60-30 **How to Execute a Diversion**	ALL	30 MAY 12
DSC-22_20-60-40 **Engine Out**	ALL	30 MAY 12
DSC-22_20-60-50 **Secondary Flight Plan**	ALL	30 MAY 12
DSC-22_20-60-60 **Pilots/Stored Route Function**	ALL	30 MAY 12
DSC-22_20-60-70 **Report Page**	ALL	30 MAY 12
DSC-22_20-60-80 **Closest Airports**	ALL	30 MAY 12
DSC-22_20-60-90 **Time Marker**	ALL	30 MAY 12
DSC-22_20-60-100 **Step ALTS**	ALL	30 MAY 12
DSC-22_20-60-110 **Required Time of Arrival (RTA)**	ALL	30 MAY 12
DSC-22_20-60-120 **Equitime Point**	ALL	30 MAY 12
DSC-22_20-60-130 **MCDU Back Up Navigation**	ALL	30 MAY 12
DSC-22_20-70 **AOC Functions**	ALL	30 MAY 12
DSC-22_20-80 **Print Functions**	ALL	30 MAY 12
DSC-22_30-10 **General**	ALL	30 MAY 12
DSC-22_30-20 **Flight Director**	ALL	30 MAY 12
DSC-22_30-30 **Autopilot (AP)**	ALL	30 MAY 12

Localization Subsection Title	Remove	Insert Rev. Date
DSC-22_30-40 **Speed/Mach Control**	ALL	30 MAY 12
DSC-22_30-50 **AP/FD Modes General**	ALL	30 MAY 12
DSC-22_30-60 **AP/FD Lateral Modes**	ALL	30 MAY 12
DSC-22_30-70-20 **Climb Mode**	ALL	30 MAY 12
DSC-22_30-70-30 **Open Climb Mode**	ALL	30 MAY 12
DSC-22_30-70-50 **Descent Mode**	ALL	30 MAY 12
DSC-22_30-70-60 **Open Descent Mode**	ALL	30 MAY 12
DSC-22_30-70-65 **Altitude Acquire Mode**	ALL	30 MAY 12
DSC-22_30-70-80 **Vertical Speed Mode - Flight Path Angle Mode (V/S - FPA)**	ALL	30 MAY 12
DSC-22_30-75 **Mode Reversions**	ALL	30 MAY 12
DSC-22_30-80-10 **General**	ALL	30 MAY 12
DSC-22_30-80-20 **Takeoff**	ALL	30 MAY 12
DSC-22_30-80-30-05 **General**	ALL	30 MAY 12
DSC-22_30-80-30-10 **Precision Approach**	ALL	30 MAY 12
DSC-22_30-80-30-20 **Non Precision Approach**	ALL	30 MAY 12
DSC-22_30-80-40 **Go Around (GA)**	ALL	30 MAY 12
DSC-22_30-90 **Autothrust**	ALL	30 MAY 12
DSC-22_30-100 **Flight Mode Annunciator (FMA)**	ALL	30 MAY 12
DSC-22_45 **Auto Flight - AOC Functions**	ALL	30 MAY 12
DSC-22_46 **Auto Flight - Print Interface**	ALL	30 MAY 12
DSC-23-10-30 **Radio Tuning**	ALL	30 MAY 12

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Localization Subsection Title	Remove	Insert Rev. Date
DSC-23-20-10 **General**	ALL	30 MAY 12
DSC-23-20-20 **Controls**	ALL	30 MAY 12
DSC-23-20-40 **Call Systems**	ALL	30 MAY 12
DSC-23-20-50 **Passenger Address**	ALL	30 MAY 12
DSC-23-20-60 **EMER EVAC**	ALL	30 MAY 12
DSC-23-20-70 **Electrical Supply**	ALL	30 MAY 12
DSC-23-30-20 **CONTROLS AND INDICATORS ON OVERHEAD PANEL**	ALL	30 MAY 12
DSC-23-30-30 **ELECTRICAL SUPPLY**	ALL	30 MAY 12
DSC-23-40-40 **ACARS Functions**		30 MAY 12
DSC-24-10-10 **General**	ALL	30 MAY 12
DSC-24-10-20 **Generation Of Electrical Power**	ALL	30 MAY 12
DSC-24-10-30-20 **NORMAL CONFIGURATION**	ALL	30 MAY 12
DSC-24-10-30-30 **Abnormal Configurations**	ALL	30 MAY 12
DSC-24-10-30-40 **Distribution Table**	ALL	30 MAY 12
DSC-24-20 **Controls and Indicators**	ALL	30 MAY 12
DSC-24-30 **Warnings and Cautions**	ALL	30 MAY 12
DSC-25-10-20 **Cockpit Plan**	ALL	30 MAY 12
DSC-25-10-50 **Pilot's Instrument Panels**	ALL	30 MAY 12
DSC-25-10-60 **Pedestal**	ALL	30 MAY 12
DSC-25-10-70 **Overhead Panel**	ALL	30 MAY 12
DSC-25-11-10 **Description**	ALL	30 MAY 12

FILING INSTRUCTIONS

Localization Subsection Title	Remove	Insert Rev. Date
DSC-25-11-30 **Cockpit Door Surveillance System (CDSS)**	ALL	30 MAY 12
DSC-25-11-40 **Electrical Supply**	ALL	30 MAY 12
DSC-26-30-10 **Description**	ALL	30 MAY 12
DSC-26-40-10 **Description**	ALL	30 MAY 12
DSC-26-40-20 **Warnings and Cautions**	ALL	30 MAY 12
DSC-26-50-10 **Smoke Detection**	ALL	30 MAY 12
DSC-26-50-20 **Fire Extinguishing**	ALL	30 MAY 12
DSC-26-50-30 **Controls and Indicators**	ALL	30 MAY 12
DSC-26-50-40 **Warnings and Cautions**	ALL	30 MAY 12
DSC-26-60 **Electrical Supply**	ALL	30 MAY 12
DSC-27-10-20 **Architecture**	ALL	30 MAY 12
DSC-27-20-10-10 **General**	ALL	30 MAY 12
DSC-27-20-10-20 **Pitch Control**	ALL	30 MAY 12
DSC-27-20-20 **Reconfiguration Control Laws**	ALL	30 MAY 12
DSC-27-20-30 **Controls and Indicators**	ALL	30 MAY 12
DSC-27-30-10 **Description**	ALL	30 MAY 12
DSC-27-30-20 **Controls and Indicators**	ALL	30 MAY 12
DSC-27-30-30 **Warnings and Cautions**	ALL	30 MAY 12
DSC-28-10-10 **General**	ALL	30 MAY 12
DSC-28-10-20 **Tanks**	ALL	30 MAY 12
DSC-28-10-30 **Engine Feed**	ALL	30 MAY 12

Localization Subsection Title	Remove	Insert Rev. Date
DSC-28-10-60 **Fuel Recirculation System**	ALL	30 MAY 12
DSC-28-10-70 **Refueling and Defueling**	ALL	30 MAY 12
DSC-28-10-80 **Fuel Quantity Indication and Level Sensing**	ALL	30 MAY 12
DSC-28-10-90 **Fuel Tank Inerting System**	ALL	30 MAY 12
DSC-28-20 **Controls and Indicators**	ALL	30 MAY 12
DSC-28-30 **Warnings and Cautions**	ALL	30 MAY 12
DSC-28-40 **ELECTRICAL SUPPLY**	ALL	30 MAY 12
DSC-29-10-30 **Distribution**	ALL	30 MAY 12
DSC-29-20 **CONTROLS AND INDICATORS**	ALL	30 MAY 12
DSC-29-30 **Warnings and Cautions**	ALL	30 MAY 12
DSC-30-10-10 **Description**	ALL	30 MAY 12
DSC-30-20-10 **Description**	ALL	30 MAY 12
DSC-30-40-10 **Description**	ALL	30 MAY 12
DSC-30-50-10 **Description**	ALL	30 MAY 12
DSC-30-50-30 **Warnings and Cautions**	ALL	30 MAY 12
DSC-30-60-10 **DESCRIPTION**	ALL	30 MAY 12
DSC-30-60-20 **CONTROLS AND INDICATORS**	ALL	30 MAY 12
DSC-31-05-30 **Architecture**	ALL	30 MAY 12
DSC-31-05-50 **Reconfiguring the DMC**	ALL	30 MAY 12
DSC-31-05-60 **Reconfiguring DUs**	ALL	30 MAY 12
DSC-31-10 **Ecam Description**	ALL	30 MAY 12

Localization Subsection Title	Remove	Insert Rev. Date
DSC-31-15 **Indications on E/WD**	ALL	30 MAY 12
DSC-31-20 **Indications on SD**	ALL	30 MAY 12
DSC-31-25-20 **Example**	ALL	30 MAY 12
DSC-31-27 **OEB Reminder**	ALL	30 MAY 12
DSC-31-30 **ECAM Controls**	ALL	30 MAY 12
DSC-31-40 **Indications on PFD**	ALL	30 MAY 12
DSC-31-45 **Indications on ND**	ALL	30 MAY 12
DSC-31-50 **EFIS Controls**	ALL	30 MAY 12
DSC-31-55-10 **GENERAL**	ALL	30 MAY 12
DSC-31-55-20 **CONTROLS AND INDICATORS**	ALL	30 MAY 12
DSC-31-60-10 **Flight Data Recording System**	ALL	30 MAY 12
DSC-31-60-20 **Controls and Indicators**	ALL	30 MAY 12
DSC-31-60-30 **Aircraft Integrated Data System**	ALL	30 MAY 12
DSC-31-70 **Warnings and Cautions**	ALL	30 MAY 12
DSC-32-10-20 **Landing Gear System/Interface**	ALL	30 MAY 12
DSC-32-10-30 **Interactions between Landing Gear and Aircraft Systems**	ALL	30 MAY 12
DSC-32-10-40 **Controls and Indicators**	ALL	30 MAY 12
DSC-32-20-10 **Description**	ALL	30 MAY 12
DSC-32-20-20 **Controls and Indicators**	ALL	30 MAY 12
DSC-32-30-10 **Description**	ALL	30 MAY 12
DSC-32-30-20 **Controls and Indicators**	ALL	30 MAY 12

Localization Subsection Title	Remove	Insert Rev. Date
DSC-32-30-30 **Warnings and Cautions**	ALL	30 MAY 12
DSC-32-30-40 **Electrical Supply**	ALL	30 MAY 12
DSC-33-10-20 **Description**	ALL	30 MAY 12
DSC-33-10-30 **Controls and Indicators**	ALL	30 MAY 12
DSC-33-10-40 **Electrical Supply**	ALL	30 MAY 12
DSC-33-30-10 **Description**	ALL	30 MAY 12
DSC-33-30-20 **Controls and Indicators**	ALL	30 MAY 12
DSC-33-40-10 **Controls and Indicators**	ALL	30 MAY 12
DSC-34-10-10 **Description**	ALL	30 MAY 12
DSC-34-10-20 **Controls and Indicators**	ALL	30 MAY 12
DSC-34-10-30 **Warnings and Cautions**	ALL	30 MAY 12
DSC-34-15-10 **Description**	ALL	30 MAY 12
DSC-34-15-40 **Warnings and Cautions**	ALL	30 MAY 12
DSC-34-25 **ISIS**	ALL	30 MAY 12
DSC-34-30-10 **Tuning**	ALL	30 MAY 12
DSC-34-30-20 **Navaids**	ALL	30 MAY 12
DSC-34-30-30 **Controls and Indicators**	ALL	30 MAY 12
DSC-34-30-40 **Electrical Supply**	ALL	30 MAY 12
DSC-34-40-10 **Description**	ALL	30 MAY 12
DSC-34-40-20 **Warnings and Cautions**	ALL	30 MAY 12
DSC-34-50-20 **Controls and Indicators**	ALL	30 MAY 12

FILING INSTRUCTIONS

Localization Subsection Title	Remove	Insert Rev. Date
DSC-34-50-40 **Warnings and Cautions**	ALL	30 MAY 12
DSC-34-60-20 **Controls and Indicators**	ALL	30 MAY 12
DSC-34-60-30 **Predictive Windshear System**	ALL	30 MAY 12
DSC-34-60-40 **Warnings and Cautions**	ALL	30 MAY 12
DSC-34-70-20 **GPWS Basics Modes**	ALL	30 MAY 12
DSC-34-70-30 **EGPWS Functions**	ALL	30 MAY 12
DSC-34-70-40 **Controls and Indicators**	ALL	30 MAY 12
DSC-34-80-10 **Description**	ALL	30 MAY 12
DSC-34-80-20 **Controls and Indicators**	ALL	30 MAY 12
DSC-34-80-30 **Warnings and Cautions**	ALL	30 MAY 12
DSC-35-20-10 **Description**	ALL	30 MAY 12
DSC-35-20-20 **Controls and Indicators**	ALL	30 MAY 12
DSC-35-30-10 **Description**	ALL	30 MAY 12
DSC-35-40-10 **Description**	ALL	30 MAY 12
DSC-36-10-20 **Engine Bleed System**	ALL	30 MAY 12
DSC-36-10-30 **Apu Bleed Air Supply**	ALL	30 MAY 12
DSC-36-10-40 **Crossbleed**	ALL	30 MAY 12
DSC-36-20 **Controls and Indicators**	ALL	30 MAY 12
DSC-36-30 **Warnings and Cautions**	ALL	30 MAY 12
DSC-38-10 **Description**	ALL	30 MAY 12
DSC-45-10 **Description**	ALL	30 MAY 12

Localization Subsection Title	Remove	Insert Rev. Date
DSC-45-20 **System Operation**	ALL	30 MAY 12
DSC-45-25 **Data Loading**	ALL	30 MAY 12
DSC-46-10 **General**	ALL	30 MAY 12
DSC-46-20 **ATSU Communications Function**	ALL	30 MAY 12
DSC-46-40 **CNS/ATM**	ALL	30 MAY 12
DSC-46-60 **Warnings and Cautions**	ALL	30 MAY 12
DSC-46-70 **Electrical Supply**	ALL	30 MAY 12
DSC-49-10-10 **General**	ALL	30 MAY 12
DSC-49-10-20 **Main Components**	ALL	30 MAY 12
DSC-49-20 **Controls and Indicators**	ALL	30 MAY 12
DSC-49-30 **Warnings and Cautions**	ALL	30 MAY 12
DSC-49-40 **Electrical Supply**	ALL	30 MAY 12
DSC-52-10-10 **General**	ALL	30 MAY 12
DSC-52-10-20 **Passenger Doors**	ALL	30 MAY 12
DSC-52-10-30 **Emergency Exits**	ALL	30 MAY 12
DSC-52-10-80 **Escape Slides/Rafts**	ALL	30 MAY 12
DSC-52-20 **Controls and Indicators**	ALL	30 MAY 12
DSC-70-20 **Fadec**	ALL	30 MAY 12
DSC-70-35-30 **Thrust Levers**	ALL	30 MAY 12
DSC-70-45-60 **IDG COOLING RECIRCULATION SYSTEM**	ALL	30 MAY 12
DSC-70-80-40 **Engine Starting System**	ALL	30 MAY 12

FILING INSTRUCTIONS

Localization Subsection Title	Remove	Insert Rev. Date
DSC-70-95 **Controls and Indicators (IAE)**	ALL	30 MAY 12
PRO-ABN-01 **Introduction**	ALL	30 MAY 12
PRO-ABN-10 **Operating Techniques**	ALL	30 MAY 12
PRO-ABN-21 **Air Conditioning / Pressurization / Ventilation**	ALL	30 MAY 12
PRO-ABN-22 **Auto Flight**	ALL	30 MAY 12
PRO-ABN-23 **Communications**	ALL	30 MAY 12
PRO-ABN-24 **Electrical**	ALL	30 MAY 12
PRO-ABN-25 **Equipment**	ALL	30 MAY 12
PRO-ABN-26 **Fire Protection**	ALL	30 MAY 12
PRO-ABN-27 **Flight Controls**	ALL	30 MAY 12
PRO-ABN-28 **Fuel**	ALL	30 MAY 12
PRO-ABN-29 **Hydraulic**	ALL	30 MAY 12
PRO-ABN-30 **Ice and Rain Protection**	ALL	30 MAY 12
PRO-ABN-31 **Indicating / Recording Systems**	ALL	30 MAY 12
PRO-ABN-32 **Landing Gear**	ALL	30 MAY 12
PRO-ABN-34 **Navigation**	ALL	30 MAY 12
PRO-ABN-36 **Pneumatic**	ALL	30 MAY 12
PRO-ABN-46 **Information Systems**	ALL	30 MAY 12
PRO-ABN-52 **Doors**	ALL	30 MAY 12
PRO-ABN-70 **Power Plant**	ALL	30 MAY 12
PRO-ABN-80 **Miscellaneous**	ALL	30 MAY 12

Localization Subsection Title	Remove	Insert Rev. Date
PRO-ABN-90 **Detailed Cabin / Cockpit Evacuation Procedure**	ALL	30 MAY 12
PRO-NOR-SOP-01 **General Information**	ALL	30 MAY 12
PRO-NOR-SOP-02 **Flight Preparation**	ALL	30 MAY 12
PRO-NOR-SOP-04 **Preliminary Cockpit Preparation**	ALL	30 MAY 12
PRO-NOR-SOP-05 **Exterior Inspection**	ALL	30 MAY 12
PRO-NOR-SOP-06 **Cockpit Preparation**	ALL	30 MAY 12
PRO-NOR-SOP-07 **Before Pushback or Start**	ALL	30 MAY 12
PRO-NOR-SOP-08 **Engine Start**	ALL	30 MAY 12
PRO-NOR-SOP-09 **After Start**	ALL	30 MAY 12
PRO-NOR-SOP-10 **Taxi**	ALL	30 MAY 12
PRO-NOR-SOP-11 **Before Takeoff**	ALL	30 MAY 12
PRO-NOR-SOP-12 **Takeoff**	ALL	30 MAY 12
PRO-NOR-SOP-13 **After Takeoff**	ALL	30 MAY 12
PRO-NOR-SOP-14 **Climb**	ALL	30 MAY 12
PRO-NOR-SOP-15 **Cruise**	ALL	30 MAY 12
PRO-NOR-SOP-16 **Descent Preparation**	ALL	30 MAY 12
PRO-NOR-SOP-17 **Descent**	ALL	30 MAY 12
PRO-NOR-SOP-18 **Precision Approach**	ALL	30 MAY 12
PRO-NOR-SOP-19 **Non Precision Approach**	ALL	30 MAY 12
PRO-NOR-SOP-20 **Visual Approach**	ALL	30 MAY 12
PRO-NOR-SOP-21 **Landing**	ALL	30 MAY 12

FILING INSTRUCTIONS

Localization Subsection Title	Remove	Insert Rev. Date
PRO-NOR-SOP-22 **Go-Around**	ALL	30 MAY 12
PRO-NOR-SOP-24 **Parking**	ALL	30 MAY 12
PRO-NOR-SOP-25 **Securing the Aircraft**	ALL	30 MAY 12
PRO-NOR-SOP-90 **Standard Callouts**	ALL	30 MAY 12
PRO-NOR-SRP-01-10 **Cockpit Preparation**	ALL	30 MAY 12
PRO-NOR-SRP-01-15 **Before Pushback or Start**	ALL	30 MAY 12
PRO-NOR-SRP-01-20 **Taxi**	ALL	30 MAY 12
PRO-NOR-SRP-01-30 **Takeoff**	ALL	30 MAY 12
PRO-NOR-SRP-01-40 **Climb**	ALL	30 MAY 12
PRO-NOR-SRP-01-50 **Cruise**	ALL	30 MAY 12
PRO-NOR-SRP-01-60 **Descent**	ALL	30 MAY 12
PRO-NOR-SRP-01-70 **Approach**	ALL	30 MAY 12
PRO-NOR-SRP-01-80 **Go-Around**	ALL	30 MAY 12
PRO-SPO-20 **Flight Without Cabin Pressurization**	ALL	30 MAY 12
PRO-SPO-25-20 **Limitations**	ALL	30 MAY 12
PRO-SPO-25-30 **Procedures**	ALL	30 MAY 12
PRO-SPO-25-40 **Performance**	ALL	30 MAY 12
PRO-SPO-40-50 **Procedures**	ALL	30 MAY 12
PRO-SPO-40-60 **Performance**	ALL	30 MAY 12
PRO-SPO-50 **Reduced Vertical Separation Minimum (RVSM)**	ALL	30 MAY 12
PRO-SPO-51 **Required Navigation Performance (RNP)**	ALL	30 MAY 12

FILING INSTRUCTIONS

Localization Subsection Title	Remove	Insert Rev. Date
PRO-SPO-52 **Schedule 8 Navigation Areas**		30 MAY 12
PRO-SPO-60 **Operations on Narrow Runways**	ALL	30 MAY 12
PRO-SUP-10 **Operating Speeds Definition**	ALL	30 MAY 12
PRO-SUP-22-10 **FMGS Reset and Other Abnormal Procedures**	ALL	30 MAY 12
PRO-SUP-22-20-10 **FMS1 Honeywell Specificities**	ALL	30 MAY 12
PRO-SUP-22-20-15 **FMS2 Honeywell Specificities**	ALL	30 MAY 12
PRO-SUP-23 **Communications**	ALL	30 MAY 12
PRO-SUP-24 **Electrical**	ALL	30 MAY 12
PRO-SUP-25 **Equipment**	ALL	30 MAY 12
PRO-SUP-27-40 **The Protection Systems**	ALL	30 MAY 12
PRO-SUP-28 **Fuel**	ALL	30 MAY 12
PRO-SUP-30 **Ice and Rain Protection**	ALL	30 MAY 12
PRO-SUP-32 **Landing Gear**	ALL	30 MAY 12
PRO-SUP-34 **Navigation**	ALL	30 MAY 12
PRO-SUP-45 **CFDS Procedures**	ALL	30 MAY 12
PRO-SUP-46-10 **ATSU**		30 MAY 12
PRO-SUP-46-20 **ACARS PROCEDURES**		30 MAY 12
PRO-SUP-70 **Power Plant**	ALL	30 MAY 12
PRO-SUP-90 **One Engine Taxi**	ALL	30 MAY 12
PRO-SUP-91-10 **Severe Turbulence**	ALL	30 MAY 12
PRO-SUP-91-30 **Cold Weather**	ALL	30 MAY 12

FILING INSTRUCTIONS

Localization Subsection Title	Remove	Insert Rev. Date
PRO-SUP-91-50 **Fluid Contaminated Runway**	ALL	30 MAY 12
PRO-SUP-91-60 **LOW VISIBILITY OPERATIONS**	ALL	30 MAY 12
LIM-10 **General Limitations**	ALL	30 MAY 12
LIM-11 **Weight and Center of Gravity Limits**	ALL	30 MAY 12
LIM-12 **Environmental Envelope and Airport Operations**	ALL	30 MAY 12
LIM-13 **Speed Limitations**	ALL	30 MAY 12
LIM-21-21_20 **Pressurization**	ALL	30 MAY 12
LIM-22-10 **General**	ALL	30 MAY 12
LIM-22-20 **Automatic Approach, Landing and Roll Out**	ALL	30 MAY 12
LIM-24 **Electrical**	ALL	30 MAY 12
LIM-28 **Fuel**	ALL	30 MAY 12
LIM-34 **Navigation**	ALL	30 MAY 12
LIM-49-10 **General**	ALL	30 MAY 12
LIM-49-20 **Envelope**	ALL	30 MAY 12
LIM-70 **Power Plant**	ALL	30 MAY 12
OEB-28 **No Localizer or Glide Slope Capture in Approach**	ALL	03 AUG 12
OEB-36 **No SRS Engagement During Go Around in the Case of EPR Mode Fault**	ALL	30 MAY 12
OEB-41 **Erroneous Alternate Fuel Predictions Upon Modification of a Company Route in the Alternate Flight Plan**	ALL	30 MAY 12
OEB-43 **F/CTL SPOILER FAULT**	ALL	30 MAY 12
OEB-44 **L/G GEAR NOT DOWNLOCKED**	ALL	30 MAY 12

FILING INSTRUCTIONS

Localization Subsection Title	Remove	Insert Rev. Date
FCB-FCB3 **IAE V2500 N1 Mode**	ALL	30 MAY 12
FCB-FCB12 **FMGS Navigation Database**	ALL	30 MAY 12
FCB-FCB22 **EGPWS Database**	ALL	30 MAY 12
FCB-FCB23 **Use of Managed Guidance in Approach and NAV Database Validation**	ALL	30 MAY 12
FCB-FCB25 **Use of Rudder on Transport Category Airplanes**	ALL	30 MAY 12
PER-LOD-GEN **GENERAL**	ALL	30 MAY 12
PER-LOD-CGO **CARGO LOADING**	ALL	30 MAY 12
PER-LOD-FUL **FUEL**	ALL	30 MAY 12
PER-LOD-WBA-LTS **LOAD AND TRIM SHEET**	ALL	30 MAY 12
PER-OPD-CON-AEO **ALL ENGINES OPERATIVE**	ALL	30 MAY 12
PER-OPD-CON-OEI **ONE ENGINE INOPERATIVE**	ALL	30 MAY 12
PER-THR-MTO **MAXIMUM TAKEOFF**	ALL	30 MAY 12
PER-THR-MGA **MAXIMUM GO AROUND**	ALL	30 MAY 12
PER-THR-MCT **MAXIMUM CONTINUOUS**	ALL	30 MAY 12
PER-THR-MCL **MAXIMUM CLIMB**	ALL	30 MAY 12
PER-THR-MCR **MAXIMUM CRUISE**	ALL	30 MAY 12
PER-THR-N1 **N1 MODE THRUST CONTROL**	ALL	30 MAY 12
PER-TOF-THR-FLX-30 **REQUIREMENTS**	ALL	30 MAY 12
PER-TOF-THR-FLX-40 **RECOMMENDATION**	ALL	30 MAY 12
PER-TOF-ACA-05 **INTRODUCTION**	ALL	30 MAY 12
PER-TOF-ACA-10-05 **DEFINITIONS**		30 MAY 12

Localization Subsection Title	Remove	Insert Rev. Date
PER-TOF-ACA-10-10 **TAKEOFF PERFORMANCE**	ALL	30 MAY 12
PER-TOF-ACA-10-20 **ACARS DESCRIPTION**	ALL	30 MAY 12
PER-TOF-ACA-10-30 **ACARS BACKUP PROCEDURES**		30 MAY 12
PER-TOF-TOD-25-10 **SPEEDS LIMITED BY VMC**	ALL	30 MAY 12
PER-TOF-TOD-25-20 **V2 LIMITED BY VMU/VMCA**	ALL	30 MAY 12
PER-TOF-CTA-20 **DEFINITIONS**	ALL	30 MAY 12
PER-FPL-GEN-MFR **MINIMUM RECOMMENDED FUEL REQUIREMENTS**	ALL	30 MAY 12
PER-FPL-FLP-CAT **CALCULATION TABLES**	ALL	30 MAY 12
PER-FPL-FLP-ALT-10 **OPTIMUM AND MAXIMUM ALTITUDES**	ALL	30 MAY 12
PER-FPL-FLP-ALT-20 **OPTIMUM ALTITUDE ON SHORT STAGE**	ALL	30 MAY 12
PER-FPL-FLP-ICR-20 **INTEGRATED CRUISE AT A GIVEN MACH NUMBER**	ALL	30 MAY 12
PER-FPL-FLP-ICR-30 **INTEGRATED CRUISE AT LONG RANGE CRUISE SPEED**	ALL	30 MAY 12
PER-FPL-FLP-ICR-40 **CLIMB CORRECTION**	ALL	30 MAY 12
PER-FPL-FLP-ICR-50 **STEP CLIMB CORRECTION**	ALL	30 MAY 12
PER-FPL-FLP-ICR-60 **DESCENT CORRECTION**	ALL	30 MAY 12
PER-FPL-FLP-QFP-10 **INTRODUCTION**	ALL	30 MAY 12
PER-FPL-FLP-QFP-30 **EXAMPLE**	ALL	30 MAY 12
PER-FPL-FLP-QFP-40 **FLIGHT PLANNING AT A GIVEN MACH NUMBER**	ALL	30 MAY 12
PER-FPL-FLP-QFP-50 **FLIGHT PLANNING AT LONG RANGE SPEED**	ALL	30 MAY 12
PER-FPL-FLP-ALN-20 **ALL ENGINES OPERATIVE**	ALL	30 MAY 12
PER-FPL-FLP-FTK **FUEL TANKERING**	ALL	30 MAY 12

FILING INSTRUCTIONS

Localization Subsection Title	Remove	Insert Rev. Date
PER-CLB-CLT **CLIMB TABLES**	ALL	30 MAY 12
PER-CRZ-ECI-10 **OPTIMUM MACH NUMBER**	ALL	30 MAY 12
PER-CRZ-ALT-10 **OPTIMUM AND MAXIMUM ALTITUDES**	ALL	30 MAY 12
PER-CRZ-ALT-20 **WIND ALTITUDE TRADE FOR CONSTANT SPECIFIC RANGE**	ALL	30 MAY 12
PER-CRZ-ALT-30 **OPTIMUM ALTITUDE ON SHORT STAGE**	ALL	30 MAY 12
PER-CRZ-CRT-20 **CRUISE AT M.78**	ALL	30 MAY 12
PER-CRZ-CRT-30 **CRUISE AT LONG RANGE**	ALL	30 MAY 12
PER-CRZ-ICQ-10 **GENERAL**	ALL	30 MAY 12
PER-CRZ-ICQ-30 **EXAMPLE**	ALL	30 MAY 12
PER-CRZ-ICQ-40 **IN CRUISE QUICK CHECK M.78**	ALL	30 MAY 12
PER-CRZ-ICQ-50 **IN CRUISE QUICK CHECK LONG RANGE**	ALL	30 MAY 12
PER-HLD-GEN **GENERAL**	ALL	30 MAY 12
PER-HLD-HLD **HOLDING TABLES**	ALL	30 MAY 12
PER-DES-STD **STANDARD**	ALL	30 MAY 12
PER-DES-EMG **EMERGENCY**	ALL	30 MAY 12
PER-GOA-GEN **GENERAL**	ALL	30 MAY 12
PER-GOA-ACG-NOR **NORMAL**	ALL	30 MAY 12
PER-GOA-ACG-CAT **CAT II**	ALL	30 MAY 12
PER-LDG-GEN **GENERAL**	ALL	30 MAY 12
PER-LDG-CTA-20 **DEFINITIONS**	ALL	30 MAY 12
PER-LDG-DIS-MAT **Runway Condition Assessment Matrix for Landing**		30 MAY 12

FILING INSTRUCTIONS

Localization Subsection Title	Remove	Insert Rev. Date
PER-LDG-DIS-RLD **REQUIRED LANDING DISTANCES / MANUAL LANDING**	ALL	30 MAY 12
PER-LDG-ACA-05 **INTRODUCTION**		30 MAY 12
PER-LDG-ACA-10-20 **ACARS DESCRIPTION**		30 MAY 12
PER-LDG-ACA-10-30 **ACARS BACKUP PROCEDURES**		30 MAY 12
PER-OEI-GEN-05 **GENERAL**	ALL	30 MAY 12
PER-OEI-GEN-10 **STANDARD STRATEGY**	ALL	30 MAY 12
PER-OEI-GEN-15 **OBSTACLE STRATEGY**	ALL	30 MAY 12
PER-OEI-GEN-20 **FIXED SPEED STRATEGIES**	ALL	30 MAY 12
PER-OEI-ALT-10 **CEILINGS**	ALL	30 MAY 12
PER-OEI-CRT-10 **STANDARD AND OBSTACLE STRATEGIES**	ALL	30 MAY 12
PER-OEI-CRT-20 **FIXED SPEED STRATEGIES**	ALL	30 MAY 12
PER-OEI-ICQ-10 **STANDARD STRATEGIES**	ALL	30 MAY 12
PER-OEI-ICQ-20 **FIXED SPEED STRATEGIES**	ALL	30 MAY 12
PER-OEI-HLD **HOLDING**	ALL	30 MAY 12
PER-OEI-DES-10 **STANDARD STRATEGY**	ALL	30 MAY 12
PER-OEI-DES-15 **OBSTACLE STRATEGY**	ALL	30 MAY 12
PER-OEI-DES-20 **FIXED SPEED STRATEGIES**	ALL	30 MAY 12
PER-OEI-DES-30 **DESCENT TO LANDING**	ALL	30 MAY 12

PRELIMINARY PAGES

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M(1)	Identification	T(2)	E(3)	Rev. Date	Title
	OEB38 issue 1.0	R	N	30 MAR 12	Erroneous Radio Altimeter Height Indication
	Criteria: SA **Applicable to: ALL**				
	OEB11 issue 1.0	W	Y	30 MAR 12	"ENG 1(2) OIL FILTER CLOG" ECAM Caution During Flight
	Criteria: V2500-A5 **Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN**				
	OEB17 issue 1.0	W	N	30 MAR 12	Dual FM Reset upon Radial Fix Info Entry
	Criteria: 22-1090, P7520 **Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI**				
E	OEB28 issue 1.0	W	N	03 AUG 12	No Localizer or Glide Slope Capture in Approach
E	Criteria: 34-1162 **Applicable to: B-HTD**				
	OEB30 issue 1.0	W	N	30 MAR 12	No SRS Engagement During Go Around Below MDA
	Criteria: SA **Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF**				
	OEB31 issue 1.0	W	N	30 MAR 12	Erroneous Vertical Profile During RNAV, LOC and LOC B/C Approaches
	Criteria: SA **Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP**				
E	OEB36 issue 1.0	W	Y	30 MAY 12	No SRS Engagement During Go Around in the Case of EPR Mode Fault
E	Criteria: 22-1203, IAE, P9126 **Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI**				
	OEB40 issue 1.0	W	Y	30 MAR 12	AIR ENG 1(2) BLEED ABNORMAL PR or AIR ENG 1(2) BLEED FAULT
	Criteria: SA **Applicable to: ALL**				
E	OEB41 issue 1.0	W	N	30 MAY 12	Erroneous Alternate Fuel Predictions Upon Modification of a Company Route in the Alternate Flight Plan
E	Criteria: P10763 **Applicable to: B-HSQ, B-HSR, B-HST, B-HSU**				
R	OEB43 issue 3.0	W	Y	30 MAY 12	F/CTL SPOILER FAULT
	Criteria: SA **Applicable to: ALL**				
R	OEB44 issue 2.0	W	Y	30 MAY 12	L/G GEAR NOT DOWNLOCKED
	Criteria: SA **Applicable to: ALL**				

(1) Evolution code : N=New, R=Revised, E=Effectivity
(2) Type of OEB: R=Red, W=White
(3) Affects ECAM: Y=Yes, N=No

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M(1)	Localization	Subsection Title	Rev. Date
R	GEN	General Information	30 MAY 12
R	DSC-20-10	Introduction	30 MAY 12
R	DSC-20-20	General Arrangement	30 MAY 12
R	DSC-21-10-10	General	30 MAY 12
R	DSC-21-10-20	Main Components	30 MAY 12
R	DSC-21-10-30	Temperature and Flow Regulation	30 MAY 12
R	DSC-21-10-40	System Operation under Failure Condition	30 MAY 12
R	DSC-21-10-50	Controls and Indicators	30 MAY 12
R	DSC-21-10-60	Warnings and Cautions	30 MAY 12
R	DSC-21-10-70	Electrical Supply	30 MAY 12
R	DSC-21-20-10	General	30 MAY 12
R	DSC-21-20-20	Main Components	30 MAY 12
	DSC-21-20-30	System Operation	30 MAR 12
R	DSC-21-20-40	Controls and Indicators	30 MAY 12
	DSC-21-20-50	Warnings and Cautions	30 MAR 12
	DSC-21-20-60	Electrical Supply	30 MAR 12
R	DSC-21-30-10	General	30 MAY 12
R	DSC-21-30-20	Avionics Ventilation	30 MAY 12
	DSC-21-30-40	Battery Ventilation	30 MAR 12
R	DSC-21-30-50	Lavatory and Galley Ventilation	30 MAY 12
R	DSC-21-30-60	Controls and Indicators	30 MAY 12
	DSC-21-30-70	Warnings and Cautions	30 MAR 12
	DSC-21-30-80	Electrical Supply	30 MAR 12
R	DSC-21-40-10	General	30 MAY 12
	DSC-21-40-20	System Operation	30 MAR 12
	DSC-21-40-30	Controls and Indicators	30 MAR 12
R	DSC-21-40-35	ECAM Cond Page	30 MAY 12
	DSC-21-40-40	Warnings and Cautions	30 MAR 12
R	DSC-21-40-50	Electrical Supply	30 MAY 12
R	DSC-22_10-10	Description	30 MAY 12
	DSC-22_10-20	System Interface Diagram	30 MAR 12
R	DSC-22_10-30	FMGS Modes of Operation	30 MAY 12
	DSC-22_10-40-05	Management of the Displays	30 MAR 12
R	DSC-22_10-40-10	MCDU	30 MAY 12
R	DSC-22_10-40-20	FCU	30 MAY 12
R	DSC-22_10-40-30	Thrust Levers	30 MAY 12
R	DSC-22_10-40-40	Primary Flight Display	30 MAY 12
R	DSC-22_10-40-50	Navigation Display	30 MAY 12
R	DSC-22_10-50	Warnings and Cautions	30 MAY 12
	DSC-22_10-60	ELECTRICAL SUPPLY	30 MAR 12
	DSC-22_20-10	General	30 MAR 12

M(1)	Localization	Subsection Title	Rev. Date
	DSC-22_20-20-05	General	30 MAR 12
R	DSC-22_20-20-10	Position Computation	30 MAY 12
R	DSC-22_20-20-20	Evaluation of Position Accuracy	30 MAY 12
R	DSC-22_20-20-30	Radio Navigation Tuning	30 MAY 12
R	DSC-22_20-20-40	Alignment of Inertial Reference System	30 MAY 12
	DSC-22_20-20-50	Navigation Database	30 MAR 12
	DSC-22_20-30-05	General	30 MAR 12
R	DSC-22_20-30-10-05	General	30 MAY 12
R	DSC-22_20-30-10-10	FMS LEGACY	30 MAY 12
R	DSC-22_20-30-10-15	FMS2 HONEYWELL	30 MAY 12
R	DSC-22_20-30-20-05	General	30 MAY 12
R	DSC-22_20-30-20-20	FMS Legacy	30 MAY 12
R	DSC-22_20-30-20-25	FMS2 Honeywell	30 MAY 12
R	DSC-22_20-40-10	Optimization	30 MAY 12
	DSC-22_20-40-20	Cost Index	30 MAR 12
R	DSC-22_20-40-30	Predictions	30 MAY 12
R	DSC-22_20-50-10-20	FMS Legacy	30 MAY 12
R	DSC-22_20-50-10-25	FMS2 Honeywell	30 MAY 12
	DSC-22_20-50-20-30	FMS Legacy	30 MAR 12
R	DSC-22_20-50-20-35	FMS2 Honeywell	30 MAY 12
R	DSC-22_20-50-30	MCDU - Data Format List	30 MAY 12
R	DSC-22_20-60-10	Effect of Baro Reference Setting	30 MAY 12
R	DSC-22_20-60-20	Clear Key (Clearing Function)	30 MAY 12
R	DSC-22_20-60-30	How to Execute a Diversion	30 MAY 12
R	DSC-22_20-60-40	Engine Out	30 MAY 12
R	DSC-22_20-60-50	Secondary Flight Plan	30 MAY 12
R	DSC-22_20-60-60	Pilots/Stored Route Function	30 MAY 12
R	DSC-22_20-60-70	Report Page	30 MAY 12
R	DSC-22_20-60-80	Closest Airports	30 MAY 12
R	DSC-22_20-60-90	Time Marker	30 MAY 12
R	DSC-22_20-60-100	Step ALTS	30 MAY 12
R	DSC-22_20-60-110	Required Time of Arrival (RTA)	30 MAY 12
R	DSC-22_20-60-120	Equitime Point	30 MAY 12
R	DSC-22_20-60-130	MCDU Back Up Navigation	30 MAY 12
R	DSC-22_20-70	AOC Functions	30 MAY 12
R	DSC-22_20-80	Print Functions	30 MAY 12
R	DSC-22_30-10	General	30 MAY 12
R	DSC-22_30-20	Flight Director	30 MAY 12
R	DSC-22_30-30	Autopilot (AP)	30 MAY 12
R	DSC-22_30-40	Speed/Mach Control	30 MAY 12
R	DSC-22_30-50	AP/FD Modes General	30 MAY 12

M(1)	Localization	Subsection Title	Rev. Date
R	DSC-22_30-60	AP/FD Lateral Modes	30 MAY 12
	DSC-22_30-70-10	Principles	30 MAR 12
R	DSC-22_30-70-20	Climb Mode	30 MAY 12
R	DSC-22_30-70-30	Open Climb Mode	30 MAY 12
R	DSC-22_30-70-50	Descent Mode	30 MAY 12
R	DSC-22_30-70-60	Open Descent Mode	30 MAY 12
R	DSC-22_30-70-65	Altitude Acquire Mode	30 MAY 12
	DSC-22_30-70-70	Altitude Hold Mode	30 MAR 12
R	DSC-22_30-70-80	Vertical Speed Mode - Flight Path Angle Mode (V/S - FPA)	30 MAY 12
	DSC-22_30-70-90	Expedite	30 MAR 12
R	DSC-22_30-75	Mode Reversions	30 MAY 12
R	DSC-22_30-80-10	General	30 MAY 12
R	DSC-22_30-80-20	Takeoff	30 MAY 12
R	DSC-22_30-80-30-05	General	30 MAY 12
R	DSC-22_30-80-30-10	Precision Approach	30 MAY 12
R	DSC-22_30-80-30-20	Non Precision Approach	30 MAY 12
R	DSC-22_30-80-40	Go Around (GA)	30 MAY 12
R	DSC-22_30-90	Autothrust	30 MAY 12
R	DSC-22_30-100	Flight Mode Annunciator (FMA)	30 MAY 12
	DSC-22_40-10	General	30 MAR 12
	DSC-22_40-20	Yaw Functions	30 MAR 12
	DSC-22_40-30	Flight Envelope Function	30 MAR 12
	DSC-22_40-40	Windshear Detection Function	30 MAR 12
	DSC-22_40-50	Controls and Indicators	30 MAR 12
R	DSC-22_45	Auto Flight - AOC Functions	30 MAY 12
R	DSC-22_46	Auto Flight - Print Interface	30 MAY 12
	DSC-23-10-10	General	30 MAR 12
	DSC-23-10-20	VHF/HF/SELCAL	30 MAR 12
R	DSC-23-10-30	Radio Tuning	30 MAY 12
	DSC-23-10-50	Electrical Supply	30 MAR 12
R	DSC-23-20-10	General	30 MAY 12
R	DSC-23-20-20	Controls	30 MAY 12
	DSC-23-20-30	Interphone Systems	30 MAR 12
R	DSC-23-20-40	Call Systems	30 MAY 12
R	DSC-23-20-50	Passenger Address	30 MAY 12
R	DSC-23-20-60	EMER EVAC	30 MAY 12
R	DSC-23-20-70	Electrical Supply	30 MAY 12
	DSC-23-30-10	DESCRIPTION	30 MAR 12
R	DSC-23-30-20	CONTROLS AND INDICATORS ON OVERHEAD PANEL	30 MAY 12
R	DSC-23-30-30	ELECTRICAL SUPPLY	30 MAY 12
	DSC-23-35-10	Controls and Indicators	30 MAR 12

M(1)	Localization	Subsection Title	Rev. Date
N	DSC-23-40-40	ACARS Functions	30 MAY 12
	DSC-23-40-50	Electrical Supply	30 MAR 12
	DSC-23-46-30	ELECTRICAL SUPPLY	30 MAR 12
	DSC-23-50	Warnings and Cautions	30 MAR 12
R	DSC-24-10-10	General	30 MAY 12
R	DSC-24-10-20	Generation Of Electrical Power	30 MAY 12
	DSC-24-10-30-10	General	30 MAR 12
R	DSC-24-10-30-20	NORMAL CONFIGURATION	30 MAY 12
R	DSC-24-10-30-30	Abnormal Configurations	30 MAY 12
R	DSC-24-10-30-40	Distribution Table	30 MAY 12
R	DSC-24-20	Controls and Indicators	30 MAY 12
R	DSC-24-30	Warnings and Cautions	30 MAY 12
	DSC-25-10-10	General	30 MAR 12
R	DSC-25-10-20	Cockpit Plan	30 MAY 12
	DSC-25-10-30	Seats	30 MAR 12
	DSC-25-10-40	Cockpit Window	30 MAR 12
R	DSC-25-10-50	Pilot's Instrument Panels	30 MAY 12
R	DSC-25-10-60	Pedestal	30 MAY 12
R	DSC-25-10-70	Overhead Panel	30 MAY 12
	DSC-25-10-80	C/B Panels	30 MAR 12
	DSC-25-10-100	Electrical Supply	30 MAR 12
R	DSC-25-11-10	Description	30 MAY 12
	DSC-25-11-20	Cockpit Door Locking System (CDLS)	30 MAR 12
R	DSC-25-11-30	Cockpit Door Surveillance System (CDSS)	30 MAY 12
R	DSC-25-11-40	Electrical Supply	30 MAY 12
	DSC-25-15-30	Electrical Supply	30 MAR 12
	DSC-25-40-10-10	Description	30 MAR 12
	DSC-26-10	GENERAL	30 MAR 12
	DSC-26-20-10	Description	30 MAR 12
	DSC-26-20-20	Controls and Indicators	30 MAR 12
	DSC-26-20-30	Warnings and Cautions	30 MAR 12
R	DSC-26-30-10	Description	30 MAY 12
	DSC-26-30-20	Controls and Indicators	30 MAR 12
	DSC-26-30-30	Warnings and Cautions	30 MAR 12
R	DSC-26-40-10	Description	30 MAY 12
R	DSC-26-40-20	Warnings and Cautions	30 MAY 12
R	DSC-26-50-10	Smoke Detection	30 MAY 12
R	DSC-26-50-20	Fire Extinguishing	30 MAY 12
R	DSC-26-50-30	Controls and Indicators	30 MAY 12
R	DSC-26-50-40	Warnings and Cautions	30 MAY 12
R	DSC-26-60	Electrical Supply	30 MAY 12

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	DSC-27-10-10	GENERAL	30 MAR 12
R	DSC-27-10-20	Architecture	30 MAY 12
R	DSC-27-20-10-10	General	30 MAY 12
R	DSC-27-20-10-20	Pitch Control	30 MAY 12
	DSC-27-20-10-30	Lateral Control	30 MAR 12
	DSC-27-20-10-50	Sideslip Target	30 MAR 12
R	DSC-27-20-20	Reconfiguration Control Laws	30 MAY 12
R	DSC-27-20-30	Controls and Indicators	30 MAY 12
	DSC-27-20-40	Warnings and Cautions	30 MAR 12
	DSC-27-20-50	Electrical Supply	30 MAR 12
R	DSC-27-30-10	Description	30 MAY 12
R	DSC-27-30-20	Controls and Indicators	30 MAY 12
R	DSC-27-30-30	Warnings and Cautions	30 MAY 12
	DSC-27-30-40	Electrical Supply	30 MAR 12
R	DSC-28-10-10	General	30 MAY 12
R	DSC-28-10-20	Tanks	30 MAY 12
R	DSC-28-10-30	Engine Feed	30 MAY 12
	DSC-28-10-50	APU Feed	30 MAR 12
R	DSC-28-10-60	Fuel Recirculation System	30 MAY 12
R	DSC-28-10-70	Refueling and Defueling	30 MAY 12
R	DSC-28-10-80	Fuel Quantity Indication and Level Sensing	30 MAY 12
R	DSC-28-10-90	Fuel Tank Inerting System	30 MAY 12
R	DSC-28-20	Controls and Indicators	30 MAY 12
R	DSC-28-30	Warnings and Cautions	30 MAY 12
R	DSC-28-40	ELECTRICAL SUPPLY	30 MAY 12
	DSC-29-10-10	General	30 MAR 12
	DSC-29-10-20	Generation	30 MAR 12
R	DSC-29-10-30	Distribution	30 MAY 12
R	DSC-29-20	CONTROLS AND INDICATORS	30 MAY 12
R	DSC-29-30	Warnings and Cautions	30 MAY 12
	DSC-29-40	ELECTRICAL SUPPLY	30 MAR 12
R	DSC-30-10-10	Description	30 MAY 12
R	DSC-30-20-10	Description	30 MAY 12
	DSC-30-20-20	Controls And Indicators	30 MAR 12
	DSC-30-20-30	Warnings And Cautions	30 MAR 12
	DSC-30-20-40	Electrical Supply	30 MAR 12
	DSC-30-30-10	Description	30 MAR 12
	DSC-30-30-20	Controls and Indicators	30 MAR 12
	DSC-30-30-30	Warnings and Cautions	30 MAR 12
	DSC-30-30-40	Electrical Supply	30 MAR 12
R	DSC-30-40-10	Description	30 MAY 12

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	DSC-30-40-20	CONTROLS AND INDICATORS	30 MAR 12
	DSC-30-40-30	WARNINGS AND CAUTIONS	30 MAR 12
	DSC-30-40-40	ELECTRICAL SUPPLY	30 MAR 12
R	DSC-30-50-10	Description	30 MAY 12
	DSC-30-50-20	Controls and Indicators	30 MAR 12
R	DSC-30-50-30	Warnings and Cautions	30 MAY 12
	DSC-30-50-40	Electrical Supply	30 MAR 12
R	DSC-30-60-10	DESCRIPTION	30 MAY 12
R	DSC-30-60-20	CONTROLS AND INDICATORS	30 MAY 12
	DSC-30-60-30	ELECTRICAL SUPPLY	30 MAR 12
	DSC-30-70-10	DESCRIPTION	30 MAR 12
	DSC-30-70-30	ELECTRICAL SUPPLY	30 MAR 12
	DSC-31-05-10	Introduction	30 MAR 12
	DSC-31-05-20	Cockpit Arrangement	30 MAR 12
R	DSC-31-05-30	Architecture	30 MAY 12
	DSC-31-05-40	Controls and Switching	30 MAR 12
R	DSC-31-05-50	Reconfiguring the DMC	30 MAY 12
R	DSC-31-05-60	Reconfiguring DUs	30 MAY 12
R	DSC-31-10	Ecam Description	30 MAY 12
R	DSC-31-15	Indications on E/WD	30 MAY 12
R	DSC-31-20	Indications on SD	30 MAY 12
	DSC-31-25-10	General	30 MAR 12
R	DSC-31-25-20	Example	30 MAY 12
R	DSC-31-27	OEB Reminder	30 MAY 12
R	DSC-31-30	ECAM Controls	30 MAY 12
R	DSC-31-40	Indications on PFD	30 MAY 12
R	DSC-31-45	Indications on ND	30 MAY 12
R	DSC-31-50	EFIS Controls	30 MAY 12
R	DSC-31-55-10	GENERAL	30 MAY 12
R	DSC-31-55-20	CONTROLS AND INDICATORS	30 MAY 12
R	DSC-31-60-10	Flight Data Recording System	30 MAY 12
R	DSC-31-60-20	Controls and Indicators	30 MAY 12
R	DSC-31-60-30	Aircraft Integrated Data System	30 MAY 12
R	DSC-31-70	Warnings and Cautions	30 MAY 12
	DSC-31-75	Electrical Supply	30 MAR 12
	DSC-32-10-10	Description	30 MAR 12
R	DSC-32-10-20	Landing Gear System/Interface	30 MAY 12
R	DSC-32-10-30	Interactions between Landing Gear and Aircraft Systems	30 MAY 12
R	DSC-32-10-40	Controls and Indicators	30 MAY 12
	DSC-32-10-50	Warnings and Cautions	30 MAR 12
	DSC-32-10-60	Electrical Supply	30 MAR 12

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R	DSC-32-20-10	**Description**	30 MAY 12
R	DSC-32-20-20	**Controls and Indicators**	30 MAY 12
	DSC-32-20-30	**Warnings and Cautions**	30 MAR 12
	DSC-32-20-40	**Electrical Supply**	30 MAR 12
R	DSC-32-30-10	**Description**	30 MAY 12
R	DSC-32-30-20	**Controls and Indicators**	30 MAY 12
R	DSC-32-30-30	**Warnings and Cautions**	30 MAY 12
R	DSC-32-30-40	**Electrical Supply**	30 MAY 12
	DSC-32-40-40	**Electrical Supply**	30 MAR 12
	DSC-33-10-10	**General**	30 MAR 12
R	DSC-33-10-20	**Description**	30 MAY 12
R	DSC-33-10-30	**Controls and Indicators**	30 MAY 12
R	DSC-33-10-40	**Electrical Supply**	30 MAY 12
	DSC-33-20-10	**General**	30 MAR 12
	DSC-33-20-20	**Controls and Indicators**	30 MAR 12
	DSC-33-20-30	**Electrical Supply**	30 MAR 12
R	DSC-33-30-10	**Description**	30 MAY 12
R	DSC-33-30-20	**Controls and Indicators**	30 MAY 12
	DSC-33-30-30	**Electrical Supply**	30 MAR 12
R	DSC-33-40-10	**Controls and Indicators**	30 MAY 12
R	DSC-34-10-10	**Description**	30 MAY 12
R	DSC-34-10-20	**Controls and Indicators**	30 MAY 12
R	DSC-34-10-30	**Warnings and Cautions**	30 MAY 12
	DSC-34-10-40	**Electrical Supply**	30 MAR 12
R	DSC-34-15-10	**Description**	30 MAY 12
	DSC-34-15-20	**Normal Operation**	30 MAR 12
	DSC-34-15-30	**Operation in Case of Failure**	30 MAR 12
R	DSC-34-15-40	**Warnings and Cautions**	30 MAY 12
	DSC-34-15-50	**Electrical Supply**	30 MAR 12
	DSC-34-20	**Standby Instruments**	30 MAR 12
R	DSC-34-25	**ISIS**	30 MAY 12
R	DSC-34-30-10	**Tuning**	30 MAY 12
R	DSC-34-30-20	**Navaids**	30 MAY 12
R	DSC-34-30-30	**Controls and Indicators**	30 MAY 12
R	DSC-34-30-40	**Electrical Supply**	30 MAY 12
R	DSC-34-40-10	**Description**	30 MAY 12
R	DSC-34-40-20	**Warnings and Cautions**	30 MAY 12
	DSC-34-40-30	**Electrical Supply**	30 MAR 12
	DSC-34-50-10	**Description**	30 MAR 12
R	DSC-34-50-20	**Controls and Indicators**	30 MAY 12
R	DSC-34-50-40	**Warnings and Cautions**	30 MAY 12

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	DSC-34-50-50	Electrical Supply	30 MAR 12
	DSC-34-60-10	Description	30 MAR 12
R	DSC-34-60-20	Controls and Indicators	30 MAY 12
R	DSC-34-60-30	Predictive Windshear System	30 MAY 12
R	DSC-34-60-40	Warnings and Cautions	30 MAY 12
	DSC-34-60-50	ELECTRICAL SUPPLY	30 MAR 12
	DSC-34-70-10	Description	30 MAR 12
R	DSC-34-70-20	GPWS Basics Modes	30 MAY 12
R	DSC-34-70-30	EGPWS Functions	30 MAY 12
R	DSC-34-70-40	Controls and Indicators	30 MAY 12
	DSC-34-70-50	Warnings and Cautions	30 MAR 12
	DSC-34-70-60	Electrical Supply	30 MAR 12
R	DSC-34-80-10	Description	30 MAY 12
R	DSC-34-80-20	Controls and Indicators	30 MAY 12
R	DSC-34-80-30	Warnings and Cautions	30 MAY 12
	DSC-34-80-40	Electrical Supply	30 MAR 12
	DSC-35-10	General	30 MAR 12
R	DSC-35-20-10	Description	30 MAY 12
R	DSC-35-20-20	Controls and Indicators	30 MAY 12
	DSC-35-20-30	Electrical Supply	30 MAR 12
R	DSC-35-30-10	Description	30 MAY 12
	DSC-35-30-20	Controls and Indicators	30 MAR 12
	DSC-35-30-40	Electrical Supply	30 MAR 12
R	DSC-35-40-10	Description	30 MAY 12
	DSC-36-10-10	General	30 MAR 12
R	DSC-36-10-20	Engine Bleed System	30 MAY 12
R	DSC-36-10-30	Apu Bleed Air Supply	30 MAY 12
R	DSC-36-10-40	Crossbleed	30 MAY 12
	DSC-36-10-50	Leak Detection	30 MAR 12
	DSC-36-10-60	Operation Following Failures	30 MAR 12
R	DSC-36-20	Controls and Indicators	30 MAY 12
R	DSC-36-30	Warnings and Cautions	30 MAY 12
	DSC-36-40	Electrical Supply	30 MAR 12
R	DSC-38-10	Description	30 MAY 12
	DSC-38-20	ELECTRICAL SUPPLY	30 MAR 12
R	DSC-45-10	Description	30 MAY 12
R	DSC-45-20	System Operation	30 MAY 12
R	DSC-45-25	Data Loading	30 MAY 12
	DSC-45-30	PRINTER	30 MAR 12
	DSC-45-40	ELECTRICAL SUPPLY	30 MAR 12
R	DSC-46-10	General	30 MAY 12

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R	DSC-46-20	ATSU Communications Function	30 MAY 12
	DSC-46-30	AOC Applications	30 MAR 12
R	DSC-46-40	CNS/ATM	30 MAY 12
R	DSC-46-60	Warnings and Cautions	30 MAY 12
R	DSC-46-70	Electrical Supply	30 MAY 12
R	DSC-49-10-10	General	30 MAY 12
R	DSC-49-10-20	Main Components	30 MAY 12
R	DSC-49-20	Controls and Indicators	30 MAY 12
R	DSC-49-30	Warnings and Cautions	30 MAY 12
R	DSC-49-40	Electrical Supply	30 MAY 12
R	DSC-52-10-10	General	30 MAY 12
R	DSC-52-10-20	Passenger Doors	30 MAY 12
R	DSC-52-10-30	Emergency Exits	30 MAY 12
	DSC-52-10-40	Cargo Doors	30 MAR 12
	DSC-52-10-50	Avionics Compartment Access Door	30 MAR 12
	DSC-52-10-60	Cockpit Door	30 MAR 12
R	DSC-52-10-80	Escape Slides/Rafts	30 MAY 12
R	DSC-52-20	Controls and Indicators	30 MAY 12
	DSC-52-30	Warnings and Cautions	30 MAR 12
	DSC-52-50	ELECTRICAL SUPPLY	30 MAR 12
	DSC-70-10	Engine	30 MAR 12
R	DSC-70-20	Fadec	30 MAY 12
	DSC-70-35-10	General	30 MAR 12
	DSC-70-35-20	Engine Power Setting	30 MAR 12
R	DSC-70-35-30	Thrust Levers	30 MAY 12
	DSC-70-35-40	Thrust Rating Limit	30 MAR 12
	DSC-70-35-50	Thrust Control	30 MAR 12
	DSC-70-45-10	GENERAL	30 MAR 12
	DSC-70-45-20	FUEL PUMP UNIT	30 MAR 12
	DSC-70-45-30	FUEL OIL HEAT EXCHANGER	30 MAR 12
	DSC-70-45-40	FUEL METERING UNIT	30 MAR 12
	DSC-70-45-50	FUEL FILTER	30 MAR 12
R	DSC-70-45-60	IDG COOLING RECIRCULATION SYSTEM	30 MAY 12
	DSC-70-50	OIL SYSTEM	30 MAR 12
	DSC-70-65	Airbleed System (IAE)	30 MAR 12
	DSC-70-70	THRUST REVERSER SYSTEM	30 MAR 12
	DSC-70-80-10	General	30 MAR 12
	DSC-70-80-20	Architecture	30 MAR 12
	DSC-70-80-30	Ignition System	30 MAR 12
R	DSC-70-80-40	Engine Starting System	30 MAY 12
R	DSC-70-95	Controls and Indicators (IAE)	30 MAY 12

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	DSC-70-98	ELECTRICAL SUPPLY	30 MAR 12
R	PRO-ABN-01	Introduction	30 MAY 12
R	PRO-ABN-10	Operating Techniques	30 MAY 12
R	PRO-ABN-21	Air Conditioning / Pressurization / Ventilation	30 MAY 12
R	PRO-ABN-22	Auto Flight	30 MAY 12
R	PRO-ABN-23	Communications	30 MAY 12
R	PRO-ABN-24	Electrical	30 MAY 12
R	PRO-ABN-25	Equipment	30 MAY 12
R	PRO-ABN-26	Fire Protection	30 MAY 12
R	PRO-ABN-27	Flight Controls	30 MAY 12
R	PRO-ABN-28	Fuel	30 MAY 12
R	PRO-ABN-29	Hydraulic	30 MAY 12
R	PRO-ABN-30	Ice and Rain Protection	30 MAY 12
R	PRO-ABN-31	Indicating / Recording Systems	30 MAY 12
R	PRO-ABN-32	Landing Gear	30 MAY 12
R	PRO-ABN-34	Navigation	30 MAY 12
R	PRO-ABN-36	Pneumatic	30 MAY 12
R	PRO-ABN-46	Information Systems	30 MAY 12
	PRO-ABN-49	APU	30 MAR 12
R	PRO-ABN-52	Doors	30 MAY 12
R	PRO-ABN-70	Power Plant	30 MAY 12
R	PRO-ABN-80	Miscellaneous	30 MAY 12
R	PRO-ABN-90	Detailed Cabin / Cockpit Evacuation Procedure	30 MAY 12
R	PRO-NOR-SOP-01	General Information	30 MAY 12
R	PRO-NOR-SOP-02	Flight Preparation	30 MAY 12
	PRO-NOR-SOP-03	Safety Exterior Inspection	30 MAR 12
R	PRO-NOR-SOP-04	Preliminary Cockpit Preparation	30 MAY 12
R	PRO-NOR-SOP-05	Exterior Inspection	30 MAY 12
R	PRO-NOR-SOP-06	Cockpit Preparation	30 MAY 12
R	PRO-NOR-SOP-07	Before Pushback or Start	30 MAY 12
R	PRO-NOR-SOP-08	Engine Start	30 MAY 12
R	PRO-NOR-SOP-09	After Start	30 MAY 12
R	PRO-NOR-SOP-10	Taxi	30 MAY 12
R	PRO-NOR-SOP-11	Before Takeoff	30 MAY 12
E	PRO-NOR-SOP-12	Takeoff	30 MAY 12
R	PRO-NOR-SOP-13	After Takeoff	30 MAY 12
R	PRO-NOR-SOP-14	Climb	30 MAY 12
E	PRO-NOR-SOP-15	Cruise	30 MAY 12
R	PRO-NOR-SOP-16	Descent Preparation	30 MAY 12
R	PRO-NOR-SOP-17	Descent	30 MAY 12
R	PRO-NOR-SOP-18	Precision Approach	30 MAY 12

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R	PRO-NOR-SOP-19	Non Precision Approach	30 MAY 12
R	PRO-NOR-SOP-20	Visual Approach	30 MAY 12
R	PRO-NOR-SOP-21	Landing	30 MAY 12
R	PRO-NOR-SOP-22	Go-Around	30 MAY 12
	PRO-NOR-SOP-23	After Landing	30 MAR 12
R	PRO-NOR-SOP-24	Parking	30 MAY 12
R	PRO-NOR-SOP-25	Securing the Aircraft	30 MAY 12
R	PRO-NOR-SOP-90	Standard Callouts	30 MAY 12
	PRO-NOR-SRP-01-05	Introduction	30 MAR 12
R	PRO-NOR-SRP-01-10	Cockpit Preparation	30 MAY 12
R	PRO-NOR-SRP-01-15	Before Pushback or Start	30 MAY 12
R	PRO-NOR-SRP-01-20	Taxi	30 MAY 12
R	PRO-NOR-SRP-01-30	Takeoff	30 MAY 12
R	PRO-NOR-SRP-01-40	Climb	30 MAY 12
R	PRO-NOR-SRP-01-50	Cruise	30 MAY 12
R	PRO-NOR-SRP-01-60	Descent	30 MAY 12
R	PRO-NOR-SRP-01-70	Approach	30 MAY 12
R	PRO-NOR-SRP-01-80	Go-Around	30 MAY 12
R	PRO-SPO-20	Flight Without Cabin Pressurization	30 MAY 12
	PRO-SPO-25-10	General	30 MAR 12
R	PRO-SPO-25-20	Limitations	30 MAY 12
R	PRO-SPO-25-30	Procedures	30 MAY 12
R	PRO-SPO-25-40	Performance	30 MAY 12
	PRO-SPO-35	Flight Over Mountainous Area	30 MAR 12
	PRO-SPO-40-10	General	30 MAR 12
	PRO-SPO-40-20	Operational Limitations	30 MAR 12
	PRO-SPO-40-30	Dispatch Consideration	30 MAR 12
	PRO-SPO-40-40	Diversion During Extended Range Operations	30 MAR 12
R	PRO-SPO-40-50	Procedures	30 MAY 12
E	PRO-SPO-40-60	Performance	30 MAY 12
R	PRO-SPO-50	Reduced Vertical Separation Minimum (RVSM)	30 MAY 12
E	PRO-SPO-51	Required Navigation Performance (RNP)	30 MAY 12
N	PRO-SPO-52	Schedule 8 Navigation Areas	30 MAY 12
R	PRO-SPO-60	Operations on Narrow Runways	30 MAY 12
	PRO-SPO-85	ILS PRM Approach	30 MAR 12
	PRO-SUP-05	Maintenance Reporting	30 MAR 12
R	PRO-SUP-10	Operating Speeds Definition	30 MAY 12
	PRO-SUP-21	Air Conditioning / Pressurization / Ventilation	30 MAR 12
R	PRO-SUP-22-10	FMGS Reset and Other Abnormal Procedures	30 MAY 12
R	PRO-SUP-22-20-10	FMS1 Honeywell Specificities	30 MAY 12
R	PRO-SUP-22-20-15	FMS2 Honeywell Specificities	30 MAY 12

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R	PRO-SUP-23	Communications	30 MAY 12
R	PRO-SUP-24	Electrical	30 MAY 12
R	PRO-SUP-25	Equipment	30 MAY 12
	PRO-SUP-27-10	General	30 MAR 12
	PRO-SUP-27-20	Normal Operations	30 MAR 12
	PRO-SUP-27-30	Abnormal Operations	30 MAR 12
R	PRO-SUP-27-40	The Protection Systems	30 MAY 12
	PRO-SUP-27-50	Aircraft Trimming	30 MAR 12
R	PRO-SUP-28	Fuel	30 MAY 12
R	PRO-SUP-30	Ice and Rain Protection	30 MAY 12
	PRO-SUP-31	Indicating / Recording Systems	30 MAR 12
R	PRO-SUP-32	Landing Gear	30 MAY 12
R	PRO-SUP-34	Navigation	30 MAY 12
	PRO-SUP-35	Inadvertent Oxygen Mask Deployment	30 MAR 12
R	PRO-SUP-45	CFDS Procedures	30 MAY 12
N	PRO-SUP-46-10	ATSU	30 MAY 12
N	PRO-SUP-46-20	ACARS PROCEDURES	30 MAY 12
R	PRO-SUP-70	Power Plant	30 MAY 12
R	PRO-SUP-90	One Engine Taxi	30 MAY 12
R	PRO-SUP-91-10	Severe Turbulence	30 MAY 12
	PRO-SUP-91-20	Operations in Windshear or Downburst	30 MAR 12
R	PRO-SUP-91-30	Cold Weather	30 MAY 12
	PRO-SUP-91-40	Operations On Airports Covered With Ash, Sand or Dust	30 MAR 12
R	PRO-SUP-91-50	Fluid Contaminated Runway	30 MAY 12
R	PRO-SUP-91-60	LOW VISIBILITY OPERATIONS	30 MAY 12
	PRO-SUP-91-70	HIGH GROUND TEMPERATURES	30 MAR 12
	PRO-SUP-91-80	TYPHOON CONDITIONS	30 MAR 12
R	LIM-10	General Limitations	30 MAY 12
R	LIM-11	Weight and Center of Gravity Limits	30 MAY 12
R	LIM-12	Environmental Envelope and Airport Operations	30 MAY 12
R	LIM-13	Speed Limitations	30 MAY 12
	LIM-21-21_10	Air Conditioning	30 MAR 12
R	LIM-21-21_20	Pressurization	30 MAY 12
	LIM-21-21_30	Ventilation	30 MAR 12
R	LIM-22-10	General	30 MAY 12
R	LIM-22-20	Automatic Approach, Landing and Roll Out	30 MAY 12
R	LIM-24	Electrical	30 MAY 12
	LIM-27	Flight Controls	30 MAR 12
R	LIM-28	Fuel	30 MAY 12
	LIM-29	Hydraulic	30 MAR 12
	LIM-32	Landing Gear	30 MAR 12

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R	LIM-34	Navigation	30 MAY 12
	LIM-35	Oxygen	30 MAR 12
R	LIM-49-10	General	30 MAY 12
R	LIM-49-20	Envelope	30 MAY 12
R	LIM-70	Power Plant	30 MAY 12
	OEB-GEN	General Description	30 MAR 12
	OEB-11	"ENG 1(2) OIL FILTER CLOG" ECAM Caution During Flight	30 MAR 12
	OEB-17	Dual FM Reset upon Radial Fix Info Entry	30 MAR 12
R	OEB-28	No Localizer or Glide Slope Capture in Approach	03 AUG 12
	OEB-30	No SRS Engagement During Go Around Below MDA	30 MAR 12
	OEB-31	Erroneous Vertical Profile During RNAV, LOC and LOC B/C Approaches	30 MAR 12
R	OEB-36	No SRS Engagement During Go Around in the Case of EPR Mode Fault	30 MAY 12
	OEB-38	Erroneous Radio Altimeter Height Indication	30 MAR 12
	OEB-40	AIR ENG 1(2) BLEED ABNORMAL PR or AIR ENG 1(2) BLEED FAULT	30 MAR 12
R	OEB-41	Erroneous Alternate Fuel Predictions Upon Modification of a Company Route in the Alternate Flight Plan	30 MAY 12
R	OEB-43	F/CTL SPOILER FAULT	30 MAY 12
R	OEB-44	L/G GEAR NOT DOWNLOCKED	30 MAY 12
	FCB-10	Introduction	30 MAR 12
	FCB-FCB2	Operation in Windshear/Downburst Conditions	30 MAR 12
R	FCB-FCB3	IAE V2500 N1 Mode	30 MAY 12
	FCB-FCB5	Avoiding Tailstrikes	30 MAR 12
	FCB-FCB7	FQI Accuracy	30 MAR 12
	FCB-FCB8	Electronic Interference from Portable Equipment carried on by Passengers	30 MAR 12
	FCB-FCB9	Thrust Acceleration in A/THR Modes	30 MAR 12
	FCB-FCB11	Radio Altimeter Anomalies during Adverse Weather Conditions	30 MAR 12
R	FCB-FCB12	FMGS Navigation Database	30 MAY 12
	FCB-FCB13	Specific Features of the FMGS Full Standard	30 MAR 12
	FCB-FCB15	VMO/MMO Determination	30 MAR 12
	FCB-FCB16	Operation of Fleets with/without CPIP	30 MAR 12
	FCB-FCB17	Characteristic and Protection Speeds	30 MAR 12
	FCB-FCB18	Ground Speed Mini Function	30 MAR 12
	FCB-FCB20	Publication of some Attendant Information Bulletins	30 MAR 12
R	FCB-FCB22	EGPWS Database	30 MAY 12
R	FCB-FCB23	Use of Managed Guidance in Approach and NAV Database Validation	30 MAY 12
	FCB-FCB24	Aircraft Handling in Final Approach	30 MAR 12

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R	FCB-FCB25	Use of Rudder on Transport Category Airplanes	30 MAY 12
	FCB-FCB26	Yaw Disturbances during the Takeoff Roll	30 MAR 12
	FCB-FCB27	Automatic Landing Performance	30 MAR 12
R	PER-LOD-GEN	GENERAL	30 MAY 12
R	PER-LOD-CGO	CARGO LOADING	30 MAY 12
R	PER-LOD-FUL	FUEL	30 MAY 12
R	PER-LOD-WBA-LTS	LOAD AND TRIM SHEET	30 MAY 12
	PER-OPD-GEN	GENERAL	30 MAR 12
R	PER-OPD-CON-AEO	ALL ENGINES OPERATIVE	30 MAY 12
R	PER-OPD-CON-OEI	ONE ENGINE INOPERATIVE	30 MAY 12
	PER-THR-GEN	GENERAL	30 MAR 12
R	PER-THR-MTO	MAXIMUM TAKEOFF	30 MAY 12
R	PER-THR-MGA	MAXIMUM GO AROUND	30 MAY 12
	PER-THR-FLX	FLEXIBLE TAKEOFF	30 MAR 12
R	PER-THR-MCT	MAXIMUM CONTINUOUS	30 MAY 12
R	PER-THR-MCL	MAXIMUM CLIMB	30 MAY 12
R	PER-THR-MCR	MAXIMUM CRUISE	30 MAY 12
R	PER-THR-N1	N1 MODE THRUST CONTROL	30 MAY 12
	PER-TOF-THR-FLX-10	DEFINITION OF FLEXIBLE TAKEOFF	30 MAR 12
	PER-TOF-THR-FLX-20	USE OF FLEXIBLE TAKEOFF	30 MAR 12
R	PER-TOF-THR-FLX-30	REQUIREMENTS	30 MAY 12
R	PER-TOF-THR-FLX-40	RECOMMENDATION	30 MAY 12
R	PER-TOF-ACA-05	INTRODUCTION	30 MAY 12
N	PER-TOF-ACA-10-05	DEFINITIONS	30 MAY 12
R	PER-TOF-ACA-10-10	TAKEOFF PERFORMANCE	30 MAY 12
R	PER-TOF-ACA-10-20	ACARS DESCRIPTION	30 MAY 12
N	PER-TOF-ACA-10-30	ACARS BACKUP PROCEDURES	30 MAY 12
R	PER-TOF-TOD-25-10	SPEEDS LIMITED BY VMC	30 MAY 12
R	PER-TOF-TOD-25-20	V2 LIMITED BY VMU/VMCA	30 MAY 12
R	PER-TOF-CTA-20	DEFINITIONS	30 MAY 12
	PER-FPL-GEN-INT	INTRODUCTION	30 MAR 12
R	PER-FPL-GEN-MFR	MINIMUM RECOMMENDED FUEL REQUIREMENTS	30 MAY 12
	PER-FPL-GEN-FPL	FLIGHT PLAN	30 MAR 12
R	PER-FPL-FLP-CAT	CALCULATION TABLES	30 MAY 12
R	PER-FPL-FLP-ALT-10	OPTIMUM AND MAXIMUM ALTITUDES	30 MAY 12
R	PER-FPL-FLP-ALT-20	OPTIMUM ALTITUDE ON SHORT STAGE	30 MAY 12
	PER-FPL-FLP-ICR-10	GENERAL	30 MAR 12
R	PER-FPL-FLP-ICR-20	INTEGRATED CRUISE AT A GIVEN MACH NUMBER	30 MAY 12
R	PER-FPL-FLP-ICR-30	INTEGRATED CRUISE AT LONG RANGE CRUISE SPEED	30 MAY 12
R	PER-FPL-FLP-ICR-40	CLIMB CORRECTION	30 MAY 12
R	PER-FPL-FLP-ICR-50	STEP CLIMB CORRECTION	30 MAY 12

M(1)	Localization	Subsection Title	Rev. Date
R	PER-FPL-FLP-ICR-60	DESCENT CORRECTION	30 MAY 12
R	PER-FPL-FLP-QFP-10	INTRODUCTION	30 MAY 12
	PER-FPL-FLP-QFP-20	CORRECTION FOR DEVIATION FROM REFERENCE LANDING WEIGHT	30 MAR 12
R	PER-FPL-FLP-QFP-30	EXAMPLE	30 MAY 12
R	PER-FPL-FLP-QFP-40	FLIGHT PLANNING AT A GIVEN MACH NUMBER	30 MAY 12
R	PER-FPL-FLP-QFP-50	FLIGHT PLANNING AT LONG RANGE SPEED	30 MAY 12
R	PER-FPL-FLP-ALN-20	ALL ENGINES OPERATIVE	30 MAY 12
R	PER-FPL-FLP-FTK	FUEL TANKERING	30 MAY 12
	PER-CLB-GEN	GENERAL	30 MAR 12
R	PER-CLB-CLT	CLIMB TABLES	30 MAY 12
R	PER-CRZ-ECI-10	OPTIMUM MACH NUMBER	30 MAY 12
R	PER-CRZ-ALT-10	OPTIMUM AND MAXIMUM ALTITUDES	30 MAY 12
R	PER-CRZ-ALT-20	WIND ALTITUDE TRADE FOR CONSTANT SPECIFIC RANGE	30 MAY 12
R	PER-CRZ-ALT-30	OPTIMUM ALTITUDE ON SHORT STAGE	30 MAY 12
	PER-CRZ-CRT-10	GENERAL	30 MAR 12
R	PER-CRZ-CRT-20	CRUISE AT M.78	30 MAY 12
R	PER-CRZ-CRT-30	CRUISE AT LONG RANGE	30 MAY 12
R	PER-CRZ-ICQ-10	GENERAL	30 MAY 12
	PER-CRZ-ICQ-20	CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT	30 MAR 12
R	PER-CRZ-ICQ-30	EXAMPLE	30 MAY 12
R	PER-CRZ-ICQ-40	IN CRUISE QUICK CHECK M.78	30 MAY 12
R	PER-CRZ-ICQ-50	IN CRUISE QUICK CHECK LONG RANGE	30 MAY 12
R	PER-HLD-GEN	GENERAL	30 MAY 12
R	PER-HLD-HLD	HOLDING TABLES	30 MAY 12
	PER-DES-GEN	GENERAL	30 MAR 12
R	PER-DES-STD	STANDARD	30 MAY 12
R	PER-DES-EMG	EMERGENCY	30 MAY 12
R	PER-GOA-GEN	GENERAL	30 MAY 12
R	PER-GOA-ACG-NOR	NORMAL	30 MAY 12
R	PER-GOA-ACG-CAT	CAT II	30 MAY 12
R	PER-LDG-GEN	GENERAL	30 MAY 12
	PER-LDG-CTA-10	GENERAL	30 MAR 12
R	PER-LDG-CTA-20	DEFINITIONS	30 MAY 12
N	PER-LDG-DIS-MAT	Runway Condition Assessment Matrix for Landing	30 MAY 12
R	PER-LDG-DIS-RLD	REQUIRED LANDING DISTANCES / MANUAL LANDING	30 MAY 12
N	PER-LDG-ACA-05	INTRODUCTION	30 MAY 12
N	PER-LDG-ACA-10-20	ACARS DESCRIPTION	30 MAY 12
N	PER-LDG-ACA-10-30	ACARS BACKUP PROCEDURES	30 MAY 12
R	PER-OEI-GEN-05	GENERAL	30 MAY 12
R	PER-OEI-GEN-10	STANDARD STRATEGY	30 MAY 12

M(1)	Localization	Subsection Title	Rev. Date
R	PER-OEI-GEN-15	**OBSTACLE STRATEGY**	30 MAY 12
R	PER-OEI-GEN-20	**FIXED SPEED STRATEGIES**	30 MAY 12
R	PER-OEI-ALT-10	**CEILINGS**	30 MAY 12
R	PER-OEI-CRT-10	**STANDARD AND OBSTACLE STRATEGIES**	30 MAY 12
R	PER-OEI-CRT-20	**FIXED SPEED STRATEGIES**	30 MAY 12
R	PER-OEI-ICQ-10	**STANDARD STRATEGIES**	30 MAY 12
R	PER-OEI-ICQ-20	**FIXED SPEED STRATEGIES**	30 MAY 12
R	PER-OEI-HLD	**HOLDING**	30 MAY 12
R	PER-OEI-DES-10	**STANDARD STRATEGY**	30 MAY 12
R	PER-OEI-DES-15	**OBSTACLE STRATEGY**	30 MAY 12
R	PER-OEI-DES-20	**FIXED SPEED STRATEGIES**	30 MAY 12
R	PER-OEI-DES-30	**DESCENT TO LANDING**	30 MAY 12

(1) Evolution code : N=New, R=Revised, E=Effectivity, M=Moved

This table gives, for each delivered aircraft, the cross reference between:

- The Manufacturing Serial Number (MSN).
- The Fleet Serial Number (FSN) of the aircraft as known by AIRBUS S.A.S.
- The registration number of the aircraft as known by AIRBUS S.A.S.
- The aircraft model.

M(1)	MSN	FSN	Registration Number	Model
	0633	HDA 0103	B-HTF	321-231
	0756	HDA 0051	B-HSD	320-232
	0784	HDA 0052	B-HSE	320-232
	0812	HDA 0001	B-HSG	320-232
	0930	HDA 0055	B-HSI	320-232
	0993	HDA 0101	B-HTD	321-231
	1024	HDA 0102	B-HTE	321-231
	1253	HDA 0002	B-HSJ	320-232
	1695	HDA 0104	B-HTG	321-231
	1721	HDA 0056	B-HSK	320-232
	1984	HDA 0151	B-HTH	321-231
	2021	HDA 0152	B-HTI	321-231
	2229	HDA 0003	B-HSL	320-232
	2238	HDA 0004	B-HSM	320-232
	2428	HDA 0005	B-HSN	320-232
	4023	HDA 0057	B-HSO	320-232
	4247	HDA 0058	B-HSP	320-232
	5024	HDA 0060	B-HSQ	320-232
	5030	HDA 0059	B-HSR	320-232
N	5362	HDA 0061	B-HST	320-232
N	5429	HDA 0062	B-HSU	320-232

(1) Evolution code : N=New, R=Revised

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M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	J0006		20 AUG 10	FUEL- INSTALL A CENTRE TANK SYSTEM-
	Applicable to: ALL			
	J0012		20 AUG 10	LIGHTS - NAVIGATION LIGHTS - INSTALL A SECOND NAVIGATION LIGHT SYSTEM -
	Applicable to: ALL			
	J0071		20 AUG 10	WINGS-WING TIP FENCES-INTRODUCE WING TIPS INCLUDING FENCES-
	Applicable to: ALL			
R	J0513		25 NOV 11	ICE AND RAIN PROTECTION - WING ICE PROTECTION - ETOPS CIRCUIT BREAKERS 1DL AND 2DL - TRANSFER POWER SUPPLY.
	Applicable to: ALL			
	J0664		20 AUG 10	FUEL - IMPROVE LOW LEVEL WARNING
	Applicable to: ALL			
	J0689		20 AUG 10	WINGS - REMOVE LEADING EDGE VENTILATION SYSTEM
	Applicable to: ALL			
R	J1255		20 AUG 10	FUEL - TANK LEVEL SENSING - INTRODUCE MODIFIED LOW FUEL PRESSURE WARNING CONTROL
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	J1334		20 AUG 10	LANDING GEAR-MLG-LGCIU-INTRODUCTION OF STANDARD UNIT P/N A4C
	Applicable to: ALL			
R	J1617		20 AUG 10	FLIGHT CONTROLS-GENERAL- DELETION OF L.A.F. FEATURE FROM A320 A/C (SERIAL SOLUTION)
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	J2145		07 APR 11	WINGS - TRAILING EDGE AND TRAILING EDGE DEVICES - INTRODUCE WATER DRAIN HOLE ON FLAP TRACK 1
	Applicable to: B-HTG, B-HTH, B-HTI			
	J2153		20 AUG 10	FUEL-CERTIFICATION OF FUEL SYSTEM- (LOW PRESSURE SYSTEM) FOR THE OPERATION 0 TO 2 ACTS
	Applicable to: B-HTG, B-HTH, B-HTI			
R	J2190		20 AUG 10	FUEL - MAIN FUEL PUMP SYSTEM - ADAPT PUMP CONTROL LATCH FOR FLIGHT DECK REFUEL CAPABILITY
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	J2257	28-1106 03	20 AUG 10	FUEL-MANUAL (MAGNETIC) INDICATORS- DELETE ATTIDUDE MONITOR
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	J2360		20 AUG 10	FUEL - QUANTITY INDICATION - INTRODUCE FUEL LEAK DETECTION
	Applicable to: B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	J2361		20 AUG 10	FUEL-QUANTITY INDICATION-REMOVE FUEL LEAK DETECTION FUNCTION ASSOCIATED WITH FQIC 13-9 (ANTI-MOD FOR MOD 32650)
	Applicable to: B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	J2527		20 AUG 10	FUEL - QUANTITY INDICATING - INSTALL FUEL QUANTITY INDICATING COMPUTER STANDARD 13.10
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	J2816		07 APR 11	WINGS - FIXED PARTITION - INTRODUCE A STANDARD OF BOX WITHOUT DRY BAY
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	J2817		07 APR 11	WINGS - FIXED PARTITION - INTRODUCE A VERSION OF WING BOX WITH A DRY BAY
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	J2879		25 NOV 11	INERT GAS SYSTEM - CERTIFY FUEL TANK INERTING SYSTEM AND ACTIVATE MONITORING
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
R	J2963		07 APR 11	WINGS - MAIN STRUCTURE - REDUCE THE QUANTITY OF MAGNETIC LEVEL INDICATORS
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	K0024		20 AUG 10	DOORS- BULK CARGO COMPARTMENT- INSTALL AN ADDITIONAL DOOR AT FR 60/62-
	Applicable to: ALL			
	K0026		20 AUG 10	LIGHTS - EXTERNAL LIGHTS - INSTALL LOGO LIGHTS
	Applicable to: ALL			
R	K0035	26-1021 19	20 AUG 10	FIRE PROTECTION - FWD CARGO COMPARTMENT - INSTALL SMOKE DETECTION SYSTEM -
	Applicable to: ALL			
R	K0036	26-1021 19	20 AUG 10	FIRE PROTECTION - AFT CARGO COMPARTMENT - INSTALL SMOKE DETECTION SYSTEM -
	Applicable to: ALL			
	K0037	26-1020 18	20 AUG 10	FIRE PROTECTION - CARGO COMPARTMENT FIRE EXTINGUISHING - INSTALL A SINGLE SHOT SYSTEM -
	Applicable to: ALL			
	K0052	31-1123 11	20 AUG 10	INDICATING/RECORDING SYSTEMS - INSTALL AN AIRCRAFT INTEGRATED DATA SYSTEM -
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	K0064		20 AUG 10	LIGHTS - EXTERIOR LIGHTS - INSTALL SYNCHRONIZED STROBE LIGHTS
	Applicable to: ALL			
	K0070		20 AUG 10	AIR CONDITIONING - CARGO COMPARTMENT - VENTILATION - INSTALL SYSTEM IN AFT COMPARTMENT -
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	K0082		20 AUG 10	WATER/WASTE- INSTALL VACUUM TOILET SYSTEM -
	Applicable to: ALL			
	K0344		20 AUG 10	LIGHTS-CABIN EMERGENCY LIGHTING- INSTALL A "LSI" FLOOR PATH MARKING SYSTEM
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ			
	K0385		20 AUG 10	LIGHTS - CABIN - MODIFY CONTROL OF "FASTEN SEAT BELT" SIGN
	Applicable to: B-HSL, B-HSM, B-HSN			
R	K10003	49-1070 00	07 APR 11	AIRBORNE AUXILIARY POWER-CONTROL AND MONITORING - INTRODUCE ECB SOFTWARE VERSION 06.00.000
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTF, B-HTG, B-HTH, B-HTI			
R	K10009		20 AUG 10	EQUIPMENT/FURNISHINGS - CURTAINS AND PARTITIONS - INSTALL IMPROVED STRIKES FOR COCKPIT DOOR
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	K1014		20 AUG 10	WATER/WASTE - RELOCATE POTABLE WATER TANK -
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	K10359		25 NOV 11	LIGHTS- EMERGENCY LIGHTING- DEFINE FLOOR MOUNTED LUFTHANSA TECHNIK 900 SERIES EEPMS
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
R	K10463		25 NOV 11	AIR CONDITIONING - PACK TEMPERATURE CONTROL - INSTALL AIR CONDITIONING CONTROLLER P/N 1803B0000-02
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	K10494		20 AUG 10	AIRBORNE AUXILIARY POWER - GENERAL - INSTALL APIC APS3200 APU AS STANDARD (REPLACES HONEYWELL GTCP36-300)
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	K10516		25 NOV 11	AIRBORNE AUXILIARY POWER - CONTROL AND MONITORING - INTRODUCE HONEWELL VECB WITH SOFTWARE -04
	Applicable to: B-HSQ, B-HSR			
R	K10575		20 AUG 10	FIRE PROTECTION-CARGO COMPARTMENT FIRE EXTINGUISHING - INSTALL 2ND FIREX BOTTLE FOR ETOPS 120/180 ON A320 A/C
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	K11047		20 AUG 10	COMMUNICATIONS - ANTI HIJACK CAMERA MONITORING - INSTALL COCKPIT DOOR SURVEILLANCE SYSTEM DISPLAYED ON SD
	Applicable to: B-HSO, B-HSP, B-HST, B-HSU			
	K1119		20 AUG 10	EQUIPMENT/FURNISHINGS - CARGO COMPARTMENT - REARRANGE COMPARTMENT 4 INTO TWO ZONES -
	Applicable to: ALL			
R	K11694		07 APR 11	E/F -MISCELLANEOUS EMERGENCY EQUIPMENT- INSTALL ELT (406AFN) WITH RCP IN COCKPIT AND NAV PROVISIONS - HONEYWELL
	Applicable to: B-HSO, B-HSP, B-HST, B-HSU			
R	K1170		20 AUG 10	LIGHTS - AUTOMATIC FASTEN SEATBELT SIGN CONTROL AT SLAT EXTENSION -
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTH, B-HTI			
R	K12405		07 APR 11	COMMUNICATIONS - CIDS - INTRODUCE HANDSET SERIES N40A FROM VENDOR HOLMBERG
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	K1245		20 AUG 10	APU - INTRODUCE APU MODE 6 AND ASSOCIATED ECB (GARRETT)
	Applicable to: ALL			
R	K12824		25 NOV 11	COMMUNICATIONS - CIDS - INSTALL CIDS AND SDF OBRM SOFTWARE P/N -33A AND CAM UPDATE
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
R	K12825		25 NOV 11	COMMUNICATIONS - CIDS - INSTALL CIDS DIRECTOR P/N -333B
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
	K1420		20 AUG 10	DOORS-CARGO COMPT DOORS-MODIFY LOCKING INDICATION
	Applicable to: ALL			
R	K1522		20 AUG 10	COMMUNICATIONS - INSTALL PA IN USE INDICATORS LIGHT -
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTH, B-HTI			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	K1688	26-1024 16	20 AUG 10	FIRE PROTECTION-CARGO COMPARTMENT FIRE EXTINGUISHING-INSTALL A FLOW METERING SYSTEM FOR ETOPS
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN			
	K1733		20 AUG 10	LIGHTS - CABIN EMERGENCY LIGHTING - LSI SYSTEM - REMOVE LIGHT STRIPS IN FWD/AFT DOOR AREA -
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ			
R	K1806		20 AUG 10	ELECTRICAL POWER-AC/DC ESSENTIAL POWER DISTRIBUTION-PROVIDE PROVISIONS FOR ETOPS-
	Applicable to: ALL			
	K2102		07 APR 11	WATER/WASTE - ADAPT SYSTEM TO A321 DEFINITION
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	K2106		20 AUG 10	FIRE PROTECTION - INSTALL A SMOKE DETECTION AND FIRE EXTINGUISHING SYSTEM
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	K2113		20 AUG 10	FUSELAGE - REAR FUSELAGE SECTION 16A - DEFINE A321 BASIC STRUCTURE
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	K2319		20 AUG 10	GENERAL - INCREASE DESIGN WEIGHT TO 75,5T MTOW
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP			
	K2335		20 AUG 10	FIRE PROTECTION - LAVATORY SMOKE DETECTION - INTRODUCE AMBIENT SYSTEM
	Applicable to: ALL			
R	K2393		20 AUG 10	AIR CONDITIONING - PRESSURIZATION CONTROL - IMPROVE CONTROLLER TO ENABLE USE OF EXTERNAL MODE
	Applicable to: ALL			
	K2450	49-1029 27	20 AUG 10	AIRBORNE AUXILIARY POWER UNIT - INTRODUCE APIC APS-3200
	Applicable to: ALL			
	K2676		20 AUG 10	LIGHTS - EMERGENCY LIGHTING - INSTALL A "LSI" FLOOR PATH MARKING SYSTEM FOR A321
	Applicable to: B-HTD, B-HTE, B-HTF			
	K2938		20 AUG 10	DOORS-CARGO COMPARTMENT DOOR HYDRAULIC SYSTEM-INTRODUCE MODIFIED DOOR SELECTOR VALVE
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	K2962		20 AUG 10	HYDRAULIC POWER-BLUE MAIN HYDRAULIC POWER-IMPROVE MAINTENANCE STATUS OF BLUE HYDRAULIC RESERVOIR
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	K3118		20 AUG 10	AUXILIARY POWER UNIT - CONTROL AND MONITORING - INTRODUCE A NEW ECB
	Applicable to: ALL			
	K3279		20 AUG 10	AUXILIARY POWER UNIT - CONTROL AND MONITORING - MODIFY WIRE HARNESSES FOR NEW ECB 817-1
	Applicable to: ALL			
	K3335		20 AUG 10	HYDRAULIC POWER - INDICATING - REMOVE SENSOR AND ASSOCIATED WIRING FOR BLUE RESERVOIR INDICATION
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
R	K3471		20 AUG 10	GENERAL - INCREASE DESIGN WEIGHT TO 61T MZFW
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	K3599		20 AUG 10	AIR CONDITIONING - COCKPIT AND CABIN TEMPERATURE CONTROL - INTRODUCE ZONE TEMPERATURE CONTROLLER -03
	Applicable to: ALL			
	K3898		20 AUG 10	FUEL-TANKS- ADDITIONAL CENTER TANK (ACT) ON A321 GROWTH VERSION
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
R	K3901		20 AUG 10	COMMUNICATIONS-CIDS-INTRODUCE MODIFIED DIRECTOR POWER SUPPLY PRINCIPLE
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	K4337		20 AUG 10	INDICATING/RECORDING SYSTEM - NEW LOGIC CABIN READY MEMO
	Applicable to: B-HSO, B-HSP, B-HST, B-HSU			
	K4350		20 AUG 10	FUEL-TANKS-INSTALL 1ST ACT IN BULK AND CLS CARGO CONFIGURATION (A321-200).
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
R	K4453		20 AUG 10	COMMUNICATION - INSTALL AN ALL CABIN ATTENDANTS CALL PUSH BUTTON IN THE FLIGHT COMPARTMENT
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU			
	K4457		25 NOV 11	A.P.U.-POWER PLANT-INTRODUCE ALLIED SIGNAL APU 131-9(A)
	Applicable to: B-HSQ, B-HSR			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	K4504		20 AUG 10	EQUIPMENT/FURNISHINGS-PAX COMPARTMENT-INSTALL BASE LINE CONFIGURATION 220 PAX FOR I2L04 VERSION
	Applicable to: B-HTD, B-HTE, B-HTF			
R	K4574		20 AUG 10	AIR CONDITIONING-FLOW CONTROL AND INDICATING INTRODUCE MODIFIED AIR CONDITIONING FLOW CONTROL
	Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
	K4653		20 AUG 10	LIGHTS-EMERGENCY LIGHTING-INSTALL- A FLOOR PROXIMITY EMERGENCY ESCAPE PATH MARKING-PHOTOLUMINESCENT SYST.LTAG
	Applicable to: B-HTG, B-HTH, B-HTI			
R	K4726		20 AUG 10	WATER/WASTE-TOILET SYSTEM-INTRODUCE MODIFIED TOILET ASSY
	Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
R	K4787		20 AUG 10	LIGHTS-INTRODUCE EPSU P/N 54-10 ON A319/A320 A/C
	Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	K4788		20 AUG 10	LIGHTS-INTRODUCE EPUSU ON ON A321 A/C
	Applicable to: B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
R	K4793		20 AUG 10	AIR CONDITIONING-AIR COOLING SYSTEM-INTRODUCE MODIFIED RAM AIR OUTLET
	Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
R	K4913		20 AUG 10	HYDRAULIC POWER - AUXILIARY HYDRAULIC POWER - INSTALL A319 RAM AIR TURBINE ON A320
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	K5043		20 AUG 10	COMMUNICATIONS - CIDS - CABIN CONFIGURATION FOR NON-SMOKING FLIGHTS
	Applicable to: B-HSL, B-HSM, B-HSN, B-HTH, B-HTI			
R	K5059		20 AUG 10	COMMUNICATIONS - CIDS - RELOCATE PA IN USE LIGHT IN COCKPIT
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTH, B-HTI			
R	K5070		20 AUG 10	COMMUNICATIONS - CIDS - DUAL DIAL CODE ON HANDSET KEYBOARD (A319/A3 21)
	Applicable to: B-HSL, B-HSM, B-HSN			
	K5104		20 AUG 10	LIGHTS - EMERGENCY LIGHTING - INSTALL A FLOOR PROXIMITY EMERGENCY ESCAPE PATH MARKING-PHOTOLUMINISCENT SYSTEM LTAG
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	K5213		20 AUG 10	AIR CONDITIONING-PACK TEMPERATURE CTRL- INTRODUCE MODIFIED PACK TEMPERATURE CONTROLLER
	Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
	K5227		20 AUG 10	COMUNICATION - CIDS - PURSER CALL FUNCTION FROM FLIGHT COMPARTMENT AND ALL ATTENDANT STATIONS
	Applicable to: B-HTH, B-HTI			
	K5355		20 AUG 10	LIGHTS-EMERGENCY LIGHTING-INSTL FLOOR PROXIMITY EMERGENCY ESCAPE PATH MARKING PHOTOLUMINESCENT SYSTEM VENDOR LTAG
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI			
R	K5446		20 AUG 10	INDICATING/RECORDING SYSTEMS-CFDS- INTRODUCE A COMBINED FDIU/DMU
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	K5549	35-1020 00	20 AUG 10	OXYGEN-PASSENGER OXYGEN-INTRODUCE MODIFIED CHEMICAL OXYGEN CONTAINER -15 MIN- PURITAN
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
	K5801	21-1116 04	07 APR 11	AIR CONDITIONING-PRESSURE CONTROL AND MONITORING-INTRODUCE PRESSURE CONTROLLER P/N 9022-15702-10
	Applicable to: ALL			
R	K6156	21-1118 00	20 AUG 10	AIR CONDITIONING-PACK TEMP.CTRL INTRODUCE MODIFIED PACK TEMP. CTRL P/N 759D0000-02
	Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
R	K6164		25 NOV 11	GENERAL - DESIGN WEIGHT - INCREASE A320 DESIGN WEIGHTS TO 77.0 MTOW, 66.0T MLW AND 62.5T MZFW (WV 012)
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
	K6318	49-1029 27 49-1061 03	20 AUG 10	APU-CONTROL AND MONITORING-INTRODUCE APIC ECB SOFWARE VERSION 5
	Applicable to: ALL			
R	K6443		20 AUG 10	AIR CONDITIONING-AIR COOLING- INSTALL A NEW ECS
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	K6746		25 NOV 11	EQUIPMENT/FURNISHINGS-ELEC SERVICE SUPPLY-DEFINE A PC POWER SYSTEM PROVIDING 110V/60HZ - VENDOR KID
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTH, B-HTI			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	K6936		20 AUG 10	AIRBORNE AUXILIARY POWER (APU) - GENERAL - INCREASE OPERATION ENVELOPE TO 39800 FT FOR GTCP 36-300
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	K7072		20 AUG 10	LIGHTS-EMERGENCY LIGHTING-MODIFY EPSU LOAD DISTRIBUTION FOR A319/A320
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	K7253		20 AUG 10	LIGHTS-EMERGENCY LIGHTING-MODIFY EPSU LOAD DISTRIBUTION FOR A321
	Applicable to: B-HTG, B-HTH, B-HTI			
	K7519		20 AUG 10	INDICATING/RECORDING-AIDS INTERCONNECTION-REPLACE FDIMU BY SEPARATE FDIU AND DMU
	Applicable to: B-HSK, B-HTG			
	K7727		20 AUG 10	EQUIPMENT/FURNISHINGS - MISCELLANEOUS EMERGENCY EQPT - INSTALL AN HONEYWELL ELT WITH CONTROL PANEL IN COCKPIT
	Applicable to: B-HSK, B-HSL, B-HSM, B-HTG, B-HTH, B-HTI			
	K7755	25-1305 06	20 AUG 10	EQUIPMENT FURNISHINGS-CURTAINS AND PARTITIONS-MODIFIED INTRUSION AND PENETRATION RESISTANT COCKPIT DOOR
	Applicable to: ALL			
	K7778		25 NOV 11	COMMUNICATIONS-ANTI HIJACK CAMERA MONITORING-INSTALL A COCKPIT DOOR SURVEILLANCE SYSTEM
	Applicable to: B-HSQ, B-HSR			
	K7790	25-1305 06	20 AUG 10	DOORS-PASSENGER COMPARTMENT FIXED INTERIOR DOORS-INSTALL ELECTRICAL COCKPIT DOOR RELEASE SYSTEM
	Applicable to: ALL			
R	K8400		20 AUG 10	COMMUNICATIONS-CIDS-INTRODUCE ENHANCED CIDS (A318 VERSION) AND RELATED SYSTEMS ON SINGLE AISLE FAMILY
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	K8734		25 NOV 11	AIR CONDITIONING - AIR COOLING - ADAPT A318 ECS TO A320 A/C
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	K8905	25-1400 17	20 AUG 10	EQUIPMENT/FURNISHINGS-CURTAINS AND PARTITIONS-INSTALL DEADBOLT ON CENTER LATCH OF REINFORCED COCKPIT DOOR
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	K9009	25-1239 01	20 AUG 10	COMMUNICATIONS - P/A - MODIFY EMERGENCY POWER SUPPLY -
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	K9231		20 AUG 10	EQUIPMENT/FURNISHINGS-MISCELLANEOUS EMERGENCY EQUIPMENT-INSTALL ELT WITH RCP IN COCKPIT ON ENH. PROV.-HONEYWELL
	Applicable to: B-HSN			
	K9234		25 NOV 11	EQUIPMENT/FURNISHINGS-MISC. EMERGENCY EQUIPMENT-INSTALL ELT (406AF) WITH RCP IN COCKPIT ON ENH. PROV. - ELTA
	Applicable to: B-HSQ, B-HSR			
R	K9458		25 NOV 11	AIR CONDITIONING - PACK TEMPERATURE CONTROL - INSTALL IMPROVED AIR COND. SYSTEM CONTROLLER PN 1803B0000-01
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	K9473		20 AUG 10	AIR CONDITIONING - PRESSURE CONTROL AND MONITORING - INSTALL RPCU AND WIRING PROVISIONS FOR RPWS
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	K9877	25-1400 17	20 AUG 10	EQUIPMENT/FURNISHINGS - CURTAINS AND PARTITIONS - MODIFY DEADBOLT FOR REINFORCED COCKPIT DOOR
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	K9920		25 NOV 11	COMMUNICATIONS - ANTI HIJACK CAMERA MONITORING - REPLACE CDSS LCD/SYSTEM CONTROLLER
	Applicable to: B-HSQ, B-HSR			
	P0033		07 APR 11	COMMUNICATIONS - HF SYSTEM - INSTALL SYSTEM PROVISION FOR A SINGLE SYSTEM -
	Applicable to: ALL			
	P0034		07 APR 11	COMMUNICATIONS - HF SYSTEM - INSTALL A FULL PROVISION FOR A SINGLE SYSTEM -
	Applicable to: ALL			
	P0040		20 AUG 10	EQUIPMENT/FURNISHINGS - FLIGHT COMPARTMENT - INSTALL A 4TH OCCUPANT SEAT -
	Applicable to: ALL			
	P0063		07 APR 11	NAVIGATION - INSTALL PROVISION SYSTEM FOR ADF/RMI
	Applicable to: ALL			
	P0080	34-1055 41	20 AUG 10	NAVIGATION - AIR DATA - INSTALL METRIC ALTIMETER -
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P0091		20 AUG 10	OXYGEN - FLIGHT CREW SYSTEM - INSTALL A 77.1 CU/FT BOTTLE IN COMPOSITE MATERIAL -
	Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P0117		20 AUG 10	POWER PLANT - ENGINE - INSTALL IAE V2500 ENGINE RATED AT 25.000 LBS
	Applicable to: ALL			
R	P0143	23-1107 05	20 AUG 10	COMMUNICATIONS - RADIO MANAGEMENT - INSTALL A 3RD RMP -
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P0147		20 AUG 10	STRUCTURE - REINFORCE STRUCTURE TO ALLOW MTOW 72T-MLW 63T-MZFW 59T DESIGN WEIGHTS
	Applicable to: ALL			
	P0160	35-1013 07	20 AUG 10	OXYGEN - FLIGHT CREW OXYGEN - INSTALL A 115 CU/FT STEEL OXYGEN CYLINDER -
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSQ, B-HSR, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P0164		20 AUG 10	COMMUNICATIONS - DATA LINK SYSTEM - DEFINE PIN PROGRAMMING
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTG, B-HTH, B-HTI			
	P0197		07 APR 11	COMMUNICATIONS - HF SYSTEM - INSTALL A SINGLE SYSTEM
	Applicable to: ALL			
	P0287		07 APR 11	NAVIGATION - REPLACE VOR RMI BY A VOR/ADF/RMI
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
R	P0357	25-1239 01	20 AUG 10	ELECTRICAL POWER- DC ELECTRICAL LOAD DISTRIBUTION- MODIFY P.A. SWITCHING
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P0415		20 AUG 10	COMMUNICATIONS - PROVIDE "HOT MIKE" RECORDING
	Applicable to: ALL			
R	P0435	30-1039 00	20 AUG 10	ICE AND RAIN PROTECTION-WINDSHIELD RAIN PROTECTION - ADD AN INTERMITTENT FUNCTION
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P10098	24-1120 04	20 AUG 10	ELECTRICAL POWER - AC ESSENTIAL GENERATION SWITCHING - INSTALL AUTO SWITCHING SYSTEM FOR AC AND DC ESS BUS
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	P10267		20 AUG 10	NAVIGATION - RADIO MAGNETIC INFORMATION SWITCHING AND INDICATING - RE-INSTALL THALES DDRMI VOR/DME INDICATORS
	Applicable to: B-HSO, B-HSP			
R	P10321		07 APR 11	AUTO FLIGHT - GENERAL - REMOVE AFM LIMITATION ON NON-PRECISION APPROACHES WITH ONE ENGINE OUT ON A320/A318 A/C
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P10383	31-1334 04	20 AUG 10	INDICATING/RECORDING SYSTEMS - FLIGHT WARNING COMPUTER (FWC) - INSTALL FWC STANDARD H2-F5
	Applicable to: ALL			
R	P10443	27-1182 03	07 APR 11	FLIGHT CONTROL - ELAC SYSTEM - INTRODUCE ELAC "L93" SOFTWARE STANDARD
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTE, B-HTF			
R	P10447		07 APR 11	POWERPLANT - GENERAL - INTRODUCE SELECT ONE PRODUCTION PACKAGE ON IAE V2500-A5 ENGINES
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P10493	27-1183 02	07 APR 11	FLIGHT CONTROL - ELAC - ACTIVATE HIGH ALTITUDE UPSETS VMO/MMO OVERSHOOT PROTECTION FUNCTION ON ELAC
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTE, B-HTF			
R	P10527		25 NOV 11	INDICATING/RECORDING SYSTEM-ELECTRONIC INSTRUMENT SYSTEM (EIS)-INSTALL DISPLAY MANAGEMENT COMP. SOFTW. EIS2 S8-2
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
R	P10538		07 APR 11	AUTO FLIGHT - AUTOPILOT/FLIGHT DIRECTOR - INSTALL WIRING PROVISIONS FOR AP/FD TCAS FUNCTION
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P10652		07 APR 11	COMMUNICATIONS - AUDIO MANAGEMENT- INSTALL NON SATCOM TEAM ACP3000 P/N ACP2788AD01
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P10686		07 APR 11	AUTO-FLIGHT - FMGC - INSTALL HONEYWELL PERFORMANCE DATABASE RELEASE 1A (PS4087592-901)
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P10694		20 AUG 10	AUTO-FLIGHT - FMGC - ACTIVATE "MOD NAV GO AROUND" ON FMGC
	Applicable to: B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P10763		25 NOV 11	AUTO FLIGHT - FMGC - INSTALL FMGC HWL H2I11 (RELEASE 1A) ON IAE AND PW A/C
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
R	P10777		20 AUG 10	AUTO FLIGHT - FAC (FLIGHT AUGMENTATION COMPUTER) - INTRODUCE FAC SOFTWARE STANDARD "BAM0620"
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P10963	27-1189 03	25 NOV 11	FLIGHT CONTROL - ELAC SYSTEM - INTRODUCE ELAC "L94" STANDARD
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSQ, B-HSR, B-HST, B-HSU, B-HTE, B-HTF			
R	P11120		07 APR 11	COMMUNICATIONS- COCKPIT VOICE RECORDER- INSTALL CVR STANDARD L3-COM P/N 2100-1025-02
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P11146		25 NOV 11	LANDING GEAR - PARKING/ULTIMATE EMERGENCY BRAKING ACTIVATE PARKING BRAKE MONITORING FUNCTION ON SA A/C
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
	P1116		20 AUG 10	ELECTRICAL POWER - RELOCATE 3 CIRCUIT BREAKERS FROM PANEL 120 VU TO 49 VU -
	Applicable to: ALL			
R	P11473		25 NOV 11	AUTO FLIGHT- FLIGHT MANAGEMENT SYSTEM- ACTIVATE BARO RADIO SETTING FUNCTION
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
N	P11510		30 MAY 12	NAVIGATION - TCAS - INSTALL TCAS HONEYWELL TPA-100B CHANGE 7.1 CAPABLE OF ATSAW
	Applicable to: B-HST, B-HSU			
R	P11592		25 NOV 11	COMMUNICATION-COCKPIT VOICE RECORDER- SUPPLY THE CVR 28VDC TO COMPLY WITH FAA REGULATION (FAR 25.14.57 (D)(5))
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
R	P11620		25 NOV 11	INDICATING/RECORDING SYSTEMS - FWC - ACQUISITION/INTERFACE ACTIVATE MONITORING OF ATC/XPDR
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
N	P11677		30 MAY 12	ENGINE FUEL AND CONTROL- FADEC SYSTEM- INTRODUCE EEC SOFTWARE STANDARD SCN21/AA FOR IAE V2500-A5
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
N	P11807		30 MAY 12	INDICATING/RECORDING SYSTEM - ELECTRONIC INSTRUMENT SYSTEM (EIS) - INSTALL NEW EIS2 SOFTWARE S9
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P11856		25 NOV 11	AUTO FLIGHT- FLIGHT MANAGEMENT SYSTEM- ACTIVATE NO AP DISCONNECTION BELOW MDA/MDH UNTIL MISSED APPROACH POINT
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
R	P11955		25 NOV 11	INDICATING RECORDING SYSTEMS-SYSTEM DATA ACQUISITION CONCENTRATOR-INSTALL SDAC H2-E3
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
N	P12171		30 MAY 12	NAVIGATION-WEATHER RADAR SYSTEM-INSTALL COLLINS SINGLE WEATHER RADAR CAPABLE OF PWS FUNCTION IN SINGLE CONFIG
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
N	P12330		30 MAY 12	NAVIGATION-TRAFFIC COLLISION AVOIDANCE SYSTEM (TCAS) - INSTALL TCAS COLLINS TTR-921 CHANGE 7.1
	Applicable to: B-HSQ, B-HSR			
N	P12637		30 MAY 12	NAVIGATION - WEATHER RADAR SYSTEM - INSTALL COLLINS MANUAL EQUIPMENTS FOR CONFIGURATIONS WITH DUAL PROVISIONS
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
	P1302		20 AUG 10	LANDING GEAR-WHEELS AND BRAKES-INSTALL BSCU STD5-
	Applicable to: ALL			
	P1312		07 APR 11	LIGHTS - PANEL 25VU - INTEGRALLY LIGHTED PLATE - MODIFY WORDING
	Applicable to: ALL			
	P1390		20 AUG 10	ELECTRCIAL POWER - DC - IMPROVE BCL -
	Applicable to: ALL			
	P1450		20 AUG 10	NAVIGATION - ATC MODE "S" - ACTIVATE SELECTIVE INTERROGATION FUNCTION -
	Applicable to: ALL			
	P1485		20 AUG 10	ELECTRICAL POWER - DC GENERATION - REVISE "BAT OFF" INDICATION -
	Applicable to: ALL			
	P1573		20 AUG 10	ENGINE CONTROLS-MODIFY POWER SUPPLY FOR HP FUEL SOLENOID
	Applicable to: ALL			
	P1631	34-1278 04	20 AUG 10	NAVIGATION - MODIFY GPWC WARNING -
	Applicable to: ALL			
	P1669		20 AUG 10	AIR CONDITIONING-AVIONICS VENTILATION- INSTALL A NRV AT AIR INLET
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	P1752		20 AUG 10	HYDRAULIC POWER-MODIFY ELECTRICAL ROUTING OF GREEN LEAKAGE MEASUREMENT ELECTROVALVE CONTROL
	Applicable to: ALL			
	P1850		20 AUG 10	FLIGHT CONTROLS - ELAC/EFCS SYSTEM - INTRODUCE SOFTWARE L62
	Applicable to: ALL			
R	P1872		20 AUG 10	AIR CONDITIONING - INSTALL CIRCUIT BREAKER FOR REAR CARGO COMPT VALVE SUPPLY FOR EROPS -
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P1883		20 AUG 10	FLIGHT CONTROLS - FCDC - INSTALL SOFTWARE L45
	Applicable to: ALL			
	P1970		20 AUG 10	COMMUNICATIONS - INSTALL HF1 FOR EROPS
	Applicable to: ALL			
	P2040		20 AUG 10	OXYGENE - COCKPIT - INSTALL MODIFIED LP OXYGEN SUPPLY SOLENOID VALVE
	Applicable to: ALL			
	P2196		20 AUG 10	MINOR IMPROVEMENTS INTRODUCED FROM A/C 268 - AS ZONE
	Applicable to: ALL			
R	P2205		20 AUG 10	FIRE PROTECTION - DETECTION - INTRODUCE MODIFIED ENGINE AND APU FIRE PANEL
	Applicable to: ALL			
	P2218		20 AUG 10	NAVIGATION - TCAS II - INTRODUCE COMPLETE PROVISIONS
	Applicable to: ALL			
R	P2223		20 AUG 10	NAVIGATION - GPWS - INSTALL GPWC MARK V WITH INTERFACE WITH CFDS
	Applicable to: ALL			
R	P2316		20 AUG 10	AUTO FLIGHT - ACTIVATE WINDSHEAR FUNCTION
	Applicable to: ALL			
	P2379		20 AUG 10	ELECTRICAL POWER - DC GENERATION - INTRODUCE IMPROVED BCL
	Applicable to: ALL			
R	P2493		20 AUG 10	EQUIPMENT/FURNISHINGS - COCKPIT SEATS - INTRODUCE TYPE A340 SEATS
	Applicable to: ALL			
	P2546	31-1265 03	20 AUG 10	INDICATING/RECORDING SYSTEMS - CENTRAL WARNING SYSTEM - INSTALL SDAC A320/321 STANDARD
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	P2547		07 APR 11	INDICATING RECORDING SYSTEMS - EIS - DEFINE COF A STANDARD FOR A320/A321 DMC
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P2588		20 AUG 10	EQUIPMENT/FURNISHINGS - EMERGENCY EQUIPMENT - INTRODUCE PBE DRAEGER IN THE COCKPIT
	Applicable to: ALL			
R	P2590		20 AUG 10	NAVIGATION - INSTALL A BENDIX TCAS II COLLISION AVOIDANCE SYSTEM
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
	P2717		20 AUG 10	NAVIGATION-ATC MODE 'S'(SELECT) INSTALL ATC/TCAS CONTROL PANEL P/N 6990/20 (BFE)
	Applicable to: B-HTF			
	P2814		20 AUG 10	LANDING GEAR - WHEELS AND BRAKES - INTRODUCE BSCU STD 6
	Applicable to: ALL			
R	P2878		20 AUG 10	INDICATING RECORDING SYSTEM - SDAC - DEFINE A PIN PROGRAM FOR REAR C.C. VENTILATION
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
R	P2960	00-1016 42	20 AUG 10	CERTIFICATION DOCUMENTS - GENERAL - CERTIFICATION FOR TAKE-OFF WITH 15 KNOT TAILWIND
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTF			
R	P2963		20 AUG 10	AIR CONDITIONING - IMPROVE CABIN PRESSURIZATION CONTROL ON 25VU PANEL.
	Applicable to: ALL			
	P3004		20 AUG 10	LIGHTS - COCKPIT ILLUMINATION - INTRODUCE IMPROVED COCKPIT LIGHTING
	Applicable to: ALL			
R	P3011		20 AUG 10	AUTO FLIGHT - FMS - PROVIDE FMS CROSS LOAD
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
	P3040		20 AUG 10	NAVIGATION - ADIRS - INSTALL LITTON 4MCU ON A321 A/C
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P3044		20 AUG 10	NAVIGATION - ADIRS - ADAPT SHELVES FOR 4 MCU ADIRS INSTALLATION
	Applicable to: ALL			
	P3102		20 AUG 10	AUTO FLIGHT - FCU - INTRODUCE FCU M-9 STD
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	P3106		20 AUG 10	ENGINE FUEL AND CONTROL - IAE V2500 - EIU - INTRODUCE VERSION -4 AND ADDITIONAL WIRING
	Applicable to: ALL			
R	P3112	34-1101 24	25 NOV 11	NAVIGATION - INSTALL A TCAS II COLLINS SYSTEM
	Applicable to: B-HSQ, B-HSR, B-HTF			
	P3202		20 AUG 10	AUTO FLIGHT - FCU - INTRODUCE FCU STANDARD M10
	Applicable to: ALL			
	P3208		20 AUG 10	AUTO FLIGHT - FMS - INTRODUCE FMGC A320/321 B1 STD WITH OPTIONS AND 400 KILOWORDS FOR IAE V2500 VERSIONS
	Applicable to: ALL			
R	P3277		20 AUG 10	MINOR IMPROVEMENTS INTRODUCED FROM A/C 508 (ST2) TO A/C 521 (ST2)
	Applicable to: ALL			
	P3337		20 AUG 10	GENERAL-A321 IAE ENG-EXTEND AUTOLAND CAT IIIB CAPABILITY
	Applicable to: B-HTG, B-HTH, B-HTI			
R	P3341		20 AUG 10	LANDING GEAR - WHEELS AND BRAKES - INSTALL MESSIER GOODRICH WHEELS AND BRAKES ON A321
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
R	P3348		20 AUG 10	AUTO FLIGHT - LAND CAT III CAPABILITY TEST - EXTEND CAT III CAPABILITY FOR IAE ENGINE
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P3356		20 AUG 10	LANDING GEAR - BSCU - TWIN WHEEL - INTRODUCE A320/A321 STD 6 VERSION 60C
	Applicable to: ALL			
	P3365		20 AUG 10	ICE AND RAIN PROTECTION-ICE DETECTION- PROVIDE ICE DETECTOR ILLUMINATION
	Applicable to: ALL			
	P3379		20 AUG 10	INDICATING/RECORDING SYSTEMS - GENERAL- DEFINE CPIP3
	Applicable to: ALL			
R	P3401	22-1042 04 22-1099 06	20 AUG 10	AUTO FLIGHT - FLIGHT CONTROL UNIT (FCU) DELETE "EXPEDITE" FUNCTION FROM FCU
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P3451		20 AUG 10	BSCU - PIN PROGRAMMING
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P3453		20 AUG 10	LANDING GEAR - WHEELS AND BRAKES - EXTE ND PIN PROGRAMMING FOR STD6 BSC U
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P3510		20 AUG 10	NAVIGATION - ADIRS - INTRODUCE STD P/N AC06
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	P3511		20 AUG 10	AUTO FLIGHT - FAC - INSTALL TWO FACS P/N BAM 0509
	Applicable to: ALL			
	P3524		20 AUG 10	ELECTRICAL POWER - AC AUXILIARY GENERATION (APU GENERATOR) - INTRODUCE MODIFIED GENERATOR
	Applicable to: ALL			
R	P3588		20 AUG 10	LANDING GEAR - A320/A321 TWIN WHEELS - INTRODUCE BSCU STANDARD 7 (70B VERSION)
	Applicable to: ALL			
	P3594		20 AUG 10	INDICATING/RECORDING SYSTEMS - ELECTRICAL CLOCK - INSTALL A CLOCK SMITHS TYPE 2610
	Applicable to: ALL			
	P3660		20 AUG 10	FLIGHT CONTROLS -S.E.C. SYSTEM INTRODUCE A320/A321 S.E.C STANDARD P/N BAM0508
	Applicable to: ALL			
	P3686		20 AUG 10	AUTO FLIGHT-FAC-INTRODUCE FAC P/N BAM 510
	Applicable to: ALL			
	P3693		25 NOV 11	AUTOFLIGHT -FMGC-A320/321-STANDARD FOR A321 IAE CAT III
	Applicable to: ALL			
	P3704		20 AUG 10	ENGINE FUEL AND CTRL-FUNCTIONAL INTERFACES-INTRODUCE EIU VERSION 5 ON IAE V2500 ENGINES
	Applicable to: ALL			
R	P3790		20 AUG 10	NAVIGATION-ADIRS-INTRODUCE 4MCU ADIRU HONEYWELL P/N C06
	Applicable to: B-HSD, B-HSE, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	P3800		20 AUG 10	NAVIGATION-ADIRU-INTRODUCE ADIRU P/N -307
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P3812		07 APR 11	PNEUMATIC-ENGINE BLEED AIR SUPPLY- INTRODUCE A BLEED AIR MONITORNG COMPUTER STD6
	Applicable to: ALL			
	P3830		20 AUG 10	FLIGHT CONTROLS-SEC SYSTEM-"PARTIAL LIFT DUMPING" FUNCTION ACTIVATION
	Applicable to: ALL			
	P3878		20 AUG 10	FLIGHT CONTROLS-INTRODUCE ELAC STD L69J
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	P3897		20 AUG 10	INDICATING RECORDING SYSTEMS-DMC- INTRODUCE D.M.C. V31 STANDARD
	Applicable to: ALL			
	P3924		25 NOV 11	LANDING GEAR - MLG - MESSIER - INTRODUCE BRAKES P/N C202253
	Applicable to: B-HSQ, B-HSR			
	P3955		20 AUG 10	NACELLES-PYLONS-PYLON STRUCTURE- ADAPT PRIMARY STRUCTURE TO A321-200 VERSION
	Applicable to: ALL			
	P3964		20 AUG 10	NAVIGATION-TCAS-INSTALL ATC/TCAS CONTROL PANEL SEXTANT P/N 04-AA01.
	Applicable to: ALL			
	P4017		20 AUG 10	NAVIGATION - ADIRS - INSTALL ADIRS LITTON 4MCU ON A320
	Applicable to: B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP			
	P4054		20 AUG 10	AUTOFLIGHT-FCU-INTRODUCE F.C.U. STANDARD M11
	Applicable to: ALL			
R	P4055		20 AUG 10	AUTOFLIGHT-FCU-INTRODUCE FCU STANDARD M11 WITHOUT EXPEDITE FUNCTION
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTD, B-HTE			
	P4080		20 AUG 10	AUTO FLIGHT - FMGC - IAE VERSION - INTRODUCE FMGC CAPABLE OF ACARS AND PRINTER
	Applicable to: ALL			
R	P4087		20 AUG 10	NAVIGATION-ADIRS-INSTALL HONEYWELL ADIRS WITH GPS PRIMARY NAVIGATION CAPABILITY
	Applicable to: B-HSD, B-HSE, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P4089		20 AUG 10	AUTO FLIGHT-FMGC-REDUCE VAPP FOR A320 CFM/IAE
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P4121		20 AUG 10	EXHAUST-THRUST REVERSER CONTROL AND INDICATING-ACTIVATE ADDITIONAL THRUST REVERSER LOCK CONTROL
	Applicable to: ALL			
	P4149		20 AUG 10	ENGINE FUEL AND CONTROL-CONTROLLING- INTRODUCE E.E.C. SOFTWARE SCN 10A ON IAE V2500-A5
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P4151		20 AUG 10	INDICATING/RECORDING SYSTEM - INSTALL A PORTABLE DATA LOADER CONNECTOR AND DISK STOWAGE
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P4155	22-1043 30	20 AUG 10	AUTOFLIGHT - FMGC - ACTIVATE ACARS INTERFACE IN FMS (CFM AND IAE ENGINES)
	Applicable to: ALL			
R	P4170	27-1113 12	20 AUG 10	FLIGHT CONTROLS - FCDC SYSTEM - PROVIDE A VISUAL INDICATION FOR SIMULTANEOUS SIDE STICK ACTION
	Applicable to: ALL			
	P4179		20 AUG 10	FUEL-GENERAL-INSTALL ACT PROVISIONS (A/S PART)
	Applicable to: B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P4191		20 AUG 10	NAVIGATION - GENERAL - CHANGE EQUIPMENTS TO COMPLY WITH MARCH 95 SPECS.
	Applicable to: ALL			
R	P4205	22-1049 26	20 AUG 10	AUTOFLIGHT - FMGC - ACTIVATE PRINTER INTERFACE IN FMS (CFM AND IAE ENGINES)
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
	P4234		20 AUG 10	ICE AND RAIN PROTECTION-WINDSHIELD RAIN PROTECTION-DESACTIVATION OF RAIN REPELLENT SYSTEM
	Applicable to: ALL			
R	P4287	31-1113 31 31-1264 04	20 AUG 10	INDICATING/RECORDING SYSTEMS - FWC - DEFINE OEB REMINDER WITHIN FWC STD -E1 AND SUBSEQUENT
	Applicable to: ALL			
	P4319	22-1058 48	20 AUG 10	AUTO FLIGHT - FCU - DEFINE FLIGHT DIRECTOR ENGAGEMENT IN CROSSED BARS AT GO AROUND
	Applicable to: ALL			
R	P4320		20 AUG 10	AUTO FLIGHT-GENERAL-ACTIVATE GLOBAL SPEED PROTECTION AND F/D DISENGAGEMENT UPON SPEED CONSTRAINTS
	Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
	P4354		20 AUG 10	ENGINE FUEL AND CONTROL-CONTROLLING INTRODUCE EEC SOFTWARE SCN 10B ON IAE V2500-A5 ENGINES
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	P4417	24-1091 01	20 AUG 10	ELECTRICAL POWER-DC GENERATION- MODIFY TRANSFORMER RECTIFIER OVERHEAT PROTECTION
	Applicable to: ALL			
R	P4426	34-1130 00	20 AUG 10	NAVIGATION-ADIRS-INTRODUCE LITTON ADIRU 4 MCU STD WITH P/N-309 (AIME FUNCTION)
	Applicable to: B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P4456		20 AUG 10	ENGINE FUEL AND CONTROL -CONTROLLING- FADEC SYSTEM-INTRODUCE EEC SOFTWARE SCN-11 (IEAE V2500-A5)
	Applicable to: ALL			
	P4495		20 AUG 10	INDICATING/RECORDING SYSTEMS-DISPLAY MANAGEMENT COMPUTER (DMC)-INTRODCUE DMC V32 STD
	Applicable to: ALL			
R	P4497		20 AUG 10	DOORS EMERGENCY ESCAPE SLIDE RELEASE & OVERPRESS. WARNING SYSTEMS-MODIFY CTRL LOGIC OF THE OVERPRESS. WARNING SYST
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
	P4502	46-1001 08 46-1006 04	20 AUG 10	INFORMATION SYSTEM - AIR TRAFFIC AND INFORMATION SYSTEM (ATIMS) - INSTALL ATSU COMPUTER FOR ACARS
	Applicable to: ALL			
R	P4539		20 AUG 10	AUTOFLIGHT-FLIGHT CONTROL UNIT- (FCU) INTRODUCE SEXTANT MODULAR FCU
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P4576		20 AUG 10	LANDING GEAR-ALTERNATE BRAKING- INTRODUCE MODIFIED ALTERNATE BRAKING SYSTEM
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	P4642	34-1176 05	20 AUG 10	NAVIGATION - WEATHER RADAR SYSTEM - ACTIVATE DUAL PREDICTIVE WINDSHEAR FUNCTION
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
R	P4647		20 AUG 10	NAVIGATION - WEATHER RADAR SYSTEM - ACTIVATE COLLINS DUAL PREDICTIVE WINDSHEAR SYSTEM
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P4654		20 AUG 10	OXYGEN - INSTALL COCKPIT PROTECTIVE BREATHING EQUIPMENT (PBE) AIR LIQUIDE -SFE-
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
	P4663	22-1068 00	20 AUG 10	AUTOFLIGHT -FLIGHT MANAGEMENT SYSTEM- INTRODUCE FMGC (P/N B546 CC M0102) CAPABLE OF GPS/ACARS FUNCTIONS
	Applicable to: B-HSD, B-HSE, B-HSG, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
R	P4677		20 AUG 10	COM-CVR-INSTALL A SOLID STATE COCKPIT VOICE RECORDER (SSCVR) LORAL FAIRCHILD P/N 200-0012-00 (SFE)
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
	P4682	34-1215 01	20 AUG 10	NAVIGATION - WEATHER RADAR SYSTEM - ALLIED SIGNAL CONFIGURATION AND FULL PROVISION FOR A SECOND TRANSCEIVER
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P4707	23-1158 14	20 AUG 10	COMMUNICATIONS - SSCVR - INSTALL SSCVR ALLIED SIGNAL P/N 980-6022-001
	Applicable to: ALL			
R	P4709	00-1043 33	20 AUG 10	ADDITIONAL CERTIFICATION ITEMS - LANDING WITH A 15 KNOT TAILWIND
	Applicable to: ALL			
R	P4710	00-1016 42	20 AUG 10	TAKE OFF WITH A 15 KNOT TAILWIND
	Applicable to: B-HSD, B-HSE, B-HSG, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P4713		20 AUG 10	NAVIGATION-WEATHER RADAR SYSTEM-INSTALL AN ALLIED SIGNAL SINGLE WEATHER RADAR CONFIG. WITH SINGLE TRANSCEIVER MOUNT
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI			
R	P4766		25 NOV 11	NAVIGATION - SINGLE PWS - COLLINS SINGLE PWS ACTIVATION
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
R	P4770	34-1035 06	20 AUG 10	NAVIGATION-WEATHER RADAR SYSTEM- INSTALL FULL PROVISION FOR 2ND TRANSCEIVER
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTF, B-HTG, B-HTH, B-HTI			
	P4773	34-1063 17	20 AUG 10	NAVIGATION - ADF - INSTALL A SECOND ADF RECEIVERS
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P4789	34-1147 22	20 AUG 10	NAVIGATION - ILS - INSTALL ADDITIONAL WIRING PROVISIONS FOR MMR INSTALLATION
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P4801		20 AUG 10	ELECTRICAL POWER-GENERAL-DEFINE NEW ELECTRICAL GENERATION CONCEPT FOR SINGLE AISLE A/C
	Applicable to: B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P4808		20 AUG 10	LANDING GEAR-WHEELS AND BRAKES- INTRODUCE BSCU COMMON STD
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P4880	22-1068 00	20 AUG 10	AUTO-FLIGHT-FMGC-INTRODUCE CCM0103 FOR A319 IAE AUTOLAND AND GPS/ACARS FUNCTION.
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTF			
	P4885	34-1197 13	20 AUG 10	NAVIGATION - GPWS - ACTIVATE ENHANCED FUNCTIONS OF THE EGPWS
	Applicable to: ALL			
R	P4916		20 AUG 10	FLIGHT CONTROL -ELAC SYSTEM- INTRODUCE E.L.A.C. WITH ENHANCED RELAYS
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
	P4977	31-1115 12 31-1264 04	20 AUG 10	INDICATING/RECORDING SYSTEMS - FWC - PROVIDE NEW SYNTHETIC VOICE "DUAL INPUT"
	Applicable to: ALL			
	P4983	22-1061 00	20 AUG 10	AUTO-FLIGHT-FAC INTRODUCE FAC STD BAM 0513
	Applicable to: ALL			
	P4985	73-1055 00	20 AUG 10	ENGINE -FUEL AND CONTROL-CONTROLLING FADEC SYSTEM-IAE V2500-A5-INTRODUCE EEC SOFTWARE SCN 11/P
	Applicable to: ALL			
	P5066		07 APR 11	PNEUMATIC-ENG BLEED AIR SYS-INTRODUCE A TEMP THERMOSTAT WITH MODIFIED LIMITATION SETTINGS (P/N 341E020000)
	Applicable to: B-HSG, B-HSI			
R	P5071	30-1037 02	20 AUG 10	ICE AND RAIN PROTECTION-WINSHIELD RAIN PROTECTION-ACTIVATION OF RAIN REPELLENT SYS.(FLUID COMPATIBLE WITH OZONE RULES)
	Applicable to: ALL			
	P5128		20 AUG 10	NAVIGATION-WEATHER RADAR SYSTEM- INSTALL FULL PROVISION FOR 2ND TRANSCEIVER (ALLIED SIGNAL CONFIG)
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI			
R	P5138	27-1121 01	20 AUG 10	FLIGHT CONTROLS-ELAC SYSTEM-INTRODUCE ELAC SOFTWARE "L80"
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	P5168	34-1162 08	20 AUG 10	NAVIGATION - MMR - INSTALL COLLINS MMR PROVIDING ILS AND GPS FUNCTION
	Applicable to: ALL			
	P5180	22-1068 00	20 AUG 10	AUTO-FLIGHT-FMGC-IAE ENGINES-INTRODUCE FMGC B546CCM0104 (FA 817 STD) CAPABLE OF GPS/ACARS FUNCTION
	Applicable to: ALL			
	P5206	73-1060 01	20 AUG 10	ENGINE FUEL AND CONTROL-CONTROLLING-FADEC SYSTEM-IAE V2500-A5-INTRODUCE EEC SOFT. SCN12
	Applicable to: ALL			
R	P5239	34-1160 09	20 AUG 10	NAVIGATION-ATC MODE"S"-INTRODUCE ATC/TCAS CONTROL UNIT P/N C12404AB02
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
R	P5241		20 AUG 10	NAVIGATION - WEATHER RADAR SYSTEM - INSTALL COLLINS SINGLE WEATHER RADAR WITH FULL PROVISION FOR A SECOND SYS
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P5253		20 AUG 10	NAVIGATION - ADIRS - REPLACE ADIRS CDU BY MSU (MODE SELECTOR UNIT)
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P5314		20 AUG 10	AUTO FLIGHT - MULTIPURPOSE CONTROL AND DISPLAY UNIT (MCDU) - INTRODUCE MCDU HONEYWELL 2ND GENERATION (P/N -980)
	Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
R	P5377		20 AUG 10	INFORMATION SYSTEM-AIR TRAFFIC AND INFO MANAGEMENT SYS(ATIMS)-COCKPIT-INTRODUCE SYS PROVISIONS FOR FANS "A"(ATSU-2DCDU)
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P5451		20 AUG 10	ELECTRICAL POWER - GENERAL - AC-DC MAIN DISTRIBUTION - INSTALL AC-DC SHEDDABLE BUSBARS
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
	P5459	21-1121 03	20 AUG 10	AIR CONDITIONING - PACK COOLING AIR CONTROL - INTRODUCE LOGIC RELAY FOR CONTROL PACK CLOSURE AT ENGINE START
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P5465		20 AUG 10	INDICATING/RECORDING SYSTEMS - ELECTRICAL CLOCK- INSTALL AIR PRECISION P/N APE5100-1 CAPABLE OF GPS TIME
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
	P5518	32-1232 01 32-1336 01	20 AUG 10	LANDING GEAR-NORMAL BRAKING- INTRODUCE STD 8 BSCU (TWIN VERSION)
	Applicable to: ALL			
R	P5567	31-1127 00	20 AUG 10	INDICATING RECORDING SYSTEM-DMC- INTRODUCE DMC V40 STANDARD
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P5577	73-1063 00	20 AUG 10	ENGINE FUEL AND CONTROL- GENERAL IAE V2500-A5-INTR. ENGINE WITH DATA ENTRY PLUG CONFIG.30 SEC. DRY CRANK SELECTION
	Applicable to: ALL			
R	P5583	34-1172 02	20 AUG 10	NAVIGATION - ADIRS - REDUCE VERTICAL SEPARATION MINIMUM USING ADR1 AND 2 ONLY
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTF, B-HTG, B-HTH, B-HTI			
	P5613		25 NOV 11	NAVIGATION - TCAS - INSTALL COLLINS TCAS TTR921 WITH COLLINS ATC TPR901
	Applicable to: B-HSQ, B-HSR			
	P5622		20 AUG 10	AUTO FLIGHT - MCDU - INSTALL AN MCDU 2ND GENERATION HONEYWELL FMS (MCDU WITH A340 KEYBOARD)
	Applicable to: B-HSL, B-HSM, B-HSN			
R	P5638		20 AUG 10	NAVIGATION-STANDBY DATA : ALTITUDE AND HEADING - INSTALL INTEGRATED STANDBY INSTRUMENT SYSTEM (ISIS)
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	P5669	34-1177 17	20 AUG 10	NAVIGATION - TCAS - INSTALL ALLIED SIGNAL TCAS COMPUTER P/N 066-50000-2220 (WITH CHANGE 7.0)
	Applicable to: ALL			
	P5698	34-1176 05 34-1215 01	20 AUG 10	NAVIGATION - WEATHER RADAR SYSTEM - INSTALL ALLIED SIGNAL WEATHER RADAR TRANSCEIVER P/N 066-50008-0405
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P5706	31-1257 01	20 AUG 10	INDICATING RECORDING SYSTEM-FWC- INTRODUCE FWC STANDARD H2/E3P
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P5768		20 AUG 10	ELEC PWR-AC EMERGENCY GENERATION- ACTIVATE A319/A321 ELECTRICAL EMERGENCY CONFIGURATION ON A320 A/C
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	P5769		20 AUG 10	ICE AND RAIN PROTECTION-WINDSHIELD RAIN PROTECTION-DESACTIVATION OF NEW RAIN REPELLENT
	Applicable to: B-HSI, B-HTE			
R	P5782		20 AUG 10	AIR CONDITIONING-AVIONIC EQPT VENTILATION-INTRODUCE FAN WITH HIGH AND LOW SPEED CAPABILITY
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P5783		20 AUG 10	AIR CONDITIONING-AVIONIC EQPT INSTALL COMPLETE PROVISIONS FOR TWO SPEED CAPABILITY
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
	P5802	34-1181 04	20 AUG 10	NAVIGATION-ADIRS-INTRODUCE LITTON ADIRU 4 MCU STD-312
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P5895	34-1193 37	20 AUG 10	NAVIGATION-GPWS-INTRODUCE EGPWS P/N 206-206 AND INHIBIT AUTOMATIC DEACTIVATION ENHANCED FUNCTIONS
	Applicable to: ALL			
R	P5918		20 AUG 10	NAVIGATION - INTEGRATED STANDBY INSTRUMENT SYSTEM (ISIS) - ACTIVATE BAROMETRIC REFERENCE IN INCH HG
	Applicable to: B-HSN, B-HSO, B-HSP, B-HST, B-HSU			
	P6027	34-1215 01	20 AUG 10	NAVIGATION - WEATHER RADAR SYSTEM - REINSTALL A SINGLE WEATHER RADAR CONFIGURATION
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTF, B-HTG, B-HTH, B-HTI			
R	P6030		20 AUG 10	ELECTRICAL POWER - AC GENERATION - INSTALL ELECTRICAL OUTLETS IN COCKPIT
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	P6044	30-1037 02	20 AUG 10	ICE AND RAIN PROTECTION-WINSHIELD- RAIN PROTECTION-INTRODUCE MODIFIED GAGE ASSY -P/N 4020W35-2
	Applicable to: ALL			
R	P6067		20 AUG 10	LANDING GEAR-NOSE LANDING GEAR WHEELS-REMOVE RUBBING STRIPS
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P6071		20 AUG 10	INDICATING/RECORDING SYSTEMS - DMC - DISPLAY ALTITUDE IN METRIC UNITS ON THE PRIMARY FLIGHT DISPLAY (PFD)
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTH, B-HTI			
R	P6142		20 AUG 10	NAV-STANDBY DATA: ATT AND HDG-INTRODUCE COMPLETE PROV FOR INTEGRATED STANDBY INSTRUMENT SYSTEM ELECTRICAL SUPPLY
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P6146		20 AUG 10	INDICATING/RECORDING SYSTEM - FWC - INTRODUCE "F/CTL FLAP LVR NOT ZERO" RED WARNING
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HTG, B-HTH, B-HTI			
R	P6201	00-1156 01	20 AUG 10	GENERAL-FLIGHT ENVIRONMENTAL ENVELOPE-EXTENSION TO 12100 M (39800 FT)
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P6251	30-1037 02	20 AUG 10	ICE AND RAIN PROTECTION-WINDSHIELD RAIN PROTECTION-INTRODUCE MODIFIED GAGE ASSY WITH INPUT VALUE FUNCTION SUPPRESSED
	Applicable to: ALL			
R	P6314		20 AUG 10	AUTO FLIGHT - DEFINE "GUIDED RADAR APPROACH WITH AUTOPILOT ENGAGED" PROCEDURE (MUH 250 FT)
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
	P6375	32-1201 04	20 AUG 10	LANDING GEAR-PARKING/ULTIMATE EMERGENCY BRAKING-INTRODUCE A PRESSURE SWITCH
	Applicable to: ALL			
	P6380		20 AUG 10	ELECTRICAL POWER-GALLEY SUPPLY- INSTALL A RELAY FOR GALLEY SHEEDING IN A SINGLE GENERATION CONFIGURATION
	Applicable to: B-HTG, B-HTH, B-HTI			
N	P6437	31-1141 04 31-1257 01	30 MAY 12	INDICATING RECORDING SYSTEM-FWS INTRODUCE FWC STANDARD H1PE3P
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
R	P6544		20 AUG 10	INDICATING/RECORDING SYSTEMS - FWC - ACTIVATE SPECIFIC FWC PROCEDURE
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P6567		20 AUG 10	AIR CONDITIONING - AVIONICS EQUIPMENT VENTILATION - ACTIVATE THE TWO SPEED CAPABILITY OF TECHNOFAN FANS
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P6578		20 AUG 10	INDICATING RECORDING SYSTEMS- EIS-INSTALL DMC, DU AND DISKETTES FOR EIS2
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	P6588	46-1009 06	20 AUG 10	INFORMATION SYSTEM - ATIMS - MODIFY ATSU AIRCRAFT INTERFACE SOFTWARE ACCORDING TO SERVICE PROVIDERS LIST
	Applicable to: ALL			
R	P6589		20 AUG 10	INDICATING/RECORDING SYSTEMS-CFDIU- INTRODUCE CFDIU STANDARD 9B
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P6612		20 AUG 10	COMMUNICATIONS - COCKPIT VOICE RECORDER - INSTALL A SSCVR L3-C P/N 2100-1020-02 (SFE)
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTH, B-HTI			
R	P6624		20 AUG 10	COMMUNICATIONS - COCKPIT VOICE RECORDER - REINTRODUCE SSCVR ALLIED SIGNAL P/N 980-6022-001
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P6630	00-1058 93	20 AUG 10	CERTIFICATION DOCUMENTS - GENERAL - CERTIFY AIRCRAFT FOR OPERATION ON RUNWAYS LESS THAN 45M WIDTH
	Applicable to: ALL			
	P6634	31-1265 03	20 AUG 10	INDICATING RECORDING SYSTEM-SDAC- INTRODUCE STANDARD SDAC P/N 350E5500202
	Applicable to: ALL			
R	P6687	23-1184 02	07 APR 11	COMMUNICATIONS-RADIO MANAGEMENT- INTRODUCE NEW RMP STANDARD 2A P/NO. C12848CA01
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P6688	23-1184 02	07 APR 11	COMMUNICATIONS-RADIO MANAGEMENT-INSTALL A THIRD RADIO MANAGEMENT PANEL
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
	P6703	22-1079 08 22-1102 02 22-1226 02	20 AUG 10	AUTO-FLIGHT-FLIGHT AUGMENTATION COMPUTER-INTRODUCE FAC SOFTWARE STANDARD P/N B397BAM0515
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P6777	46-1001 08 46-1006 04	07 APR 11	INFORMATION SYSTEM-ATIMS- UPGRADE ATSU HARDWARE FOR NEW ARINC 429 I/O BOARD
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P6801	31-1257 01	20 AUG 10	INDICATING/RECORDING SYSTEMS - FWC - INSTALL FWC STANDARD H2E4
	Applicable to: ALL			
	P6832	46-1013 04	20 AUG 10	INFORMATION SYSTEMS - ATIMS - DEFINE AND INSTALL MODIFIED SOFTWARE ATSU A/C INTERFACE UPGRADED
	Applicable to: ALL			
R	P6901	27-1152 02 27-1160 01	20 AUG 10	FLIGHT CONTROLS - ELAC SYSTEM - INTRODUCE ELAC SOFTWARE "L90"
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTE, B-HTG, B-HTH, B-HTI			
R	P6911		20 AUG 10	INDICATING/RECORDING SYSTEM : FROM FWC-F1 PIN-PROGRAMMING FOR IMPROVING THE MONITORING ABOUT THE NORMAL BRAKING SYSTEM
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR			
	P6952	34-1245 03	20 AUG 10	NAVIGATION-ADIRS-INSTALL LITTON ADIRU 4 MCU STANDARD 0314 (A318 COEFF CFM ADDED)
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
R	P6954	22-1102 02 22-1226 02	20 AUG 10	AUTO-FLIGHT - FLIGHT AUGMENTATION COMPUTER (FAC) - INTRODUCE FAC SOFTWARE "BAM0616"
	Applicable to: ALL			
R	P6985		20 AUG 10	NAVIGATION - ADIRS - INSTALL HONEYWELL ADIRU 4MCU P/N HG2030AE21 (A318 COEFF CFM ADDED)
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	P6986	22-1083 03	20 AUG 10	AUTO-FLIGHT-FMGC-INSTALL FMGC P/N B546CCM0105 (IAE/GPS/ACARS)
	Applicable to: ALL			
	P7005	32-1232 01 32-1336 01	20 AUG 10	LANDING GEAR - NORMAL BRAKING - INTRODUCE STD 9 BSCU (TWIN VERSION)
	Applicable to: ALL			
R	P7062		20 AUG 10	OXYGEN - CREW OXYGEN - INSTALL ALTERNATIVE 115CU FT FLIGHT CREW OXYGEN CYLINDER COMPOSITE SCOTT P/N 897940-15
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU			
R	P7092		20 AUG 10	INDICATING/RECORDING SYSTEM - EIS - ACTIVATE FUEL FLOW/DELTA ISA FUNCTION BY PIN PROGRAMMING ON DMC
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	P7125	31-1257 01	20 AUG 10	INDICATING RECORDING SYSTEM-FWC- INTRODUCE FWC STANDARD H2 F1
	Applicable to: ALL			
R	P7172		20 AUG 10	COMMUNICATIONS-COCKPIT VOICE RECORDER-REINTRODUCE SSCVR L3C P/N S200-0012-00
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTH, B-HTI			
R	P7175		20 AUG 10	ELECTRICAL POWER - GENERAL - INSTALL A COMMERCIAL SHEDDING PUSH-BUTTON SWITCH IN COCKPIT
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
	P7186	34-1345 02	20 AUG 10	NAVIGATION-GPWS-ACTIVATE PEAKS MODE ON EGPWS IN CONJUNCTION WITH TERRAIN DISPLAY
	Applicable to: ALL			
R	P7187	34-1351 02	20 AUG 10	NAVIGATIONS-EGPWS-ACTIVATE GEOMETRIC ALTITUDE FUNCTION IN THE EGPWS
	Applicable to: ALL			
	P7188	34-1345 02	20 AUG 10	NAVIGATION - EGPWS - ACTIVATE OBSTACLE OPTION ON THE EGPWS
	Applicable to: ALL			
R	P7247	27-1135 02	20 AUG 10	FLIGHT CONTROLS - ELAC SYSTEM - INTRODUCE ELAC STD L81
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
R	P7268		20 AUG 10	NAVIGATION-ADIRU-RESTORE RVSM 3 CIRCUIT CAPABILITIES (SERIAL SOLUTION)
	Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P7278		20 AUG 10	INDICATING/RECORDING SYSTEM-EIS2- INSTALL MODIFIED EIS2 SOFTWARE
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P7360		20 AUG 10	OXYGEN - OXYGEN DISTRIBUTION - INSTALL FOURTH OXYGEN MASK EROS WITH ASSOCIATED BOX
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P7397		20 AUG 10	NAVIGATION-ADIRS-INTRODUCE HONEYWELL ADIRU 4 MCU P/N HG2030AE22
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P7406		20 AUG 10	COMMUNICATIONS-AUDIO MANAGEMENT-INSTALL ACP WITH A NEW FRONT FACE DESIGN TO COMPLY WITH"LS"FUNCTIONS(PROD.SOLUTION)
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P7455		20 AUG 10	ELECTRICAL POWER-GENERAL-CHANGE IFE POWER SUPPLY BUSBARS INTO SHEDDABLE BUSBARS 220XP AND 212PP
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTH, B-HTI			
R	P7520	22-1090 11	20 AUG 10	AUTOFLIGHT-FMGC-INSTALL FMGC IAE C13042BA01 (EQUIPPED WITH FMS2 HONEYWELL)
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P7635	27-1151 01 27-1152 02 27-1154 00 27-1160 01	20 AUG 10	FLIGHT CONTROLS - ELAC SYSTEM - INTRODUCE ELAC SOFTWARE L82
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI			
R	P7721	32-1247 02	20 AUG 10	LANDING GEAR-WHEELS AND BRAKES-CANCEL MIXABILITY BETWEEN GOODRICH BRAKES 2-1600-2 AND -3 AUTHOR. WITH MOD 31803
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU			
	P7752	46-1027 06	20 AUG 10	INFORMATION SYSTEMS-ATIMS-ATSU PROVIDE ATSU A/C INTERFACE SOFTWARE CSB 3.2C CAPABLE OF VDL MODE 2
	Applicable to: ALL			
R	P7754		25 NOV 11	NAVIGATION - DDRMI - REPLACE THALES DDRMI P/N 63543-150-3 BY P/N 63543-150-4.
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
R	P7790		20 AUG 10	AUTO FLIGHT - FLIGHT MANAGEMENT AND GUIDANCE SYSTEM - ACTIVATE FMA ENHANCEMENT FUNCTION
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI			
	P7810	32-1254 00 32-1336 01	25 NOV 11	LANDING GEAR - NORMAL BRAKING - INSTALL BSCU 9.1
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P7876	73-1075 01	20 AUG 10	ENGINE FUEL AND CONTROL - CONTROLLING - INTRODUCE EEC SOFTWARE STANDARD "SCN17" ON V2500-A5 ENGINES
	Applicable to: ALL			
R	P7929		25 NOV 11	NAVIGATION-WEATHER RADAR SYSTEM-INSTALL COLLINS DUAL CONTROL PANEL TO ACTIVATE MULTISCAN FUNCTION
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
	P7976		07 APR 11	COMMUNICATION - AUDIO MANAGEMENT - REMOVE "LS" FUNCTIONS ACP (ANTI MOD OF 32526)
	Applicable to: B-HSL, B-HSM, B-HSN			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	P8025		25 NOV 11	NAVIGATION - TCAS - INSTALL ROCKWELL-COLLINS TCAS TTR921 P/N 822-1293-322
	Applicable to: B-HSQ, B-HSR			
R	P8076		20 AUG 10	LANDING GEAR - NORMAL BRAKING - INSTALL BSCU STD L4.5
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P8175	31-1266 02	20 AUG 10	INDICATING/RECORDING SYSTEMS - SDAC - ACTIVATE IAS DISCREPANCY MONITORING BY PIN PROGRAMMING
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
R	P8176	31-1266 02	07 APR 11	INDICATING/RECORDING SYSTEMS - SDAC - ACTIVATE DUAL PITOT MONITORING BY PIN PROGRAMMING
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
R	P8194		20 AUG 10	NAVIGATION - ADIRS ACTIVATE ALIGNMENT IMPROVEMENT FUNCTION ON ADIRU
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P8232	31-1266 02	20 AUG 10	INDICATING/RECORDING SYSTEMS - FWC - INTRODUCE IAS DISCREPANCY AND DUAL PITOT MONITORING ON FWC H2F1
	Applicable to: ALL			
R	P8256	22-1102 02 22-1226 02	20 AUG 10	AUTO FLIGHT - FLIGHT AUGMENTATION COMPUTER - INSTALL FAC STANDARD BAM0617 FOR A318
	Applicable to: ALL			
	P8274	31-1257 01	20 AUG 10	INDICATING RECORDING SYSTEM - FLIGHT WARNING COMPUTER (FWC) - INSTALL FWC STANDARD H2F2
	Applicable to: ALL			
R	P8303		20 AUG 10	NAVIGATION - DDRMI - REMOVE DDRMI VOR/ADF/DME INDICATORS
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P8440	32-1291 01	20 AUG 10	LANDING GEAR - WHEELS AND BRAKES INTRODUCE GOODRICH DURACARB CARBON BRAKES WITH ANTI - OXYDAN "M1"
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU			
	P8521	73-1082 01	20 AUG 10	ENGINE FUEL AND CONTROL - CONTROLLING - INSTALL EEC SOFTWARE "SCN18" ON IAE V2500-A5 ENGINES
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P8564	31-1331 01	20 AUG 10	INDICATING/RECORDING SYSTEM - ELECTRONIC INSTRUMENT SYSTEM (EIS)- ACTIVATE ENGINE AVAIL DISPLAY
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSJ, B-HSL, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
R	P8606		07 APR 11	NAVIGATION-TCAS-INSTALL A NEW HONEYWELL TCAS TPA 100 CHANGE 7.0 WITH COLLINS ATC TPR901 OR HNWL TRA67A
	Applicable to: B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P8626		20 AUG 10	NAVIGATION - STANDBY DATA: INTEGRATED STANDBY INSTRUMENT SYSTEM (ISIS) - INSTALL ISIS STANDARD VA01
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	P8629	46-1027 06	20 AUG 10	INFORMATION SYSTEMS - ATIMS - UPGRADE ATSU A/C INTERFACE SOFTWARE FOR FANS A+ CSB4.1 IMPLEMENTATION
	Applicable to: ALL			
R	P8671	31A1220 01	20 AUG 10	INDICATING/RECORDING SYSTEMS-ELECTRONIC INSTRUMENT SYSTEM(EIS)- INSTALL DISPLAY MANAGEMENT COMPUTER SOFTWARE EIS2 S4-2
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P8710		25 NOV 11	NAVIGATION - WEATHER RADAR SYSTEM - INSTALL COLLINS TRANSCEIVER FULLY COMPLIANT WITH MULTI-SCAN FUNCTION
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
	P8751	34-1345 02	20 AUG 10	NAVIGATION - EGPWS - INSTALL EGPWC CAPABLE OF PEAKS/OBSTACLE FUNCTIONS WITH EIS1 & USING GPS LATERAL POSITION
	Applicable to: ALL			
	P8799	34-1352 01	20 AUG 10	NAVIGATION- GPWS - USE LATERAL GPS POSITION WITH AUTOMATIC DESELECTION
	Applicable to: ALL			
R	P8850		20 AUG 10	PNEUMATIC - ENGINE BLEED AIR SUPPLY SYSTEM - INSTALL BMC STD 9 CAPABLE OF A318 PW
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P8863		20 AUG 10	INDICATING/RECORDING SYSTEM FWC ACQUISITION INTERFACE CONNECT FWC TO RPWS TO PREVENT DOOR OPENING WITH RESIDUAL CABIN PRESSURE
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P8866		20 AUG 10	LANDING GEAR - NORMAL BRAKING - INSTALL BSCU STD L4.8 (EM2)
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	P9034		20 AUG 10	NAVIGATION - GROUND PROXIMITY WARNING SYSTEM(GPWS) - DEACTIVATE GEOMETRIC ALTITUDE FUNCTION (ANTI MOD TO 31426)
	Applicable to: B-HSN			
R	P9038		20 AUG 10	AUTOFLIGHT-MULTIPURPOSE CONTROL AND DISPLAY UNIT (MCDU) - INSTALL HONEYWELL LCD MCDU
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	P9107	31-1267 03 31-1300 02	20 AUG 10	INDICATING/RECORDING SYSTEMS - FLIGHT WARNING COMPUTER (FWC) - INSTALL FWC STANDARD H2F3
	Applicable to: ALL			
R	P9126	22-1203 02	20 AUG 10	AUTOFLIGHT - FMGC - INSTALL FMGC IAE/PW STD P1I10 (WITH FMS2 HONEYWELL) ON A/C FITTED WITH IAE OR PW POWERPLANTS
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P9171		20 AUG 10	NAVIGATION-AIR DATA/INERTIAL REFERENCE SYSTEM (ADIRS) - INTRODUCE AIR DATA MONITORING FUNCTION
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P9196	34-1335 02	07 APR 11	NAVIGATION - STANDBY DATA: INTEGRATED STANDBY INSTRUMENT SYSTEM (ISIS) - INSTALL ISIS STD WB01
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P9225		20 AUG 10	INDICATING/RECORDING SYSTEM-ELECTRONIC INSTRUMENT SYSTEM (EIS)-INSTALL DISPLAY MANAGEMENT COMPUTER SOFTWARE EIS2 S6-1
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	P9332	34-1350 02	07 APR 11	NAVIGATION - ADIRU - INSTALL NORTHROP GRUMMAN ADIRU P/N 465020-0303-0316
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	P9355		20 AUG 10	NAVIGATION - WEATHER RADAR SYSTEM - REMOVE WXR TRANSCEIVER COLLINS -623 AND DEACTIVATE PWS (ANTI-MOD 32740/26560)
	Applicable to: B-HSO, B-HSP			
	P9496	73-1088 01	20 AUG 10	ENGINE FUEL AND CONTROL-FADEC SYSTEM- INTRODUCE EEC SOFTWARE STANDARD "SCN19" ON IAE V2500-A5 ENGINES
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
R	P9522		20 AUG 10	AUTO-FLIGHT-MULTIPURPOSE CONTROL AND DISPLAY UNIT(MCDU) - ACTIVATE BACK-UP NAV FUNCTION
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P9594		07 APR 11	PNEUMATIC - LEAK DETECTION - ACTIVATE PYLON LEAK DETECTION MONITORING
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P9655		07 APR 11	LANDING GEAR - NORMAL BRAKING - INSTALL BSCU SOFTWARE STD "L4.9"
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	P9688		20 AUG 10	AUTO FLIGHT - FAC - ACTIVATE TAIL STRIKE FUNCTION ON FAC 'BAM0618' BY PIN-PROGRAMMING
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR			
R	P9823	22-1244 02	20 AUG 10	AUTO-FLIGHT - FLIGHT MANAGEMENT AND GUIDANCE COMPUTER (FMGC) - INSTALL FMGC STD P1I11 ON IAE AND PW ENGINED A/C
	Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI			
R	P9824	31-1276 01	20 AUG 10	INDICATING/RECORDING SYSTEMS-ELECTRONIC INSTRUMENT SYSTEM(EIS)-INSTALL DISPLAY MANAGEMENT COMPUTER SOFTWARE EIS2 S7
	Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
	P9894		07 APR 11	AUTO FLIGHT - FLIGHT AUGMENTATION COMPUTER - INTRODUCE TAIL STRIKE INDICATION ON PFD FOR A320 AND A321 A/C
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR			
R	P9895		20 AUG 10	AUTO FLIGHT - FLIGHT AUGMENTATION COMPUTER- INTRODUCE TAIL STRIKE "PITCH-PITCH" CALL-OUT FOR A320 AND A321 A/C
	Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU			
R	P9902		25 NOV 11	NAVIGATION - WEATHER RADAR SYSTEM - INSTALL COLLINS WXR MULTISCAN WRT -2100 P/N 822-1710-213
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
	P9907		07 APR 11	INDICATING RECORDING SYSTEM - FLIGHT WARNING COMPUTER (FWC)- INSTALL FWC STANDARD H2-F4
	Applicable to: B-HSO, B-HSP			
N	P9978		30 MAY 12	NAVIGATION - ATC/MODE S (SELECT) - CERTIFY ADS-B OUT CAPABILITY THROUGH EXTENDED SQUITTER 1090 MHZ
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	22-1087 03		20 AUG 10	AUTOFLIGHT - FMGC - INSTALL FMGC PN B546CCM0106 (IAE GPS AND ACARS).
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF			
	25-1444 02		20 AUG 10	EQUIPMENT/FURNISHINGS - CURTAINS AND PARTITIONS - INTRODUCE PPTC FOR COCKPIT DOOR STRIKE PROTECTION
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
N	27-1188 00		30 MAY 12	FLIGHT CONTROL -ELAC SYSTEM- INTRODUCE ELAC A L84 SOFTWARE STANDARD - SB ONLY.
	Applicable to: B-HSI			
	31-1157 02		07 APR 11	INDICATING/RECORDING SYSTEM-DMC- INTRODUCE DMC V50 STANDARD
	Applicable to: B-HTG, B-HTH			
	31-1286 01		07 APR 11	INDICATING/RECORDING SYSTEMS - DMC - INTRODUCE DMC EIS1 V60 STANDARD.
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	32-1305 00		20 AUG 10	LANDING GEAR - NORMAL BRAKING - INSTALL BSCU STD L4.8 (EM2).
	Applicable to: B-HSL, B-HSM, B-HSN			
	33-1057 03		07 APR 11	LIGHTS - INSTRUMENT AND PANEL INTEGRAL LIGHTING - ENSURE EMERGENCY LIGHTING FOR STAND-BY INSTRUMENTS.
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH, B-HTI			
	34-1115 51		20 AUG 10	NAVIGATION - AIR DATA/INERTIAL REFERENCE SYSTEM - REDUCED VERTICAL SEPARATION MINIMUM (RVSM) WITH OPERATIONAL RESTRICTIONS.
	Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE			
	34-1119 02		20 AUG 10	NAVIGATION - SATELLITE NAVIGATION - INSTALL DUAL LITTON GPS AS A SUPPLEMENTARY MEANS OF NAVIGATION.
	Applicable to: B-HTF			
	34-1143 08		20 AUG 10	NAVIGATION - GLOBAL POSITIONING SYSTEM - ACTIVATE A PRIMARY GPS MEANS OF NAVIGATION USING LITTON GPS (CLASS C1 - HYBRID ARCHITECTURE).
	Applicable to: B-HTF			
	34-1167 01		20 AUG 10	NAVIGATION - INSTALL LITTON ADIRS (4MCU) INSTEAD OF HONEYWELL ADIRS (4MCU) - FOR RETROFIT ONLY.
	Applicable to: B-HSD, B-HSE			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	34-1205 11		20 AUG 10	NAVIGATION - EGPWS - ADAPT EGPWS PIN PROGRAMMING TO A321 AIRCRAFT CONFIGURATION.
	Applicable to: B-HTF			
	34-1216 03		20 AUG 10	NAVIGATION - ATC/TCAS - REPLACE GABLES ATC/TCAS CONTROL PANEL BY THALES CONTROL PANEL.
	Applicable to: B-HTF			
	34-1442 02		07 APR 11	NAVIGATION - EGPWS - ACTIVATE GEOMETRIC ALTITUDE FUNCTION
	Applicable to: B-HSN			

(1) Evolution code : N=New, R=Revised, E=Effectivity

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GENERAL INFORMATION

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GEN-PLP PRELIMINARY PAGES

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Localization Title	Toc Index	ID	Reason
GEN May 2012	A	1	Documentation update: Addition of "May 2012" documentary unit

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MAIN FCOM CHANGES

Applicable to: ALL

INTRODUCTION

PURPOSE

The purpose of the MAIN FCOM CHANGES section is to provide operators with general information about the most significant changes that are introduced in the current revision of the manual.
The information provided in this section is the same for all Operators, and is not customized.

In addition to this section, every revised Documentary Unit (DU) has a revision highlight (HL) that:

- Indicates the change(s) made to the DU
- Can be found in the associated “Preliminary Pages – Summary of Highlights” subchapter.

In addition to this section, the Modification Operational Impact (MOI) documents available on AirbusWorld web site (Flight Operations community) provide the operation impact linked to a MOD number.

1

MAY 2012

IN-FLIGHT LANDING DISTANCES

AIRBUS introduces a new reference for In-Flight Landing Distances assessment, both with and without in-flight failures, to replace the former Actual Landing Distances. AIRBUS modified the FCTM to reflect this new reference.
AIRBUS provides detailed information, as well as training packages that explain the concepts and their implementation, on AirbusWorld in the "Safety & Operational Materials" section of the "Flight Operations Community" menu.

ILLUSTRATIONS ENHANCEMENTS

Many illustrations are revised without technical change. The objective is to address format standardization and enhance readability.

TABLE OF CONTENTS PRO-ABN SECTION

Procedures are classified in alphabetical order to ease their access from the table of contents.

COVERAGE OF NEW FMS SPECIFICITIES

The PRO-SUP-22-20 "FMS Specificities" section of the FCOM gives the description of the following three FMS Specificities and their associated operational recommendations.

1. Undue reversion to V/S mode during climb and descent. This is applicable to all FMS Honeywell.
2. VOR/DME and VOR/TACAN not automatically tuned. This is applicable to the FMS2 Honeywell Release 1A H2 standard.
3. Erroneous lateral guidance in NAV mode during procedures that use not collocated NAVAIDs. This is applicable to all FMS Thales.

REV MAX SELECTION

The landing normal procedure allows the flight crews to maintain REV IDLE if the runway is dry and the aircraft performance permits. For any other case, AIRBUS recommends REV MAX selection on all thrust levers.

NOVEMBER 2011

CHANGE OF PRO-SPO-40 EXTENDED RANGE OPERATIONS

FCOM section PRO-SPO-40 Extended Range Operations has been updated, in reference with FAR 121.646 and EU-OPS1 (AMC 20-6 rev.2), and for which the operators must be in compliance with.
The new requirements amend essentially ETOPS weather minima, ETOPS threshold definition that corresponds now to a 60 min diversion distance and ETOPS fuel reserves.

Concerning the fuel reserves, the new regulations impact mainly:

- the weather contingency taking into account the wind errors,
- the icing protection during 100% of the forecasted icing time, which is the most penalizing scenario,
- the go-around and second approach that are no longer considered.

As a consequence the sections of PRO-SPO-40 Extended Range Operations have changed as follows:

- 10 General
- 20 Operational Limitations
- 30 Dispatch Consideration
- 40 Diversion During Extended Range Operations
- 50 Procedures
- 60 Performance

For additional information, it is possible to download a slide show which was presented during session 6 of the “17th Performance and Operations conference” held in 2011 in Dubai, from the Flight Operations community at www.airbusworld.com.

FUEL PENALTY FACTORS

Following an in-flight failure, it is essential for the flight crew to understand and have a clear view of all the operational consequences generated by this failure. In particular, when the failure has an impact on the fuel consumption the flight crew should have the means to estimate this impact. This is the purpose of the new Fuel Penalty Factor tables introduced in the QRH-FPE In-Flight Performance. These Fuel Penalty Factors are given as a guideline in order to increase the crew awareness on the consequences of such failures and to help the decision making.
On the other hand, the information is now grouped together in one part of the operational documentation (easier access), takes into account more operational cases (multiple failures, dispatch under MMEL) and the associated procedure is more formalized. It actually ensures a standardized and common treatment of all failures impacting the fuel consumption, by giving the same level of information to all flight crew.

CHAPTER MOVED

DSC ATA 56 (Windows) is moved to DSC ATA 25-40 (Equipment).

REMOVAL OF FLIGHT CREW BULLETINS FROM THE FCOM

Subsequent to suggestions received from numerous Airbus Operators, Airbus has decided to remove all Flight Crew Bulletins from the FCOM.

The information in these Bulletins will either be deleted when the information becomes useless, or incorporated in one or more of the following documents, if and as applicable:
- In the Flight Crew Training Manual (FCTM), and/or
- In a relevant and already-existent section of the Flight Crew Operating Manual (FCOM), and/or
- In a technical “WISE”article, published on the new “World In Service Experience Knowledge Management (WISE KM)” page of the AirbusWorld website.

The removal of all Flight Crew Bulletins, and the corresponding update of above-listed documents (as applicable), will be progressive. Therefore, as a first step, the following Bulletins are deleted: “Carbon Brakes Wear”, “Cabin Fans”, "Avoid Disorder in the Cockpit", "Stowage of Third Occupant Seat" and "Erroneous Airspeed/Altitude Indications".

REMOVAL OF FCOM REFERENCES FROM THE QRH

The Airbus aircraft are designed to be safely operated with the ECAM and QRH only. The FCOM provides only supplementary information on top of the ECAM and QRH. The FCOM

references in the QRH do not contain significant information needed for the continuation of the flight, but may contain information that is useful from an operational point of view.

Therefore, Airbus decided to review the QRH in order to:
- Introduce in the QRH the FCOM information, when useful for operations,
- Otherwise, remove the FCOM references.

AUGUST 2011

OEB IDENTIFICATIONS

Following the entry into service of the new digital FCOM/QRH, the OEB/OEBPROC identifications were changed. The Cross Reference Table (CRT), that provides the link between former and new OEB/OEBPROC identifications, is included in the description of the List of Effective Operations Engineering Bulletins (LEOEB).*Refer to GEN List of Effective Operations Engineering Bulletins (LEOEB)*

JULY 2011

CHANGE OF SOP STRUCTURE LINKED TO PRECISION APPROACH

The name of the Standard Operating Procedure section "18 ILS Approach" is changed into "18 Precision Approach" in order to deal with all Precision Approaches in the same section: ILS, GLS (if installed), MLS (if installed).

As a consequence the following sections (if installed) are deleted :
- PRO Procedures / NOR Normal Procedures / SOP Standard Operating Procedures / 18A MLS Approach
- PRO Procedures / NOR Normal Procedures / SOP Standard Operating Procedures / 18B GLS Approach

The Standard Operating Procedure section "21 Precision Approach" has been deleted. The content of this section (a link to the section SRP System Related Procedures/ 01 FMS/ 70 Approach) is part of the section "18 Precision Approach" (previous "18 ILS Approach").

As a consequence the number of the SOP sections after the removed section is changed as follows:
- PRO Procedures / NOR Normal Procedures / SOP Standard Operating Procedures / 21 Landing
- PRO Procedures / NOR Normal Procedures / SOP Standard Operating Procedures / 22 Go-Around
- PRO Procedures / NOR Normal Procedures / SOP Standard Operating Procedures / 23 After Landing

- PRO Procedures / NOR Normal Procedures / SOP Standard Operating Procedures / 24 Parking
- PRO Procedures / NOR Normal Procedures / SOP Standard Operating Procedures / 25 Securing the Aircraft

FIRST RELEASE

WEATHER RADAR

The information related to the use of the weather radar is removed from the FCOM/Procedures/Supplementary Procedures/34 Navigation as:
- This information is already provided in the FCTM/Supplementary Information/Use of Radar
- This information is training related.

DELETION OF THE "FPA CORRECTION CHART FOR COLD WEATHER"

Last winter, Airbus published on customer request the “FPA correction chart for cold weather operations” in FCOM 3.05.05 page 7. This table provided a FPA to be set on the FCU when flying in vertical selected mode FPA, depending on:
- The deviation from ISA conditions and
- The FPA published in the approach chart.

However, based on customer’s feedback, Airbus concluded that there was no satisfactory solution to provide accurate FPA correction that would apply for all different cases. This is because the altitude at which the final descent starts is not known. This altitude is indeed variable: it depends not only on Airport Temperature, but also on ATC clearance and local regulations. As a result, in all cases, the flight crew will need to fine tune the FPA during descent, based on the usual checks “Altitude (corrected in temperature) versus Distance”. Therefore, Airbus decided to describe the ADIRS behaviour with regards to FPA computation in cold weather in the FCTM but to remove the FPA correction table from the FCOM.

Note: *The FCOM sections concerned are:*
- *PER Performance / OPD Operating Data / GEN General (former 3.05.05)*
- *PRO Procedures / NOR Normal Procedures / SOP Standard Operating Procedures / 19 Non Precision Approach / A.Introduction (former 3.03.19)*

COCKPIT WINDSHIELD / WINDOW CRACKED

FCOM PRO-ABN part

The previous COCKPIT WINDSHIELD / WINDOW CRACKED procedure required to systematically descent to FL 230 for any crack. The intent was to not ask the flight crew to determine if the cracked windshield/window is still capable to sustain the difference of pressure between outside and inside. However this procedure led to descents and diversions that could have been avoided depending on the crack location.

Therefore the COCKPIT WINDSHIELD / WINDOW CRACKED procedure is changed. It now requires checking the condition of the inner ply by touching the crack:

- If the inner ply is not damaged, the flight may be continued at the intended flight level, as the inner ply is capable to sustain the differential pressure at maximum flight level.
- If the inner ply is cracked, the flight must be limited to FL 230 as the flight crew cannot determine how many structural plies are affected.

FCOM DSC part

A descriptive of the cockpit windshield / Window is introduced to explain the cockpit windshield/window structure and fail safe concept.

UNRELIABLE SPEED INDICATION

Airbus conducted an internal review of the Unreliable Speed Indication (USI) procedure based on several operators' feedback. Taking into account the training aspects and the procedure handling, Airbus decided to modify the USI procedure for aircraft equipped with Back-Up Speed Scale (BUSS).

The main modification consists in providing operators with the tables for initial level-off when the aircraft is below FL 250. As a consequence the layout of the procedure has been modified: The flight crew does not any longer refer to two different procedures if above or below FL 250. However, FL 250 is kept as a reference after the affected ADR(s) identification: If the affected ADR(s) cannot be identified or if all ADRs are affected:

- Above FL 250, the flight crew must keep one ADR to ON and fly the pitch and thrust tables.
- Below FL 250, the flight crew must switch off all the ADRs in order to activate the BUSS function.

With this modification, the Unreliable Speed Indication procedure for aircraft equipped with BUSS is similar to the procedure for aircraft that do not have the BUSS function. The subject modification eases the handling of the procedure for operators that have mixed-fleet (aircraft with BUSS function and aircraft without BUSS function).
The modification of the Unreliable Speed Indication for aircraft equipped with the BUSS will be addressed at the 2011 Dubai Performance and Operational conference.
The Flight Crew Training Manual (FCTM) provides information and recommendations associated to the use of the BUSS function.

FCOM PURPOSE

Applicable to: ALL

FCOM PURPOSE

The Flight Crew Operating Manual (FCOM) is the support documentation for flight crews. It provides them with the necessary information about the operational, technical, procedural, and performance characteristics of the Single Aisle aircraft family, to ensure safe and efficient operations of the aircraft during normal and abnormal/emergency situations, that may occur on ground, or in flight.
The manual is not designed to provide basic jet aircraft piloting techniques, or information, that are considered as basic airmanship for trained flight crews that are familiar with that type of aircraft and with its general handling characteristics.

The FCOM is intended to be used:

- Directly as flight crew operating manual or to provide operators with a basis for their development of a customized airline operations manual, in accordance with applicable requirements
- As a comprehensive reference guide during initial and refresher flight crew training. Practical and training-oriented information is addressed in the Flight Crew Training Manual (FCTM).*Refer to FCTM/OP-10 Introduction* . Moreover, the FCOM is not intended to be used for teaching basic piloting skills.

The Flight Crew Operating Manua complements the approved Airplane Flight Manual (AFM).
If the data contained in this manual differs from the data in the AFM, the AFM remains the reference.
Airbus encourages all manual holders and users to submit any FCOM question and suggestion to:
E.MAIL: fltops.fbwstd@airbus.com
AIRBUS S.A.S.
FLIGHT OPERATIONS SUPPORT AND SERVICES
1 ROND-POINT MAURICE BELLONTE
31707 BLAGNAC CEDEX, FRANCE
Fax: +33 5 61 93 29 68

FCOM CONTENTS

The contents of the FCOM are organized in the following six parts:

- System Descriptions (DSC, organized by ATA)
- Procedures
  - PRO ABN : Abnormal/Emergency
  - PRO NOR SOP : Normal
  - PRO NOR SRP : System Related
  - PRO SPO : Special Operations
  - PRO SUP : Supplementary
- Limitations (LIM)
- Performance (PER, organized by phase of flight)
- Operations Engineering Bulletins (OEB)
- Flight Crew Bulletins (FCB).

DOCUMENTARY UNITS

The FCOM is made of Documentary Units (DU). The DU is the smallest part of information with a technical content.

The DUs are listed on a separate "List of Effective Documentary Units" (LEDU). *Refer to the General section.*

Note: 1. DUs can be grouped into Group of DU (GDU)
2. Temporary information may be provided via Temporary DU (TDU).

IDENTIFICATION STRIP

Below the title of the DU, the identification strip provides:

- The list of MSN the DU is applicable to
- For TDU, the reference to the DU impacted by the TDU.

LIST OF EFFECTIVE SECTIONS/SUBSECTIONS (LESS) - PAPER ONLY

Applicable to: ALL

The List of Effective Sections/Subsections (LESS) summarizes all the sections and subsections contained in the FCOM. For each revision, a new LESS is issued when at least one DU of the section/subsection is changed.

The LESS consists of:
- The "M" field that may provide the following evolution code:
  - The "N" letter indicates a new section introduced by the revision
  - The "R" letter indicates a section in which the content has been revised
  - The "E" letter indicates an aircraft validity change within the section
  - The "M" letter indicates a section that have move within the FCOM
- The “Localization” field that allows localizing the section within the manual with the product structure
- The “Subsection title” field
- The “Rev. Date” field that indicated the date at which the section was changed.

LIST OF EFFECTIVE OPERATIONS ENGINEERING BULLETINS (LEOEB)

Applicable to: ALL

Refer to OEB-GEN Cross Reference Between the Former and New OEB Identifications

LIST OF EFFECTIVE DOCUMENTARY UNITS (LEDU) - PAPER ONLY

Applicable to: ALL

For each revision, a new List of Effective Documentary Units (LEDU) is issued at the section level. The LEDU provides information about the DU localization, applicability, identification and issue date.

The LEDU consists of:
- The "M" field that may provide the following Evolution Code:
  - The "N" letter indicates a new DU introduced by the revision
  - The "R" letter indicates a revised DU: The content of the DU is updated by the revision. A vertical line in the margin of the DU locates the modified part
  - The "E" letter indicates an aircraft validity change for the DU: The list of MSNs for which the DU is effective has been changed compared to the previous LEDU, by addition or deletion of one or several MSN
- The “Localization” field that allows localizing the DU in the manual with the product structure of the manual
- The "T" field (Temporary Information) that contains a cross if the associated DU is a TDU
- The "DU title" that provides the title of the DU
- The “DU identification” that identifies the DU with its own unique identification number or the GDU with its own unique code.
- The “DU date” that indicates when the DU has been released
- The DU criteria which lists the technical or operational criteria for which the DU and solution is applicable to.

- The “Applicable to” which provides the list of aircraft this DU and solution is applicable to
- The “Impacted by TDU” which is the identification of the TDU superseding the DU

LIST OF EFFECTIVE TEMPORARY DOCUMENTARY UNITS (LETDU) - PAPER ONLY

Applicable to: ALL

The List of Effective Temporary Documentary Units (LETDU) provides a summary of the Temporary DU impacting the section.

The LETDU consists of:

- The "M" field that may provide the following Evolution Code:
  - The "N" letter indicates a new TDU introduced by the revision
  - The "R" letter indicates a revised TDU: The content of the TDU is updated by the revision. A vertical line in the margin of the TDU locates the modified part
  - The "E" letter indicates an aircraft validity change for the TDU: The list of MSNs the TDU is applicable to has been changed compared to the previous LETDU, by addition or deletion of one or several MSN
- The “Localization” field that allows localizing the TDU in the manual with the product structure of the manual
- The “TDU Title” that provides the title of the TDU
- The “TDU identification” that identifies the TDU with its identification number with its own unique code
- The “TDU date” that indicates when the TDU has been released
- The TDU criteria which lists the technical or operational criteria, the it is applicable to
- The “Applicable to” which provides the list of aircraft this TDU is applicable to
- The “Impacted DU” which is the Identification of DU superseded by the TDU
- The “Reason for issue” of the TDU

Note: *1. TDU is displayed on a yellow background*
2. within the QRH the TDU replaces the impacted DU

AIRCRAFT ALLOCATION TABLE (AAT) - PAPER ONLY

Applicable to: ALL

The Aircraft Allocation Table (AAT) provides a view of the fleet covered in the FCOM. For each aircraft, the AAT provides its MSN, its registration number and the model.

LIST OF MODIFICATIONS (LOM) - PAPER ONLY

Applicable to: ALL

The List of Modifications (LOM) lists the criteria (Modification Proposal (MP) or Service Bulletins (SB)) which the installation on the aircraft affects the FCOM.

Note: *Each MP has one or more associated MODs. The MP/MOD correlation is available in AirN@v / Engineering.*

The LOM also indicates:
- The title of the criteria
- The date of incorporation of the criteria in the FCOM
- The list of aircraft that have the criteria
- The "M" field that may indicate the following evolution code
  - The "E" letter indicates an aircraft validity change of the criteria. The list of aircraft to which the criteria applies has changed compared to the previous FCOM revision, by addition or deletion of one or several aircraft.
  - The "N" letter indicates new criteria added by this FCOM revision
  - The "R" letter indicates a change in the criteria title or associated SB

FCOM USE AND ORGANIZATION

Applicable to: ALL

DEFINITIONS OF WARNINGS, CAUTIONS AND NOTES

The following are the official definitions of warnings, cautions and notes taken directly from the JAR25/CS-25 and applicable to Airbus flight operation documentation:

WARNING	An operating procedure, technique, etc. that may result in personal injury or loss of life if not followed.
CAUTION	An operating procedure, technique, etc. that may result in damage to equipment if not followed.
NOTE	An operating procedure, technique, etc. considered essential to emphasize. Information contained in notes may also be safety related.

INFORMATION TYPE AND LAYERS

The FCOM has technical information that may be used for:
- Flight crew operations in flight, or on ground
- Airlines operations on ground
- Training.

To take the above-noted objectives into account, the FCOM is organized in three layers as follows:

- Layer 1: "Need to know"
  Layer 1 presents information that is necessary in the cockpit.
- Layer 2: "Nice to know"
  Layer 2 presents information that is used as a reference, in order to fully understand the logic of the aircraft and pilot interfaces.
- Layer 3: Detailed information
  Layer 3 provides more detailed explanations, that are not necessarily needed in flight.

Note: *For paper only, the following examples show the visual characteristics of each kind of layer*

EXAMPLE	- Text in layer 1 Layer 1 is the default layer. No symbology when not following layer 2 or layer 3 information.

L2

EXAMPLE	- Text in layer 2

L3

EXAMPLE	- Text in layer 3

L1

EXAMPLE	- Text in layer 1 (as this text follows a text in layer 2 or 3, symbology "L1")

OPTIONAL EQUIPMENT

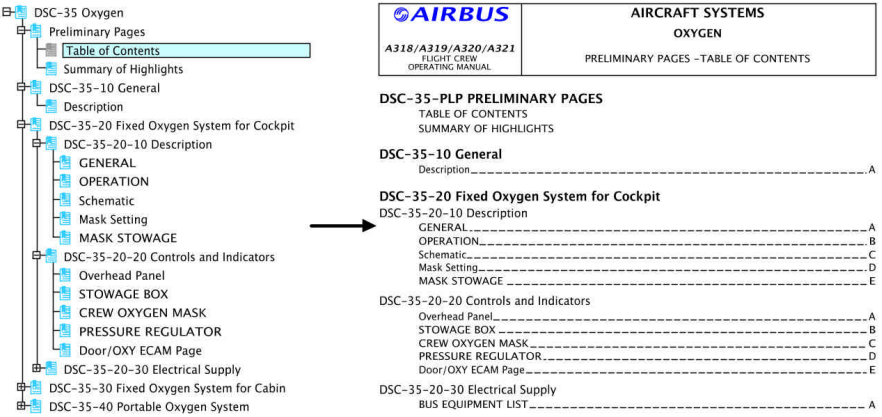
The legend ⋖ (if installed) indicates that a paragraph or a schematic is applicable only if the related equipment is installed.

FCOM FORMAT AND STYLE INFORMATION - PAPER ONLY

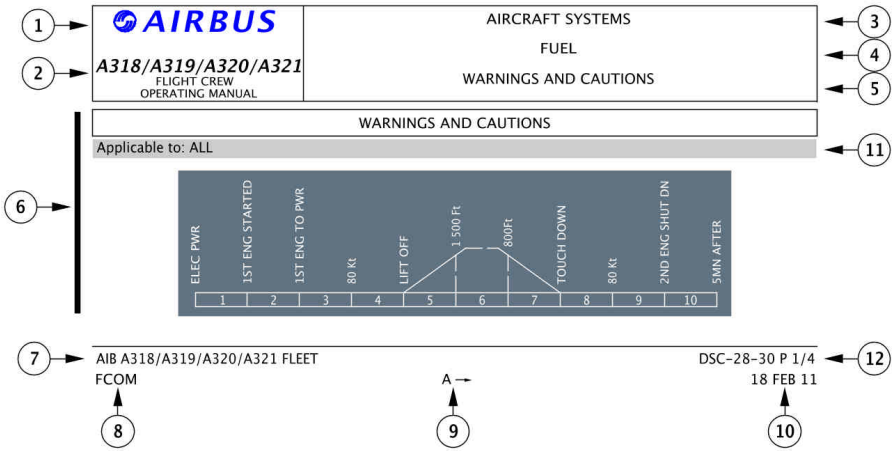
Applicable to: ALL

TABLE OF CONTENTS

Each TOC entry has an alphabetical index that identifies this TOC entry within its subsection. The manual user can easily find a TOC entry content within the manual thanks to this alphabetical index and the subsection identification. Both are indicated in the TOC and both cross-refer to the paper page footer (see the TOC indexing part below).



HEADER AND FOOTER



1. Airline logo
2. Aircraft types and manual
3. Level 2 chapter (PSL level 2 : GEN, DSC, PRO, LIM, OEB, FCB, PER)
4. Level 3 chapter
5. Level 4 chapter
6. Revision mark
7. Key product (document identification and aircraft designation)
8. Key product (manual code)
9. Page index
10. Last evolution date
11. Identification strip (list of impacted aircraft)
12. PSL path

REVISION MARK

In the paper format, a vertical bar in the margin of the DU identifies the modified part. Each vertical bar has a numerical index that refers to the associated reason of the change in the Summary of Highlight.
This Summary of Highlight lists all the changes and associated reasons of the change (if necessary) that the revision has introduced.

TOC INDEXING

In the paper page footer, the TOC indexing is of the following type:

A	:	The paper page contains the whole "A" TOC entry content
A to B	:	The paper page contains the whole "A" and "B" TOC entries contents
A →	:	The "A" TOC entry content starts on this paper page and continues on the following paper page
←A	:	The "A" TOC entry content starts on a previous paper page and finishes on this paper page
←A →	:	The "A" TOC entry content starts on a previous paper page and continues on the following paper page
A to C→	:	The paper page contains the whole "A" and "B" TOC entries contents but the "C" TOC entry content starts on this paper page and continues on the following paper page
←A to C	:	The paper page contains the whole "B" and "C" TOC entries contents but the "A" TOC entry content starts on a previous paper page and finishes on this paper page
←A to C →	:	The paper page contains the whole "B" TOC entry content but the "A" TOC entry content starts on a previous paper page and finishes on this paper page and the "C" TOC entry content starts on this paper page and continues on the following paper page

Note: *1. The indexes follow the alphabetical order: A, B, C, ..., Z, AA, AB, AC, ..., AZ, BA, BB, BC, ...*
2. For each subsection, the index starts again from A.
3. When a TOC entry content continues on the following paper page, the text "Continued on the following page" is also indicated.

FCOM REVISIONS

Applicable to: ALL

FCOM REVISION

FCOM revisions are issued to add, update, or revise information. The Operator determines the revision periodicity.
When necessary, a revision may be issued in between the defined periodicity (e.g. need for urgent update).
A vertical bar appears to the left of all revised parts of the manual.

TEMPORARY INFORMATION

Some FCOM sections may need a temporary update (e.g. to explain a system behavior that will be modified by a future standard). In such cases, the applicable FCOM section is updated with a Temporary Documentary Unit (TDU).
Information contained in the TDU is highlighted in the manual and the initial content of the FCOM remains available for consultation and comparison and is highlighted (identification strip) as being impacted by the TDU.
A List of Effective Documentary Units (LEDU) is provided in the FCOM

OPERATING ENGINEERING BULLETINS

Operations Engineering Bulletins (OEB) are issued, when it is necessary, to rapidly transmit technical and procedural information.
The OEB chapter provides a list of all applicable OEBs.

FLIGHT CREW BULLETINS

Flight Crew Bulletins (FCB) are issued, when it is necessary, to transmit complementary technical or operational information.
The FCB chapter provides a list of all applicable FCBs.

ABBREVIATIONS

Applicable to: ALL

A

Abbreviation	Term
A>B	A is greater than B
A≥B	A is greater than or equal to B
A<B	A is less than B
A≤B	A is less than or equal to B
A/BRK	Autobrake
A/C	Aircraft
A/P	Autopilot
AP	Autopilot
A/S	Airspeed
A/SKID	Anti-skid
A/THR	Auto Thrust
AA	Airworthiness Authorities
AB	Abort
ABCU	Alternate Braking Control Unit
ABN	Abnormal
ABV	Above
AC	Alternating Current
ACARS	ARINC Communication Addressing and Reporting System
ACAS	Airbrone Collision Avoidance System
ACCEL	Acceleration
ACC	Active Clearance Control
ACCU	Accumulator
ACP	Audio Control Panel
ACSC	Air Conditioning System Controller
ACT	Additional Center Tank
ADF	Automatic Direction Finder
ADIRS	Air Data Inertial Reference System
ADIRU	Air Data Inertial Reference Unit
ADM	Air Data Module
ADR	Air Data Reference
ADS-B	Automatic Dependent Surveillance-Broadcast
ADV	Advisory
AEVC	Avionic Equipment Ventilation Controller
AFM	Airplane Flight Manual
AFS	Auto Flight System
AGL	Above Ground Level

Continued on the following page

Continued from the previous page

Abbreviation	Term
AIDS	Aircraft Integrated Data System
AIL	Aileron
AIME	Autonomous Integrity Monitoring Extrapolation
AIU	Audio Interface Unit
ALT	Altitude
ALTN	Alternate
AMI	Airline Modifiable Information
AMU	Audio Management Unit
ANT	Antenna
AOA	Angle of Attack
AOC	Airline Operational Control
APP	Approach
APPR	Approach
APPU	Assymetry Position Pick-off Unit
APU	Auxiliary Power Unit
AR	Authorization Required
ARINC	Aeronautical Radio Incorporated
ARN	Aircraft Registration Number
ARP	Aerospace Recommended Practice
ARPT	Airport
ASAP	As Soon As Possible
ASI	Air Speed Indicator
ASP	Audio Selector Panel
ATC	Air Traffic Control
ATM	Air Traffic Management
ATN	Aeronautical Telecommunications Network
ATE	Automatic Test Equipment
ATIS	Airbus Technical Information System
ATS	Auto Thrust System
ATSAW	Airbrone Traffic Situational Awareness
ATSU	Air Traffic Service Unit
ATT	Attitude
AUTO	Automatic
AVNCS	Avionics
AWY	Airway

B

Abbreviation	Term
B/C	Back Course
BARO	Barometric

Continued on the following page

Continued from the previous page

Abbreviation	Term
BAT	Battery
BCL	Battery Charge Limiter
BCDS	Bite Centralized Data System
BCU	Backup Control Unit
BDDV	Brake Dual Distribution Valve
BITE	Built-In Test Equipment
BIU	BITE Interface Unit
BFE	Buyer Furnished Equipment
BFO	Beat Frequency Oscillator
BMC	Bleed Monitoring Computer
BNR	Binary
BRG	Bearing
BRK	Brake
BRT	Bright
BSCU	Braking Steering Control Unit
BTC	Bus Tie Contactor
BTL	Bottle
BUS	Busbar

C

Abbreviation	Term
C/B	Circuit Breaker
CB	Circuit Breaker
C/L	Checklist
CL	Checklist
CAB	Cabin
CAPT	Captain, Capture
CAS	Calibrated Airspeed
CAT	Category
CBMS	Circuit Breaker Monitoring System
CDL	Configuration Deviation List
CDLS	Cockpit Door Locking System
CDSS	Cockpit Door Surveillance System
CDU	Control Display Unit
CF	Cost of Fuel
CFDIU	Centralized Fault Display Interface Unit
CFDS	Centralized Fault Display System
CG	Center of Gravity
CHAN	Channel
CHG	Change

Continued on the following page

Continued from the previous page

Abbreviation	Term
CHK	Check
CI	Cost Index
CIDS	Cabin Intercommunication Data System
CKPT	Cockpit
CLB	Climb
CLR	Clear
CLSD	Closed
CM1(2)	Crewmember 1 (left seat) or 2 (right seat)
CM1	Crewmember 1 (left seat)
CM2	Crewmember 2 (right seat)
CMPTR	Computer
CNSU	Cabin Network Server Unit
CO	Company
CO RTE	Company Route
COND	Conditioning
CONF	Configuration
CONT	Continuous
CPCU	Cabin Pressure Controller Unit
CPDLC	Controller-Pilot Data Link Communication
CRC	Continuous Repetitive Chime
CRG	Cargo
CRS	Course
CRT	Cathode Ray Tube
CRZ	Cruise
CSAS	Conditioned Service Air System
CSCU	Cargo Smoke Control Unit
CSD	Constant Speed Drive
CSM/G	Constant Speed Motor/Generator
CSTR	Constraint
CT	Cost of Time
CTL	Control
CTL PNL	Control Panel
CTR	Center
CVR	Cockpit Voice Recorder

D

Abbreviation	Term
DA	Drift Angle
DAC	Digital to Analog Converter
DAR	Digital AIDS Recorder

Continued on the following page

Continued from the previous page

Abbreviation	Term
DC	Direct Current
DCDU	Datalink Control and Display Unit
DCL	Digital Cabin Logbook
DDRMI	Digital Distance and Radio Magnetic Indicator
DECEL	Deceleration
DES	Descent
DEST	Destination
DET	Detection, Detector
DFA	Delayed Flap Approach
DFDR	Digital Flight Data Recorder
DH	Decision Height
DIR	Direction
DIR TO	Direct To
DISC	Disconnect
DISCH	Discharge
DIST	Distance
DITS	Digital Information Transfer System
DIV	Diverter
DMC	Display Management Computer
DME	Distance Measuring Equipment
DMU	Data Management Unit (Aids)
DN	Down
DSDL	Dedicated Serial Data Link
DTG	Distance To Go
DTO	Derated Takeoff
DU	Display Unit
DU	Documentary Units

E

Abbreviation	Term
EWD	Engine/Warning Display
ECAM	Electronic Centralized Aircraft Monitoring
ECAS	Emergency Cockpit Alerting System
ECB	Electronic Control Box (APU)
ECM	Engine Condition Monitoring
ECON	Economic
ECP	ECAM Control Panel
ECS	Environmental Control System
ECU	Engine Control Unit
EDP	Engine-Driven Pump

Continued on the following page

Continued from the previous page

Abbreviation	Term
EEC	Electronic Engine Computer
EFCS	Electronic Flight Control System
EFIS	Electronic Flight Instruments System
EFOB	Estimated Fuel On Board
EGPWS	Enhanced Ground Proximity Warning System
EGT	Exhaust Gas Temperature
EIS	Electronic Instruments System
EIU	Engine Interface Unit
ELAC	Elevator Aileron Computer
ELEC	Electrics
ELT	Emergency Locator Transmitter
ELEV	Elevator
ELV	Elevation
EMER	Emergency
EMER GEN	Emergency Generator
ENG	Engine
EO	Engine-Out
EOSID	Engine-Out Standard Instrument Departure
EPR	Engine Pressure Ratio
EPU	Emergency Power Unit
EROPS	Extended Range Operation
ESS	Essential
EST	Estimated
ETA	Estimated Time of Arrival
ETE	Estimated Time Enroute
ETOPS	Extended Twin Operations
ETP	Equal Time Point
EVMU	Engine Vibration Monitoring Unit
E/WD	Engine/Warning Display
EXP	Expedite
EXT PWR	External Power
EXTN	Extension

F

Abbreviation	Term
F	Fuel
FAA	Federal Aviation Administration
FAP	Forward Attendant Panel
F/C	Flight Crew
F/O	First Officer

Continued on the following page

Continued from the previous page

Abbreviation	Term
FO	First Officer
FAC	Flight Augmentation Computer
FADEC	Full Authority Digital Engine Control System
FAF	Final Approach Fix
FAP	Forward Attendant Panel
FAR	Federal Aviation Regulations
FAV	Fan Air Valve
FCDC	Flight Control Data Concentrator
FCMS	Fuel Control and Monitoring System
FCOM	Flight Crew Operating Manual
FCU	Flight Control Unit
FD	Flight Director
FDIMU	Flight Data Interface and Management Unit
FDIU	Flight Data Interface Unit
FDU	Fire Detection Unit
FF	Fuel Flow
FG	Flight Guidance
FGC	Flight Guidance Computer
F-G/S	FLS Glide Slope
FIDS	Fault Isolation and Detection System
FL	Flight Level
FLHV	Fuel Lower Heating Value
F-LOC	FLS Localizer
FLP	Flap
FLS	FMS Landing System
FLT	Flight
F/CTL	Flight Control
FLT CTL	Flight Control
FLXTO	Flexible Takeoff
FM	Flight Management
FMA	Flight Mode Annunciator
FMGC	Flight Management and Guidance Computer
FMGS	Flight Management and Guidance System
FMS	Flight Management System
FNL	Final
FOB	Fuel On Board
FOM	Figure Of Merit
FPA	Flight Path Angle
F-PLN	Flight Plan
FPD	Flight Path Director

Continued on the following page

Continued from the previous page

Abbreviation	Term
FPPU	Feedback Position Pick-off Unit
FPV	Flight Path Vector
FQI	Fuel Quantity Indication
FQU	Fuel Quantity Unit
FREQ	Frequency
FRT	Front
FRV	Fuel Return Valve
FU	Fuel Used
FWC	Flight Warning Computer
FWD	Forward
FWS	Flight Warning System

G

Abbreviation	Term
G/S	Glideslope
GA	Go-Around
GAPCU	Ground and Auxiliary Power Control Unit
GBAS	Ground Based Augmentation System
GCU	Generator Control Unit
GDU	Group of Documentary Unit
GEN	Generator
GES	Ground Earth Station
GLC	Generator Line Contactor
GLS	GBAS Landing System
GLS	GNSS Landing System
GMT	Greenwich Mean Time
GND	Ground
GPCU	Ground Power Control Unit
GPIRS	Global Positioning and Inertial Reference System
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
GRND	Ground
GRP	Geographic Reference Point
GRVTY	Gravity
GS	Ground Speed
GW	Gross Weight

H

Abbreviation	Term
HC	Harness Connector
HCU	Hydraulic Control Unit
HDG	Heading
HDG/S	Heading Selected
HDL	Handle
HF	High Frequency
HI	High
HLD	Hold
HM	Holding Pattern with a Manual Termination
HMU	Hydrau-Mechanical Unit
HMS	Heat Management System
HP	High Pressure
HPA	Hectopascal
HPV	High Pressure Valve
HUD	Head Up Display
HYD	Hydraulic

I

Abbreviation	Term
I/O	Inputs/Outputs
I/P	Input or Intercept Profile
IAF	Initial Approach Fix
IAS	Indicated Airspeed
ICAO	International Air Transport Organization
IDENT	Identification
IDG	Integrated Drive Generator
IFE	In Flight Entertainment
IFR	Instrument Flight Rules
IGGS	Inert Gas Generation System
IGN	Ignition
ILS	Instrument Landing System
IM	Inner Marker
IMM	Immediate
INB	Inbound
INBO	Inboard
INCREM	Increment
INIT	Initialization
INOP	Inoperative
INR	Inner

Continued on the following page

Continued from the previous page

Abbreviation	Term
INST	Instrument
INTCP	Intercept
INV	Inverter
IP	Intermediate Pressure
IPC	Intermediate Pressure Check valve
IPPU	Instrumentation Position Pick-off Unit
IR	Inertial Reference
IRS	Inertial Reference System
ISA	International Standard Atmosphere
ISDU	Initial System Display Unit
ISIS	Integrated Standby Instrument System
ISOL	Isolation
ISPSS	In Seat Power Supply System

J

Abbreviation	Term

K

Abbreviation	Term

L

Abbreviation	Term
L/G	Landing Gear
LAF	Load Alleviation Function
LAT	Latitude
LAT REV	Lateral Revision
LAV	Lavatory
LCD	Liquid Crystal Display
LCN	Load Classification Number
LDG	Landing
LED	Light Emiting Diode
LEDU	List of Effective Documentary Units
LEFCB	List of Effective Flight Crew Bulletins
LEOEB	List of Effective Operations Engineering Bulletins
LESS	List of Effective Section/Subsections
LF	Low Frequency
LGCIU	Landing Gear Control Interface Unit
LGPIU	Landing Gear Position Indicator Unit
LH	Left-Hand
LIM	Limitation

Continued on the following page

Continued from the previous page

Abbreviation	Term
LIS	Localizer Inertial Smoothing
LK	Lock
LL	Latitude/Longitude
LLS	Left-Line Select key
LO	Low
LOC	Localizer
LONG	Longitude
LP	Low Pressure
LRRA	Low Range Radio Altimeter
LRU	Line Replaceable Unit
LS	Loudspeaker
LSK	Line Select Key
LVL	Level
LVL/CH	Level Change
LVR	Lever
LW	Landing Weight

M

Abbreviation	Term
MABH	Minimum Approach Break-off Height
MAC	Mean Aerodynamic Chord
MAG	Magnetic
MAG DEC	Magnetic Declination
MAG VAR	Magnetic Variation
MAINT	Maintenance
MAN	Manual
MAP	Missed Approach Point
MAX	Maximum
MAX CLB	Maximum Climb
MAX DES	Maximum Descent
MAX END	Maximum Endurance
MC	Master Caution
MCDU	Multipurpose Control and Display Unit
MCT	Maximum Continuous Thrust
MCU	Modular Concept Unit
MDA	Minimum Descent Altitude
MDDU	Multifunction Disk Drive Unit
MDH	Minimum Descent Height
MECH	Mechanic
MEA	Minimum En Route Altitude

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Abbreviation	Term
MED	Medium
MEL	Minimum Equipment List
MFA	Memorized Fault Annunciator
MIN	Minimum
MKR	Marker
MLA	Maneuver Load Alleviation
MLS	Microwave Landing System
MLW	Maximum Landing Weight
MM	Middle Marker
MMEL	Master Minimum Equipment List
MMO	Maximum Operating Mach
MMR	Multi Mode Receiver
MN	Mach number
MORA	Minimum Off Route Altitude
MRIU	Maintenance and Recording Interface Unit
MSA	Minimum Safe Altitude
MSG	Message
MSL	Mean Sea Level
MSU	Mode Selector Unit
MTBF	Mean Time Between Failure
MTOW	Maximum Takeoff Weight
MZFW	Maximum Zero Fuel Weight

N

Abbreviation	Term
N/A	Not Applicable
NA	Not Applicable
N1	Low Pressure Rotor Speed (in %)
N2	High Pressure Rotor Speed (in %)
NACA	National Advisory Committee for Aeronautics
NAV	Navigation
NAVAID	Navigation Aid
NCD	Non Computed Data
ND	Navigation Display
NDB	Non Directional Beacon
NORM	Normal
NW	Nosewheel
NWS	Nosewheel Steering

O

Abbreviation	Term
O/P	Output
OAT	Outside Air Temperature
OBRM	On Board Replaceable Module
OEB	Operations Engineering Bulletin
OFF/R	Off Reset
OFST	Offset
OIS	Onboard Information System
OIT	Onboard Information Terminal
OM	Outer Marker
OP	Open
OPP	Opposite
OPS	Operations
OPT	Optimum
OUTB	Outbound
OUTR	Outer
OVBD	Overboard
OVHD	Overhead
OVHT	Overheat
OVRD	Override
OVSPD	Overspeed
OXY	Oxygen

P

Abbreviation	Term
P/N	Part Number
PN	Part Number
PA	Passenger Address
P-ALT	Profile Altitude
PAX	Passenger
PBE	Portable Breathing Equipment
P-CLB	Profile Climb
PCU	Power Control Unit
P-DES	Profile Descent
PDB	Performance Data Base
PDU	Pilot Display Unit
PERF	Performance
PES	Passenger Entertainment System
PF	Pilot Flying
PFD	Primary Flight Display

Continued on the following page

Continued from the previous page

Abbreviation	Term
PHC	Probes Heat Computer
P-MACH	Profile Mach
PNF	Pilot Non Flying
PNL	Panel
POB	Pressure Off Brake
POS	Position
PPOS	Present Position
PPU	Position Pick-off Unit
PR	Pressure
PRED	Prediction
PRESS	Pressure, Pressurization
PROC	Procedure
PROC T	Procedure Turn
PROF	Profile
PROG	Progress
PROTEC	Protection
P-SPEED	Profile Speed
PSL	Product Structure Level
PSU	Passenger Service Unit
PT	Point
PTR	Printer
PTT	Push To Talk
PTU	Power Transfer Unit (Hydraulic)
PVI	Paravisual Indicator
PWR	Power
PWS	Predictive Windshear System

Q

Abbreviation	Term
QAR	Quick Access Recorder
QFE	Field Elevation Atmosphere Pressure
QFU	Runway Heading
QNE	Sea Level Standard Atmosphere Pressure (1013 hPa)
QNH	Sea Level Atmosphere Pressure
QRH	Quick Reference Handbook
QT	Quart (US)
QTY	Quantity

R

Abbreviation	Term
R/I	Radio/Inertial
RA	Radio Altitude
RA	Resolution Advisory
RACC	Rotor Active Clearance Control
RAD	Radio
RAIM	Receiver Autonomous Integrity Monitoring
RAT	Ram Air Turbine
RATC	Remote ATC Box
RCDR	Recorder
RCL	Recall
RCVR	Receiver
REAC	Reactive
REC	Recommended
RED	Reduction
REG	Regulation
REL	Release
REV	Reverse
RH	Right-Hand
RLSK	Right Line Select Key
RMI	Radio Magnetic Indicator
RMP	Radio Management Panel
RNAV	Area Navigation
RNG	Range
RNP	Required Navigation Performance
RPM	Revolution Per Minute
RPTG	Repeating
RQRD	Required
RSV	Reserves
RTE	Route
RTL	Rudder Travel Limit
RTO	Rejected Takeoff
RTOW	Regulatory Takeoff Weight
RUD	Rudder
RVSM	Reduced Vertical Separation Minimum
RWY	Runway

S

Abbreviation	Term
S	South
S/C	Step Climb
S/D	Step Descent
S/D	Shut Down
S/F	Slats/Flaps
S/N	Serial Number
SN	Serial Number
SAAAR	Special Aircrew and Aircraft Authorization Required
SAT	Static Air Temperature
SATCOM	Satellite Communication
SC	Single Chime
SD	System Display
SDAC	System Data Acquisition Concentrator
SDCU	Smoke Detection Control Unit
SEC	Spoiler Elevator Computer
SEL	Selector
SFCC	Slat/Flap Control Computer
SFE	Seller-Furnished Equipment
SID	Standard Instrument Departure
SIM	Simulation
SLT	Slat
SPD	Speed
SPD LIM	Speed Limit
SPLR	Spoiler
SRS	Speed Reference System
STAR	Standard Terminal Arrival Route
STAT	Static
STAT INV	Static Inverter
STBY	Standby
STD	Standard
STEER	Steering
STRG	Steering
STS	Status
SWTG	Switching
SYNC	Synchronize
SYS	System

T

Abbreviation	Term
T.O	Takeoff
T/O	Takeoff
TO	Takeoff
T/C	Top of Climb
T/D	Top of Descent
TA	Traffic Advisory
TAC	Taxiing Aid Camera
TACAN	Tactical Air Navigation
TACT	Tactical
TAS	True Air Speed
TAT	Total Air Temperature
TAU	Time to intercept
TBC	To Be Confirmed
TBD	To Be Determined
TCAS	Traffic Collision Alert System or Threat-Analysis/Collision Avoidance System
TDU	Temporary Documentary Unit
TEMP	Temperature
TFTS	Terrestrial Flight Telephon System
TGT	Target
THR	Thrust
THS	Trimmable Horizontal Stabilizer
TK	Tank
TK	Track angle
TKE	Track Angle Error
TLA	Throttle Lever Angle
TLU	Travel Limitation Unit
TMR	Timer
TOGA	Takeoff - Go-Around
TOGW	Takeoff Gross Weight
TOW	Takeoff Weight
T-P	Turn Point
TPIS	Tire Pressure Indicating System
TR	Thrust Reverser
T-R	Transmitter-Receiver
TRANS	Transition
TRK	Track
TROPO	Tropopause
TRU	Transformer Rectifier Unit
TRV	Travel

Continued on the following page

Continued from the previous page

Abbreviation	Term
TSM	Trouble Shooting Manual
TTG	Time to Go
TVMC	Minimum Control Speed Temperature

U

Abbreviation	Term
UFD	Unit Fault Data
ULB	Underwater Locator Beacon
UNLK	Unlock
UP	Up, Upper
UTC	Universal Coordinated Time

V

Abbreviation	Term
V/S	Vertical Speed
V1	Decision Speed
V2	Takeoff Safety Speed
VAPP	Approach Speed
VBV	Variable Bypass Valve
VC	Calibrated airspeed
VDEV	Vertical Deviation
VEL	Velocity
VERT	Vertical
VERT REV	Vertical Revisor
VFE	Maximum Speed for each Flap configuration
VFEN	VFE Next
VFTO	Final Takeoff Speed
VHF	Very High Frequency
VHV	Very High Voltage
VIB	Vibration
VLE	Maximum Landing Gear Extended Speed
VLS	Lowest Selectable Speed
VLV	Valve
VM	Maneuvering Speed
VMAX	Maximum Allowable Speed
VMCA	Minimum Control Speed in the Air
VMCG	Minimum Control Speed on Ground
VMCL	Minimum Control Speed at Landing
VMIN	Minimum Operating Speed
VMO	Maximum Operating Speed

Continued on the following page

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Abbreviation	Term
VMU	Minimum Unstick Speed
VOR	VHF Omnidirectional Range
VOR-D	VOR-DME
VR	Rotation Speed
VREF	Landing Reference Speed
VSI	Vertical Speed Indicator
VSV	Variable Stator Vane
VU	Visual Unit

W

Abbreviation	Term
WARN	Warning
WBC	Weight and Balance Computer
WBS	Weight and Balance System
WGD	Windshield Guidance Display
WHC	Window Heat Computer
WNDW	Window
WPT	Waypoint
WSHLD	Windshield
WT	Weight
WTB	Wing Tip Brake
WXR	Weather Radar

X

Abbreviation	Term
XBLD	Crossbleed
XCVR	Transceiver
XFR	Transfer
XMTR	Transmitter
XPDR	Transponder
XTK	Crosstrack Error

Y

Abbreviation	Term

Z

Abbreviation	Term
ZFCG	Zero Fuel Center of Gravity
ZFW	Zero Fuel Weight
ZFWCG	Zero Fuel Weight Center of Gravity field

AIRCRAFT SYSTEMS

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AIRCRAFT SYSTEMS

AIRCRAFT GENERAL

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Principal Dimensions....B
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Localization Title	Toc Index	ID	Reason
DSC-20-20 Principal Dimensions	B	1	Update of the vertical stabilizer height to be in accordance with AFM.
DSC-20-20 Principal Dimensions	B	2	Update of the vertical stabilizer height to be in accordance with AFM.
DSC-20-20 Antenna Locations	D	3	Improvement of illustration quality.

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GENERAL

Applicable to: ALL 320

The A320 is a subsonic, medium-range, civil transport aircraft.

GENERAL

Applicable to: ALL 321

The A321 is a subsonic, medium-range, civil transport aircraft.

ENGINES

Applicable to: ALL

The aircraft has two high bypass turbofan engines mounted under the wings.

COCKPIT

Applicable to: ALL

The cockpit is designed for a two-member crew. It also has a place for 2 observers.

CABIN

Applicable to: ALL 320

The passenger seating layout may vary, depending on operating requirements. The certified maximum is 180 seats.

CABIN

Applicable to: ALL 321

The passenger seating layout may vary, depending on operating requirements. The certified maximum is 220 seats.

CARGO

Applicable to: ALL

Two cargo compartments are under the cabin floor.

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GENERAL ARRANGEMENT

Applicable to: ALL

This subchapter gives the principal aircraft dimensions, location of unpressurized areas, antennas, ground service connections, and ground maneuvering characteristics.

PRINCIPAL DIMENSIONS

Applicable to: ALL 320

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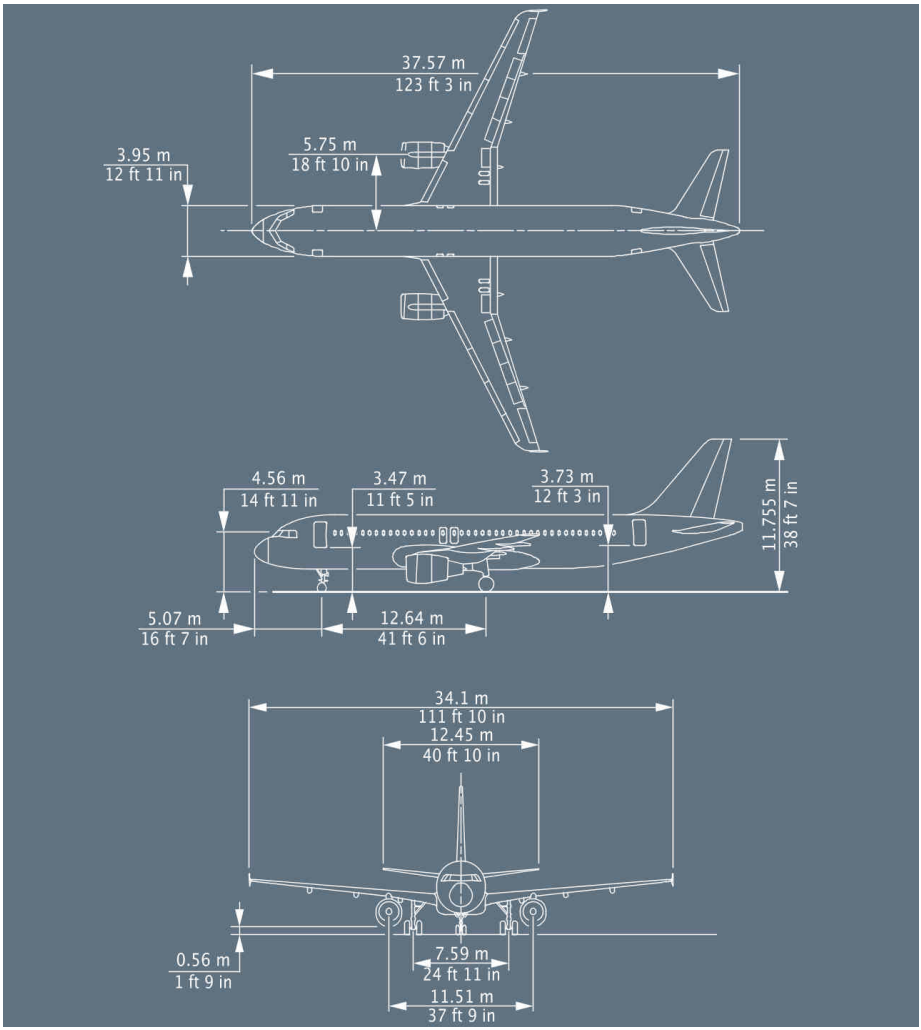

PRINCIPAL DIMENSIONS

Applicable to: ALL 321

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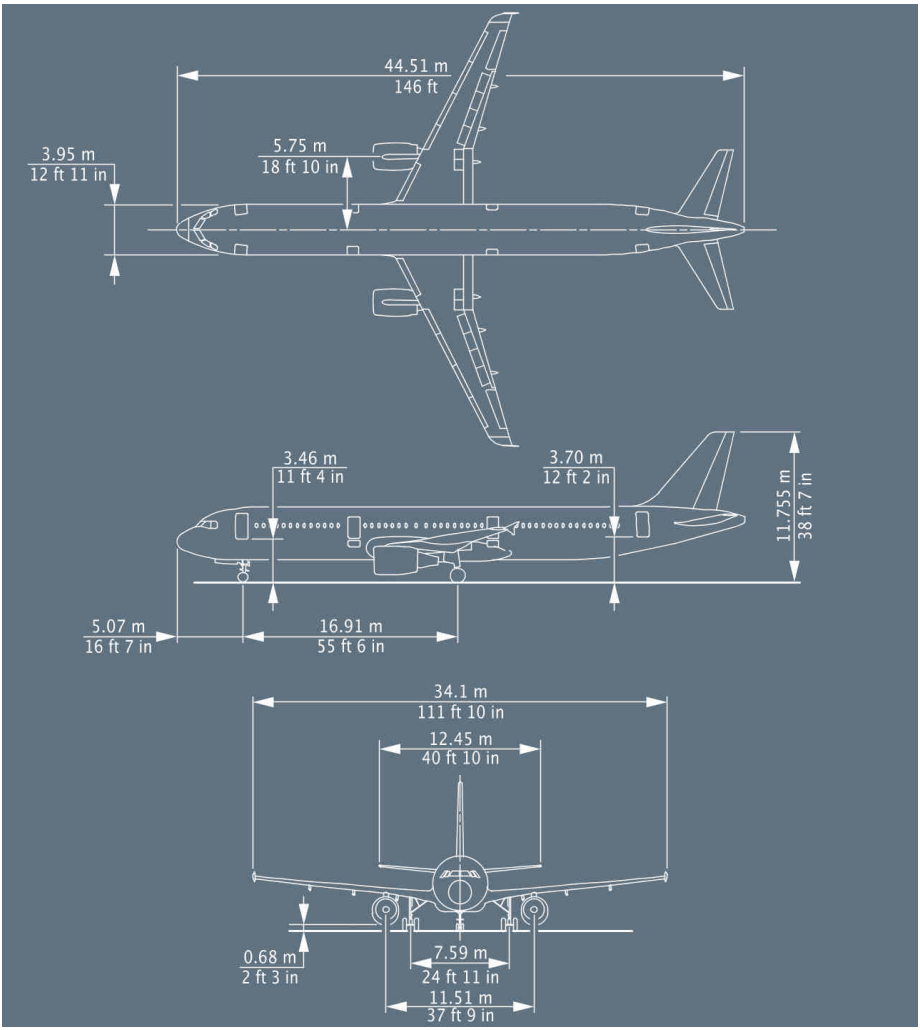
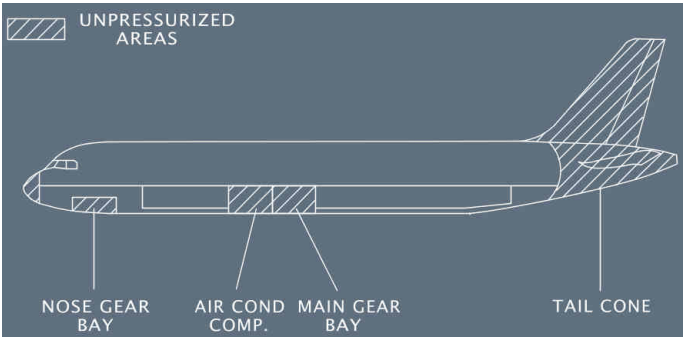


UNPRESSURIZED COMPARTMENTS

Applicable to: ALL



ANTENNA LOCATIONS

Applicable to: ALL

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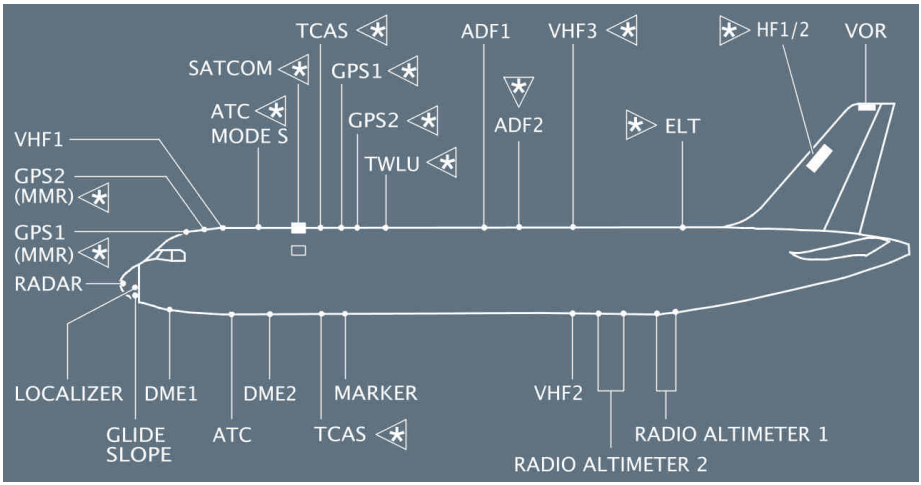
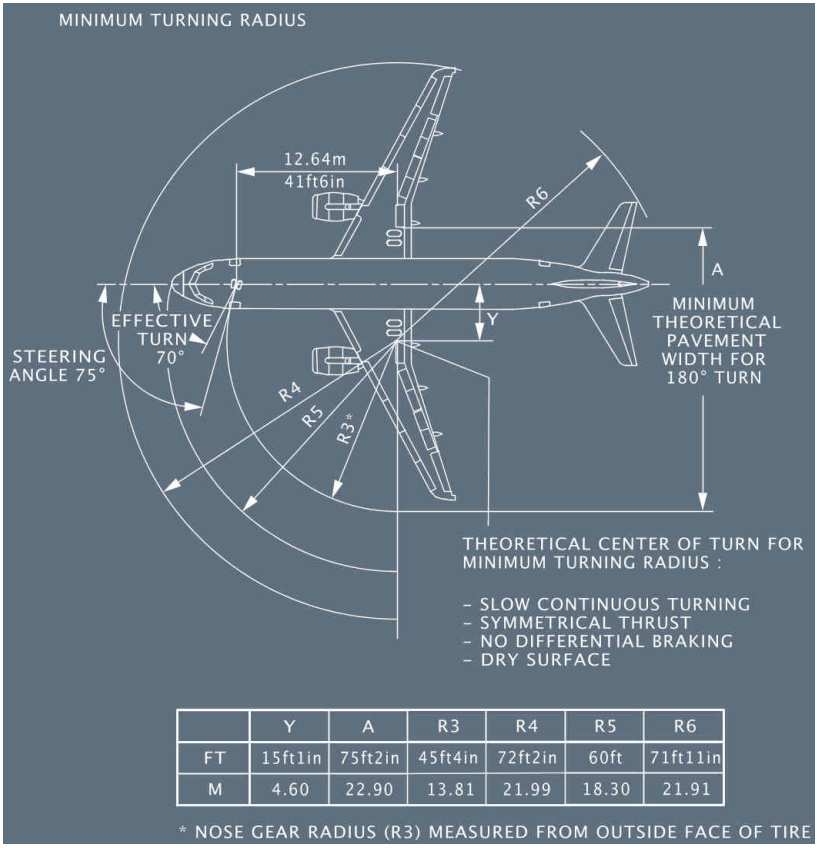


GROUND MANEUVERING

Applicable to: ALL 320

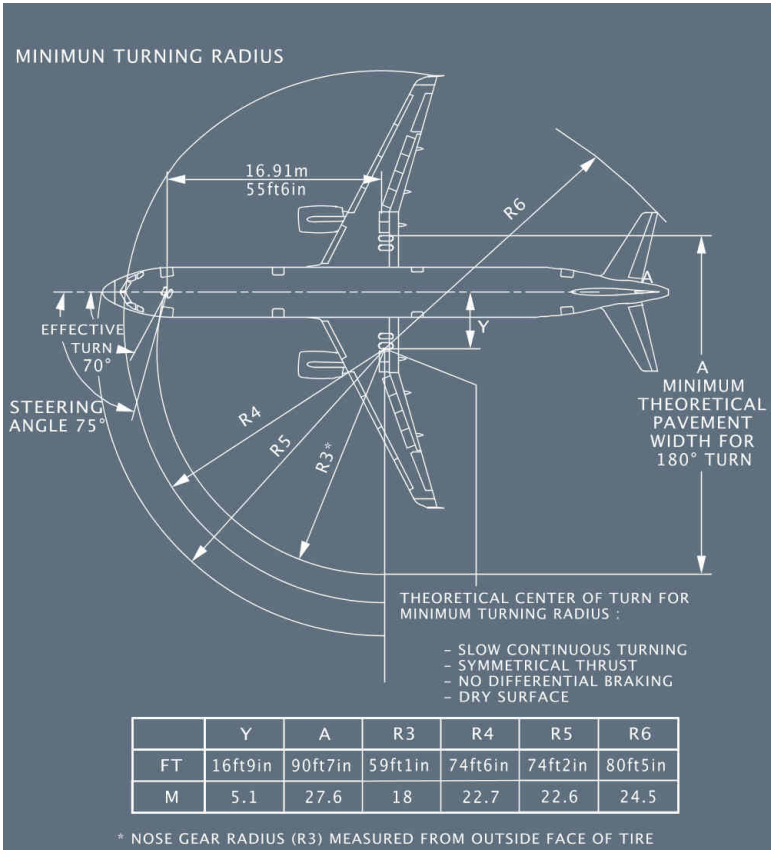


	Y	A	R3	R4	R5	R6
FT	15ft1in	75ft2in	45ft4in	72ft2in	60ft	71ft11in
M	4.60	22.90	13.81	21.99	18.30	21.91

* NOSE GEAR RADIUS (R3) MEASURED FROM OUTSIDE FACE OF TIRE

GROUND MANEUVERING

Applicable to: ALL 321

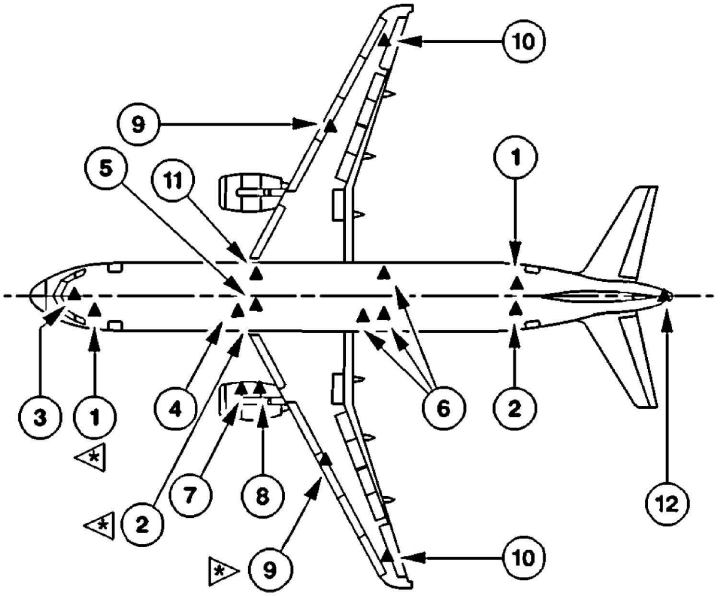


	Y	A	R3	R4	R5	R6
FT	16ft9in	90ft7in	59ft1in	74ft6in	74ft2in	80ft5in
M	5.1	27.6	18	22.7	22.6	24.5

* NOSE GEAR RADIUS (R3) MEASURED FROM OUTSIDE FACE OF TIRE

GROUND SERVICE CONNECTIONS AND PANELS

Applicable to: ALL 320



(1) Toilet servicing

(2) Water filling and/or draining

(3) Electrical ground power receptacle

(4) LP ground air supply connector

(5) HP ground air supply connector

(6) Hydraulic

(7) IDG oil filling

(8) Engine oil filling

(9) Refueling/defueling

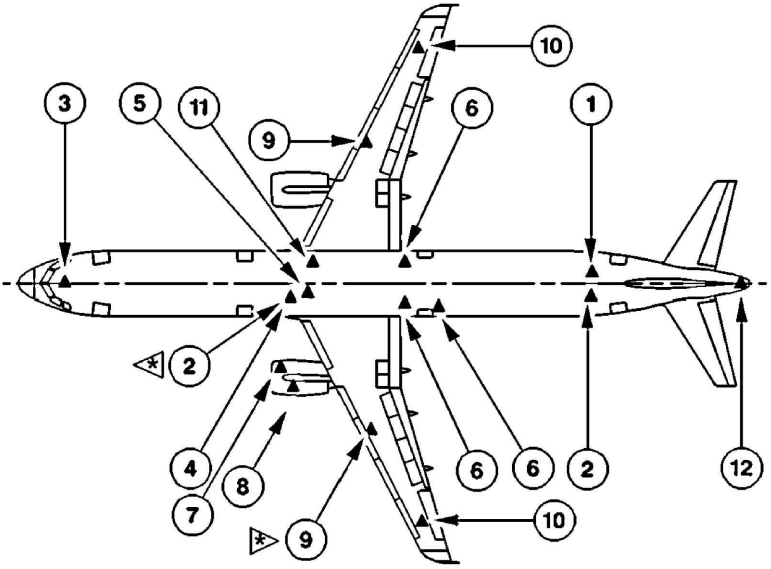
(10) Gravity filling panels

(11) Refueling/defueling panel

(12) APU oil filling

GROUND SERVICE CONNECTIONS AND PANELS

Applicable to: ALL 321



(1) Toilet servicing

(2) Water filling and/or draining

(3) Electrical ground power receptacle

(4) LP ground air supply connector

(5) HP ground air supply connector

(6) Hydraulic

(7) IDG oil filling

(8) Engine oil filling

(9) Refueling/defueling

(10) Gravity filling panels

(11) Refueling/defueling panel

(12) APU oil filling

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AIRCRAFT SYSTEMS

AIR CONDITIONING / PRESSURIZATION / VENTILATION

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DSC-21-10-10 Architecture	B	1	Improvement of illustration quality.
DSC-21-10-10 Architecture	B	2	Improvement of illustration quality.
DSC-21-10-10 Architecture	B	3	Improvement of illustration quality.
DSC-21-10-20 Pack Schematic (Simplified)	C	1	Improvement of illustration quality.
DSC-21-10-20 Pack Schematic (Simplified)	C	2	Improvement of illustration quality.
DSC-21-10-20 Pack Schematic (Simplified)	C	3	Improvement of illustration quality.
DSC-21-10-20 Pack Schematic (Simplified)	C	4	Improvement of illustration quality.
DSC-21-10-20 Pack Schematic (Simplified)	C	5	Improvement of illustration quality.
DSC-21-30-20 Normal Operation, Intermediate Configuration	F	1	Addition of a note to explain the measuring range of the skin temperature and the consequence on skin air valve operation.
DSC-21-30-60 ECAM CAB PRESS S-Page	B	1	Improvement of illustration quality.
DSC-21-30-60 ECAM CAB PRESS Page	C	2	Improvement of illustration quality.
DSC-21-40-10 Schematic	B	1	Improvement of illustration quality.
DSC-21-40-35 ECAM COND Page	A	1	Improvement of illustration quality

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GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The air conditioning system is fully automatic.
It provides continuous air renewal and maintains a constant, selected temperature in the following three zones : COCKPIT, FWD CABIN, AFT CABIN. These three zones are independently controlled.

Air is supplied by the pneumatic system, via:
- Two pack flow control valves,
- Two packs,
- The mixing unit, which mixes the air that comes from the cabin and the packs.

Air is then distributed to the cockpit and the cabin.
Temperature regulation is optimized via the hot air pressure regulating valve, and the trim air valves that add hot air, tapped upstream of the packs, to the mixing unit air.
In an emergency, a ram air inlet can provide ambient air to the mixing unit.
Temperature regulation is controlled by a zone controller and two pack controllers. Flight deck and cabin temperature can be selected from the cockpit's AIR COND panel.
Low-pressure air is supplied to the mixing unit by a ground connection.

GENERAL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The air conditioning system is fully automatic.
It provides continuous air renewal and maintains a constant, selected temperature in the following three zones : COCKPIT, FWD CABIN, AFT CABIN. These three zones are independently controlled.

Air is supplied by the pneumatic system, via:
- Two pack flow control valves,
- Two packs,
- The mixing unit, which mixes the air that comes from the cabin and the packs.

Air is then distributed to the cockpit and the cabin.
Temperature regulation is optimized via the hot air pressure regulating valve, and the trim air valves that add hot air, tapped upstream of the packs, to the mixing unit air.
In an emergency, a ram air inlet can provide ambient air to the mixing unit.
Temperature regulation is controlled by two Air Conditioning System Controllers. Flight deck and cabin temperature can be selected from the cockpit's AIR COND panel.
A control panel is provided on the Forward Attendant Panel. During cruise, the cabin crew can modify each cabin zone temperature that is selected from the cockpit, with a limited authority of ± 2.5 °C. (± 4.5 °F).
Low-pressure air is supplied to the mixing unit by a ground connection.

ARCHITECTURE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

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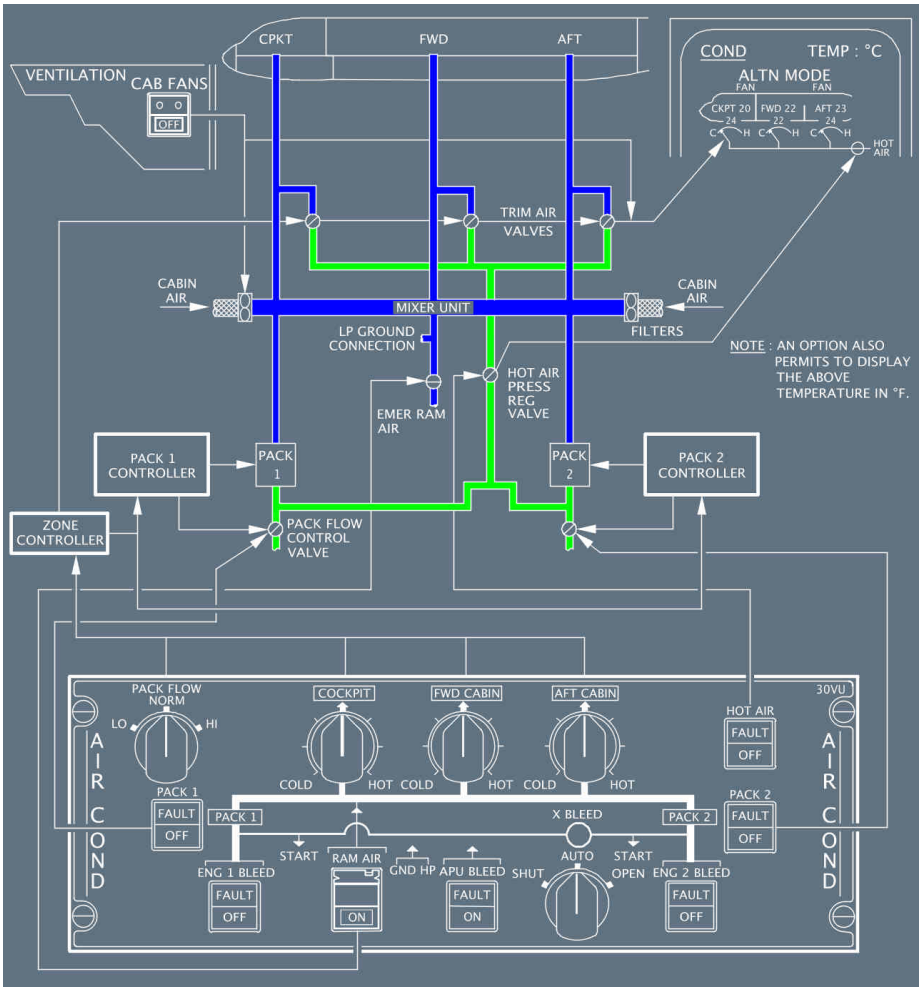
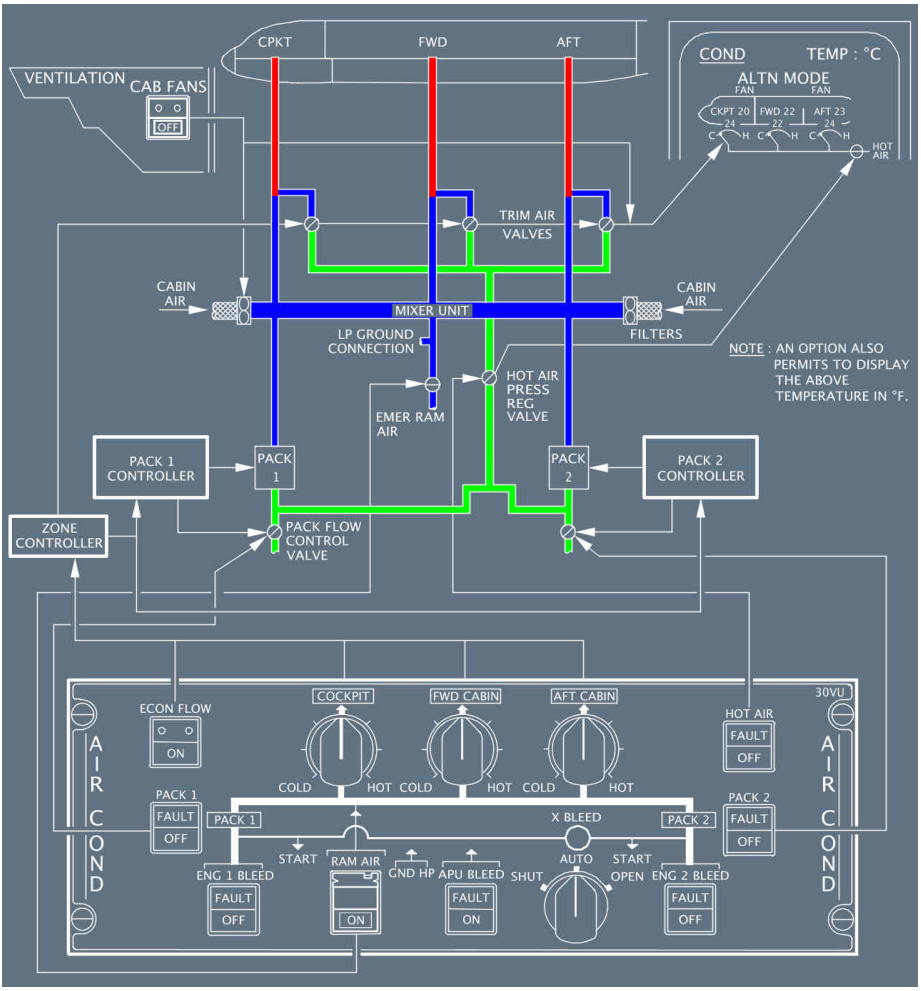


ARCHITECTURE

Applicable to: ALL 321

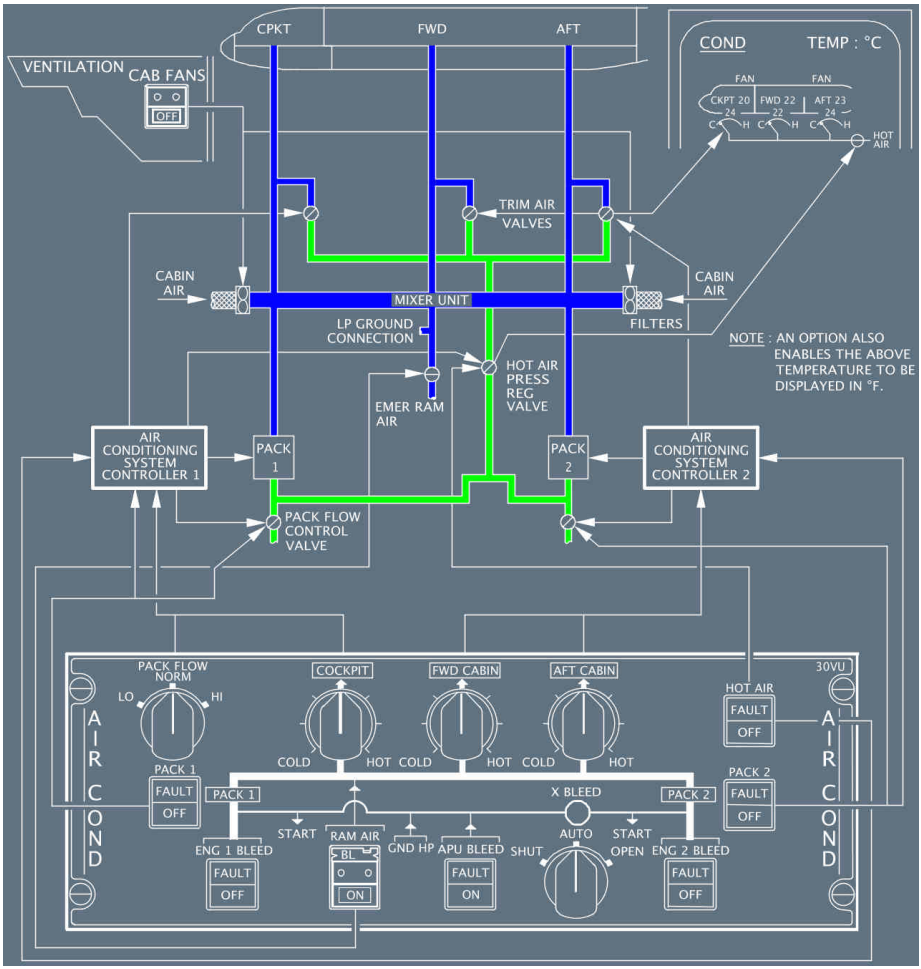
2



ARCHITECTURE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

3



AIR CONDITIONING PACK

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The two packs operate automatically and independently of each other. Pack operation is controlled by pack controller signals.

Warm pre-conditioned bleed air enters the cooling path via the pack flow control valve, and is ducted to the primary heat exchanger.

Then, the cooled bleed air enters the compressor section of the air-cycle machine and is compressed to a higher pressure and temperature.

It is cooled again in the main heat exchanger and enters the turbine section, where it expands and, in expanding, generates power to drive the compressor and cooling air fan.

The removal of energy during this process reduces air temperature, resulting in very low air temperature at turbine discharge.

L3 A water separator system dries the air before it enters the turbine section.

AIR CONDITIONING PACK

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The two packs operate automatically and independently of each other. Pack operation is controlled by air conditioning system controller signals.

Warm pre-conditioned bleed air enters the cooling path via the pack flow control valve, and is ducted to the primary heat exchanger.

Then, the cooled bleed air enters the compressor section of the air-cycle machine and is compressed to a higher pressure and temperature.

It is cooled again in the main heat exchanger and enters the turbine section, where it expands and, in expanding, generates power to drive the compressor and cooling air fan.

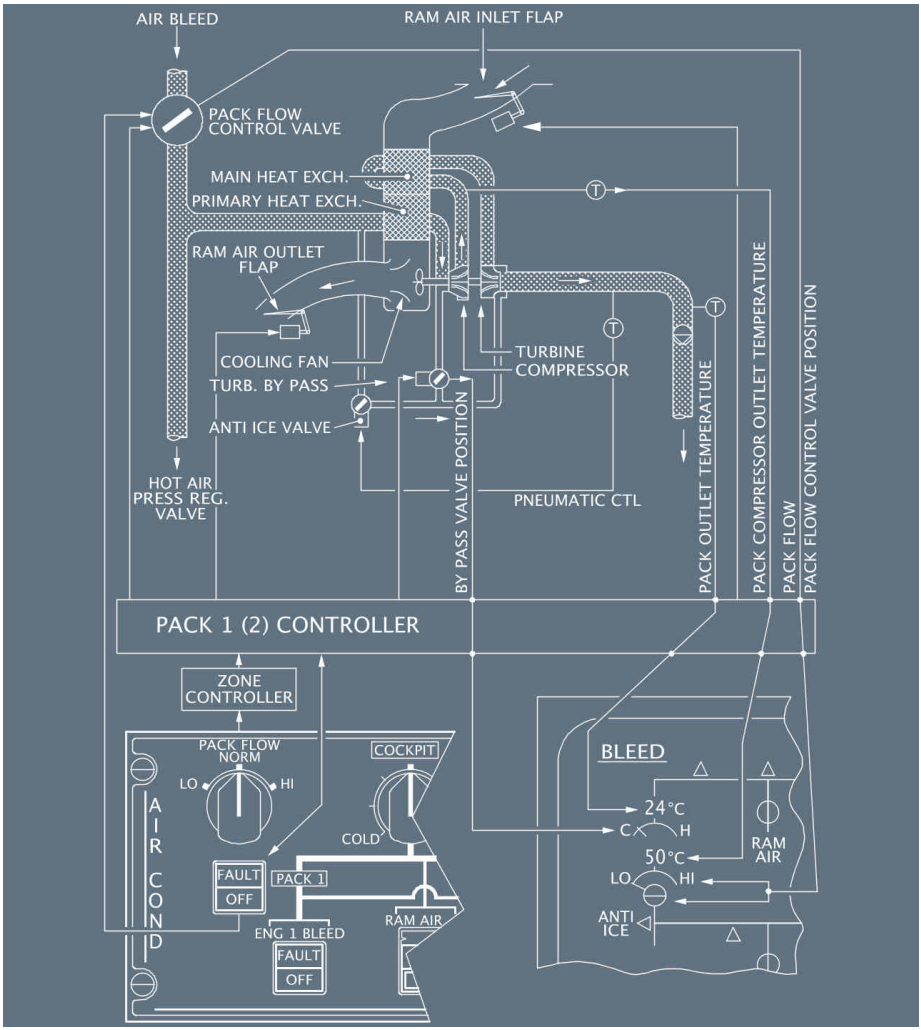
The removal of energy during this process reduces air temperature, resulting in very low air temperature at turbine discharge.

L3 A water separator system dries the air before it enters the turbine section.

PACK SCHEMATIC (SIMPLIFIED)

Applicable to: B-HSD, B-HSE, B-HSG

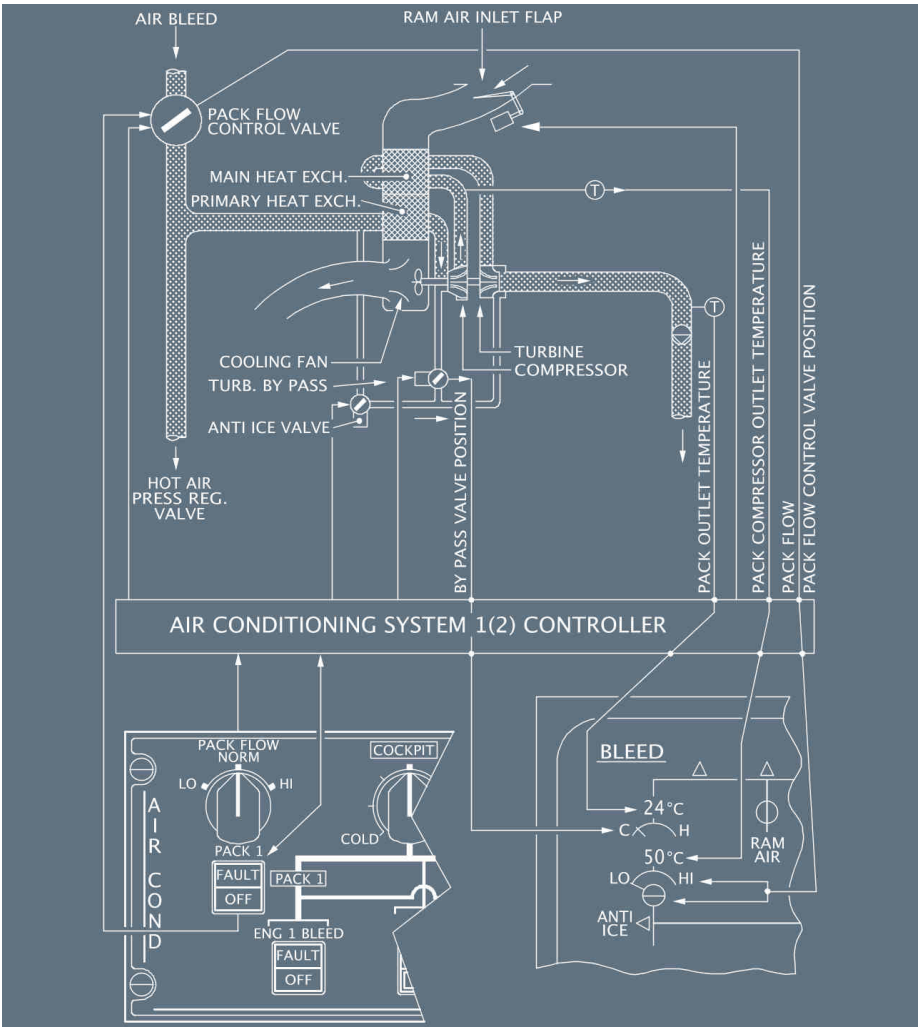
1



PACK SCHEMATIC (SIMPLIFIED)

Applicable to: B-HTF

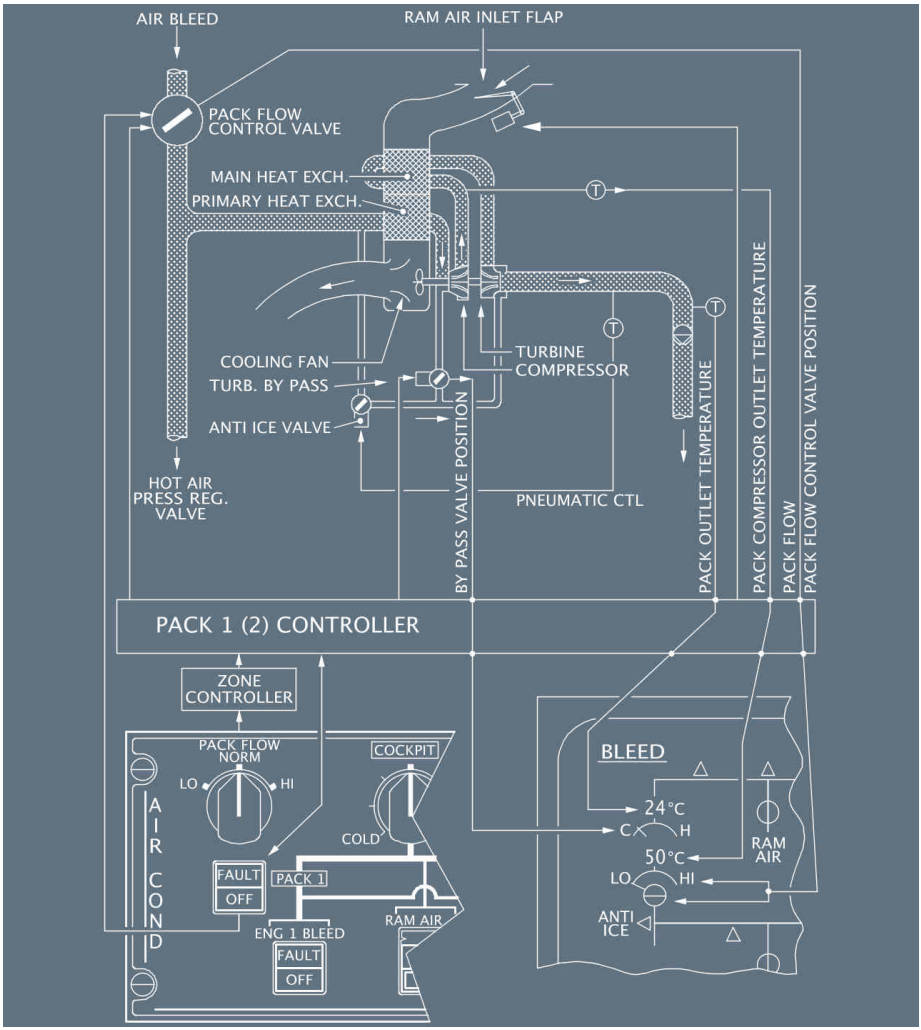
2



PACK SCHEMATIC (SIMPLIFIED)

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

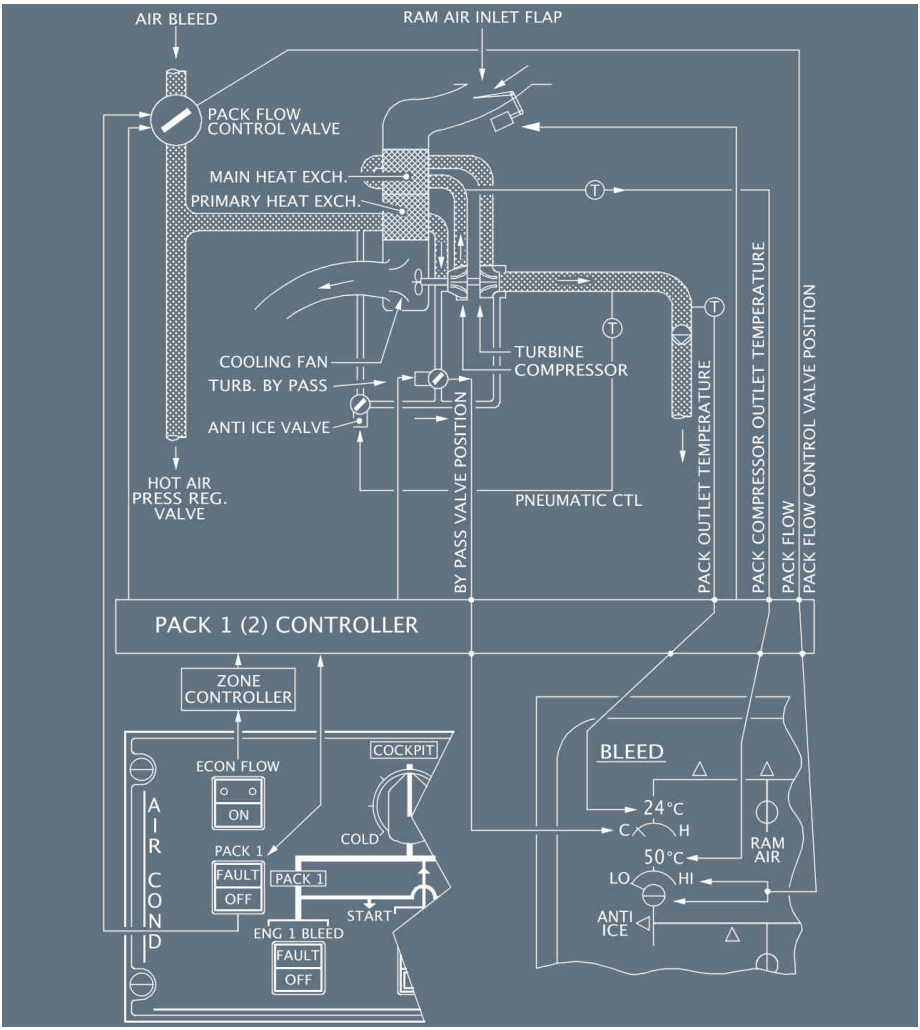
3



PACK SCHEMATIC (SIMPLIFIED)

Applicable to: B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

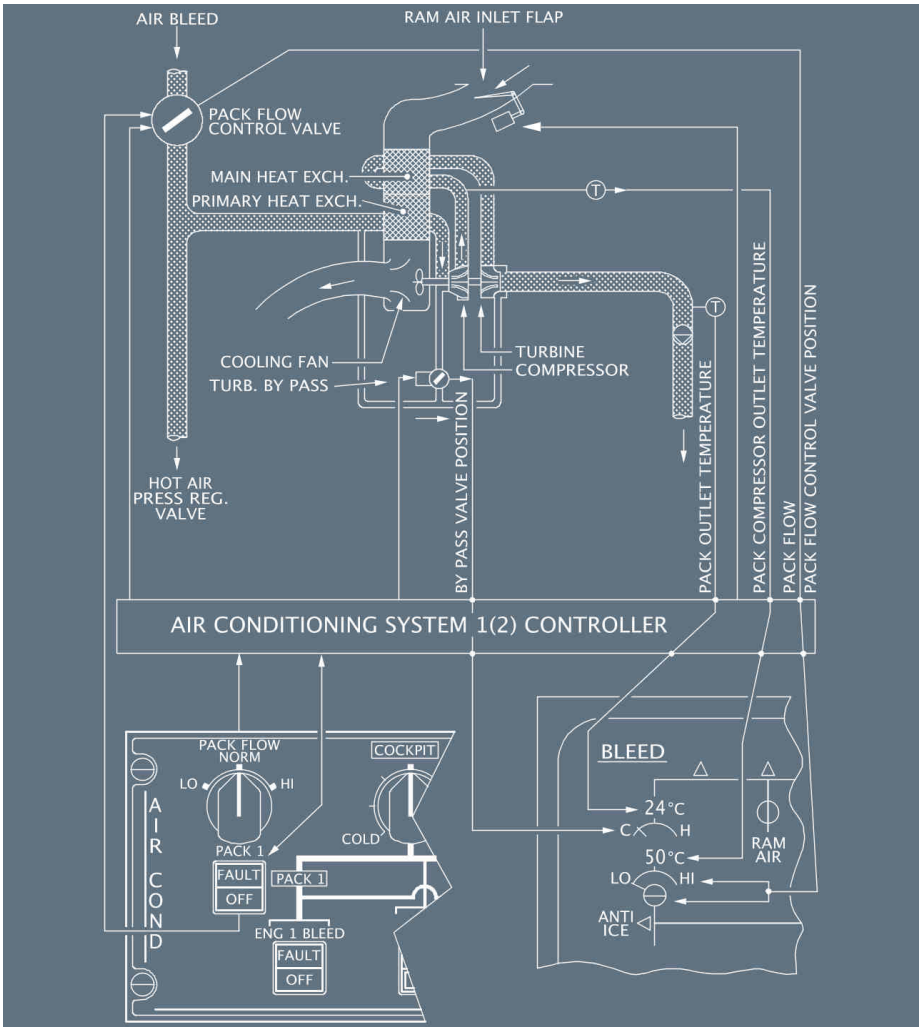
4



PACK SCHEMATIC (SIMPLIFIED)

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

5



PACK FLOW CONTROL VALVE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

This valve is pneumatically-operated and electrically-controlled. It regulates the air flow in accordance with signals received from the pack controller.
In the absence of air pressure, a spring keeps the valve closed.
The valve closes automatically in case of pack overheating, engine starting, or operation of the fire or ditching pushbutton. The valve is controlled from the AIR COND panel.

PACK FLOW CONTROL VALVE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

This valve is pneumatically-operated and electrically-controlled. It regulates the air flow in accordance with signals received from the air conditioning system controllers.
In the absence of air pressure, a spring keeps the valve closed.
The valve closes automatically in case of pack overheating, engine starting, or operation of the fire or ditching pushbutton. The valve is controlled from the AIR COND panel.

RAM AIR

Applicable to: ALL

An emergency ram air inlet ventilates the cockpit and cabin to remove smoke, or if both packs fail.
The emergency ram air inlet valve is controlled by the RAM AIR pushbutton on the AIR COND panel.
This pushbutton opens the ram air valve, provided that ditching is not selected.
When the RAM AIR pushbutton is ON : The outflow valve opens about 50 %, provided that it is under automatic control and ΔP is less than 1 PSI. The outflow valve does not automatically open if it is under manual control, even if ΔP is less than 1 PSI. If ΔP is greater than 1 PSI, the check valve located downstream the ram air door will not open, even if the ram air door has been selected open. No airflow will then be supplied.

MIXER UNIT

Applicable to: ALL

This unit mixes cold fresh air from the packs with the cabin air being recirculated through recirculation fans. The mixer unit is also connected to the emergency ram air inlet and the low pressure ground inlets.

HOT-AIR PRESSURE-REGULATING VALVE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

This valve regulates the pressure of hot air, tapped upstream of the packs.

It is pneumatically-operated and electrically-controlled from the HOT AIR pushbutton on the AIR COND panel. In the absence of air, a spring keeps the valve closed.

The valve closes automatically, if:
- The duct overheats, or
- The cockpit trim air valve fails, or
- Both cabin trim air valves fail.

The hot-air pressure-regulating valve remains operative, even if either the forward or aft cabin trim air valve fails.

HOT-AIR PRESSURE-REGULATING VALVE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

In the absence of air, a spring keeps the valve closed. This pneumatically-operated and electrically-controlled valve regulates hot air pressure, which is tapped upstream of the packs. The air conditioning system controller 1 regulates this valve. This valve closes upon pressing the HOT AIR pushbutton on the AIR COND panel, or when both lanes of one air conditioning system controller fail.

The valve closes automatically, if:
- The duct overheats, or
- The cockpit trim air valve fails, or
- Both cabin trim air valves fail.

The hot-air pressure-regulating valve remains operative, even if either the forward or aft cabin trim air valve fails.

TRIM AIR VALVES

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

These valves are electrically-controlled by the zone controller. A trim air valve, associated with each zone, adjusts the temperature by adding hot air.

TRIM AIR VALVES

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

These valves are electrically-controlled by the air conditioning system controllers. The cockpit trim air valve, controlled by the air conditioning system controller 1, and the cabin trim air valves, controlled by the air conditioning system controller 2, adjust the temperature by adding hot air.

GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

Temperature regulation is automatic and controlled by one zone controller and two pack controllers.

GENERAL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

Temperature regulation is automatic and controlled by the air conditioning system controllers.

PACK CONTROLLER

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

Each pack controller regulates the temperature of its associated pack, in accordance with a demand signal from the zone controller, by modulating the bypass valve, the ram air inlet flaps and the ram air outlet flaps.
The ram air inlet and outlet flaps close during takeoff and landing to avoid ingestion of foreign matter.

Note: *During takeoff, the ram air inlet and outlet flaps close when TO power is set and the main landing gear struts are compressed.*
During landing they close as soon as the main landing gear struts are compressed, as long as speed is at or above 70 kt.
They open 20 s after the speed drops below 70 kt.

The pack controllers also regulate flow by modulating the associated pack flow control valve.

PACK CONTROLLER

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

Each pack controller regulates the temperature of its associated pack, in accordance with a demand signal from the zone controller, by modulating the bypass valve and the ram air inlet flaps.
The ram air inlet flaps close during takeoff and landing to avoid ingestion of foreign matter.

Note: *During takeoff, the ram air inlet flaps close when TO power is set and the main landing gear struts are compressed.*
During landing they close as soon as the main landing gear struts are compressed, as long as speed is at or above 70 kt.
They open 20 s after the speed drops below 70 kt.

The pack controllers also regulate flow by modulating the associated pack flow control valve.

ZONE CONTROLLER

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

PACK FLOW CONTROL

The crew can use the PACK FLOW pushbutton to adjust the pack flow for the number of passengers and for external conditions.

Whatever the crew selects, the system delivers higher flow for any of the following circumstances:
- In single-pack operation,
- When the APU is supplying bleed air.

The system delivers normal flow if the crew selects LO flow and the temperature demand cannot be satisfied.

ENGINE PRESSURE DEMAND

When the cooling demand in one zone cannot be satisfied, if the bleed pressure is too low, the zone controller sends a pressure demand signal to both Engine Interface Units (EIU) to increase the minimum idle and to raise the bleed pressure.

APU FLOW DEMAND

When the APU bleed valve is open, the zone controller signals the APU's Electronic Control Box (ECB) to increase the APU flow output when any zone temperature demand cannot be satisfied.

ZONE CONTROLLER

Applicable to: ALL 321

PACK FLOW CONTROL

The crew can use the ECON FLOW pushbutton to adjust the pack flow for the number of passengers and for external conditions.

Whatever the crew selects, the system delivers higher flow (40 % more than the ECON flow) for any of the following circumstances:
- In single-pack operation,
- When the APU is supplying bleed air.

The system delivers normal flow (20 % more than the ECON flow) if the crew selects ECON flow and the temperature demand cannot be satisfied.

ENGINE PRESSURE DEMAND

When the cooling demand in one zone cannot be satisfied, if the bleed pressure is too low, the zone controller sends a pressure demand signal to both Engine Interface Units (EIU) to increase the minimum idle and to raise the bleed pressure.

APU FLOW DEMAND

When the APU bleed valve is open, the zone controller signals the APU's Electronic Control Box (ECB) to increase the APU flow output when any zone temperature demand cannot be satisfied.

TEMPERATURE REGULATION

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The zone controller regulates the temperature of the two cabin zones and the cockpit.

BASIC TEMPERATURE REGULATION

The flight crew uses the temperature selectors on the air conditioning panel in the cockpit to select the reference temperatures. The zone controller computes a temperature demand from the selected temperature and the actual temperature.

The actual temperature is measured by sensors:
- In the cockpit, for the cockpit zone;
- In the lavatory extraction circuit and galley ventilation system, for the cabin.

A signal corresponding to the lowest demanded zone temperature goes to the pack controller, which then make both packs produce the required outlet temperature.

OPTIMIZED TEMPERATURE REGULATION

The zone controller optimizes the temperature by action on the trim air valves.
The temperature selection range is from 18 °C (64 °F) to 30 °C (86 °F).

TEMPERATURE REGULATION

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The air conditioning system controller 2 regulates the temperature of the two cabin zones, and the air conditioning system controller 1 regulates, the cockpit temperature.

BASIC TEMPERATURE REGULATION

The flight crew uses the temperature selectors on the cockpit's air conditioning panel to select the reference temperatures which are fine tuned through the Forward Attendant Panel (FAP) for the cabin zones. The air conditioning system controllers compute a temperature demand from the selected temperature and the actual temperature.

The actual temperature is measured by sensors:
- In the cockpit, for the cockpit zone;
- In the lavatory extraction circuit and galley ventilation system, for the cabin.

A signal corresponding to the lowest demanded zone temperature goes to the air conditioning system controllers, which then make both packs produce the required outlet temperature.

OPTIMIZED TEMPERATURE REGULATION

The air conditioning system controllers optimize temperature by acting on the trim air valves. The temperature selection range is from 18 °C (64 °F) to 30 °C (86 °F).

AIR CONDITIONING SYSTEM CONTROLLERS

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

Each air conditioning system controller regulates the temperature of its associated pack, by modulating the bypass valve and the ram air inlet flap.
The ram air inlet flap closes during takeoff and landing to avoid the ingestion of foreign matter.

Note: During takeoff, the ram air inlet flap closes when takeoff power is set, and the main landing gear struts are compressed.
During landing, it closes as soon as the main landing gear struts are compressed, as long as speed is at or above 70 kt.
It opens 20 s after the speed drops below 70 kt.

The air conditioning system controllers also regulate flow by modulating the associated pack flow control valve.

PACK FLOW CONTROL

The crew can use the PACK FLOW selector to adjust the pack flow for the number of passengers and for external conditions.

Whatever the crew selects, the system delivers higher flow for any of the following circumstances:
- In single-pack operation,
- When the APU is supplying bleed air.

The system delivers normal flow if the crew selects LO flow and the temperature demand cannot be satisfied.

ENGINE PRESSURE DEMAND

When the cooling demand in one zone cannot be satisfied, if the bleed pressure is too low, the air conditioning system controller sends a pressure demand signal to both Engine Interface Units (EIU) to increase the minimum idle and to raise the bleed pressure.

APU FLOW DEMAND

When the APU bleed valve is open, the air conditioning system controller signals the APU's Electronic Control Box (ECB) to increase the APU flow output when any zone temperature demand cannot be satisfied.

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GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

Each controller consists of a primary channel that is normally in control and a secondary channel that acts as a backup if the primary channel fails.

GENERAL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

Each controller is comprised of two lanes. One lane controls the system, the other takes over full control, in case of an active lane failure.

ZONE CONTROLLER

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

PRIMARY CHANNEL FAILURE

The secondary channel operates as backup.
The flow setting function and optimized temperature regulation are not available. HOT AIR and TRIM AIR valves close.
The zones are controlled to 24 °C (76 °F) (backup regulation). Pack 1 controls the cockpit temperature. Pack 2 controls the FWD and AFT cabin temperatures.
ALTN MODE appears on the ECAM (Electronic Centralized Aircraft Monitoring) COND page.

SECONDARY CHANNEL FAILURE

This has no effect on zone temperature regulation.
Backup mode is lost.

PRIMARY AND SECONDARY CHANNEL FAILURE

Optimized and backup temperature regulation is lost.
The packs deliver a fixed temperature: 20 °C (68 °F) for pack 1, 10 °C (50 °F) for pack 2. The failure removes all information from the ECAM COND page, which then displays PACK REG.

PACK CONTROLLERS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

PRIMARY CHANNEL FAILURE

The secondary computer operates as a backup.
Regulation is not optimized.
Pack flow is fixed at the previous setting.

SECONDARY CHANNEL FAILURE

This failure has no effect on pack regulation. Backup mode is lost.
ECAM signals related to the corresponding pack are lost.

PRIMARY AND SECONDARY CHANNEL FAILURE

As a backup, corresponding pack outlet temperature is controlled by the anti-ice valve and is stabilized to a temperature between 5 °C (41 °F) and 30 °C (86 °F) in a maximum of 6 min.
ECAM signals, related to the corresponding pack, are lost.

AIR CONDITIONING SYSTEM CONTROLLER

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

ONE LANE FAILURE

No effect, as the second lane takes over.

BOTH LANES FAILURE

The related pack is lost, and the hot air pressure-regulating valve and associated trim air valves close.

AIR CYCLE MACHINE FAILURE

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

If the Air Cycle Machine (ACM) fails (compressor/turbine seizure), the affected pack may be operated in heat exchanger cooling mode.
Warm pre-conditioned bleed air enters the cooling path via the pack valve and goes to the primary heat exchanger. Then, the main part of the cooled air goes directly downstream of ACM turbine through the bypass valve, and the rest goes through the failed ACM.
The ACM seizure reduces the pack flow.

As for normal pack operation :

- The pack controller regulates temperature, in accordance with zone controller demand, by modulating the bypass valve and the ram air inlet and outlet flaps.
- The zone controller regulates the hot air flow through the hot air valves to optimize cockpit/cabin temperature regulation. Hot air flow is lower than in normal pack operation, because pack flow is reduced.

AIR CYCLE MACHINE FAILURE

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

If the Air Cycle Machine (ACM) fails (compressor/turbine seizure), the affected pack may be operated in heat exchanger cooling mode.
Warm pre-conditioned bleed air enters the cooling path via the pack valve and goes to the primary heat exchanger. Then, the main part of the cooled air goes directly downstream of ACM turbine through the bypass valve, and the rest goes through the failed ACM.
The ACM seizure reduces the pack flow.

As for normal pack operation:

- The pack controller regulates temperature, in accordance with zone controller demand, by modulating the bypass valve and the ram air inlet flap.
- The zone controller regulates the hot air flow through the hot air valves to optimize cockpit/cabin temperature regulation. Hot air flow is lower than in normal pack operation, because pack flow is reduced.

AIR CYCLE MACHINE FAILURE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

If the Air Cycle Machine (ACM) fails (compressor/turbine seizure), the affected pack may be operated in heat exchanger cooling mode.
Warm pre-conditioned bleed air enters the cooling path via the pack valve and goes to the primary heat exchanger. Then, the main part of the cooled air goes directly downstream of ACM turbine through the bypass valve, and the rest goes through the failed ACM.
The ACM seizure reduces the pack flow.

As for normal pack operation :

- The air conditioning system controller regulates temperature by modulating the bypass valve and the ram air inlet flap.
- The air conditioning system controller regulates the hot air flow through the trim air valves to optimize cockpit/cabin temperature regulation. Hot air flow is lower than in normal pack operation, because pack flow is reduced.

HOT AIR PRESSURE REGULATING VALVE FAILURE

Applicable to: ALL

Failed open : No effect.

Failed closed : Optimized regulation is lost. Trim air valves are driven to the fully closed position. Pack 1 controls the cockpit temperature to the selected value and pack 2 controls the cabin temperature (FWD and AFT) to the mean value of the selected temperatures.

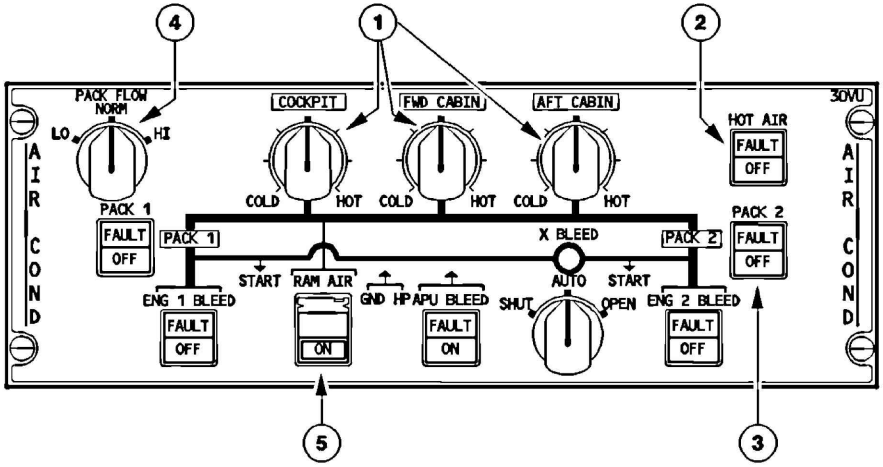
TRIM AIR VALVE FAILURE

Applicable to: ALL

Optimized temperature regulation of the corresponding zone is lost.

CONTROLS ON OVERHEAD PANEL

Applicable to: ALL 320



(1) Zone temperature rotary selector

- 12 o'clock position: 24 °C (76 °F).
- COLD position: 18 °C (64 °F).
- HOT position: 30 °C (86 °F).

(2) HOT AIR pushbutton

ON : The valve regulates hot air pressure.

OFF : The valve closes, and the trim air valves close.
The FAULT circuit is reset.

FAULT : The FAULT light comes on amber, along with an associated ECAM caution, when duct overheat is detected. The fault circuit detects an overheat when the duct temperature reaches 88 °C (190 °F) once.
The valve and trim air valves close automatically.
The FAULT light goes off when the temperature drops below 70 °C (158 °F), and the flight crew selects OFF.

(3) PACK pb-sw

ON : The pack flow control valve is automatically-controlled.

It opens, except in the following cases:
- Upstream pressure below minimum.
- Compressor outlet overheat.
- Engine start sequence:
  1. If the crossbleed valve is closed, the valve located on the starting engine side immediately closes, when the MODE selector is set to IGN (or CRK).
  2. It remains closed on the starting engine side (provided the crossbleed valve is closed) when:
     - the MASTER switch is set to ON (or MAN START pushbutton is set to ON) and,
     - the start valve is open and,
     - N2 <50 %.

     Note: If the crossbleed valve is open at engine start, both pack flow control valves close.

  3. On ground, reopening of the valves is delayed for 30 s to avoid a supplementary pack closure cycle during second engine start.
- Fire pushbutton, of the engine on the related side, is pressed,
- Ditching is selected.

OFF : The pack flow control valve closes.

FAULT lt : Comes on amber, and a caution appears on the ECAM, if the pack flow control valve position disagrees with the selected position, or in the case of compressor outlet overheat or pack outlet overheat.

(4) PACK FLOW sel

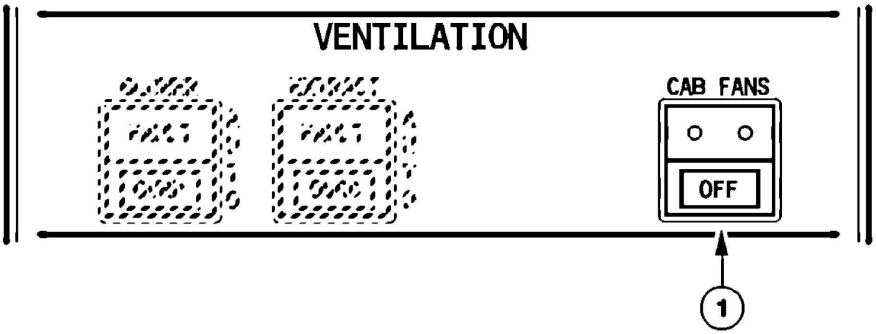
- Permits the selection of pack valve flow, according to the number of passengers and ambient conditions (smoke removal, hot or wet conditions).
  LO (80 %) – NORM (100 %) – HI (120 %).
- Manual selection is irrelevant in single pack operation, or with APU bleed supply. In these cases, HI is automatically selected.
- If LO is selected, the pack flow can be automatically selected up to 100 % when the cooling demand cannot be satisfied.

(5) RAM AIR pushbutton (guarded)

ON : The ON light comes on white.

If the DITCHING pushbutton, on the CABIN PRESS panel, is in normal position:
- The RAM air inlet opens.
- If $\Delta p \geq 1$ PSI: The outflow valve control remains normal. No emergency RAM air flows in.
- If $\Delta p < 1$ PSI: The outflow valve opens to about 50 % when under automatic control. It does not automatically open when it is under manual control. Emergency RAM airflow is directly supplied to the mixer unit.

OFF: The RAM air inlet closes.



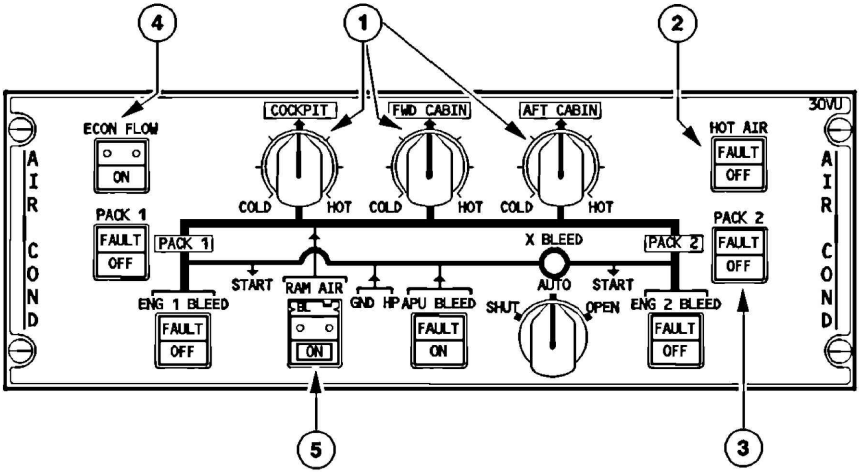
(1) CAB FAN pb

ON : The two cabin fans are on.

OFF: The two cabin fans are off.

CONTROLS ON OVERHEAD PANEL

Applicable to: ALL 321



(1) Zone temperature rotary selector

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- COLD position: 18 °C (64 °F).
- HOT position: 30 °C (86 °F).

(2) HOT AIR pushbutton

ON : The valve regulates hot air pressure.

OFF : The valve closes, and the trim air valves close.
The FAULT circuit is reset.

FAULT : The FAULT light comes on amber, along with an associated ECAM caution, when duct overheat is detected. The fault circuit detects an overheat when the duct temperature reaches 88 °C (190 °F).
The valve and trim air valves close automatically.
The FAULT light goes off when the temperature drops below 70 °C (158 °F), and the flight crew selects OFF.

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It opens, except in the following cases:
- Upstream pressure below minimum.
- Compressor outlet overheat.
- Engine start sequence:
  1. If the crossbleed valve is closed, the valve located on the starting engine side immediately closes, when the MODE selector is set to IGN (or CRK).
  2. It remains closed on the starting engine side (provided the crossbleed valve is closed) when:
     - the MASTER switch is set to ON (or MAN START pushbutton is set to ON) and,
     - the start valve is open and,
     - N2 <50 %.

     Note: If the crossbleed valve is open at engine start, both pack flow control valves close.

  3. On ground, reopening of the valves is delayed for 30 s to avoid a supplementary pack closure cycle during second engine start.
- Fire pushbutton, of the engine on the related side, is pressed,
- Ditching is selected.

OFF : The pack flow control valve closes.

FAULT lt : Comes on amber, and a caution appears on the ECAM, if the pack flow control valve position disagrees with the selected position, or in the case of compressor outlet overheat or pack outlet overheat.

(4) PACK FLOW pushbutton

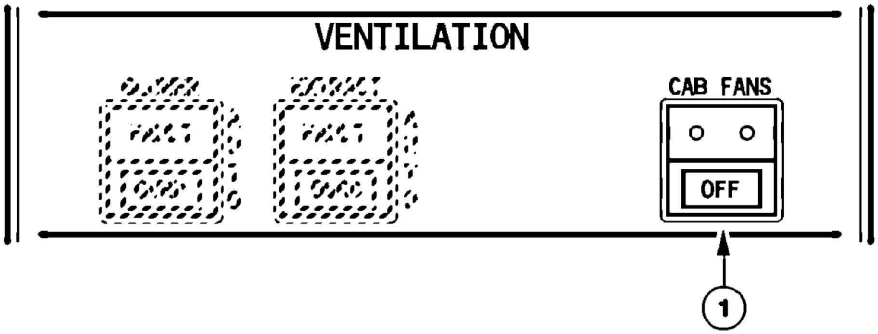
- Permits selection of ECON or normal pack valve flow according to number of passengers and ambient conditions (smoke removal, hot or wet conditions).
  ON ECON flow is selected
  OFF normal flow is selected. Normal flow provides 20 % more than the ECON flow.
- The manual selection is irrelevant in single pack operation or with APU bleed supply. In these cases, the system delivers high flow (40 % more than the ECON flow).
- If ECON flow is selected, the pack flow can be automatically selected up to normal flow.

(5) RAM AIR pushbutton (guarded)

ON : The ON light comes on white.

If the DITCHING pushbutton, on the CABIN PRESS panel, is in normal position:
- The RAM air inlet opens.
- If $\Delta p \geq 1$ PSI: The outflow valve control remains normal. No emergency RAM air flows in.
- If $\Delta p < 1$ PSI: The outflow valve opens to about 50 % when under automatic control. It does not automatically open when it is under manual control. Emergency RAM airflow is directly supplied to the mixer unit.

OFF: The RAM air inlet closes.



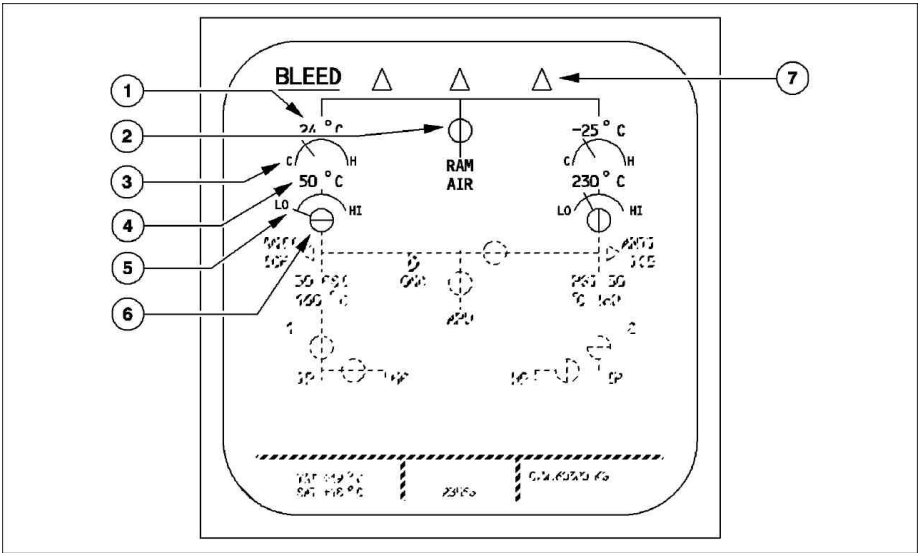
(1) CAB FAN pb

ON : The two cabin fans are on.

OFF: The two cabin fans are off.

ECAM BLEED PAGE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



(1) Pack outlet temperature
It appears in green. It becomes amber, if the temperature is higher than 90 °C.

(2) RAM AIR inlet

Crossline: – Green : The flap is normally closed.

In transit : – Amber : The flap is partially open

Inline – Amber : The flap is fully open on ground.

Inline – Green : The flap is fully open in flight.

(3) Pack bypass valve position
Indication is green.

C = Cold – Valve closed

H = Hot – Valve open.

(4) Pack compressor outlet temperature
It appears in green. It becomes amber, if the temperature is higher than 230 °C.

(5) Pack flow
It appears in green. It becomes amber, if the pack flow control valve is closed.

Note: The pack flow indication can be up to 30 % below the actual flow rate.

(6) Pack flow control valve

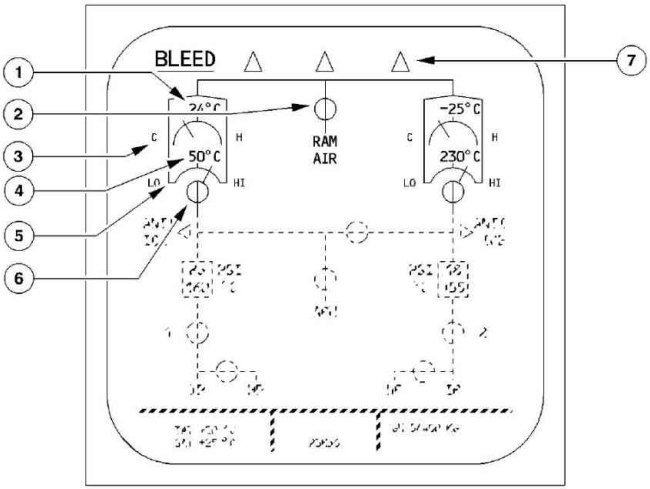
Inline - Green	:	Open.
Inline - Amber	:	Open, and disagrees with the control position.
Crossline - Green	:	Fully closed.
Crossline - Amber	:	Fully closed, and disagrees with the control position.

(7) User Indication
It appears in green.

It becomes amber:
- On ground, when both pack flow control valves are closed, or
- In flight, when RAM AIR flap is not fully open, and both pack flow control valves are closed.

ECAM BLEED PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



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Crossline: – Green : The flap is normally closed.

In transit : – Amber : The flap is partially open

Inline – Amber : The flap is fully open on ground.

Inline – Green : The flap is fully open in flight.

(3) Pack bypass valve position
Indication is green.

C = Cold – Valve closed

H = Hot – Valve open.

(4) Pack compressor outlet temperature
It appears in green. It becomes amber, if the temperature is higher than 230 °C.

(5) Pack flow
It appears in green. It becomes amber, if the pack flow control valve is closed.

Note: The pack flow indication can be up to 30 % below the actual flow rate.

(6) Pack flow control valve

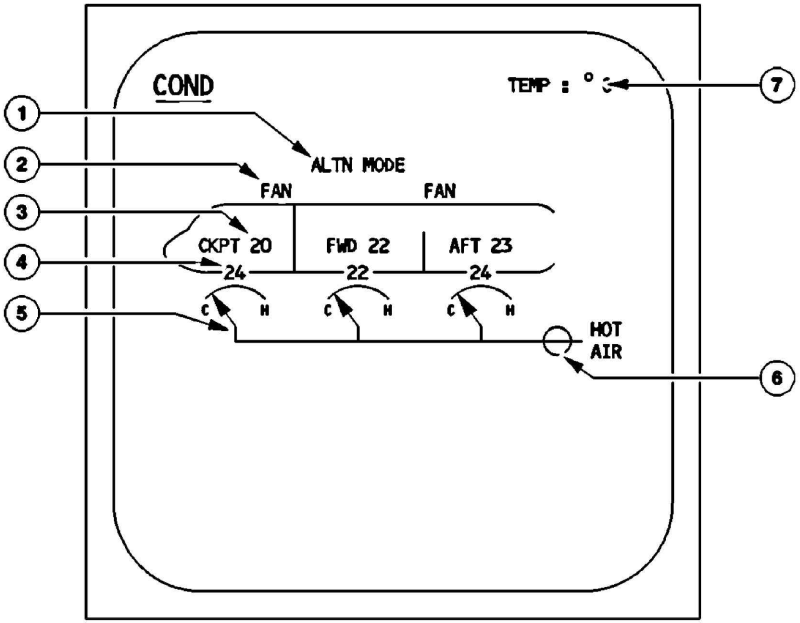
Inline - Green	:	Open.
Inline - Amber	:	Open, and disagrees with the control position.
Crossline - Green	:	Fully closed.
Crossline - Amber	:	Fully closed, and disagrees with the control position.

(7) User Indication
It appears in green.

It becomes amber:
- On ground, when both pack flow control valves are closed, or
- In flight, when RAM AIR flap is not fully open, and both pack flow control valves are closed.

ECAM COND PAGE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



(1) Zone controller fault indication

ALTN MODE : Primary zone controller fault (green).

PACK REG : Zone controller fault (basic regulation by packs only) (green).

No indication : Zone controller normal operation.

(2) Cabin FAN fault indication

It appears in amber, if the recirculation fan is detected as faulty.

(3) Zone temperature indication

It is in green.

(4) Zone duct temperature

It appears in green, and becomes amber at 80 °C (176 °F).

(5) Zone trim air valve position indication

The arrow is green. It is replaced by amber crosses (“XX”) if the valve fails.

C = Cold valve fully closed.

H = Hot valve fully open.

(6) Hot air pressure regulating valve

In line - Green	:	The valve is open.
In line - Amber	:	The valve is not closed; disagrees with the control position.
Crossline - Green	:	The valve is fully closed, and the pushbutton is at auto.
Crossline - Amber	:	The valve is closed, and pushbutton is OFF, or the valve disagree is closed.

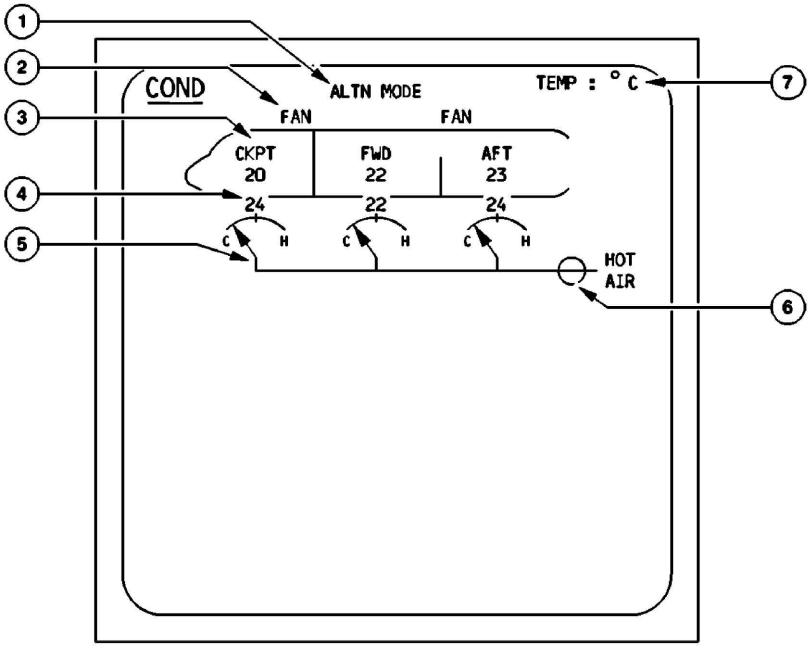
(7) TEMP

Unit of measure (°C or °F) is indicated in cyan.

Note: When the hot air valve is closed, a spurious FWD CRG HEAT message may appear in the INOP SYS list, even if the system remains operative.

ECAM COND PAGE

Applicable to: B-HSL, B-HSM, B-HSN



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It appears in amber, if the recirculation fan is detected as faulty.

(3) Zone temperature indication

It is in green.

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It appears in green, and becomes amber at 80 °C (176 °F).

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The arrow is green. It is replaced by amber crosses (“XX”) if the valve fails.

C = Cold valve fully closed.

H = Hot valve fully open.

(6) Hot air pressure regulating valve

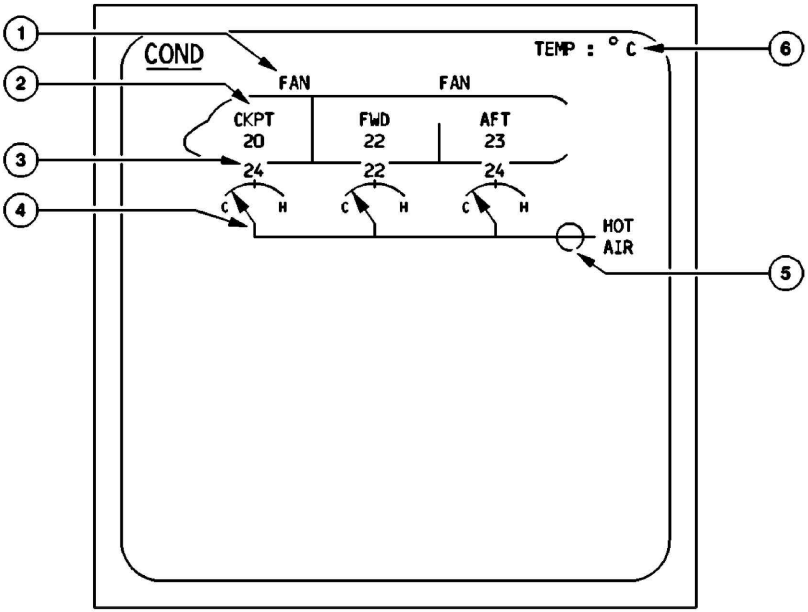
In line - Green	:	The valve is open.
In line - Amber	:	The valve is not closed; disagrees with the control position.
Crossline - Green	:	The valve is fully closed, and the pushbutton is at auto.
Crossline - Amber	:	The valve is closed, and pushbutton is OFF, or the valve disagree is closed.

(7) TEMP

Unit of measure (°C or °F) is indicated in cyan.

ECAM COND PAGE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) Cabin FAN fault indication

It appears in amber, if the recirculation fan is detected as faulty.

(2) Zone temperature
It is in green.

(3) Zone duct temperature
It appears in green, and becomes amber at 80 °C (176 °F).

(4) Zone trim air valve position
The arrow is green. It is replaced by amber crosses (“XX”) if the valve fails.

C = Cold valve fully closed.

H = Hot valve fully open.

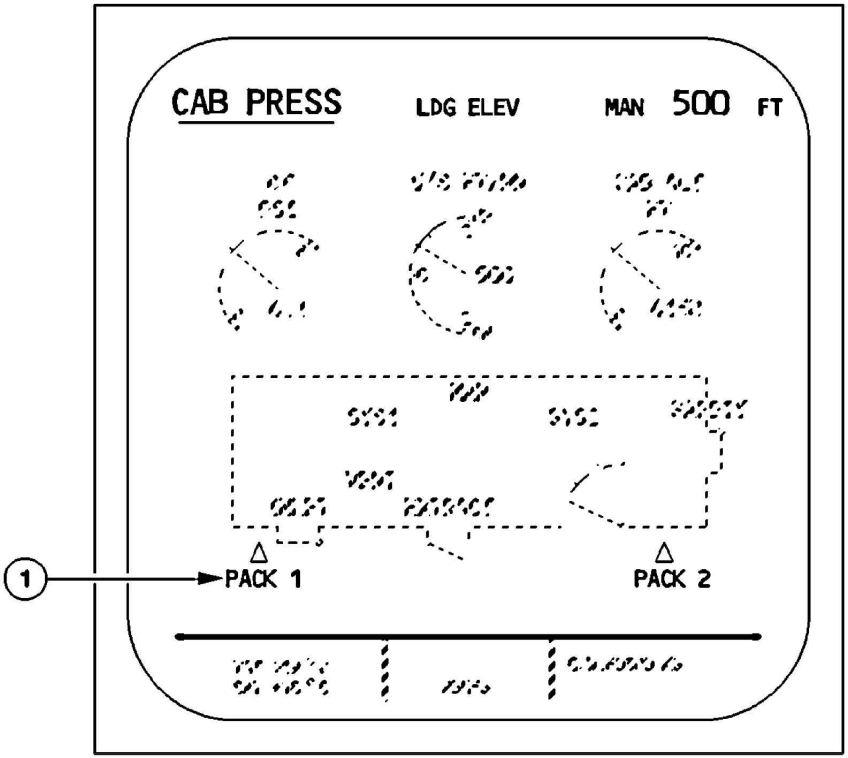
(5) Hot air pressure regulating valve

In line - Green	:	Valve is normally open.
In line - Amber	:	Valve is abnormally open (disagrees with control position).
Crossline - Green	:	Valve is normally fully closed.
Crossline - Amber	:	Valve is closed and pushbutton OFF, or valve position disagrees with control position.

(6) TEMP
Unit of measure (°C or °F) is indicated in cyan.

ECAM CAB PRESS PAGE

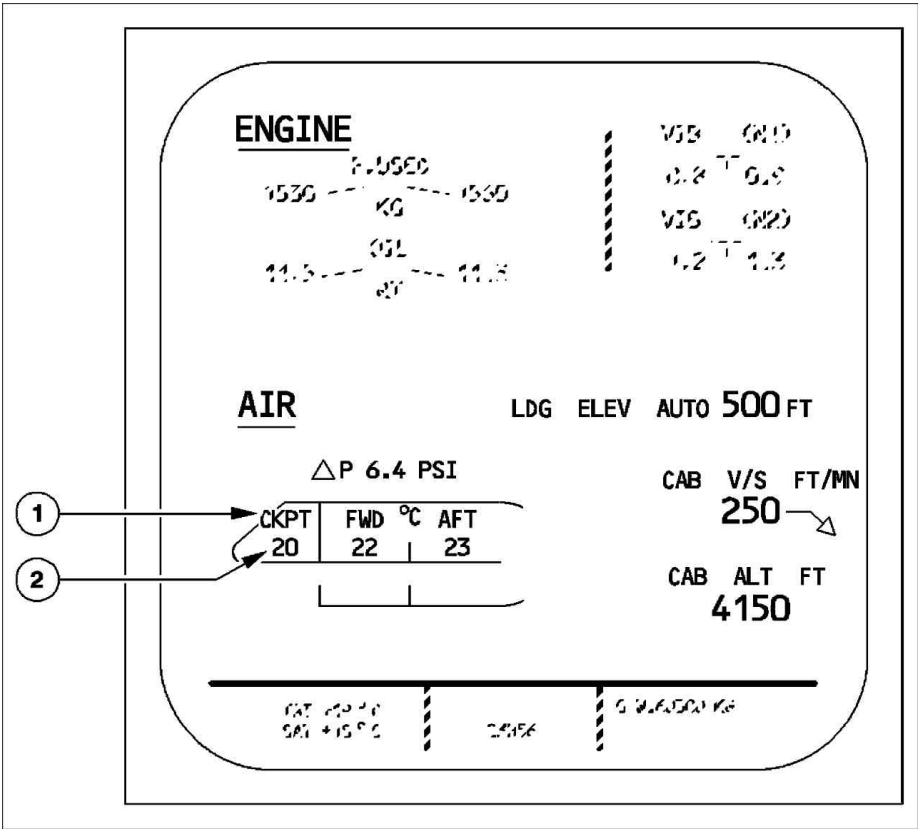
Applicable to: ALL



(1) PACK indication
Triangle normally green, PACK 1(2) indication normally white. Both become amber when pack flow control valve is closed with associated engine running.

ECAM CRUISE PAGE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

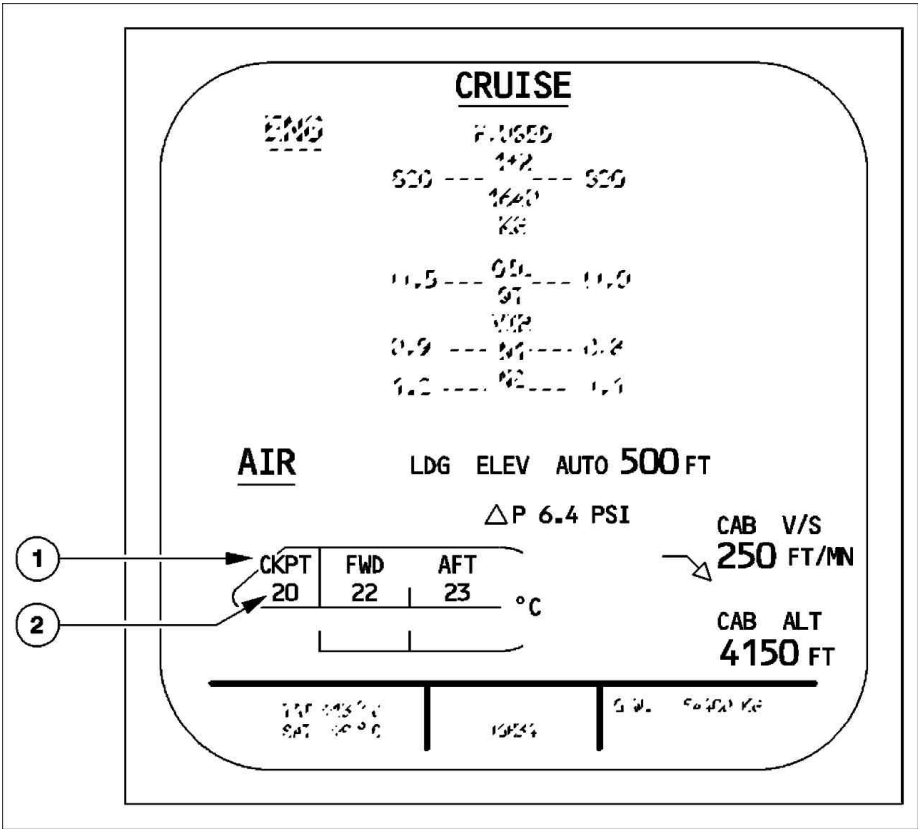


(1) Zone indication
This field also displays the temperature scale in use (°C or °F).

(2) Zone temperature

ECAM CRUISE PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



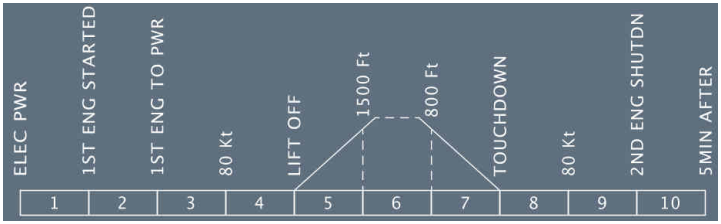
(1) Zone indication
This field also displays the temperature scale in use (°C or °F).

(2) Zone temperature

Intentionally left blank

WARNINGS AND CAUTIONS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN



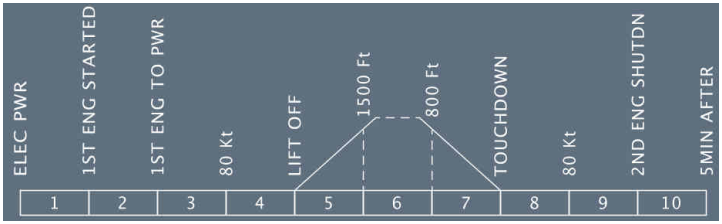
E/WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
PACK 1 (or 2) OVHT Pack compressor outlet temperature above 260 °C, or pack outlet temp above 95 °C.	SINGLE CHIME	MASTER CAUT	BLEED	PACK FAULT lt	3, 4, 5, 7, 8
PACK 1 (or 2) FAULT Pack valve disagree with selected position, or Pack compressor outlet temperature above 230 °C four times during one flight.					
PACK 1 + 2 FAULT One pack off, then the other fault.					
PACK 1 (2) OFF Pack pb-sw at off with no failure.				NIL	1, 2, 3, 4, 5, 7, 8, 9, 10
CKPT (FWD CAB OR AFT CAB) DUCT OVHT Duct temperature above 8 °C.			COND	HOT AIR FAULT lt	3, 4, 5, 7, 8
HOT AIR FAULT Hot air pressure regulating valve disagrees with selected position.					
L + R CAB FAN FAULT Both fan failure.				NIL	
PACK 1(2) REGUL FAULT Pack main channel, or pack main and secondary channels failed.	NIL	NIL	BLEED		
ZONE REGUL FAULT Zone controller main channel, or main and secondary channels failed.			COND		
LAV + GALLEY FAN FAULT			NIL		3, 4, 5, 7, 8, 9
TRIM AIR SYS FAULT One trim air valve fault, or overpressure downstream hot air valve.					3, 4, 5, 7, 8

MEMO DISPLAY

RAM AIR ON appears in green if the ram air pushbutton switch is ON.

WARNINGS AND CAUTIONS

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



E/WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
PACK 1 (or 2) OVHT Pack compressor outlet temperature above 260 °C, or above 230 °C four times during one flight.	SINGLE CHIME	MASTER CAUT	BLEED	PACK FAULT lt	3, 4, 5, 7, 8
PACK 1 (or 2) FAULT Pack valve disagree with selected position, or pack valve closed.					
PACK 1 + 2 FAULT Loss of ACSC 1 and ACSC 2.					
PACK 1 (2) OFF Pack pb at OFF with no failure.				NIL	1, 2, 3, 4, 5, 7, 8, 9, 10
CKPT (FWD CAB OR AFT CAB) DUCT OVHT Duct temperature above 88 °C or above 80 °C four times during one flight.			COND	HOT AIR FAULT lt	3, 4, 5, 7, 8
HOT AIR FAULT Hot air pressure regulating valve disagrees with selected position.					
L + R CAB FAN FAULT Both fan failure.				NIL	
PACK 1 (2) REGUL FAULT Failure of the By Pass Valve, or the RAM Air Inlet, or the Compressor Outlet Temperature sensor or the Flow Control Valve.	NIL	NIL	BLEED		
LAV + GALLEY FAN FAULT			NIL		3, 4, 5, 7, 8, 9
TRIM AIR SYS FAULT One trim air valve fault, or overpressure downstream hot air valve.					3, 4, 5, 7, 8
CTL 1 (2) - A (B) FAULT The lane A (B) of ACSC 1 (2) fails.					3, 4, 5, 7, 8

MEMO DISPLAY

RAM AIR ON appears in green if the ram air pushbutton switch is ON.

Intentionally left blank

BUS EQUIPMENT LIST

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
AIR COND	PACK CONT	1 PRIM. SEC.	AC 1 AC 1	DC 1 DC 1			
		2 PRIM. SEC.	AC 2 AC 2	DC 2 DC 2			
	ZONE CONT	PRIM. SEC.	AC 1 AC 2	DC 1 DC 2			
	PACK 1 VALVE CLOSURE					SHED	
	PACK 2 VALVE CLOSURE			DC 2			
	RAM AIR INLET					X	

BUS EQUIPMENT LIST

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
AIR COND	AIR COND SYS CONT	1 lane 1	AC1	DC1			
		2	AC2			X	
		2 lane 1	AC1	DC1			
		2	AC2	DC2			
	PACK 1 VALVE CLOSURE					SHED	
	PACK 2 VALVE CLOSURE			DC2			
	RAM AIR INLET					X	

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GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The cabin pressurization system has four general functions :
- Ground function : Fully opens the outflow valve on ground.
- Prepressurization : During takeoff, increases cabin pressure to avoid a surge in cabin pressure during rotation.
- Pressurization in flight : Adjusts cabin altitude, and rate of change to provide passengers with a comfortable flight.
- Depressurization : After touchdown, gradually releases residual cabin overpressure before the ground function fully opens the outflow valve.

The system consists of :
- Two Cabin Pressure Controllers (CPC)
- One outflow valve, with an actuator that incorporates three motors (two for automatic operation, one for manual operation)
- One control panel
- Two safety valves

Any one of the three independent electric motors may power the outflow valve.
Normally, one of the two cabin pressure controllers operates the outflow valve by means of its associated automatic motor.
In case of ditching, an override switch on the control panel allows the flight crew to close the outflow valve and all valves below the flotation line.
The flight crew can set the system to operate automatically, semi-automatically, or manually.
In normal operation, cabin pressurization is fully automatic.

GENERAL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The cabin pressurization system has four general functions :
- Ground function : Fully opens the outflow valve on ground.
- Prepressurization : During takeoff, increases cabin pressure to avoid a surge in cabin pressure during rotation.
- Pressurization in flight : Adjusts cabin altitude, and rate of change to provide passengers with a comfortable flight.
- Depressurization : After touchdown, gradually releases residual cabin overpressure before the ground function fully opens the outflow valve.

The system consists of :
- Two Cabin Pressure Controllers (CPC)
- One Residual Pressure Control Unit (RPCU)

- One outflow valve, with an actuator that incorporates three motors (two for automatic operation, one for manual operation)
- One control panel
- Two safety valves

Any one of the three independent electric motors may power the outflow valve.
Normally, one of the two cabin pressure controllers operates the outflow valve by means of its associated automatic motor.
In case of ditching, an override switch on the control panel allows the flight crew to close the outflow valve and all valves below the flotation line.
The flight crew can set the system to operate automatically, semi-automatically, or manually.
In normal operation, cabin pressurization is fully automatic.

AUTOMATIC OPERATION

Applicable to: ALL

The flight crew monitors the operation of the system, but does nothing to control it. Air pressure in the cabin follows external schedules that the system receives as signals from the Flight Management and Guidance System (FMGS).
When FMGS data is not available for automatic pressurization, the crew only needs to select the landing field elevation.
The pressurization system then uses the manually-selected landing field elevation for internal schedules.

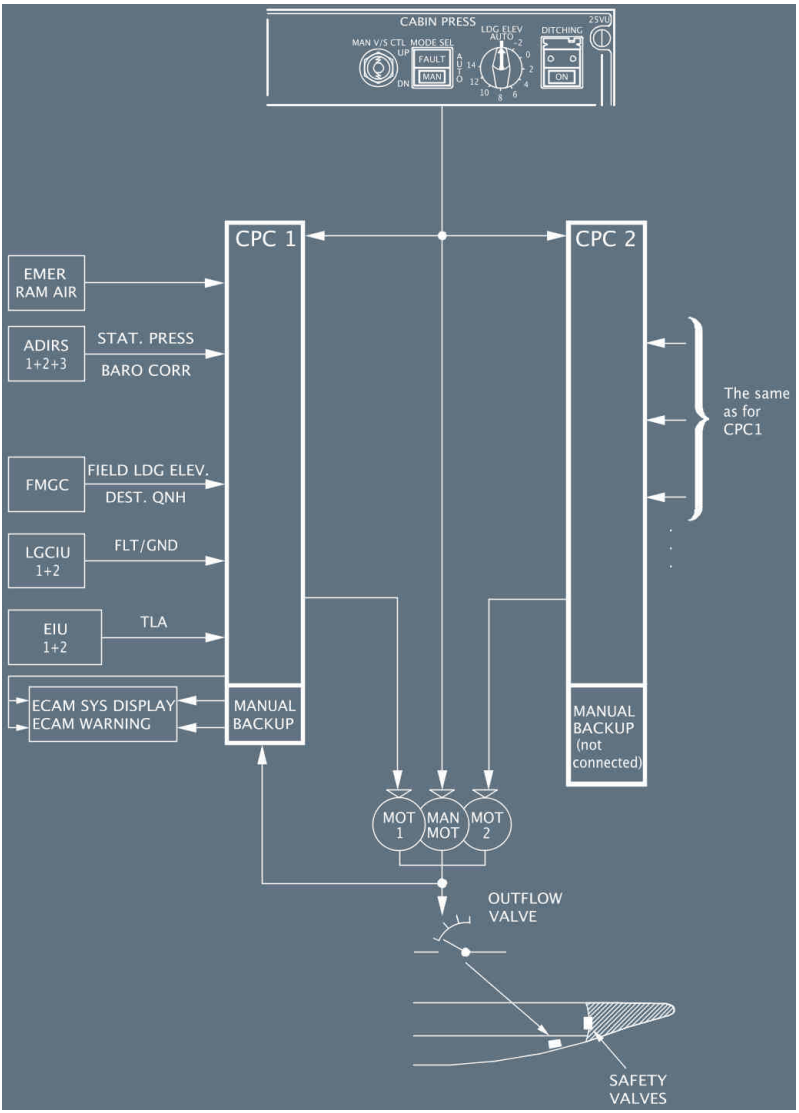
MANUAL OPERATION

Applicable to: ALL

In manual mode, the flight crew controls the cabin altitude via the manual motor of the outflow valves, by operating controls on the pressurization control panel.

SCHEMATICS

Applicable to: ALL


CABIN PRESS
MAN V/S CTL
MODE SEL
FAULT
MAN
LDG ELEV
AUTO
DITCHING
ON
CPC 1
CPC 2
EMER RAM AIR
ADIRS 1+2+3
STAT. PRESS
BARO CORR
FMGC
FIELD LDG ELEV.
DEST. QNH
LGCIU 1+2
FLT/GND
EIU 1+2
TLA
ECAM SYS DISPLAY
ECAM WARNING
MANUAL BACKUP
MANUAL BACKUP (not connected)
The same as for CPC1
MOT 1
MAN MOT
MOT 2
OUTFLOW VALVE
SAFETY VALVES

CABIN PRESSURE CONTROLLERS

Applicable to: ALL

Two identical, independent, digital controllers automatically control the system, by maintaining the proper cabin pressure. They receive signals from the Air Data Inertial Reference System (ADIRS), the Flight Management and Guidance Computer (FMGC), the Engine Interface Unit (EIU), and the Landing Gear Control Interface Unit (LGCIU).
When the system is in automatic or semi-automatic mode, one controller is active, the other is on standby.
The controllers also generate signals for the Electronic Centralized Aircraft Monitoring (ECAM).
For operation in manual mode, each controller has a backup section, which is powered by an independent power supply in the controller N°1 position. This section also has a pressure sensor that generates the cabin altitude and pressure signal for the ECAM, when MAN mode is selected.
The controllers communicate with each other via a cross-channel link.

OUTFLOW VALVE

Applicable to: ALL

The outflow valve is on the right-hand side of fuselage, behind the aft cargo compartment and below the flotation line.
The outflow valve assembly consists of a flush, skin-mounted, rectangular frame, carrying inward and outward opening flaps linked to the actuator. The actuator contains the drives of the two automatic motors and the manual motor. Either of two automatic motors operates the valve in automatic mode, and the manual motor operates it in manual mode.
In automatic mode, the operating controller signals the position of the valve to the ECAM.
In manual mode, the backup section of the N° 1 controller signals the position of the valve to the ECAM.

Note: When the RAM AIR pushbutton is ON, and Δp is below 1 PSI, the system drives the outflow valve about 50 % open if it is under automatic control. If the system is under manual control, the outflow valve does not automatically open, even if Δp is below 1 PSI.

SAFETY VALVES

Applicable to: ALL

Two independent pneumatic safety valves prevent cabin pressure from going too high (8.6 PSI above ambient) or too low (1 PSI below ambient).
They are located on the rear pressure bulkhead, above the flotation line.

RESIDUAL PRESSURE CONTROL UNIT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The Residual Pressure Control Unit (RPCU) automatically depressurizes the aircraft in case of abnormal residual pressure on ground. It automatically opens the outflow valve, when:

- The outflow valve is not fully open, and
- Both CPCs are failed, or manual mode is selected, and
- The aircraft is on ground, and
- All engines are shutdown, or all ADIRS indicate an airspeed below 100 kt.

AUTOMATIC PRESSURE CONTROL MODE

Applicable to: ALL

GENERAL

- Two identical, independent, automatic systems (each consisting of a controller and its associated motors) control cabin pressure.
  Either system controls the single outflow valve.
  Only one controller operates at a time.

  An automatic transfer occurs:
  - 70 s after each landing.
  - If the operating system fails.
- The controller automatically controls the cabin pressure. It limits the cabin pressure to 8 000 ft maximum and optimizes it during climb and descent phases.
- The controller normally uses the landing elevation and the QNH from the FMGC, and the pressure altitude from ADIRS.
  If FMGC data are not available, the controller uses the captain BARO Reference from the ADIRS and the LDG ELEV selection.
- Pressurization is assumed through the following modes:

GROUND (GN)

Before takeoff, and 55 s after landing, the outflow valve fully opens to ensure that there is no residual cabin pressure. At touchdown, any remaining cabin pressure is released at a cabin vertical speed of 500 ft/min.

TAKEOFF (TO)

To avoid a pressure surge at rotation, the controller pre-pressurizes the aircraft at a rate of 400 ft/min, until the ΔP reaches 0.1 PSI. At liftoff, the controller initiates the climb phase.

CLIMB (CL)

During climb, the cabin altitude varies according to a fixed pre-programmed law that takes into account the aircraft's actual rate of climb.

CRUISE (CR)

During cruise, the controller maintains cabin altitude at the level-off value, or at the landing field elevation, whichever is higher.

DESCENT (DE)

During descent, the controller maintains a cabin rate of descent, such that the cabin pressure is equal to the landing field pressure +0.1 PSI, shortly before landing.

The maximum descent rate is 750 ft/min.

ABORT (AB)

If the aircraft does not climb after takeoff, the abort mode prevents the cabin altitude from climbing.
Cabin pressure is set back to the takeoff altitude +0.1 PSI.

PRESSURIZATION MODES SWITCHING

Applicable to: ALL

L3

	FROM	GN	TO	GN	CL	AB	TO	CL	CR	CR	DE	DE	AB
	TO	TO	CL	CL	AB	GN	GN	CR	CL	DE	CL	GN	CL
CONDITIONS	ENG 1 and ENG 2 TLA ≥MCT (1)	1					0						
	L/G SYS1 or SYS 2 COMPRESSED	1					1						
	One L/G SYS UNLOADED and A/C speed above 100 kt		1	1									
	One L/G SYS COMPRESSED and A/C speed below 100 kt					1						1	
	A/C ALT. < 8 000 ft				1A								
	A/C ALT. ≥ 8 000 ft							1					
	A/C ALT. CHANGE SINCE T/O ≤5 075 SLFT				1A								
	A/C ALT. CHANGE SINCE T/O ≥5 075 SLFT							1					
	A/C RATE OF CLIMB ≥ 21 SL FPM FOR 60 s.										1		1
	A/C RATE OF CLIMB ≥ 100 SL FPM FOR 30 s.							0	1				
	A/C RATE OF DESCENT ≥ 200 SL FPM FOR 30 s.				1								
	A/C RATE OF DESCENT ≥ 250 SL FPM FOR 30 s.									1			

(1) Engine running

0 : Condition not valid

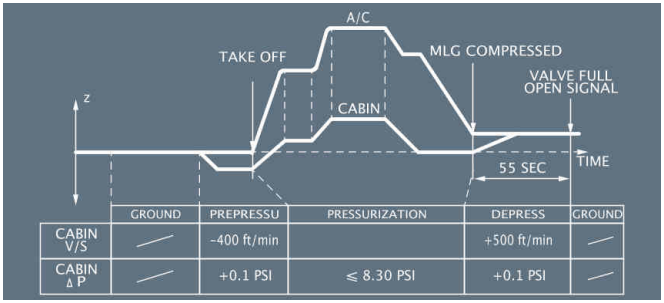
1 : Condition valid

1A : Only one A condition is necessary

EXAMPLE	The cabin pressure controller switches from Climb mode (CL) to Abort mode (AB) when: - The aircraft is below 8 000 ft, or the aircraft has changed altitude less than 5 075 ft since takeoff and, - The aircraft rate of descent is greater than 200 ft/min for 30 s.

PRESSURIZATION FLIGHT PROFILE

Applicable to: ALL



MANUAL PRESSURE CONTROL MODE

Applicable to: ALL

If both automatic systems fail, the flight crew may use the CABIN PRESS control panel to take over manual control of cabin pressurization.

- Release the MODE SEL pushbutton to select MAN, and
- Push the MAN V/S CTL switch UP or DN to increase or decrease cabin altitude.

The first of these actions cuts off power to the AUTO motors, and enables the MAN motor to control the outflow valve.

Note: *1. Due to the slow operation of the outflow valves in manual mode, and the limited resolution of the outflow valves' position on the ECAM, the visual ECAM indication of a change in the outflow valves' position can take up to 5 s.*

2. As the pressurization system is manually-controlled, the outflow valve does not open automatically at touchdown.

DITCHING

Applicable to: ALL

To prepare for ditching, the flight crew must press the DITCHING pushbutton on the CABIN PRESS control panel to close the outflow valve, the emergency ram air inlet, the avionics ventilation inlet and extract valves, and the pack flow control valves.

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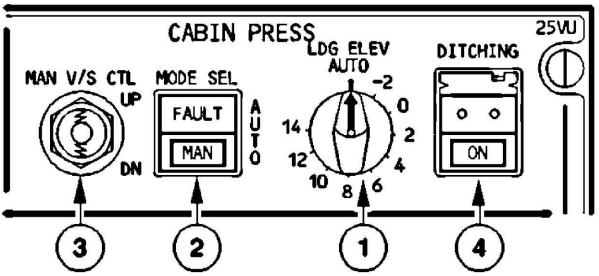
OVERHEAD PANEL

Applicable to: ALL



(1) LDG ELEV knob

AUTO : The pressurization system uses the FMGS data to construct an optimized pressure schedule.
To exit the AUTO position, pull out and turn the selector.

Other positions : The pressurization schedule does not use the landing elevation from the FMGS, but instead uses the landing elevation selected with this knob (from -2 000 to +14 000 ft) as its reference.

Note: The LDG ELEV knob scale is only given as an indication; refer to the ECAM information for accurate adjustment.

(2) MODE SEL pb

AUTO : Automatic mode is operating. One of the two systems controls the outflow valve.

MAN : This legend appears in white, and FAULT does not come on. The flight crew then uses the MAN V/S CTL selector to control the outflow valve.

Note: Switching the MODE SEL pb to MAN, for at least 10 s, then returning it to AUTO will select the other system.

FAULT lt : This legend appears in amber and the ECAM caution light comes on only when both automatic systems are faulty.

Note: The pilot may notice a variation in the CAB ALT indication on the ECAM PRESS page, when the system switches from the cabin pressure control AUTO mode to MAN mode, due to the reduced resolution of the backup pressure sensor.

(3) MAN V/S CTL toggle switch

The switch, springloaded to neutral controls the outflow valve position through operation of the MAN motor, when the MODE SEL pb is in the MAN position.

UP : The valve moves towards the open position.

DN : The valve moves towards the closed position.

Note: The outflow valve operates slowly, so the pilot must hold the toggle switch in the UP or DN position until reaching the target V/S.

(4) DITCHING guarded pushbutton

Normal : The system functions normally.

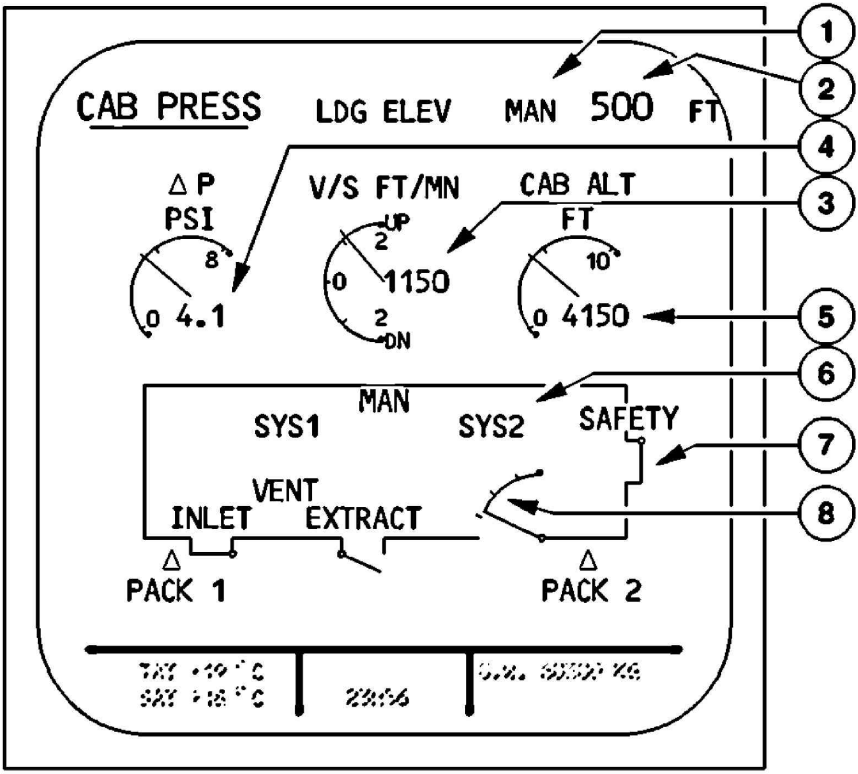
ON : The operating system sends a “close” signal to the outflow valve, emergency ram air inlet, avionics ventilation inlet and extract valves, pack flow control valves.

Note: The outflow valve will not close automatically, if it is under manual control.

CAUTION	If the ditching pb is set to ON, with the low pressure ground cart connected and all doors closed, a differential pressure will build up.

ECAM CAB PRESS PAGE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



(1) LDG ELEV AUTO/MAN

- LDG ELEV AUTO : appears in green when the LDG ELEV selector is in AUTO.
- LDG ELEV MAN: appears in green when the LDG ELEV selector is not in AUTO.

Neither appears when the MODE SEL pushbutton switch is in MAN.

(2) Landing elevation

The landing elevation selected either automatically by the FMGS or manually by the pilot appears in green (but not when the MODE SEL pushbutton switch is in MAN).

(3) V/S FT/MIN (cabin vertical speed)
The analog and digital presentations appear in green when V/S is in the normal range.
They appear in amber when V/S ≥2 000 ft/min.
The digital presentation pulses when V/S >1 800 ft/min (resets at 1 600 ft/min).

(4) ΔP PSI (cabin differential pressure)
The analog and digital presentations appear in green when ΔP is in the normal range.
They appear in amber when ΔP ≤ –0.4 PSI or ≥ 8.5 PSI.
The digital presentation pulses if Δp > 1.5 PSI (resets at 1 PSI) during flight phase 7. (*Refer to DSC-21-20-50 Warnings and Cautions*).

(5) CAB ALT FT (cabin altitude)
The analog and digital presentations appear in green, in normal range.
They appear in red if the cabin altitude goes above 9 550 ft.
The digital presentation pulses if the cabin altitude is at or above 8 800 ft (resets at 8 600 ft).

(6) Active system indication (SYS 1 or SYS 2 or MAN)
SYS 1 or SYS 2 appears in green when active and in amber when faulty. When either system is inactive, its title does not appear.
MAN appears in green when the MODE SEL switch is in MAN.

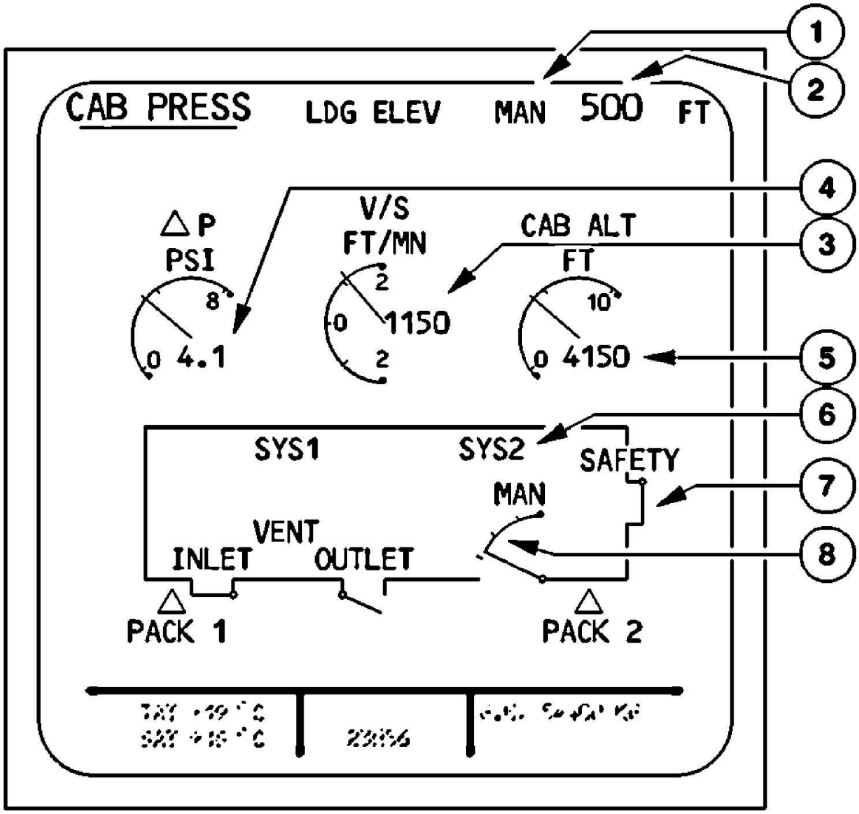
(7) Safety valve position
SAFETY appears in white and the diagram in green when both safety valves are fully closed.
SAFETY and the diagram appear in amber when either valve is not closed.

Note: The safety valve opens when the cabin differential pressure is between 8.2 and 8.9 PSI. The range is due to the reduced accuracy of ΔP measurements (in MAN mode), combined with the decrease in cabin differential pressure that occurs immediately after the safety valves open.

(8) Outflow valve position
The diagram is green when the valve is operating normally.
The diagram becomes amber when the valve opens more than 95 % during flight.

ECAM CAB PRESS PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) LDG ELEV AUTO/MAN

- LDG ELEV AUTO : appears in green when the LDG ELEV selector is in AUTO.
- LDG ELEV MAN : appears in green when the LDG ELEV selector is not in AUTO.

Neither appears when the indications from SDAC are not valid.

(2) Landing elevation

The landing elevation selected either automatically by the FMGS or manually by the pilot appears in green (but not when the MODE SEL pushbutton switch is in MAN).

(3) V/S FT/MIN (cabin vertical speed)
The analog and digital presentations appear in green when V/S is in the normal range.
The digital presentation pulses when V/S >1 750 ft/min (resets at 1 650 ft/min).

(4) ΔP PSI (cabin differential pressure)
The analog and digital presentations appear in green when ΔP is in the normal range.
They appear in amber when ΔP ≤ –0.4 PSI or ≥ 8.5 PSI.
The digital presentation pulses if Δp > 1.5 PSI (resets at 1 PSI) during flight phase 7. (*Refer to DSC-21-20-50 Warnings and Cautions*).

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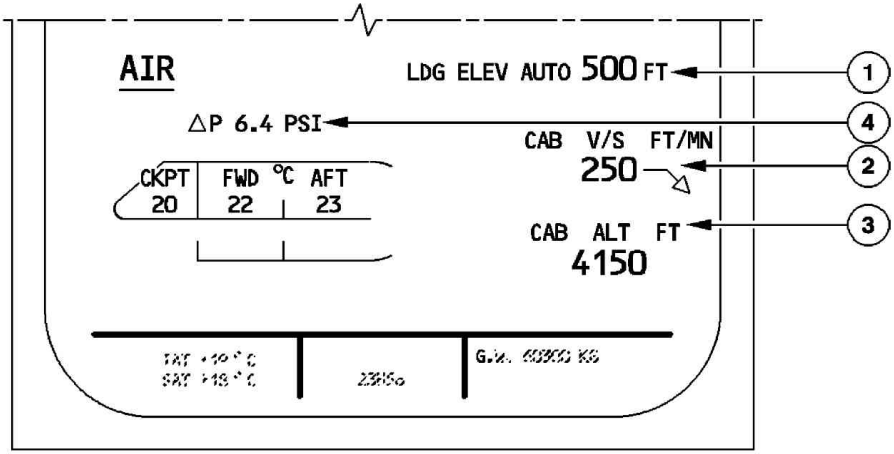
The diagram is green when the valve is operating normally.
The diagram becomes amber when the valve opens more than 95 % during flight.

ECAM CRUISE PAGE

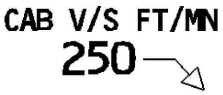
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



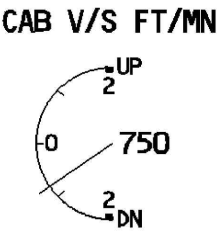
(1) LDG ELEV AUTO/MAN
Identifical to the CAB PRESS page.

(2) CAB V/S FT/MIN (cabin vertical speed)
Green, in normal range.
Amber, when out of normal range : V/S ≥2 000 ft/min
Pulses, when the V/S >1 800 ft/min (resets at 1 600 ft/min).

AUTO MODE:



MAN MODE:

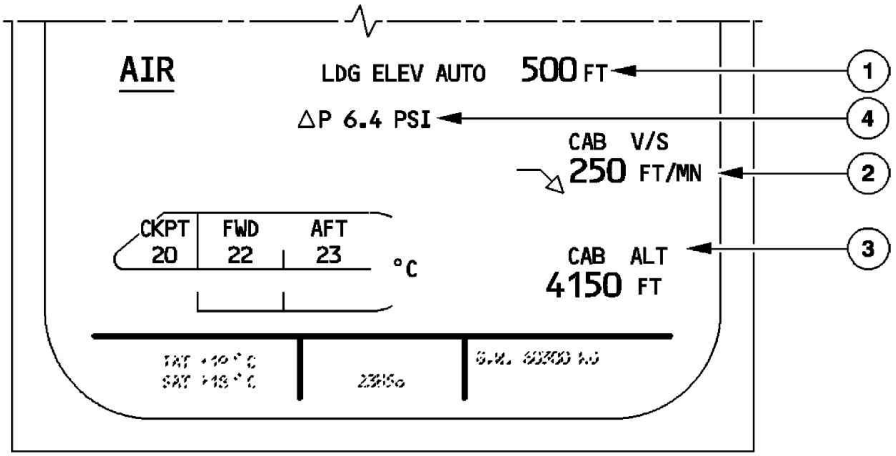


(3) CAB ALT FT (cabin altitude)
Green, in normal range.
Red, for excessive cabin altitude : ≥ 9 550 ft.
Pulses for cabin altitude at, or above, 8 800 ft (resets at 8 600 ft).

(4) ΔP indication
It is normally green.
It becomes amber, when out of normal range Δp ≤ -0.4 PSI or ≥ 8.5 PSI.

ECAM CRUISE PAGE

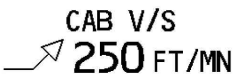
Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



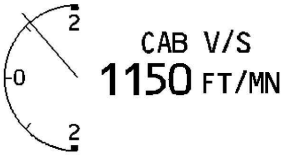
(1) LDG ELEV AUTO/MAN
Identifical to the CAB PRESS page

(2) CAB V/S FT/MIN (cabin vertical speed)
Green, in normal range.
Pulses, when the V/S >1 750 ft/min (resets at 1 650 ft/min).

AUTO MODE:



MAN MODE:

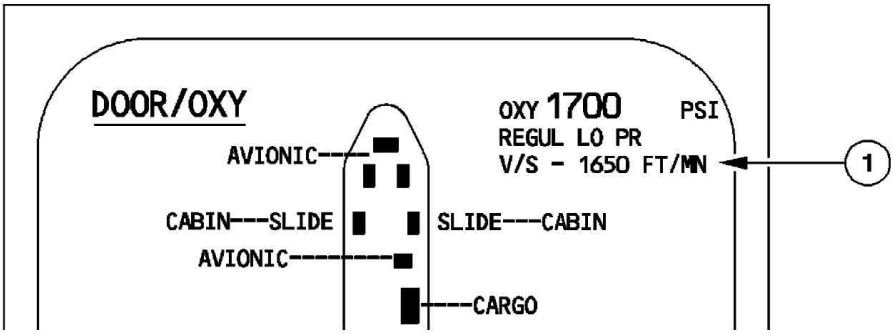


(3) CAB ALT FT (cabin altitude)
Green, in normal range.
Red, for excessive cabin altitude : ≥ 9 550 ft.
Pulses for cabin altitude at, or above, 8 800 ft (resets at 8 600 ft).

(4) ΔP indication
It is normally green. Pulses green when CAB ΔP ≥ 1.5 PSI before landing.
It becomes amber, when out of normal range Δp ≤ -0.4 PSI or ≥ 8.5 PSI.

ECAM DOOR PAGE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



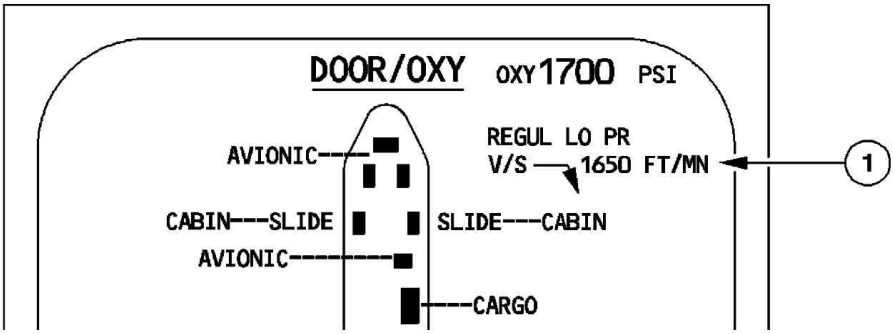
(1) V/S (cabin vertical speed)

This number only appears during flight phases 5, 6 and 7. (*Refer to DSC-21-20-50 Warnings and Cautions* for flight phase definitions).

- It is normally green.
- It becomes amber, when the V/S is greater than 2 000 ft/min, or less than -2 000 ft/min.

ECAM DOOR PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) V/S (cabin vertical speed)

This number only appears during flight phases 5, 6 and 7. (*Refer to DSC-21-20-50 Warnings and Cautions* for flight phase definitions).

- It is normally green.
- It pulses, when the V/S is greater than 1 750 ft/min and stops pulsing, when less than 1 650 ft/min.
- It becomes amber, when the V/S is greater than 2 000 ft/min, or less than -2 000 ft/min.

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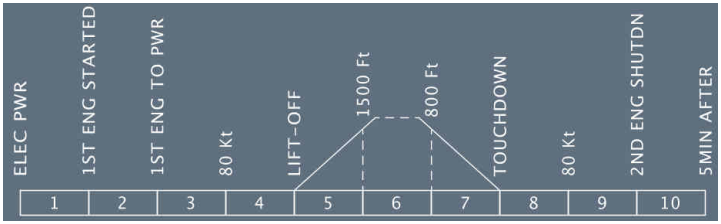
WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
EXCESS CAB ALT Cabin altitude exceeds: - In CLB and DES the higher of: 9 550 ft or landing field elevation plus 1 000 ft - In CRZ 9 550 ft	CRC	MASTER WARN	CAB PRESS	NIL	1 to 5 7 to 10
SYS 1 + 2 FAULT Both pressure controllers fail.	SINGLE CHIME	MASTER CAUT	CAB PRESS	MODE SEL FAULT lt	4, 5, 7, 8
LO DIFF PR Time to reach $\Delta P = 0 < 1.5$ min, and time to reach $\Delta P = 0 \leq$ (time for cab alt to reach landing elevation) +30 s and aircraft is at least 3 000 ft above landing field. *Note:* *The warning is maintained, when the aircraft descends below 3 000 ft above landing field.*				NIL	2, 3, 4, 5, 7, 8, 9, 10
OFV NOT OPEN Valve not fully open on ground (time delay 70 s)					3, 4, 5, 6, 7, 8
SAFETY VALVE OPEN Either safety valve not fully closed on ground or not fully closed for more than 1 min in flight.					4, 5, 7, 8, 9, 10
LDG ELEV FAULT No FMGS LDG ELEV data is available.					3, 4, 5, 7, 8, 9, 10
SYS 1 (or 2) FAULT Pressure controller fault.	NIL	NIL			3, 4, 5, 7, 8

MEMO DISPLAY

The “MAN LDG ELEV” message is displayed in green, if the LDG ELEV knob is not in the AUTO position.

BUS EQUIPMENT LIST

Applicable to: ALL

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
PRESS	CAB PRESS CONT	1				X	
		2		DC2			
		MANUAL CTL		DC BAT			

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GENERAL

Applicable to: ALL 320

The ventilation system includes ventilation for:
- The avionics, controlled by the avionics equipment ventilation controller (AEVC),
- The battery,
- The lavatories and galleys.

GENERAL

Applicable to: ALL 321

The ventilation system includes ventilation for:
- The avionics, controlled by the avionics equipment ventilation controller (AEVC),
- The battery,
- The lavatories and galleys.

Note: *For more information about cargo ventilation, Refer to DSC-21-40-10 General*

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GENERAL

Applicable to: ALL

The avionics ventilation system is fully automatic.
It cools the electrical and electronic components in the avionics compartment and on the flight deck, including the instrument and circuit breaker panels. It uses two electric fans to force the circulation of cooling air.
Whatever the configuration of the avionics ventilation system is, a part of the avionics ventilation air is sucked from the cockpit through the different cockpit panels.

MAIN COMPONENTS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSQ, B-HSR, B-HTD, B-HTE, B-HTF

FANS

Two electric fans operate continuously, as long as the aircraft's electrical system is supplied. They make the air circulate around the avionics equipment.

SKIN AIR INLET AND EXTRACT VALVES

These valves admit air from outside the aircraft and evacuate hot air from the avionics equipment.

SKIN EXCHANGE INLET AND OUTLET BYPASS VALVES

These valves enable air to circulate between the avionics bay and the space under the cargo compartment floor.

AIR CONDITIONING INLET VALVE

This valve opens to enable the air conditioning circuit to supply fresh air to the avionics bay.

SKIN EXCHANGE ISOLATION VALVE

This valve connects or isolates the skin heat exchanger.

AVIONICS EQUIPMENT VENTILATION COMPUTER (AEVC)

The AEVC controls the operation of all fans and valves in the avionics ventilation system.

MAIN COMPONENTS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

FANS

Two electric fans continuously circulate air around the avionics equipment, when the aircraft is electrically supplied.
The electric fans have two operating speeds: High and Low.

The fans operate at high speed, when the ventilation air temperature goes above +40 °C (104 °F). If the ventilation air temperature goes below +35 °C the electric fans will operate at low speed.

SKIN AIR INLET AND EXTRACT VALVES

These valves admit air from outside the aircraft and evacuate hot air from the avionics equipment.

SKIN EXCHANGE INLET AND OUTLET BYPASS VALVES

These valves enable air to circulate between the avionics bay and the space under the cargo compartment floor.

AIR CONDITIONING INLET VALVE

This valve opens to enable the air conditioning circuit to supply fresh air to the avionics bay.

SKIN EXCHANGE ISOLATION VALVE

This valve connects or isolates the skin heat exchanger.

AVIONICS EQUIPMENT VENTILATION COMPUTER (AEVC)

The AEVC controls the operation of all fans and valves in the avionics ventilation system.
The FAN SPEED CONTROLER (FSC) controls the avionics ventilation fan speed as a function of temperature.

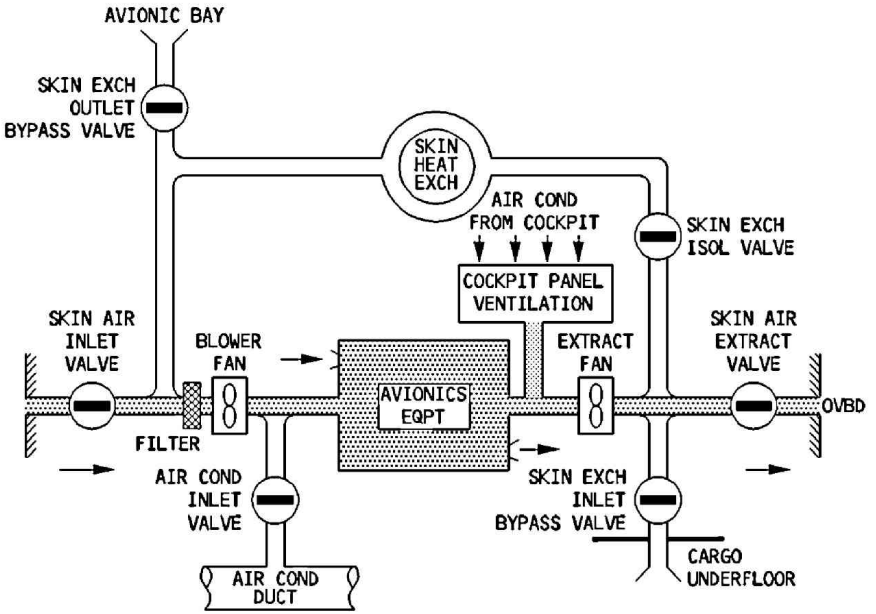
NORMAL OPERATION, OPEN-CIRCUIT CONFIGURATION

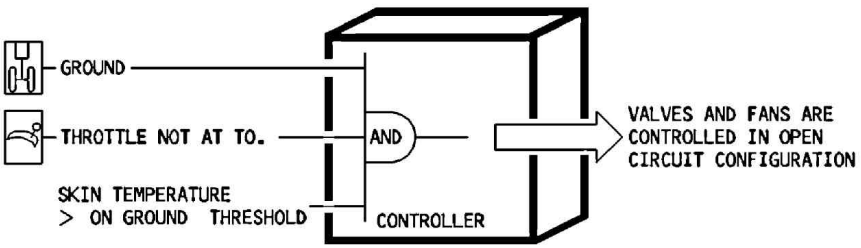
Applicable to: ALL

GROUND OPERATIONS

The open-circuit configuration operates when skin temperature is above the on-ground threshold.

On-ground threshold = +12 °C (53 °F), temperature increasing, or
+9 °C (48 °F), temperature decreasing.





NORMAL OPERATION, CLOSE-CIRCUIT CONFIGURATION

Applicable to: ALL

FLIGHT OPERATIONS

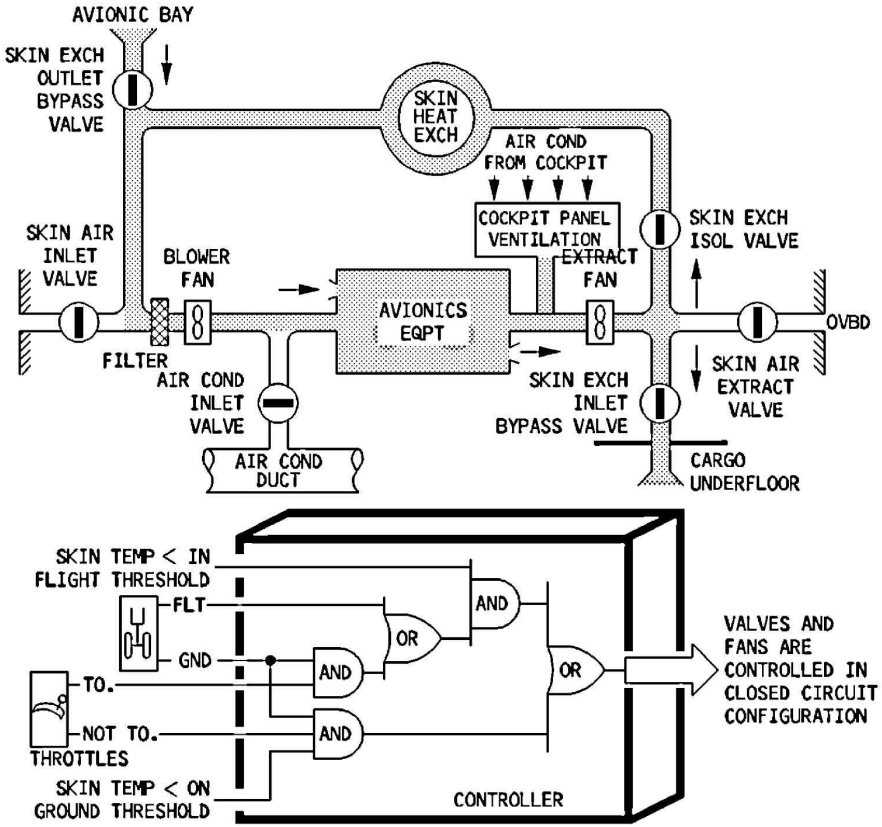
The close-circuit configuration operates when skin temperature is beneath the in-flight threshold.

In flight threshold = +35 °C (95 °F), temperature increasing, or
+32 °C (90 °F), temperature decreasing.

GROUND OPERATIONS

The close-circuit configuration operates when skin temperature is beneath the on-ground threshold.

On ground threshold = +12 °C (53 °F), temperature increasing, or
+9 °C (48 °F), temperature decreasing.



NORMAL OPERATION, INTERMEDIATE CONFIGURATION

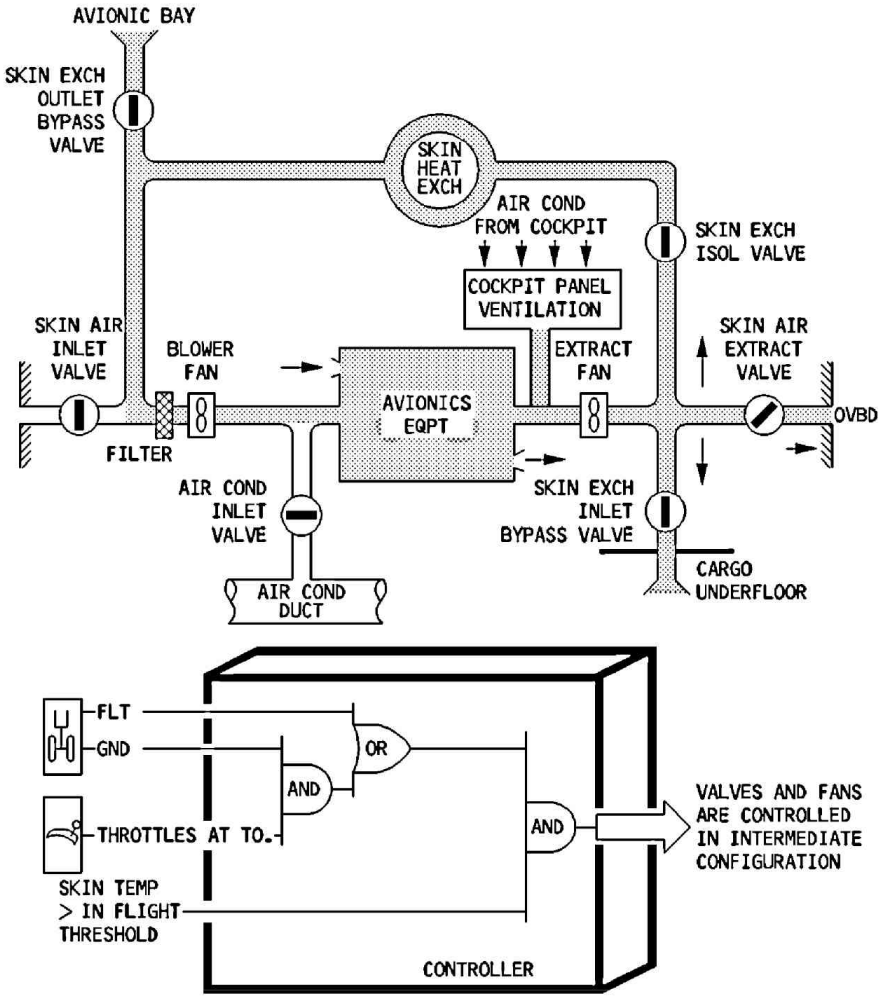
Applicable to: ALL

1 FLIGHT OPERATIONS

The intermediate configuration operates when skin temperature is above the in-flight threshold.

In flight threshold = +35 °C (95 °F), temperature increasing, or
+32 °C (90 °F), temperature decreasing.

Note: The measuring range of the skin temperature sensed is between -50 °C and 80 °C. Outside of this range, the AEVC sets the avionics ventilation configuration to the intermediate configuration (partially open) until the temperature is within the operation range again.

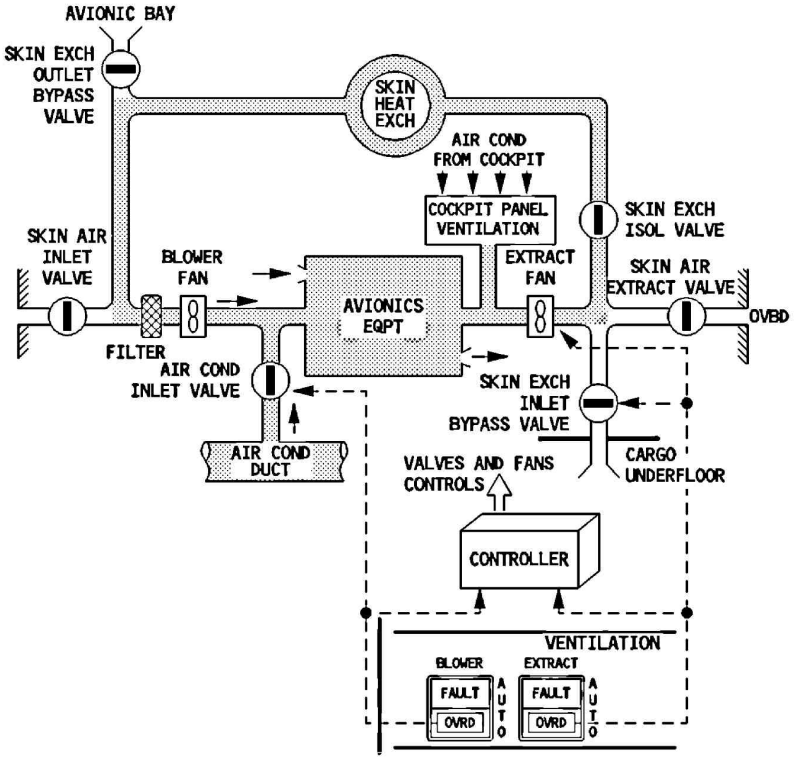

AVIONIC BAY
SKIN EXCH OUTLET BYPASS VALVE
SKIN HEAT EXCH
AIR COND FROM COCKPIT
SKIN EXCH ISOL VALVE
COCKPIT PANEL VENTILATION
SKIN AIR INLET VALVE
BLOWER FAN
EXTRACT FAN
SKIN AIR EXTRACT VALVE
AVIONICS EQPT
OVBD
FILTER
AIR COND INLET VALVE
SKIN EXCH INLET BYPASS VALVE
CARGO UNDERFLOOR
AIR COND DUCT
FLT
GND
OR
AND
THROTTLES AT TO.
AND
VALVES AND FANS ARE CONTROLLED IN INTERMEDIATE CONFIGURATION
SKIN TEMP > IN FLIGHT THRESHOLD
CONTROLLER

ABNORMAL OPERATION

Applicable to: ALL

BLOWER FAULT OR EXTRACT FAULT WARNING

When the BLOWER or the EXTRACT pushbutton switch is set at the OVRD (override) position, the system is in closed-circuit configuration and adds air from the air conditioning system to the ventilation air.

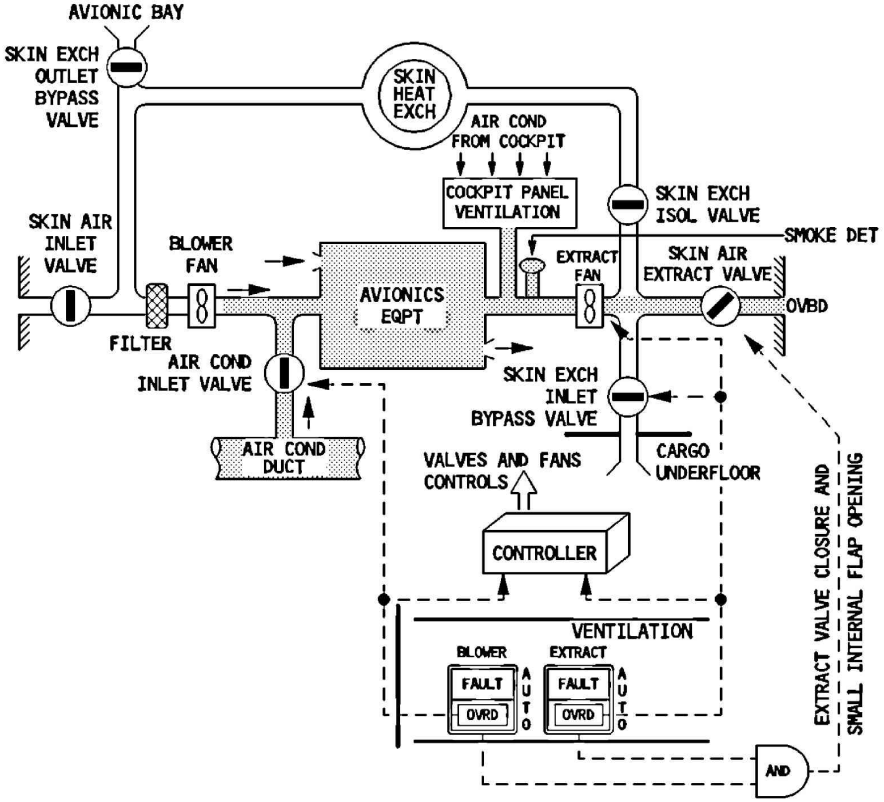


When the BLOWER pushbutton switch is set at OVRD, the blower fan is stopped and the extract fan continues to run.

When the EXTRACT pushbutton switch is set at OVRD, the extract fan is controlled directly from the pushbutton. Both fans continue to run.

SMOKE CONFIGURATION

When the smoke detector detects smoke in the avionics ventilation air the BLOWER and the EXTRACT FAULT lights come on.
When both the BLOWER and the EXTRACT pushbuttons are set to the OVRD position, the air conditioning system supplies cooling air, which is then exhausted overboard. The blower fan stops.



CONTROLLER FAILURE

The system goes to the same configuration as above, except that the skin exchange isolation valve stays open.
The inlet valve and the skin exchange inlet bypass valve remain in the position they were in before the failure occurred.
The extract fan keeps running.

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BATTERY VENTILATION

Applicable to: ALL

A venturi in the skin of the aircraft draws air from the space around the batteries and vents it overboard. The resulting airflow ventilates the batteries.

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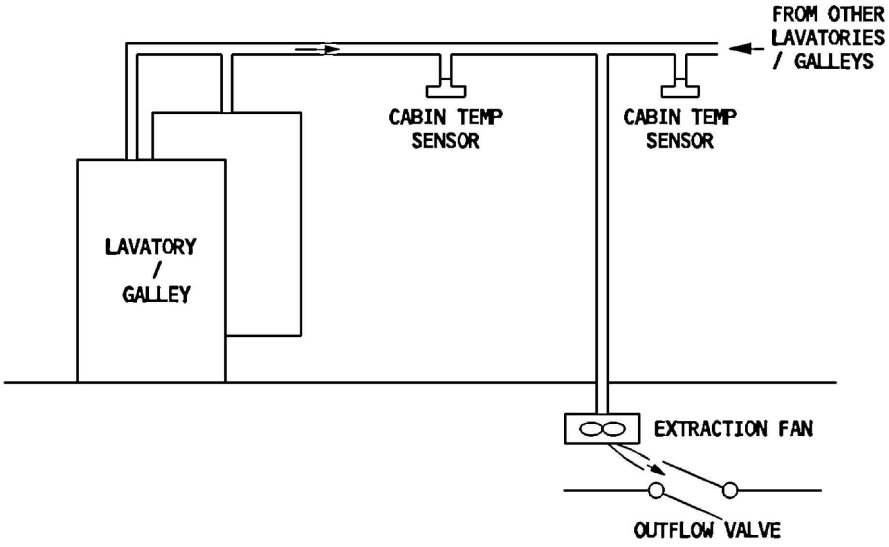
LAVATORY AND GALLEY

Applicable to: ALL

An extraction fan draws ambient cabin air through the lavatories and galleys and exhausts it near the outflow valve.

The extraction fan runs continually when electric power is available.



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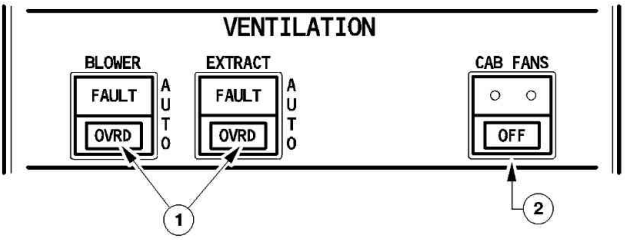
OVERHEAD PANEL

Applicable to: ALL



(1) BLOWER pb-sw and EXTRACT pb-sw

AUTO: : When both pushbutton switches are on AUTO:
- On the ground before the application of TO power, the ventilation system is in open circuit configuration (closed configuration when the skin temperature is below the ground threshold).
- On the ground after the application of TO power, and in flight, the ventilation system is in closed circuit configuration.

OVRD: : When either pushbutton switch is on OVRD:
- The system goes to closed circuit configuration.
- Air from the air conditioning system is added to ventilation air. (The blower fan stops if the BLOWER pushbutton switch is in the OVRD position).

When both pushbutton switches are on OVRD:
- Air flows from the air conditioning system and then overboard.
- The extract fan continues to run.

FAULT : Lights up amber (and ECAM activates)

It: in the blower switch, if :
- blowing pressure is low (See *)
- duct overheats (See *)
- computer power supply fails
- smoke warning is activated

in the extract switch, if :
- extract pressure is low (See *)
- computer power supply fails
- smoke warning is activated.

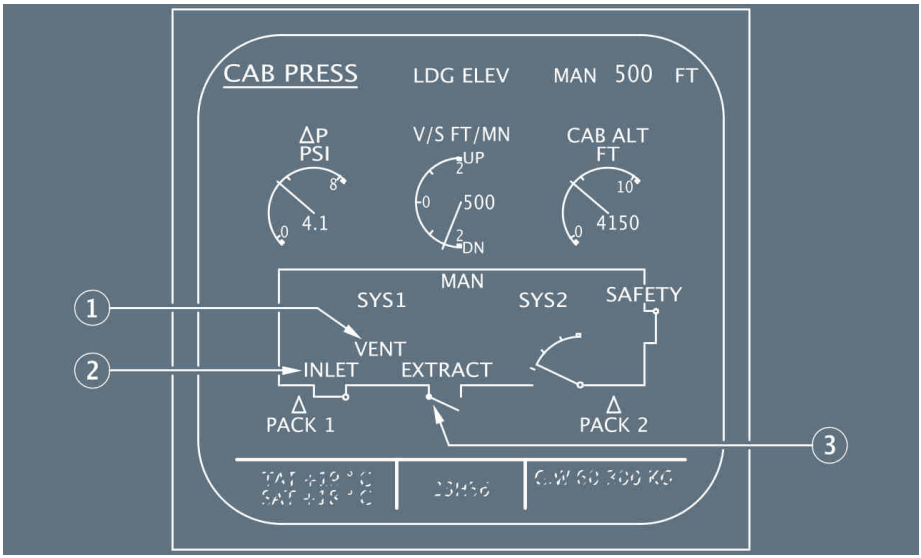
* If the warning occurs on the ground when the engines are stopped, the external horn sounds.

(2) *Refer to DSC-21-10-50 Controls on Overhead Panel*

ECAM CAB PRESS S-PAGE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

1



(1) VENT
This normally appears in white. It becomes amber, if there is a BLOWER FAULT, EXTRACT FAULT, or AVNCS SYS FAULT.

(2) INLET and EXTRACT Indications
Normally white. The corresponding indication becomes amber, in case of a BLOWER FAULT or EXTRACT FAULT.

(3) INLET and EXTRACT Valve Diagrams

This indicates that the valve is fully closed.
It is normally green, but is amber if there is a disagreement.

This indicates that the valve is fully open.
It is normally green, but is amber if there is a disagreement.

NOTE: Because of the accuracy of the temperature sensors, on the ground the closed or open indication may become amber when the temperature is close to the valve opening or closing threshold.

This indicates that the inlet valve is in transit (inlet valve only).
It is amber.

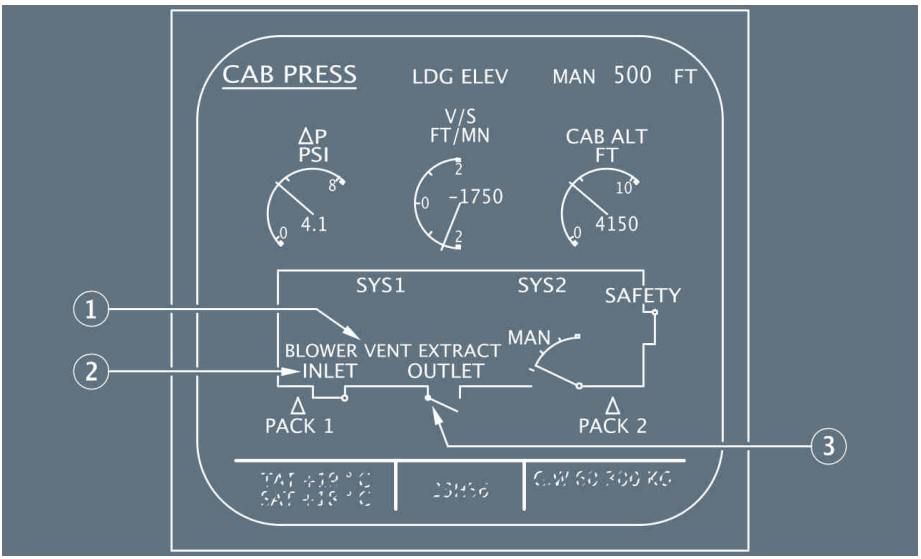
This indicates that the extract valve is partially open (the extract valve is closed but a small internal flap is open).

It is normally green, but is amber when the valve failed in transit.

ECAM CAB PRESS PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

2



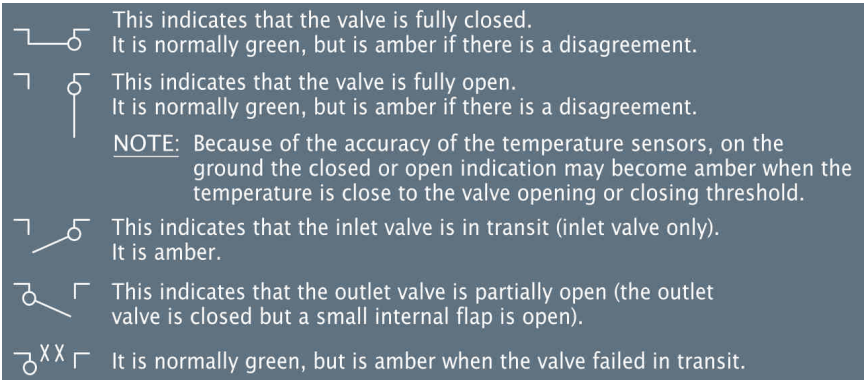
(1) BLOWER, VENT and EXTRACT Indications

VENT message normally appears in white. It becomes amber, if there is a BLOWER FAULT, EXTRACT FAULT, or AVNCS SYS FAULT.
BLOWER message appears in amber if there is a BLOWER FAULT.
EXTRACT message appears in amber if there is an EXTRACT FAULT.

(2) INLET and OUTLET Indications

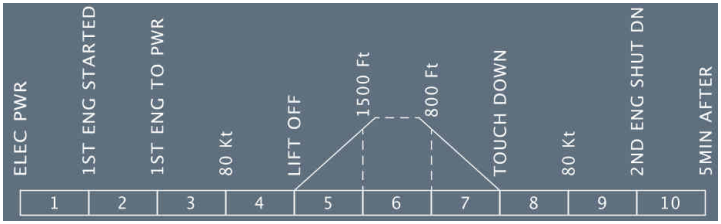
Normally white. The corresponding indication becomes amber, when the inlet valve or the outlet valve is failed.

(3) INLET and OUTLET Valve Diagrams



WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
BLOWER FAULT Blowing pressure low or duct overheat	SINGLE CHIME	MASTER CAUT	CAB PRESS	BLOWER (1) FAULT lt	3, 4, 5, 7, 8
EXTRACT FAULT Extract pressure low				EXTRACT (1) FAULT lt	
SKIN VALVE FAULT 1. Extract valve fully open in phase 3 or 2. Extract valve fully open in flight or 3. Inlet valve not fully closed in flight				NIL	4, 5, 7, 8
AVNCS SYS FAULT Power up test not satisfactory or AEVC not supplied or valves position disagree				BLOWER and EXTRACT FAULT lts (2)	3, 4, 5, 6, 7, 8, 9

(1) *Associated with ground external call.*
(2) *Only in case of AEVC power supply failure on ground.*

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BUS EQUIPMENT LIST

Applicable to: ALL

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
VENT	CABIN FANS	1	AC1	DC1			
		2	AC2	DC2			
	AEVC			DC1		SHED	
	AVIONIC FANS	FAN BLOWER	AC1	DC1			
		EXTRACT	AC2			SHED	
	GND COOL UNIT ◁	UNIT FAN CONTROL	AC2 AC1				

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GENERAL

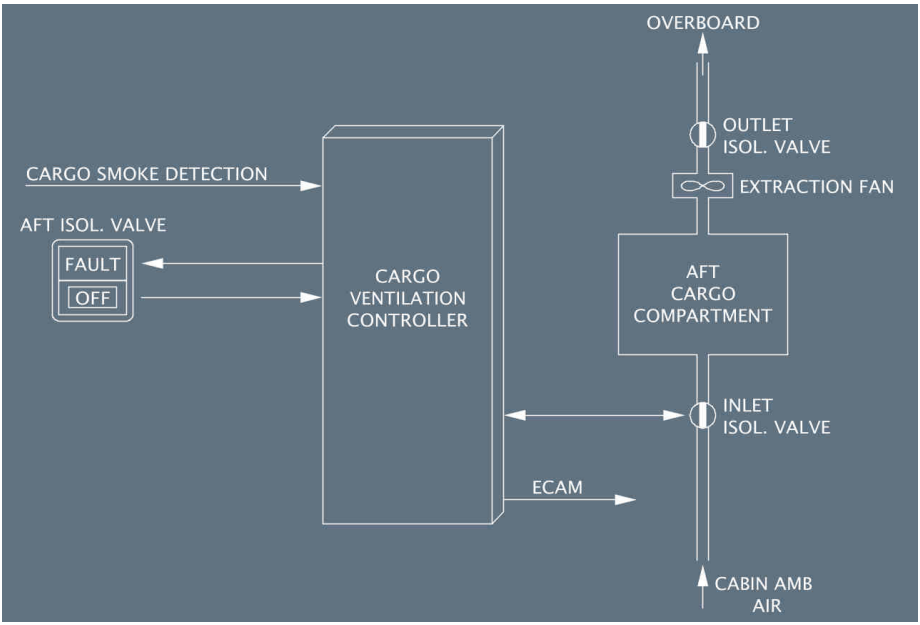
Applicable to: ALL 321

An extraction fan draws air from the cargo compartments and exhausts it overboard. Air from the cabin replaces the exhausted air, thus ventilating the cargo compartments.

SCHEMATIC

Applicable to: ALL 321

1



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AFT CARGO COMPARTMENT VENTILATION

Applicable to: ALL 321

Air from the cabin goes via the inlet isolation valve to the aft cargo compartment, driven by an extraction fan. Air is controlled by the outlet isolation valve and then goes outboard through the outflow valve.
The cargo ventilation controller controls the operation of the inlet and outlet isolation valves and the extraction fan.
When the isolation valves are fully open, the extraction fan operates continuously when the aircraft is on the ground and during flight.

The controller closes the isolation valves and stops the extraction fan when :
- the flight crew turns the AFT ISOL VALVE pushbutton switch OFF, or
- the aft cargo smoke detection unit detects smoke.

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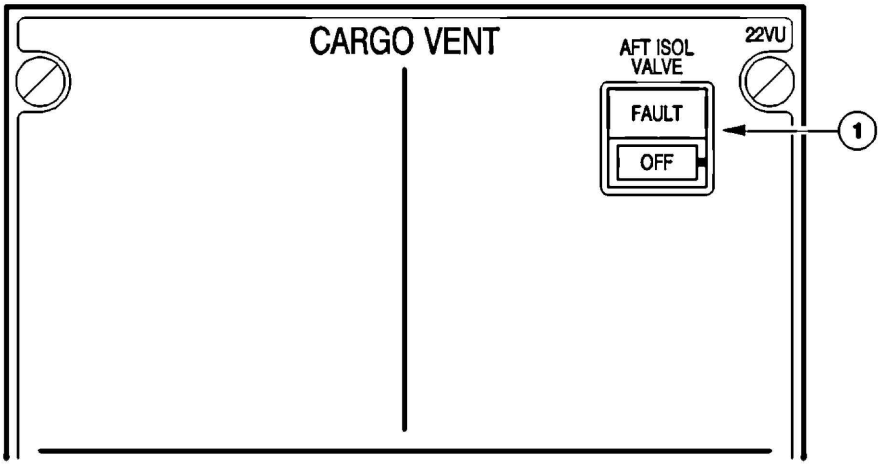
OVERHEAD PANEL

Applicable to: ALL 321



(1) AFT ISOL VALVE pb

The switch controls the isolation valves, the blower and the extraction fan.

Auto : The inlet and outlet isolation valves open, blower and extraction fans run if there is no smoke detected in the aft cargo bay.

OFF : The inlet and outlet isolation valves and the trim air valve close, the blower and extraction fan stops.

FAULT lt : The light, associated with the ECAM caution, comes on amber when either inlet or outlet valve is not in the selected position.

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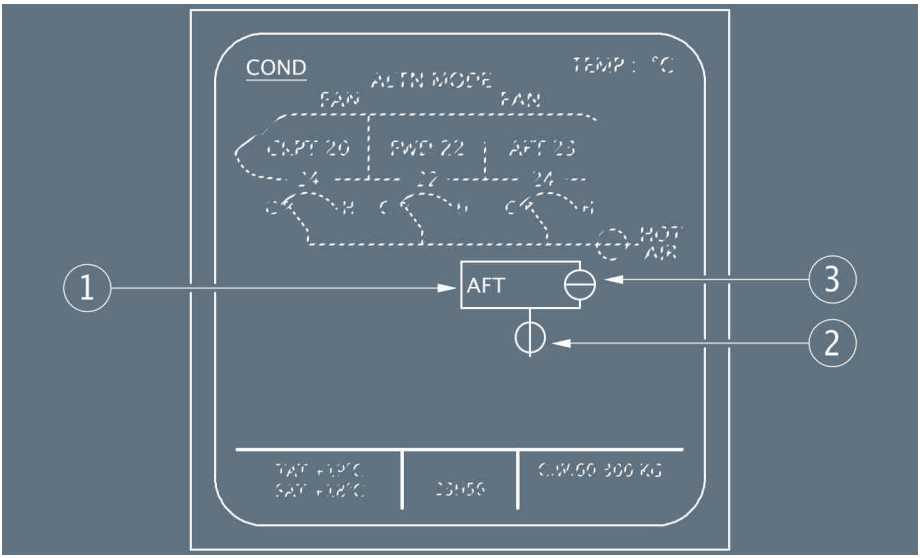
ECAM COND PAGE

Applicable to: ALL 321

1



(1) Zone indication
It is white.

(2) Inlet isolation valve

In line – Green	:	Valve is open.
Crossline – Amber	:	Valve is closed.

(3) Outlet isolation valve

Crossline – Green	:	Valve is open.
In line – Amber	:	Valve is closed.

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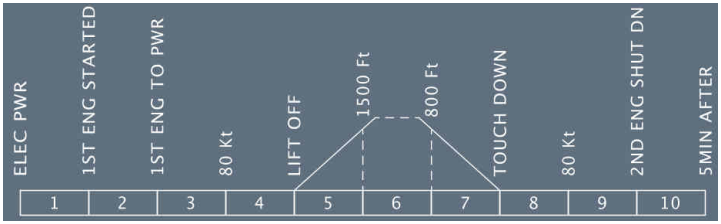
WARNINGS AND CAUTIONS

Applicable to: ALL 321



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
AFT (FWD) CRG ISOL VALVE Cargo isolation valve disagreement	NIL	NIL	NIL	ISOL VALVE FAULT lt	3, 4, 5, 7, 8
AFT (FWD) CRG VENT FAULT Cargo fan fault				NIL	

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BUS EQUIPMENT LIST

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
FWD/AFT CARGO	VENT CONT		DC BAT			
	HEAT CONT		DC BAT			
	VENT/HEAT FANS(S)	AC 1				

BUS EQUIPMENT LIST

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
FWD/AFT CARGO	VENT CONT				SHED	
	HEAT CONT				SHED	
	VENT/HEAT FANS(S)	AC1				

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AIRCRAFT SYSTEMS

AUTO FLIGHT - GENERAL

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DSC-22_10-PLP PRELIMINARY PAGES

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Localization Title	Toc Index	ID	Reason
DSC-22_10-10 Flight Crew Interface with FMGC	I	1	Improvement of Illustration quality
DSC-22_10-40-10 MCDU - MCDU Interface	A	1	Improvement of Illustration quality
DSC-22_10-40-10 MCDU - MCDU Interface	A	2	Improvement of Illustration quality
DSC-22_10-40-10 MCDU - MCDU Interface	A	3	Improvement of Illustration quality
DSC-22_10-40-10 MCDU - MCDU Interface	A	4	Improvement of Illustration quality
DSC-22_10-40-10 MCDU - Screen Prompts	A	5	Improvement of Illustration quality
DSC-22_10-40-10 MCDU - MCDU Display	A	6	DU revised to improve illustration. Improvement of Illustration quality
DSC-22_10-40-10 MCDU - MCDU Display	A	7	DU revised to improve illustration. Improvement of Illustration quality
DSC-22_10-40-20 FCU	A	1	Improvement of Illustration quality
DSC-22_10-40-20 FCU	A	2	Improvement of Illustration quality
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DSC-22_10-40-20 Speed/Mach Control Area	C	4	Improvement of Illustration quality
DSC-22_10-40-20 Lateral Control Area	D	5	Improvement of Illustration quality
DSC-22_10-40-20 Lateral Control Area	D	6	Improvement of Illustration quality
DSC-22_10-40-20 AP-A/THR Control Area	E	7	Improvement of Illustration quality
DSC-22_10-40-20 Vertical Control Area	F	8	Improvement of illustration quality.
DSC-22_10-40-20 Vertical Control Area	F	9	Improvement of illustration quality.
DSC-22_10-40-30 Thrust Levers	A	1	Improvement of Illustration quality
DSC-22_10-40-40 Climb Phase	B	1	Improvement of Illustration quality
DSC-22_10-40-40 Approach Phase	C	2	Improvement of Illustration quality
DSC-22_10-40-40 Approach Phase	C	3	Improvement of Illustration quality

Localization Title	Toc Index	ID	Reason
DSC-22_10-40-50 Arc Mode	B	1	Update of the Wind Direction reference. "Wind Arrow" appears on the illustration instead of "Magnetic Wind Arrow".
			Improvement of Illustration quality

PREAMBLE

Applicable to: ALL

This section gives a general description of the Auto Flight System and its functions:

- Architecture
- Function description
- Basic principle of systems:
  - Reversion
  - Protection
  - Managed and selected guidance modes.
- Mode information
- Display characteristics
- Operational principles
- Flight crew interface (MCDU pages)
- Degraded modes of operations.

DESCRIPTION

Applicable to: ALL

The Flight Management Guidance System (FMGS) contains the following units:

- Two Flight Management Guidance Computers (FMGC)
- Two Multipurpose Control and Display Units (MCDU) (third MCDU optional)
- One Flight Control Unit (FCU)
- Two Flight Augmentation Computers (FAC).

GENERAL PHILOSOPHY

Applicable to: ALL

The Flight Management and Guidance System (FMGS) provides predictions of flight time, mileage, speed, economy profiles and altitude.
It reduces cockpit workload, improves efficiency, and eliminates many routine operations generally performed by the flight crew.

The Flight Management Guidance System (FMGS) operates as follows:

- During cockpit preparation the flight crew uses the Multipurpose Control and Display Unit (MCDU) to insert a preplanned route from origin to destination. This route includes SID, EN ROUTE, WAYPOINTS, STAR, APPROACH, MISSED APPR, and ALTN route as available from the navigation database.
- Subsequently the system defines a vertical profile and a speed profile, taking into account ATC requirements and performance criteria.

Either FMGC performs all operations, if one FMGC fails.

The FMGS computes the aircraft position continually, using stored aircraft performance data and navigation data. Therefore it can steer the aircraft along a preplanned route and vertical and speed profiles. This type of guidance is said to be “managed”.
If the flight crew wants to modify any flight parameter (SPD, V/S, HDG, etc.) temporarily, they may do so by using the various Flight Control Unit (FCU) selectors. The FMGS then guides the aircraft to the target value of this parameter that they have selected. This type of guidance is said to be “selected”.

The two available types of guidance, then, are:
- Managed guidance guides the aircraft along the preplanned route and the vertical and speed/Mach profile. (The FMGS computes the target values of the various flight parameters).
- Selected guidance guides the aircraft to the target values of the various flight parameters the flight crew selects by using the FCU selectors.

Selected guidance always has priority over managed guidance.

FLIGHT MANAGEMENT GUIDANCE COMPUTER (FMGC)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

Each FMGC is divided into two main parts:
- The Flight Management (FM) part controls the following functions:
  - Navigation and management of navigation radios
  - Management of flight planning
  - Prediction and optimization of performance
  - Display management.
- The Flight Guidance (FG) part performs the following functions:
  - Autopilot (AP) command
  - Flight Director (FD) command
  - Autothrust (A/THR) command.

Each FMGC has its own database (190 Kwords or 400 Kwords, depending upon the FMGS standard), and each is comprised of two fields.
- One field, which the flight crew cannot modify, contains customized and standard navigation data: Navaids, waypoints, airways, enroute information, holding patterns, airports, runways, procedures (SIDs, STARs, etc.), company routes, fuel policy, alternates.
  The airline updates this part every 28 days, and is responsible for defining, acquiring, updating, loading, and using this data.
  The data goes into each FMGC separately, although it can be copied from one FMGC to the other, if the system has the optional crossload function. This updating operation takes about 20 min.
- The second field contains elements stored by the flight crew that enable them to create 20 waypoints, 10 runways, 20 navaids, and 3 routes.

Note: When the two FMGCs are not working with the same database, the FMGS operates in independent mode. Refer to DSC-22_10-30 Independent Mode.

- Each FMGC also contains an integrated performance database, used by the FM part, for computing predictions. The airline does not have access to this database.

FLIGHT MANAGEMENT GUIDANCE COMPUTER (FMGC)

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

Each FMGC is divided into two main parts:

- The Flight Management (FM) part controls the following functions:
  - Navigation and management of navigation radios
  - Management of flight planning
  - Prediction and optimization of performance
  - Display management.
- The Flight Guidance (FG) part performs the following functions:
  - Autopilot (AP) command
  - Flight Director (FD) command
  - Autothrust (A/THR) command.

Each FMGC has its own set of databases. The individual databases can be independently loaded into their respective FMGC, or independently copied from one FMGC to the other.

Each FMGC contains these main databases:

1. The Navigation database (2.8 Mbytes) contains standard navigation data: Navaids, waypoints, airways, enroute information, holding patterns, airports, runways, procedures (SIDs, STARs, etc.), company routes, alternates.
   The airline updates this part every 28 days, and is responsible for defining, acquiring, updating, loading, and using this data. The updating operation takes 20 min to complete or 5 min if cross loaded from the opposite FMGC.
2. The Airline Modifiable Information (AMI), also described as the FM Airline Configuration file, contains:
   - Airline policy values: THR RED altitude, ACC altitude, EO ACC altitude, PERF factor, IDLE factor.
   - Fuel policy values: Fuel for taxi, % of route reserve, maximum and minimum values of route reserve, etc.
   - AOC functions customization.
3. The Aircraft Performance database includes the Engine model, Aerodynamical model, and Performance model. The airline cannot modify this database.

4. The Magnetic Variation database.
5. Each FMGC contains elements stored by the flight crew that enable them to create 20 waypoints, 10 runways, 20 navaids, and 5 routes.

MULTIPURPOSE CONTROL AND DISPLAY UNIT (MCDU)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

Two MCDUs are installed on the pedestal for flight crew loading and display of data. The use of the MCDU allows the flight crew to interface with the FMGC by selection of a flight plan for lateral and vertical trajectories and speed profiles. The flight crew may also modify selected navigation or performance data and specific functions of Flight Management (revised flight plan, engine-out, secondary flight plan, etc.). Additional data from peripherals (Centralized Fault Display System (CFDS), ARINC Communication Addressing and Reporting System (ACARS), Air Traffic Service Unit (ATSU)...) can also be displayed. Data that is entered into the MCDU that is illogical or beyond the aircraft capabilities will either be disregarded or will generate an advisory message.

MULTIPURPOSE CONTROL AND DISPLAY UNIT (MCDU)

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

Two MCDUs are installed on the pedestal for flight crew loading and display of data. The use of the MCDU allows the flight crew to interface with the FMGC by selection of a flight plan for lateral and vertical trajectories and speed profiles. The flight crew may also modify selected navigation or performance data and specific functions of Flight Management (revised flight plan, engine-out, secondary flight plan, etc.). Additional data from peripherals (Centralized Fault Display System (CFDS), ARINC Communication Addressing and Reporting System (ACARS), Air Traffic Service Unit (ATSU)...) can also be displayed. Data that is entered into the MCDU that is illogical or beyond the aircraft capabilities will either be disregarded or will generate an advisory message.
The MCDUs allow the activation of the back–up navigation in the case of a dual FM Failure.

FLIGHT CONTROL UNIT (FCU)

Applicable to: ALL

The FCU located on the glareshield, is the short-term interface between the flight crew and the FMGC. It is used to select any flight parameters or modify those selected in the MCDU. The autopilots and autothrust functions may be engaged or disengaged. Different guidance modes can be selected to change various targets (speed, heading, track, altitude, flight path angle, vertical speed).

FLIGHT AUGMENTATION COMPUTER (FAC)

Applicable to: ALL

The FAC controls rudder, rudder trim and yaw damper inputs. It computes data for the flight envelope and speed functions. The FAC also provides warning for low-energy and windshear detection if these functions are installed.

OTHER FLIGHT CREW INTERFACES

Applicable to: ALL

THRUST LEVERS

The thrust levers are the main interface between the Flight Management Guidance Computer (FMGC), the Full Authority Digital Engine Control System (FADEC), and the flight crew.

The thrust levers:
- Arm the autothrust at takeoff, when FLX or TOGA is selected
- Limit the maximum thrust by their position when autothrust is active
- Disconnect the autothrust system when the flight crew sets them to IDLE
- Command the thrust manually when autothrust is not active
- Engage the common modes (takeoff or go-around) when TOGA (or FLX for takeoff) is set
- Set the autothrust to the active mode when they are between IDLE and CL detent (MCT in engine out).

Applicable to: ALL

ELECTRONIC FLIGHT INSTRUMENTS (EFIS)

Two Primary Flight Displays (PFD) and Navigation Displays (ND) provide the flight crew with full-time flight guidance, navigation and system advisory information for all flight phases. An EFIS control panel is located at each end of the glareshield and is used to control both Primary and Navigation Displays. This panel includes controls to select various modes within the PFD. A selector allows the barometric altimeter setting to be displayed on the PFD. Various distance ranges can be selected on the ND, and two switches allow either the left or right VOR/ADF bearing pointers to be displayed on the ND.

Applicable to: ALL

PRIMARY FLIGHT DISPLAYS

The PFDs combine several conventional flight instrument indications on one color display panel, for centralized reference of flight data.

This centralized color display includes:
- Flight Director attitude guidance targets
- Armed and engaged modes
- Navigation and instrument approach information
- Altimeter setting
- Barometric altitude
- System messages.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

NAVIGATION DISPLAYS

Five different color navigation compass displays can be selected:
- ARC (map mode)
- ROSE NAV (map mode)
- ROSE VOR
- ROSE ILS
- PLAN.

Information displayed on these modes uses the aircraft's position as a reference point for the flight plan navigation data (lateral and vertical information).

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

NAVIGATION DISPLAYS

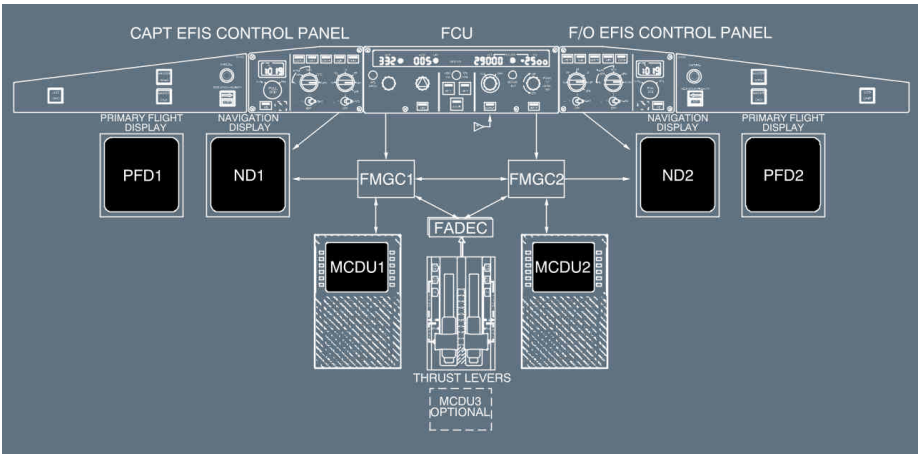
Five different color navigation compass displays can be selected:
- ARC (map mode)
- ROSE NAV (map mode)
- ROSE VOR
- ROSE LS
- PLAN.

Information displayed on these modes uses the aircraft's position as a reference point for the flight plan navigation data (lateral and vertical information).

FLIGHT CREW INTERFACE WITH FMGC

Applicable to: ALL

1



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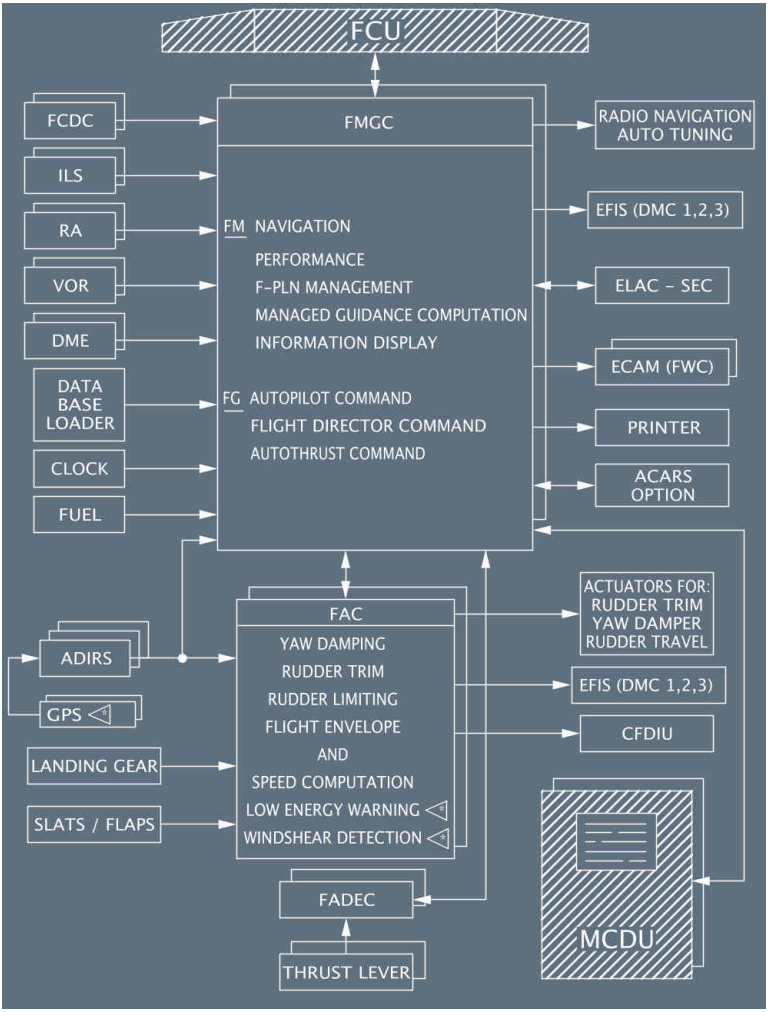
SYSTEM INTERFACE DIAGRAM

Applicable to: ALL



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GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The FMGS has three modes of operation:
- Dual mode (the normal mode)
- Independent mode. Each FMGC being controlled by its associated MCDU
- Single mode (using one FMGC only).

GENERAL

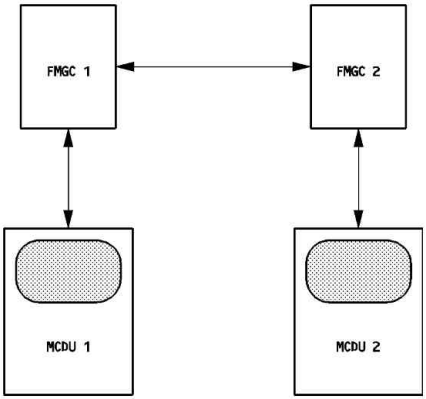
Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The FMGS has four modes of operation:
- Dual mode (the normal mode)
- Independent mode. Each FMGC being controlled by its associated MCDU
- Single mode (using one FMGC only)
- Back–up navigation mode.

DUAL MODE

Applicable to: ALL

This is the normal mode. The two FMGCs are synchronized: each performs its own computations and exchanges data with the other through a crosstalk bus.
One FMGC is the master, the other the slave, so that some data in the slave FMGC comes from the master.
All data inserted into any MCDU is transferred to both FMGCs and to all peripherals.

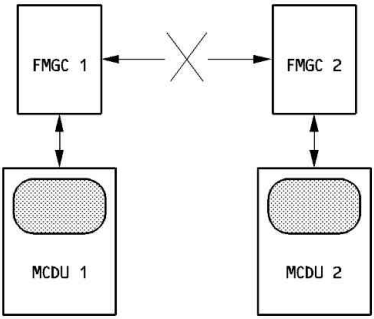


MASTER FMGC LOGIC

- If one autopilot (AP) is engaged, the related FMGC is master:
  - It uses the onside FD for guidance
  - It controls the A/THR
  - It controls the FMA 1 and 2.
- If two APs are engaged, FMGC1 is master.
- If no AP is engaged, and
  - The FD1 pb is on, then FMGC1 is master
  - The FD1 pb is off, and FD2 pb on then FMGC2 is master.
- If no AP/FD is engaged, A/THR is controlled by FMGC1.

INDEPENDENT MODE

Applicable to: ALL



The system automatically selects this degraded mode under specific abnormal conditions (e.g. different database validity on both FMGCs).
Both FMGCs work independently and are linked only to peripherals on their own sides of the flight deck (“onside” peripherals).
When this occurs, the “INDEPENDENT OPERATION” message is displayed on both MCDU scratchpads.
Each MCDU transmits data it receives from its onside FMGC. It affects only the onside EFIS (Electronic Flight Instrument System) and RMP (Radio Management Panel).
On the POS MONITOR page (and GPS MONITOR page ◁), FMGS position (and GPS position ◁) from the opposite FMGC is not displayed.
On the RAD NAV page (and PROG page, if the FMGS GPS is not installed), navaids tuned on the opposite MCDU are not displayed. Corresponding fields are blank.

PROCEDURES ON GROUND

- **If each FMGC is loaded with a different database,** the FMGS will only operate in independent mode.

  CHECK the database number and validity.
  CROSSLOAD ⋖ the database to restore the dual operation.
  Crossload function is available on ground only (in preflight or done phase), when an independent operation is detected.

PROCEDURES IN FLIGHT

DO NOT SWITCH the navigation databases.
MAKE the same entries on both MCDUs to have both AP/FDs similar orders.
Both FGs being valid, 2 APs may be engaged for CAT II or CAT III operations.

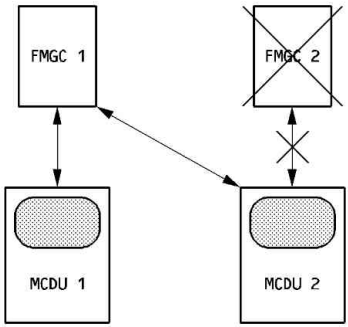
- **In the event of a go-around and when the second AP is disconnected:**

  ENSURE that the FMGC in command has correct flight plan orders and an updated nav database.

  Airbus does not recommend pulling one FMGC circuit breaker to force the system to operate in SINGLE mode.

SINGLE MODE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



The system automatically selects this degraded mode when one FMGC fails.
When this occurs, the failed FMGC displays “OPP FMGC IN PROCESS” in white on the MCDU scratchpad.
The corresponding ND displays the “SELECT OFFSIDE RNG/MODE” amber message.
Both POS MONITOR pages display the same position (operative FMGC position).

Both FDs are driven by the same FMGC. Any entry on either MCDU is sent to the operative FMGC.

PROCEDURES

- **If a transient failure triggers a single mode of operation:**

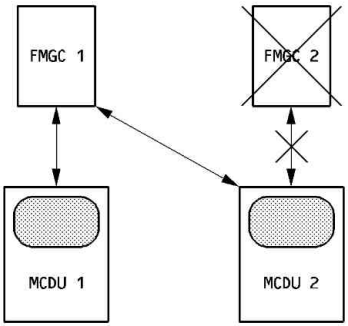
  DO NOT USE the MCDU(s) until the PLEASE WAIT message is suppressed.

  SET both NDs on the same range and mode to display the same information from the operative FMGC.

  When convenient, RESET the failed FMGC. (*Refer to PRO-SUP-22-10 Manual FMGS Reset - General*).

SINGLE MODE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



The system automatically selects this degraded mode when one FMGC fails.
When this occurs, the failed FMGC displays “OPP FMGC IN PROCESS” in white on the MCDU scratchpad.

On the ND usually associated with the failed FM:
- If the NDs are not both in the same mode or range, the associated ND displays "MAP NOT AVAIL" and "SET OFFSIDE RNG/MODE".
- If the NDs are in the same mode and range, the associated ND displays the "OFFSIDE FM CONTROL" amber message.

Both POS MONITOR pages display the same position (operative FMGC position).
Both FDs are driven by the same FMGC. Any entry on either MCDU is sent to the operative FMGC.

PROCEDURES

- **If a transient failure triggers a single mode of operation:**

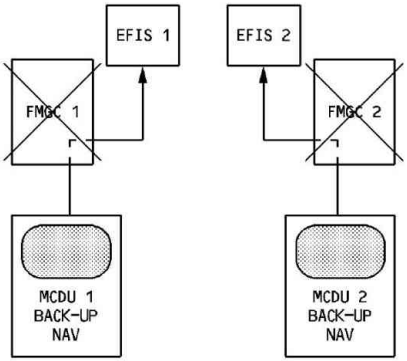
  DO NOT USE the MCDU(s) until the PLEASE WAIT message is suppressed.

SET both NDs on the same range and mode to display the same information from the operative FMGC.

When convenient, RESET the failed FMGC. (*Refer to PRO-SUP-22-10 Manual FMGS Reset - General*).

BACK UP NAVIGATION MODE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



The flight crew selects on the MCDU MENU page this degraded mode when both FMGCs fail. They recover the navigation function through the MCDU and IRS/GPS ◁✻ .
The MCDU continuously memorizes the active flight plan in its memory.

If both FMGCs fail, the back up navigation provides the following functions:

- Flight Planning
- Aircraft position using onside IRS, IRS3, or GPIRS position (if GPS ◁✻)
- F-PLN display on ND
- No AP/FD NAV mode
- Limited lateral revision
- F-PLN automatic sequencing.

Intentionally left blank

GENERAL

Applicable to: ALL

The flight management system displays navigation, performance and guidance information on the:

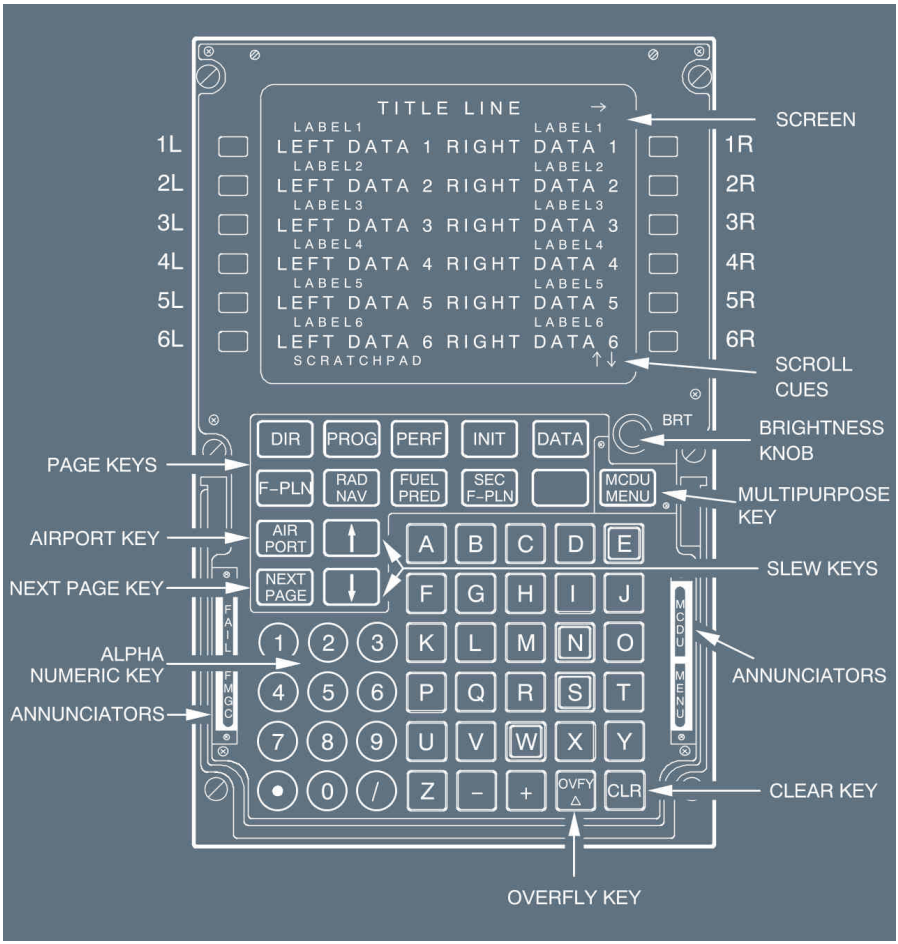
- Multipurpose Control and Display Unit (MCDU)
- Navigation Display (ND) of the Electronic Flight Instrument System (EFIS)
- Primary Flight Display (PFD) of the EFIS.

Intentionally left blank

MCDU

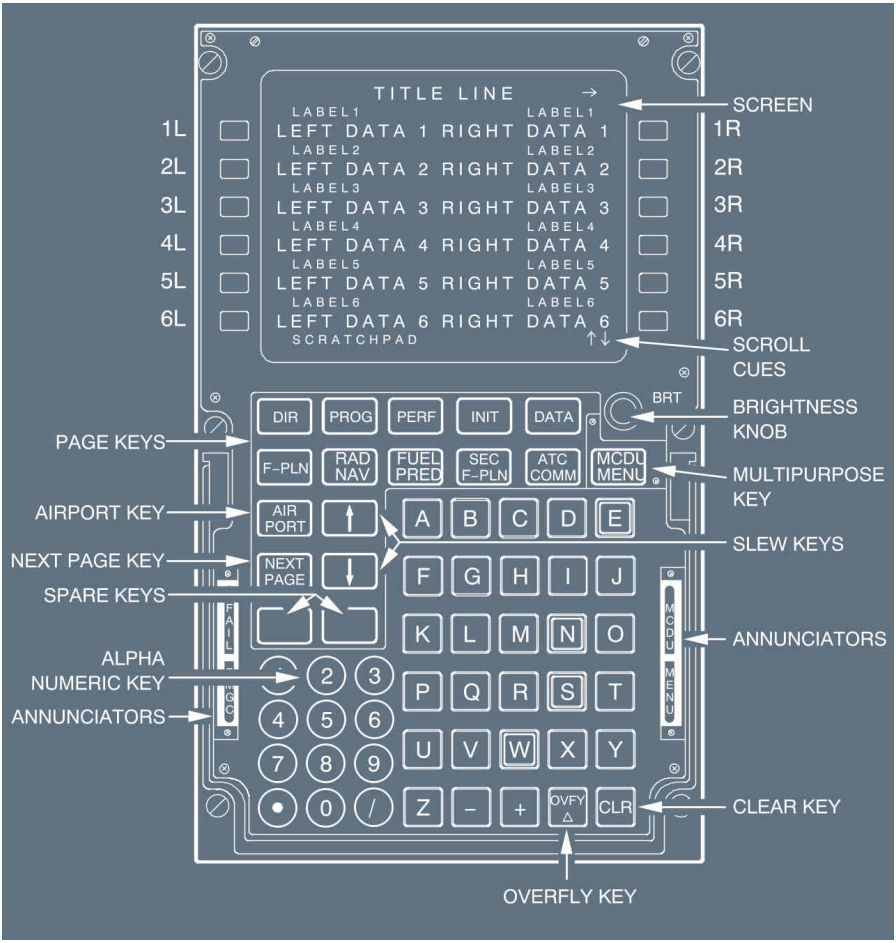
Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

1 MCDU INTERFACE



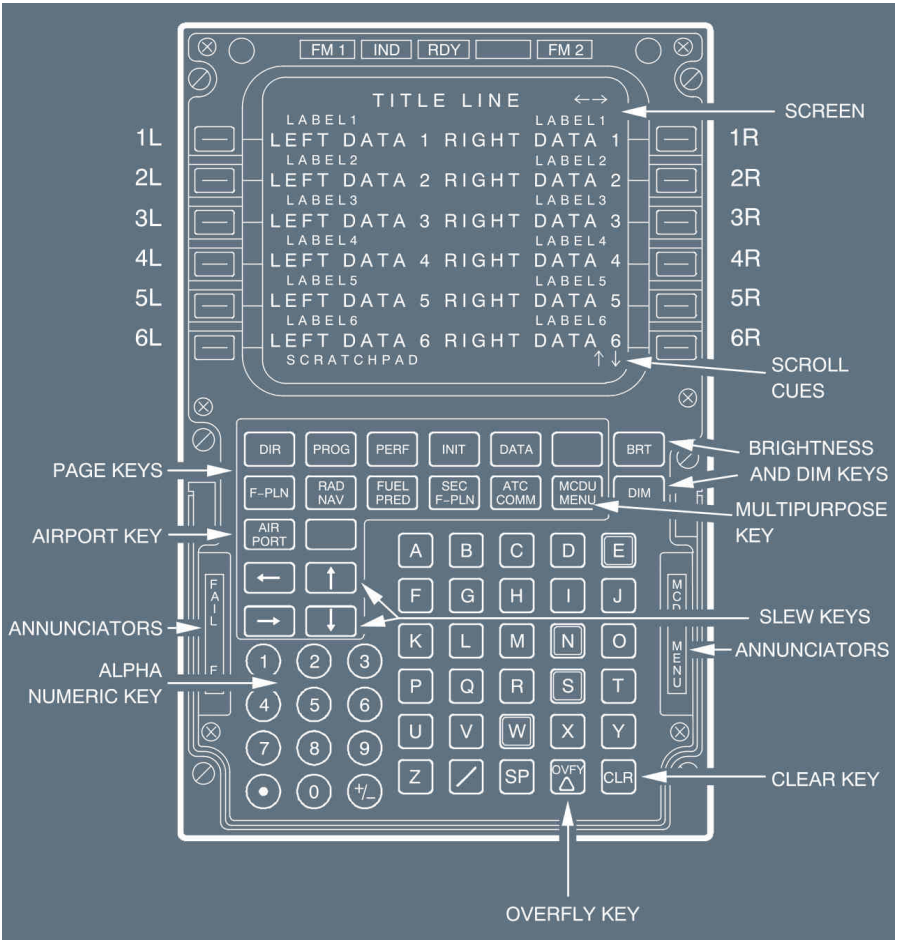
Applicable to: B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

2 **MCDU INTERFACE**



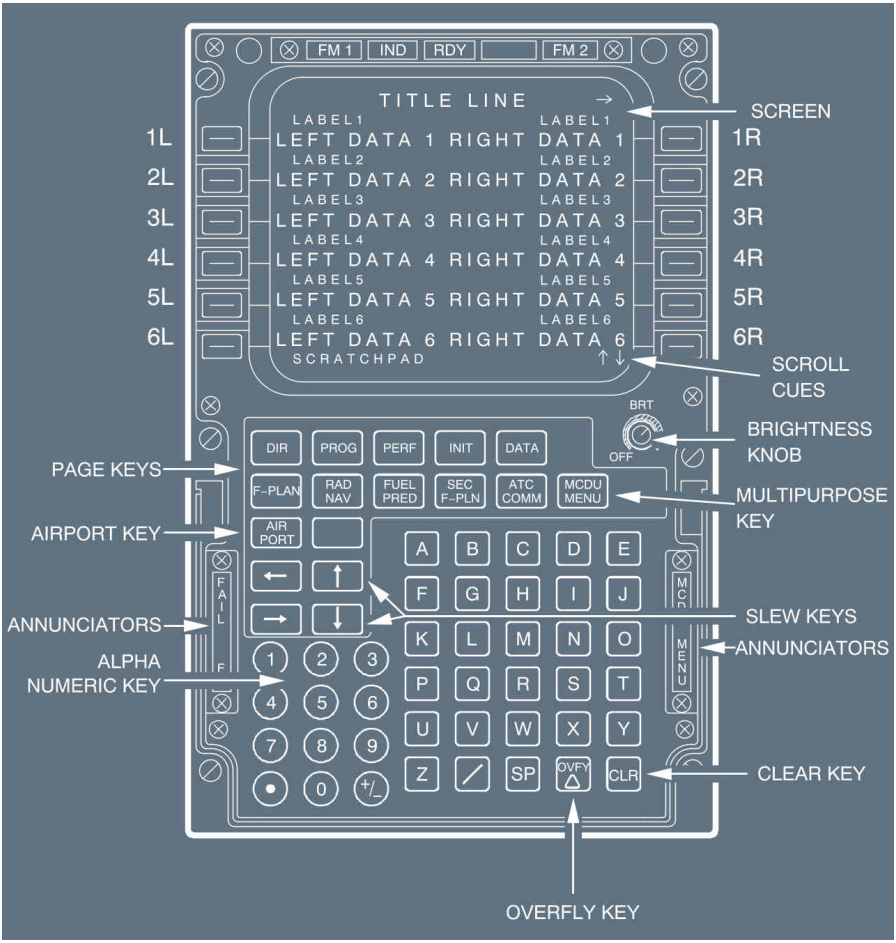
Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

3 MCDU INTERFACE



Applicable to: B-HSL, B-HSM, B-HSN

4 MCDU INTERFACE



Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

GENERAL

The Multipurpose Control and Display Unit (MCDU) is a cathode ray tube that generates 14 lines of 24 characters each, including:

- A title line that gives the name of the current page in large letters
- Six label lines, each of which names the data displayed just below it (on the data field line)
- Six data field lines that display computed data or data inserted by the flight crew
- The scratchpad line that displays:
  - Specific messages
  - Information the flight crew has entered by means of the number and letter keys and which can then be moved to one of the data fields.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

GENERAL

The Multipurpose Control and Display Unit (MCDU) has a Liquid Crystal Display (LCD) with 14 lines of 24 characters each, including:

- A title line that gives the name of the current page in large letters
- Six label lines, each of which nhames the data displayed just below it (on the data field line)
- Six data field lines that display computed data or data inserted by the flight crew
- The scratchpad line that displays:
  - Specific messages
  - Information the flight crew has entered by means of the number and letter keys and which can then be moved to one of the data fields.

Applicable to: ALL

LINE SELECT KEYS

There is a column of Line Select Keys (LSKs) on each side of the screen.

The flight crew uses these keys to:

- Move a parameter they have entered in the scratchpad to the appropriate line on the main screen
- Call up a specific function page indicated by a prompt displayed on the adjacent line
- Call up lateral or vertical revision pages from the flight plan page.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

KEYBOARD

The keyboard includes:

- Function and Page keys — Call up functions and pages the flight crew uses for flight management functions and computations.
  - ↑ ↓ (or SLEW) keys — Move a page up or down to display portions that are off the screen.
  - NEXT PAGE key — Moves to the next page of a multi-page element. An arrow in the top right corner indicates that another page is available.
  - AIRPORT key — Calls up the flight plan page that contains the next airport along the current flight plan. Successive pushes on the key show the alternate airport, the origin airport (before takeoff), and the next airport again.
- Number and letter keys allow the flight crew to insert data in the scratchpad so that they can use a line select key to enter it in the main display.
- Two keys have special functions:
  - CLR (clear) key — Erases material (messages or inserted data) from the scratchpad or from certain areas of displayed pages.
  - OVFY (overfly) key — Allows the aircraft to overfly a selected waypoint.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

KEYBOARD

The keyboard includes:

- Function and Page keys — Call up functions and pages the flight crew uses for flight management functions and computations.
  - ↑ ↓ (or SLEW) keys — Move a page up or down to display portions that are off the screen.
  - ←→keys — Moves to the next page of a multi-page element. An arrow in the top right corner indicates that another page is available.
  - AIRPORT key — Calls up the flight plan page that contains the next airport along the current flight plan. Successive pushes on the key show the alternate airport, the origin airport (before takeoff), and the next airport again.
- Number and letter keys allow the flight crew to insert data in the scratchpad so that they can use a line select key to enter it in the main display.
- Three keys have special functions:
  - CLR (clear) key — Erases material (messages or inserted data) from the scratchpad or from certain areas of displayed pages.
  - OVFY (overfly) key — Allows the aircraft to overfly a selected waypoint.
  - SP (space) key — Allows to insert a space in specific message.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

ANNUNCIATORS (ON THE SIDE OF THE KEYBOARD)

FAIL (amber)	Indicates that the Multipurpose Control and Display Unit (MCDU) has failed.
MCDU MENU (white)	Indicates that the flight crew should call up a peripheral linked to the MCDU (such as ACARS, ATSU or CFDS).
FMGC (white)	Comes on while the flight crew is using the MCDU to display peripherals. This light tells the flight crew that the FMGC has an important message to deliver. The flight crew accesses the message by pressing the MCDU MENU key and the line select key adjacent to the FMGC prompt.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

ANNUNCIATORS (ON THE SIDE OF THE KEYBOARD)

FAIL (amber)	Indicates that the Multipurpose Control and Display Unit (MCDU) has failed.
MCDU MENU (white)	Indicates that the flight crew should call up a peripheral linked to the MCDU (such as ACARS, ATSU or CFDS).
FM (white)	Comes on while the flight crew is using the MCDU to display peripherals. This light tells the flight crew that the FMGC has an important message to deliver. The flight crew accesses the message by pressing the MCDU MENU key and the line select key adjacent to the FMGC prompt.

Applicable to: B-HSL, B-HSM, B-HSN

ANNUNCIATORS (ON THE TOP OF THE KEYBOARD)

FM 1 and FM 2 (amber)	The onside FM is failed
IND (amber)	The onside FM detects an independent mode of operation while both FM are healthly.
RDY (green)	MCDU has passed its power up test after its BRT knob was turned to OFF.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

ANNUNCIATORS (ON THE TOP OF THE KEYBOARD)

FM 1 and FM 2 (amber)	The onside FM is failed
IND (amber)	The onside FM detects an independent mode of operation while both FM are healthly.
RDY (green)	MCDU has passed its power up test after it was turned off using its DIM key.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

BRT AND DIM KEYS

Control the light intensity of the entire MCDU. MCDU power up is performed with the BRT key and MCDU shut down is performed with the DIM key.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

BRT knob

Controls the light intensity of the entire MCDU.

Applicable to: ALL

DATA ENTRY

The flight crew enters data by typing it into the scratchpad on the MCDU. Next, pressing the line select key (LSK) will load the data from the scratchpad into the desired field. An error message displays if the data is out of range or not formatted correctly. To correct data, the flight crew may clear the message with the clear (CLR) key and then retype the message into the scratchpad. Pressing the CLR key when the scratchpad is empty displays “CLR”. To clear data from a field, select CLR from the scratchpad to the data field to be cleared.

Applicable to: ALL

MCDU ENTRY FORMAT

The flight crew enters information into the MCDU at the bottom line of the scratchpad. When data has lead zeros, they may be omitted if desired. For example a three-digit wind direction of 060 may be typed as 60. The display will still show 060. To enter an altitude below 1 000 ft, the lead zero must be added as 0400 for 400 ft. This differentiates the altitude from a flight level.
To enter a double data entry such a speed/altitude, the separating slash must be used. If entering only the first part of a double entry, omit the slash. To enter only the second part of a double entry, a leading slash must be used i.e. /0400.

Applicable to: ALL

MESSAGES

The scratchpad displays various messages for flight crew information. Theses messages are prioritized by importance to the flight crew as either amber or white.

Amber messages are:
- Navigation messages
- Data entry messages
- EFIS repeat messages.

Amber messages are categorized into two types:
- Type 1 message that is a direct result of a flight crew action. Type 1 messages are displayed immediately in the scratchpad ahead of other messages.
- Type 2 messages inform the flight crew of a given situation or request a specific action. Stored in “last in”, “first out” message queue that holds maximum of 5 messages.
  Type 2 messages are displayed in the scratchpad only if there are no Type 1 messages or other data and will remain until all the messages have been viewed and cleared with the CLR key.

White messages are advisory only.

Applicable to: ALL

CHARACTERS

Small and large fonts are displayed according to the following rules:
- The title line and the scratchpad are displayed in large font
- Datafields are usually displayed in large font
- Label lines are displayed in small font
- Flight crew entries and modifiable data are displayed in large font
- Defaulted/computed and non modifiable data are displayed in small font.

Applicable to: ALL

COLORS

DATA	MCDU COLOR
TITLES, COMMENTS, <, >, ↑ ↓, ←→, DASHES, MINOR MESSAGES	WHITE
- MODIFIABLE DATA - SELECTABLE DATA - BRACKETS	BLUE
- NON MODIFIABLE DATA - ACTIVE DATA	GREEN
- MANDATORY DATA (BOXES) - FLIGHT CREW ACTION REQUIRED - IMPORTANT MESSAGES - MISSED CONSTRAINT	AMBER
- CONSTRAINTS - MAX ALTITUDE	MAGENTA
PRIMARY F-PLN	GREEN WAYPOINTS, WHITE LEGS
TEMPORARY F-PLN	YELLOW WAYPOINTS, WHITE LEGS

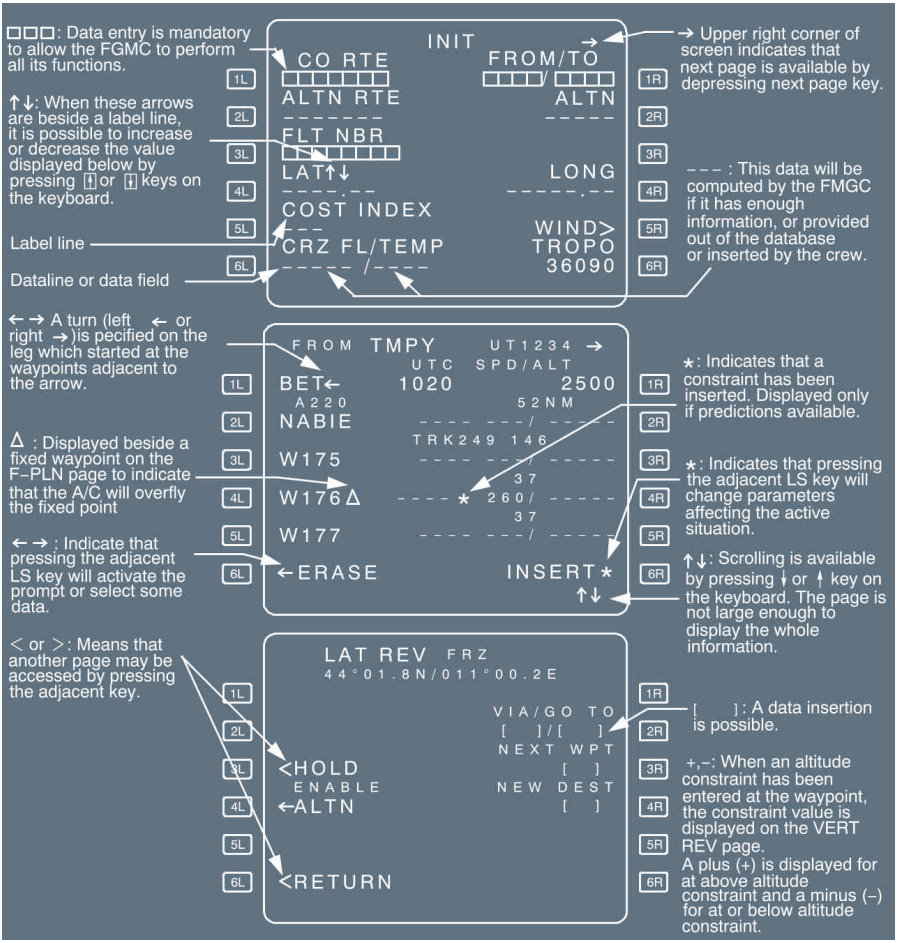
Continued on the following page

Continued from the previous page

DATA	MCDU COLOR
SECONDARY F-PLN	WHITE WAYPOINTS AND LEGS
MISSED APPROACH (not active)	BLUE WAYPOINTS, WHITE LEGS
ALTERNATE F-PLN (not active)	BLUE WAYPOINTS, WHITE LEGS
OFFSET	GREEN WAYPOINTS, WHITE LEGS, OFST DISPLAYED IN THE TITLE OF THE F-PLN PAGE
TUNED NAVAID	BLUE
"TO" WAYPOINT AND DESTINATION	WHITE

Applicable to: ALL

5 ## SCREEN PROMPTS



Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

MCDU FUNCTION KEYS

The function keys on the Multipurpose Control and Display Units allow the flight crew to call up MCDU pages quickly.
The following is a summary of the purpose of each key:

DIR	Calls up the DIR TO page, and enables the flight crew to proceed directly from the present position to any waypoint, entered manually or selected in the active flight plan.
PROG	Calls up the progress page corresponding to the phase of the active flight plan that is in progress. This page displays navigation information and active data such as the optimum and maximum recommended cruise flight levels. It enables the flight crew to update the FMGS position and to obtain a bearing and distance to any location.
PERF	Calls up the performance pages, that display the optimum speed or Mach number for each phase. The flight crew can amend these pages. The first page to be displayed is the one corresponding to the current flight phase (except for preflight and done phases). The flight crew can then use the appropriate 6L or 6R LSK to call up pages corresponding to future flight phases.
INIT	Calls up the flight plan initialization A page, which also gives the flight crew access to the B page. The flight crew uses the INIT pages to initialize Flight Management for the flight. The flight crew uses the INIT A page primarily to insert his flight plan and to align the inertial reference system. The flight crew uses the INIT B page to insert aircraft weight, fuel on board, CG and various fuel requirements. The FMGS uses this data to compute predictions and fuel planning parameters. The flight crew has access to the INIT A page only in the preflight phase. INIT B page (not accessible after engine start) is called up by pressing the "NEXT PAGE"key.
DATA	Calls up the data index page. This gives the flight crew access to various reference pages that show aircraft position, aircraft status, runways, waypoints, navaids, routes, and data stored by the flight crew.
F-PLN	Calls up the flight plan A and B pages, which contain a leg-by-leg description of the active primary flight plan. The flight crew can use the slewing keys to review the entire active flight plan. They can make all lateral and vertical revisions to the flight plan through these pages, using the left LSKs for lateral revision and the right keys for vertical revision.
RAD NAV	Calls up the radio navigation page. This page displays the Radio Navaids tuned automatically or manually through the FMGC.

FUEL PRED — Calls up the fuel prediction page. Once the engines are started, this page displays the fuel predicted to be remaining at the destination and the alternate, as well as fuel management data.

SEC F-PLN — Calls up the index page for the secondary flight plan. The flight crew can use this page to call up the secondary flight plan and all the functions related to it (copying, deleting, reviewing, activating, and the INIT and PERF pages).

MCDU MENU — Calls up the MCDU MENU page, which displays the subsystems currently addressed via the MCDU. The key next to the name of a subsystem enables the flight crew to select that subsystem.
When the MCDU MENU annunciator lights up, the flight crew should press the MCDU MENU key. The menu will have [REQ] displayed next to the name of the subsystem that requires attention.

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

MCDU FUNCTION KEYS

The function keys on the Multipurpose Control and Display Units allow the flight crew to call up MCDU pages quickly.
The following is a summary of the purpose of each key:

DIR — Calls up the DIR TO page, and enables the flight crew to proceed directly from the present position to any waypoint, entered manually or selected in the active flight plan.

PROG — Calls up the progress page corresponding to the phase of the active flight plan that is in progress.
This page displays navigation information and active data such as the optimum and maximum recommended cruise flight levels. It enables the flight crew to update the FMGS position and to obtain a bearing and distance to any location.

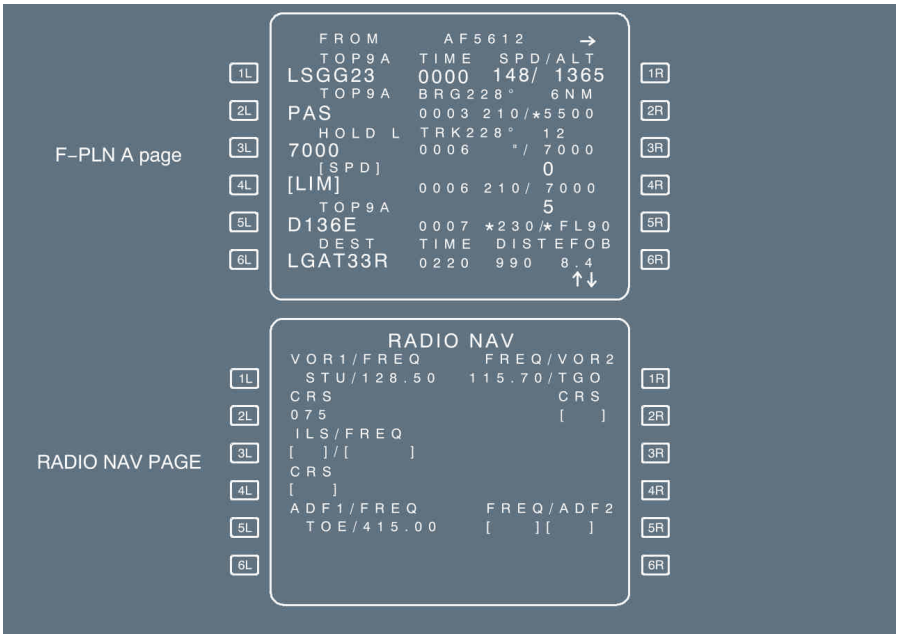
PERF — Calls up the performance pages, that display the optimum speed or Mach number for each phase. The flight crew can amend these pages. The first page to be displayed is the one corresponding to the current flight phase (except for preflight and done phases).
The flight crew can then use the appropriate 6L or 6R LSK to call up pages corresponding to future flight phases.

INIT	Calls up the flight plan initialization A page, which also gives the flight crew access to the B page. The flight crew uses the INIT pages to initialize Flight Management for the flight. The flight crew uses the INIT A page primarily to insert his flight plan and to align the inertial reference system. The flight crew uses the INIT B page to insert aircraft weight, fuel on board, CG and various fuel requirements. The FMGS uses this data to compute predictions and fuel planning parameters. The flight crew has access to the INIT A page only in the preflight phase. INIT B page (not accessible after engine start) is called up by pressing the "NEXT PAGE"key.
DATA	Calls up the data index page. This gives the flight crew access to various reference pages that show aircraft position, aircraft status, runways, waypoints, navaids, routes, and data stored by the flight crew.
F-PLN	Calls up the flight plan A and B pages, which contain a leg-by-leg description of the active primary flight plan. The flight crew can use the slewing keys to review the entire active flight plan. They can make all lateral and vertical revisions to the flight plan through these pages, using the left LSKs for lateral revision and the right keys for vertical revision.
RAD NAV	Calls up the radio navigation page. This page displays the Radio Navaids tuned automatically or manually through the FMGC.
FUEL PRED	Calls up the fuel prediction page. Once the engines are started, this page displays the fuel predicted to be remaining at the destination and the alternate, as well as fuel management data.
SEC F-PLN	Calls up the index page for the secondary flight plan. The flight crew can use this page to call up the secondary flight plan and all the functions related to it (copying, deleting, reviewing, activating, and the INIT and PERF pages).
ATC COMM	Calls up the ATC applications (not activated).
MCDU MENU	Calls up the MCDU MENU page, which displays the subsystems currently addressed via the MCDU. The key next to the name of a subsystem enables the flight crew to select that subsystem. When the MCDU MENU annunciator lights up, the flight crew should press the MCDU MENU key. The menu will have [REQ] displayed next to the name of the subsystem that requires attention.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

6 **MCDU DISPLAY**

The MCDUs display:
- Position and accuracy information
- Tuned navaids
- Lateral and vertical flight plans (waypoints, pseudo waypoints, constraints)
- Predictions (SPD, TIME, ALT, WIND)
- Fuel predictions and fuel management information (estimated fuel on board, extra fuel)
- Performance data.

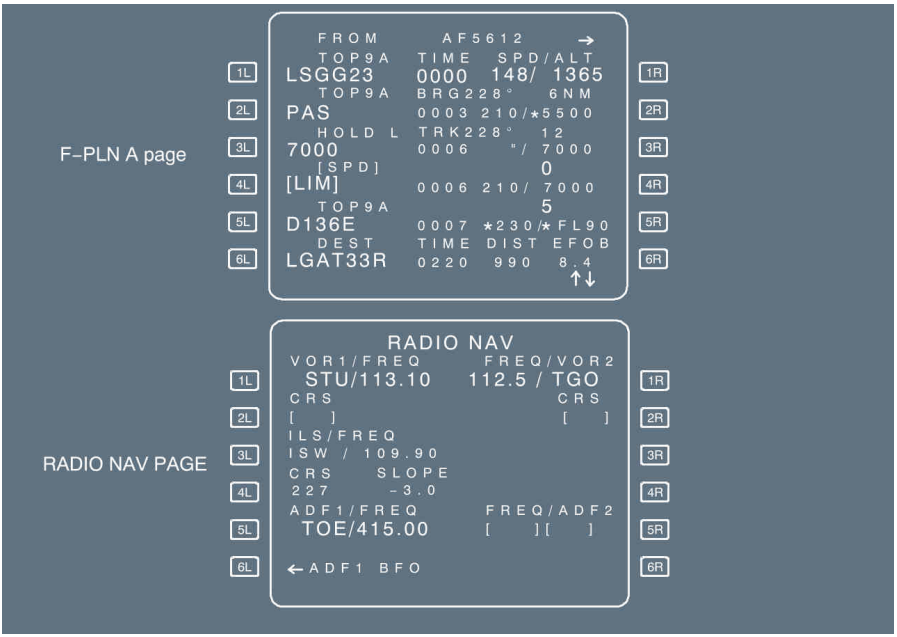


Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

7 **MCDU DISPLAY**

The MCDUs display:
- Position and accuracy information
- Tuned navaids
- Lateral and vertical flight plans (waypoints, pseudo waypoints, constraints)
- Predictions (SPD, TIME, ALT, WIND)

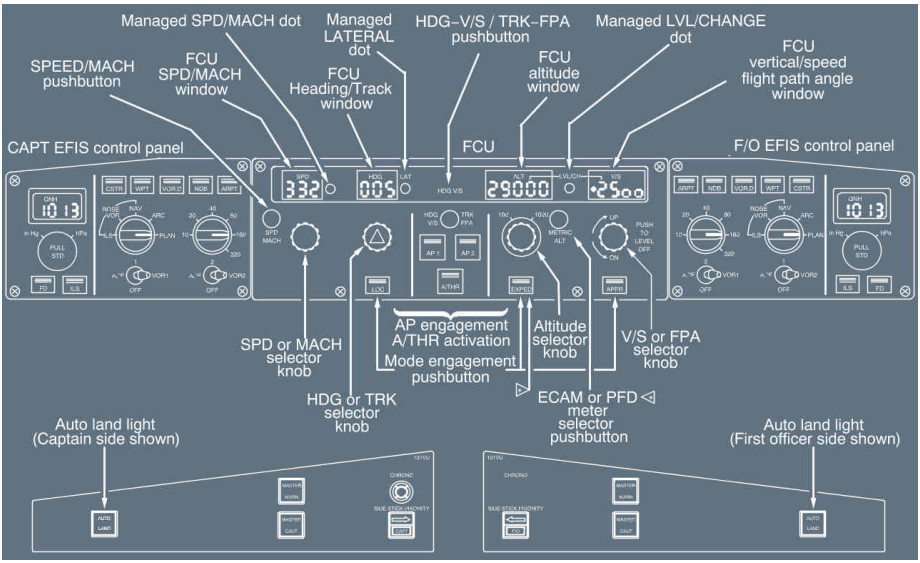
- Fuel predictions and fuel management information (estimated fuel on board, extra fuel)
- Performance data.



FCU

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

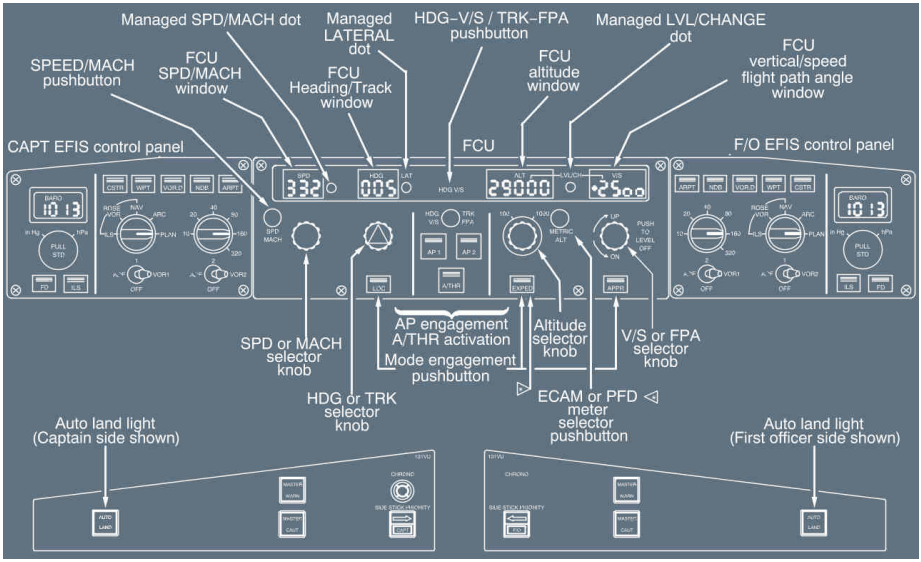
1 The Flight Control Unit (FCU) is located on the glareshield and is constituted of three control panels: One for the automatic flight controls and two for the Electronic Flight Instrument System (EFIS). The FCU has two channels, each of which can independently command the central control panel. If one channel fails, the other channel can control all the functions.



FCU

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

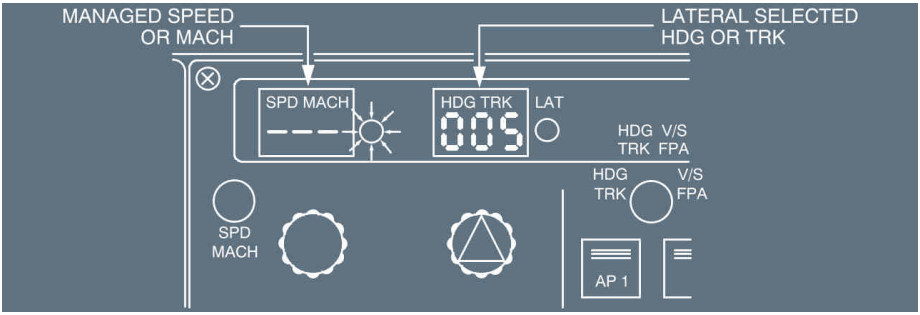
2 The Flight Control Unit (FCU) is located on the glareshield and is constituted of three control panels: One for the automatic flight controls and two for the Electronic Flight Instrument System (EFIS). The FCU has two channels, each of which can independently command the central control panel. If one channel fails, the other channel can control all the functions.



FCU PHILOSOPHY

Applicable to: ALL

3 The flight crew can use two types of guidance to control the aircraft in auto flight. One type is managed by the Flight Management Guidance System (FMGS). The other uses target quantities which are manually entered by the flight crew.
When the aircraft uses target quantities from the FMGS (managed guidance), the FCU windows display dashes and the white dots next to those windows light up. When the aircraft uses target quantities, entered by the flight crew (selected guidance), the windows display the selected numbers and the white dots do not light up.



Note: *The altitude window always displays an altitude selected by the flight crew (never dashes).*

The FCU has four knobs:
- SPD-MACH
- HDG-TRK
- ALT
- V/S-FPA.

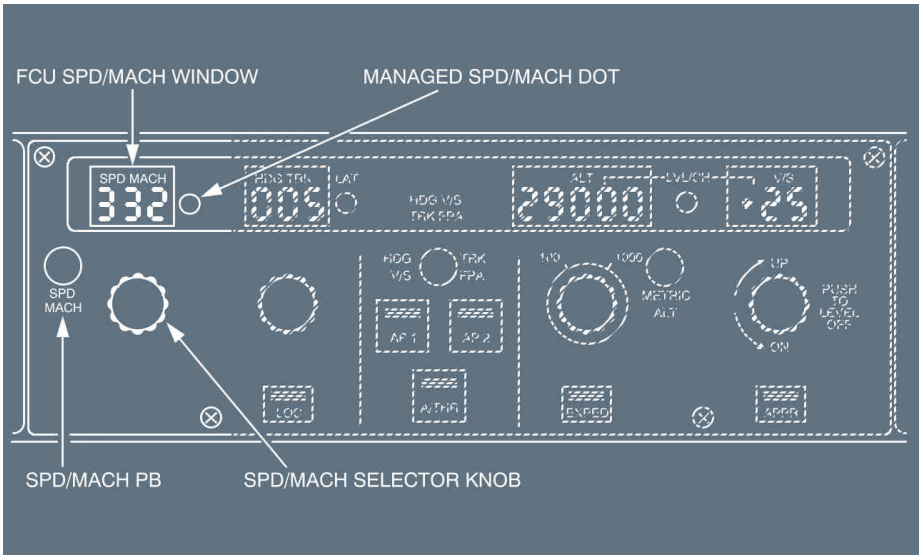
The knobs can be rotated, pushed in, and pulled out:
- In order to arm or engage managed guidance for a given mode, the flight crew pushes in the associated knob. If, for example, they push in the HDG knob, they engage or arms the NAV mode.
- In order to engage a selected guidance mode, the flight crew turns the knob to set the desired value, then pulls the knob out to engage the mode with a target value equal to the selected value.

Note: *In managed guidance (lateral, vertical guidance or managed speed), the corresponding window is dashed. Turning a knob without pulling it, displays a value that is the sum of the current target and the turn action value. The display remains 45 s on the HDG/TRK and V/S windows and 10 s on the SPD/MACH window before the dashes reappear. This rule does not apply to the ALT knob/window.*

SPEED/MACH CONTROL AREA

Applicable to: ALL

4



SPD/MACH knob

Display range: between 100 and 399 kt for speed, between 0.10 and 0.99 for Mach number. One rotation of the knob corresponds to approximately 32 kt or M 0.32.

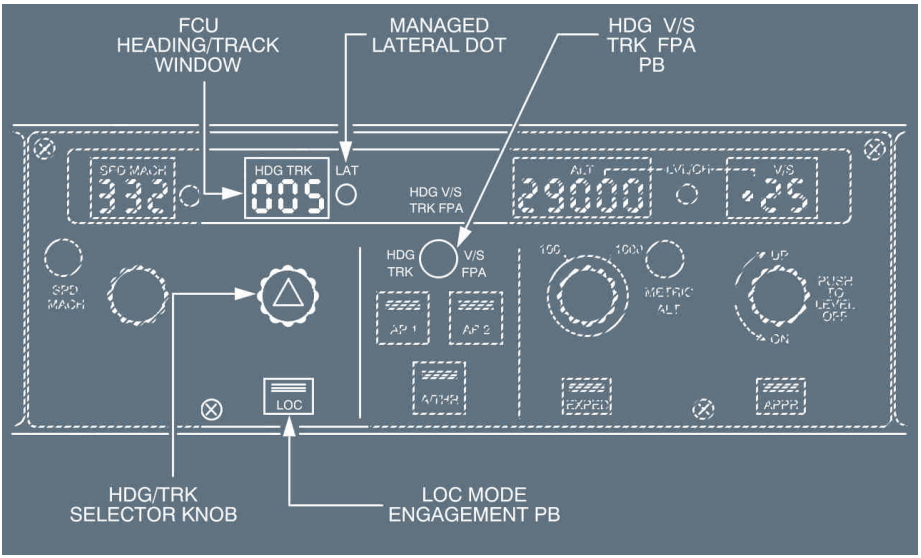
SPD/MACH pb

Pushing this pushbutton changes the SPD target to the corresponding MACH target and vice versa.

LATERAL CONTROL AREA

Applicable to: ALL

5



HDG/TRK knob

Display range: between 0 ° and 359 °.
One rotation of the knob corresponds to 32 ° (1 ° per click).

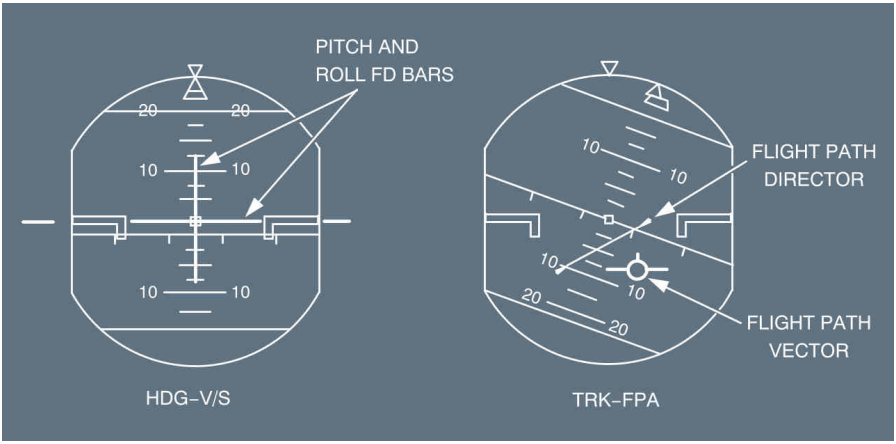
LOC pb

Pushing this pushbutton arms, engages, or disengages the LOC mode.

6 **HDG V/S – TRK FPA pb**

The flight crew uses this pushbutton to select HDG (associated with V/S) or TRK (associated with FPA). Pushing it:

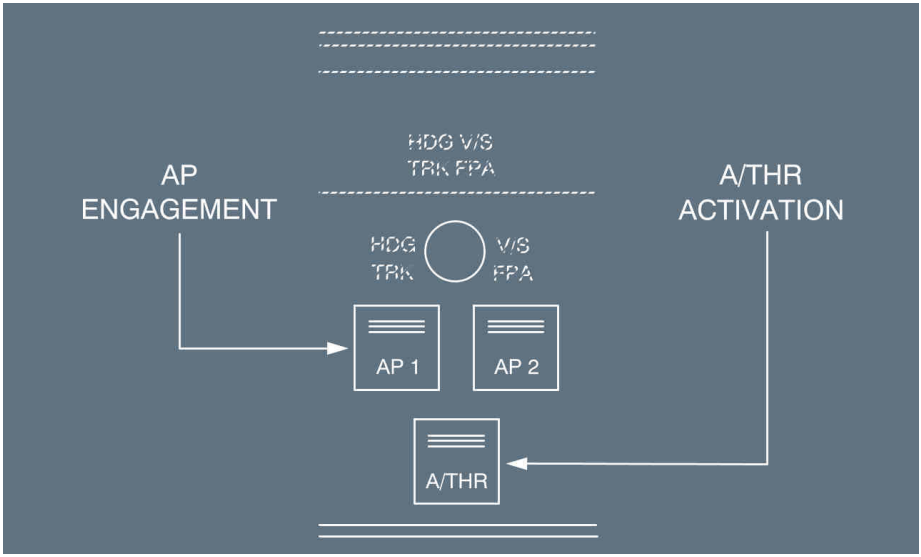
- Displays the Flight Path Vector (FPV) on the Primary Flight Display (PFD) or deletes it.
- On the PFD, changes the FD crossbar display (with the aircraft attitude as its reference) to the aircraft Flight Path Director (with the flight path vector as its reference) and vice versa.
- Changes heading reference into track reference in the HDG/TRK window and vice versa.
- Changes vertical speed reference target into flight path angle reference target in the V/S-FPA window and vice versa.



AP-A/THR CONTROL AREA

Applicable to: ALL

7



AP1 pb AND AP2 pb

The flight crew uses these pushbuttons to engage or disengage the autopilots. The buttons illuminate green when the autopilot is engaged.

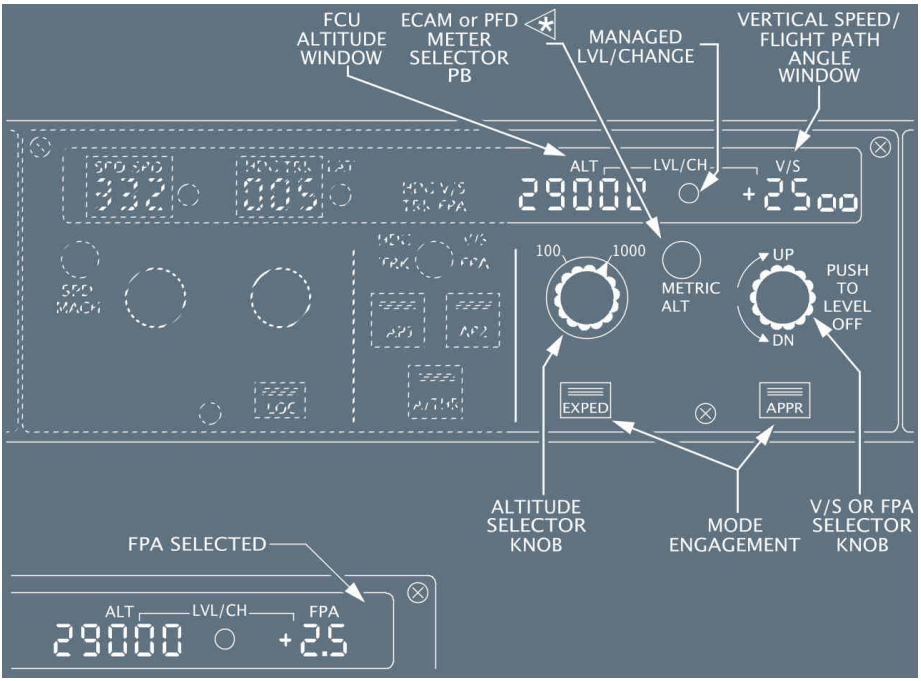
A/THR pb

The flight crew uses this pushbutton to arm, activate, or disconnect the autothrust (A/THR). This button illuminates green if the A/THR is armed or active.

VERTICAL CONTROL AREA

Applicable to: B-HSQ, B-HSR

8



The FCU altitude window always displays a target value selected by the flight crew. It never displays dashes.

Altitude knob (INNER AND OUTER)

Display range: 100 to 49 000 ft

- The outer knob has two positions: 100 and 1000
- The inner knob sets the altitude in the FCU window in increments of 100 or 1 000 ft, depending upon the position of the outer knob.

EXPED pb

This pushbutton is used to engage the expedite mode. *Refer to DSC-22_30-70-90 General.*

METRIC ALT pb

This pushbutton is used to display the FCU altitude target in meters on the ECAM, or the current altitude and FCU/FM altitude target in meters on the PFD ◁ .

V/S or FPA knob

Range (V/S) : –6 000 to +6 000 ft/min
2 clicks = 100 ft/min
If the flight crew turns the knob slowly, each click equals 100 ft/min.

Range (FPA) : –9.9 ° to +9.9 °
1 click = 0.1 °

The flight crew turns this knob to set the value of the vertical speed (V/S) or flight path angle (FPA) to be displayed in the V/S or FPA window (They choose which, V/S or FPA, is to be displayed by pushing the HDG V/S - TRK FPA pb).

One rotation of the knob corresponds to 32 clicks. One complete rotation sets:
FPA = 3.2 °
V/S = 1 600 ft/min

When the flight crew pushes in the V/S or FPA knob, the system commands an immediate level-off by engaging the V/S or FPA mode with a target of zero. The flight mode annunciator (FMA) then displays "V/S = 0"in green when V/S or FPA is nulled. If the flight crew now turns the knob to put in a new setting for V/S or FPA, the aircraft changes flight path accordingly.

APPR pb

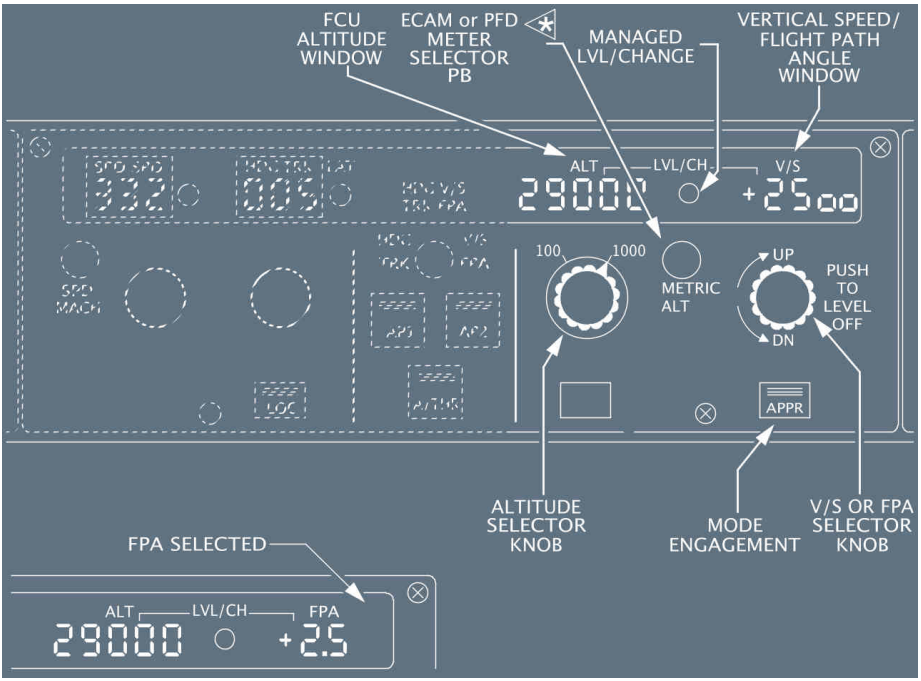
This pushbutton arms, disarms, engages, or disengages the approach modes:

- LOC and G/S modes, if an ILS approach is selected in the active F-PLN.
- APP NAV-FINAL modes, if a non precision approach is selected in the active F-PLN.

VERTICAL CONTROL AREA

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

9



The FCU altitude window always displays a target value selected by the flight crew. It never displays dashes.

Altitude knob (INNER AND OUTER)

Display range: 100 to 49 000 ft

- The outer knob has two positions: 100 and 1000
- The inner knob sets the altitude in the FCU window in increments of 100 or 1 000 ft, depending upon the position of the outer knob.

METRIC ALT pb

This pushbutton is used to display the FCU altitude target in meters on the ECAM, or the current altitude and FCU/FM altitude target in meters on the PFD ◁ .

V/S or FPA knob

Range (V/S) : –6 000 to +6 000 ft/min
2 clicks = 100 ft/min
If the flight crew turns the knob slowly, each click equals 100 ft/min.

Range (FPA) : –9.9 ° to +9.9 °
1 click = 0.1 °

The flight crew turns this knob to set the value of the vertical speed (V/S) or flight path angle (FPA) to be displayed in the V/S or FPA window (They choose which, V/S or FPA, is to be displayed by pushing the HDG V/S - TRK FPA pb).

One rotation of the knob corresponds to 32 clicks. One complete rotation sets:
FPA = 3.2 °
V/S = 1 600 ft/min

When the flight crew pushes in the V/S or FPA knob, the system commands an immediate level-off by engaging the V/S or FPA mode with a target of zero. The flight mode annunciator (FMA) then displays "V/S = 0"in green when V/S or FPA is nulled. If the flight crew now turns the knob to put in a new setting for V/S or FPA, the aircraft changes flight path accordingly.

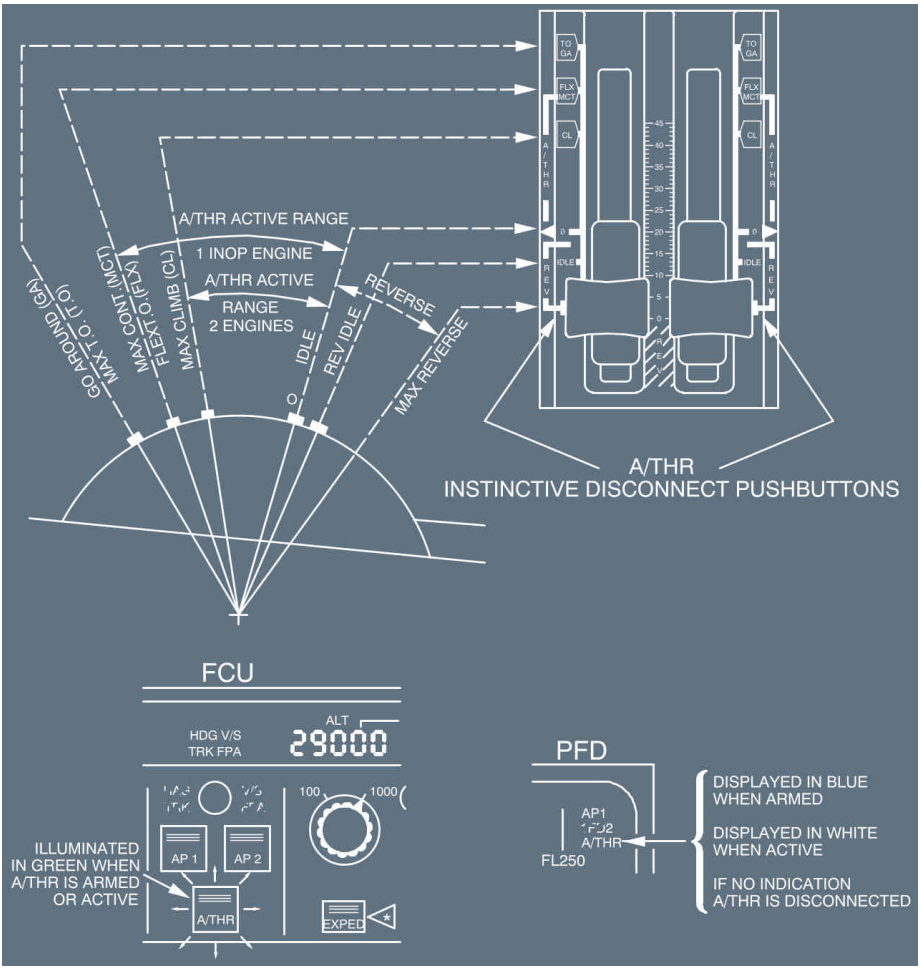
APPR pb

This pushbutton arms, disarms, engages, or disengages the approach modes:
- LOC and G/S modes, if an ILS approach is selected in the active F-PLN.
- APP NAV-FINAL modes, if a non precision approach is selected in the active F-PLN.

THRUST LEVERS

Applicable to: ALL

1



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PFD

Applicable to: ALL

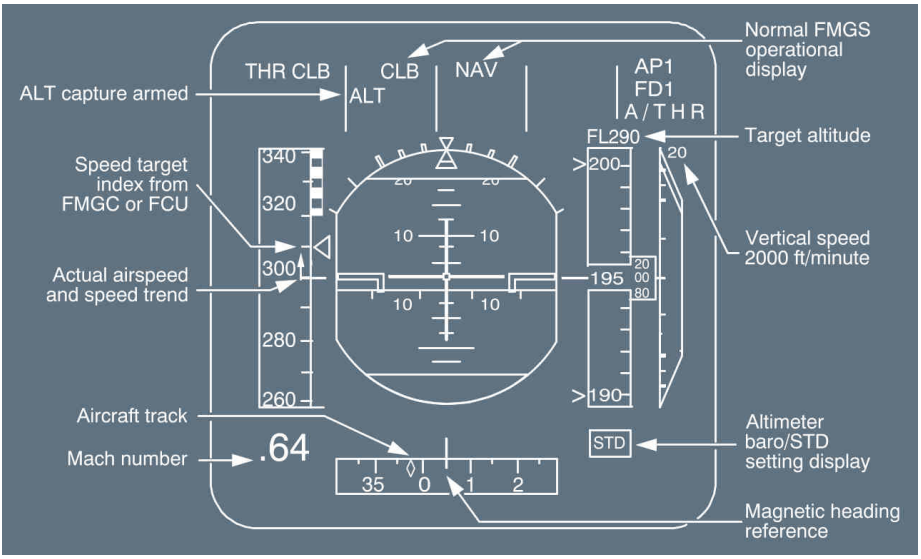
The Flight Management and Guidance System generates the following information to the EFIS Primary Flight Display:

- Armed and engaged modes on the Flight Mode Annunciator (FMA)
- FMGS guidance targets (SPD, ALT, HDG)
- Vertical deviation from descent profile
- Messages
- Navigation information.

CLIMB PHASE

Applicable to: ALL

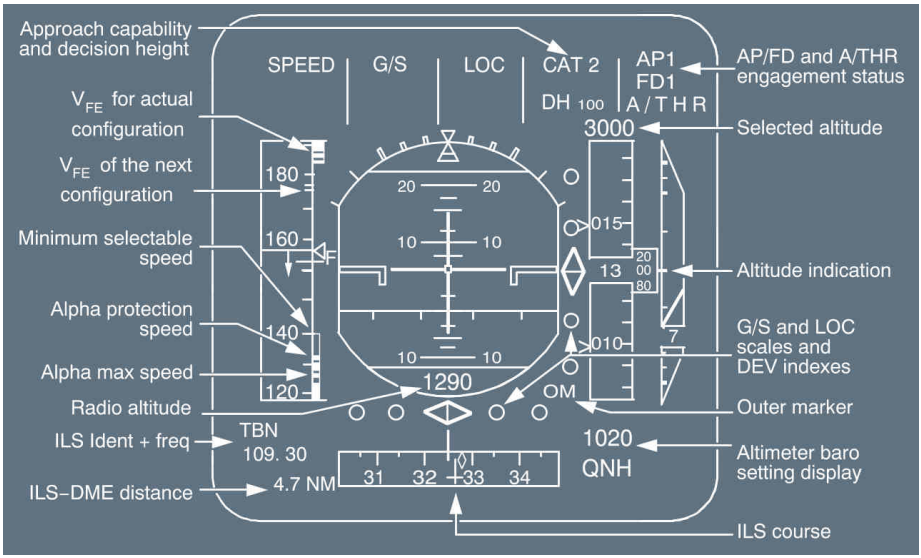
1



APPROACH PHASE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

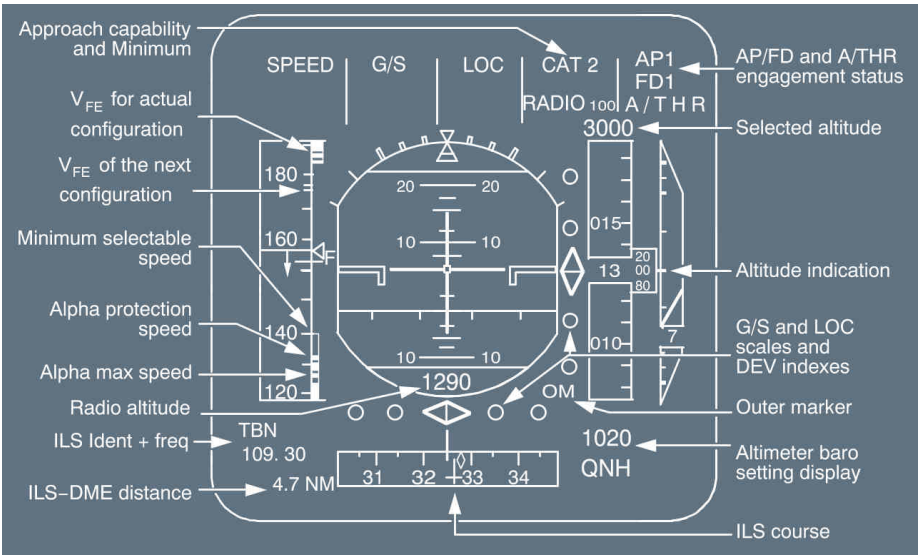
2



APPROACH PHASE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

3



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ND

Applicable to: ALL

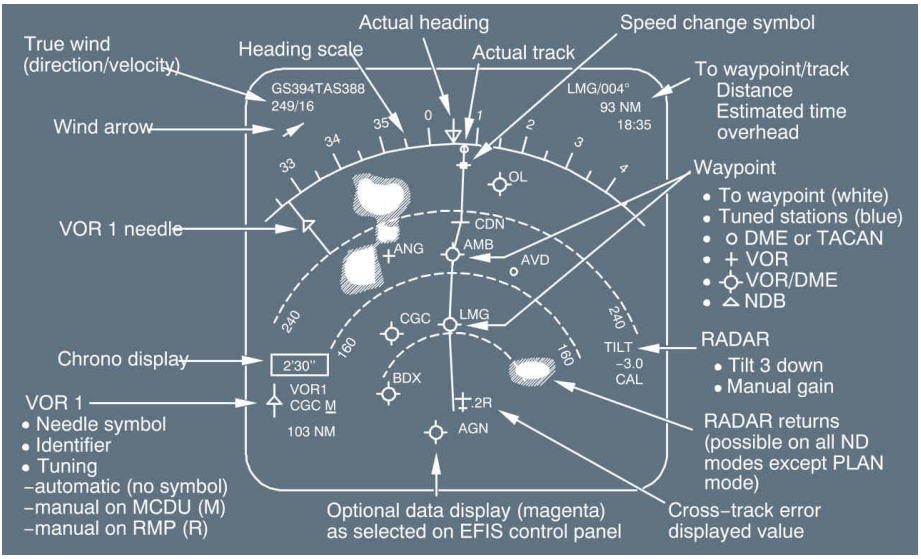
The FMGS generates the following information, displayed on the EFIS Navigation Displays:

- Flight plan (active secondary, temporary, dashed)
- Aircraft position and lateral deviation from the flight plan
- Pseudo-waypoints along the flight plan
- Raw data from tuned Navaids and type of selected approach
- Various display options (waypoints, Navaids, NDBs, airports, constraints)
- Wind information and various messages.

ARC MODE

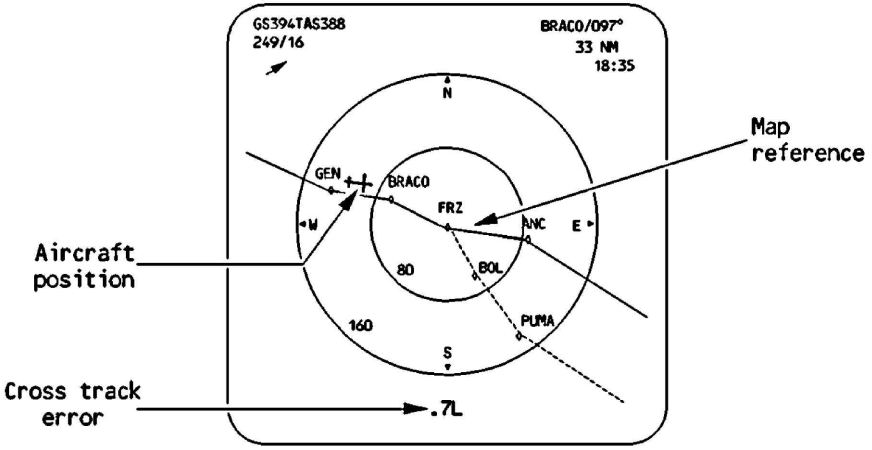
Applicable to: ALL

1



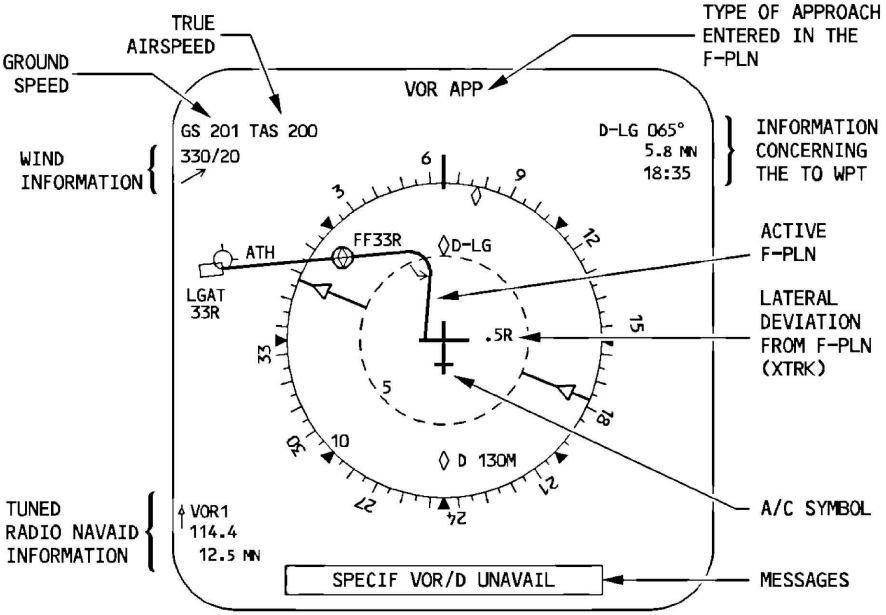
PLAN MODE

Applicable to: ALL



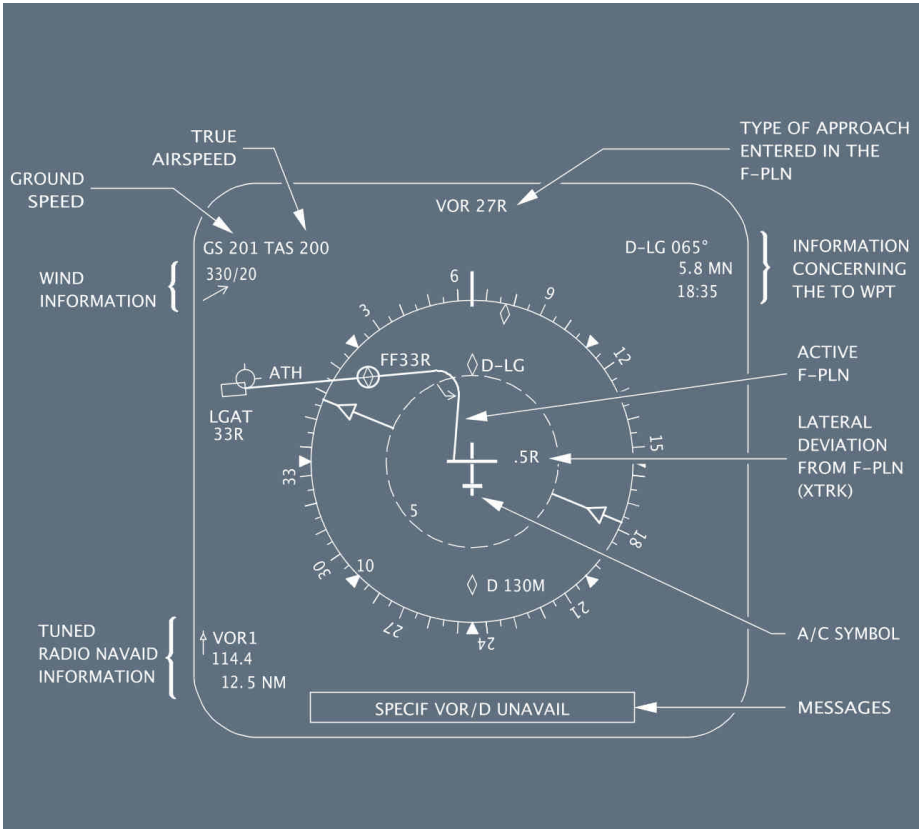
ROSE MODES

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP



ROSE MODES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU



FLIGHT PLAN DISPLAY COLORS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

F-PLN	Color
Primary Flight Plan	- Managed mode: Steady green - Selected mode: Dashed green
Track line	Steady green

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F-PLN	Color
Alternate flight plan	Dashed blue
Missed approach	Steady blue
Offset flight plan	Steady green (Original flight plan: Dashed green)
Temporary flight plan	Dashed yellow
Engine-out SID (not inserted)	Steady yellow
Secondary flight plan	Steady dimmed white

FLIGHT PLAN DISPLAY COLORS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

F-PLN	Color
Primary Flight Plan	- Managed mode: Steady green - Selected mode: Dashed green
Track line	Steady green
Alternate flight plan	Dashed blue
Missed approach	Steady blue
Offset flight plan	Steady green (Original flight plan: Dashed green)
Temporary flight plan	Dashed yellow
Engine-out SID (not inserted)	Steady yellow
Secondary flight plan	Steady dimmed white
Abeam/Radial	Dashed blue

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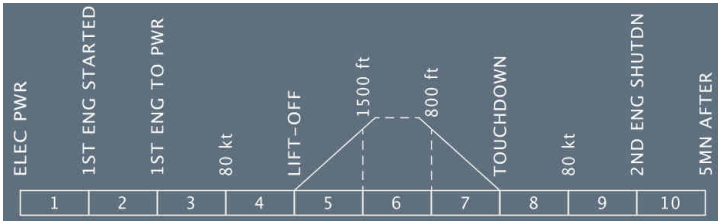
WARNINGS AND CAUTIONS

Applicable to: B-HSL, B-HSM, B-HSN, B-HTI



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
FAC 1 (2) FAULT	SINGLE CHIME	MASTER CAUT	NIL	FAC FAULT lt	3, 4, 5, 7, 8
YAW DAMPER 1 (2)	NIL	NIL		NIL	3, 4, 5, 7, 8, 10
RUDDER TRIM 1 (2) FAULT					3, 4, 5, 7, 8
RUD TRV LIM 1 (2)					
FCU 1 (2) FAULT					
FAC 1 + 2 FAULT	SINGLE CHIME	MASTER CAUT		FAC FAULT lts	4, 5, 7, 8
YAW DAMPER SYS				NIL	4, 5, 7, 8, 10
RUD TRIM SYS			F/CTL		4, 5, 7, 8
RUD TRV LIM SYS			NIL		4, 5
A/THR OFF A/THR disconnection (*Refer to DSC-22_30-90 A/THR Disconnection - General*).					4, 8, 10
A/THR LIMITED A/THR is active but thrust levers are set below CL detent (2 engines), or MCT detent (1 engine).	SINGLE CHIME every 5 s	MASTER CAUT every 5 s			1, 2, 3, 4, 8, 9, 10
FCU 1 + 2 FAULT	SINGLE CHIME	MASTER CAUT			3, 4, 5, 7, 8
AP OFF AP disengagement (*Refer to DSC-22_30-30 AP Disengagement*).	CAVALRY CHARGE	MASTER WARN			-
(ILS) CAPABILITY DOWNGRADE - Condition(s) required for CAT3/CAT2 are no longer fulfilled. (*Refer to PRO-NOR-SRP-01-70 Failures and Associated Actions Above 1 000 ft for CAT II or CAT III*). - Mode reversions *Refer to DSC-22_30-10 Mode Reversions*	TRIPLE CLICK	NIL			2, 3, 4, 5, 8, 9, 10

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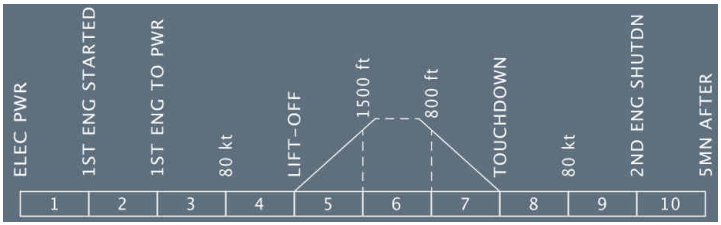
E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
WINDSHEAR No ECAM message.	SYNTHETIC VOICE "WINDSHEAR" repeated 3 times			"WINDSHEAR" on PFDs	2, 3, 4, 8, 9
WINDSHEAR DET FAULT or REAC W/S DET FAULT ⩤	SINGLE CHIME	MASTER CAUT			3, 4, 5, 8
LOW ENERGY WARNING Available between 100 and 2 000 ft in CONF ≥2. No ECAM message.	SYNTHETIC VOICE "SPEED" 3 times every 5 s	NIL		NIL	1, 2, 3, 4, 8, 9, 10
AUTOLAND (No ECAM message) Only available below 200 ft.	NIL	AUTOLAND (red) on glareshield			2, 3, 4, 5, 8, 9, 10
When GPS primary is lost, the ″GPS PRIMARY LOST ″ message is displayed on the ND and PFD.	TRIPLECLICK(1)	NIL		ND/MCDU message	
″NAV FMS/GPS POS DISAGREE″ : When the FMS 1 or 2 position differs by more than 0.5 minutes of latitude or longitude from the GPS 1 or 2 position, this message comes up on the ECAM.	SINGLE CHIME	MASTER CAUT		NIL	1, 10

(1) Only during a non precision approach.

WARNINGS AND CAUTIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
FAC 1 (2) FAULT	SINGLE CHIME	MASTER CAUT	NIL	FAC FAULT lt	3, 4, 5, 7, 8
YAW DAMPER 1 (2)	NIL	NIL		NIL	3, 4, 5, 7, 8, 10
RUDDER TRIM 1 (2) FAULT					3, 4, 5, 7, 8
RUD TRV LIM 1 (2)					
FCU 1 (2) FAULT					
FAC 1 + 2 FAULT	SINGLE CHIME	MASTER CAUT		FAC FAULT lts	4, 5, 7, 8
YAW DAMPER SYS				NIL	4, 5, 7, 8, 10
RUD TRIM SYS			F/CTL		4, 5, 7, 8
RUD TRV LIM SYS			NIL		4, 5
A/THR OFF A/THR disconnection (*Refer to DSC-22_30-90 A/THR Disconnection - General*).					4, 8, 10
A/THR LIMITED A/THR is active but thrust levers are set below CL detent (2 engines), or MCT detent (1 engine).	SINGLE CHIME every 5 s	MASTER CAUT every 5 s			1, 2, 3, 4, 8, 9, 10
FCU 1 + 2 FAULT	SINGLE CHIME	MASTER CAUT			3, 4, 5, 7, 8
AP OFF AP disengagement (*Refer to DSC-22_30-30 AP Disengagement*).	CAVALRY CHARGE	MASTER WARN			-
(ILS) CAPABILITY DOWNGRADE Condition(s) required for CAT3/CAT2 are no longer fulfilled. (*Refer to PRO-NOR-SRP-01-70 Failures and Associated Actions Above 1 000 ft for CAT II or CAT III*).	TRIPLE CLICK	NIL			2, 3, 4, 5, 8, 9, 10
WINDSHEAR No ECAM message.	SYNTHETIC VOICE "WINDSHEAR" repeated 3 times			"WINDSHEAR" on PFDs	2, 3, 4, 8, 9

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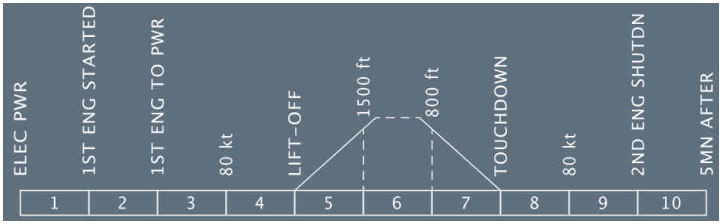
E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
WINDSHEAR DET FAULT or REAC W/S DET FAULT ◁	SINGLE CHIME	MASTER CAUT			3, 4, 5, 8
LOW ENERGY WARNING ◁ Available between 100 and 2 000 ft in CONF ≥2. No ECAM message.	SYNTHETIC VOICE "SPEED" 3 times every 5 s	NIL		NIL	1, 2, 3, 4, 8, 9, 10
AUTOLAND (No ECAM message) Only available below 200 ft.	NIL	AUTOLAND (red) on glareshield			2, 3, 4, 5, 8, 9, 10
When GPS primary is lost, the ″GPS PRIMARY LOST ″ message is displayed on the ND and PFD.	TRIPLE CLICK *(1)*	NIL		ND/MCDU message	
NAV FMS/GPS POS DISAGREE is triggered, when FMS 1 or 2 position differs from GPS 1 or 2 position by more than: - A longitude threshold that depends on the latitude: • 0.5 min for latitudes below 55 °, • 0.9 min for latitudes at or above 55 °, and below 70 °, - A latitude threshold of 0.5 min , regardless of the latitude. Above 70 ° of latitude, a longitude difference does not trigger the alarm.	SINGLE CHIME	MASTER CAUT		NIL	1, 3, 4, 10

(1) Only during a non precision approach.

WARNINGS AND CAUTIONS

Applicable to: B-HSO, B-HSP



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
FAC 1 (2) FAULT	SINGLE CHIME	MASTER CAUT	NIL	FAC FAULT lt	3, 4, 5, 7, 8
YAW DAMPER 1 (2)	NIL	NIL		NIL	3, 4, 5, 7, 8, 10
RUDDER TRIM 1 (2) FAULT					3, 4, 5, 7, 8
RUD TRV LIM 1 (2)					
FCU 1 (2) FAULT					
FAC 1 + 2 FAULT	SINGLE CHIME	MASTER CAUT		FAC FAULT lts	4, 5, 7, 8
YAW DAMPER SYS				NIL	4, 5, 7, 8, 10
RUD TRIM SYS			F/CTL		4, 5, 7, 8
RUD TRV LIM SYS			NIL		4, 5
A/THR OFF A/THR disconnection (*Refer to DSC-22_30-90 A/THR Disconnection - General*).					4, 8, 10
A/THR LIMITED A/THR is active but thrust levers are set below CL detent (2 engines), or MCT detent (1 engine).	SINGLE CHIME every 5 s	MASTER CAUT every 5 s			1, 2, 3, 4, 8, 9, 10
FCU 1 + 2 FAULT	SINGLE CHIME	MASTER CAUT			3, 4, 5, 7, 8
AP OFF AP disengagement (*Refer to DSC-22_30-30 AP Disengagement*).	CAVALRY CHARGE	MASTER WARN			-
(ILS) CAPABILITY DOWNGRADE - Condition(s) required for CAT3/CAT2 are no longer fulfilled. (*Refer to PRO-NOR-SRP-01-70 Failures and Associated Actions Above 1 000 ft for CAT II or CAT III*). - Mode reversions *Refer to DSC-22_30-10 Mode Reversions*	TRIPLE CLICK	NIL			2, 3, 4, 5, 8, 9, 10

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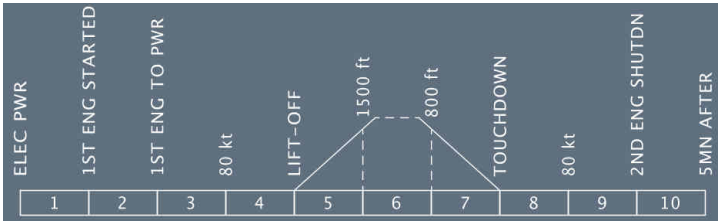
E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
WINDSHEAR No ECAM message.	SYNTHETIC VOICE "WINDSHEAR" repeated 3 times			"WINDSHEAR" on PFDs	2, 3, 4, 8, 9
WINDSHEAR DET FAULT or REAC W/S DET FAULT ◁◁	SINGLE CHIME	MASTER CAUT		NIL	3, 4, 5, 8
LOW ENERGY WARNING Available between 100 and 2 000 ft in CONF ≥2. No ECAM message.	SYNTHETIC VOICE "SPEED" 3 times every 5 s	NIL			1, 2, 3, 4, 8, 9, 10
AUTOLAND (No ECAM message) Only available below 200 ft.	NIL	AUTOLAND (red) on glareshield			2, 3, 4, 5, 8, 9, 10
When GPS primary is lost, the ″GPS PRIMARY LOST ″ message is displayed on the ND and PFD.	TRIPLECLICK(1)	NIL		ND/MCDU message	
″NAV FMS/GPS POS DISAGREE″ : When the FMS 1 or 2 position differs by more than 0.5 minutes of latitude or longitude from the GPS 1 or 2 position, this message comes up on the ECAM.	SINGLE CHIME	MASTER CAUT		NIL	1, 10
TCAS MODE FAULT TCAS flight guidance mode is operative					3, 4, 5, 7

(1) *Only during a non precision approach.*

WARNINGS AND CAUTIONS

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
FAC 1 (2) FAULT	SINGLE CHIME	MASTER CAUT	NIL	FAC FAULT lt	3, 4, 5, 7, 8
YAW DAMPER 1 (2)	NIL	NIL		NIL	3, 4, 5, 7, 8, 10
RUDDER TRIM 1 (2) FAULT					3, 4, 5, 7, 8
RUD TRV LIM 1 (2)					
FCU 1 (2) FAULT					
FAC 1 + 2 FAULT	SINGLE CHIME	MASTER CAUT		FAC FAULT lts	4, 5, 7, 8
YAW DAMPER SYS				NIL	4, 5, 7, 8, 10
RUD TRIM SYS			F/CTL		4, 5, 7, 8
RUD TRV LIM SYS			NIL		4, 5
A/THR OFF A/THR disconnection (*Refer to DSC-22_30-90 A/THR Disconnection - General*).					4, 8, 10
A/THR LIMITED A/THR is active but thrust levers are set below CL detent (2 engines), or MCT detent (1 engine).	SINGLE CHIME every 5 s	MASTER CAUT every 5 s			1, 2, 3, 4, 8, 9, 10
FCU 1 + 2 FAULT	SINGLE CHIME	MASTER CAUT			3, 4, 5, 7, 8
AP OFF AP disengagement (*Refer to DSC-22_30-30 AP Disengagement*).	CAVALRY CHARGE	MASTER WARN			-
(ILS) CAPABILITY DOWNGRADE - Condition(s) required for CAT3/CAT2 are no longer fulfilled. (*Refer to PRO-NOR-SRP-01-70 Failures and Associated Actions Above 1 000 ft for CAT II or CAT III*). - Mode reversions *Refer to DSC-22_30-10 Mode Reversions*	TRIPLE CLICK	NIL			2, 3, 4, 5, 8, 9, 10

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
WINDSHEAR No ECAM message.	SYNTHETIC VOICE "WINDSHEAR" repeated 3 times			"WINDSHEAR" on PFDs	2, 3, 4, 8, 9
WINDSHEAR DET FAULT or REAC W/S DET FAULT ◁	SINGLE CHIME	MASTER CAUT			3, 4, 5, 8
LOW ENERGY WARNING Available between 100 and 2 000 ft in CONF ≥2. No ECAM message.	SYNTHETIC VOICE "SPEED" 3 times every 5 s	NIL		NIL	1, 2, 3, 4, 8, 9, 10
AUTOLAND (No ECAM message) Only available below 200 ft.	NIL	AUTOLAND (red) on glareshield			2, 3, 4, 5, 8, 9, 10
When GPS primary is lost, the ″GPS PRIMARY LOST ″ message is displayed on the ND and PFD.		NIL		ND/MCDU message	
″NAV FMS/GPS POS DISAGREE″ : When the FMS 1 or 2 position differs by more than 0.5 minutes of latitude or longitude from the GPS 1 or 2 position, this message comes up on the ECAM.	SINGLE CHIME	MASTER CAUT		NIL	1, 10
TCAS MODE FAULT TCAS flight guidance mode is inoperative.					3, 4, 5, 7

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BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
FMGC	1				SHED	
	2		DC2			
MCDU	1			SHED		
	2	AC2				
	3 ◁	AC1				
FCU	1				X	
	2		DC2			

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AIRCRAFT SYSTEMS

AUTO FLIGHT - FLIGHT MANAGEMENT

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DSC-22_20-20-10 GPS Position	C	1	Improvement of Illustration quality
DSC-22_20-20-20 Navigation Accuracy Check	E	1	Improvement of Illustration quality
DSC-22_20-20-20 Navigation Accuracy Check	E	2	Improvement of Illustration quality
DSC-22_20-20-20 Navigation Accuracy Check	E	3	Improvement of Illustration quality
DSC-22_20-20-30 Manual Tuning	H	1	DU revised to improve illustration.
DSC-22_20-20-30 Manual Tuning	H	2	Documentation update: Addition of "Manual Tuning" documentary unit
DSC-22_20-30-10-05 Flight Plan Construction	C	1	Documentation update: Addition of "Flight Plan Construction" documentary unit
DSC-22_20-30-10-10 Inserting an Airway with "Via/Go TO"	C	1	Improvement of Illustration quality
DSC-22_20-30-10-10 Inserting an Airway with "Via/Go TO"	C	2	Improvement of Illustration quality
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DSC-22_20-30-10-10 DIR Key (Direct-TO Function)	I	8	Improvement of Illustration quality
DSC-22_20-30-10-10 DIR Key (Direct-TO Function)	I	9	Improvement of Illustration quality
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DSC-22_20-30-10-15 Inserting an Airway with "Via" - General	C	1	Improvement of Illustration quality
DSC-22_20-30-10-15 Inserting an Airway with "Via" - Successive Airway Segments from a Waypoint	C	2	Improvement of Illustration quality

Localization Title	Toc Index	ID	Reason
DSC-22_20-30-10-15 Inserting a Waypoint - Waypoint Inserted Directly in the Flight Plan	D	3	Improvement of Illustration quality
DSC-22_20-30-10-15 Inserting a Waypoint - Waypoint Inserted Through the Use of "Next Waypoint"	D	4	Improvement of Illustration quality
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DSC-22_20-30-10-15 Fix Info - General	E	6	Documentation update: Addition of "Fix Info - General" documentary unit
DSC-22_20-30-10-15 Fix Info - Inserting a Radial Intercept Waypoint	E	7	Documentation update: Addition of "Fix Info - Inserting a Radial Intercept Waypoint" documentary unit
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DSC-22_20-30-10-15 Fix Info - Inserting an Abeam Intercept Waypoint	E	10	Documentation update: Addition of "Fix Info - Inserting an Abeam Intercept Waypoint" documentary unit
DSC-22_20-30-10-15 Inserting a New Destination	F	11	Improvement of Illustration quality
DSC-22_20-30-10-15 Holding Pattern - Hold with Manual Termination (HM)	G	12	Improvement of illustration quality.
DSC-22_20-30-10-15 Holding Pattern - Hold with Manual Termination (HM)	G	13	Improvement of illustration quality.
DSC-22_20-30-10-15 Holding Pattern - Hold with Manual Termination (HM)	G	14	Documentation update: Addition of "Holding Pattern - Hold with Manual Termination (HM)" documentary unit
DSC-22_20-30-10-15 Offset - General	H	15	Improvement of Illustration quality
DSC-22_20-30-10-15 Offset - General	H	16	Documentation update: Addition of "Offset - General" documentary unit
DSC-22_20-30-10-15 Offset - Inserting an Offset	H	17	Documentation update: Addition of "Offset - Inserting an Offset" documentary unit

Localization Title	Toc Index	ID	Reason
DSC-22_20-30-10-15 Offset - Manual Cancellation of an Offset	H	18	Improvement of illustration quality.
DSC-22_20-30-10-15 Offset - Manual Cancellation of an Offset	H	19	Documentation update: Addition of "Offset - Manual Cancellation of an Offset" documentary unit
DSC-22_20-30-10-15 Alternate Function - Review and Selection of Alternate Airport	I	20	Documentation update: Addition of "Alternate Function - Review and Selection of Alternate Airport" documentary unit
DSC-22_20-30-10-15 Enable ALTN	J	21	Improvement of illustration quality.
DSC-22_20-30-10-15 Enable ALTN	J	22	Improvement of illustration quality.
DSC-22_20-30-10-15 Enable ALTN	J	23	Documentation update: Addition of "Enable ALTN" documentary unit
DSC-22_20-30-10-15 DIR Key (Direct-to-Function) - Procedure for DIR TO/ABEAM	K	24	Improvement of illustration quality.
DSC-22_20-30-10-15 DIR Key (Direct-to-Function) - Procedure for DIR TO/ABEAM	K	25	Documentation update: Addition of "DIR Key (Direct-to-Function) - Procedure for DIR TO/ABEAM" documentary unit
DSC-22_20-30-10-15 DIR Key (Direct-to-Function) - Procedure for DIR TO/Intercept	K	26	Improvement of illustration quality.
DSC-22_20-30-20-20 Wind	C	1	Incorporation of DU ref link to insert wind data procedure.
DSC-22_20-30-20-20 Wind	C	2	Incorporation of DU ref link to insert wind data procedure.
DSC-22_20-30-20-25 General	A	1	Improvement of illustration quality.
DSC-22_20-30-20-25 General	A	2	Documentation update: Addition of "General" documentary unit
DSC-22_20-30-20-25 Required Time of Arrival (RTA) - Entering a Required Time of Arrival	B	3	Improvement of illustration quality.
DSC-22_20-30-20-25 Required Time of Arrival (RTA) - Entering a Required Time of Arrival	B	4	Documentation update: Addition of "Required Time of Arrival (RTA) - Entering a Required Time of Arrival" documentary unit
DSC-22_20-30-20-25 Wind - Temperature - QNH - Entering the Wind and Temperature During F-PLN Initialization	C	5	Documentation update: Addition of "Wind - Temperature - QNH - Entering the Wind and Temperature During F-PLN Initialization" documentary unit

Localization Title	Toc Index	ID	Reason
DSC-22_20-30-20-25 Wind - Temperature - QNH - Entering the Cruise Winds and Temperatures	C	6	Improvement of illustration quality.
DSC-22_20-30-20-25 Wind - Temperature - QNH - Entering the Descent Winds	C	7	Improvement of illustration quality.
DSC-22_20-30-20-25 Wind - Temperature - QNH - Entering the Descent Winds	C	8	Documentation update: Addition of "Wind - Temperature - QNH - Entering the Descent Winds" documentary unit
DSC-22_20-30-20-25 Wind - Temperature - QNH - Entering the Approach Wind Temperature and QNH	C	9	Improvement of illustration quality.
DSC-22_20-30-20-25 Wind - Temperature - QNH - Entering the Approach Wind Temperature and QNH	C	10	Documentation update: Addition of "Wind - Temperature - QNH - Entering the Approach Wind Temperature and QNH" documentary unit
DSC-22_20-30-20-25 Constant Mach Segment - Entering a Constant Mach Segment	D	11	Improvement of illustration quality.
DSC-22_20-30-20-25 Constant Mach Segment - Entering a Constant Mach Segment	D	12	Documentation update: Addition of "Constant Mach Segment - Entering a Constant Mach Segment" documentary unit
DSC-22_20-40-10 Optimization	B	1	Documentation update: Addition of "Optimization" documentary unit
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DSC-22_20-50-10-20 Aircraft Status Page	W	3	Improvement of Illustration quality
DSC-22_20-50-10-20 Position Monitor Page	Y	4	Change of the wording "onside FMGC" or "opposite FMGC" to "FMGC 1" or "FMGC 2".
DSC-22_20-50-10-20 Position Monitor Page	Y	5	Change of the wording "onside FMGC" or "opposite FMGC" to "FMGC 1" or "FMGC 2".

Localization Title	Toc Index	ID	Reason
DSC-22_20-50-10-20 PERF Takeoff Page	AE	6	Improvement of Illustration quality
			Revision of the description of FLAPS/THS field to be in accordance with SOP (PRO-NOR-SOP-06-FMGS Data Insertion - Takeoff Data Insertion (PERF Takeoff page))
DSC-22_20-50-10-25 MCDU MENU Page	B	1	Improvement of Illustration quality
DSC-22_20-50-10-25 MCDU MENU Page	B	2	Improvement of Illustration quality
DSC-22_20-50-10-25 INIT A Page	C	3	Improvement of Illustration quality
DSC-22_20-50-10-25 INIT A Page	C	4	Documentation update: Addition of "INIT A Page" documentary unit
DSC-22_20-50-10-25 IRS INIT Page	E	5	Documentation update: Addition of "IRS INIT Page" documentary unit
DSC-22_20-50-10-25 WIND Pages	F	6	Documentation update: Addition of "WIND Pages" documentary unit
DSC-22_20-50-10-25 INIT B Page	G	7	Improvement of Illustration quality
DSC-22_20-50-10-25 INIT B Page	G	8	Documentation update: Addition of "INIT B Page" documentary unit
DSC-22_20-50-10-25 Fuel Prediction Page	H	9	Improvement of Illustration quality
DSC-22_20-50-10-25 Fuel Prediction Page	H	10	Documentation update: Addition of "Fuel Prediction Page" documentary unit
DSC-22_20-50-10-25 Flight Plan Pages	I	11	Improvement of Illustration quality
DSC-22_20-50-10-25 Flight Plan Pages	I	12	Improvement of Illustration quality
DSC-22_20-50-10-25 Flight Plan Pages	I	13	Documentation update: Addition of "Flight Plan Pages" documentary unit
DSC-22_20-50-10-25 Lateral Revision Pages	J	14	Improvement of Illustration quality
DSC-22_20-50-10-25 Lateral Revision Pages	J	15	Documentation update: Addition of "Lateral Revision Pages" documentary unit
DSC-22_20-50-10-25 Fix Info Page	K	16	Improvement of Illustration quality
DSC-22_20-50-10-25 Fix Info Page	K	17	Documentation update: Addition of "Fix Info Page" documentary unit
DSC-22_20-50-10-25 Offset Page	L	18	Documentation update: Addition of "Offset Page" documentary unit
DSC-22_20-50-10-25 Airways Page	M	19	Improvement of Illustration quality

Localization Title	Toc Index	ID	Reason
DSC-22_20-50-10-25 Airways Page	M	20	Documentation update: Addition of "Airways Page" documentary unit
DSC-22_20-50-10-25 ARRIVAL Pages	Q	21	Improvement of Illustration quality
DSC-22_20-50-10-25 ARRIVAL Pages	Q	22	Documentation update: Addition of "ARRIVAL Pages" documentary unit
DSC-22_20-50-10-25 VERTICAL REVISION Pages	T	23	Improvement of Illustration quality
DSC-22_20-50-10-25 VERTICAL REVISION Pages	T	24	Documentation update: Addition of "VERTICAL REVISION Pages" documentary unit
DSC-22_20-50-10-25 Step ALTS Page	U	25	Improvement of Illustration quality
DSC-22_20-50-10-25 Step ALTS Page	U	26	Documentation update: Addition of "Step ALTS Page" documentary unit
DSC-22_20-50-10-25 RTA Page	V	27	Improvement of Illustration quality
DSC-22_20-50-10-25 RTA Page	V	28	Documentation update: Addition of "RTA Page" documentary unit
DSC-22_20-50-10-25 Position Monitor and Position Frozen Page	AG	29	Change of the wording "onside FMGC" or "opposite FMGC" to "FMGC 1" or "FMGC 2".
DSC-22_20-50-10-25 Uplink TO Data REQ Pages	AP	30	Improvement of Illustration quality
DSC-22_20-50-10-25 Uplink TO Data REQ Pages	AP	31	Documentation update: Addition of "Uplink TO Data REQ Pages" documentary unit
DSC-22_20-50-10-25 Uplink MAX TO Data Pages	AQ	32	Documentation update: Addition of "Uplink MAX TO Data Pages" documentary unit
DSC-22_20-50-10-25 PERF Takeoff Page	AU	33	Improvement of Illustration quality
			Revision of the description of FLAPS/THS field to be in accordance with SOP (PRO-NOR-SOP-06-FMGS Data Insertion - Takeoff Data Insertion (PERF Takeoff page))
DSC-22_20-50-10-25 PERF Takeoff Page	AU	34	Documentation update: Addition of "PERF Takeoff Page" documentary unit
DSC-22_20-50-10-25 PERF Climb Page	AV	35	Improvement of Illustration quality
DSC-22_20-50-10-25 PERF Cruise Page	AW	36	Documentation update: Addition of "PERF Cruise Page" documentary unit
DSC-22_20-50-10-25 PERF Descent Page	AX	37	Documentation update: Addition of "PERF Descent Page" documentary unit
DSC-22_20-50-10-25 PERF APPR Page	AY	38	Improvement of Illustration quality

Localization Title	Toc Index	ID	Reason
DSC-22_20-50-10-25 PERF APPR Page	AY	39	Documentation update: Addition of "PERF APPR Page" documentary unit
DSC-22_20-50-10-25 PROG Pages	BA	40	Documentation update: Addition of "PROG Pages" documentary unit
DSC-22_20-50-10-25 Predictive GPS Pages	BB	41	Improvement of illustration quality
DSC-22_20-50-10-25 Predictive GPS Pages	BB	42	Documentation update: Addition of "Predictive GPS Pages" documentary unit
DSC-22_20-50-10-25 Report Page	BC	43	Improvement of Illustration quality
DSC-22_20-50-10-25 Report Page	BC	44	Documentation update: Addition of "Report Page" documentary unit
DSC-22_20-50-10-25 Radio NAV Page	BD	45	Improvement of Illustration quality
DSC-22_20-50-10-25 Radio NAV Page	BD	46	Documentation update: Addition of "Radio NAV Page" documentary unit
DSC-22_20-50-10-25 Secondary Pages	BE	47	Improvement of Illustration quality
DSC-22_20-50-10-25 Secondary Pages	BE	48	Improvement of Illustration quality
DSC-22_20-50-10-25 Secondary Pages	BE	49	Documentation update: Addition of "Secondary Pages" documentary unit
DSC-22_20-50-10-25 Back Up NAV Pages	BF	50	Improvement of Illustration quality
DSC-22_20-50-10-25 Back Up NAV Pages	BF	51	Improvement of Illustration quality
DSC-22_20-50-10-25 Back Up NAV Pages	BF	52	Improvement of Illustration quality
DSC-22_20-50-10-25 Back Up NAV Pages	BF	53	Improvement of Illustration quality
DSC-22_20-50-10-25 Back Up NAV Pages	BF	54	Improvement of Illustration quality
DSC-22_20-50-20-35 MCDU Message List	A	1	Documentation update: Addition of "MCDU Message List" documentary unit
DSC-22_20-50-30 MCDU Data Format List	A	1	Documentation update: Addition of "MCDU Data Format List" documentary unit
DSC-22_20-60-40 Engine-Out SID - General	F	1	Improvement of Illustration quality
DSC-22_20-60-40 Engine-Out SID - Before the Diversion Point	F	2	Improvement of Illustration quality

Localization Title	Toc Index	ID	Reason
DSC-22_20-60-40 Engine-Out SID - Below THR Red Altitude	F	3	Improvement of Illustration quality
DSC-22_20-60-50 Secondary Flight Plan	A	1	Improvement of Illustration quality
DSC-22_20-60-50 Secondary Flight Plan	A	2	Documentation update: Addition of "Secondary Flight Plan" documentary unit
DSC-22_20-60-70 Report Page Access	B	1	Improvement of Illustration quality
DSC-22_20-60-70 Report Page Acces	C	2	Documentation update: Addition of "Report Page Acces" documentary unit
DSC-22_20-60-90 How to Insert a Time Marker	B	1	Improvement of Illustration quality
DSC-22_20-60-100 Step Climb/Step Descent	A	1	Documentation update: Addition of "Step Climb/Step Descent" documentary unit
DSC-22_20-60-130 Back Up NAV Selection - Example of Downloaded F-PLN	B	1	Improvement of Illustration quality
DSC-22_20-60-130 Back Up NAV Operation - Waypoint Insertion	C	2	Improvement of Illustration quality
DSC-22_20-60-130 Back Up NAV Operation - Direct to a Waypoint	C	3	Improvement of Illustration quality
DSC-22_20-60-130 Back Up NAV Operation - CLR Waypoint/Discontinuity	C	4	Improvement of Illustration quality
DSC-22_20-70 Flight Plan Initialization Through ACARS	A	1	Documentation update: Addition of "Flight Plan Initialization Through ACARS" documentary unit
DSC-22_20-70 Takeoff Data - Procedure to Insert Uplink Takeoff Data	B	2	Improvement of Illustration quality
DSC-22_20-70 Wind Data - Procedure to Insert Wind Data	C	3	Improvement of Illustration quality
DSC-22_20-70 Wind Data - Procedure to Insert Wind Data	C	4	Documentation update: Addition of "Wind Data - Procedure to Insert Wind Data" documentary unit

GENERAL

Applicable to: ALL

The flight management and guidance system (FMGS) performs navigation functions and lateral and vertical flight planning functions. It also computes performance parameters and guides the aircraft along a preplanned route.

The Flight Management (FM) part controls the following functions:

- Navigation
- Management of flight planning
- Prediction and optimization of performance
- Management of navigation radios
- Management of displays

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NAVIGATION

Applicable to: ALL

Essential navigation functions are:

- Computation of position
- Evaluation of position accuracy
- Radio navigation tuning
- Alignment of Inertial Reference System.

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GENERAL

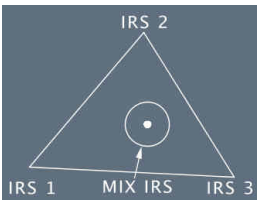
Applicable to: ALL

Each FMGC computes its own aircraft position (called the "FM position") from a MIX IRS position and a computed radio position, or a GPS position.
The FMGS selects the most accurate position, considering the estimated accuracy and integrity of each positioning equipment.
GPS/INERTIAL is the basic navigation mode, provided GPS data is valid and successfully tested. Otherwise, navaids plus inertial or inertial only are used. (*Refer to DSC-22_20-20-10 Navigation Modes*).

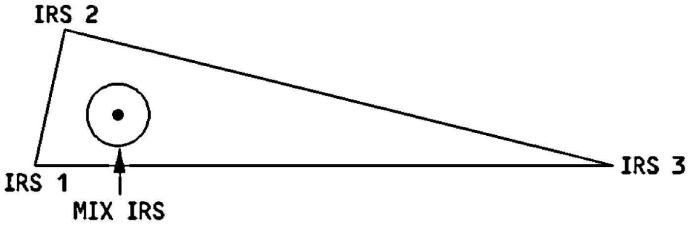
MIX IRS POSITION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

Each FMGC receives a position from each of the three IRSs, and computes a mean-weighted average called the “MIX IRS”position:



- If one of the IRSs drifts abnormally, the MIX IRS position uses an algorithm that decreases the influence of the drifting IRS within the MIX IRS position.

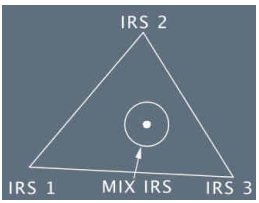


- If one of the IRSs fails, each FMGC uses only one IRS (onside IRS or IRS3). Each IRS position and inertial speed are continuously tested. If the test fails, the corresponding IRS is rejected.
- When the MIX IRS position differs from the radio position by more than 12 nm, the “CHECK A/C POSITION” message is displayed on the MCDUs.

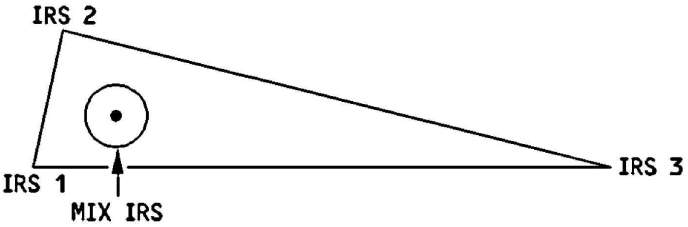
MIX IRS POSITION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

Each FMGC receives a position from each of the three IRSs, and computes a mean-weighted average called the “MIX IRS”position:



- If one of the IRSs drifts abnormally, the MIX IRS position uses an algorithm that decreases the influence of the drifting IRS within the MIX IRS position.



- If one of the IRSs fails, each FMGC uses only one IRS (onside IRS or IRS3). Each IRS position and inertial speed are continuously tested. If the test fails, the corresponding IRS is rejected.
- When the "CHECK IRS (1, 2 or 3)/FM POSITION" message appears on the MCDU.

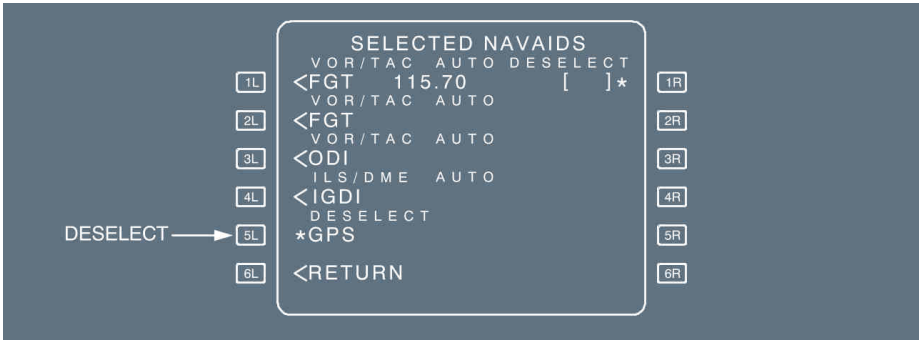
GPS POSITION

Applicable to: ALL

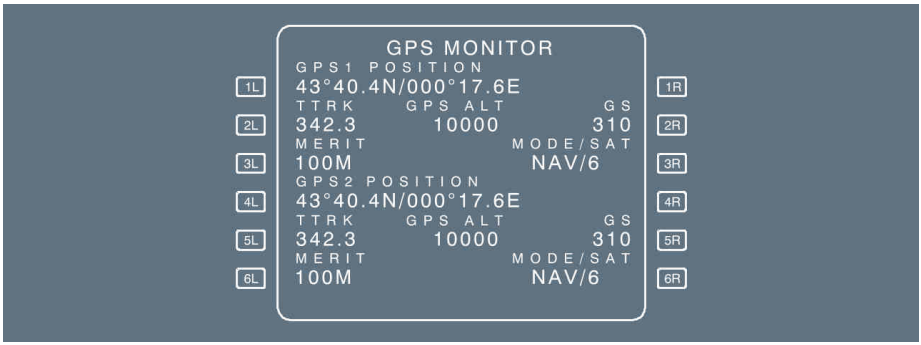
1 Each IRS computes a mixed IRS/GPS position called the GPIRS position. For this, each IRS can independently select their GPS source in order to maximize the availability of GPS data.
Of the three GPIRS positions that each FMGC receives, the FMS selects one GPIRS position based on a figure of merit and priority.

The FMS uses the following hierarchy to perform the selection:
- Onside GPIRS position
- GPIRS 3
- Opposite GPIRS position.

If the GPIRS data does not comply with an integrity criterion that is based on a Horizontal Integrity Limit (HIL) and on the automatic detection of failed satellites, the FMS rejects the GPS mode and uses the radio position update.
The flight crew can deselect/select the GPS position on the SELECTED NAVAIDS page, if necessary.



Information about the GPS position is displayed on the GPS MONITOR page.



Note: *In normal operations, all ADIRUs may select the same GPS source. As a result, the data of the GPS that is not selected may be dashed on the GPS MONITOR page, without any detected GPS failure or triggered "GPS PRIMARY LOST" message.*

RADIO POSITION

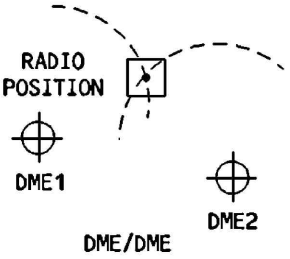
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

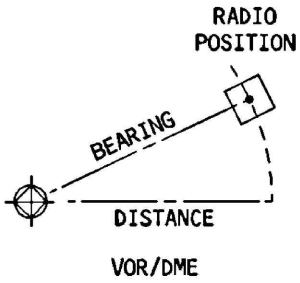
Each FMGC uses onside navaids to compute its own radio position. These navaids are displayed on the SELECTED NAVAIDS page.

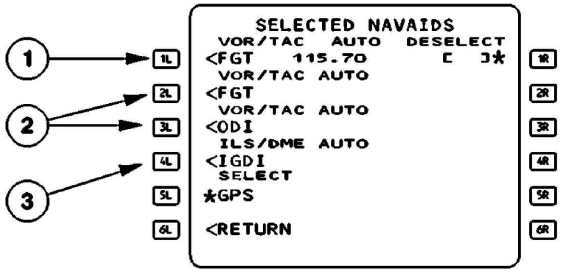
The available navaids are:
- DME/DME
- VOR/DME
- LOC

- DME/DME-LOC
- VOR/DME-LOC.

It uses LOC to update the lateral position, using LOC beam during ILS approach.
LOC is also used for quick update, when in GPS/IRS mode.
If one or more navaids fail, each FMGC can use offside navaids to compute the VOR/DME, or the DME/DME radio position.
The radio navaid selection is displayed on the DATA “SELECTED NAVAIDS” page.







(1) VOR/DME selection (auto or manual) for display (onside VOR).

(2) DMEs automatic selection for DME/DME onside radio position.

(3) ILS selection (auto or manual) for LOC update computation.

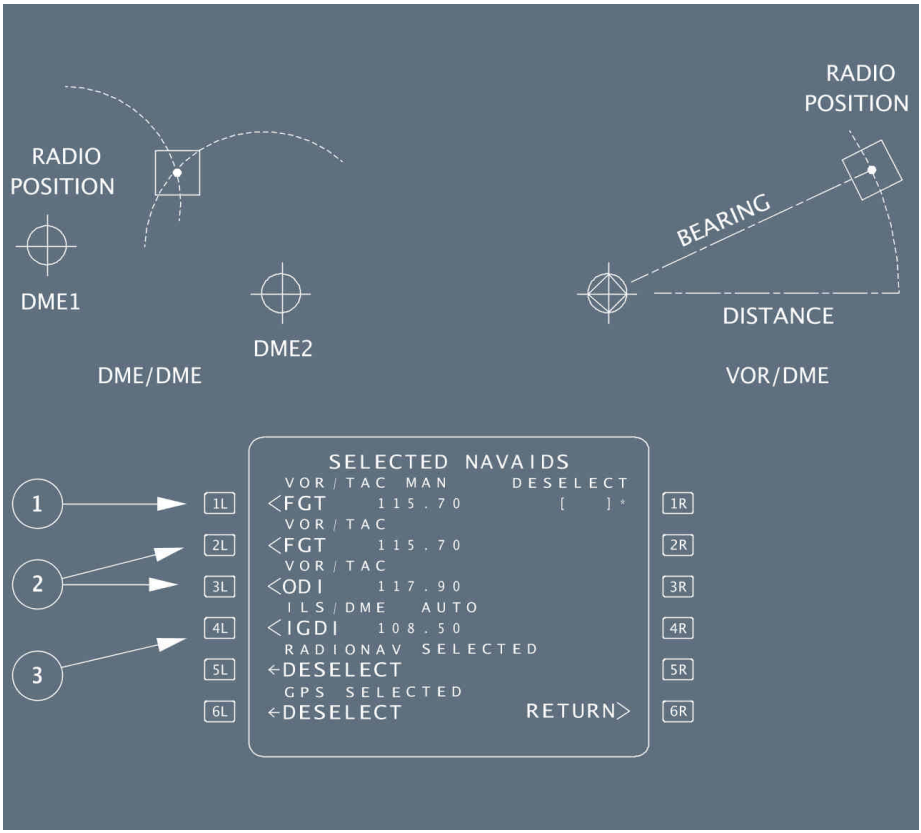
RADIO POSITION

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

Each FMGC uses onside navaids to compute its own radio position. These navaids are displayed on the SELECTED NAVAIDS page.

The available navaids are:
- DME/DME
- VOR/DME
- LOC
- DME/DME-LOC
- VOR/DME-LOC.

It uses LOC to update the lateral position, using LOC beam during ILS approach.
LOC is also used for quick update, when in GPS/IRS mode.
If one or more navaids fail, each FMGC can use offside navaids to compute the VOR/DME, or the DME/DME radio position.
The radio navaid selection is displayed on the DATA “SELECTED NAVAIDS” page.



(1) VOR/DME selection (auto or manual) for display (onside VOR).

(2) DMEs automatic selection for DME/DME onside radio position.

(3) ILS selection (auto or manual) for LOC update computation.

CHECK A/C POSITION MESSAGE

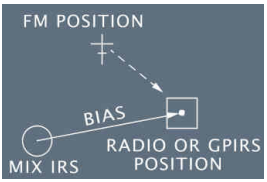
Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This message comes up on the MCDU, when the radio position and the IRS position disagree by more than 12 nm.

FM POSITION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

At flight initialization, each FMGC displays an FM position that is a MIX IRS/GPS position (GPIRS):
- At takeoff, when the FM position is updated to the runway threshold position as stored in the database, possibly corrected by the takeoff shift entered on PERF TO page.
- In flight, the FM position approaches the radio position or the GPS position at a rate depending upon the aircraft altitude.



BIAS

Each FMGC computes a vector from its MIX IRS position to the radio position or GPIRS position. This vector is called the “bias”.
Each FMGC updates its bias continuously as long as a radio position or a GPIRS position is available.
If an FMGC loses its radio/GPIRS position, it memorizes the bias and uses it to compute the FM position, which equals the MIX IRS position plus the bias. Until the radio or the GPIRS position is restored, the bias does not change.
The flight crew can update the FM position manually. This also updates the bias.

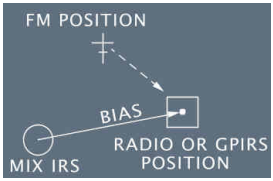
FM POSITION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

At flight initialization, each FMGC displays an FM position that is a MIX IRS/GPS position (GPIRS):

- At takeoff, when the FM position is updated to the runway threshold position as stored in the database, possibly corrected by the takeoff shift entered on PERF TO page.
- In flight, the FM position approaches the radio position or the GPS position at a rate depending upon the aircraft altitude.

Note: *The FM position update at takeoff is inhibited when GPS PRIMARY is active.*



BIAS

Each FMGC computes a vector from its MIX IRS position to the radio position or GPIRS position. This vector is called the “bias”.

Each FMGC updates its bias continuously as long as a radio position or a GPIRS position is available.

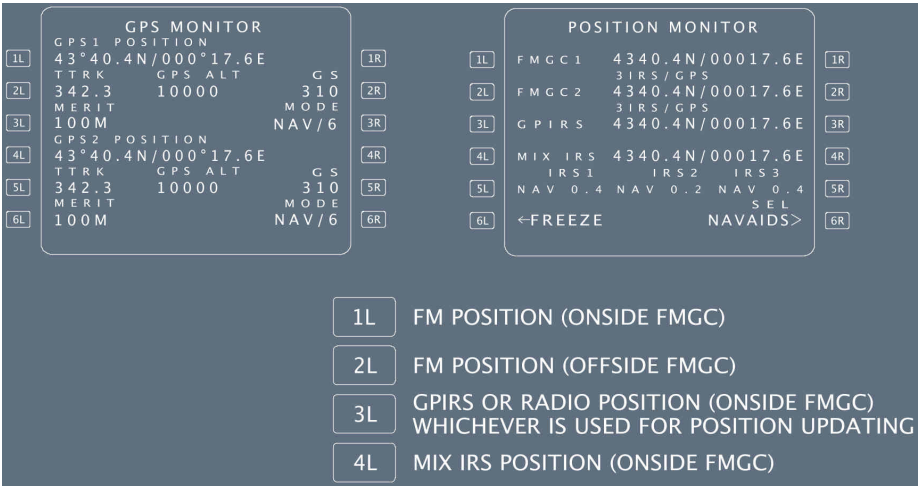
If an FMGC loses its radio/GPIRS position, it memorizes the bias and uses it to compute the FM position, which equals the MIX IRS position plus the bias. Until the radio or the GPIRS position is restored, the bias does not change.

The flight crew can update the FM position manually. This also updates the bias.

POSITION MONITOR

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

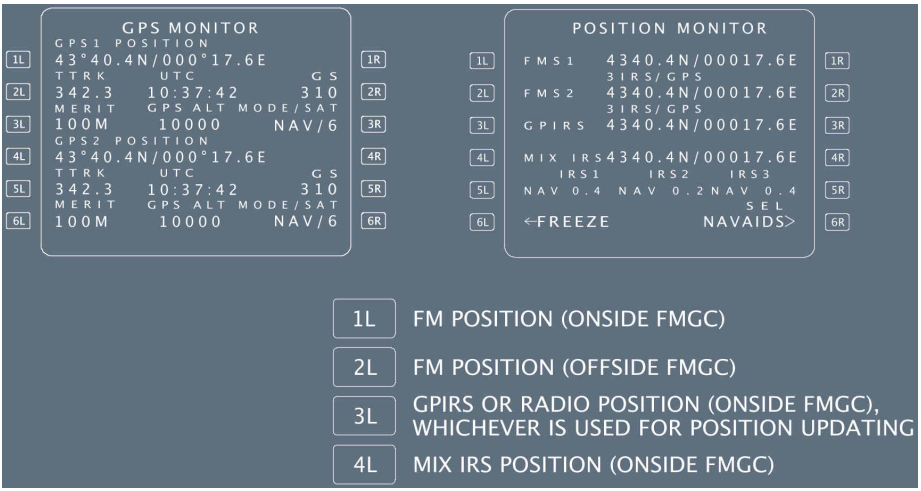
The flight crew may check the position computation using the GPS MONITOR or POSITION MONITOR page.



POSITION MONITOR

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

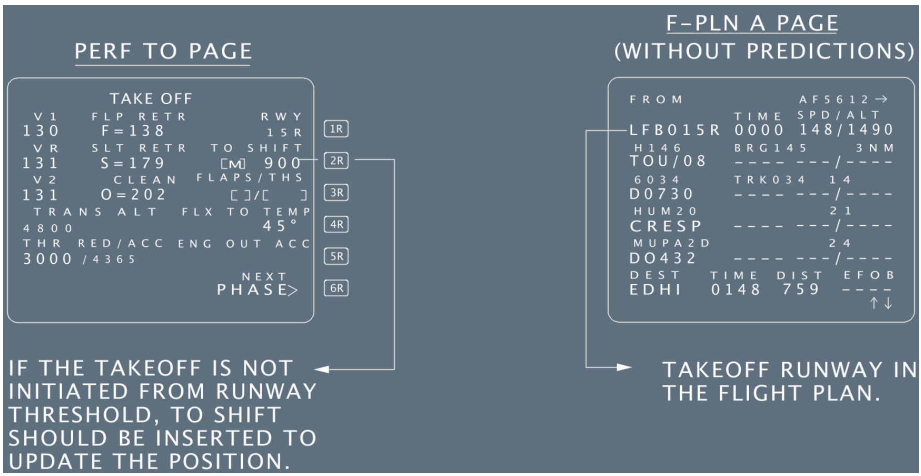
The flight crew may check the position computation using the GPS MONITOR or POSITION MONITOR page.



TAKEOFF UPDATE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

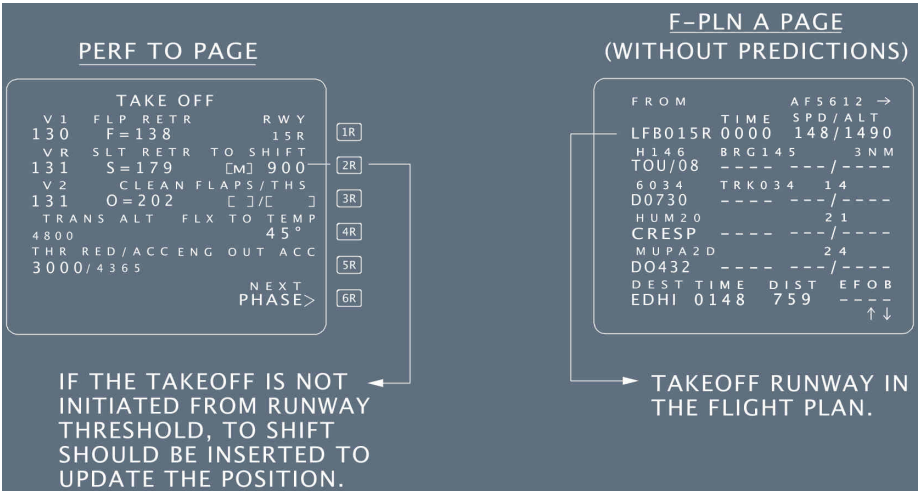
A takeoff update requires that the takeoff runway be part of the flight plan. This provides the most accurate position update.
If the takeoff run starts at an intersection, enter a takeoff shift on the PERF TO page to refine the takeoff update.
An accurate takeoff update ensures a precise aircraft position during departure.



TAKEOFF UPDATE (GPS PRIMARY NOT ACTIVE)

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

A takeoff update requires that the takeoff runway be part of the flight plan. This provides the most accurate position update.
If the takeoff run starts at an intersection, enter a takeoff shift on the PERF TO page to refine the takeoff update.
An accurate takeoff update ensures a precise aircraft position during departure.



NAVIGATION MODES

Applicable to: ALL

The FMGS updates the FM position via the use of radio navaids or GPS, if available. It can use four different FM navigation modes to make this update.

The decreasing order of priority is:
- IRS-GPS
- IRS-DME/DME
- IRS-VOR/DME
- IRS only.

During ILS approaches, the system performs a temporary lateral update, via one of the following modes:
- IRS-GPS/LOC
- IRS-DME/DME-LOC
- IRS-VOR/DME-LOC
- IRS-LOC.

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GENERAL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The FMGS continuously computes an Estimated Position Uncertainty (EPU).
It is an estimate of how much the FM position diverged, and it is a function of the navigation mode that the system uses.

CURRENT NAV MODE	EPU (RATE or THRESHOLD)	REMARK
IRS/GPS	$\sqrt{(FOM^2 + 100^2)}$ (in meters).	FOM = Figure of Merit of GPS. If above 0.28 nm, the FMS rejects the GPS position.
IRS/DME/DME	Moves toward 0.28 nm.	EPU decreases from initial value to 0.28 nm.
IRS/VOR/DME	0.1 nm + 0.05 X DME DIST. Minimum : 0.28 nm.	Dependent on the distance between the aircraft and the VOR/DME.
IRS ONLY	+8 kt for the first 21 min. +2 kt after.	EPU increases continuously.

Note: After an IRS alignment or at takeoff, the EPU is set to 0.2 nm.

GENERAL

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The FMGS continuously computes an Estimated Position Uncertainty (EPU).
It is an estimate of how much the FM position diverged, and it is a function of the navigation mode that the system uses.

CURRENT NAV MODE	EPU (RATE or THRESHOLD)	REMARK
IRS/GPS	$\sqrt{(FOM^2 + 100^2)}$ (in meters).	FOM = Figure of Merit of GPS. If above 0.28 nm, the FMS rejects the GPS position.
IRS/DME/DME	Moves toward 0.28 nm.	EPU decreases from initial value to 0.28 nm.
IRS/VOR/DME	0.1 nm + 0.05 X DME DIST. Minimum : 0.28 nm.	Dependent on the distance between the aircraft and the VOR/DME.
IRS ONLY	+8 kt for the first 30 min. 0 kt for the following 60 min. +4 kt for the following 30 min. 0 kt for the following 60 min. +2 kt after.	EPU increases continuously.

Note: After an IRS alignment or at takeoff, the EPU is set to 0.2 nm.

ESTIMATED POSITION UNCERTAINTY

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

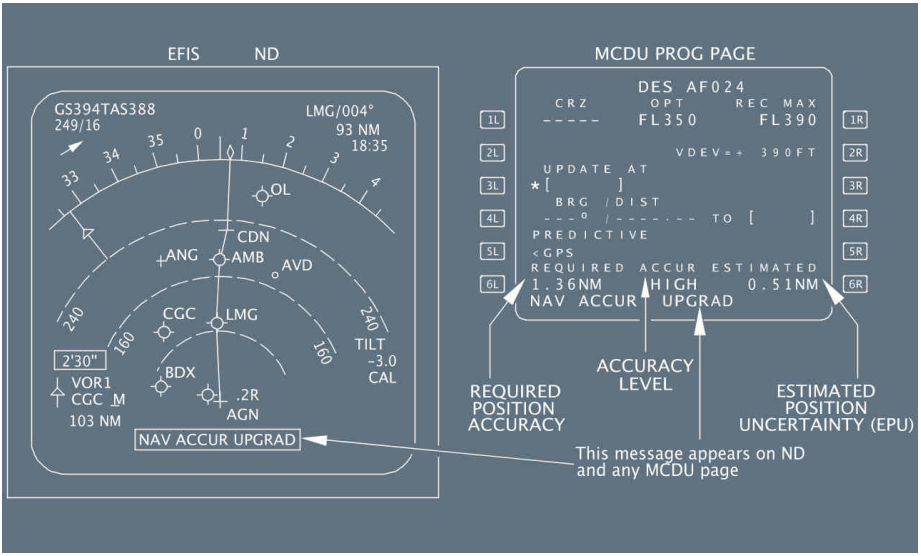
The FMS displays the EPU to the flight crew and compares it with the Required Navigation Performance (RNP):

- If the EPU does not exceed the RNP, accuracy is HIGH
- If the EPU exceeds the RNP, accuracy is LOW.

The RNP is displayed in the REQUIRED field of the PROG page. The displayed RNP is a default value and it is possible for the flight crew to modify it.
When the "SYSTEM RNP IS XX.XX" message is displayed, the flight crew should verify the RNP value that was manually entered in the REQUIRED field of the PROG page, and clear or modify it if necessary.
This message is also displayed at the change of flight area if the new RNP (default value) is smaller than the displayed RNP (manually entered).

POSITION ACCURACY CRITERIA Defined by Airworthiness Authorities	
FLIGHT AREA	**RNP VALUES**
EN ROUTE	3.41 nm
TERMINAL	2.07 nm
APPROACH	VOR/DME 0.61 nm OTHER CASES 0.36 nm

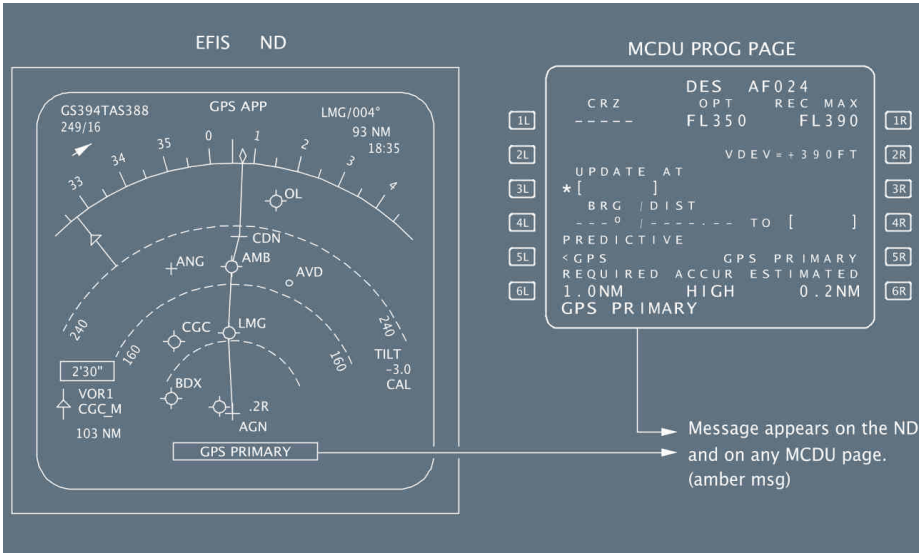
When one FMGC changes the NAV accuracy from LOW to HIGH (or HIGH to LOW), the MCDU and the ND display the "NAV ACCUR UPGRAD" (or DOWNGRAD) message.
These messages are inhibited when the navigation mode is IRS/GPS.



When in IRS/GPS mode, the GPS PRIMARY status is related to integrity criterion: This is the capability to detect a failure and provide appropriate warning of it. This criterion indicates the confidence that the flight crew can have in the FMS position.
If the GPS PRIMARY status complies with this criterion, the "GPS PRIMARY" message is displayed on the MCDU (PROG page, [5R] field and scratchpad) and temporarily on the ND. If the GPS PRIMARY status no longer complies with this criterion (integrity lost), the GPS PRIMARY status is lost and the MCDU and the ND display the "GPS PRIMARY LOST" message. It is possible to clear the scratchpad message on the MCDU, but not on the ND. During a non-ILS approach, a triple-click aural warning is also triggered.

Note: *When the position computation uses IRS/GPS mode (FOM <0.28 nm), the EPU is always smaller than any value required by airworthiness authorities (whose minimum, in approach, is 0.36 nm). As a result, accuracy is always at HIGH when in IRS/GPS mode, and so when in GPS PRIMARY.*

CAUTION	"HIGH" or "LOW" on the PROG page indicates the FM position accuracy, based on estimated uncertainty. When GPS PRIMARY mode is lost, the flight crew must periodically check this position accuracy. In GPS PRIMARY mode, the position accuracy is always at HIGH.



When the GPS is manually deselected, the "GPS IS DESELECTED" message is displayed on the MCDU, 80 nm before the T/D or at approach phase transition.

ESTIMATED POSITION UNCERTAINTY

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

The FMS displays the EPU to the flight crew and compares it with the Required Navigation Performance (RNP):

- If the EPU does not exceed the RNP, accuracy is HIGH
- If the EPU exceeds the RNP, accuracy is LOW.

The RNP is displayed in the REQUIRED field of the PROG page. The displayed RNP is (in a decreasing order of priority):

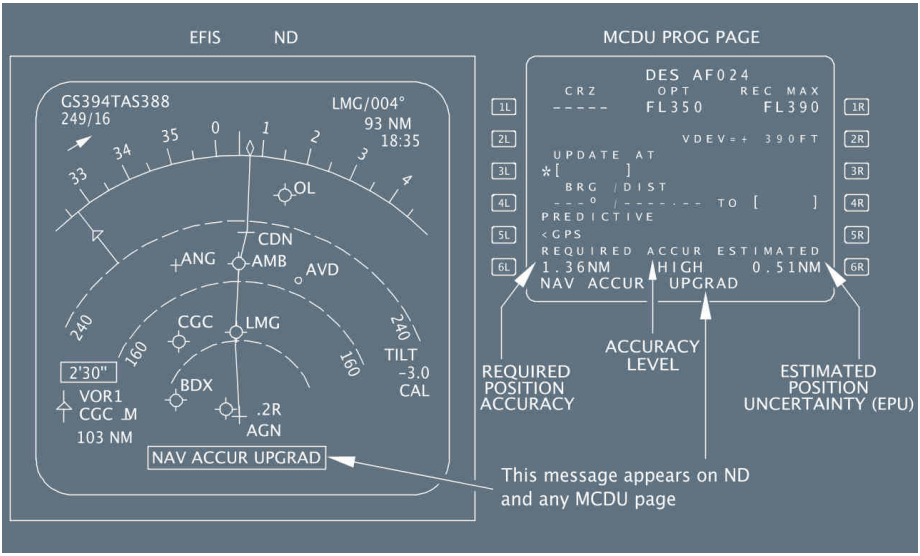
- The value that the flight crew entered
- The navigation database procedure value
- The system's default value.

When a flight crew enters an RNP that is higher than the published value, one of the following messages is displayed : "PROCEDURE RNP IS XX.XX", or "AREA RNP IS XX.XX". When this occurs, the flight crew should verify the RNP value that was manually entered in the REQUIRED field of the PROG page, and clear or modify it if necessary.

The "AREA RNP IS XX.XX" message is also displayed at the change of flight area if the new RNP (default value) is smaller than the displayed RNP (manually entered).

DEFAULT AREA RNP VALUES	
EN ROUTE	2.0 nm
TERMINAL	1.0 nm
APPROACH	GPS 0.3 nm OTHER CASES 0.5 nm

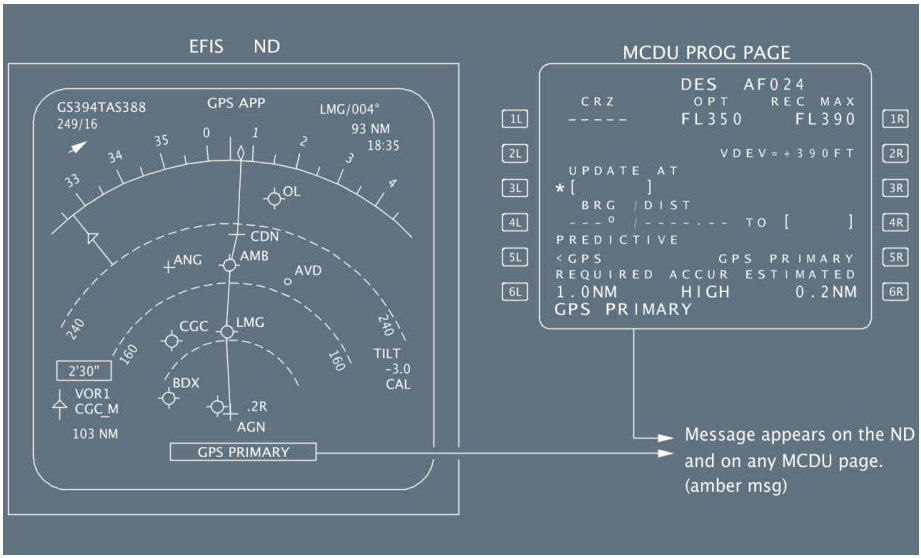
When one FMGC changes the NAV accuracy from LOW to HIGH (or HIGH to LOW), the MCDU and the ND display the "NAV ACCUR UPGRAD" (or DOWNGRAD) message.
These messages are inhibited when the navigation mode is IRS/GPS.



When in IRS/GPS mode, the GPS PRIMARY status combines two different criteria:
- The accuracy criterion previously described (HIGH/LOW accuracy)
- An integrity criterion: This is the capability to detect a failure and provide appropriate warning of it. This criterion indicates the confidence that the flight crew can have in the FMS position.

If the GPS PRIMARY status complies with both criteria, "GPS PRIMARY" is displayed on the MCDU (PROG page, [5R] field and scratchpad) and temporarily on the ND.
If the GPS PRIMARY status no longer complies with one of these criteria (Navigation downgraded or integrity lost), the GPS PRIMARY status is lost and the MCDU and the ND display the "GPS PRIMARY LOST" message. It is possible to clear the scratchpad message on the MCDU, but not on the ND. During a non-ILS approach, a triple-click aural warning is also triggered.

CAUTION	"HIGH" or "LOW" on the PROG page indicates the FM position accuracy, based on estimated uncertainty. When GPS PRIMARY mode is lost, the flight crew must periodically check this position accuracy. In GPS PRIMARY mode, the position accuracy is always at HIGH.



When the GPS is manually deselected, the "GPS IS DESELECTED" message is displayed on the MCDU, 80 nm before the T/D or at approach phase transition.

ESTIMATED POSITION UNCERTAINTY

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

The FMS displays the EPU to the flight crew and compares it with the Required Navigation Performance (RNP):

- If the EPU does not exceed the RNP, accuracy is HIGH
- If the EPU exceeds the RNP, accuracy is LOW.

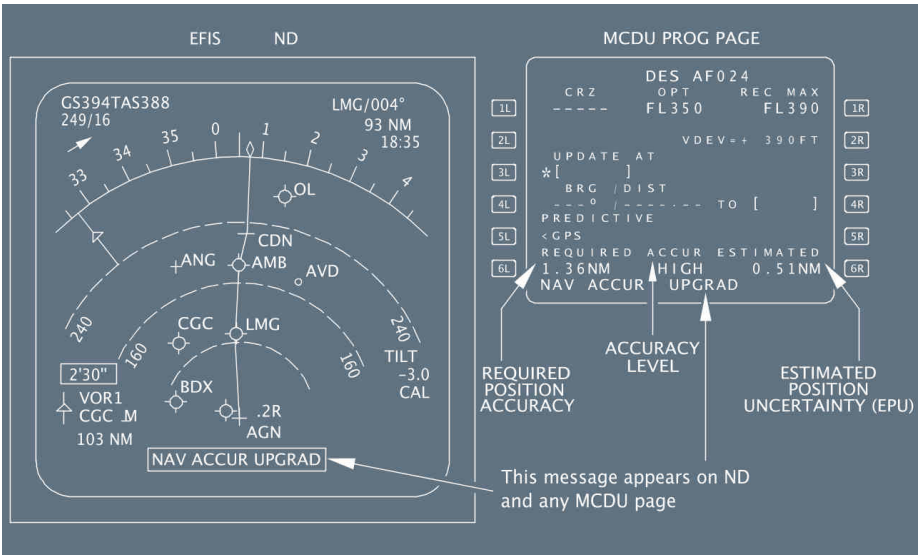
The RNP is displayed in the REQUIRED field of the PROG page. The displayed RNP is (in a decreasing order of priority):

- The value that the flight crew entered
- The navigation database procedure value
- The system's default value.

When a flight crew enters an RNP that is higher than the published value, one of the following messages is displayed : "PROCEDURE RNP IS XX.XX", or "AREA RNP IS XX.XX". When this occurs, the flight crew should verify the RNP value that was manually entered in the REQUIRED field of the PROG page, and clear or modify it if necessary.
The "AREA RNP IS XX.XX" message is also displayed at the change of flight area if the new RNP (default value) is smaller than the displayed RNP (manually entered).

DEFAULT AREA RNP VALUES	
EN ROUTE	2.0 nm
TERMINAL	1.0 nm
APPROACH	GPS 0.3 nm OTHER CASES 0.5 nm

When one FMGC changes the NAV accuracy from LOW to HIGH (or HIGH to LOW), the MCDU and the ND display the "NAV ACCUR UPGRAD" (or DOWNGRAD) message.
These messages are inhibited when the navigation mode is IRS/GPS.

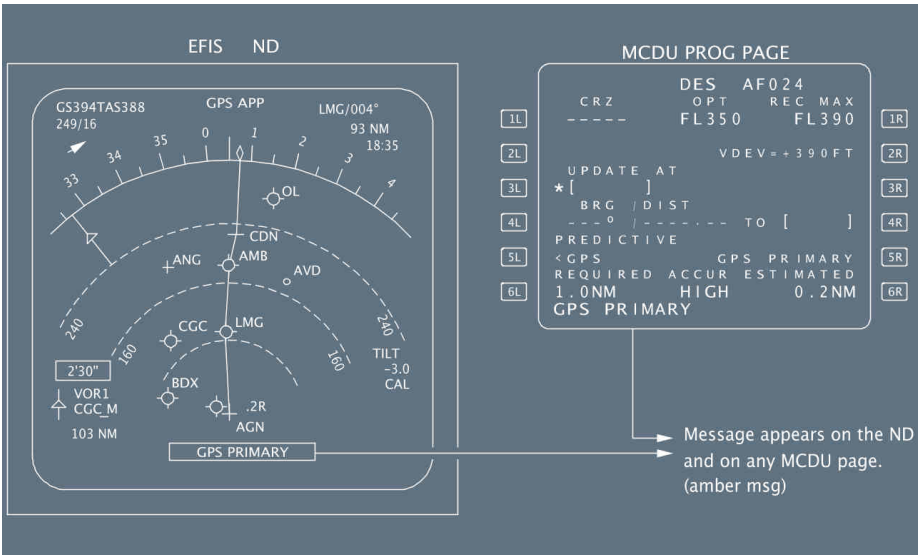


When in IRS/GPS mode, the GPS PRIMARY status combines two different criteria:
- The accuracy criterion previously described (HIGH/LOW accuracy)
- An integrity criterion: This is the capability to detect a failure and provide appropriate warning of it. This criterion indicates the confidence that the flight crew can have in the FMS position.

If the GPS PRIMARY status complies with both criteria, "GPS PRIMARY" is displayed on the MCDU (PROG page, [5R] field and scratchpad) and temporarily on the ND.

If the GPS PRIMARY status no longer complies with one of these criteria (Navigation downgraded or integrity lost), the GPS PRIMARY status is lost and the MCDU and the ND display the "GPS PRIMARY LOST" message. It is possible to clear the scratchpad message on the MCDU, but not on the ND.

CAUTION	"HIGH" or "LOW" on the PROG page indicates the FM position accuracy, based on estimated uncertainty. When GPS PRIMARY mode is lost, the flight crew must periodically check this position accuracy. In GPS PRIMARY mode, the position accuracy is always at HIGH.



When the GPS is manually deselected, the "GPS IS DESELECTED" message is displayed on the MCDU, 80 nm before the T/D or at approach phase transition.

FM/GPS POSITION DISAGREEMENT

Applicable to: ALL

When the GPS PRIMARY function is active, and either of the FM positions deviate from the GPS positions 1 or 2 by more than:

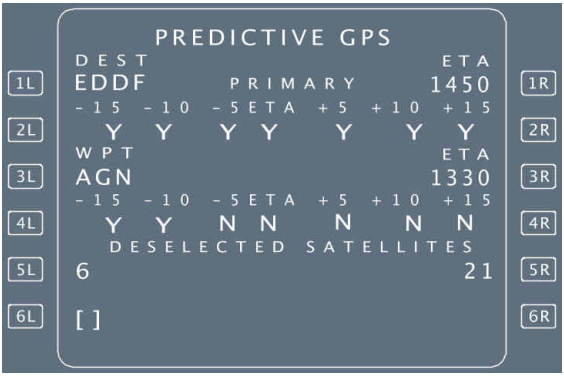
- A longitude threshold that depends on the latitude:
  - 0.5' for latitudes below 55°
  - 0.9' for latitudes at or above 55°, and below 70°.
- A latitude threshold of 0.5', regardless of the latitude,

then, the lower ECAM displays the NAV FM/GPS POS DISAGREE amber caution. The master caution light comes on and the single chime sounds.
This amber caution is inhibited during the takeoff phase.
Above 70° of latitude, a longitude difference does not trigger the alarm.

PREDICTIVE GPS PAGE

Applicable to: ALL

The predictive GPS page is only operative with the Honeywell ADIRS equipment. All fields are blank with Litton ADIRS equipment.
The predictive GPS function predicts the availability of the GPS within ± 15 min of ETA at destination, or at any waypoint entered by the flight crew.



Predictions are displayed on the predictive GPS page at time intervals of 5 min (+15 and –15 min of ETA).
To access this page, press the 5L key of the PROG page. This page also enables the deselection of up to 4 satellites at a time.

NAVIGATION ACCURACY CHECK

Applicable to: B-HSD, B-HSE

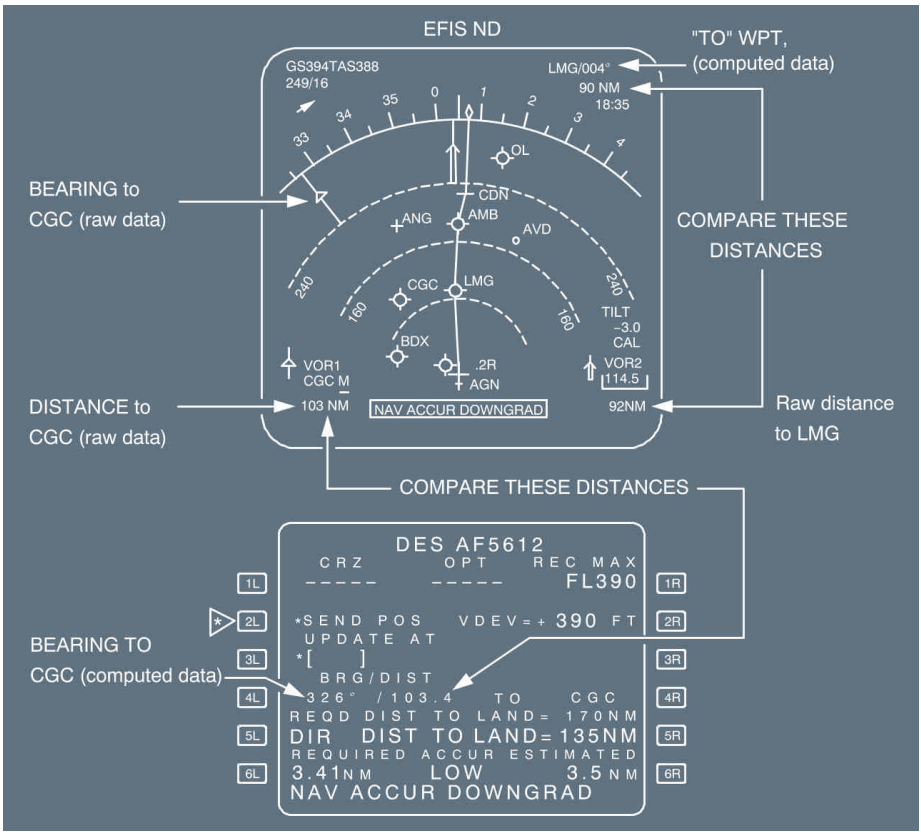
1

The flight crew must perform this essential check:
- Periodically in cruise
- At 10 000 ft in descent.

When entering a terminal/approach area, the flight crew must monitor navigation accuracy only.

The procedure is:

- While en route, check the HIGH/LOW accuracy information.
  - If accuracy is "LOW" (and whenever "NAV ACCUR DOWNGRAD" appears), compare raw data from the tuned navaids with the corresponding FM computed data on the ND or the MCDU PROG page
  - If accuracy is "HIGH", periodically perform the comparison (about once per hour).
- In descent, and in terminal and approach areas, validate the estimated accuracy, whether it is "HIGH" or "LOW", by comparing the FM data with the raw data from the VOR/DME at the destination airfield, if available.



This check verifies and quantifies the FM accuracy. It confirms the reliability of FMGS data itself and navigation display presentation. It also validates the use of the NAV mode.

By comparing the bearing, the flight crew may evaluate the validity of the overall check. In area with high magnetic variation change, the comparison of bearings may not be adequate.

NAVIGATION ACCURACY CHECK

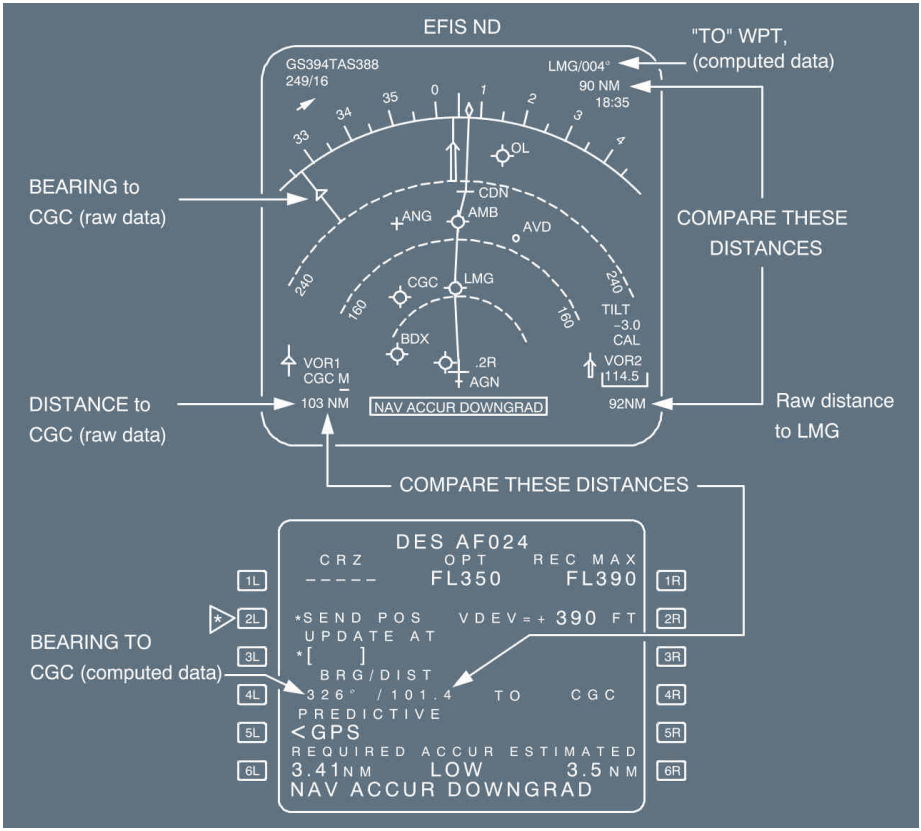
Applicable to: B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

2 When GPS PRIMARY is available, the navigation accuracy check is not required.

When GPS PRIMARY is not available, the flight crew must perform this essential check:
- Periodically in cruise
- At 10 000 ft in descent.

When entering a terminal/approach area, the flight crew must monitor navigation accuracy only.

The procedure is:
- While en route, check the HIGH/LOW accuracy information.
  - If accuracy is "LOW" (and whenever "NAV ACCUR DOWNGRAD" appears), compare raw data from the tuned navaids with the corresponding FM computed data on the ND or the MCDU PROG page
  - If accuracy is "HIGH", periodically perform the comparison (about once per hour).
- In descent, and in terminal and approach areas, validate the estimated accuracy, whether it is "HIGH" or "LOW", by comparing the FM data with the raw data from the VOR/DME at the destination airfield, if available.



This check verifies and quantifies the FM accuracy. It confirms the reliability of FMGS data itself and navigation display presentation. It also validates the use of the NAV mode.
By comparing the bearing, the flight crew may evaluate the validity of the overall check. In area with high magnetic variation change, the comparison of bearings may not be adequate.

NAVIGATION ACCURACY CHECK

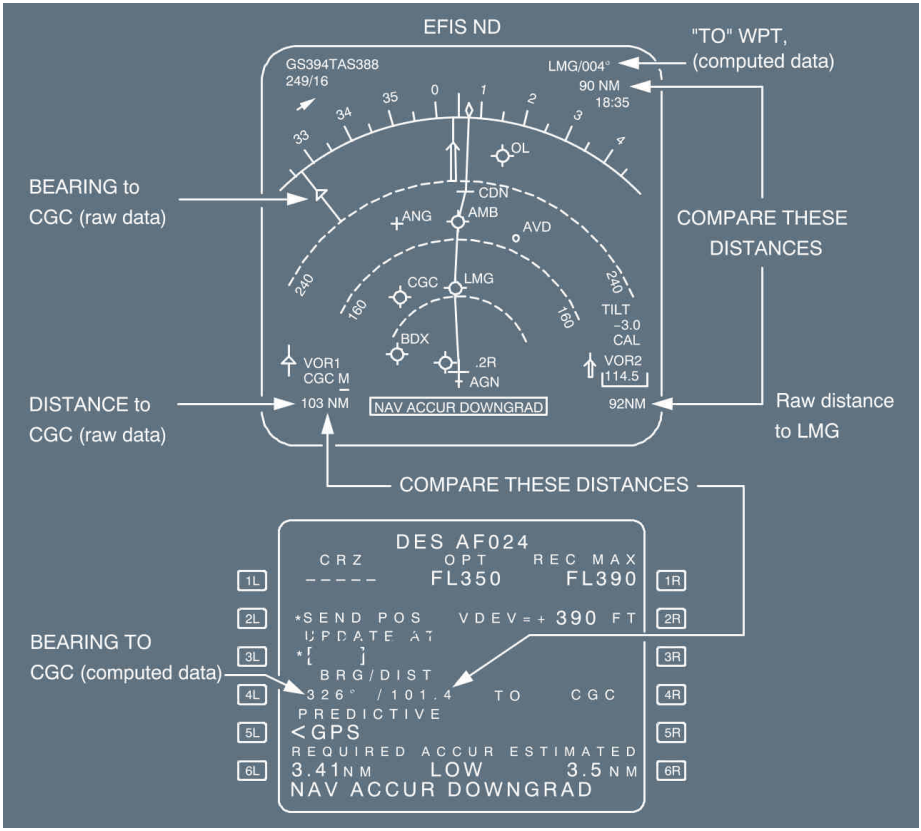
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

3 When GPS PRIMARY is available, the navigation accuracy check is not required.

When GPS PRIMARY is not available, the flight crew must perform this essential check:
- Periodically in cruise
- At 10 000 ft in descent.

When entering a terminal/approach area, the flight crew must monitor navigation accuracy only.

The procedure is:
- While en route, check the HIGH/LOW accuracy information.
  - If accuracy is "LOW" (and whenever "NAV ACCUR DOWNGRAD" appears), compare raw data from the tuned navaids with the corresponding FM computed data on the ND or the MCDU PROG page
  - If accuracy is "HIGH", periodically perform the comparison (about once per hour).
- In descent, and in terminal and approach areas, validate the estimated accuracy, whether it is "HIGH" or "LOW", by comparing the FM data with the raw data from the VOR/DME at the destination airfield, if available.



This check verifies and quantifies the FM accuracy. It confirms the reliability of FMGS data itself and navigation display presentation. It also validates the use of the NAV mode.
By comparing the bearing, the flight crew may evaluate the validity of the overall check. In area with high magnetic variation change, the comparison of bearings may not be adequate.

GENERAL

Applicable to: ALL

Radio navaids are tuned for two different purposes: Display and computation.

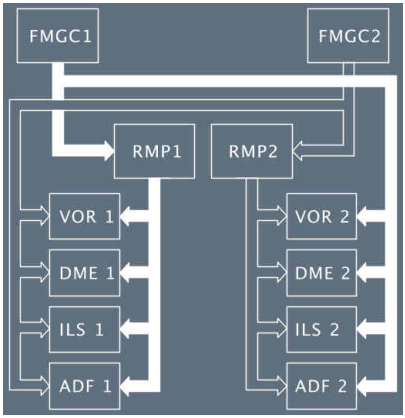
It is possible to perform tuning for display in three different ways:
- Automatic tuning via FMGC software
- Manual tuning via the MCDU RAD NAV page
- Manual tuning via the Radio Management Panel (RMP) if both FMGCs or both MCDUs fail.

The FMGS automatically tunes the radio navaids for computation of the radio position.

Note: The manual selection of a VOR or VOR/DME may prevent the FMGS from automatically tuning a VOR/DME to compute position. In this case, the related MCDU displays "TUNE BBB FFF.FF" (BBB = ident, FFF.FF = frequency).

ARCHITECTURE

Applicable to: ALL



- In dual mode and independent mode, each FMGC simultaneously tunes the navaids on its own side (one VOR, one DME, one ILS and one ADF). In these modes, the flight crew can also manually tune the VOR (and associated DME), ILS, and ADF.
- In single mode, the valid FMGC tunes navaids on both sides. The flight crew can also use the RAD NAV page to manually tune both VORs, both ADFs and the ILS.

Manual tuning has priority over automatic tuning.

Note: *If one radio receiver fails, both FMGCs use the operative radio receiver to compute the position of the aircraft.*

VOR

Applicable to: ALL

Each FMGC may tune only one VOR (manually or automatically).

Automatic tuning complies with the following priorities for tuning the VOR:

1. The specified navaid for the approach
2. The navaid that the flight crew should use to compute the current radio position
3. For display purposes:
   - A navaid specified for the active flight leg
   - The "TO" waypoint (TO WPT), if it is a navaid
   - The "FROM" waypoint (FROM WPT), if it is a navaid
   - A waypoint farther along the flight path, if it is a navaid
   - The navaid closest to the current position of the aircraft.

The scratchpad displays "SPECIFIC VOR-D UNAVAIL", if the VOR or the VOR/DME that the flight crew requires for tuning is deselected.

DME

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

Each FMGC automatically uses its five DME frequencies as follows:

- One DME frequency for display. It is possible to tune it manually or automatically.
- Two DME frequencies in DME/DME mode for calculating the radio position of the aircraft. The FMGC automatically tunes these as a function of their best accuracy. The flight crew does not receive any indication that this process is happening.
- One DME frequency automatically tuned for radio position. This occurs in the VOR/DME mode, when the DME/DME is not available and the flight crew complies with the conditions for a VOR/DME update. In this case, the VOR/DME that the flight crew uses for display, is identical to the VOR/DME navaid that the flight crew uses for computation of the radio position.
- One DME frequency is connected to the ILS/DME.

DME

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

Each FMGC automatically uses its four DME frequencies as follows:

- One DME frequency for display. It is possible to tune it manually or automatically. This DME frequency is also used for VOR/DME position computation.
- Two DME frequencies in DME/DME mode for calculating the radio position of the aircraft. The FMGC automatically tunes these as a function of their best accuracy. The flight crew does not receive any indication that this process is happening.
- One DME frequency is connected to the ILS/DME.

ADF

Applicable to: ALL

The FMGC automatically tunes one ADF, when the flight plan specifies a Non Directional Beacon (NDB) approach and a fix in the approach is the “TO” waypoint.
The scratchpad displays “SPECIFIC NDB UNAVAIL”, if the NDB that the flight crew requires for autotuning is deselected.

ILS

Applicable to: ALL

Each FMGC automatically tunes one ILS frequency:

- In the PREFLIGHT or TAKEOFF phase, when the takeoff runway has an associated ILS.
- In the CLIMB, CRUISE, DESCENT, APPROACH, or GO-AROUND phase, when the type of approach in the flight plan is ILS.

The scratchpad displays “RWY/ILS MISMATCH” when the flight crew manually tunes the ILS and the entered frequency does not agree with the ILS or the LOC IDENT/FREQ that the flight crew requests for automatic tuning. The FMGS logic does not enable the flight crew to modify the course of an ILS when its frequency is identical to the ILS selected in the F-PLN.

SELECTION OF NAVAIDS ON MCDU PAGES

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

The MCDU displays the navaids tuned by the FMGC on two pages:

- RADIO NAV Page
- SELECTED NAVAIDS Page.

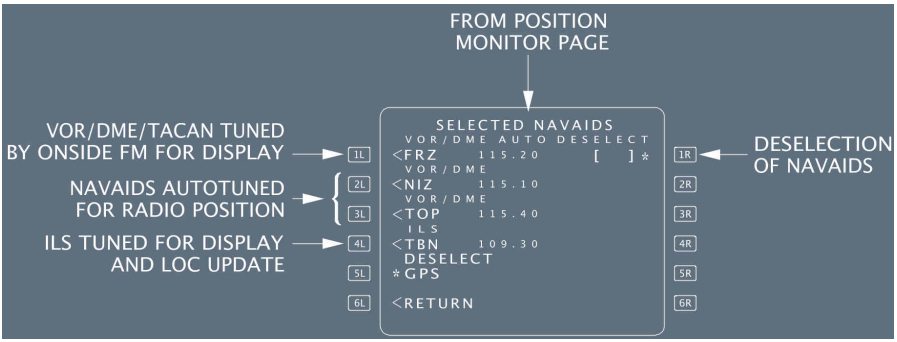
RADIO NAV PAGE

This page shows which navaids have been tuned automatically or manually for display purposes.



SELECTED NAVAIDS PAGE

This page lists the navaids tuned by the onside FMGC. No navaids can be modified on this page. The flight crew may deselect as many as six unreliable navaids for the whole flight (using 1R key).



SELECTION OF NAVAIDS ON MCDU PAGES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

The MCDU displays the navaids tuned by the FMGC on two pages:

- RADIO NAV Page
- SELECTED NAVAIDS Page.

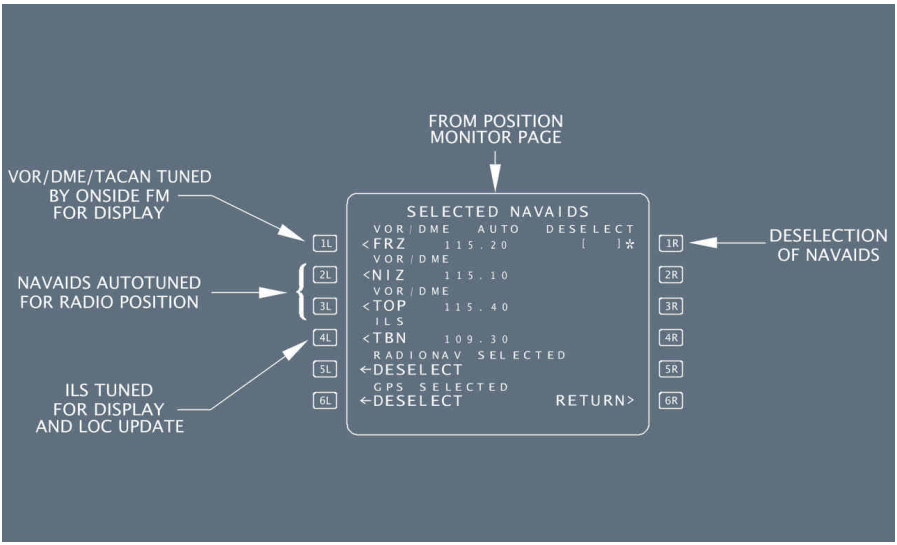
RADIO NAV PAGE

This page shows which navaids have been tuned automatically or manually for display purposes.



SELECTED NAVAIDS PAGE

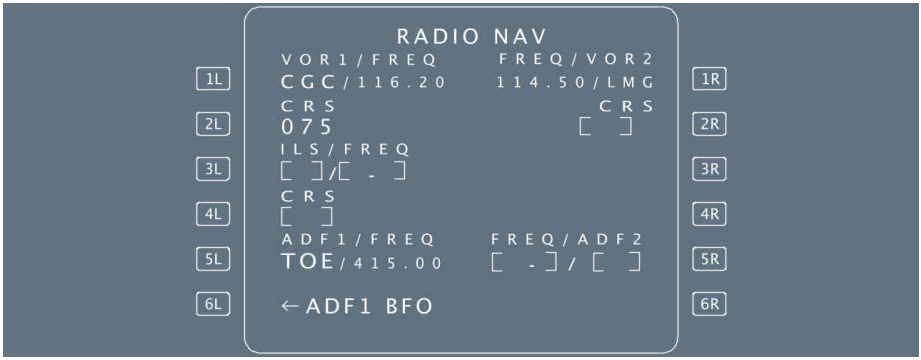
This page lists the navaids tuned by the onside FMGC. No navaids can be modified on this page. The flight crew may deselect as many as four unreliable navaids for the whole flight (using 1R key, or deselect them all, using 5L key).



MANUAL TUNING

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

1 WRITE the identifier on the RADIO NAV page.
Preferably use the identifier.



- **If the MCDU displays "NOT IN DATA BASE":**

  WRITE the frequency.

  DISREGARD the ident that appears in small font on the MCDU.

  When a frequency is entered in the VOR field, the FMGC automatically associates to the tuned frequency the closest navaid identifier with the same frequency, and displays it on the RAD NAV page. This identifier may not correspond to the tuned navaid.
  If the closest navaid, found in the database, is of a different type (e.g. VOR instead of VOR/DME), the flight crew will obtain a partial tuning (e.g. VOR indication instead of VOR/DME indication).

  ENTER the course.

  If the flight crew intends to manually tune an ILS that is not in the Navigation Database or to manually tune an ILS by its frequency (ident not entered), and if they do not enter the course, the flight crew will not be able to arm approach modes.

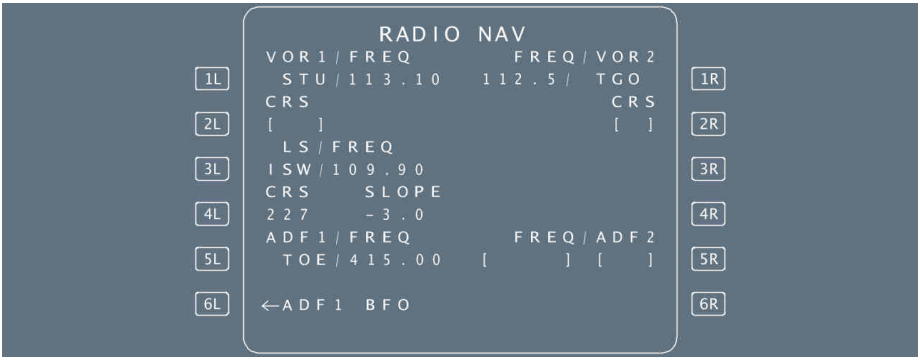
MANUAL TUNING

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

2

WRITE the identifier on the RADIO NAV page.

Preferably use the identifier.



- **If the MCDU displays "NOT IN DATA BASE":**

  WRITE the frequency.

  DISREGARD the ident that appears in small font on the MCDU.

  When a frequency is entered in the VOR field, the FMGC automatically associates to the tuned frequency the closest navaid identifier with the same frequency, and displays it on the RAD NAV page. This identifier may not correspond to the tuned navaid.
  If the closest navaid, found in the database, is of a different type (e.g. VOR instead of VOR/DME), the flight crew will obtain a partial tuning (e.g. VOR indication instead of VOR/DME indication).

  ENTER the course.

  If the flight crew intends to manually tune an ILS that is not in the Navigation Database or to manually tune an ILS by its frequency (ident not entered), and if they do not enter the course, the flight crew will not be able to arm approach modes.

NAVAID IDENTIFICATION

Applicable to: ALL

CHECK the ILS identifier decoding on the PFD, and the VOR or ADF identifier on the ND.

When the navaid identifier is decoded in agreement with that published, no audio check is necessary. When the decoding is different from the published one, check the audio. Due to morse coding inaccuracy, wrong decoding may sometimes occur.

Note: When a DME or a TACAN only is selected using either its identifier or its frequency, the NDs do not display the decoded indication.

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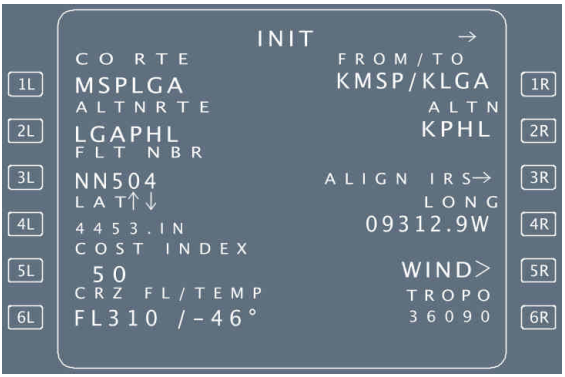
ALIGNMENT OF INERTIAL REFERENCE SYSTEM

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The FMGS uses the reference point coordinates of the departure airport to align the IRS.
It calls these up from the database automatically after the flight crew has entered a company route or an origin-destination city pair and pressed the ALIGN IRS key on the MCDU. The flight crew can adjust these coordinates manually to the gate position. A normal alignment takes 10 min, a fast alignment 30 s.
Fast alignment is used to refine a position when time is limited.



Note: *If "ALIGN" flashes on the ADIRS overhead CDU during the alignment process, it indicates one of the following:*

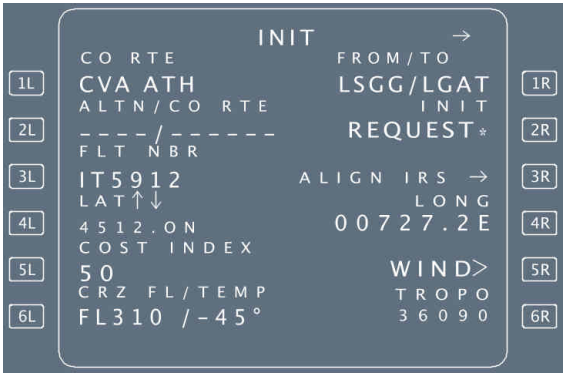
- *It has detected excessive motion. (It automatically restarts the alignment)*
- *It has detected a disagreement between the position the MCDU has sent to the IRS, and the last memorized IRS position. The flight crew must enter new coordinates in the MCDU, and realign the IRS*
- *It has detected a disagreement between the latitude the MCDU has sent to the IRS, and the latitude the IRS has computed during the alignment*
- *The IRS has not received a position from the MCDU or the ADIRS overhead CDU.*

ALIGNMENT OF INERTIAL REFERENCE SYSTEM

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTG, B-HTH, B-HTI

The FMGS uses the reference point coordinates of the departure airport to align the IRS.
It calls these up from the database automatically after the flight crew has entered a company route or an origin-destination city pair and pressed the ALIGN IRS key on the MCDU. The flight crew can adjust these coordinates manually to the gate position. A normal alignment takes 10 min, a fast alignment 30 s.

Fast alignment is used to refine a position when time is limited.



Note: *If "ALIGN" flashes on the ADIRS overhead CDU during the alignment process, it indicates one of the following:*

- *It has detected excessive motion. (It automatically restarts the alignment)*
- *It has detected a disagreement between the position the MCDU has sent to the IRS, and the last memorized IRS position. The flight crew must enter new coordinates in the MCDU, and realign the IRS*
- *It has detected a disagreement between the latitude the MCDU has sent to the IRS, and the latitude the IRS has computed during the alignment*
- *The IRS has not received a position from the MCDU or the ADIRS overhead CDU.*

ALIGNMENT OF INERTIAL REFERENCE SYSTEM

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The FMGS uses the reference point coordinates of the departure airport to align the IRS.
It calls these up from the database automatically after the flight crew has entered a company route or an origin-destination city pair and pressed the ALIGN IRS key on the MCDU. The flight crew can adjust these coordinates manually to the gate position. A normal alignment takes 10 min, a fast alignment 30 s.
Fast alignment is used to refine a position when time is limited.



Note: *If the "IRS IN ALIGN" memo flashes on the E/WD during the alignment process, it indicates one of the following:*

- *It has detected excessive motion. (It automatically restarts the alignment)*
- *It has detected a disagreement between the position the MCDU has sent to the IRS, and the last memorized IRS position. The flight crew must enter new coordinates in the MCDU, and realign the IRS*
- *It has detected a disagreement between the latitude the MCDU has sent to the IRS, and the latitude the IRS has computed during the alignment*
- *The IRS has not received a position from the MCDU .*

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GENERAL

Applicable to: ALL

Overall navigation performance is mainly based on two elements:
- The accuracy of the aircraft position calculation
- The validity of the flight path definition, as extracted from the navigation database.

The level of validation depends on the type of operations. For example, JAA TGL 10 requires that, for Precision RNAV in terminal area, providers and operators implement a quality assurance program for the navigation database, which may include a navigation database validation process. The highest level of validation is required for RNAV approach, with lateral and vertical navigation.
The navigation databases are revised every 28 days (ARINC cycle). Flights should be conducted with a navigation database that is within its cycle. This should be checked on the AIRCRAFT STATUS MCDU page.

OPERATIONS WITH AN OUTDATED NAVIGATION DATABASE

Applicable to: ALL

Airbus recommends flying with an updated navigation database. However, in exceptional circumstances, and for a limited period of time, an aircraft can continue to operate beyond the end data of the database cycle, provided it is approved by the national authorities.

The following precautions need to be considered:
- Prior to flight, identify recent changes on the intended route, with the navigation charts and manuals. Some “strategic” new waypoints, not in the navigation database, may be worth entering as DEFINED WAYPOINT on MCDU.

  Note: *Flying with an outdated database, in an airspace that was recently restructured with numerous new waypoints, should be avoided.*

- Check SID, STAR, and approach procedures of departure, destination and required alternates for recent changes.
  Do not attempt to modify or manually construct terminal instrument procedures or approaches.
- Fly terminal instrument procedures and approaches with managed guidance, that are in the navigation database and that have been checked for accuracy. Otherwise, fly the procedure, or the approach, in selected guidance with conventional radio navaid raw data.

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FLIGHT PLANNING

Applicable to: ALL

The flight crew uses the MCDU to insert flight plans into the FMGS:
- A lateral flight plan that defines the intended horizontal flight path
- A vertical flight plan that defines the intended speed and altitude profile for the aircraft to follow while flying the lateral flight plan.

Note: The flight planning function is available for both the primary and secondary flight plans.

The FMGS can contain two different flight plans:
- The ACTIVE flight plan, which is the basis for:
  - Lateral and vertical guidance
  - MCDU and ND display
  - Radio navigation autotuning
  - Performance predictions
  - Fuel planning.
- The SECONDARY flight plan which the flight crew may use:
  - When an alternate takeoff runway is probable
  - To plan a diversion
  - To prepare the next flight
  - To compare predictions or evaluations.

Each flight plan is composed of the same elements:
- The primary flight plan, from origin to destination and missed approach
- The alternate flight plan, from destination to alternate destination.

The flight crew enters the flight plan in either of two ways:
- Automatically by selecting a company route. Such a selection will call all the elements of the route out of the database.
- Manually by selecting an ORIGIN/DEST pair, and then selecting all successive waypoints, procedures, and vertical constraints on the MCDU.

The flight crew may then modify the flight plan on the ground or in flight, by making lateral and vertical revisions.

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General

GENERAL

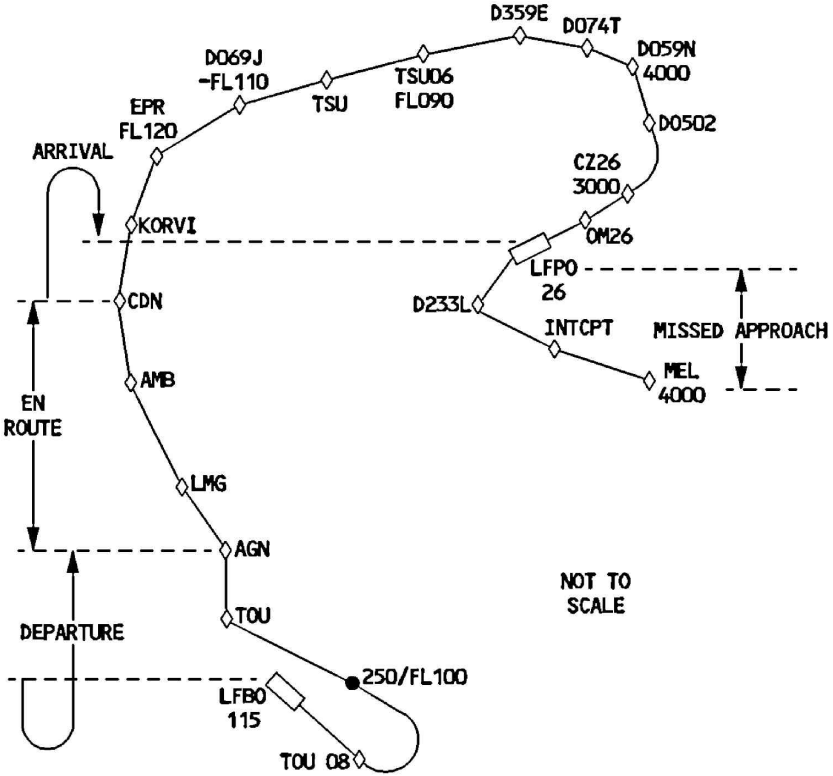
Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

To insert the lateral flight plan, the flight crew can use either a company route number or an ICAO four-letter city pair.

The lateral flight plan includes the following elements:

- Departure
  - Takeoff runway
  - SID
  - En route transition.
- En route
  - En route waypoints and airways.
- Arrival
  - En route transition
  - STARs/VIAs
  - Landing runway with selected approach
  - Missed approach.
- Alternate flight plan.

These elements are defined by waypoints and legs between the waypoints.



The FMGC automatically strings the legs in sequence.
The flight plan has a discontinuity if any two waypoints do not have a leg defined between them.
The computer assumes that the aircraft will fly a direct leg between the two waypoints that define the discontinuity.

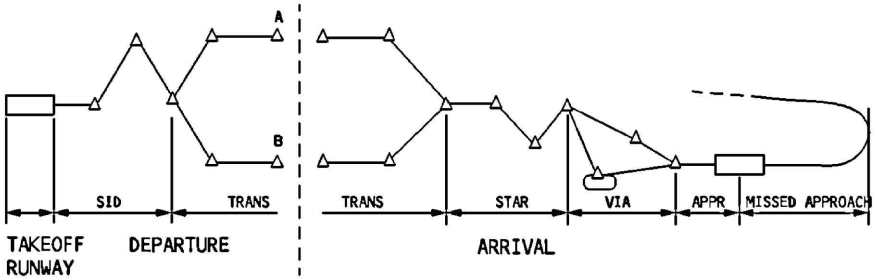
Note: *1. When the aircraft overflies a flight plan discontinuity, the NAV mode automatically reverts to the HDG (TRK) mode.*

2. In HDG/TRK mode, a waypoint is sequenced when it passes behind the aircraft, and the aircraft is less than 7 nm from it, and also when the difference between the track of the aircraft and the track of the leg is less than 90 °.
If the aircraft is flying a discontinuity towards a waypoint, this waypoint is sequenced when the aircraft is less than 5 nm from it.
The same conditions apply in NAV mode, except that no distance to the waypoint is taken into account.

The FMGS automatically strings additional types of legs, when departure or arrival procedures (SID - STAR - TRANS) are defined.

Those strings correspond to specific patterns that are heading or track referenced and are defined in the database, such as:
- DME arc leg
- Holding pattern to a fix, or reverse turn
- Course-to-fix leg
- Heading leg
- MANUAL leg.

The flight crew cannot create these types of legs: They are part of the stored departure/arrival procedures they have selected.
The flight crew can only create direct legs between manually defined geographic points (navaids, airports, waypoints).



Note: *The departure and arrival procedures are defined in the database to minimize the amount of memory required.*

They are divided, as follows:
- *DEPARTURE = SID + EN ROUTE TRANSITION*
- *ARRIVAL = APPR VIA + STAR + EN ROUTE TRANSITION*

The SID is the central common part of the departure procedure, as the STAR is of the arrival procedure. Enroute transitions (TRANS) are the various possible trajectories defined between the last SID point and the first enroute waypoints, and between the last enroute waypoint and the first fix of the STAR . "APPR VIAs" are the possible trajectories, defined between the last STAR point and the first point of the approach.

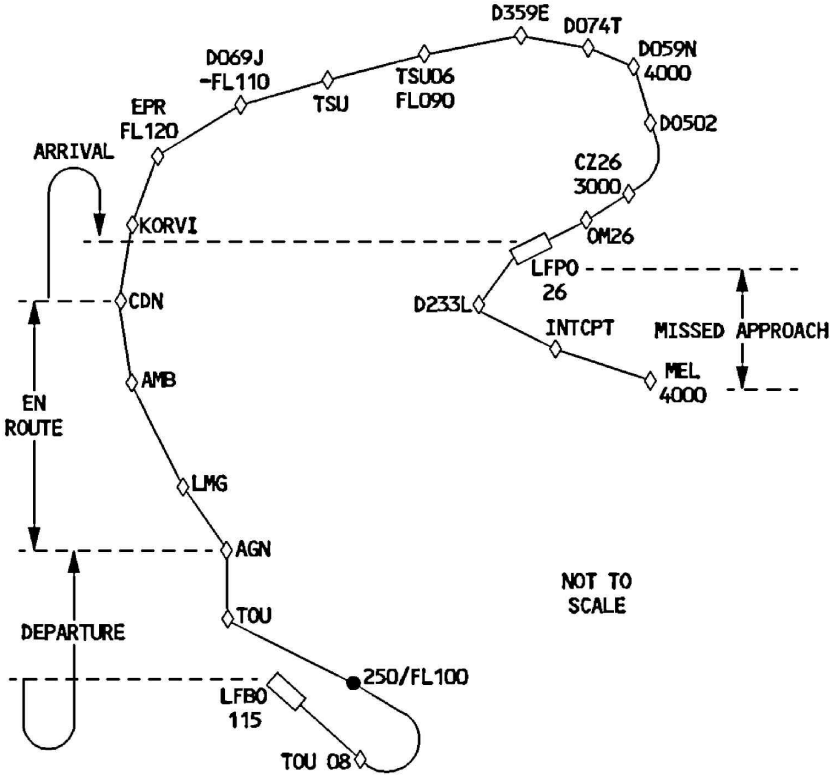
GENERAL

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

To insert the lateral flight plan, the flight crew can use either a company route number or an ICAO four-letter city pair.

The lateral flight plan includes the following elements:
- Departure
  - Takeoff runway
  - SID
  - En route transition.
- En route
  - En route waypoints and airways.
- Arrival
  - En route transition
  - STARs/VIAs
  - Landing runway with selected approach
  - Missed approach.
- Alternate flight plan.

These elements are defined by waypoints and legs between the waypoints.



The FMGC automatically strings the legs in sequence.
The flight plan has a discontinuity if any two waypoints do not have a leg defined between them.
The computer assumes that the aircraft will fly a direct leg between the two waypoints that define the discontinuity.

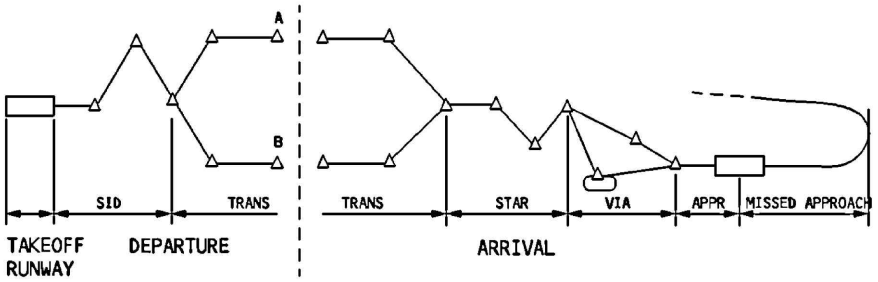
Note: *1. When the aircraft overflies a flight plan discontinuity, the NAV mode automatically reverts to the HDG (TRK) mode.*

2. In HDG/TRK mode, a waypoint is sequenced when it passes behind the aircraft, and the aircraft is less than 7 nm from it, and also when the difference between the track of the aircraft and the track of the leg is less than 90 °.
If the aircraft is flying a discontinuity towards a waypoint, this waypoint is sequenced when the aircraft is less than 5 nm from it.
The same conditions apply in NAV mode, except that no distance to the waypoint is taken into account.

The FMGS automatically strings additional types of legs, when departure or arrival procedures (SID - STAR - TRANS) are defined.

Those strings correspond to specific patterns that are heading or track referenced and are defined in the database, such as:
- DME arc leg
- Holding pattern to a fix, or reverse turn
- Course-to-fix leg
- Radius-to-fix leg
- Heading leg
- MANUAL leg.

The flight crew cannot create these types of legs: They are part of the stored departure/arrival procedures they have selected.
The flight crew can only create direct legs between manually defined geographic points (navaids, airports, waypoints).



Note: The departure and arrival procedures are defined in the database to minimize the amount of memory required.

They are divided, as follows:
- *DEPARTURE = SID + EN ROUTE TRANSITION*
- *ARRIVAL = APPR VIA + STAR + EN ROUTE TRANSITION*

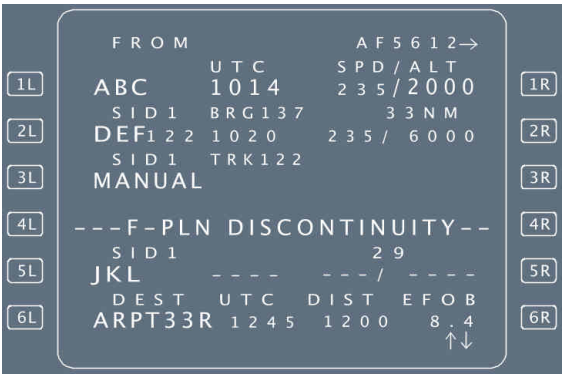
The SID is the central common part of the departure procedure, as the STAR is of the arrival procedure. Enroute transitions (TRANS) are the various possible trajectories defined between the last SID point and the first enroute waypoints, and between the last enroute waypoint and the first fix of the STAR . "APPR VIAs" are the possible trajectories, defined between the last STAR point and the first point of the approach.

MANUAL LEGS

Applicable to: ALL

A MANUAL leg stays on a constant TRK or HDG and has no termination point. The flight crew cannot insert it into a flight plan manually: it is part of a given procedure such as a SID or a STAR. When the aircraft is flying a MANUAL leg, the NAV mode remains engaged and predictions assume that the aircraft will fly a direct leg from its present position to the next waypoint (DIR TO). When the aircraft is cleared to fly to the next waypoint of the flight plan, the flight crew performs a DIR TO.

Note: 1. In NAV mode, a MANUAL leg is sequenced only by performing a DIR TO.
2. The use of the descent mode (DES) on a MANUAL leg is not recommended.



FLIGHT PLAN CONSTRUCTION

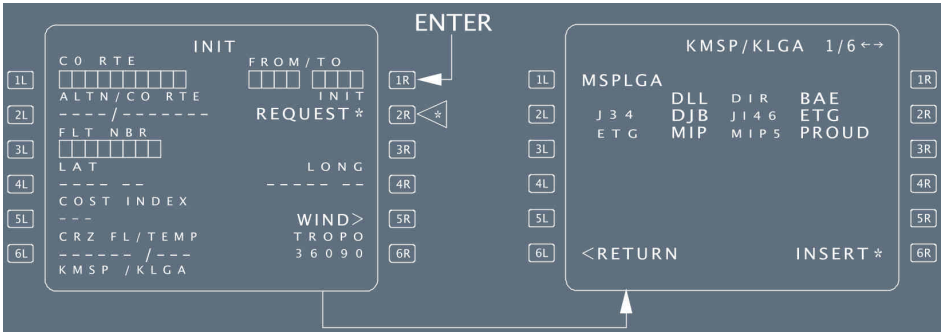
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

There are three ways of defining the route:

1. A company route, that is in the database, and is known by the flight crew.
   The flight crew enters the name of the CO RTE into the [1L] field of the INIT A page. This action enters all the elements of the flight plan. The database usually includes an alternate route associated with the destination.



2. A company route, that is in the database, but the flight crew does not know it is there.
   The flight crew enters a city pair in the [1R] field. The ROUTE SELECTION page automatically appears and enables the flight crew to review all stored routes between the two cities before selecting one of them.



3. There is no company route between the two cities.
   The flight crew enters the city pair in the [1R] field. The ROUTE SELECTION page appears and displays “NONE”.
   The flight crew has to manually construct the entire flight plan.

For procedure, *Refer to PRO-NOR-SRP-01-10 Flight Plan Initialization - General.*

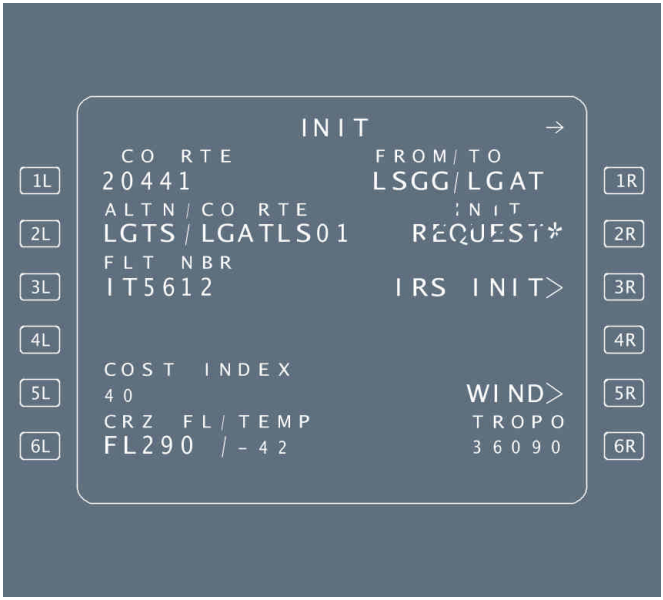
FLIGHT PLAN CONSTRUCTION

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

1

There are three ways of defining the route:

1. A company route, that is in the database, and is known by the flight crew.
   The flight crew enters the name of the CO RTE into the [1L] field of the INIT A page. This action enters all the elements of the flight plan. The database usually includes an alternate route associated with the destination.



2. A company route, that is in the database, but the flight crew does not know it is there.
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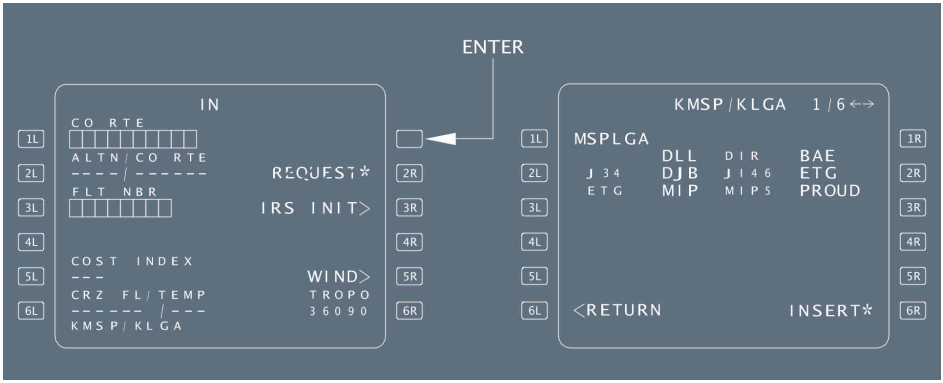


3. There is no company route between the two cities.
   The flight crew enters the city pair in the [1R] field. The ROUTE SELECTION page appears and displays “NONE”.
   The flight crew has to manually construct the entire flight plan.
   For procedure, *Refer to PRO-NOR-SRP-01-10 Flight Plan Initialization - General*.

FLIGHT PLAN CAPACITY

Applicable to: ALL

In terms of flight plan capacity, the FMS takes into account 3 flight plans:
- The active flight plan
- The secondary flight plan
- The temporary flight plan.

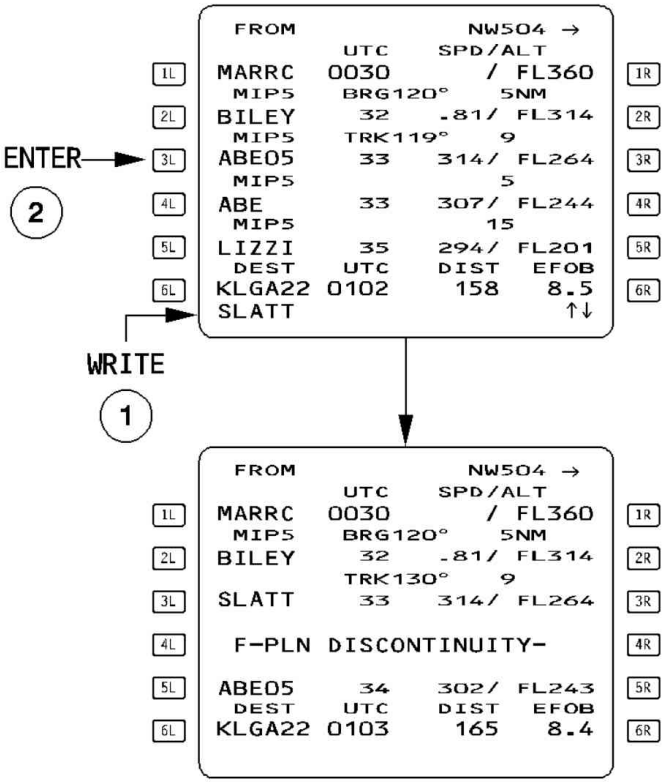
Each flight plan can contain up to 200 legs. If a flight plan contains 200 legs, and if the flight crew attempts to perform a lateral revision that increases the number of legs of this flight plan, the FMS rejects the revision and the MCDU displays the “F-PLN FULL” message. For the active and secondary flight plans, the primary parts must contain less than 135 legs, and the alternate parts must contain lesgs than 65 legs.

LATERAL REVISIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The flight crew can revise the lateral flight plan following two types of revisions:

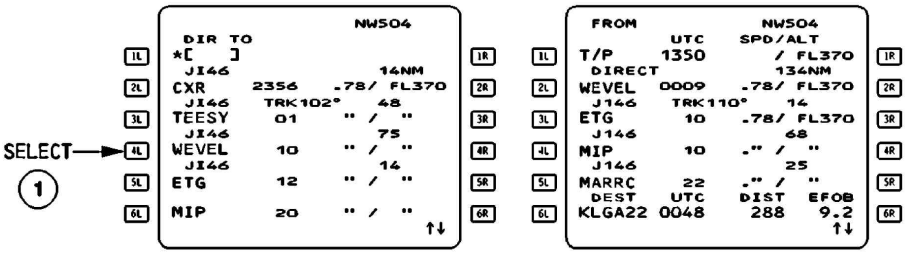
1. Lateral revisions that have an immediate effect on the active flight plan:
   - The flight crew inserts a new waypoint directly on the F-PLN page, deletes, or changes a waypoint from it:



When the flight crew enters a new waypoint, which does not exist in the flight plan, the following waypoint moves down the flight plan, with a discontinuity shown after the new waypoint.

   - The flight crew adds a direct leg (DIR TO) from his present position to a selected waypoint:

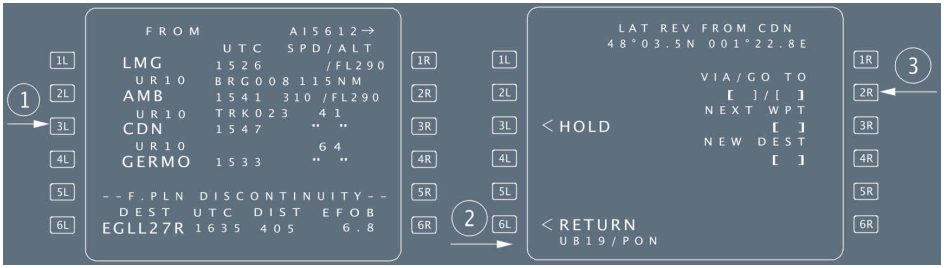
The flight crew can change the “TO” waypoint of the active leg. The active leg then goes from present position (T/P) to the waypoint selected or inserted as the new “TO” waypoint.



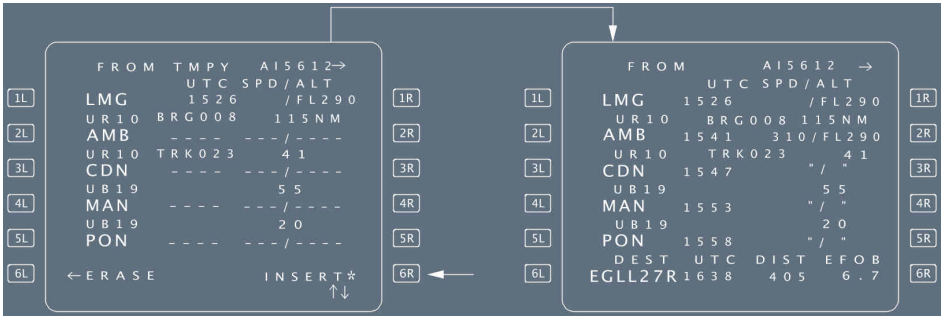
2. Lateral revisions that lead to a temporary flight plan (TMPY) before they take effect:
The flight crew creates a temporary flight plan, then inserts it as a revision to the active flight plan. The flight crew does this when selecting, deleting, or modifying several waypoints of an airway or procedure at once (SID, STAR, HOLD, TAKEOFF or LANDING RWY). This modification is made on specific “LAT REV”pages from the flight plan page.

Possible revisions are:
- Insert or modify the departure procedure
- Insert or modify the arrival procedure
- Insert a waypoint
- Change the destination
- Insert an airway
- Insert an offset
- Insert a holding pattern
- Select or enable an alternate flight plan.

The purpose of the temporary flight plan is to allow the flight crew to review the revision on the MCDU and on the ND before inserting it into the active flight plan.
It is a copy of the active flight plan that has been changed according to the flight crew revision. While it is displayed, the aircraft will continue to follow the original active flight plan. As long as there is a temporary flight plan, the flight crew cannot make revisions on the secondary flight plan. No predictions are computed or displayed on the pages of the temporary flight plan.



A temporary flight plan is displayed for a check and/or new modification. Inserting the temporary revision will modify the active flight plan.

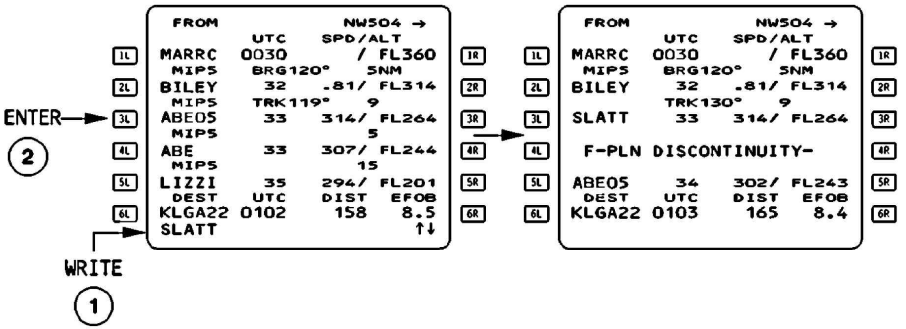


LATERAL REVISIONS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

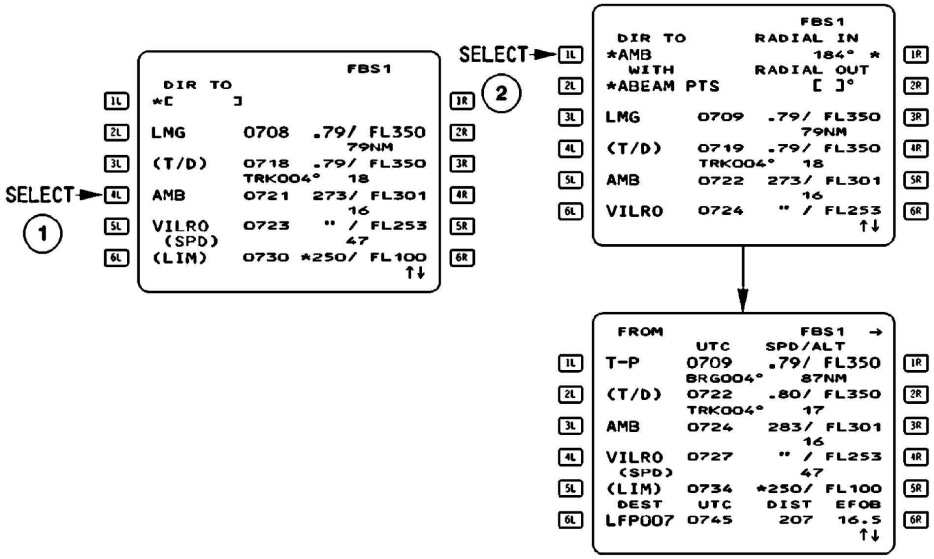
The flight crew can revise the lateral flight plan following two types of revisions:

1. Lateral revisions that have an immediate effect on the active flight plan:
   - The flight crew inserts a new waypoint directly on the F-PLN page, deletes, or changes a waypoint from it:



When the flight crew enters a new waypoint, which does not exist in the flight plan, the following waypoint moves down the flight plan, with a discontinuity shown after the new waypoint.

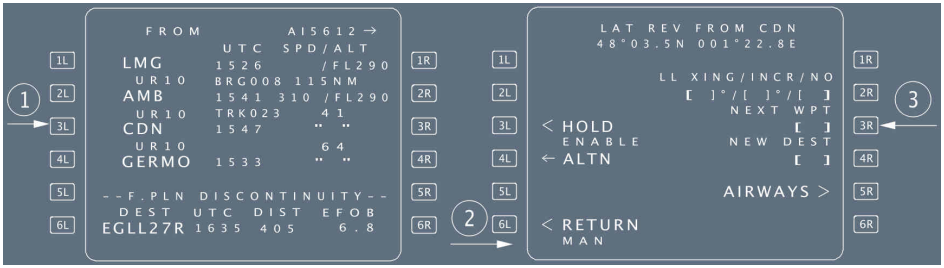
   - The flight crew adds a direct leg (DIR TO) from his present position to a selected waypoint: The flight crew can change the “TO” waypoint of the active leg. The DIR TO function gives access to DIR TO, DIR TO ABEAM, or DIR TO/INTERCEPT. The active leg then goes from the present position (T/P) to the waypoint selected or inserted as the new “TO” waypoint.



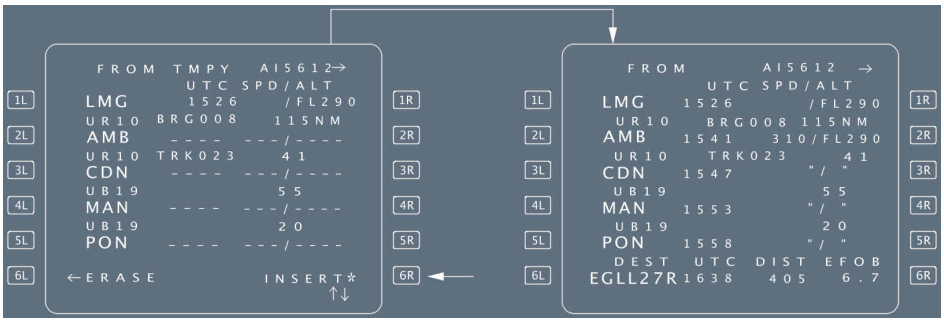
2. Lateral revisions that lead to a temporary flight plan (TMPY) before they take effect:
   The flight crew creates a temporary flight plan, then inserts it as a revision to the active flight plan. The flight crew does this when selecting, deleting, or modifying several waypoints of an airway or procedure at once (SID, STAR, HOLD, TAKEOFF or LANDING RWY). This modification is made on specific “LAT REV”pages from the flight plan page.

   Possible revisions are:
   - Insert or modify the departure procedure
   - Insert or modify the arrival procedure
   - Insert a waypoint
   - Change the destination
   - Insert an airway
   - Insert an offset
   - Insert a holding pattern
   - Select or enable an alternate flight plan
   - Fix information.

   The purpose of the temporary flight plan is to allow the flight crew to check a revision on the MCDU and on the ND before inserting the changes into the active flight plan. It is a copy of the active flight plan that has been changed according to the flight crew revision. While it is displayed, the aircraft will continue to follow the original active flight plan.
   No predictions are computed or displayed on the pages of the temporary flight plan.



A temporary flight plan is displayed for a check and/or new modification. Inserting the temporary revision will modify the active flight plan.



FMS LEGACY

GENERAL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The lateral revision function allows the pilot to create or modify the following parts of the flight plan:

- airway
- waypoint
- new destination
- holding pattern
- offset
- alternate

  Each time the pilot activates one the revisions listed above, he accesses to a temporary flight plan that allows to check the modification before inserting it in the active flight plan. The pilot selects these functions by pressing the left line select key on F-PLN A or B
- Direct to and overfly functions are accessed through MCDU keys. No temporary flight plan is created with these functions
- “Update at” capability is a specific function that manually update the FM position. It does not use a temporary flight plan, but the crew must confirm the insertion before it is activated.

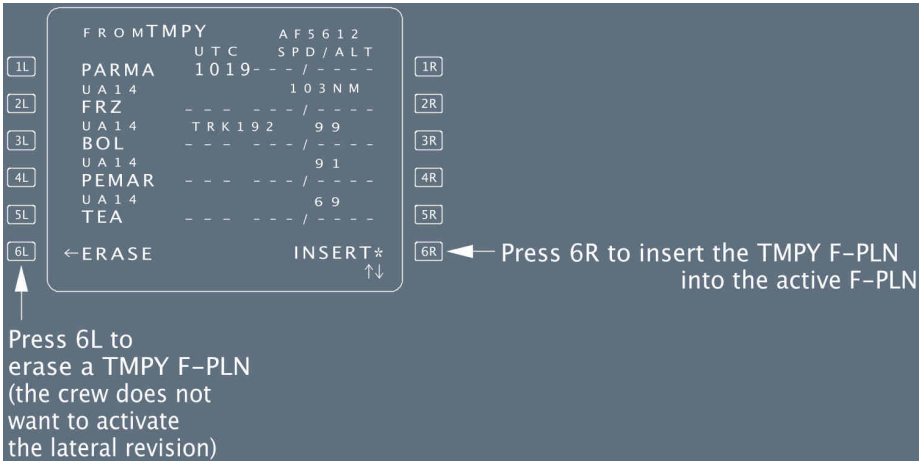
TEMPORARY F-PLN (TMPY)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

When a pilot makes a lateral revision to the F-PLN, the FMGS creates a temporary flight plan. This is a copy of the active F-PLN, but is corrected by the lateral revision in progress.
The aircraft continues to follow the active F-PLN until the temporary revision is inserted.

The revision appears in yellow characters on both MCDUs and NDs.

- Lateral and vertical revisions cannot be made to a temporary F-PLN
- Only one temporary F-PLN may be accessed at a time
- The “DIRECT TO”function, when used, erases a temporary F-PLN
- When a DIR TO is in process, a temporary revision cannot be displayed on the other MCDU
- A TMPY F-PLN changes the title of the flight plan pages. (TMPY appears in all titles)
- No predictions are computed for a temporary flight plan (Dashes are displayed).

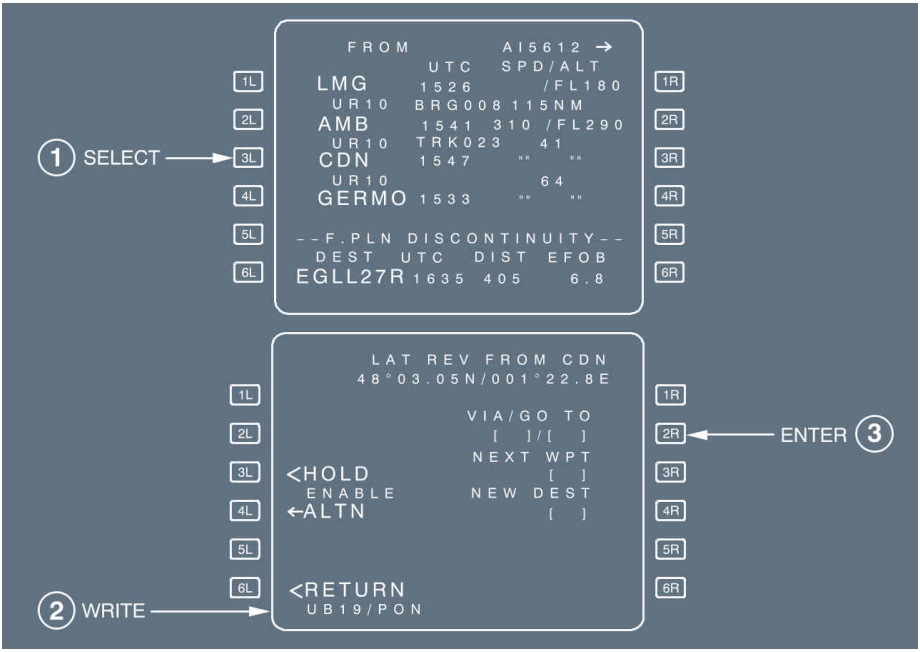


Temporary data are displayed first in yellow (ND and MCDU). Once inserted they become active and are displayed in green.

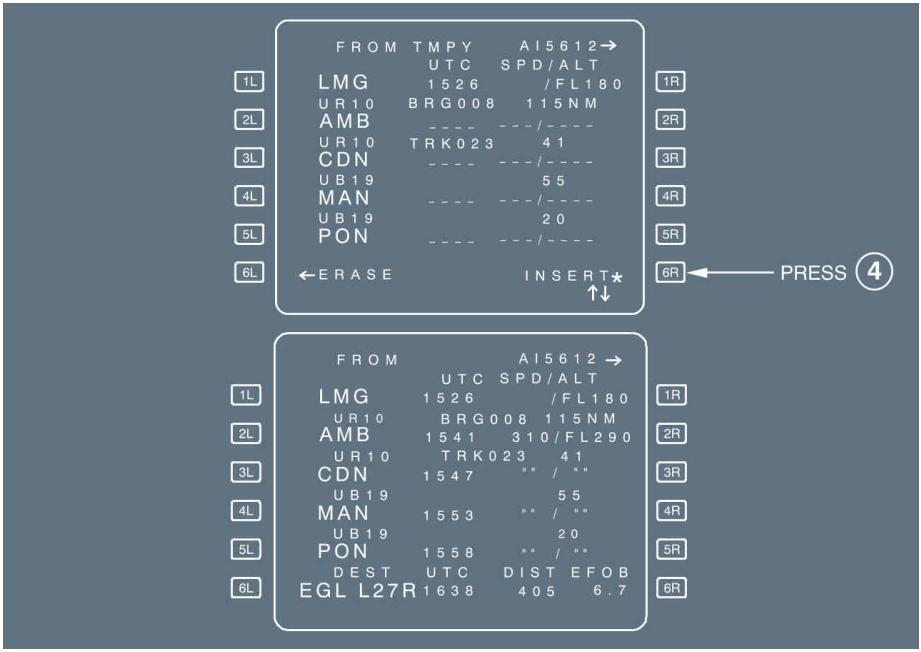
INSERTING AN AIRWAY WITH "VIA/GO TO"

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

1 The pilot can insert into the active flight plan, an airway going from a revised waypoint to another waypoint. If the end waypoint belongs to the active flight plan, the computer does the stringing automatically. If the end waypoint does not belong to the flight plan, the computer leaves a discontinuity between this waypoint and those farther along the active flight plan.



2 SELECT the revised waypoint (here CDN).
WRITE the airway and the ending waypoint in the scratchpad (here UB19/PON).
PRESS [2R] to insert the airway and ending waypoint into the VIA/GO TO field.
The MCDU displays TMPY in yellow and lists the waypoints en route to the ending waypoint.
PRESS [6R] to insert the temporary flight plan. Clear the flight plan discontinuity as necessary.



Note: *1. If the revised waypoint or the end waypoint does not belong to the airway, the MCDU displays the message "AWY/WPT MISMATCH".*

2. If two waypoints with the same ident belong to the same airway, the DUPLICATE NAMES page will not be called and the system selects the first one in the database.

INSERTING A WAYPOINT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The pilot can insert waypoints by two methods:

- directly into the flight plan. All modifications go directly into the active flight plan. No temporary flight plan is created
- by means of a lateral-revision "NEXT WAYPOINT", a process that creates a temporary flight plan.

The second method allows to check the temporary flight plan before inserting it.

WAYPOINT IDENTIFICATION

The pilot can identify a waypoint by:

- Its identifier (if it is in the navigation data base)
- A Latitude/Longitude (LL)

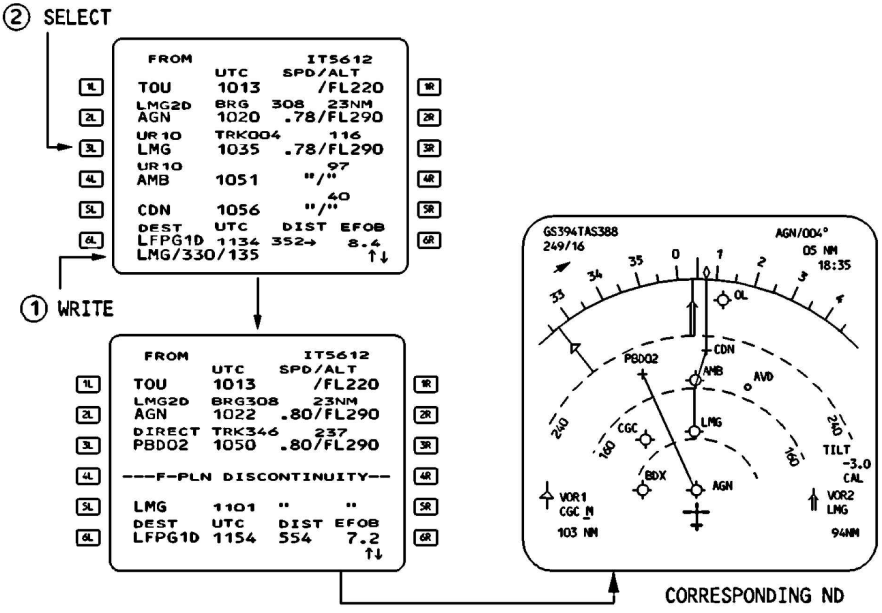
- A Place/Bearing/Distance (PBD)
- A Place-Bearing/Place-Bearing (PBX)

Note: If a slash or a dash is not entered properly, the Multifunction Control and Display Unit displays a "FORMAT ERROR" message.

When the Flight Management Guidance System receives a waypoint not in the data base, it identifies it as LLxx or PBD xx or PBX xx (xx is a two-digit number between 01 and 20) and stores it in the stored waypoints file of the data base.

Note: When NAV mode is engaged, the crew cannot modify the "TO"waypoint (active leg) using the waypoint insertion function. If the crew wants to modify it, it will use the DIR TO function.

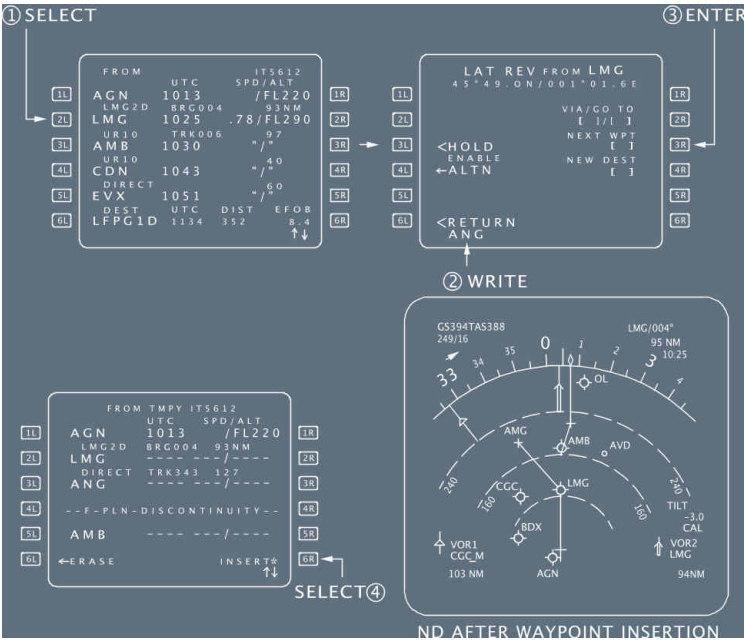
WAYPOINT INSERTED DIRECTLY IN THE FLIGHT PLAN



WRITE the waypoint identifier or LAT/LONG, Place/Bearing/Distance or Place-Bearing/Place-Bearing into the scratchpad. (Example: Place: LMG, Bearing: 330 °, Distance: 135 nm)
PRESS the appropriate key to enter the waypoint into the flight plan. The rule is that the new waypoint appears next to the pressed key, and the previous waypoint moves down the flight plan path.

This operation creates a discontinuity between the new waypoint and the previous one.
The new flight plan will have to be cleared of the discontinuity and some waypoints erased.

WAYPOINT INSERTED THROUGH THE USE OF "NEXT WAYPOINT"



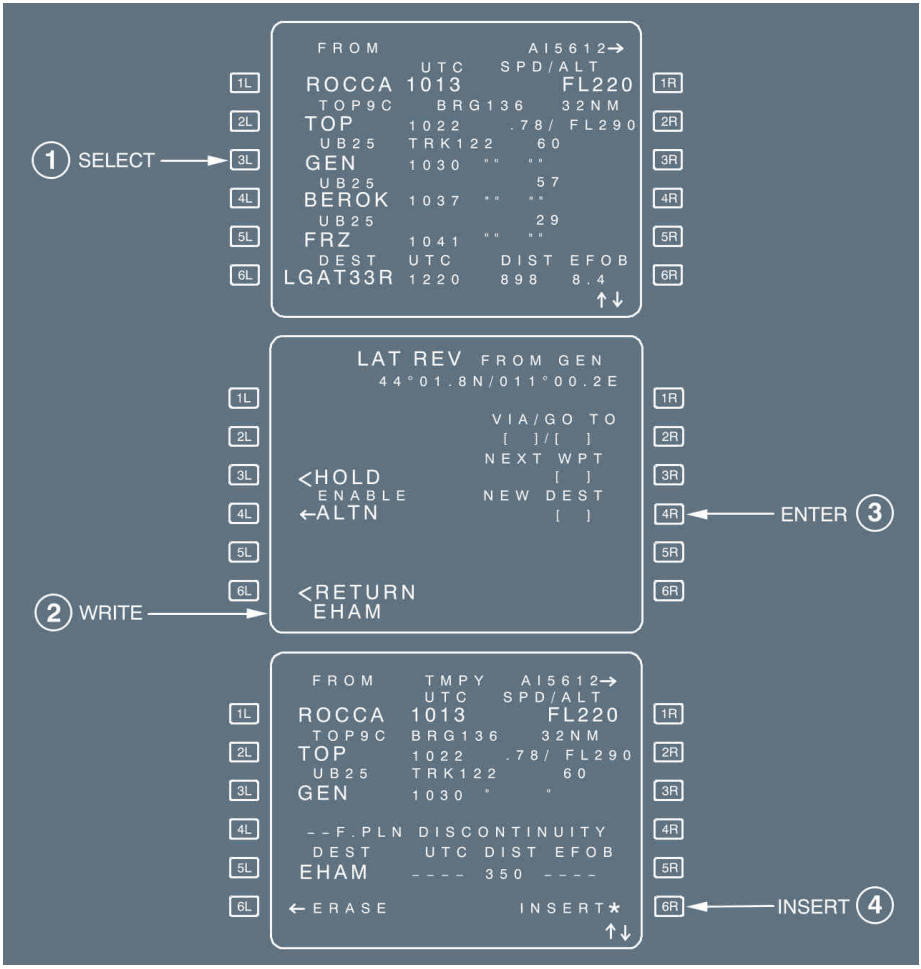
SELECT the lateral revision (LAT REV) function at an appropriate waypoint.
WRITE the waypoint identifier, or LAT/LONG, or Place/Bearing/Distance, or Place-Bearing/Place-Bearing into the scratchpad.
ENTER it in the brackets under NEXT WPT (next waypoint).
INSERT the temporary flight plan by depressing the [6R] key.
CLEAR the F-PLN discontinuity as appropriate.

INSERTING A NEW DESTINATION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The pilot may define a new destination and insert it through the lateral revision page. The pilot may then call up the new destination from any waypoint along the flight plan except the FROM waypoint, the destination, and the missed-approach waypoint. When the new destination has been inserted, a flight plan discontinuity appears between the revision waypoint and the new destination. All waypoints beyond the revision waypoint (including the previous destination and associated missed approach) are deleted.

3



SELECT the lateral revision function at an appropriate waypoint.
WRITE the new destination in the scratchpad.
ENTER it in the brackets under NEW DEST
INSERT the temporary flight plan [6R] key, and complete the flight plan to the new destination.

HOLDING PATTERN

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

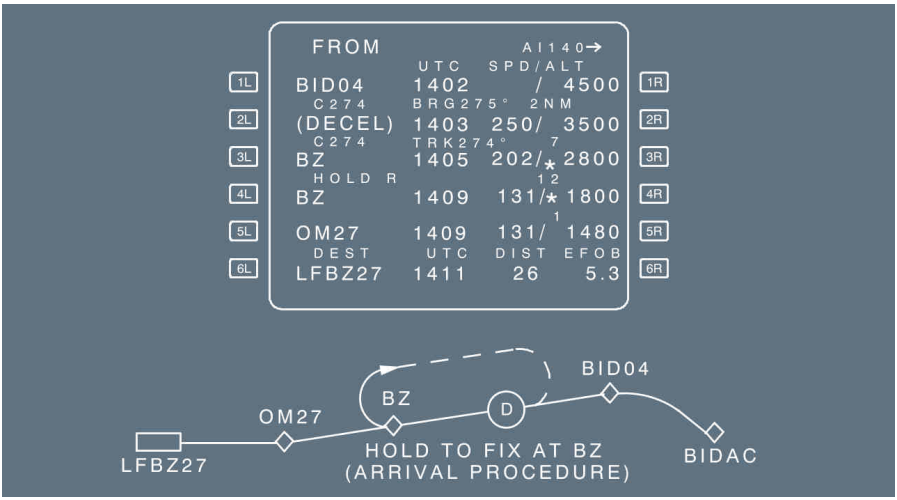
Holding pattern description, associated guidance and flight crew procedures are put together in this chapter.

The flight management and guidance computer (FMGC) has three types of holding pattern that the pilot can use in a flight plan.

4 HOLD TO FIX (HF)

The holding pattern is always part of an arrival or departure procedure. The aircraft flies it once and then exits the holding pattern automatically at the fix. The predicted speed in the holding pattern is the lowest of ICAO speed limit, max endurance speed, or any speed constraint.

Guidance to the fix in the holding pattern is similar to that on any leg of a flight plan. The HF patterns are part of the navigation database and cannot be created by the crew.



5 HOLD TO ALTITUDE (HA)

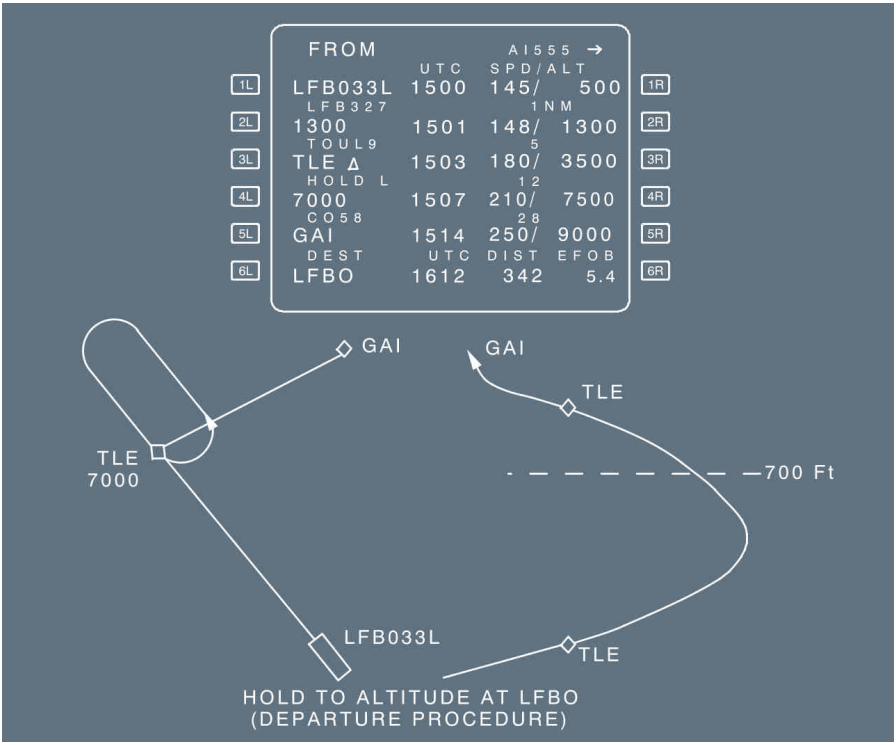
The HAs are in the navigation database as part of arrival or departure procedures and cannot be created by the crew.

The aircraft flies the hold until it reaches the specified altitude. Then it exits the hold automatically at the fix.

The predicted speed for the holding pattern is the lowest of the ICAO speed limits, the max endurance speed or any speed constraint.

The size of the holding pattern is a function of the predicted speed.

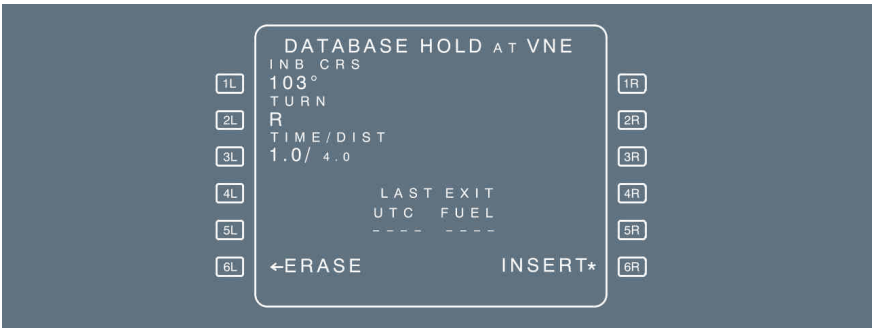
Guidance in a hold to altitude (HA) is similar to that for any leg of a flight plan.



6 **HOLD WITH MANUAL TERMINATION (HM)**

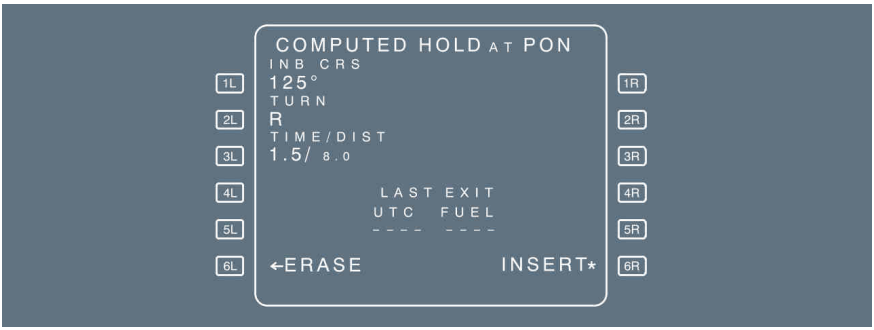
This type of holding pattern may be part of an arrival procedure, or the flight crew may enter it at present position or at any flight plan waypoint.
The pilot will use this type of holding pattern to comply with a defined procedure or a clearance limit or to meet an operational need (such as losing altitude, holding for weather improvement, or absorbing an ATC delay).
This type of holding pattern is exited under pilot decision and not automatically.
There are 3 types of HM, all are modifiable.

DATABASE HOLD



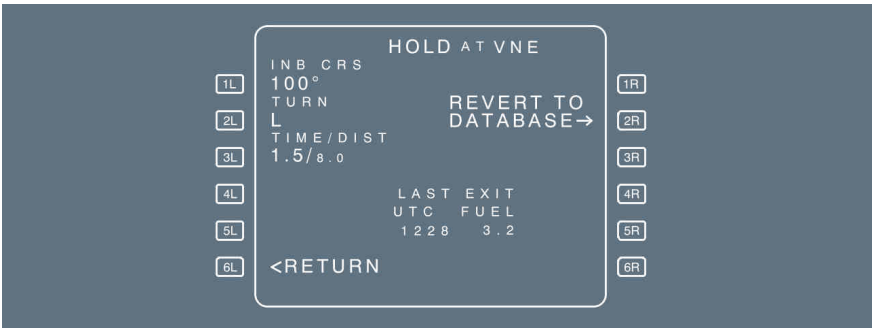
If the holding pattern is part of the database, it is named DATABASE HOLD and all its associated data (inbound course, turn direction, time/distance) are defined in the data base. Flight crew can modify this data.

COMPUTED HOLD AT ...



If the holding pattern is not in the database, the FMGC designs a holding pattern and proposes it to the pilot. The associated data consists of default values that the pilot can modify.

HOLD AT ...

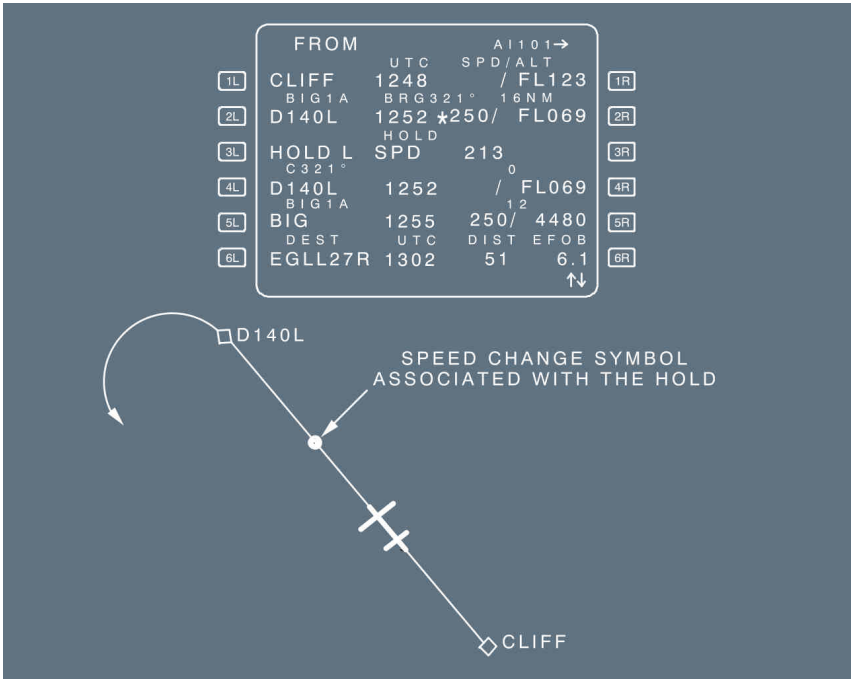


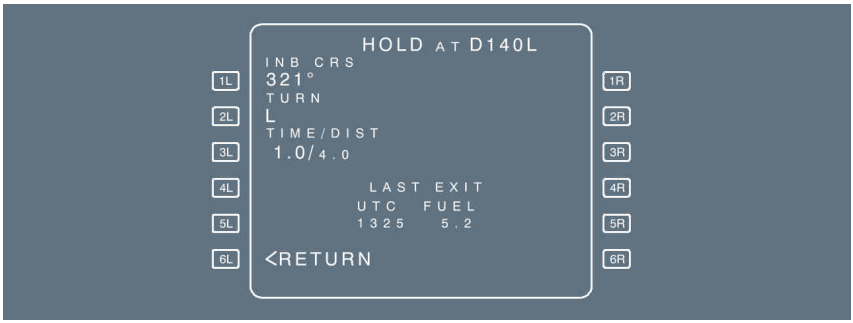
If the pilot inserts into the active flight plan a holding pattern that is manually corrected from a hold defined by the FMGS, the screen displays a “HOLD AT ...” page. The field 2R displays REVERT TO DATABASE or REVERT TO COMPUTED to restore the database data if necessary.

PREDICTIONS AND GUIDANCE ASSOCIATED WITH AN HM HOLDING PATTERN (HOLD WITH MANUAL TERMINATION)

Before Deceleration

Although the hold is inserted into the flight plan, the FMGS does not take it into account for predictions until the aircraft enters the hold.
However, if the hold is not deleted by the crew, the FMGS schedules a deceleration point and displays it on the ND.





The FMGS predicts the estimated time and amount of fuel remaining at which the aircraft must exit holding so as to comply with fuel policy specified on the fuel prediction page.
When the aircraft enters the holding pattern, the FMGS revises all predictions and assumes the aircraft to fly one turn of the holding pattern.
All predictions are revised for one more holding circuit at holding fix overfly.

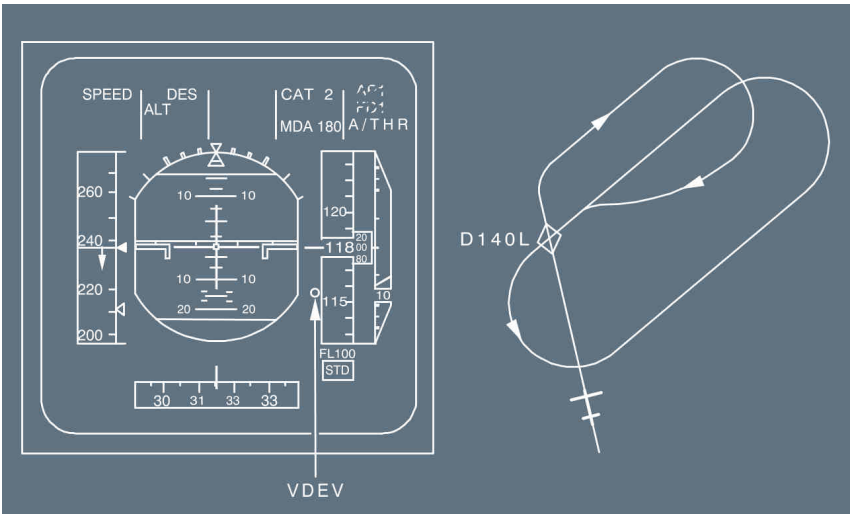
Upon Reaching the Speed Change Pseudo Waypoint

The FMGS either causes the aircraft to decelerate to the hold speed (if managed speed is active and NAV mode engaged), or displays “SET HOLD SPD”(set hold speed) on the MCDU and primary flight display if the flight crew had selected a speed target.

The default hold speed is the lowest of:
- Maximum endurance speed
- ICAO limit holding speed
- Speed constraint (if any).

When no specific speed limit applies, the default hold speed is approximately equal to:
- Green Dot speed on the A318, A319, A320 (CFM) and A321
- Green Dot +20 kt on the A320 (IAE).

The flight plan predictions for time and fuel do not yet consider that the hold will be flown, however, the navigation display shows the hold entry and holding pattern trajectory.



Deceleration receives priority, so that when the aircraft is in descent with the descent mode engaged, it will deviate above the descent path to decelerate. (VDEV becomes positive on the progress page).
The flight plan page displays an immediate exit prompt.
If the pilot presses the key next to “IMM EXIT” before arriving at the holding fix, the aircraft will not enter the holding pattern, but will resume its phase-related managed-speed profile.

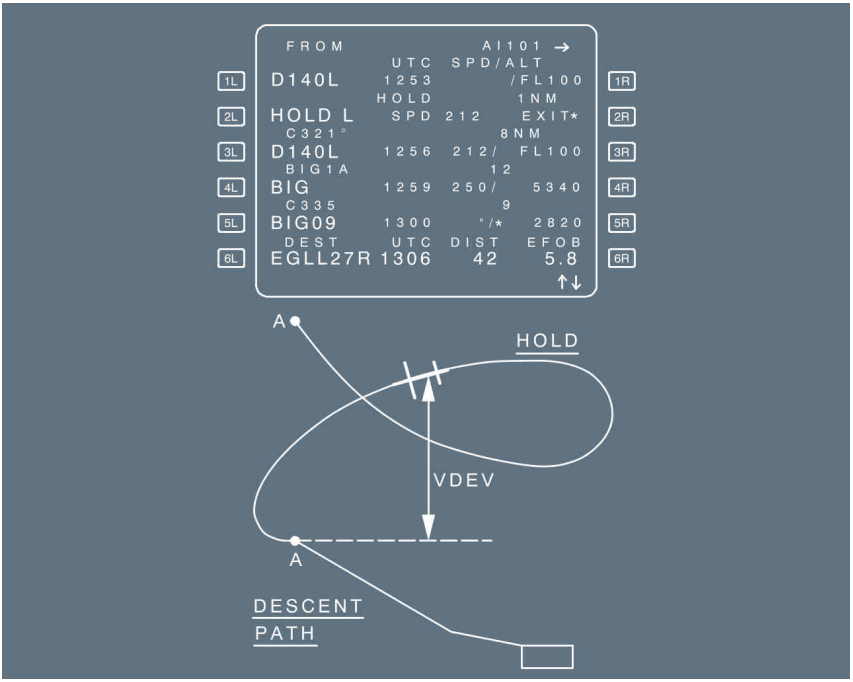


After Reaching the Hold Entry Fix

The aircraft enters the hold. The system assumes that the aircraft will fly one turn of the holding pattern and revises the predictions accordingly.

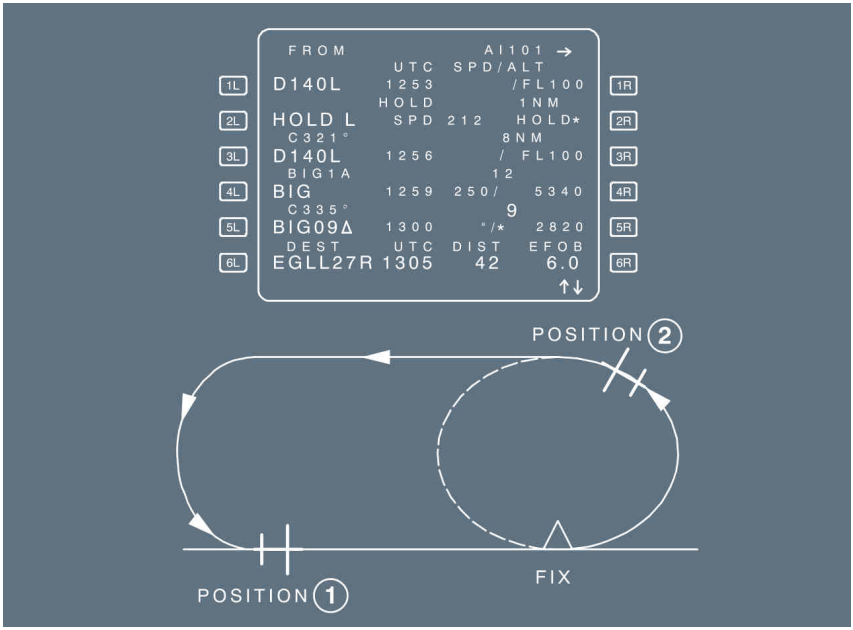
When the holding pattern was defined by a leg time (and not a leg distance), the system revises the size of the hold as a function of the target speed.

- If managed speed is active, the system uses the predicted holding speed to calculate the size of the holding pattern
- If the selected speed is active, the system uses the target speed the pilot selects at the entry fix sequencing to calculate the size of the holding pattern
- The VDEV displayed on the primary flight display and the PROG page while the aircraft is flying in the HM (hold pattern with manual termination) is the difference between its current altitude and the altitude at which it should be when it reaches the hold exit fix in order to be positioned properly on the descent path.



With IMM Exit Pressed (Aircraft in the Holding Pattern)

The predictions and guidance assume that the aircraft is returning immediately to the hold fix. Sequencing the hold fix, the aircraft exits the holding pattern and resumes its navigation. The flight plan page displays “RESUME HOLD*” instead of “IMM EXIT*”.



HOLD EXIT PROCEDURE

Position 1: If “IMM EXIT” pressed, aircraft will exit at next fix overfly.
Position 2: If “IMM EXIT” pressed, aircraft will make an immediate turn to the fix where hold will be exited.

- **If managed speed is active,** the computer sets the target speed to the applicable speed of the current phase (for example, speed constraint, ECON speed, or speed limit).

  The computer then bases its predictions on the assumption that the flight will continue on the descent path if the aircraft is in a descent.

● **If DES mode is engaged,**

the following rules apply:

- The holding pattern is never included in the descent path computation
- The pilot cannot enter altitude and speed constraints at the hold exit fix. (This is only allowed at the hold entry fix)
- The vertical guidance in the HM during the descent phase calls for a constant -1 000 ft/min, but the computer considers altitude constraints that will take effect farther down the flight path as it calculates vertical guidance and predictions. The system will not allow the aircraft to descent below the next altitude constraint, neither the FCU selected altitude. If the aircraft reaches the next altitude constraint, it will level off and the altitude constraint mode will engage.

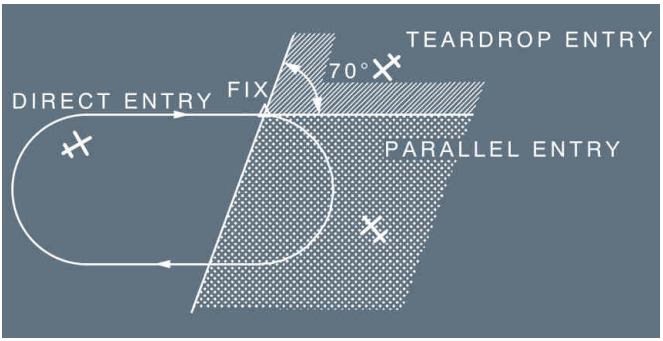
With RESUME HOLD Pressed

If the pilot presses the key next to “RESUME HOLD”, the aircraft remains in the holding pattern, and the display again shows “IMM EXIT”.
After that, each time the aircraft flies over the holding fix, the system updates the predictions for one more holding circuit.

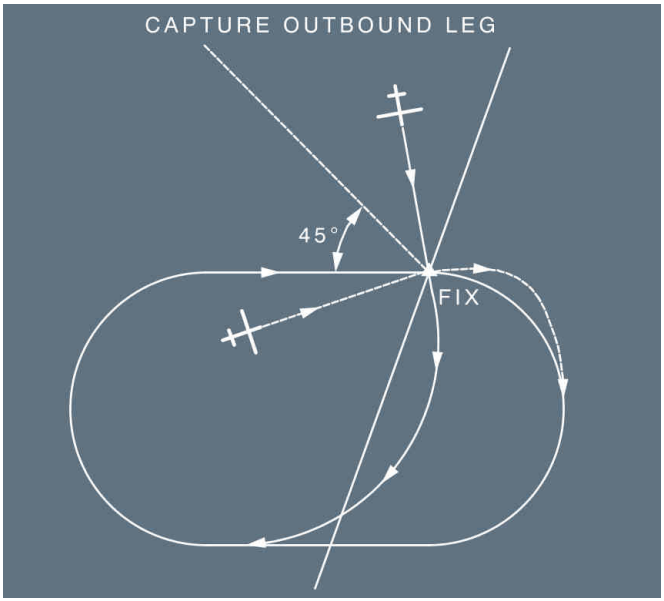
HOLDING PATTERN ENTRIES

The FMGS offers three types of entry into holding patterns:

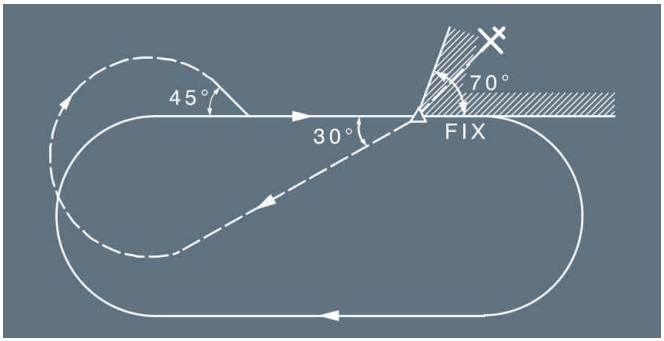
1. Direct entry
2. Teardrop entry
3. Parallel entry



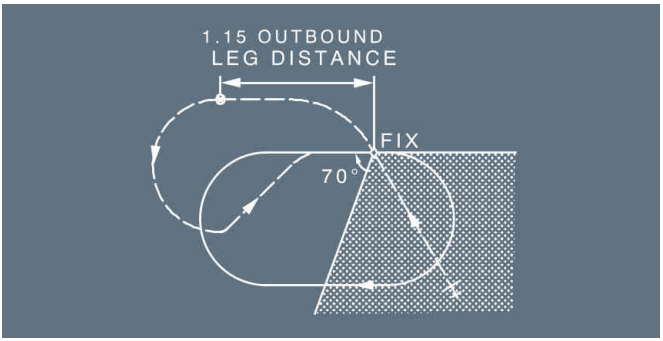
1. The Direct Entry



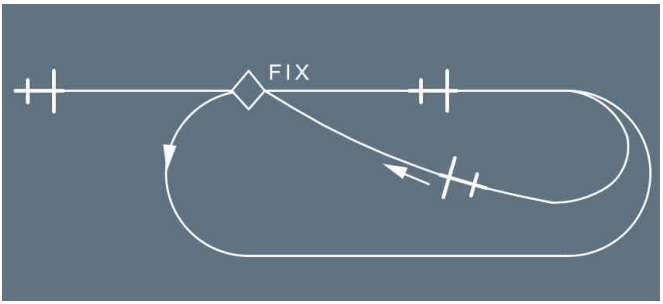
2. The Teardrop Entry



3. The Parallel Entry

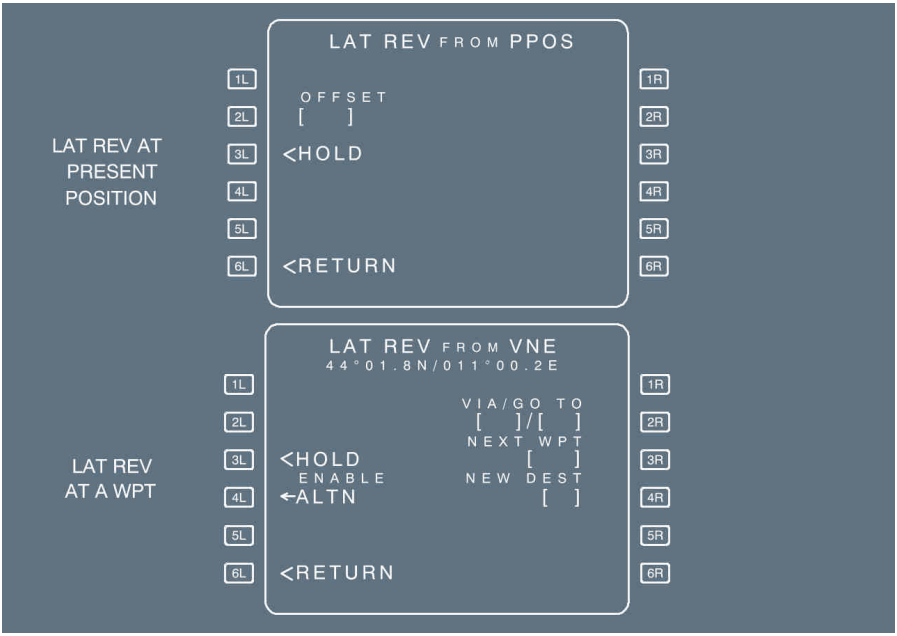


Note: *If the leg the aircraft is flying toward the holding fix is on a "limit" between a teardrop entry and a parallel entry, the FMGC may compute and display either of the two entries. The pilot should keep this in mind and not assume that the FMGC is malfunctioning.*
If the flight plan leg toward the hold entry fix is on a course that is the reciprocal of the inbound course of the holding pattern, the aircraft will fly a parallel entry.



7 **PROCEDURE TO INSERT A HOLD (HOLD WITH MANUAL TERMINATION)**

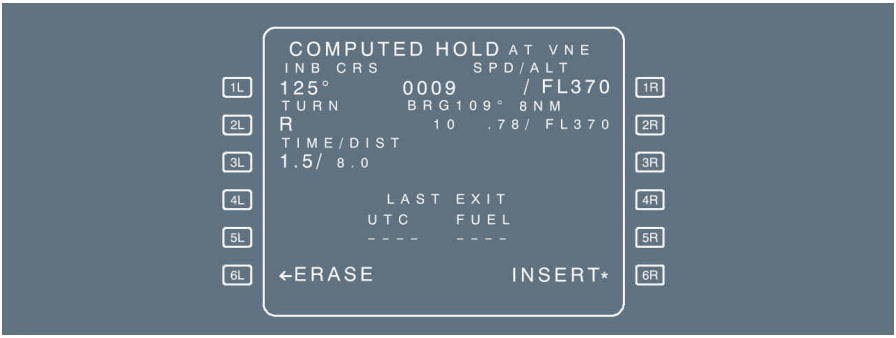
The HOLD prompt allows the pilot to enter a holding pattern with manual termination (HM) at the revised waypoint or at present position.
The pilot accesses the HOLD page from a lateral revision at the present position (PPOS) or at a waypoint. The MCDU displays HOLD-associated data: inbound course (INB CRS), TURN direction, TIME/DISTANCE and LAST EXIT time, and fuel to reach the alternate with the required fuel reserve.



SELECT lateral revision at present position (PPOS) or at applicable waypoint.
PRESS HOLD prompt, [3L] key.

A TMPY F-PLN is created and a default hold is proposed: If applicable, the database hold is proposed.
If no database hold is available, the computed hold is proposed.

CHECK and (if necessary) MODIFY the HOLD data.
CHECK the temporary flight plan and INSERT it, if appropriate.



PROCEDURE TO DELETE A HOLD (HOLD WITH MANUAL TERMINATION)

CLEAR the HOLD directly in the flight plan as it can be done for a normal waypoint.

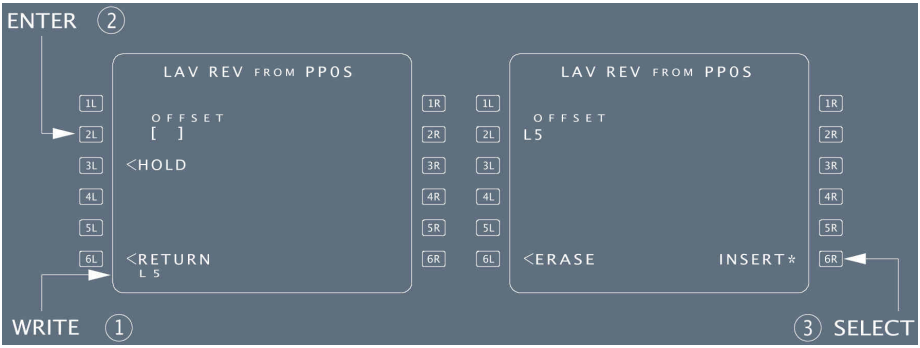
OFFSET

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

Offset allows the pilot to define a lateral offset to the left or right of the active flight plan.
Once inserted, the offset applies from present position (PPOS) all along the flight plan to the first waypoint (WPT) at which a holding pattern is defined, or to the last waypoint before the runway.
In most cases, the pilot will use it en route because of an ATC clearance or to avoid bad weather expected along the flight-plan route.
Accessed from lateral revision (LAT REV) at the present position page, an offset may be defined between 1 and 50 nm in one-nautical-mile steps.
After inserting the offset in the flight plan, the flight plan page shows OFST in its title, and the navigation display shows the offset flight plan in a solid green line and the original flight plan in a dashed green line.

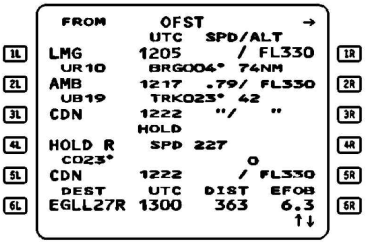
The offset is cleared:
Automatically (holding pattern, approach)
Manually with the clear (CLR) key.

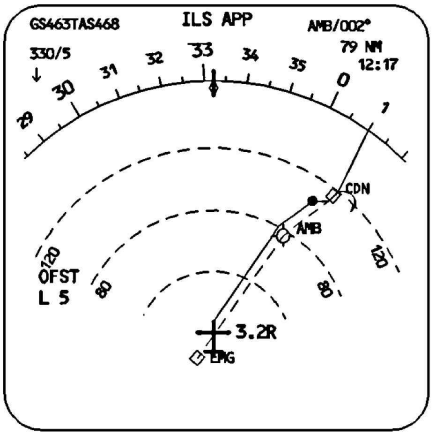
Note: *If the pilot enters an OFFSET when the aircraft is too close to the TO waypoint, the FMGS may refuse to accept it, in which case the MCDU displays the message "ENTRY OUT OF RANGE".*



INSERTING AN OFFSET

SELECT LAT REV at FROM waypoint.
WRITE the required offset value and direction (for example, L5 or 5L).
PRESS [2L] to enter the offset into the OFFSET field.
PRESS [6R] to activate the OFFSET.

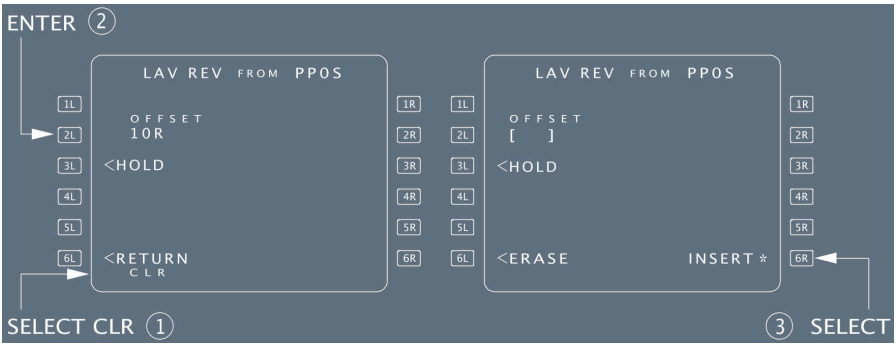




MANUAL CANCELLATION OF OFFSET

There are two normal methods for cancelling an offset:
1. SELECT DIR TO a waypoint (the next waypoint, for example)
2. SELECT a Lateral Revision (LAT REV) at FROM WPT

CLEAR THE OFFSET field.
PRESS [6R] to activate the temporary flight plan (cancelling OFFSET).



ALTERNATE FUNCTION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The ALTERNATE FUNCTION performs two actions:
- It reviews and defines alternate airports and inserts them into the flight plan
- It allows a diversion to be activated through the ENABLE ALTN command.

REVIEW AND SELECTION OF ALTERNATE AIRPORT

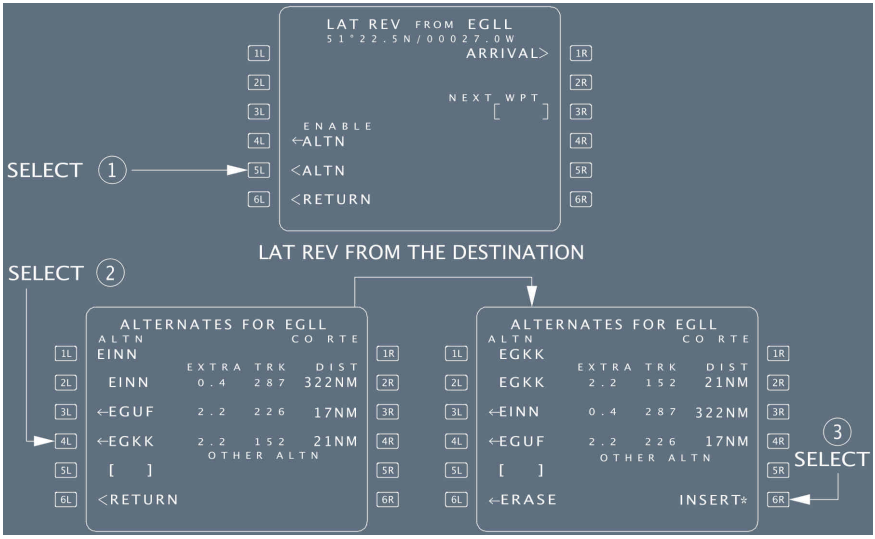
Several alternate airfields may be stored in the data base and assigned to a destination.
When the pilot selects a company route (CO RTE) (or a city pair), the computer strings the preferred alternate into the active flight plan.
The pilot may review the alternate airports on the ALTN page, and if the one selected is not suitable because of weather or fuel considerations, another alternate may be strung into the active flight plan.
The pilot may define an additional alternate airport into the list, if necessary.
The ALTERNATE page shows the track and distance (airway or direct) between the destination and the alternate, as well as fuel management data (EXTRA fuel, assuming the associated airfield is the alternate airport). This data will help the pilot change the preferred alternate, if necessary.
Access the ALTERNATE page through the ALTN prompt on LAT REV at destination.
Alternate airfields are attached to the destination.

ENTERING NEW ALTERNATE INTO THE F-PLN

If the preferred alternate is not suitable, proceed as follows:

SELECT the F-PLN key on MCDU
SELECT LAT REV at destination.
SELECT ALTN [5L] key.
SELECT an AIRFIELD IDENTIFIER
INSERT the temporary flight plan

Note: *If weather and destination airfield conditions allow it, you may select "NO ALTN", fuel predictions will be computed without alternate fuel.*



SELECTION OF OTHER ALTERNATE

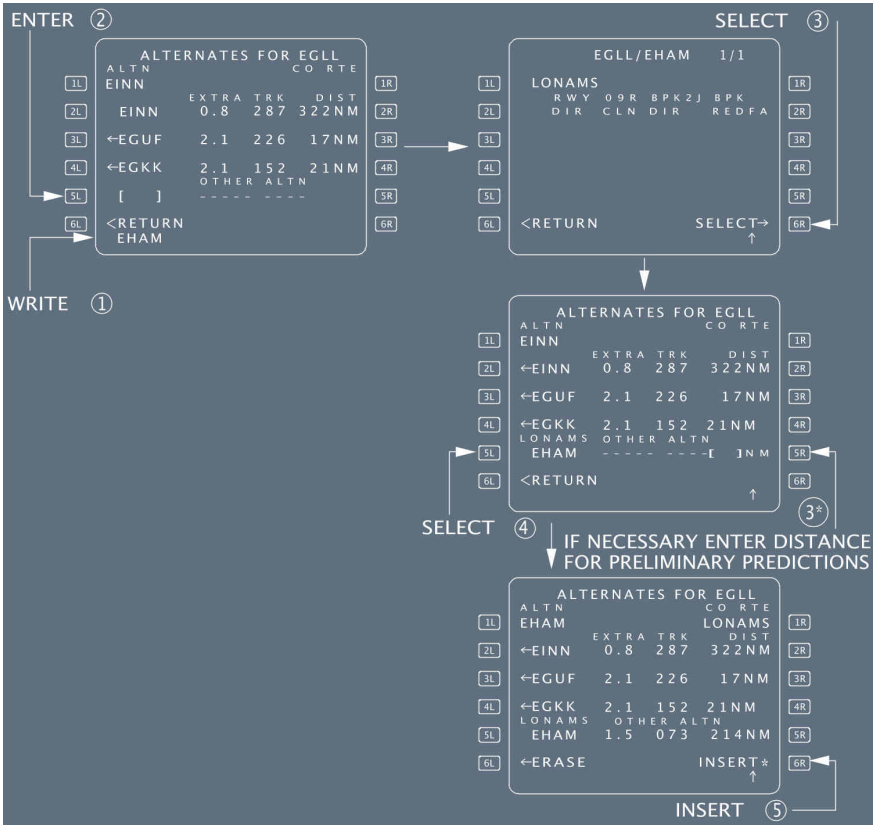
Fuel management information to another alternate airfield may be obtained by selecting the OTHER ALTN field.

SELECT LAT REV at destination.
SELECT ALTN [5L] key.
ENTER the airfield ident into the brackets.

- *If the airfield is not in the data base, the NEW RUNWAY page appears automatically.*
- *If the airfield is in the data base and there is a company route (CO RTE) to it, the ROUTE SELECTION page appears automatically.*

SELECT the route as appropriate or RETURN to the ALTN page.
ENTER the distance into the brackets (if required). XTRA fuel and track (TRK) will appear.
SELECT the other alternate (OTHER ALTN) as a primary alternate if it is convenient.
(EXTRA fuel and DIST revert to AIRWAY distance).
INSERT it if you want to have it as a primary alternate.

Note:
- *The pilot can always overwrite the "OTHER ALTN". The new "OTHER ALTN"then replaces the previous one, which is lost*
- *The pilot can select OTHER ALTN as a primary alternate (active flight plan) to replace any alternate on the initial list*
- *If the pilot selects the other alternate as a primary alternate and overwrite the OTHER ALTN field by entering a new airport, the first one will remain a primary alternate and the system will memorize a second OTHER ALTN.*



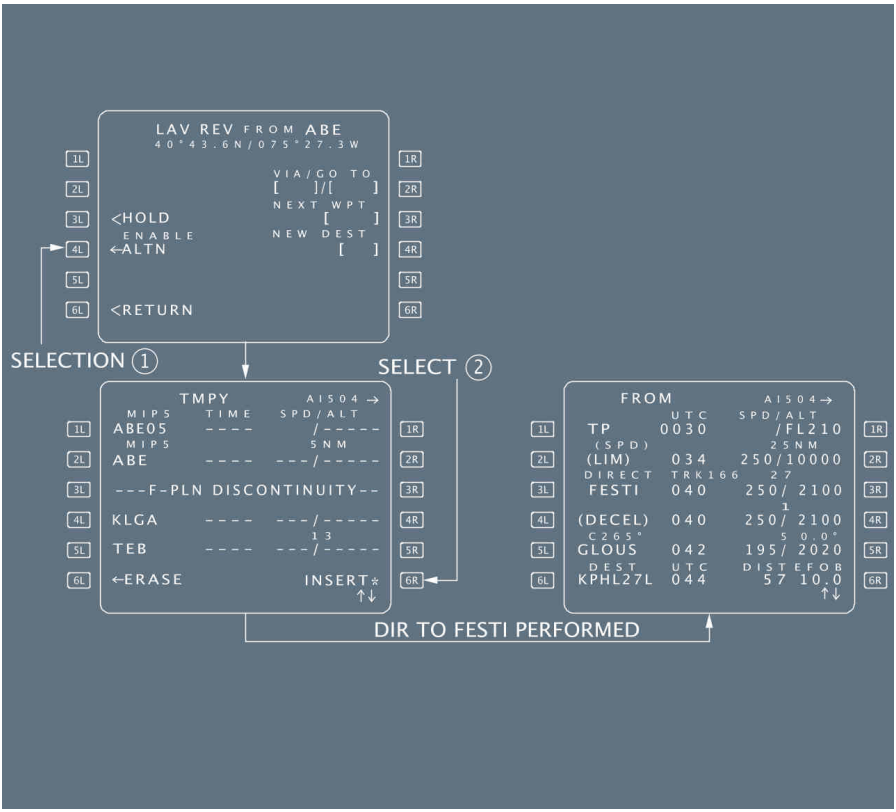
PREDICTED DATA FOR ALTERNATE

Data predictions are based on:

- Aircraft weight being equal to landing weight at primary destination
- Flight at FL 220 if the airway distance is less than 200 nm, otherwise at FL 310
- Cost index 0
- Constant wind
- Constant delta ISA (equal to delta ISA at primary destination)
- Airway distance for a company route, otherwise direct distance. (Manually entered distance for OTHER ALTN, used for preliminary predictions)

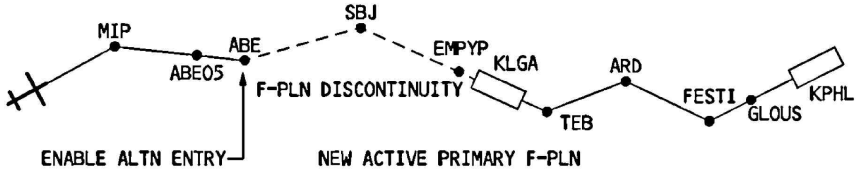
ENABLE ALTN

This allows the pilot to initiate a diversion by entering the alternate flight plan just after the revision waypoint (with a discontinuity).
The pilot may have to adjust the resulting flight plan (use “direct to”, or add or suppress waypoints), depending upon the circumstances.



TO ACTIVATE THE PRIMARY ALTN:

SELECT a LAT REV at the "TO"waypoint (or at another suitable waypoint)
PRESS the ENABLE ALTN key
INSERT the temporary flight plan
ENTER an appropriate waypoint in DIRECT TO and adjust the flight plan.
ADJUST the cost index on the PERF page and the defaulted cruise flight level (CRZ FL) on the PROG page, as required.



When ENABLE ALT is pressed at ABE, a flight plan discontinuity is created from ABE down to destination and the alternate route is linked to the active flight plan.

DIR KEY (DIRECT-TO FUNCTION)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The pilot uses the "Direct To" function to define a direct leg from the present position to any waypoint on the active flight plan or to any waypoint.
The designated waypoint may be entered by its identifier (if it is stored in the database) or by a latitude/longitude, place/bearing/distance, or a place-bearing/place-bearing. When the pilot uses DIR TO, the present position (PPOS) becomes the "FROM" waypoint and the active flight plan shows it as T-P (turn point). The pilot must not use DIR TO on the ground.

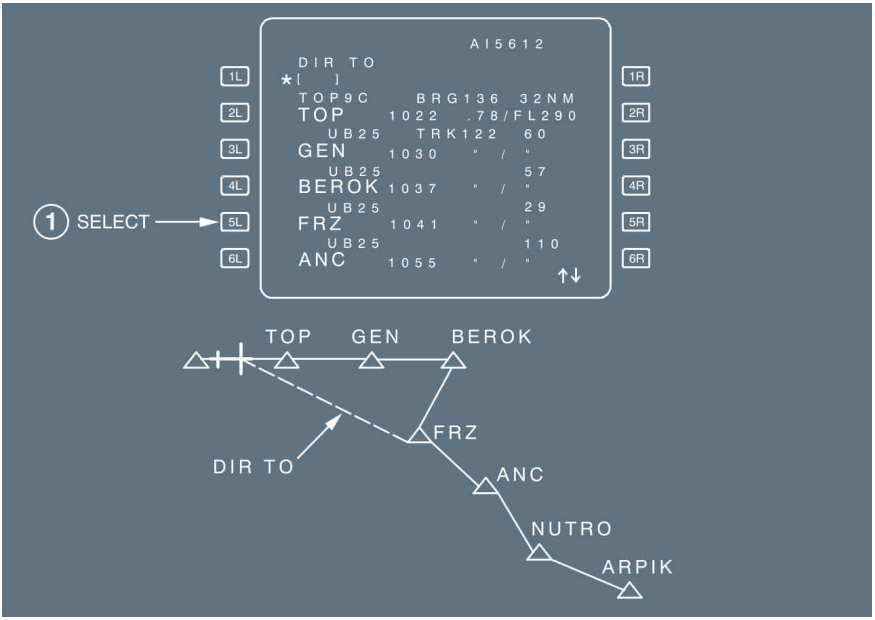
Note: If the autopilot or flight director is in the heading/track or localizer mode, the "DIR TO"function engages NAV mode.

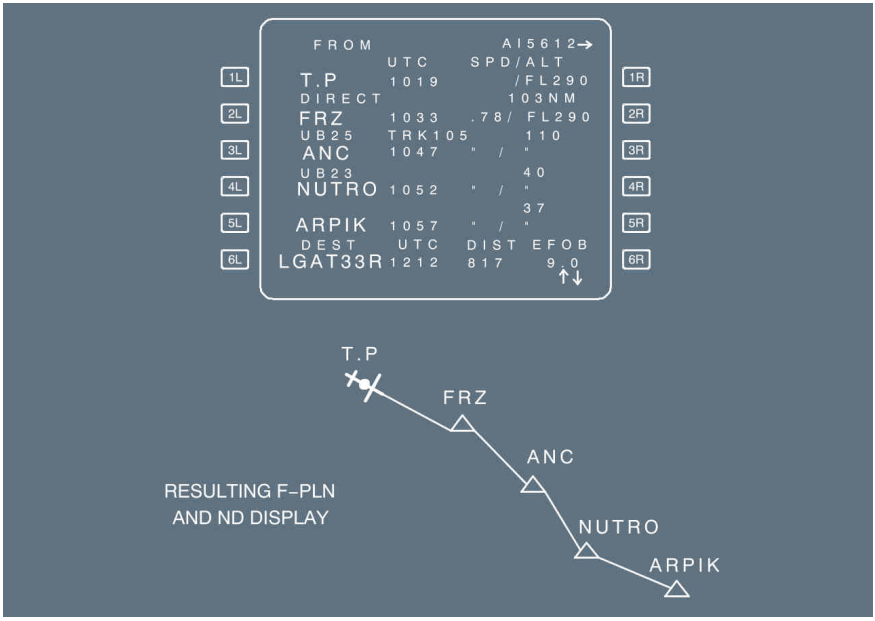
8 **PROCEDURE**

CASE 1. THE "TO"WAYPOINT IS IN THE FLIGHT PLAN

Example : DIR TO FRZ

PRESS the DIR key on the MCDU.
PRESS the line select key next to "FRZ"


AI5612
DIR TO
TOP9C BRG136 32NM
TOP 1022 .78/FL290
UB25 TRK122 60
GEN 1030 " / "
UB25 57
BEROK 1037 " / "
UB25 29
FRZ 1041 " / "
UB25 110
ANC 1055 " / "
1L
2L
3L
4L
5L
6L
1R
2R
3R
4R
5R
6R
1 SELECT
TOP
GEN
BEROK
FRZ
DIR TO
ANC
NUTRO
ARPIK

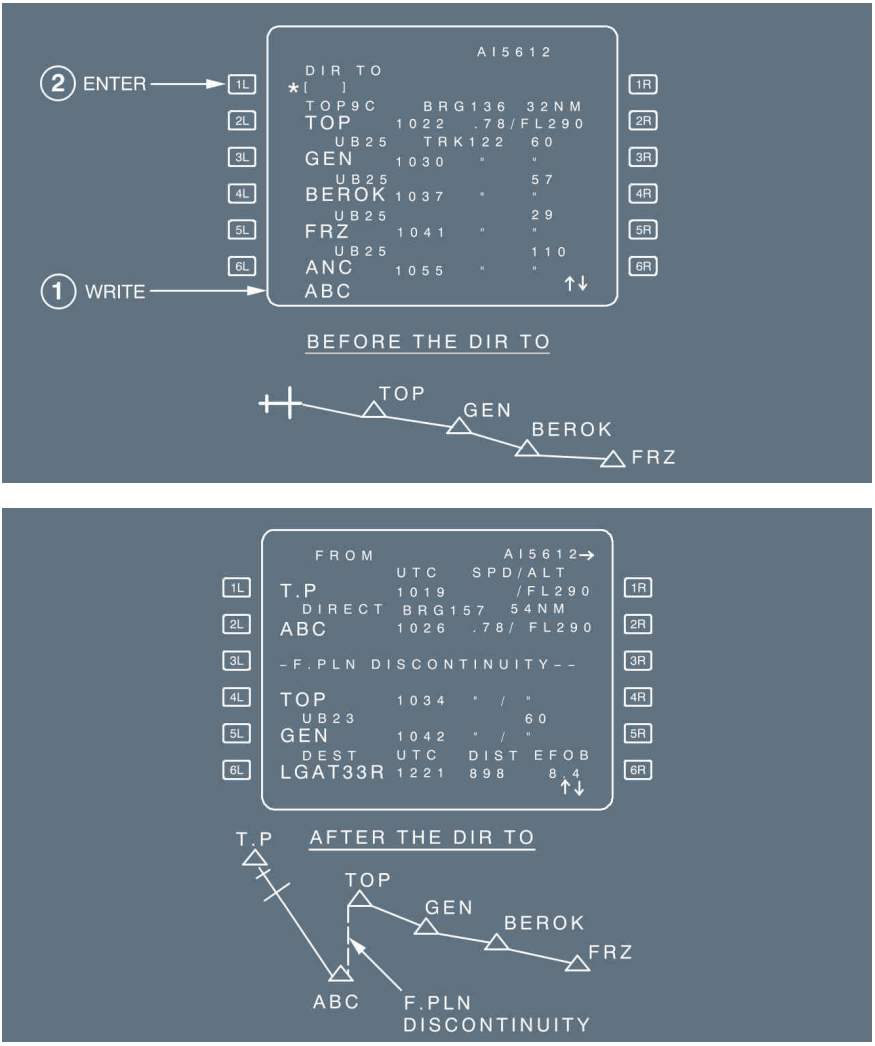


Note: *The system does not create a temporary flight plan when a DIR TO is used, the flight plan modification being immediately inserted.*

CASE 2. THE "TO"WAYPOINT DOES NOT BELONG TO THE FLIGHT PLAN

Example: Direct to ABC (ABC being an ident, LL or PBD or PB/PB)

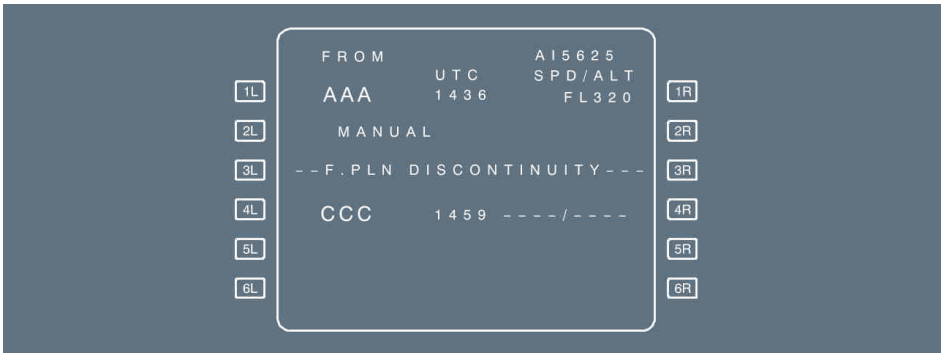
PRESS the DIR key.
WRITE "ABC" into the scratchpad.
PRESS [1L] to enter "ABC" in the "DIR TO"field.



Clear the discontinuity and the waypoints that are not included in the new flight plan.

9 **PARTICULAR CASES FOR USE OF DIR TO**

- If the pilot is flying a manual leg (part of a SID or STAR), the flight plan page displays “F-PLN DISCONTINUITY”, preceded by “MANUAL” (See).
  These legs are specific heading or track legs flown with no defined end waypoint.



- When the pilot encounters a flight plan discontinuity or if a major reset occurs, the flight plan page displays “PPOS-F-PLAN DISCONTINUITY”, and the pilot looses managed guidance in both the lateral and the vertical plans.
  The autopilot or flight director reverts to the basic HDG V/S (or TRK FPA) modes.
  Predictions remain available and are based on the assumption that the aircraft will fly a direct leg from its present position to the next waypoint.



- **In both of these cases, the only way to get back to a standard flight plan is to perform a " DIR TO "to a designated waypoint.**
- Following a DIR TO, the message “MAP PARTLY DISPLAYED” may appear on NDs if the new flight plan includes a very long leg. Please *Refer to DSC-31-45 Flags and Messages Displayed on ND* for description. When this message comes up, enter an intermediate waypoint to shorten the leg.

Note: During cruise, the DIR TO function is not available as long as uplink wind data, received through ACARS, is not inserted or cancelled on the CRUISE WIND page.

OVFY (OVERFLY) KEY

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

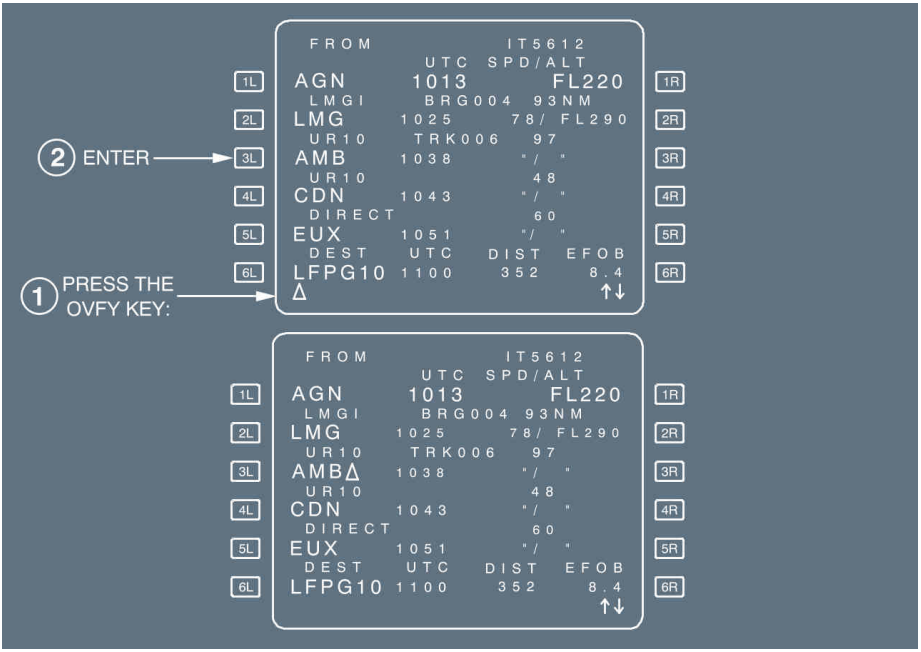
10

The overfly key programs the Flight Management Guidance Computer to fly over a specific waypoint or NAVAID. To use it:

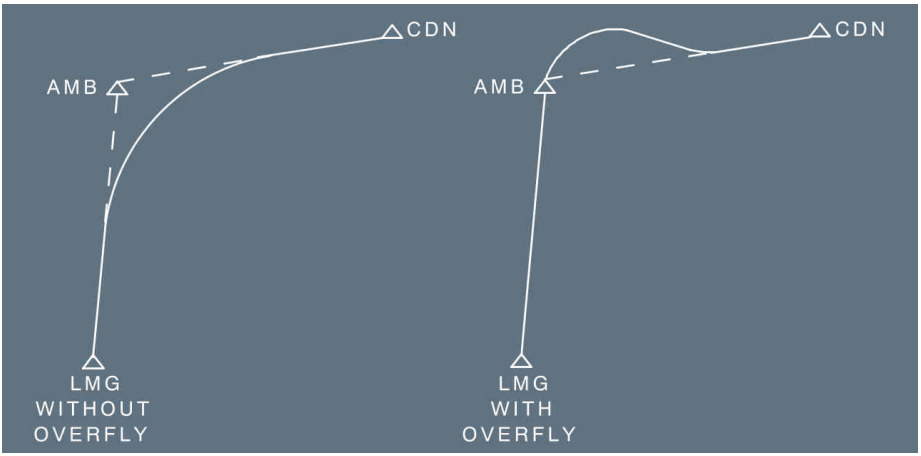
PRESS the “OVFY” key.

A “△” appears in the scratchpad.

INSERT it by pressing the key adjacent to the waypoint to be overflown. [3L] in this example.



The pilot cannot cancel the overfly program. If you do not want to fly over the point you have entered, use DIR TO (direct to) the next waypoint or the heading mode, whichever is more suitable.

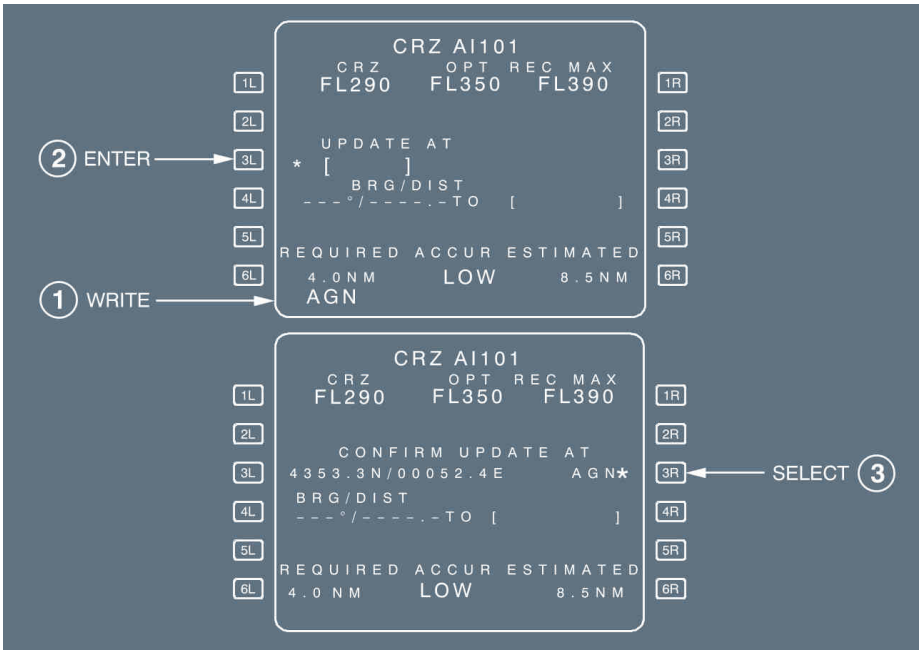


The overfly function allows you to fly over a specific waypoint, and then returns the aircraft to the great circle track.

"UPDATE AT"

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

11 The pilot uses "UPDATE AT" on the progress page to manually change the position the FMGC has computed (FM position and bias).
Use this function with extreme caution: it is apt to be inaccurate because it relies on the pilot's estimating when a designated position has been reached.



WRITE the ident for the navaid (or waypoint, or airport) or the coordinates or the PBD or PBX at which update is intended.
PRESS [3L] to enter the ident in the "UPDATE AT" field. The coordinates of the point, along with its identifier (or "ENTRY" if the identifier is not in the data base), appear in that field.
PRESS [3R] to activate the update when you estimate that you are at the position.

Note: *The system reinitializes the Estimated Position Error computation when a position update is performed. This may lead to the appearance of a "NAV ACCUR DOWNGRAD" or "NAV ACCUR UPGRAD" message.*

CAUTION

If the "UPDATE AT" does not take effect properly, it corrupts the FM position.
- In an area with good radio navaid coverage:
  - If the update error is small, subsequent radio position updating will correct the FM position.
  - If the update error is large, the system will reject any radio updating because its internal "reasonableness test" will reject the various navaids. Thus the FM position will only be the MIX IRS position corrected by the position bias determined at the time of the update, and the error will be maintained.
- In an area without proper navaid coverage, radio position updating is not available and the FM position, if incorrect, will remain incorrect until a new manual update is performed.
- Therefore, the pilot should use "UPDATE AT" only in case of a major position problem such as:
  - on the ground, no flight plan appears on the navigation display and ARC/ROSE NAV mode is selected.
  - A "CHECK A/C POSITION" message appears and the position monitor page indicates an obvious position mismatch.

When the GPS PRIMARY is operative, the FM position will always converge towards the GPS position at a rate depending on the aircraft altitude. Therefore when GPS PRIMARY is operative, an "update at" that is innacurate will have a temporary effect on the FM position.

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FMS2 HONEYWELL

GENERAL

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The lateral revision function allows the pilot to create or modify the following parts of the flight plan:

- Airway
- Waypoint
- New destination
- Holding pattern
- Offset
- Alternate
- Fix information

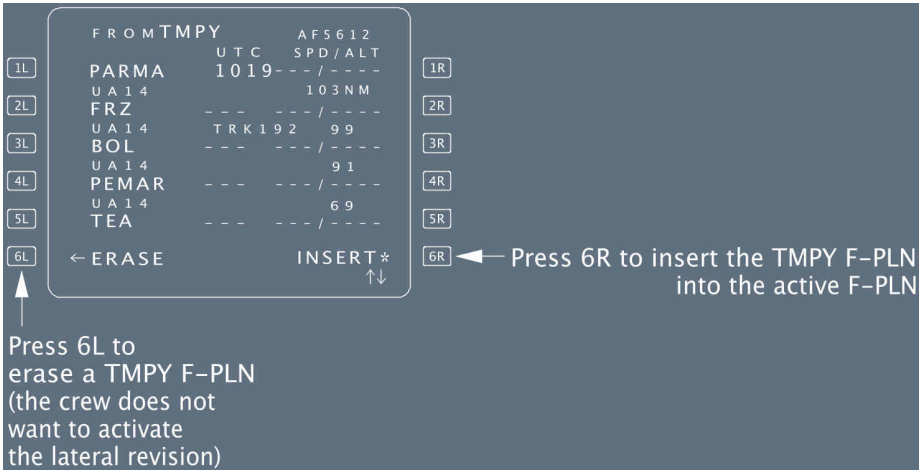
  Each time the pilot activates one of the above-listed revisions, he accesses a temporary flight plan that enables the modification to be checked before inserting it in the active flight plan. The crew selects these functions by pressing the left keys on F-PLN A or B.
- Direct to and overfly functions are accessed via the MCDU keys. No temporary flight plan is created with these functions.
- “Update at” capability is a specific function that manually updates the FM position. It does not .use a temporary flight plan, but the pilot must confirm its insertion before it is activated.

TEMPORARY F-PLN (TMPY)

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

When a pilot makes a lateral revision to the F-PLN, the FMGS creates a temporary flight plan. This is a copy of the active F-PLN, but is corrected by the lateral revision in progress.
The aircraft continues to follow the active F-PLN, until the temporary revision is inserted.
The revision appears in yellow font on both MCDUs and NDs.

- Lateral and vertical revisions cannot be made to a temporary F-PLN.
- Only one temporary F-PLN may be accessed at a time.
- The “DIRECT TO” function, when used, erases a temporary F-PLN.
- When a DIR TO is in process, a temporary revision cannot be displayed on the other MCDU.
- A TMPY F-PLN changes the title of the flight plan pages. (TMPY appears in all titles).
- No predictions are computed for a temporary flight plan (dashes are displayed).



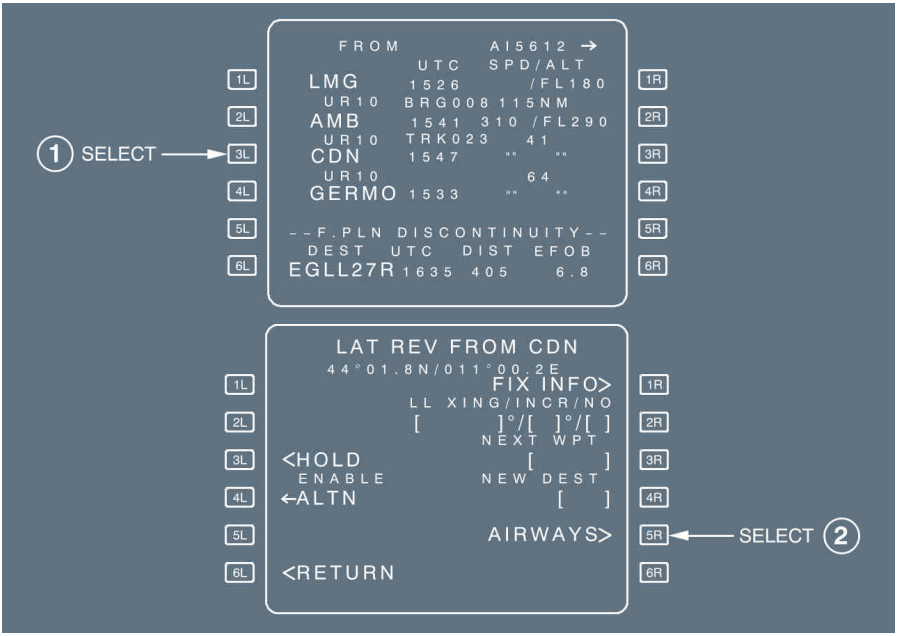
Temporary data is displayed in yellow (ND and MCDU). Once inserted, it becomes active and is displayed in green.

INSERTING AN AIRWAY WITH "VIA"

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

1 **GENERAL**

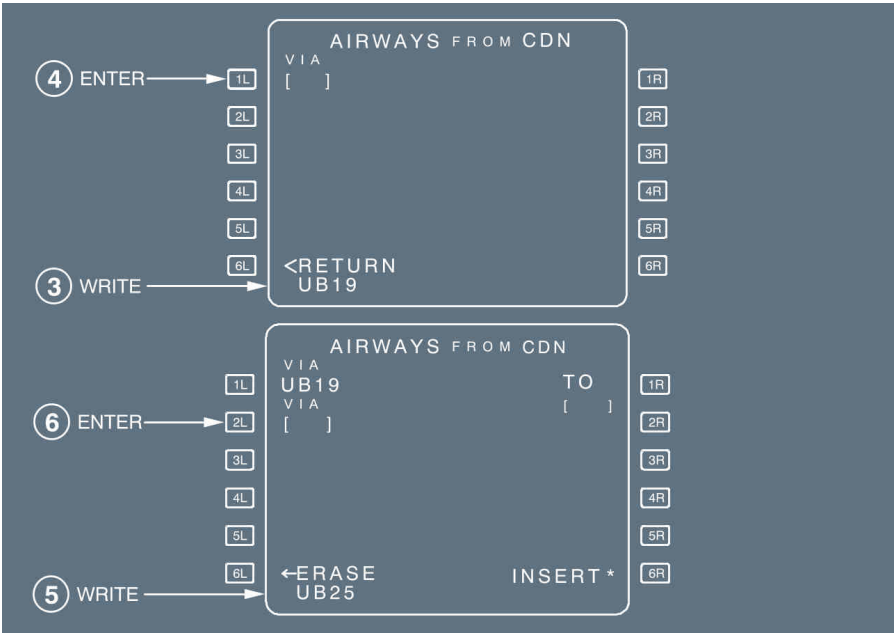
In the active flight plan, the pilot can insert up to 5 successive airway segments, going from a revised waypoint or ending at a given waypoint of the flight plan.



SELECT the revised waypoint (here CDN).
PRESS [5R] to select the airways function.

2 **THE PILOT WISHES TO INSERT SUCCESSIVE AIRWAY SEGMENTS FROM A WAYPOINT**

e.g. from CDN - Airways UB19 – Airways UB25 – Ending point AAA.

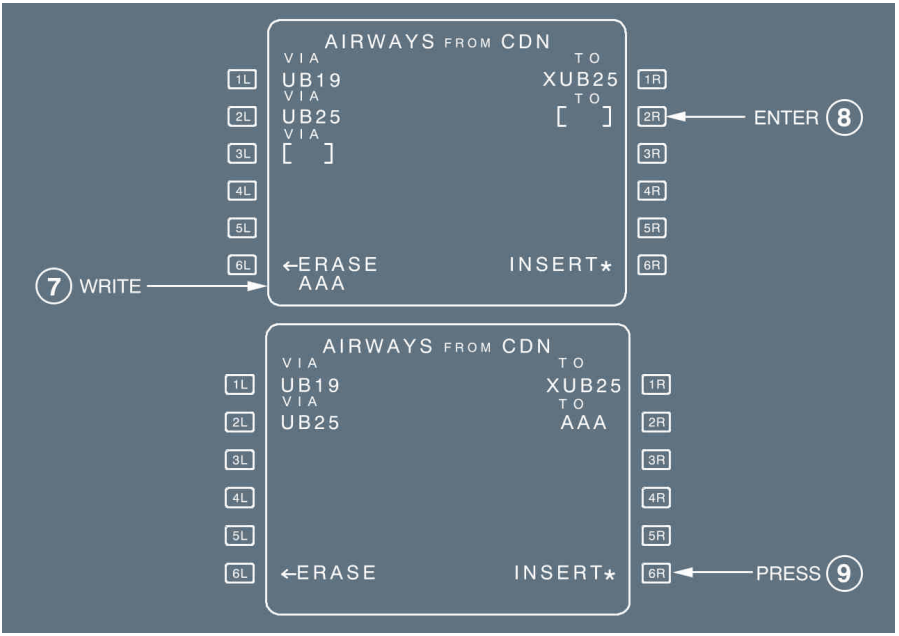


WRITE the first airway in the scratchpad (here UB19).
PRESS [1L] to insert it into the VIA field.
WRITE the second airway in the scratchpad (here UB25).
PRESS [2L] to insert it into the VIA field.

The system automatically determines the first downpath intersection point between the 2 airways.

- If the airways have a common waypoint, the system selects it as the ending point of the first VIA.
- If they have no common waypoint, but have a single intersection, the system creates this intersection as an FM-computed point and displays X followed by the airway IDENT (here XUB25).
- If they have no common waypoint or intersection, the system displays NO INTERSECTION FOUND in the scratchpad.

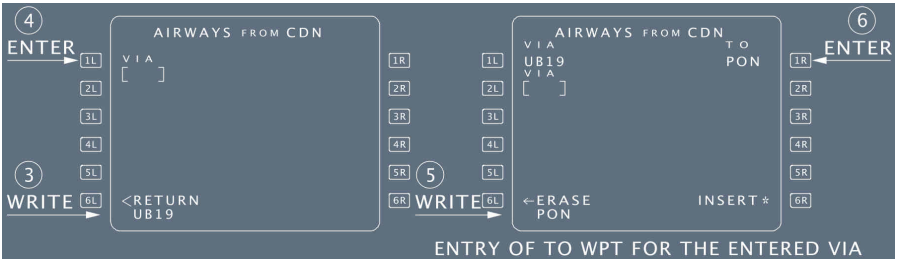
Once the pilot has entered the required airways (up to 5), he must enter the ending point of the last selected airways:



WRITE the ending waypoint in the scratchpad (here AAA).
PRESS [2R] to insert the ending waypoint into the TO field.

Note: *If two waypoints with the same IDENT belong to the same airway, the DUPLICATE NAMES page will not be called up, and the system selects the first one in the database.*

THE PILOT WISHES TO INSERT ONE AIRWAY SEGMENT TO AN ENDING WAYPOINT



WRITE the airway IDENT in the scratchpad (here UB19).
PRESS [1L] to insert it into the VIA field.

WRITE the ending waypoint in the scratchpad (here PON).
PRESS [1R] to insert it into the TO field.

Note: - *If the revise waypoint, or the ending waypoint, does not belong to the entered airway, the system displays AWY/WPT MISMATCH in the scratchpad.*
- *If two waypoints with the same IDENT belong to the same airway, the DUPLICATE NAMES page will not be called up and the system selects the first one in the database.*

FLIGHT PLAN INSERTION

The flight crew either inserts the flight plan directly from the AIRWAYS page, or from the TMPY F-PLN page. In both cases:

PRESS [6R] to insert the temporary flight plan. Clear flight plan discontinuity, as needed.

INSERTING A WAYPOINT

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

GENERAL

Waypoints can be inserted in two ways:
- Directly into the flight plan. All modifications go directly into the active flight plan. No temporary flight plan is created.
- By means of a lateral revision at the “NEXT WAYPOINT”, a process that creates a temporary flight plan.

The second method enables the temporary flight plan to be checked before it is inserted.

WAYPOINT IDENTIFICATION

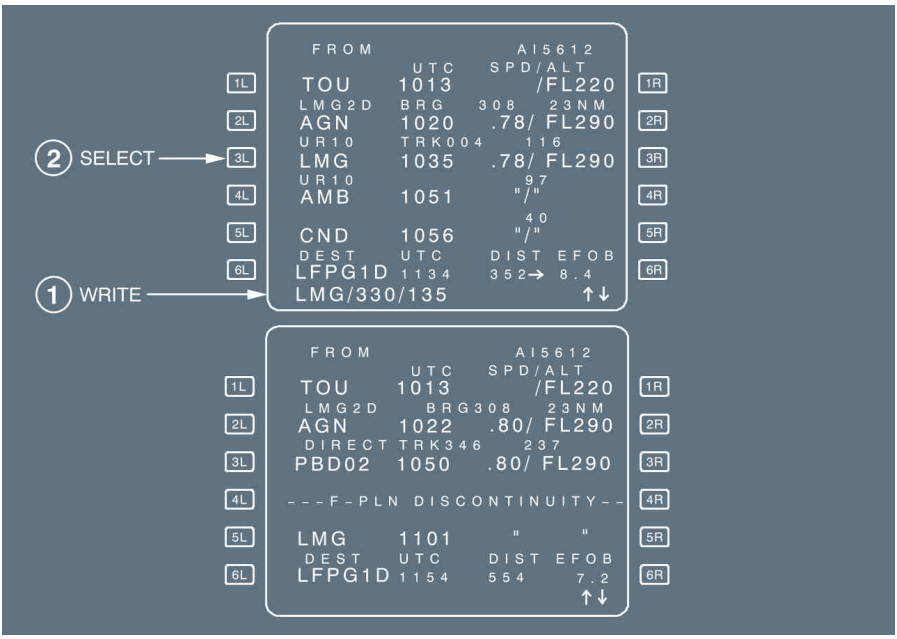
The pilot can identify a waypoint by:
- Its identifier (if it is in the navigation database).
- A Latitude/Longitude (LL).
- A Place/Bearing/Distance (PBD). The waypoint is defined by its bearing and distance from a place.
- A Place-Bearing/Place-Bearing (PBX). The waypoint is defined by the interception of 2 radials from 2 places.
- A Place/Distance (PD). The waypoint is defined by a distance from a place, along the F-PLN.

Note: *If a slash or a dash is not entered properly, the MCDU displays a “FORMAT ERROR” message.*

When the Flight Management Guidance System receives a waypoint that is not in the database, it identifies it as LLxx or PBD xx or PBX xx or PD xx (xx is a two-digit number between 01 and 20) and stores it in the stored waypoints file of the database.

Note: When NAV mode is engaged, the crew cannot modify the "TO"waypoint (active leg) using the waypoint insertion function. If the crew wants to modify it, the DIR TO function will be used.

3 **WAYPOINT INSERTED DIRECTLY IN THE FLIGHT PLAN**



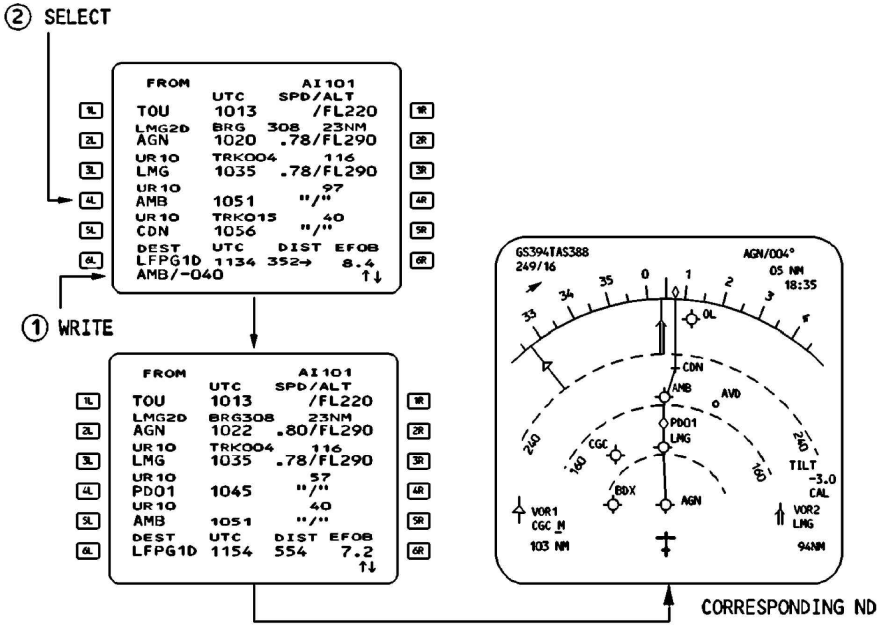


WRITE the waypoint identifier or LAT/LONG, Place/Bearing/Distance or Place-Bearing/Place-Bearing into the scratchpad. (Example: Place: LMG, Bearing: 330 °, Distance: 135 nm).
PRESS the appropriate key to enter the waypoint into the flight plan. The rule is that the new waypoint appears next to the pressed key, and the previous waypoint moves down the flight plan path.

This operation creates a discontinuity between the new waypoint and the previous one.
The new flight plan will have to be cleared of the discontinuity and some waypoints erased.

ALONG TRACK WAYPOINT INSERTION

On the F-PLN or STEP ALTS page, the pilot can enter an along track waypoint, defined as a place/distance waypoint.



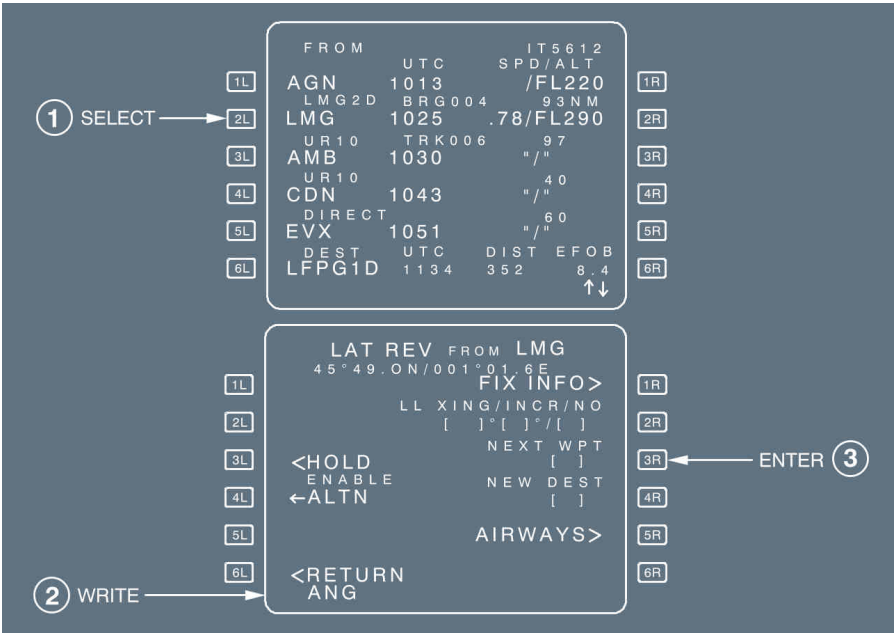
WRITE the waypoint identifier and distance from this place.

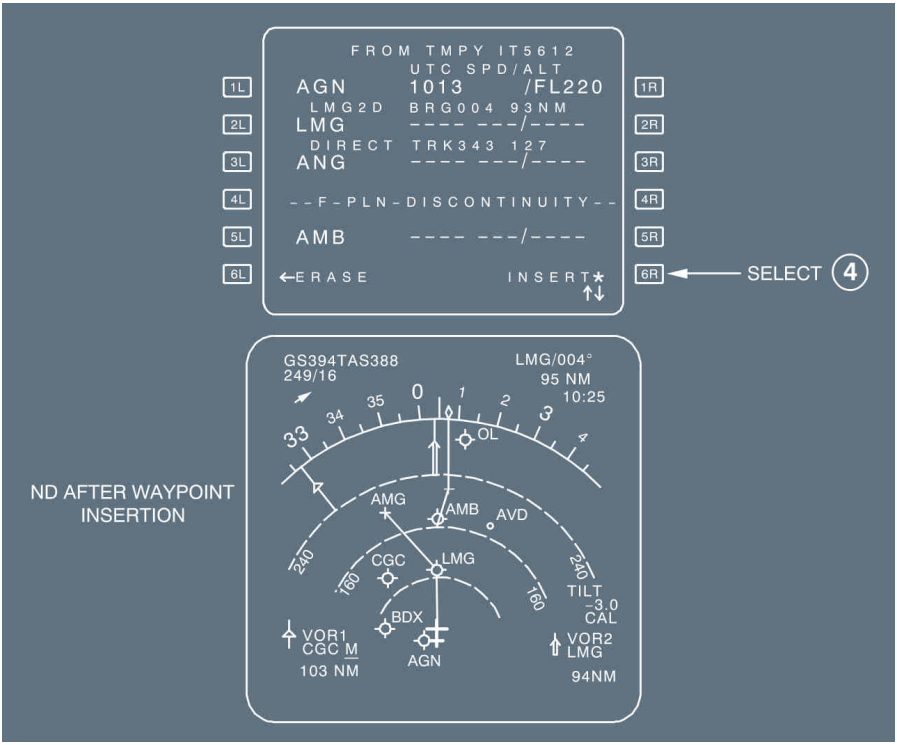
According to the sign of the distance, the crew may define an along track waypoint before or after the revised place. (Example: AMB/-040).

PRESS the appropriate key adjacent to the place identifier. The system automatically positions the waypoint in the flight plan.

This operation does not create any discontinuity.
The system does not accept an along track waypoint entered at the FROM waypoint.

4 **WAYPOINT INSERTED THROUGH THE USE OF "NEXT WAYPOINT"**

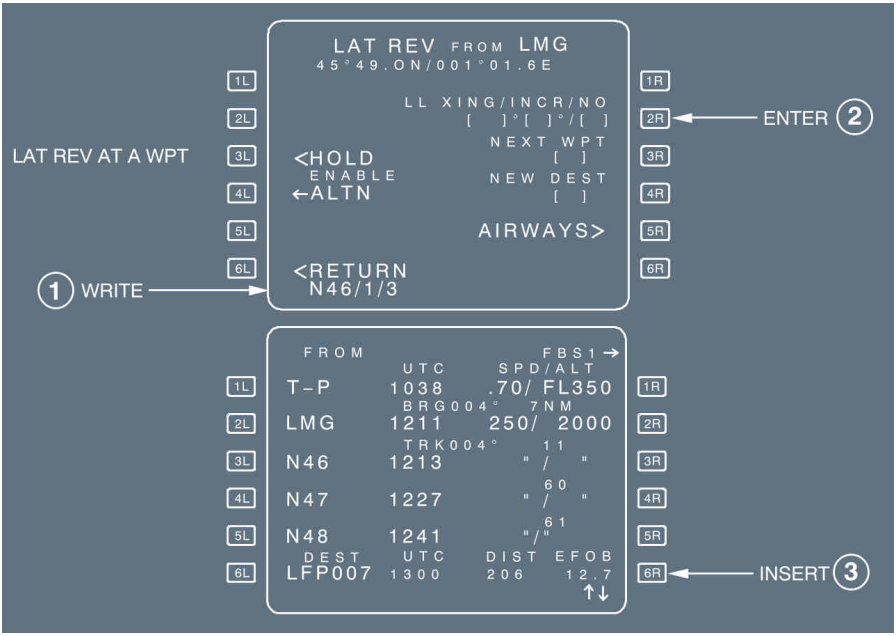




SELECT the lateral revision (LAT REV) function at an appropriate waypoint.
WRITE the waypoint identifier, or LAT/LONG, or Place/Bearing/Distance, or Place-Bearing / Place-Bearing into the scratchpad.
ENTER it in the brackets under NEXT WPT (next waypoint).
INSERT the temporary flight plan by pressing the [6R] key.
CLEAR the F-PLN discontinuity, as appropriate.

5 **LATITUDE/LONGITUDE CROSSING WAYPOINT INSERTION**

This function allows the insertion of one or several points along the flight-plan beyond the revised waypoint, at fixed latitude or longitude intervals (INCR) from a specified latitude or longitude. These waypoints are not considered as part of the pilot-defined elements. The system deletes them when sequenced.





WRITE the latitude (NXX, XXN, SXX or XXS), the required increment in degrees between the successive waypoints, and the number of required waypoints.

(Example: The pilot wants to obtain 3 points, every degree from latitude N46: He enters N46/1/3).

PRESS [2R] to insert it into the LL XING/INCR/NO field.
PRESS [6R] to insert the new waypoints in the flight plan without discontinuity.
The system does not store these waypoints in the database.

FIX INFO

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

GENERAL

When using the FIX INFO function, the pilot defines waypoint intersections of the flight plan with radials associated to a fix.
When the pilot inserts the intersection point, the system automatically identifies this point, but does not store it in the navigation database.
FIX INFO function offers 2 possible waypoint insertions: Radial intercept waypoint and abeam intercept waypoint.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

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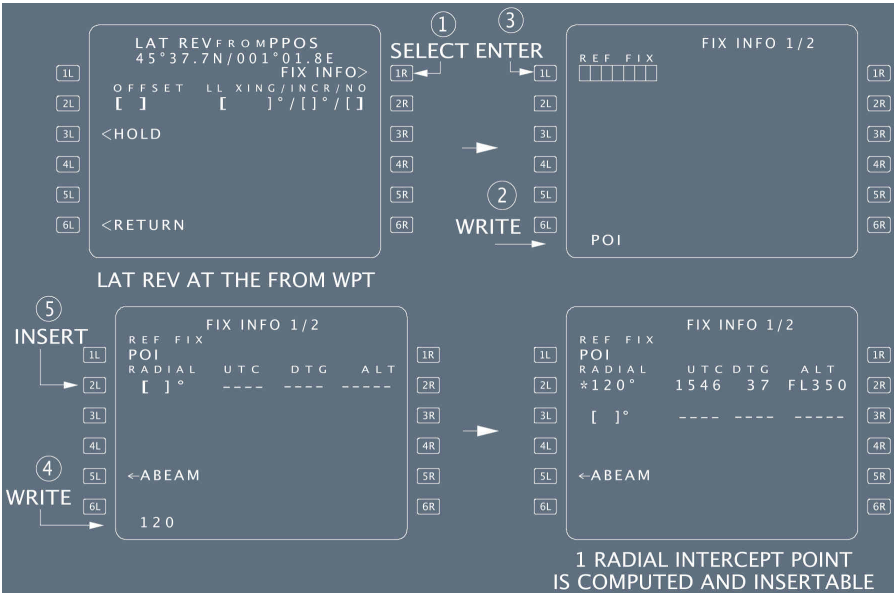
GENERAL

When using the FIX INFO function, the flight crew defines waypoint intersections of the flight plan with radials, circle or abeam associated to a fix.
When the flight crew inserts the intersection points, the system automatically identifies these points, but does not store them in the navigation database.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

INSERTING A RADIAL INTERCEPT WAYPOINT

The pilot accesses the radial intercept function from the lateral revision page at the origin or “from” waypoint.

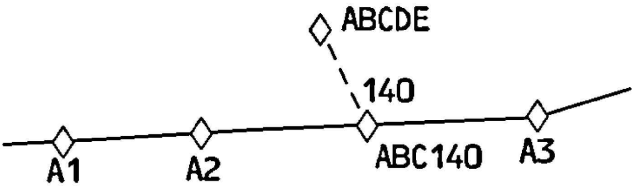


WRITE the reference fix identifier into the scratchpad. It may be any database or pilot-defined fix (here POI).
PRESS [1L].
WRITE the radial into the scratchpad (here 120 °).
PRESS [2L] for the first radial.

If the radial line intersects the active flight plan, the system computes the time, distance to go, and the altitude at the intersection point.
Up to 3 radials may be entered.

SELECT the required radial to insert the associated waypoint into the flight plan:

The system automatically assigns its IDENT as the 3 first characters of the reference fix IDENT, followed by the radial. (Example: ABC 140).



Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

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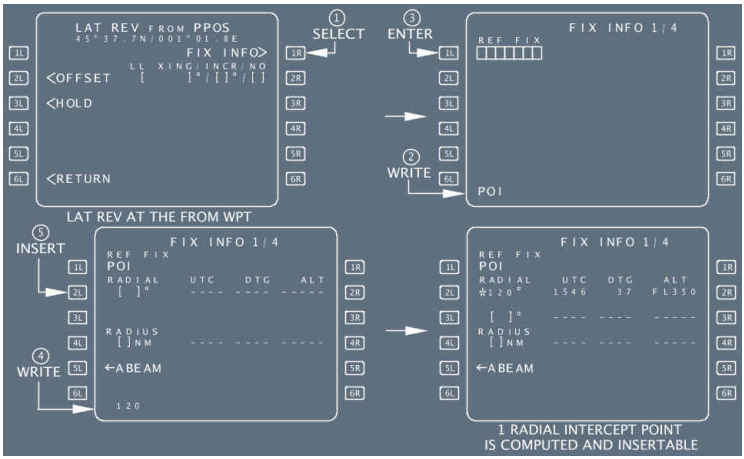
INSERTING A RADIAL INTERCEPT WAYPOINT

The flight crew accesses the radial intercept function from the lateral revision page at the origin or "from" waypoint.



WRITE the reference fix identifier into the scratchpad (here POI), and ENTER it [1L].

It may be any database or pilot-defined fix.

WRITE the radial into the scratchpad (here 120 °) and ENTER it [2L].

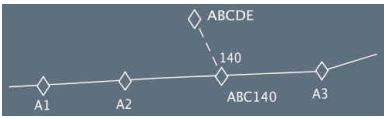
The defined radial appears as a blue dashed line on the ND.

If the radial line intersects the active flight plan, the system computes the time, distance to go, and the altitude at the intersection point.

Up to two radials can be entered.

SELECT the required radial to insert the associated waypoint into the flight plan (if needed):

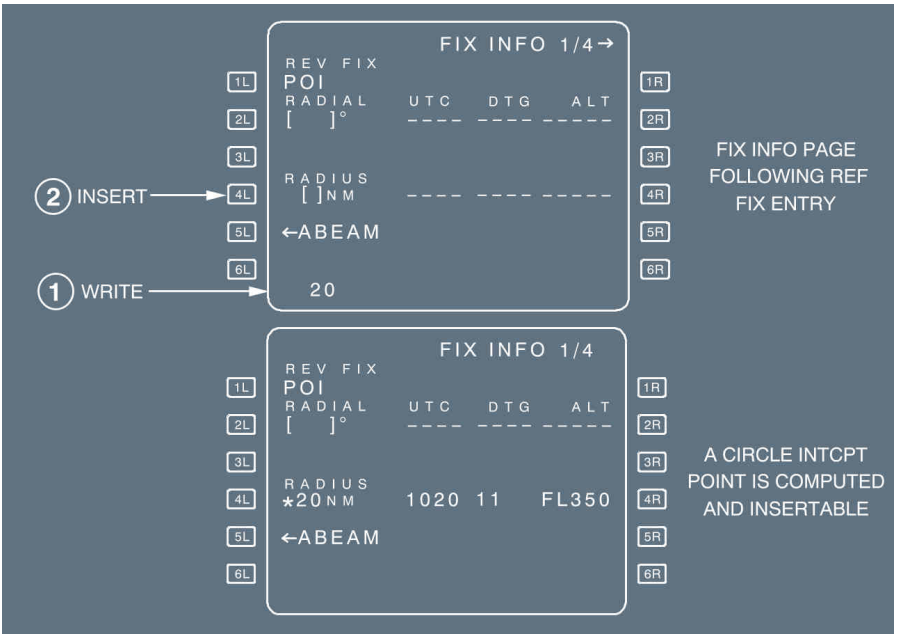
The system automatically assigns its IDENT as the three first characters of the reference fix IDENT, followed by the radial. (Example: ABC 140). The blue dashed line disappears from the ND.



Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

8

INSERTING A CIRCLE INTERCEPT WAYPOINT

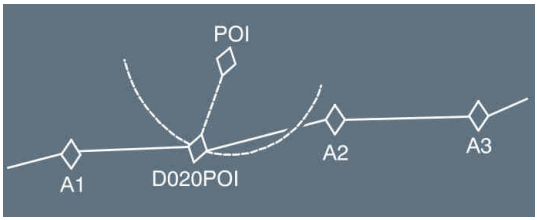


WRITE the reference fix identifier into the scratchpad (here POI), and ENTER it [1L].
WRITE the circle radius in the scratchpad (here 20 nm), and ENTER it [4L]:

The defined circle appears as a blue dashed circle on the ND. If the circle intersects the active flight plan, the system computes the time, along path distance to go and altitude at the first intersection point from the current aircraft position.

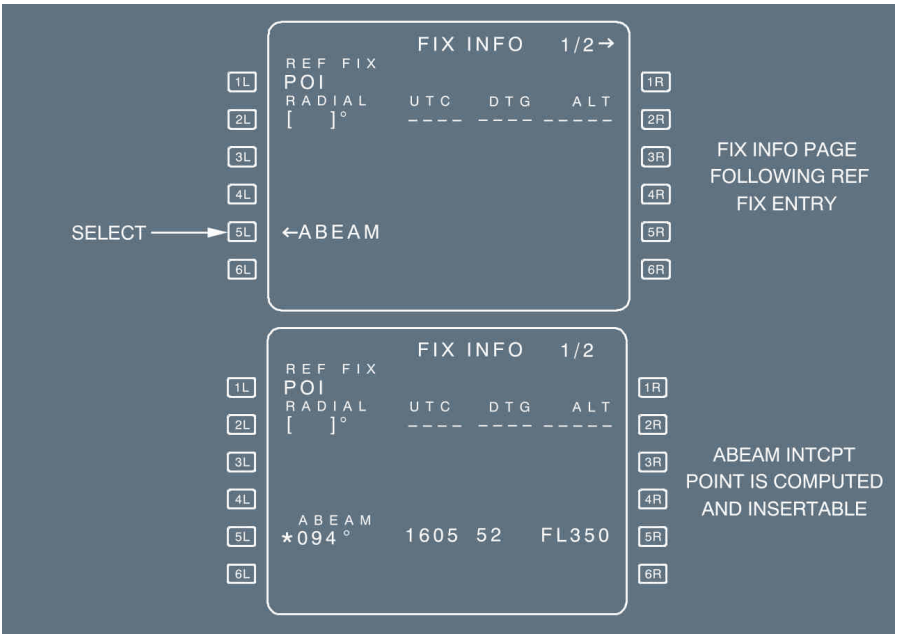
SELECT the required radius to insert the associated waypoint into the flight plan (if needed).

The system automatically assigns its IDENT as a D, followed by the radius, and followed by the three first characters of the reference fix IDENT (example D020 POI). The blue dashed circle disappears from the ND.



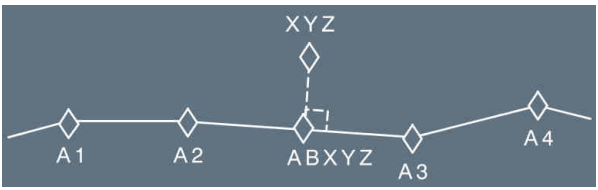
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

9 **INSERTING AN ABEAM INTERCEPT WAYPOINT**



WRITE the reference fix identifier into the scratchpad (here POI).
PRESS [1L].

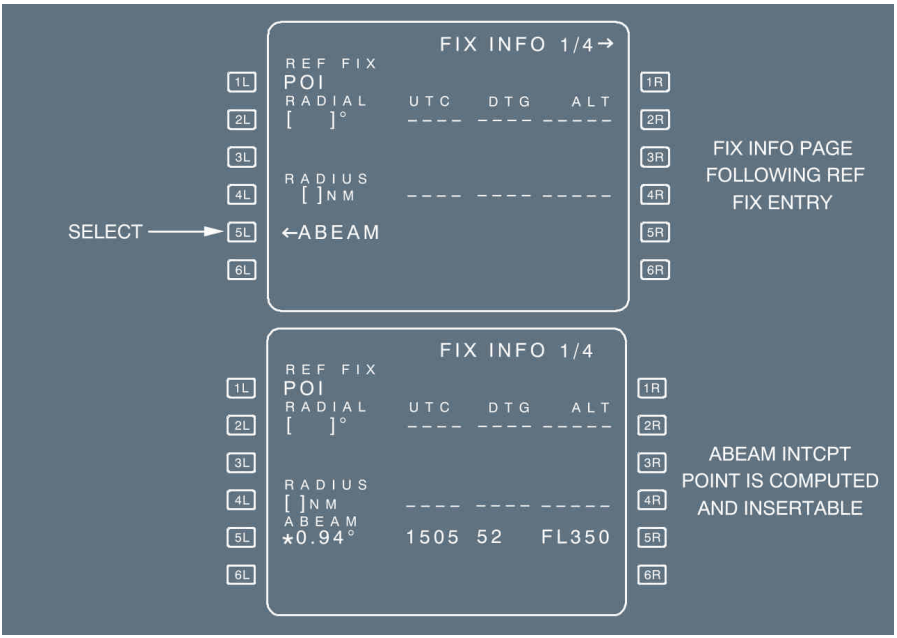
SELECT the ABEAM prompt: The system computes the radial, time, distance to go, altitude and predictions related to the waypoint abeam the reference fix.
SELECT [5L] to insert the abeam intercept waypoint into the flight plan: The system automatically assigns its identifier as AB, followed by the first five characters of the reference fix identifier (Example ABXYZ).



Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

10

INSERTING AN ABEAM INTERCEPT WAYPOINT



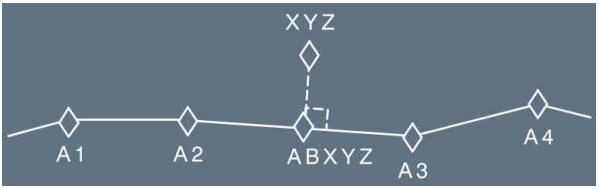
WRITE the reference fix identifier into the scratchpad (here POI), and ENTER it [1L]

SELECT the ABEAM prompt [5L]:

A blue dashed line from the reference fix and perpendicular to the flight plan appears on the ND. The system computes the radial, time, distance to go, altitude and predictions related to the waypoint abeam the reference fix.

SELECT [5L] to insert the abeam intercept waypoint into the flight plan (if needed):

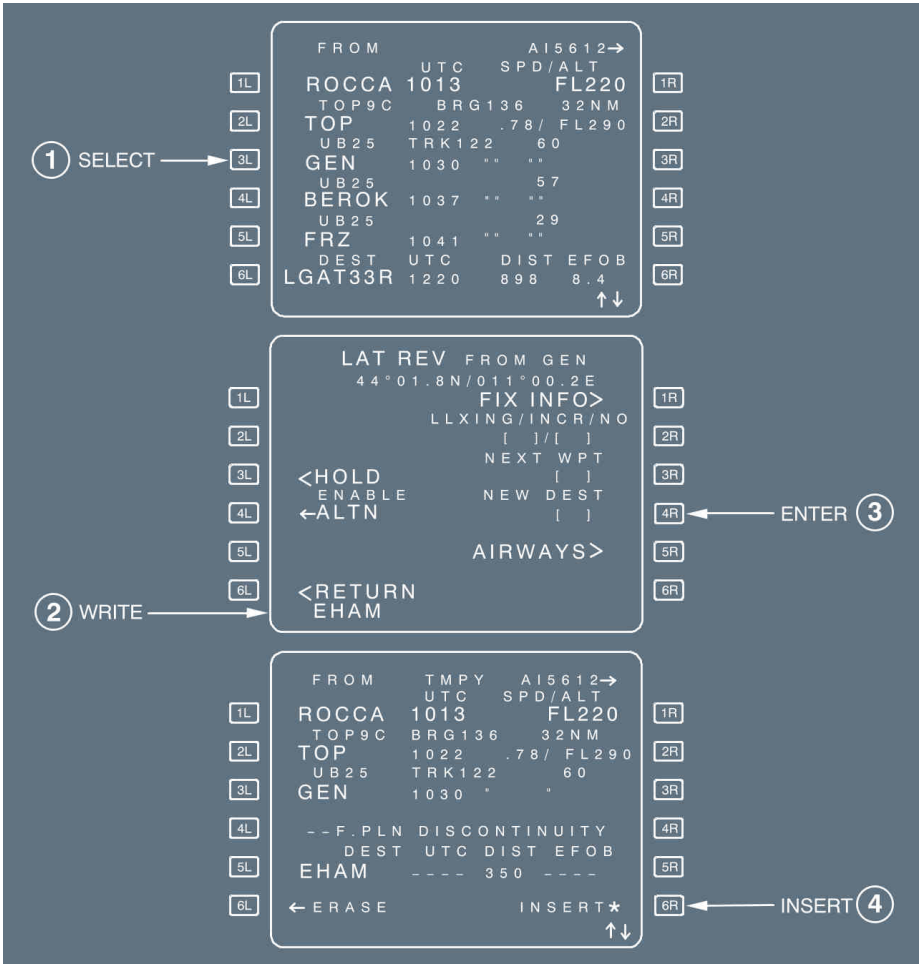
The system automatically assigns its identifier as AB, followed by the first five characters of the reference fix identifier (Example ABXYZ). The blue dashed line disappears from the ND.



INSERTING A NEW DESTINATION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

11 The pilot may define a new destination and insert it via the lateral revision page. The pilot may then call up the new destination from any waypoint along the flight plan, except the FROM waypoint, the destination, and the missed-approach waypoint. When the new destination has been inserted, a flight plan discontinuity appears between the revision waypoint and the new destination. All waypoints beyond the revision waypoint (including the previous destination and associated missed approach) are deleted.



SELECT the lateral revision function at an appropriate waypoint.
WRITE the new destination in the scratchpad.
Enter it in the brackets under “NEW DEST”.
INSERT the temporary flight plan ([6R] key), and complete the flight plan to the new destination.

HOLDING PATTERN

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

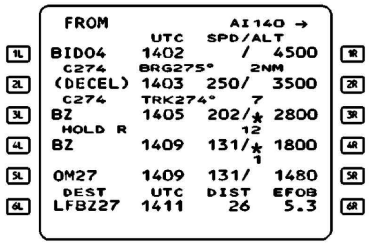
GENERAL

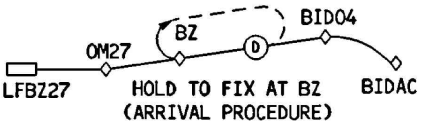
This section describes holding patterns, associated guidance and flight crew procedures.
The Flight Management and Guidance Computer (FMGC) has three types of holding patterns that the pilot can use in a flight plan.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

HOLD TO FIX (HF)

The holding pattern is always part of an arrival or departure procedure. The aircraft flies it once and then automatically exits the holding pattern at the fix. The predicted speed in the holding pattern is the lowest of the ICAO speed limit, max endurance speed, or any speed constraint. Guidance to the fix in the holding pattern is similar to that on any leg of a flight plan. The HF patterns are part of the navigation database and cannot be created by the crew.

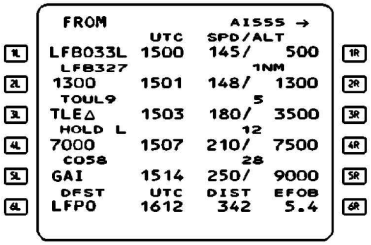


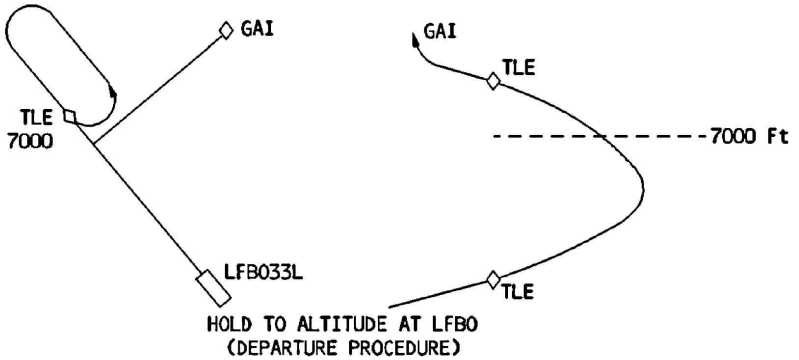


Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

HOLD TO ALTITUDE (HA)

The aircraft flies the hold until it reaches the specified altitude. Then, it automatically exits the hold at the fix.
The predicted speed for the holding pattern is the lowest of the ICAO speed limits, the max endurance speed, or any speed constraint.
The size of the holding pattern is a function of the predicted speed.
Guidance in a hold to altitude (HA) is similar to that for any leg of a flight plan.
The HAs are in the navigation database, as part of the arrival or departure procedures, and cannot be created by the crew.





Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTG, B-HTH, B-HTI

12 **HOLD WITH MANUAL TERMINATION (HM)**

This type of holding pattern may be part of an arrival procedure, or the pilot may enter it at the present position or at any flight plan waypoint.

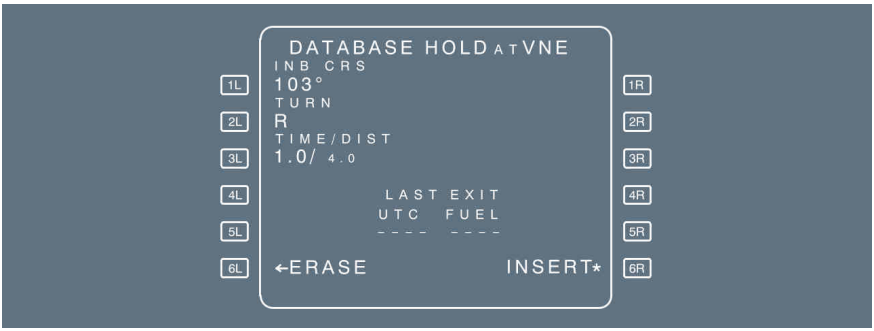
The pilot will use this type of holding pattern to comply with a defined procedure or a clearance limit, or to meet an operational need (such as losing altitude, holding for weather improvement, or absorbing an ATC delay).

This type of holding pattern is exited according to the pilot's decision, not automatically.

There are 3 types of HM.

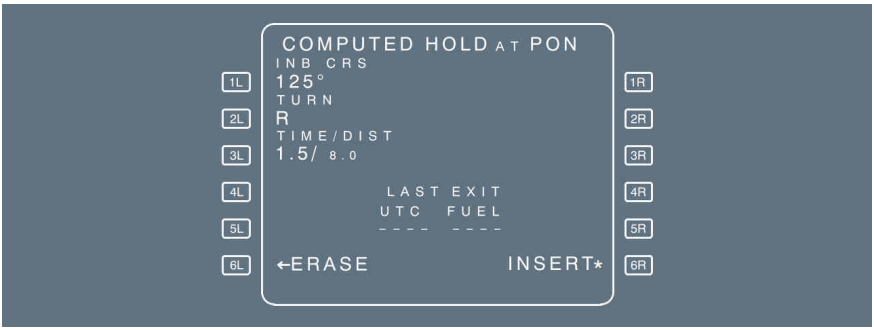
All are modifiable.

DATABASE HOLD



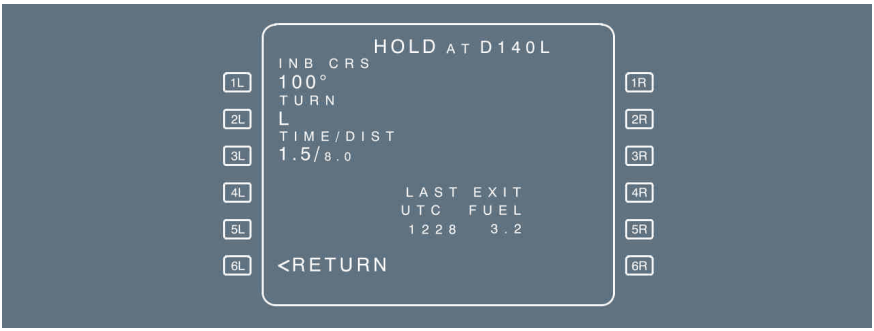
If the holding pattern is part of the database, it is named DATABASE HOLD and all its associated data (inbound course, turn direction, time/distance) are defined in the database. The flight crew can modify this data.

COMPUTED HOLD AT ...



If the holding pattern is not in the database, the FMGC designs a holding pattern and proposes it to the pilot. The associated data consists of default values that the pilot can modify.

HOLD AT ...

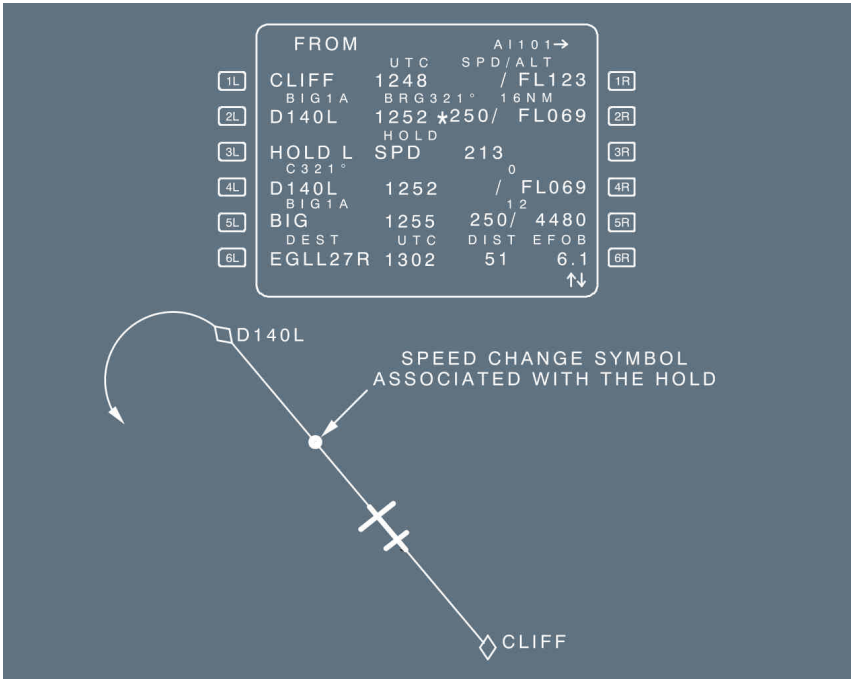


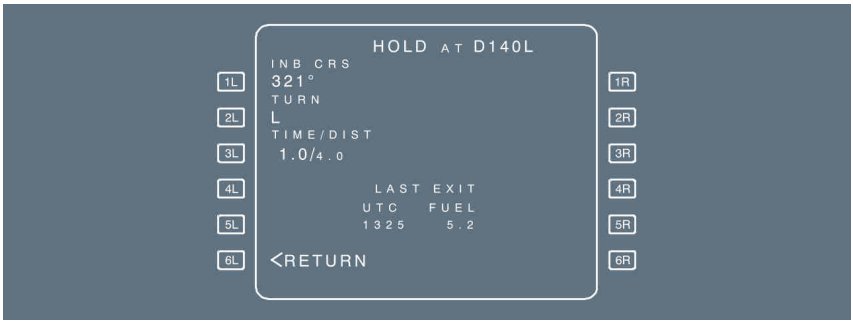
If the pilot inserts into the active flight plan a holding pattern that is manually-corrected from a hold defined by the FMGS, the screen displays a “HOLD AT...” page. The 2R field displays REVERT TO DATABASE or REVERT TO COMPUTED to restore the database data, if necessary.

PREDICTIONS AND GUIDANCE ASSOCIATED WITH A HM HOLDING PATTERN (HOLD WITH MANUAL TERMINATION)

Before deceleration

Although the hold is inserted into the flight plan, the FMGS does not take it into account for predictions until the aircraft enters the hold.
However, if the hold is not deleted by the crew, the FMGS schedules a deceleration point and displays it on the ND.





The FMGS predicts the estimated time and amount of fuel remaining at which the aircraft must exit holding, so as to comply with the fuel policy specified on the fuel prediction page. When the aircraft enters the holding pattern, the FMGS revises all predictions and assumes the aircraft will fly one turn of the holding pattern.
All predictions are revised for one more holding circuit at holding fix overfly.

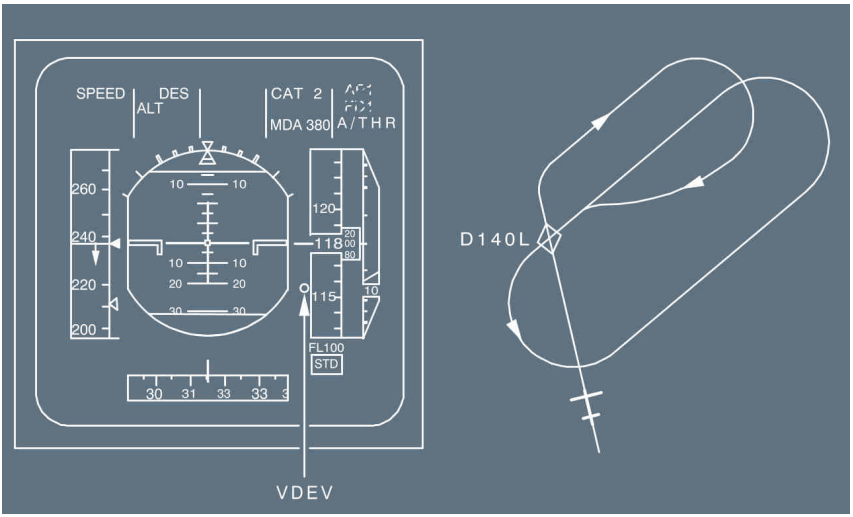
Upon reaching the speed change pseudo waypoint

The FMGS either causes the aircraft to decelerate to the hold speed (if managed speed is active and NAV mode engaged), or displays “SET HOLD SPD” (set hold speed) on the MCDU and primary flight display, if the flight crew had selected a speed target.

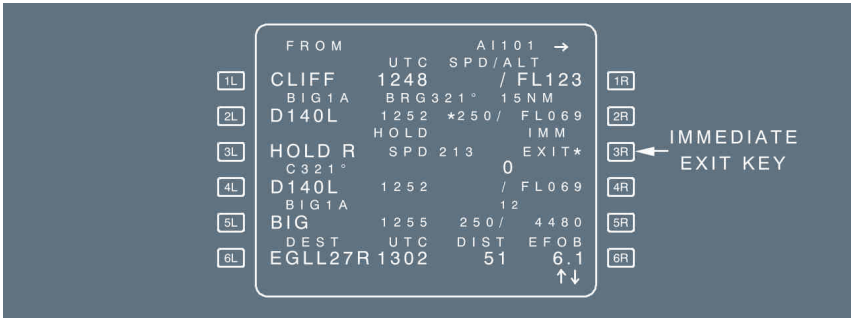
The default hold speed is the lowest of the:
- Maximum endurance speed
- ICAO limit holding speed
- Speed constraint (if any).

When no specific speed limit applies, the default hold speed is approximately equal to:
- Green Dot speed on the A318, A319, A320 (CFM) and A321
- Green Dot +20 kt on the A320 (IAE).

The flight plan predictions for time and fuel do not yet consider that the hold will be flown, however, the navigation display shows the hold entry and holding pattern trajectory.



Deceleration receives priority, so that when the aircraft is in descent with the descent mode engaged, it will deviate above the descent path to decelerate. (VDEV becomes positive on the progress page).
The flight plan page displays an immediate exit prompt.
If the flight crew presses the key next to “IMM EXIT” before arriving at the holding fix, the aircraft will not enter the holding pattern, but will resume its phase-related managed-speed profile.



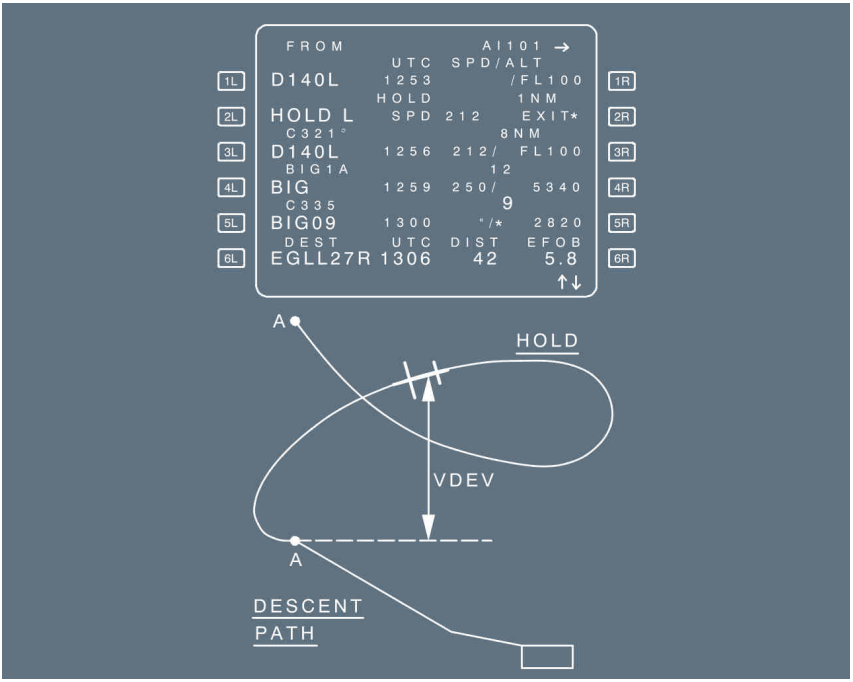
After reaching the hold entry fix

The aircraft enters the hold. The MCDU HOLD page displays the associated holding data:

- The inbound course (INB CRS)
- The TURN direction (L or R)
- The TIME/DIST
- The LAST EXIT time and the associated fuel to reach the alternate airport with no extra fuel.

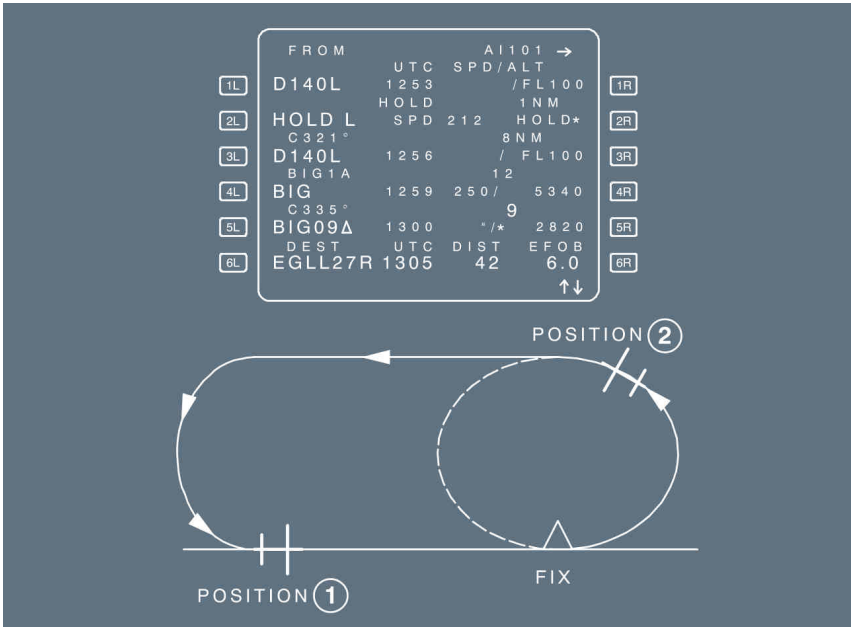
The FMS assumes that the aircraft will fly one turn of the holding pattern, and revises the predictions accordingly.
When the holding pattern is defined by a leg time (and not a leg distance), the system revises the size of the hold as a function of the target speed.

- If managed speed is active, the system uses the predicted holding speed to calculate the size of the holding pattern.
- If the selected speed is active, the system uses the target speed selected by the flight crew at the entry fix sequencing to calculate the size of the holding pattern.
- The VDEV displayed on the primary flight display and the PROG page when the aircraft is flying in the HM (hold pattern with manual termination) is the difference between the aircraft's current altitude and the altitude at which it should be when it reaches the hold exit fix in order to be correctly positioned on the descent path.



With IMM EXIT pressed (aircraft in the holding pattern)

The predictions and guidance assume that the aircraft is immediately returning to the hold fix. Sequencing the hold fix, the aircraft exits the holding pattern and resumes its navigation. The flight plan page displays “RESUME HOLD*” instead of “IMM EXIT*”.



HOLD EXIT PROCEDURE

Position (1) If “IMM EXIT” pressed, the aircraft will exit at the next fix overfly.
Position (2) If “IMM EXIT” pressed, the aircraft will make an immediate turn to the fix where the hold will be exited.

- **If managed speed is active:**

  The computer sets the target speed to the applicable speed of the current phase (for example, speed constraint, ECON speed, or speed limit).
  The computer then bases its predictions on the assumption that the flight will continue on the descent path, if the aircraft is in descent.

● **If DES mode is engaged:**

The following applies:

- The holding pattern is never included in the descent path computation.
- The flight crew cannot enter altitude and speed constraints at the hold exit fix. (This is only allowed at the hold entry fix).
- The vertical guidance in the HM, during the descent phase, calls for a constant -1 000 ft/min. But the computer considers altitude constraints that will take effect farther down the flight path as it calculates vertical guidance and predictions. The system will not allow the aircraft to descend below the next altitude constraint, neither the FCU selected altitude. If the aircraft reaches the next altitude constraint, it will level off and the altitude constraint mode will engage.

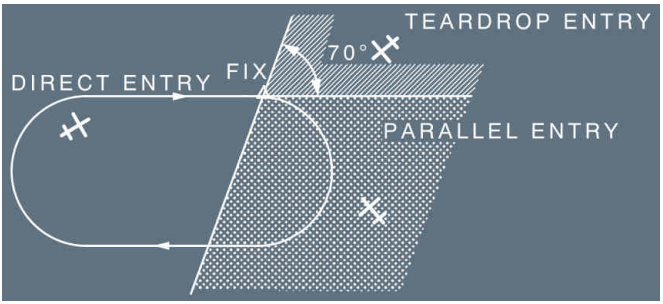
With RESUME HOLD pressed

If the flight crew presses the key next to “RESUME HOLD”, the aircraft remains in the holding pattern, and “IMM EXIT” is displayed again.
After that, each time the aircraft flies over the holding fix, the system updates the predictions for one more holding circuit.

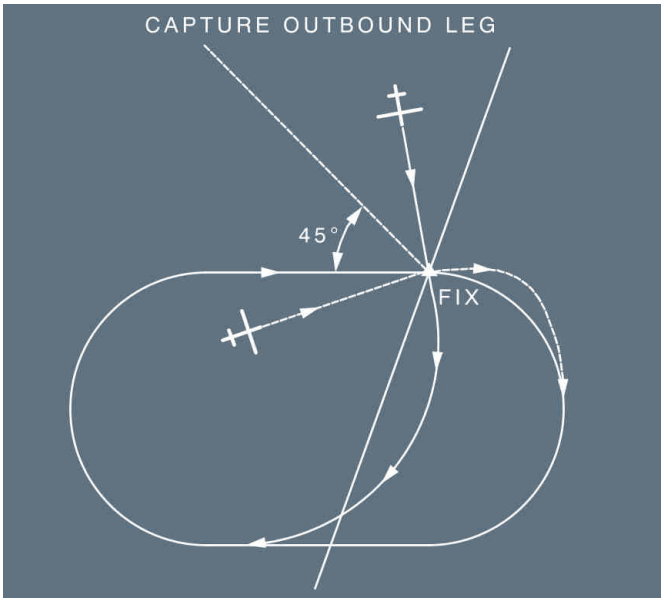
HOLDING PATTERN ENTRIES

The FMGS offers three types of entry into holding patterns:

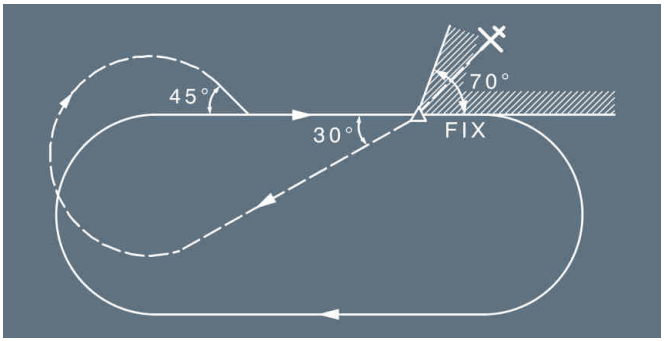
1. Direct entry
2. Teardrop entry
3. Parallel entry



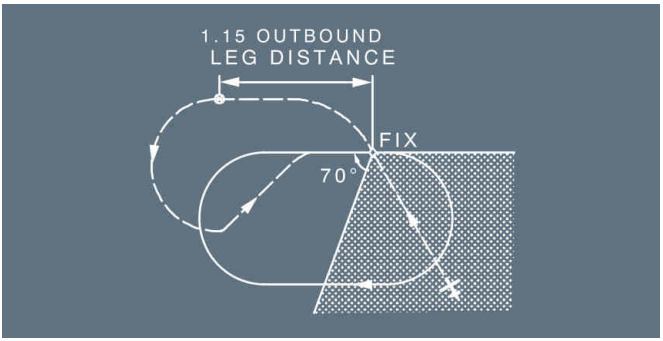
1. The direct entry



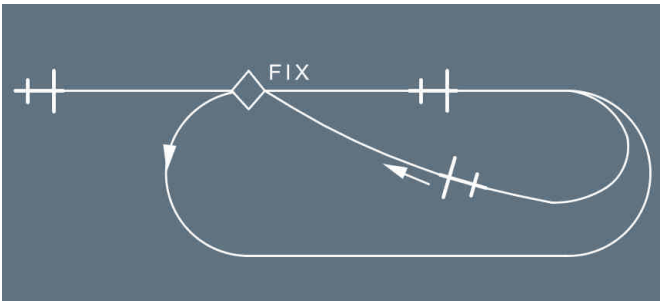
2. The teardrop entry



3. The parallel entry



Note: *If the leg the aircraft is flying toward the holding fix is on a "limit" between a teardrop entry and a parallel entry, the FMGC may compute and display either of the two entries. The pilot should keep this in mind and should not assume that the FMGC is malfunctioning.*
If the flight plan leg toward the hold entry fix is on a course that is the reciprocal of the inbound course of the holding pattern, the aircraft will fly a parallel entry.



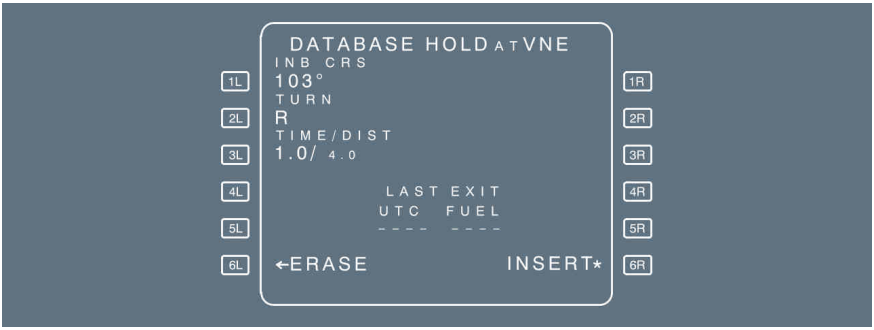
Applicable to: B-HSO, B-HSP

13 **HOLD WITH MANUAL TERMINATION (HM)**

This type of holding pattern may be part of an arrival procedure, or the pilot may enter it at the present position or at any flight plan waypoint.
The pilot will use this type of holding pattern to comply with a defined procedure or a clearance limit, or to meet an operational need (such as losing altitude, holding for weather improvement, or absorbing an ATC delay).
This type of holding pattern is exited according to the pilot's decision, not automatically.
There are 3 types of HM.

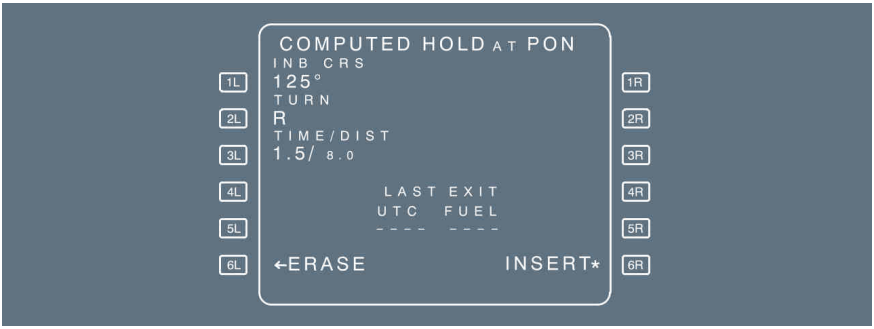
All are modifiable.

DATABASE HOLD



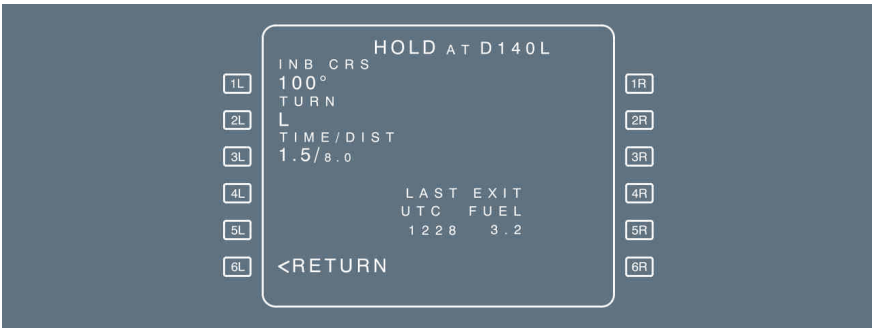
If the holding pattern is part of the database, it is named DATABASE HOLD and all its associated data (inbound course, turn direction, time/distance) are defined in the database. The flight crew can modify this data.

COMPUTED HOLD AT...



If the holding pattern is not in the database, the FMGC designs a holding pattern and proposes it to the pilot. The associated data consists of default values that the pilot can modify.

HOLD AT...

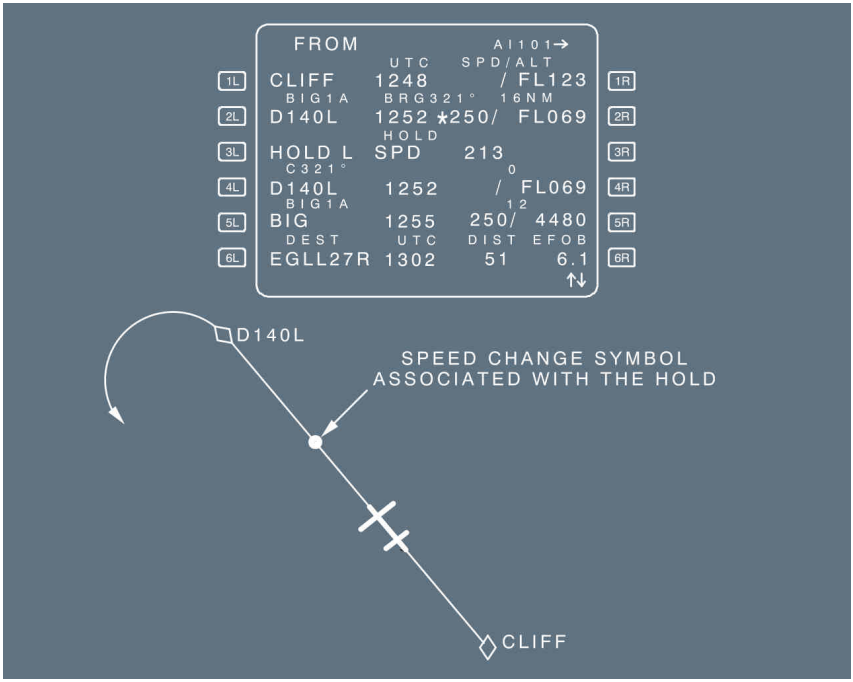


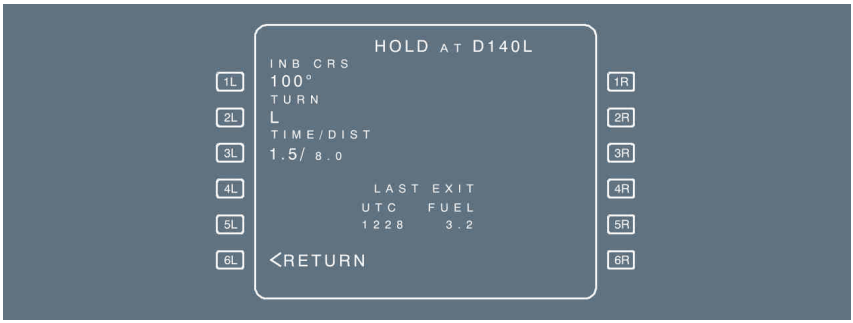
If the pilot inserts into the active flight plan a holding pattern that is manually-corrected from a hold defined by the FMGS, the screen displays a “HOLD AT...” page. The 2R field displays REVERT TO DATABASE or REVERT TO COMPUTED to restore the database data, if necessary.

PREDICTIONS AND GUIDANCE ASSOCIATED WITH A HM HOLDING PATTERN (HOLD WITH MANUAL TERMINATION)

Before deceleration

Although the hold is inserted into the flight plan, the FMGS does not take it into account for predictions until the aircraft enters the hold.
However, if the hold is not deleted by the crew, the FMGS schedules a deceleration point and displays it on the ND.





The FMGS predicts the estimated time and amount of fuel remaining at which the aircraft must exit holding, so as to comply with the fuel policy specified on the fuel prediction page. When the aircraft enters the holding pattern, the FMGS revises all predictions and assumes the aircraft will fly one turn of the holding pattern.
All predictions are revised for one more holding circuit at holding fix overfly.

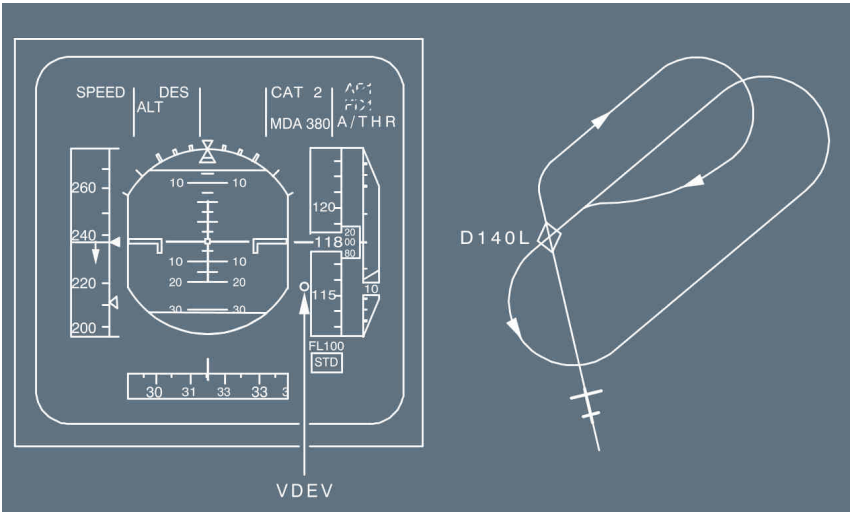
Upon reaching the speed change pseudo waypoint

The FMGS either causes the aircraft to decelerate to the hold speed (if managed speed is active and NAV mode engaged), or displays “SET HOLD SPD” (set hold speed) on the MCDU and primary flight display, if the flight crew had selected a speed target.

The default hold speed is the lowest of the:
- Maximum endurance speed
- ICAO limit holding speed
- Speed constraint (if any).

When no specific speed limit applies, the default hold speed is approximately equal to:
- Green Dot speed on the A318, A319, A320 (CFM) and A321
- Green Dot + 20 kt for altitude lower than 20 000 ft, on the A320 (IAE).
- Green Dot + 5 kt for altitude bigger than 20 000 ft, on the A320 (IAE).

The flight plan predictions for time and fuel do not yet consider that the hold will be flown, however, the navigation display shows the hold entry and holding pattern trajectory.



Deceleration receives priority, so that when the aircraft is in descent with the descent mode engaged, it will deviate above the descent path to decelerate. (VDEV becomes positive on the progress page).
The flight plan page displays an immediate exit prompt.

If the flight crew presses the key next to “IMM EXIT” before arriving at the holding fix, the aircraft will not enter the holding pattern, but will resume its phase-related managed-speed profile.

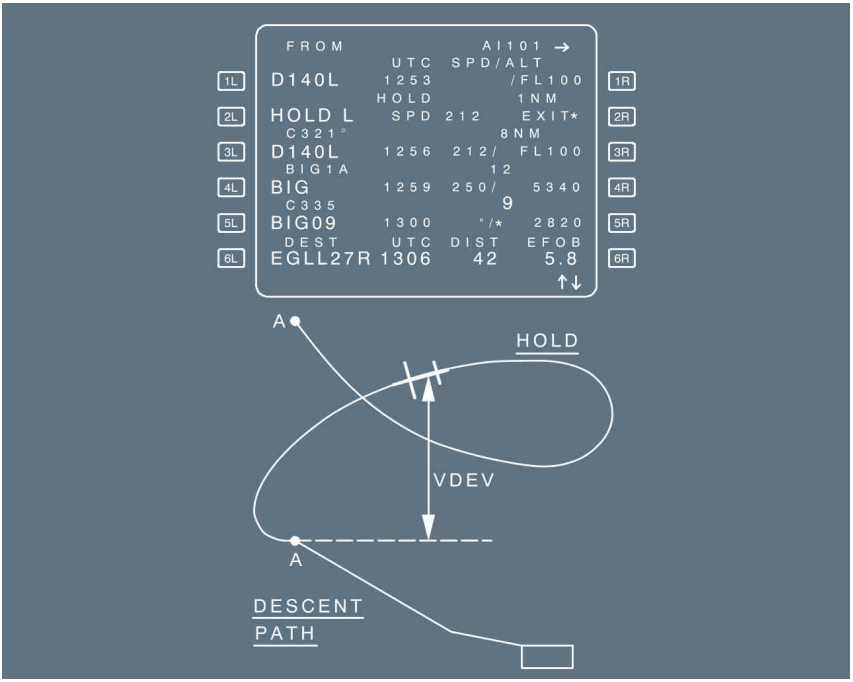


After reaching the hold entry fix

The aircraft enters the hold. The MCDU HOLD page displays the associated holding data:
- The inbound course (INB CRS)
- The TURN direction (L or R)
- The TIME/DIST
- The LAST EXIT time and the associated fuel to reach the alternate airport with no extra fuel.

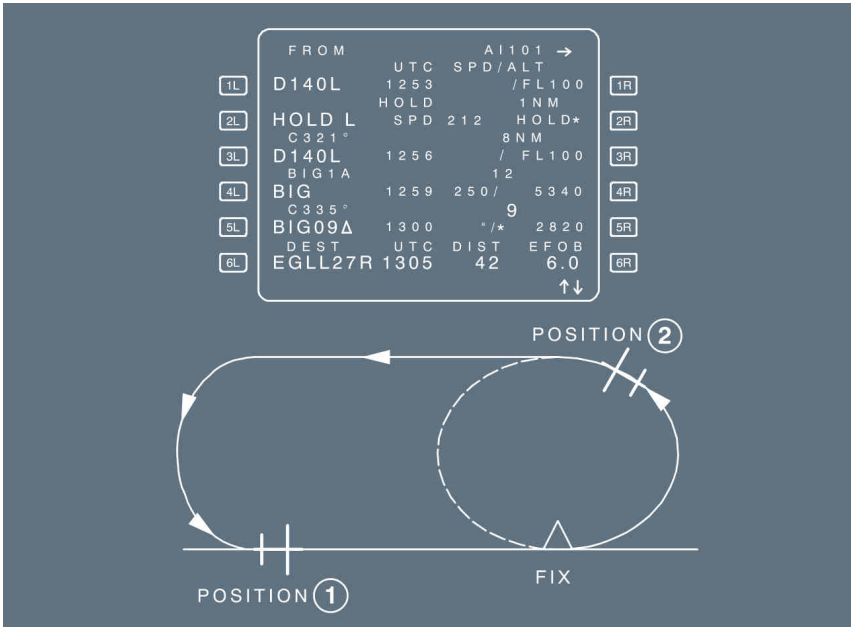
The FMS assumes that the aircraft will fly one turn of the holding pattern, and revises the predictions accordingly.
When the holding pattern is defined by a leg time (and not a leg distance), the system revises the size of the hold as a function of the target speed.

- If managed speed is active, the system uses the predicted holding speed to calculate the size of the holding pattern.
- If the selected speed is active, the system uses the target speed selected by the flight crew at the entry fix sequencing to calculate the size of the holding pattern.
- The VDEV displayed on the primary flight display and the PROG page when the aircraft is flying in the HM (hold pattern with manual termination) is the difference between the aircraft's current altitude and the altitude at which it should be when it reaches the hold exit fix in order to be correctly positioned on the descent path.



With IMM EXIT pressed (aircraft in the holding pattern)

The predictions and guidance assume that the aircraft is immediately returning to the hold fix. Sequencing the hold fix, the aircraft exits the holding pattern and resumes its navigation. The flight plan page displays “RESUME HOLD*” instead of “IMM EXIT*”.



HOLD EXIT PROCEDURE

Position (1) If “IMM EXIT” pressed, the aircraft will exit at the next fix overfly.
Position (2) If “IMM EXIT” pressed, the aircraft will make an immediate turn to the fix where the hold will be exited.

- **If managed speed is active:**

  The computer sets the target speed to the applicable speed of the current phase (for example, speed constraint, ECON speed, or speed limit).
  The computer then bases its predictions on the assumption that the flight will continue on the descent path, if the aircraft is in descent.

● **If DES mode is engaged:**

The following applies:

- The holding pattern is never included in the descent path computation.
- The flight crew cannot enter altitude and speed constraints at the hold exit fix. (This is only allowed at the hold entry fix).
- The vertical guidance in the HM, during the descent phase, calls for a constant -1 000 ft/min. But the computer considers altitude constraints that will take effect farther down the flight path as it calculates vertical guidance and predictions. The system will not allow the aircraft to descend below the next altitude constraint, neither the FCU selected altitude. If the aircraft reaches the next altitude constraint, it will level off and the altitude constraint mode will engage.

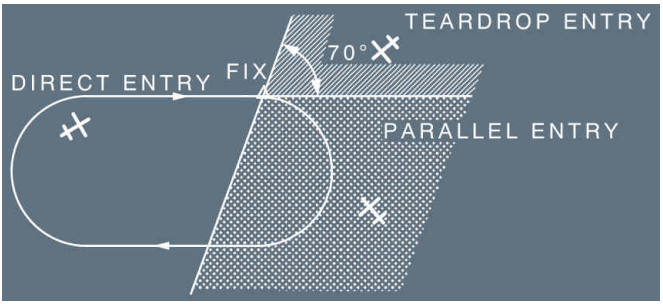
With RESUME HOLD pressed

If the flight crew presses the key next to “RESUME HOLD”, the aircraft remains in the holding pattern, and “IMM EXIT” is displayed again.
After that, each time the aircraft flies over the holding fix, the system updates the predictions for one more holding circuit.

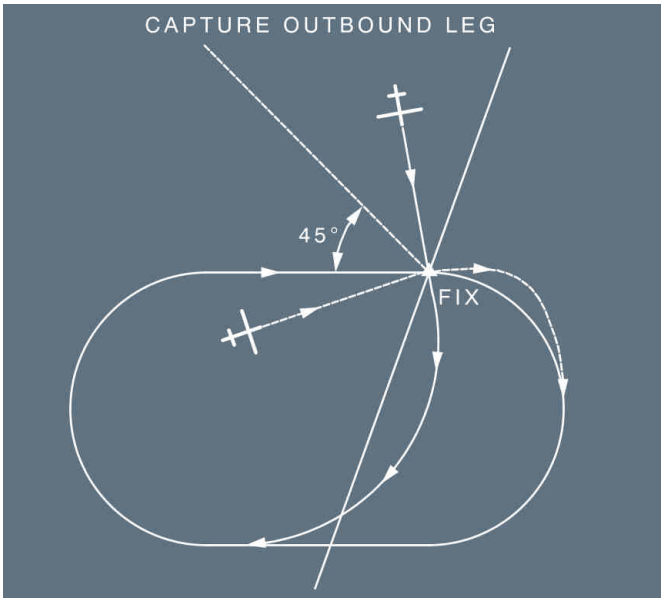
HOLDING PATTERN ENTRIES

The FMGS offers three types of entry into holding patterns:

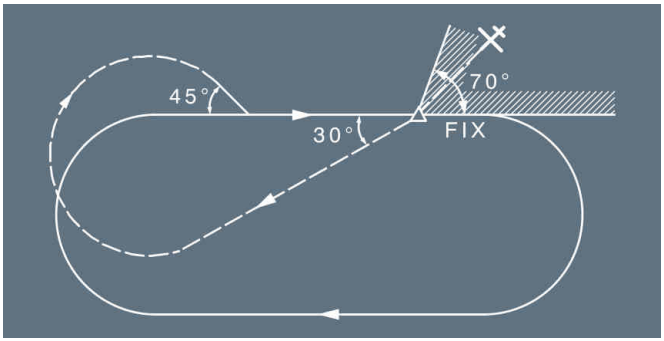
1. Direct entry
2. Teardrop entry
3. Parallel entry



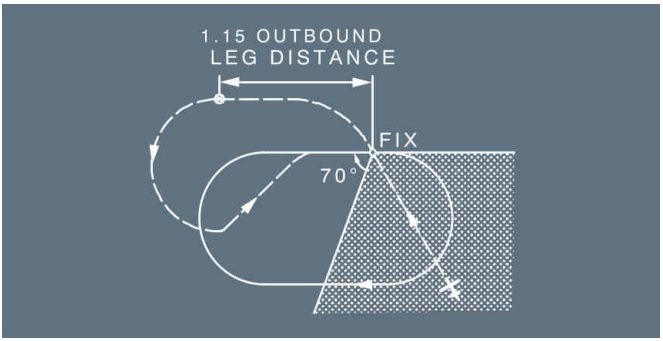
1. The direct entry



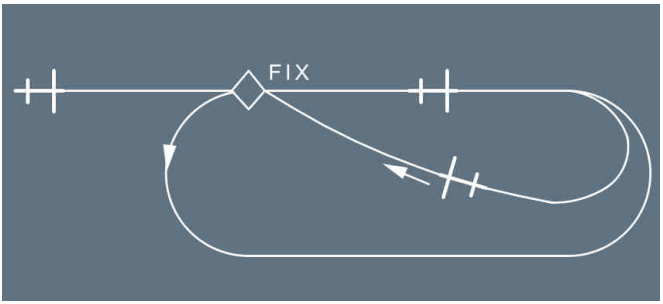
2. The teardrop entry



3. The parallel entry



Note: *If the leg the aircraft is flying toward the holding fix is on a "limit" between a teardrop entry and a parallel entry, the FMGC may compute and display either of the two entries. The pilot should keep this in mind and should not assume that the FMGC is malfunctioning.*
If the flight plan leg toward the hold entry fix is on a course that is the reciprocal of the inbound course of the holding pattern, the aircraft will fly a parallel entry.



Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

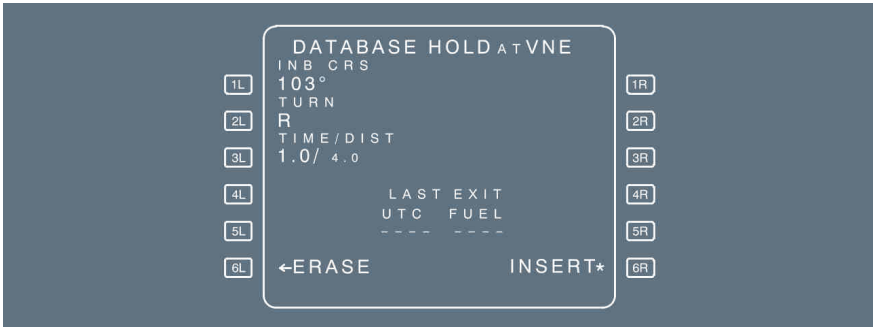
14

HOLD WITH MANUAL TERMINATION (HM)

This type of holding pattern may be part of an arrival procedure, or the pilot may enter it at the present position or at any flight plan waypoint.
The pilot will use this type of holding pattern to comply with a defined procedure or a clearance limit, or to meet an operational need (such as losing altitude, holding for weather improvement, or absorbing an ATC delay).
This type of holding pattern is exited according to the pilot's decision, not automatically.

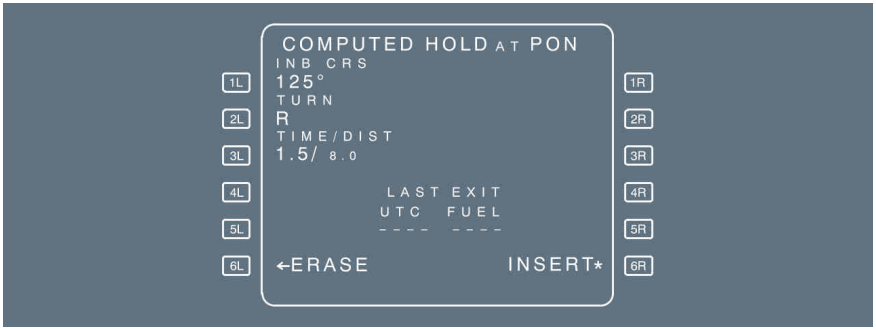
There are 3 types of HM.
All are modifiable.

DATABASE HOLD



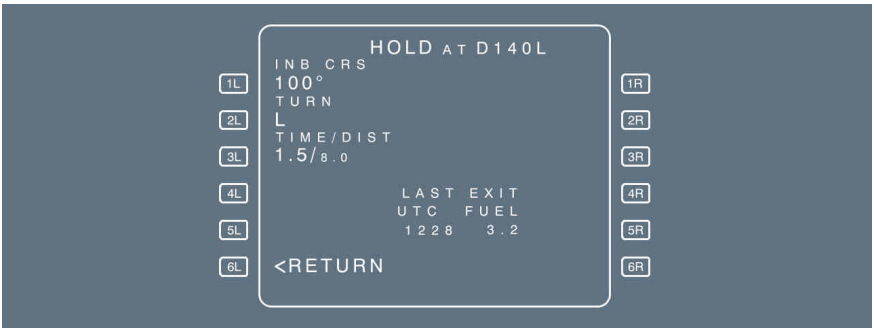
If the holding pattern is part of the database, it is named DATABASE HOLD and all its associated data (inbound course, turn direction, time/distance) are defined in the database. The flight crew can modify this data.

COMPUTED HOLD AT...



If the holding pattern is not in the database, the FMGC designs a holding pattern and proposes it to the pilot. The associated data consists of default values that the pilot can modify.

HOLD AT...

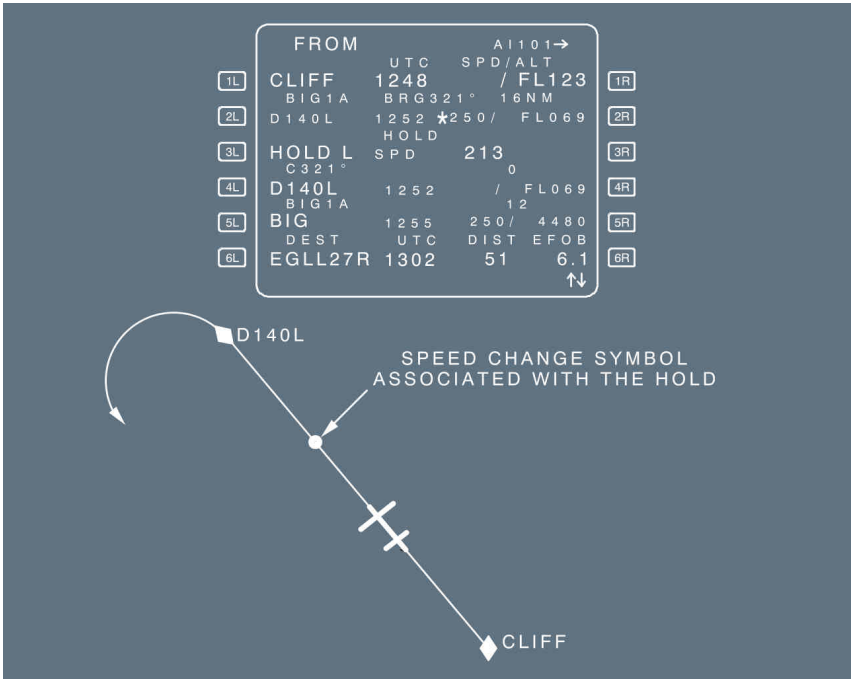


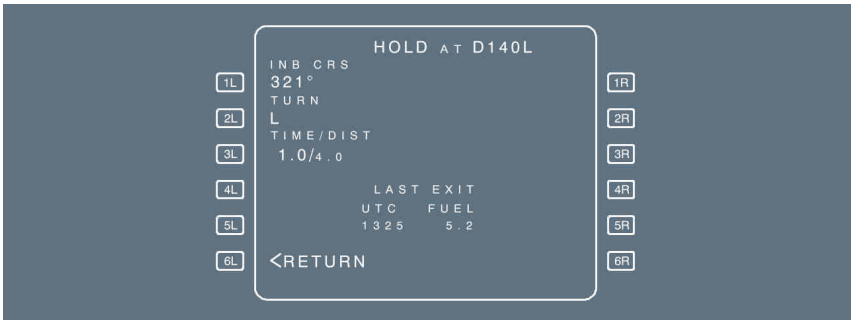
If the pilot inserts into the active flight plan a holding pattern that is manually-corrected from a hold defined by the FMGS, the screen displays a “HOLD AT...” page. The 2R field displays REVERT TO DATABASE or REVERT TO COMPUTED to restore the database data, if necessary.

PREDICTIONS AND GUIDANCE ASSOCIATED WITH A HM HOLDING PATTERN (HOLD WITH MANUAL TERMINATION)

Before deceleration

If an altitude constraint is defined at the hold entry fix, then the FMS duplicates this constraint on the hold exit.
However, different constraints may be inserted at entry and exit fixes.
Although the hold is inserted into the flight plan, the FMGS does not take it into account for predictions until the aircraft enters the hold.
However, if the hold is not deleted by the crew, the FMGS schedules a deceleration point and displays it on the ND.





The FMGS predicts the estimated time and amount of fuel remaining at which the aircraft must exit holding, so as to comply with the fuel policy specified on the fuel prediction page. When the aircraft enters the holding pattern, the FMGS revises all predictions and assumes the aircraft will fly one turn of the holding pattern.
All predictions are revised for one more holding circuit at holding fix overfly.

Upon reaching the speed change pseudo waypoint

The FMGS either causes the aircraft to decelerate to the hold speed (if managed speed is active and NAV mode engaged), or displays “SET HOLD SPD” (set hold speed) on the MCDU and primary flight display, if the flight crew had selected a speed target.

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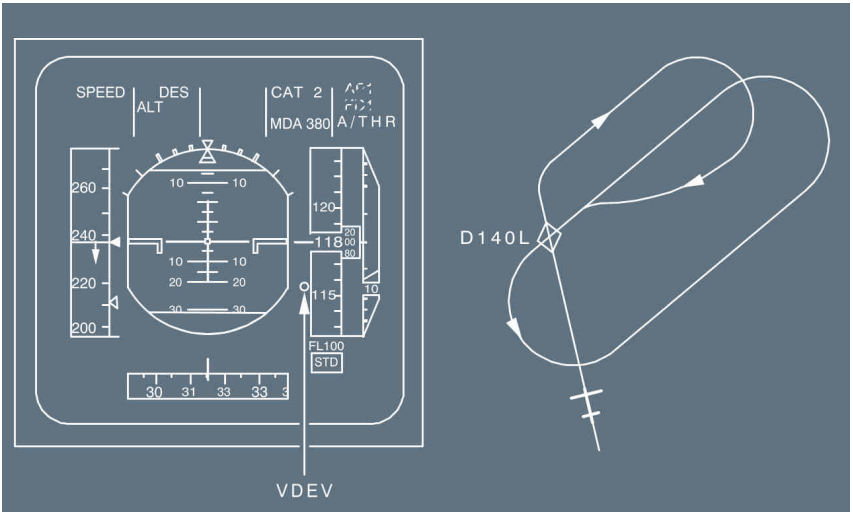

Deceleration receives priority, so that when the aircraft is in descent with the descent mode engaged, it will deviate above the descent path to decelerate. (VDEV becomes positive on the progress page).
The flight plan page displays an immediate exit prompt.

If the flight crew presses the key next to “IMM EXIT” before arriving at the holding fix, the aircraft will not enter the holding pattern, but will resume its phase-related managed-speed profile.



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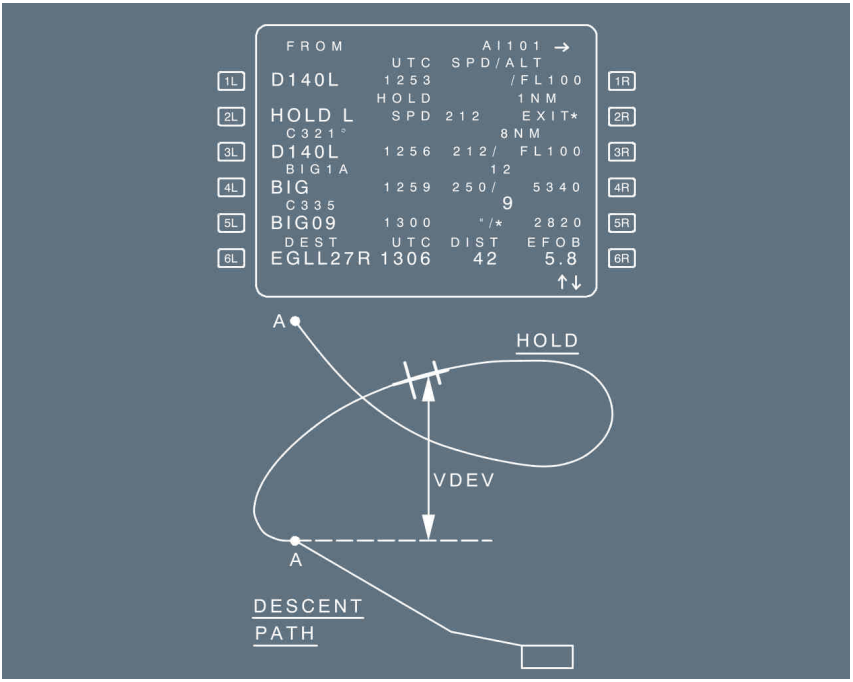

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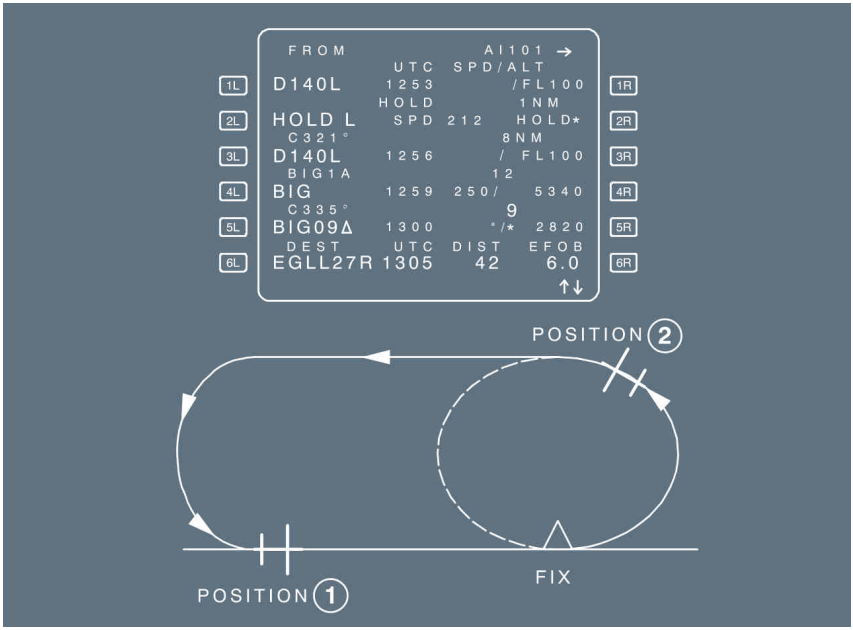

HOLD EXIT PROCEDURE

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  The computer then bases its predictions on the assumption that the flight will continue on the descent path, if the aircraft is in descent.

● **If DES mode is engaged:**

The following applies:

- The holding pattern is never included in the descent path computation.
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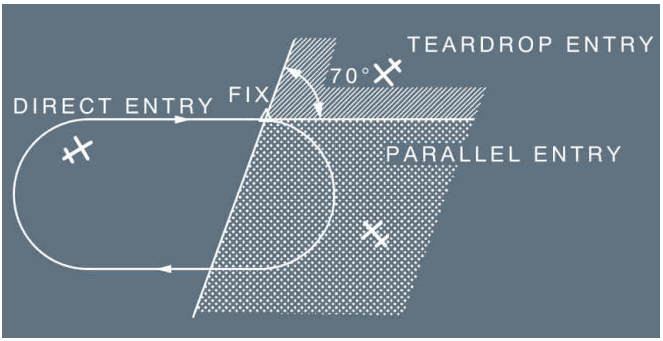
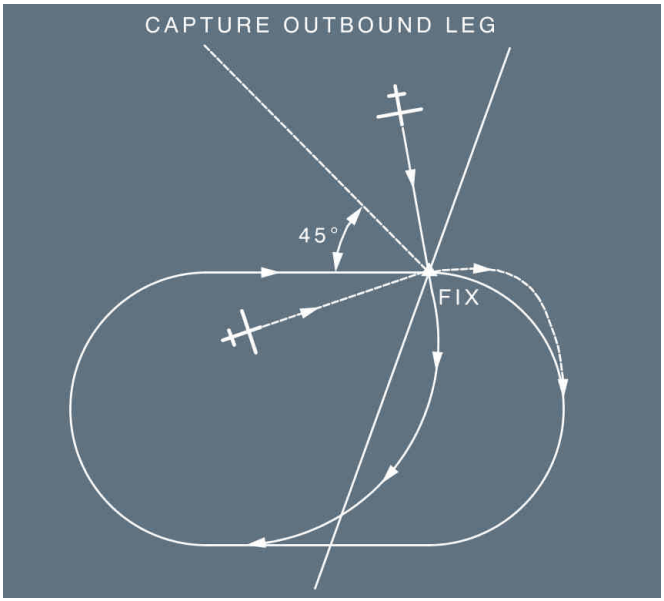
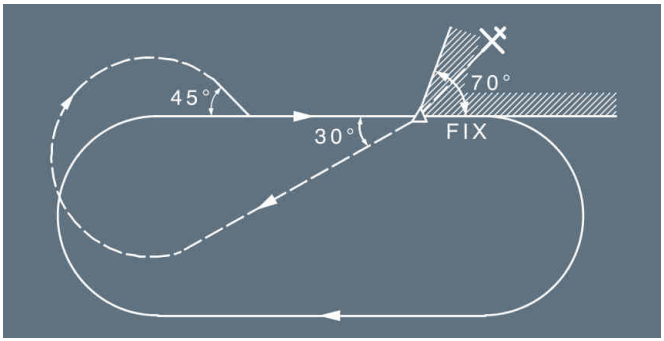


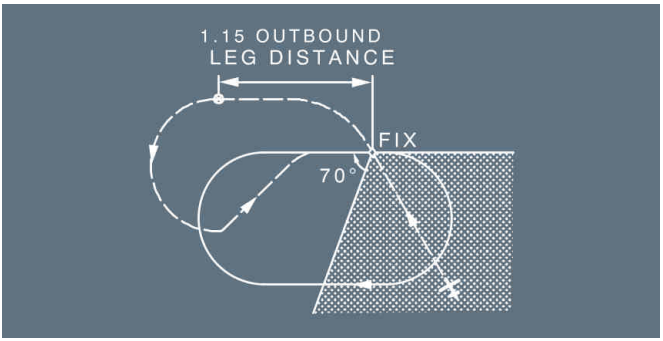
1. The direct entry



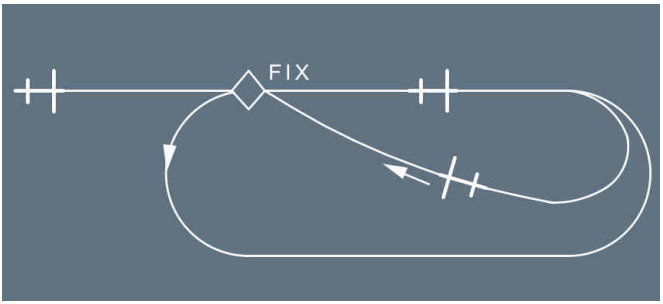
2. The teardrop entry



3. The parallel entry



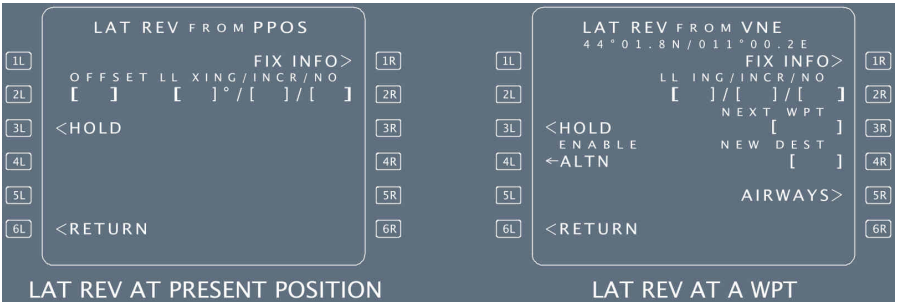
Note: *If the leg the aircraft is flying toward the holding fix is on a "limit" between a teardrop entry and a parallel entry, the FMGC may compute and display either of the two entries. The pilot should keep this in mind and should not assume that the FMGC is malfunctioning.*
If the flight plan leg toward the hold entry fix is on a course that is the reciprocal of the inbound course of the holding pattern, the aircraft will fly a parallel entry.



Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

PROCEDURE TO INSERT A HOLD (HOLD WITH MANUAL TERMINATION)

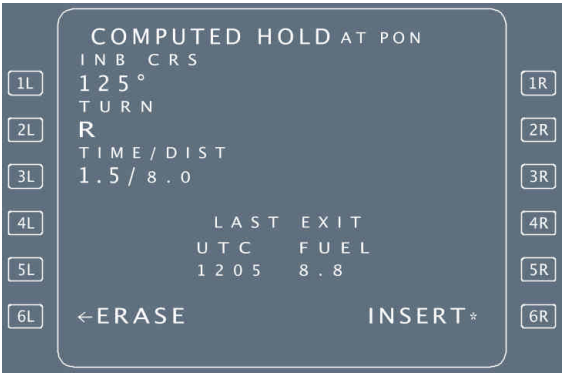
The HOLD prompt allows the flight crew to enter a hold with manual termination (HM), at the revised waypoint or at the present position.
The flight crew accesses the HOLD page from a lateral revision at the present position (PPOS) or at a waypoint.



SELECT lateral revision at present position (PPOS), or an applicable waypoint.
PRESS the HOLD prompt [3L].

A TMPY F-PLN is created and if applicable, the database hold is proposed.
If no database hold is available, the computed hold is proposed.

CHECK and (if necessary) MODIFY the HOLD data.
CHECK the temporary flight plan and INSERT it, if appropriate.



Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

PROCEDURE TO DELETE A HOLD (HOLD WITH MANUAL TERMINATION)

CLEAR the HOLD directly in the flight plan, as can be done for a normal waypoint.

OFFSET

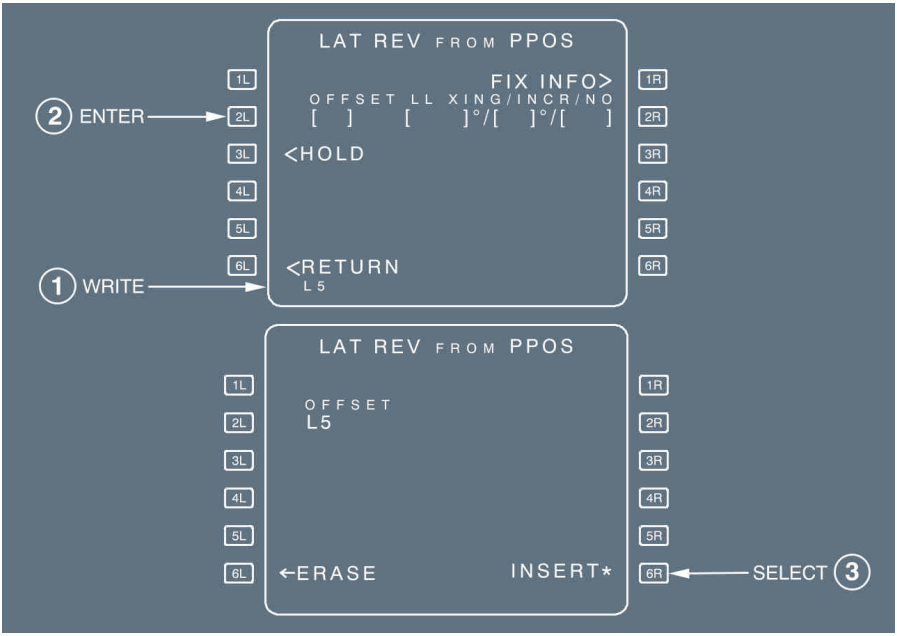
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

15 ## GENERAL

Offset allows the pilot to define a lateral offset to the left or right of the active flight plan. Once inserted, the offset applies from the present position (PPOS) all along the flight plan to the first waypoint (WPT) at which a holding pattern is defined, or to the last waypoint before the runway.
In most cases, the pilot will use it enroute because of an ATC clearance, or to avoid bad weather expected along the flight plan route.
Accessed from lateral revision (LAT REV) at the present position page, an offset may be defined between 1 and 50 nm in one-nautical-mile steps.
After inserting the offset in the flight plan, the flight plan page shows OFST in its title, and the navigation display shows the offset flight plan with a solid green line and the original flight plan with a dashed green line.

The offset is cleared:
- Automatically (holding pattern, approach), or
- Manually with the clear (CLR) key.

Note: *If the pilot enters an OFFSET when the aircraft is too close to the TO waypoint, the FMGS may refuse to accept it, in which case the MCDU displays the "ENTRY OUT OF RANGE" message.*



Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

16

GENERAL

Offset allows the flight crew to define on offset of the active flight plan. The offset can be immediate or deferred to start on a downstream leg. The offset will end by default or at a pre-planned end waypoint. Additionally, the flight crew can specify the intercept angle used for the transitions to and from the offset path.

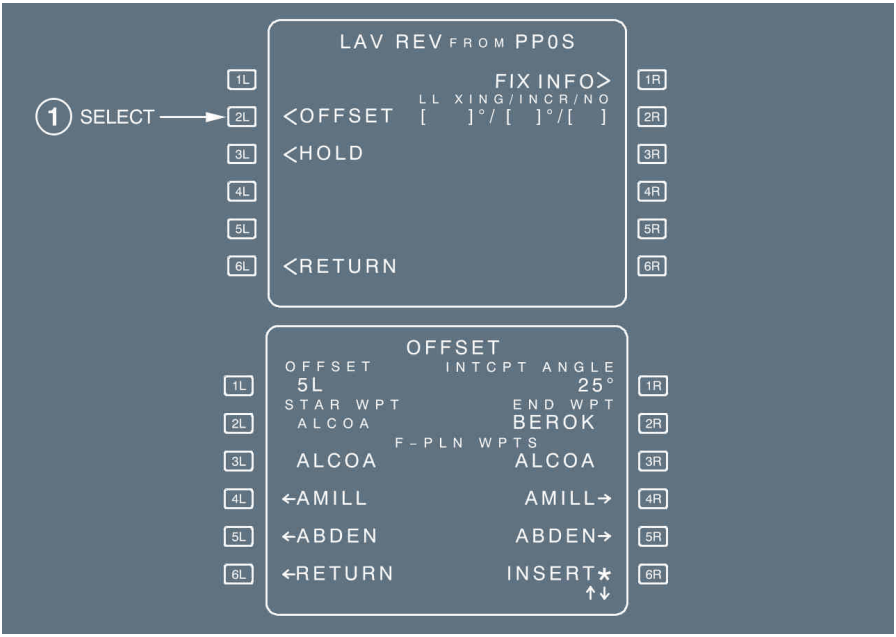
In most cases, the pilot will use it enroute because of an ATC clearance, or to avoid bad weather expected along the flight plan route.

This page is accessed from LAT REV page at the FROM waypoint or at any waypoint downpath the flight plan, except the destination airport.

After inserting the offset in the flight plan, the flight plan page shows OFST in its title, left or right arrows are displayed on every label line between the start and end waypoints of the offset, and the navigation display shows the offset flight plan with a solid green line and the original flight plan with a dashed green line.

The offset is cleared:
- Automatically (holding pattern, approach), or
- Manually with the clear (CLR) key, or by entering “o” in the offset value field [1L] or by using the delete prompt in the OFFSET page.

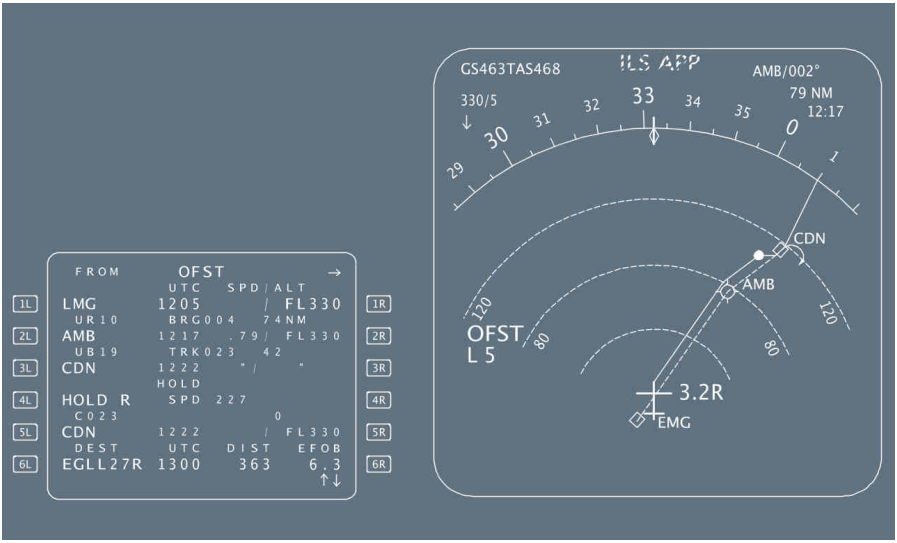
Note: If the pilot enters an OFFSET when the aircraft is too close to the TO waypoint, the FMGS may refuse to accept it, in which case the MCDU displays the “ENTRY OUT OF RANGE” message.



Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

INSERTING AN OFFSET

SELECT LAT REV at present position (PPOS).
WRITE the required offset value and direction (for example, L5 or 5L).
PRESS [2L] to enter the offset into the OFFSET field.
PRESS [6R] to activate the OFFSET.



Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

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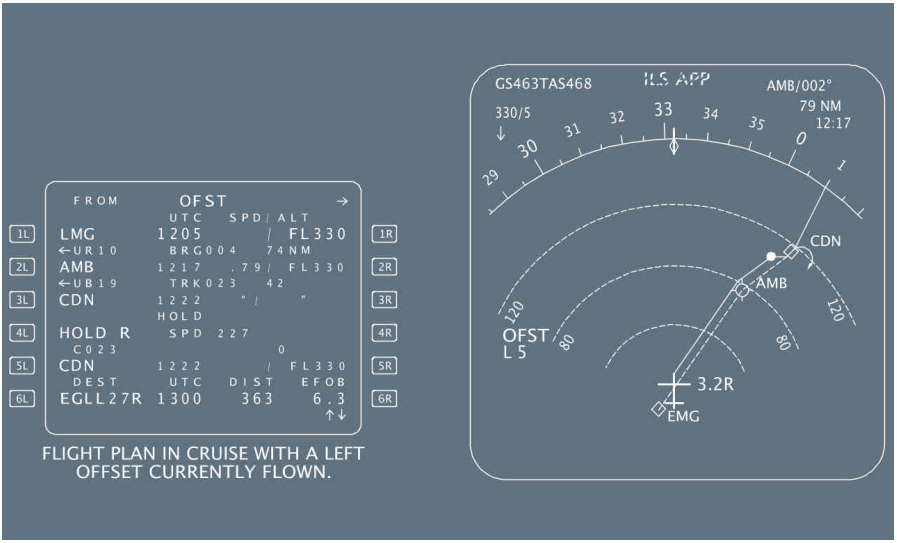
INSERTING AN OFFSET

SELECT LAT REV page at a waypoint.
SELECT OFFSET function by pressing [2L].
WRITE the required offset value and direction (for example, L5 or 5L), and enter it into [1L] field.
CHECK or INSERT the START WPT from the list in [3L] - [5L] fields or manually enter it.
CHECK or ENTER the INTCP ANGLE in [1R] field.
CHECK OR INSERT the END WPT from the list in [3R] - [5R] fields or manually enter it.
PRESS INSERT in [6R] field to activate the OFFSET.



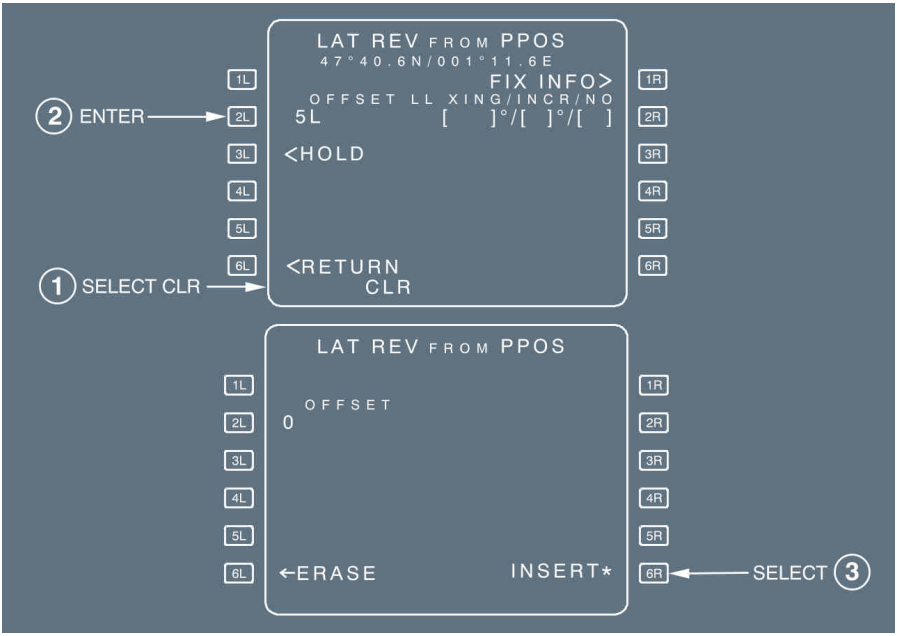
FLIGHT PLAN IN CRUISE WITH A LEFT OFFSET CURRENTLY FLOWN.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

18 **MANUAL CANCELLATION OF AN OFFSET**

There are two standard methods for cancelling an offset:
1. SELECT DIR TO a waypoint (the next waypoint, for example).
2. SELECT a Lateral Revision (LAT REV) at FROM WPT.

CLEAR the OFFSET field.
PRESS [6R] to activate the temporary flight plan (cancelling OFFSET).



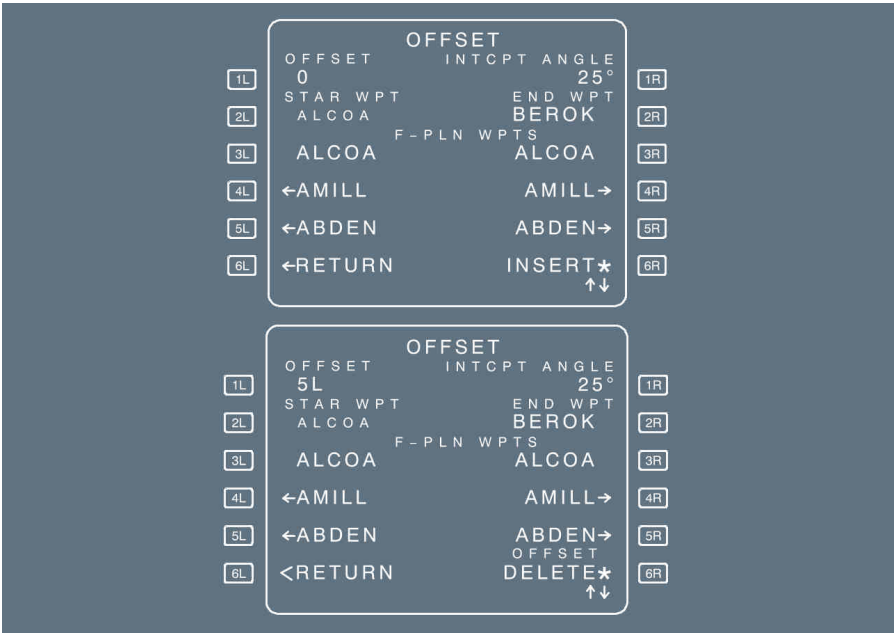
Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

19

MANUAL CANCELLATION OF AN OFFSET

There are two standard methods for cancelling an offset:
1. SELECT DIR TO a waypoint (the next waypoint, for example).
2. SELECT a Lateral Revision (LAT REV) at FROM WPT.

CLEAR the OFFSET field or enter “0” in the OFFSET value field [1L], and press INSERT* in [6R] to activate the temporary flight plan (cancelling OFFSET), or
PRESS the OFFSET DELETE prompt [6R] to activate the temporary flight plan (cancelling OFFSET).



ALTERNATE FUNCTION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

GENERAL

The ALTERNATE FUNCTION performs two actions:

- It reviews and defines alternate airports and inserts them into the flight plan.
- It allows a diversion to be activated through the ENABLE ALTN command.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

REVIEW AND SELECTION OF ALTERNATE AIRPORT

Several alternate airfields may be stored in the database and assigned to a destination. When the pilot selects a company route (CO RTE) (or a city pair), the computer strings the preferred alternate into the active flight plan.

The pilot may review the alternate airports on the ALTN page and, if the one selected is not suitable because of weather or fuel considerations, another alternate may be strung into the active flight plan.

The pilot may define an additional alternate airport into the list, if necessary.

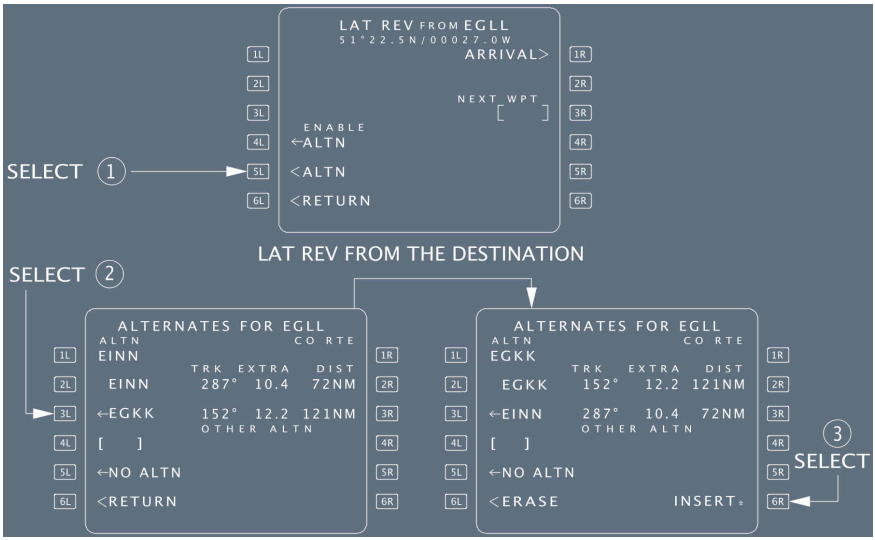
The ALTERNATE page shows the track and distance (airway or direct) between destination and alternate, as well as fuel management data (EXTRA fuel, assuming the associated airfield is the alternate airport). This data will help the pilot change the preferred alternate, if necessary. Access the ALTERNATE page through the ALTN prompt on the LAT REV page at destination. Alternate airfields are attached to the destination.

ENTERING NEW ALTERNATE INTO THE F-PLN

If the preferred alternate is unsuitable, proceed as follows:

SELECT F-PLN key on MCDU.
SELECT LAT REV at destination.
SELECT ALTN [5L].
SELECT an AIRFIELD IDENTIFIER.
INSERT the temporary flight plan.

Note: *If weather and destination airfield conditions permit, you may select "NO ALTN". Fuel predictions will be computed without alternate fuel.*



SELECTION OF ANOTHER ALTERNATE

Fuel management information for flight to another alternate airfield may be obtained by selecting the OTHER ALTN field.

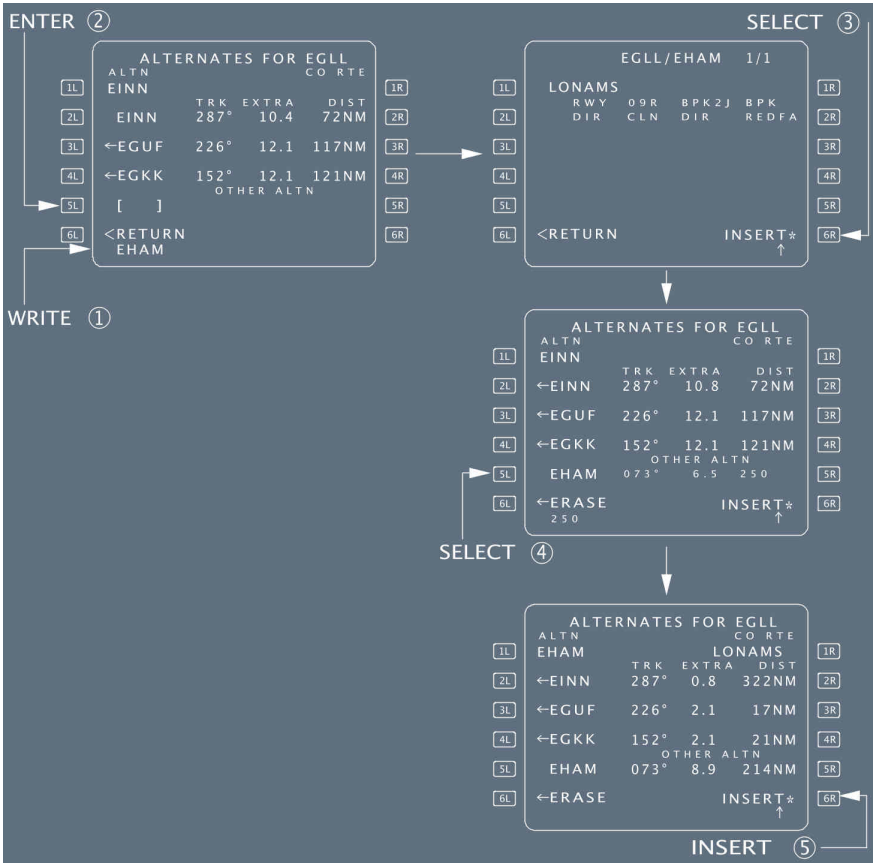
SELECT LAT REV at DESTINATION.
SELECT ALTN [5L].

ENTER the airfield identifier in the brackets.

- *If the airfield is not in the database, the NEW RUNWAY page automatically appears.*
- *If the airfield is in the database and there is a company route (CO RTE) to it, the ROUTE SELECTION page automatically appears.*

SELECT the route, as appropriate, or RETURN to the ALTN page.
ENTER the distance in the brackets (if required). XTRA fuel and track (TRK) will appear.
SELECT the other alternate (OTHER ALTN) as a primary alternate if convenient. (EXTRA fuel and DIST revert to AIRWAY distance).
INSERT it, if you want to have it as a primary alternate.

Note:
- *The pilot can always overwrite the "OTHER ALTN". The new "OTHER ALTN"then replaces the previous one, which is lost.*
- *The pilot can select OTHER ALTN as a primary alternate (active flight plan), to replace any alternate on the initial list.*
- *If the pilot selects the other alternate as a primary alternate, and overwrites the OTHER ALTN field by entering a new airport, the first one will remain a primary alternate and the system will memorize a second OTHER ALTN.*



The pilot may enter a distance in the OTHER ALTN field. The system will compute the extra fuel and the track for this distance.

PREDICTED DATA FOR ALTERNATE

Data predictions are based on:

- Aircraft weight being equal to landing weight at primary destination.
- Flight at FL 220 if the airway distance is less than 200 nm ; otherwise, at FL 310.
- Cost index 0.
- Constant wind (as entered in the alternate field of the DES WIND page).

- Constant delta ISA (equal to delta ISA at primary destination).
- Airway distance for a company route ; otherwise, direct distance manually-entered by the pilot in the OTHER ALTN field (used only for preliminary predictions).

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

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REVIEW AND SELECTION OF ALTERNATE AIRPORT

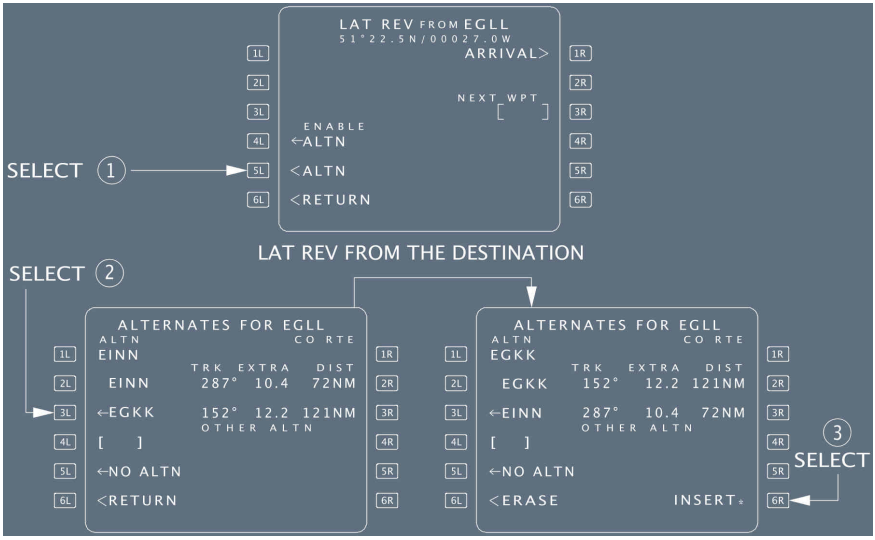
Several alternate airfields may be stored in the database and assigned to a destination. When the pilot selects a company route (CO RTE) (or a city pair), the computer strings the preferred alternate into the active flight plan.
The pilot may review the alternate airports on the ALTN page and, if the one selected is not suitable because of weather or fuel considerations, another alternate may be strung into the active flight plan.
The pilot may define an additional alternate airport into the list, if necessary.
The ALTERNATE page shows the track and distance (airway or direct) between destination and alternate, as well as fuel management data (EXTRA fuel, assuming the associated airfield is the alternate airport). This data will help the pilot change the preferred alternate, if necessary.
Access the ALTERNATE page through the ALTN prompt on the LAT REV page at destination.
Alternate airfields are attached to the destination.

ENTERING NEW ALTERNATE INTO THE F-PLN

If the preferred alternate is unsuitable, proceed as follows:

SELECT F-PLN key on MCDU.
SELECT LAT REV at destination.
SELECT ALTN [5L].
SELECT an AIRFIELD IDENTIFIER.
INSERT the temporary flight plan.

Note: *If weather and destination airfield conditions permit, you may select "NO ALTN". Fuel predictions will be computed without alternate fuel.*



SELECTION OF ANOTHER ALTERNATE

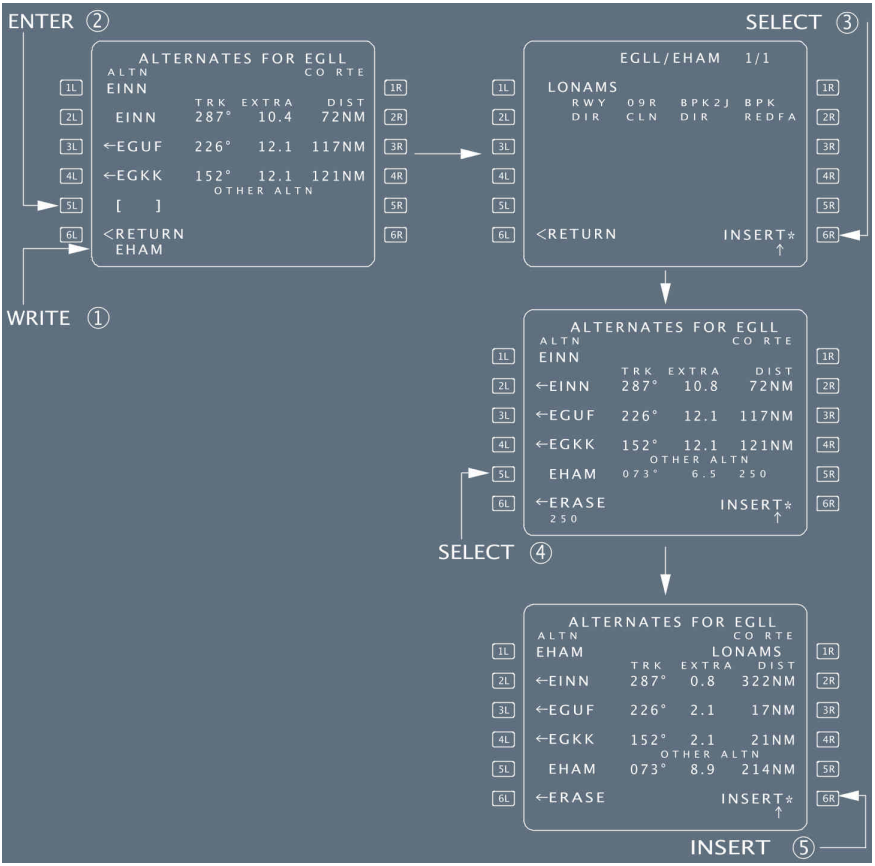
Fuel management information for flight to another alternate airfield may be obtained by selecting the OTHER ALTN field.

SELECT LAT REV at DESTINATION.
SELECT ALTN [5L].
ENTER the airfield identifier in the brackets.

- *If the airfield is not in the database, the NEW RUNWAY page automatically appears.*
- *If the airfield is in the database and there is a company route (CO RTE) to it, the ROUTE SELECTION page automatically appears.*

SELECT the route, as appropriate, or RETURN to the ALTN page.
ENTER the distance in the brackets (if required). XTRA fuel and track (TRK) will appear.
SELECT the other alternate (OTHER ALTN) as a primary alternate if convenient. (EXTRA fuel and DIST revert to AIRWAY distance).
INSERT it, if you want to have it as a primary alternate.

Note: - *The pilot can always overwrite the "OTHER ALTN". The new "OTHER ALTN"then replaces the previous one, which is lost.*
- *The pilot can select OTHER ALTN as a primary alternate (active flight plan), to replace any alternate on the initial list.*
- *If the pilot selects the other alternate as a primary alternate, and overwrites the OTHER ALTN field by entering a new airport, the first one will remain a primary alternate and the system will memorize a second OTHER ALTN.*



The pilot may enter a distance in the OTHER ALTN field. The system will compute the extra fuel and the track for this distance.

PREDICTED DATA FOR ALTERNATE

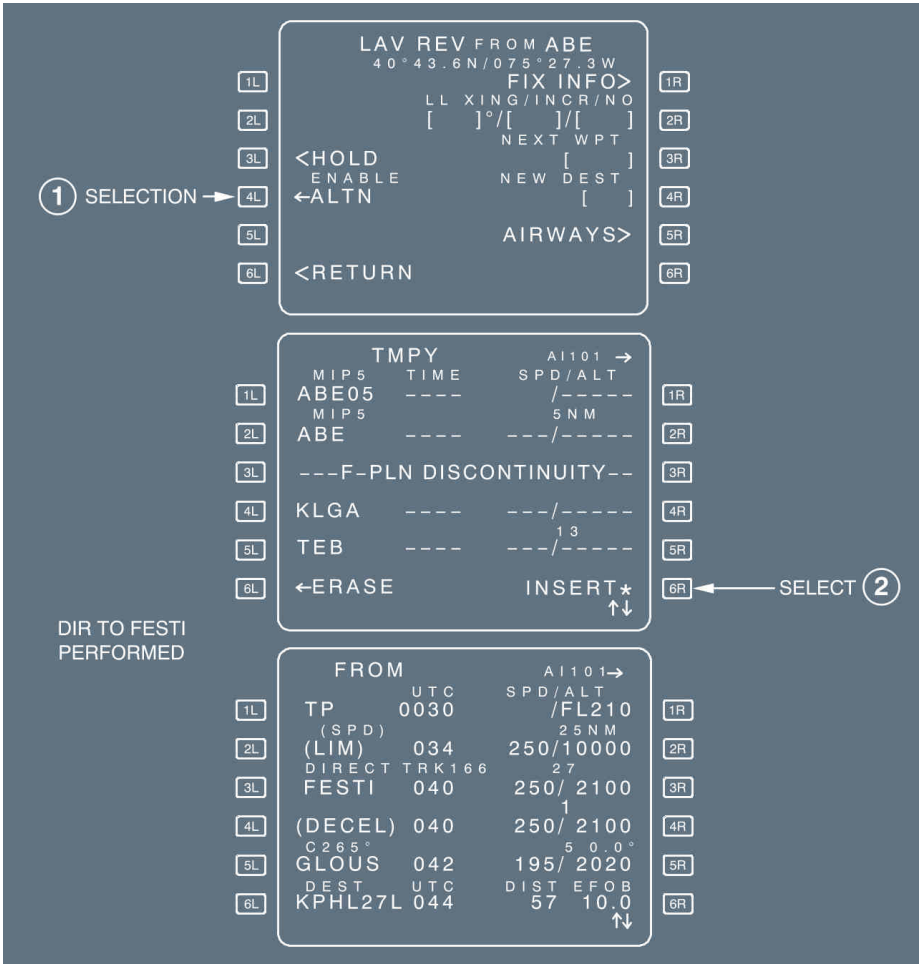
Data predictions are based on:

- Aircraft weight being equal to landing weight at primary destination.
- Flight at FL 100 if the alternate F-PLN length is less than 100 nm , at FL 220 if the alternate F-PLN length is comprised between 100 and 200 nm , or else at FL 310.
- Cost index 0.
- Constant wind (as entered in the alternate field of the DES WIND page).
- Constant delta ISA (equal to delta ISA at primary destination).
- The along flight path distance from the destination to the alternate airport. If the flight crew enters an ALTN fuel value, this value is the one taken into account.

ENABLE ALTN

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

21 This enables the pilot to initiate a diversion by entering the alternate flight plan just after the revision waypoint (with a discontinuity).
The pilot may have to adjust the resulting flight plan (use “direct to”, or add or suppress waypoints), depending on the circumstances.

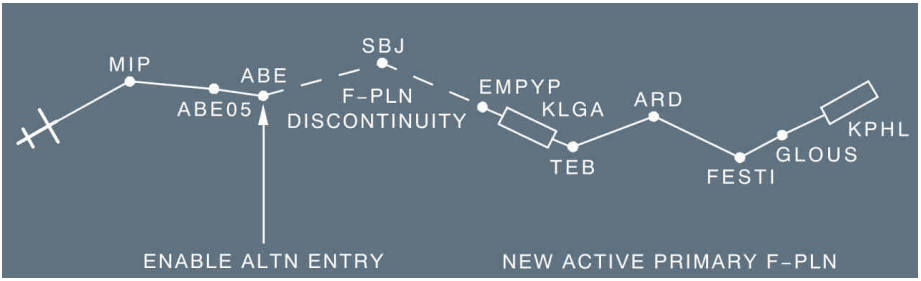


22

TO ACTIVATE THE PRIMARY ALTN:

SELECT a LAT REV at the “TO”waypoint (or at another suitable waypoint).
PRESS the ENABLE ALTN key.
INSERT the temporary flight plan.
ENTER an appropriate waypoint in DIRECT TO and adjust the flight plan.

ADJUST the cost index on the PERF page and the defaulted cruise flight level (CRZ FL) on the PROG page, as required.



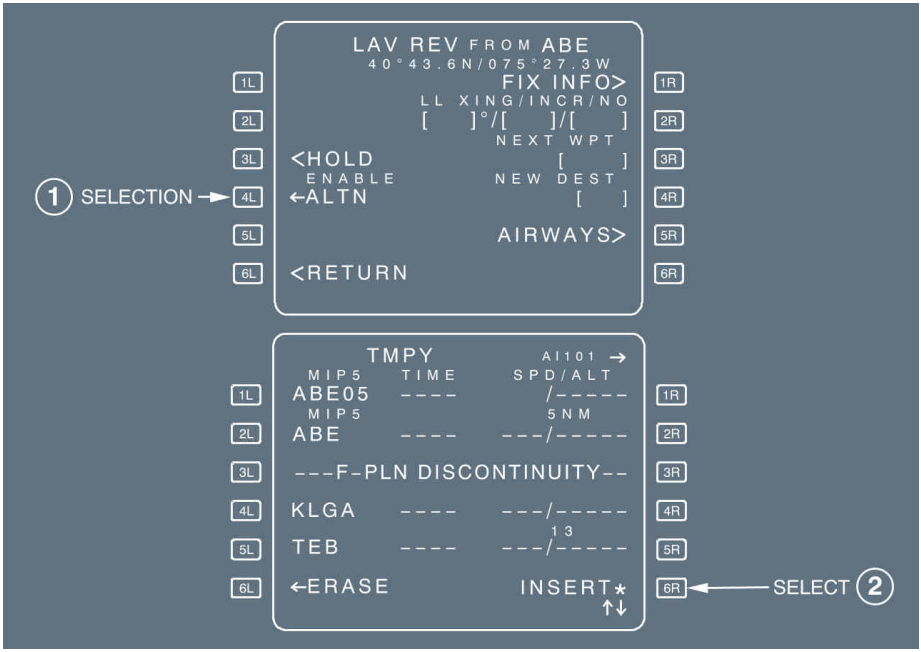
When ENABLE ALT is pressed at ABE, a flight plan discontinuity is created from ABE down to destination and the alternate route is linked to the active flight plan.

ENABLE ALTN

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

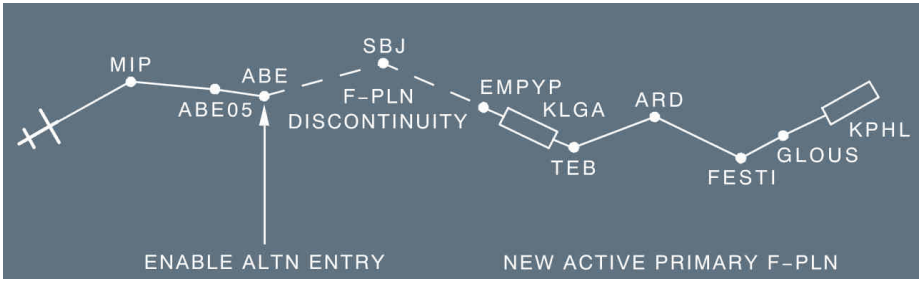
23

This enables the pilot to initiate a diversion by entering the alternate flight plan just after the revision waypoint (with a discontinuity).
The pilot may have to adjust the resulting flight plan (use “direct to”, or add or suppress waypoints), depending on the circumstances.



TO ACTIVATE THE PRIMARY ALTN:

SELECT a LAT REV at the “TO”waypoint (or at another suitable waypoint).
PRESS the ENABLE ALTN key.
INSERT the temporary flight plan.
ENTER an appropriate waypoint in DIRECT TO and adjust the flight plan.
ADJUST the cost index on the PERF page and the defaulted cruise flight level (CRZ FL) on the PROG page, as required.



When ENABLE ALT is pressed at ABE, a flight plan discontinuity is created from ABE down to destination and the alternate route is linked to the active flight plan.

DIR KEY (DIRECT-TO-FUNCTION)

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

GENERAL

The pilot uses the "Direct To" function to define a direct leg from the present position to any waypoint on the active flight plan or to any waypoint.
The designated waypoint may be entered by its identifier (if it is stored in the database) or by a latitude/longitude, place/bearing/distance, or a place-bearing/place-bearing.

Note: If the autopilot or flight director is in the heading/track or localizer mode, the "DIR TO"function engages the NAV mode.

Three functions are available through the DIR TO key:

- The DIR TO defines a direct leg from the present position to a specified waypoint.
  NAV mode engages simultaneously to the DIR TO selection.
  When the pilot uses DIR TO, the present position (PPOS) becomes the "FROM" waypoint and the active flight plan shows it as the T-P (turn point).
- The DIR TO/ABEAM function, defines the abeam waypoints along the direct leg. These waypoints are the projection on the direct leg of the initial F-PLN waypoints located between the aircraft position and the specified waypoint.
  NAV mode engages simultaneously to the DIR TO/ABEAM selection.
- The DIR TO/INTCPT function allows the definition of a specified RADIAL INBOUND or OUTBOUND at an inserted waypoint. The current aircraft track is used to compute the INTCPT point with the specified radial.
  NAV mode is armed simultaneously to the DIR TO/INTCPT selection.

The ND displays the DIR TO leg as a temporary flight plan leg between current aircraft position and specified waypoint. In case of a DIR TO/INTCPT, the leg is not displayed when the angle between the current aircraft track and the intercept radial exceeds 160 °.

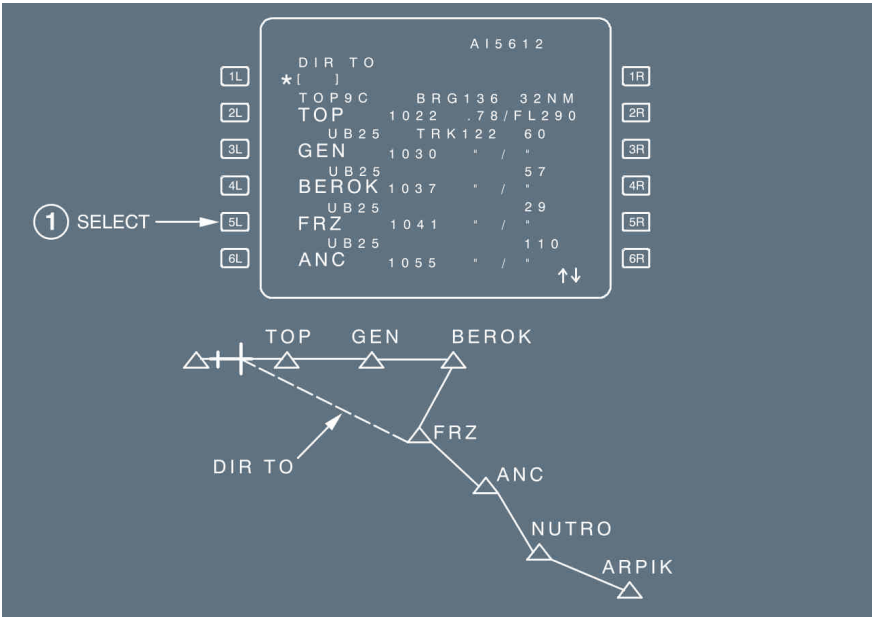
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

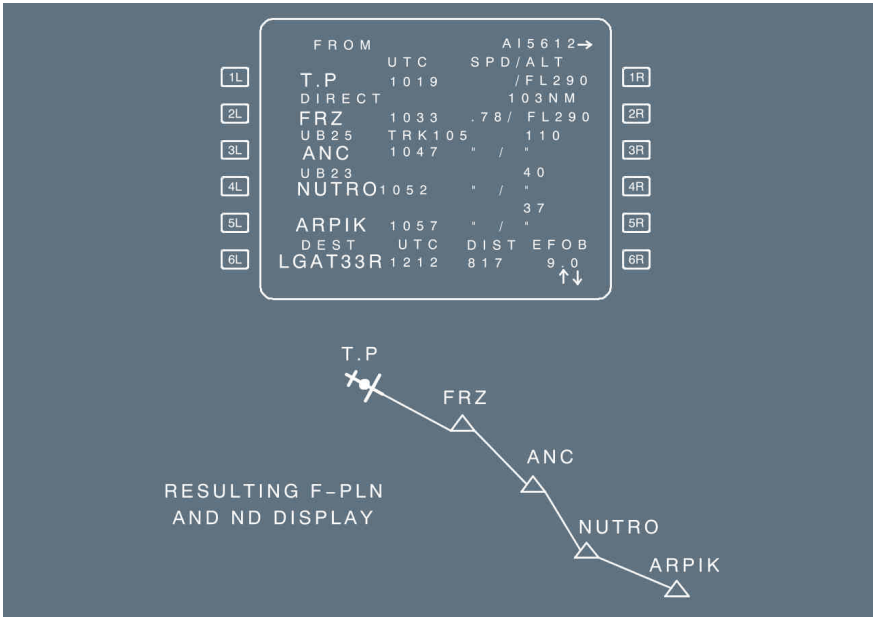
PROCEDURE FOR DIR TO WAYPOINT

CASE 1. THE "TO"WAYPOINT IS IN THE FLIGHT PLAN

Example : DIR TO FRZ

PRESS the DIR key on the MCDU.
PRESS the line select key next to "FRZ".

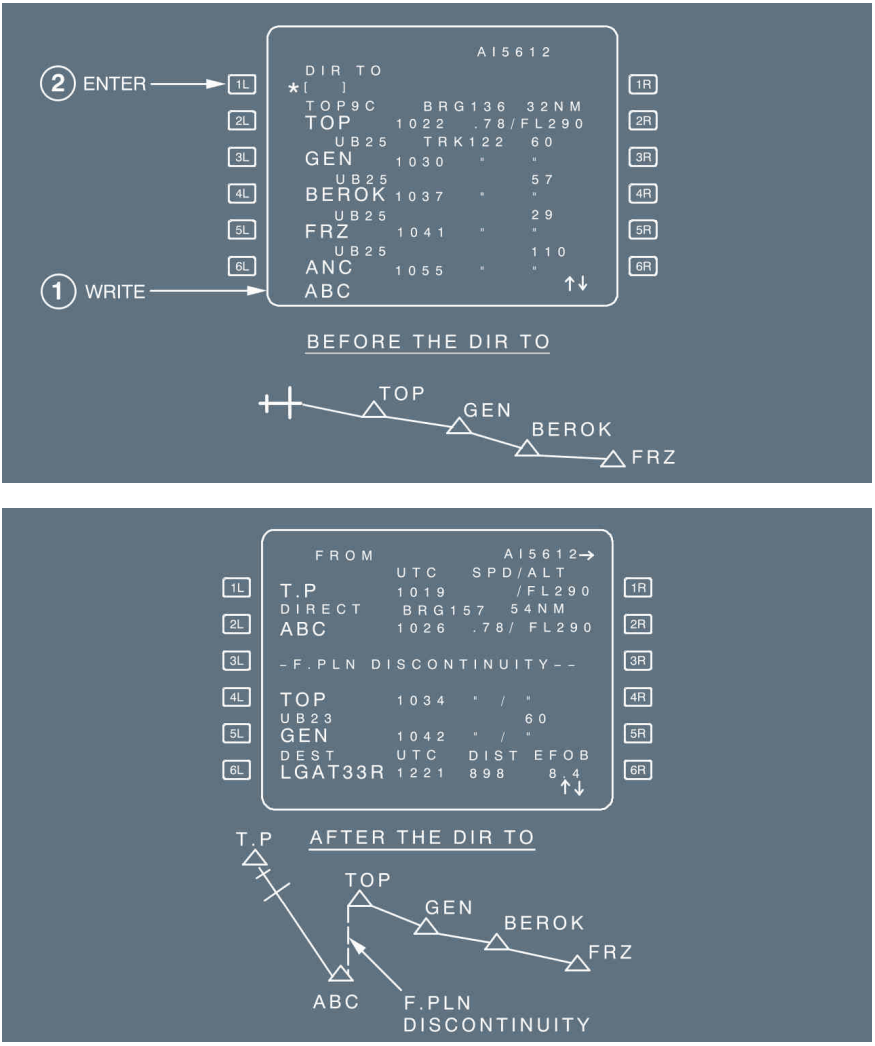

AI5612
DIR TO
1L
2L
3L
4L
5L
6L
1R
2R
3R
4R
5R
6R
TOP9C BRG136 32NM
TOP 1022 .78/FL290
UB25 TRK122 60
GEN 1030 " / "
UB25 57
BEROK 1037 " / "
UB25 29
FRZ 1041 " / "
UB25 110
ANC 1055 " / "
1 SELECT
TOP
GEN
BEROK
FRZ
DIR TO
ANC
NUTRO
ARPIK



CASE 2. THE "TO"WAYPOINT DOES NOT BELONG TO THE FLIGHT PLAN

Example : Direct to ABC (ABC being an ident, LL or PBD or PBX (Place/Bearing-Place/Bearing)

PRESS the DIR key.
WRITE the waypoint identifier (e.g. ABC) into the scratchpad.
PRESS [1 L] to enter "ABC" in the "DIR TO"field.

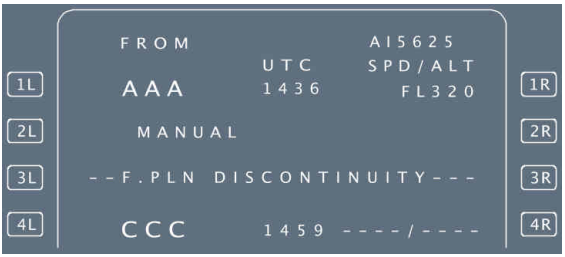


Clear the discontinuity and the waypoints that are not included in the new flight plan.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

PARTICULAR CASES FOR USE OF DIR TO

- If the pilot is flying a manual leg (part of a SID or STAR), the flight plan page displays "F-PLN DISCONTINUITY", preceded by "MANUAL" (see below).
  These legs are specific heading or track legs flown with no defined end waypoint.



- When the pilot encounters a flight plan discontinuity, or if a major reset occurs, the flight plan page displays "PPOS - F-PLAN DISCONTINUITY", and the pilot looses managed guidance in both the lateral and vertical plans.
  The autopilot or flight director reverts to the basic HDG V/S (or TRK FPA) modes. Predictions remain available and are based on the assumption that the aircraft will fly a direct leg from its present position to the next waypoint.



- **In both of these cases, the only way to get back to a standard flight plan is to perform a " DIR TO "to a designated waypoint.**
- Following a DIR TO, the message "MAP PARTLY DISPLAYED" may appear on the NDs, if the new flight plan includes a very long leg (*Refer to DSC-31-45 Flags and Messages Displayed on ND*). When this message comes up, enter an intermediate waypoint to shorten the leg.

Note: *During cruise, the DIR TO function is not available as long as uplink wind data, received through ACARS ◁, is not inserted or cancelled on the CRUISE WIND page.*

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

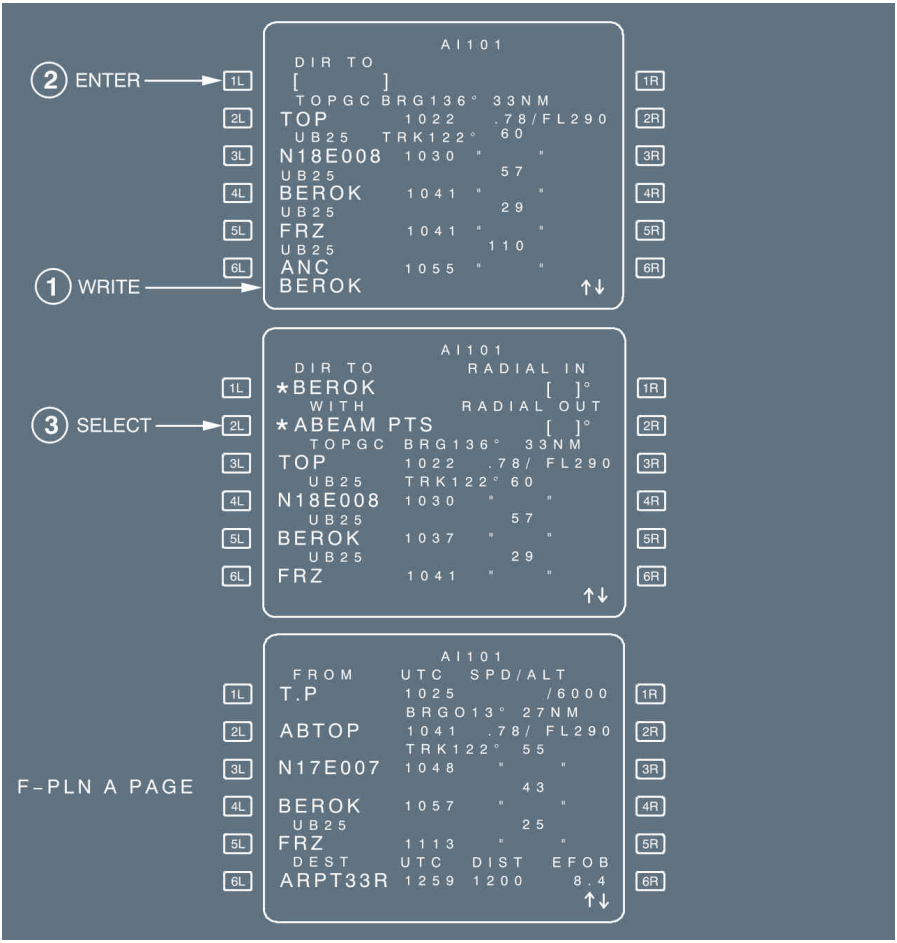
24 **PROCEDURE FOR DIR TO/ABEAM**

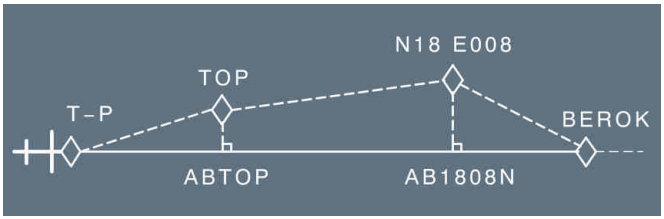
Example : DIR TO/ABEAM BEROK

PRESS the DIR on the MCDU.
WRITE the waypoint identifier into the scratchpad (Example : BEROK).
PRESS [1 L] to enter the waypoint in the DIR TO field.
SELECT the ABEAM PTS function.

The display reverts to F-PLN A page.

Note: *1. If, between two waypoints projected on the direct leg, there was a discontinuity in the original flight plan, this discontinuity disappears between the corresponding abeam points on the direct leg.*
2. If the pilot enters a latitude/longitude type reference waypoint, the system renames the abeam point with its recomputed coordinates (only in degrees).


2 ENTER
1 WRITE
3 SELECT
F-PLN A PAGE
AI101
DIR TO
[ ]
TOPGC BRG136° 33NM
TOP 1022 .78/FL290
UB25 TRK122° 60
N18E008 1030 " "
UB25 57
BEROK 1041 " "
UB25 29
FRZ 1041 " "
UB25 110
ANC 1055 " "
BEROK
AI101
DIR TO RADIAL IN
*BEROK [ ]°
WITH RADIAL OUT
*ABEAM PTS [ ]°
TOPGC BRG136° 33NM
TOP 1022 .78/ FL290
UB25 TRK122° 60
N18E008 1030 " "
UB25 57
BEROK 1037 " "
UB25 29
FRZ 1041 " "
AI101
FROM UTC SPD/ALT
T.P 1025 /6000
BRG013° 27NM
ABTOP 1041 .78/ FL290
TRK122° 55
N17E007 1048 " "
43
BEROK 1057 " "
UB25 25
FRZ 1113 " "
DEST UTC DIST EFOB
ARPT33R 1259 1200 8.4


N18 E008
TOP
T-P
BEROK
ABTOP
AB1808N

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

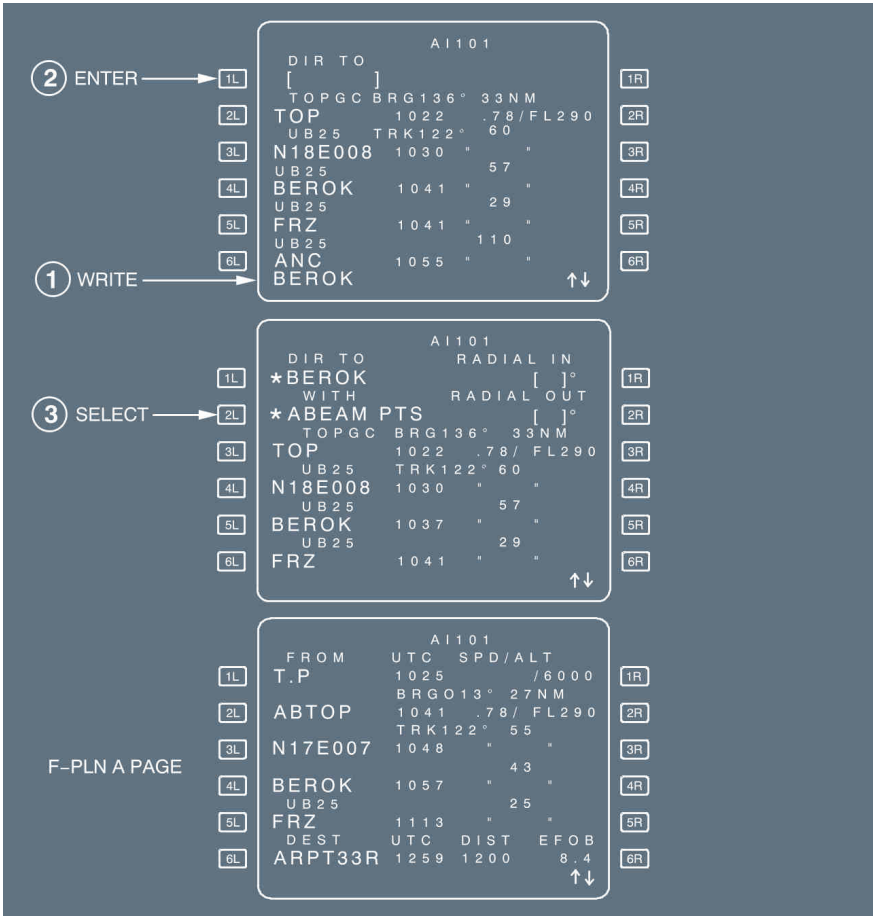
25

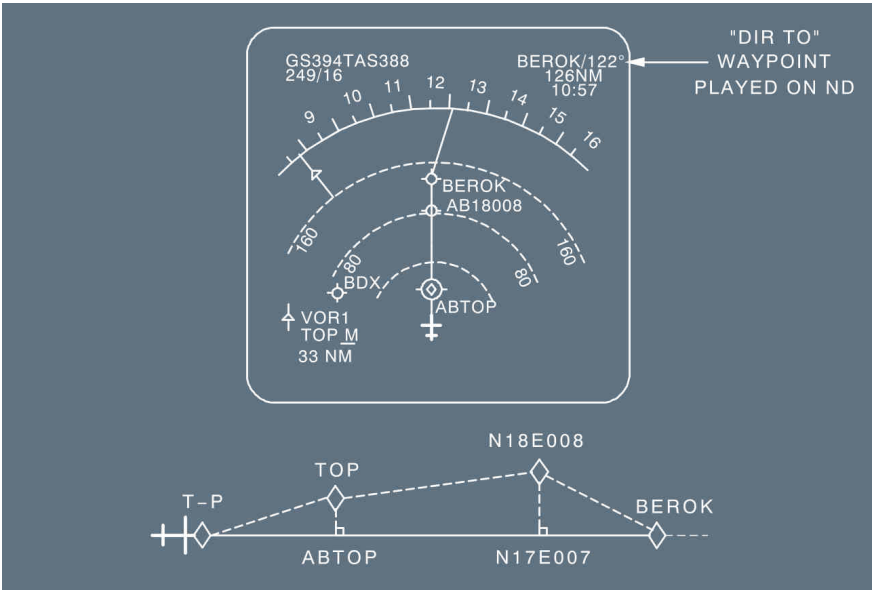
PROCEDURE FOR DIR TO/ABEAM

Example : DIR TO/ABEAM BEROK

PRESS the DIR on the MCDU.
WRITE the waypoint identifier into the scratchpad (Example : BEROK).
PRESS [1 L] to enter the waypoint in the DIR TO field.
SELECT the ABEAM PTS function.

The display reverts to F-PLN A page.


2 ENTER
1 WRITE
3 SELECT
F-PLN A PAGE
AI101
DIR TO
[ ]
TOPGC BRG136° 33NM
TOP 1022 .78/FL290
UB25 TRK122° 60
N18E008 1030 " "
UB25 57
BEROK 1041 " "
UB25 29
FRZ 1041 " "
UB25 110
ANC 1055 " "
BEROK
AI101
DIR TO RADIAL IN
*BEROK [ ]°
WITH RADIAL OUT
*ABEAM PTS [ ]°
TOPGC BRG136° 33NM
TOP 1022 .78/ FL290
UB25 TRK122° 60
N18E008 1030 " "
UB25 57
BEROK 1037 " "
UB25 29
FRZ 1041 " "
AI101
FROM UTC SPD/ALT
T.P 1025 /6000
BRG013° 27NM
ABTOP 1041 .78/ FL290
TRK122° 55
N17E007 1048 " "
43
BEROK 1057 " "
UB25 25
FRZ 1113 " "
DEST UTC DIST EFOB
ARPT33R 1259 1200 8.4



Note: 1. *If, between two waypoints projected on the direct leg, there was a discontinuity in the original flight plan, this discontinuity disappears between the corresponding abeam points on the direct leg.*

2. . *Abeam waypoints computed from latitude/longitude-type waypoints are renamed by the system as "AB XXXXX", where "xxxxx" is an abbreviation in 5 characters, of the latitude and longitude of the initial waypoints.*

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

26 **PROCEDURE FOR DIR TO/INTERCEPT**

PRESS the DIR key.
WRITE the waypoint identifier into the scratchpad.
PRESS [1L] to enter the waypoint in the DIR TO field.

In the [1R] and [2R] fields, the MCDU displays the functions radial inbound and radial outbound from the waypoint.
If the waypoint belongs to the flight plan, the system displays the flight plan track as the default inbound radial. The crew can modify it.

WRITE the required in or out radial into the scratchpad.
PRESS [1R] or [2R] to enter the radial in the required field.

The ND displays the entered radial as an amber dotted line : The pilot can still modify it.

PRESS [1R] or [2R] to confirm the DIR TO/INTERCEPT selection.

The display reverts to the F-PLN A page, the system arms the NAV mode, and engages the HDG mode. The FROM waypoint is the aircraft position at the time of the DIR TO/INTERCEPT selection. The MCDU indicates it as INBND or OUTBND.

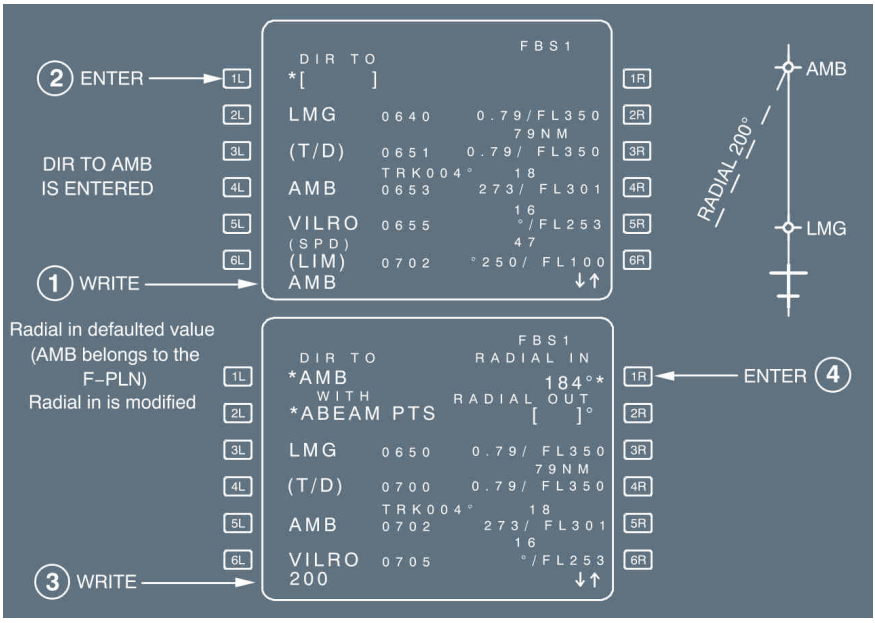
Note: *1. If the waypoint does not belong to the flight plan, the system strings the DIR TO/INTERCEPT leg to this waypoint, and inserts a discontinuity following the waypoint.*

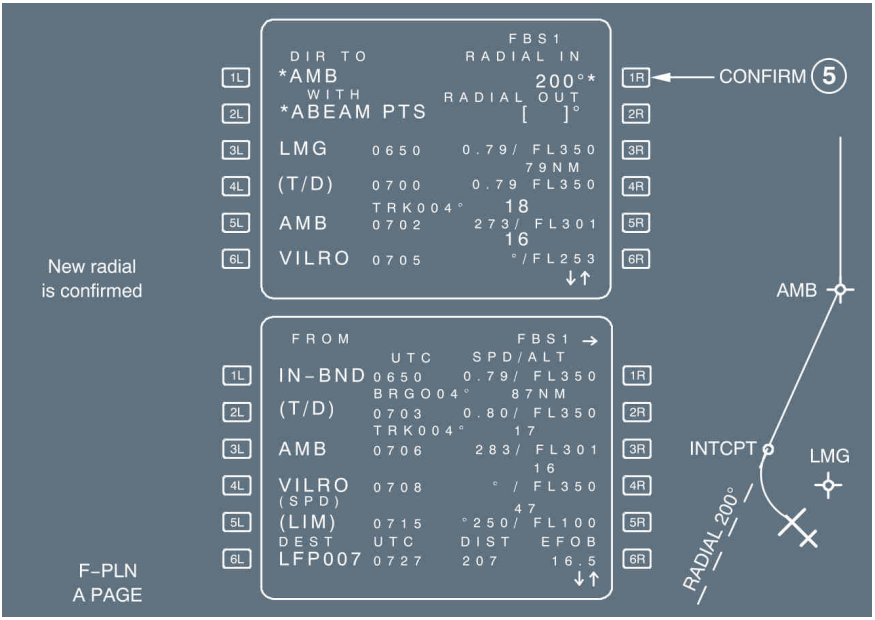
2. A DIR TO/INTERCEPT cancels any active offset.

3. If the current AP/FD lateral mode is HDG or TRK, NAV becomes armed.
If the NAV mode was engaged, NAV becomes armed. FCU HDG or TRK must be used to guide the aircraft.
The ND displays an intercept point, if the intercept angle is less than 120 °. The system constantly updates it to reflect the current aircraft track and position with respect to the intercept radial. The NAV mode engages when reaching the intercept point.

EXAMPLE: RADIAL INBND

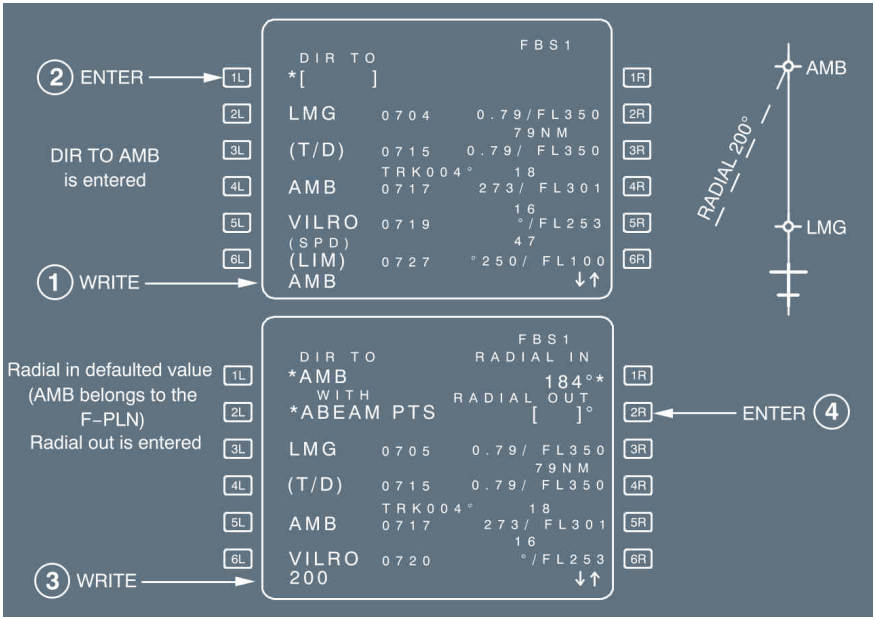
DIR TO AMB - RADIAL 200 ° INBOUND

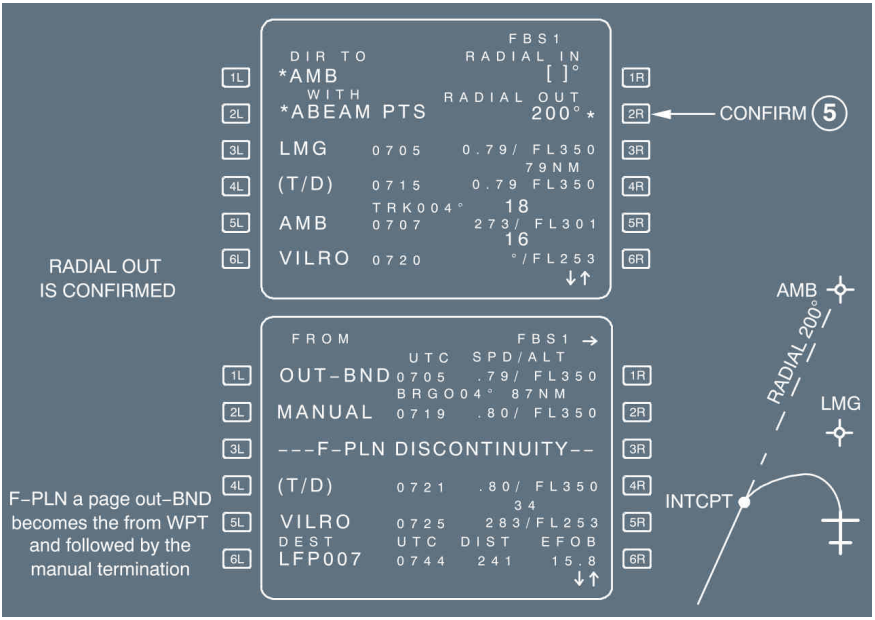




EXAMPLE: RADIAL OUTBND

DIR TO AMB - RADIAL 200 ° OUTBOUND


2 ENTER
1L
DIR TO AMB
is entered
1 WRITE
DIR TO
*[ ]
FBS1
LMG 0704 0.79/FL350
79NM
(T/D) 0715 0.79/ FL350
TRK004° 18
AMB 0717 273/ FL301
16
VILRO 0719 °/FL253
(SPD) 47
(LIM) 0727 °250/ FL100
AMB
1R
2R
3R
4R
5R
6R
AMB
RADIAL 200°
LMG
Radial in defaulted value
(AMB belongs to the
F–PLN)
Radial out is entered
3 WRITE
DIR TO
*AMB
WITH
*ABEAM PTS
RADIAL IN
184°*
RADIAL OUT
[ ]°
ENTER 4
LMG 0705 0.79/ FL350
79NM
(T/D) 0715 0.79/ FL350
TRK004° 18
AMB 0717 273/ FL301
16
VILRO 0720 °/FL253
200



OVFY (OVERFLY) KEY

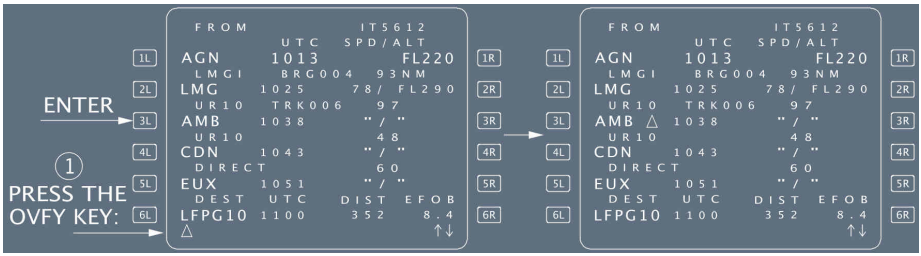
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The overfly key programs the Flight Management Guidance Computer to fly over a specific waypoint or NAVAID. To use it:

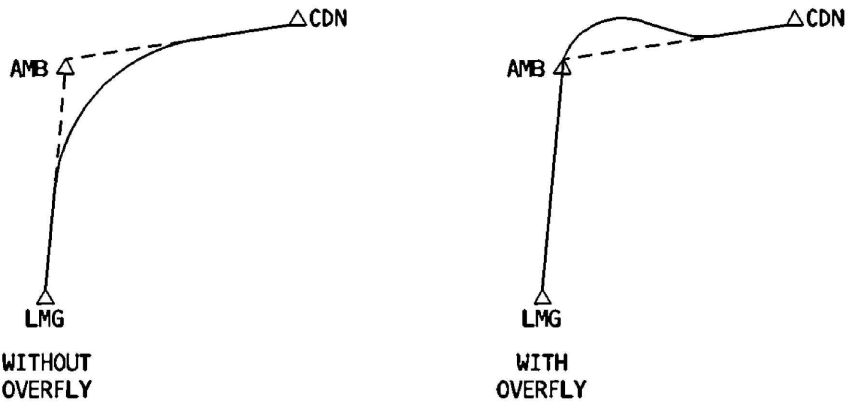
PRESS the "OVFY" key.

A "Δ" appears in the scratchpad.

INSERT it by pressing the key adjacent to the waypoint to be overflown. [3L] in this example.



The pilot cannot cancel the overfly program. If you do not want to fly over the point you have entered, use DIR TO (direct to) the next waypoint or engage the heading mode, whichever is more suitable.

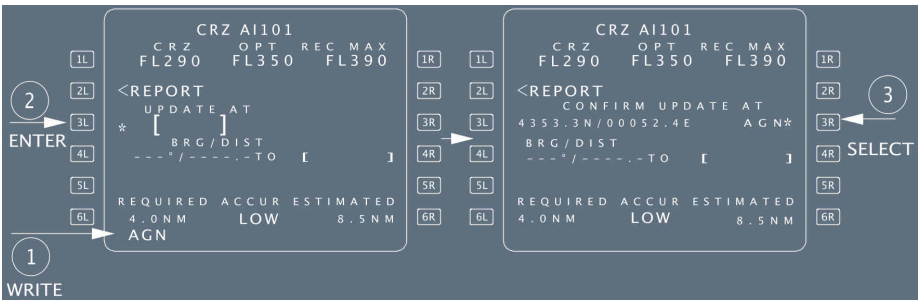


The overfly function allows you to fly over a specific waypoint, and return the aircraft to the great circle track.

"UPDATE AT"

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

To manually change the position computed by the FMGC (FM position and bias), the pilot uses "UPDATE AT" on the progress page.
Use this facility with extreme caution: It is apt to be inaccurate, because it relies on the pilot's estimation of when a designated position has been reached.



WRITE the ident for the NAVAID (or waypoint or airport), or the coordinates, or the PBD or PBX (Place/Bearing-Place/Bearing) at which the update is intended.

PRESS [3L] to enter the ident in the "UPDATE AT" field. The coordinates of the point, along with its identifier (or "ENTRY", if the identifier is not in the database), appear in that field.
PRESS [3R] to activate the update, when you estimate that you are at the position.

Note: The system reinitializes the Estimated Position Error computation when a position update is performed. This may lead to the appearance of a "NAV ACCUR DOWNGRAD" or "NAV ACCUR UPGRAD" message.

If the "UPDATE AT" does not properly take effect, it corrupts the FM position.

- In an area with good radio NAVAID coverage:
  - If the update error is small, subsequent radio position updating will correct the FM position.
  - If the update error is large, the system will reject any radio updating because its internal "reasonableness test" will reject the various NAVAIDs. Thus, the FM position will only be the MIX IRS position corrected by the position bias, determined at the time of the update, and the error will be maintained.
- In an area without proper NAVAID coverage, radio position updating will not be available and the FM position, if incorrect, will remain incorrect until a new manual update is performed.
- Therefore, the pilot should only use "UPDATE AT" in case of a major position problem, such as:
  - On the ground, no flight plan appears on the navigation display and ARC/ROSE NAV mode is selected.
  - A "CHECK IRS/FM POSITION" message appears on the MCDU.
  - A "FM/IR POSITION DISAGREE" message appears on the ECAM.

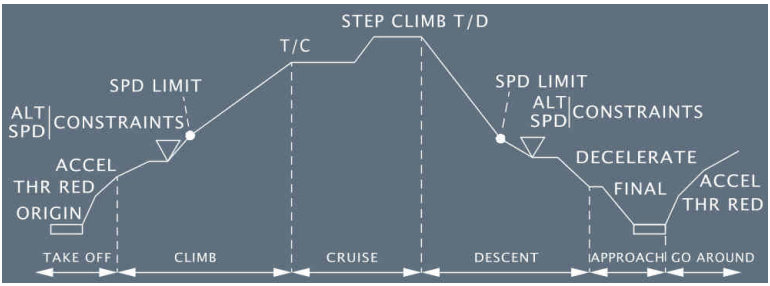
When GPS PRIMARY is operative, the FM position will always converge towards the GPS position at a rate depending on the aircraft altitude. Therefore, when GPS PRIMARY is operative, an inaccurate "update at" will have a temporary effect on the FM position.

General

GENERAL

Applicable to: ALL

The vertical flight plan is divided into the following flight phases:
Preflight - Takeoff - Climb - Cruise - Descent - Approach - Go-Around - Done.
All but “Preflight” and “Done” phases are associated with speed and altitude profiles.



Each phase has an assigned profile of target speeds. For each phase the FMGS computes an optimum (ECON) speed as a function of the strategic parameters (CI, CRZ FL, ZFW, ZFWCG, block FUEL) and performance criteria.
ECON speed is the basis of the managed speed profile.

The ECON speed can be modified by:
- Presetting a speed or Mach number on the MCDU (PERF page) for the next phase
- Selecting on the FCU a speed or a Mach number for the active phase
- Inserting speed constraints or speed limits on the MCDU vertical revision (VERT REV) page.

The vertical flight plan includes vertical constraints (altitude, speed, time) that may be stored in the data base or entered manually by the flight crew through vertical revision pages.
The flight crew may also define step climbs or step descents for cruise purposes. If the flight crew plans to climb to a higher flight level or descend to a lower level, they can use a vertical revision at any waypoint to insert the new level.
When all the vertical data has been defined, the FMGC computes the vertical profile and the managed speed/Mach profile from takeoff to landing.

VERTICAL FLIGHT PLANNING

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

DATA ENTRY

The vertical flight plan provides the FMGS with all the data required to calculate performance and predictions. This data is either entered by the flight crew or calculated by the FMS.

There are three categories of data:

- Strategic data, that applies to the overall flight profile:
  - Cost Index (CI)
  - Cruise Flight Level (CRZ FL)
  - Zero-Fuel Weight (ZFW)
  - Zero-Fuel Weight Center of Gravity (ZFWCG)
  - Block Fuel.
- Weather data:
  - Winds (for climb, cruise, descent, approach)
  - Sea level atmospheric pressure (QNH) at destination
  - Surface temperature (TEMP) at destination
  - Temperature in cruise phase
  - The Tropopause altitude (TROPO).
- Tactical data for the flight phases:
  - Phase switching conditions:
    - Setting of the thrust levers to TOGA or FLEX positions
    - Reaching acceleration altitude (ACCEL ALT)
    - Entering cruise (T/C)
    - Initiation of descent (T/D)
    - Passing a deceleration pseudo waypoint (DECEL PSEUDO WPT)
    - Touchdown.
  - Speed profile:
    - V2
    - Economy climb speed or Mach (ECON CLB SPD/MACH)
    - Preselected speed or Mach (SPD/MACH PRESELECTION)
    - Economy cruise Mach (ECON CRZ MACH)
    - Economy descent Mach or speed (ECON DES MACH/SPD)
    - Approach speed (VAPP).
  - Vertical limitations:
    - Speed limits (SPD LIMIT)
    - Speed and altitude constraints (SPD AND ALT CSTR)
    - Time constraints ⋖ .

In addition to the data entered by the flight crew, the FMS uses some real flight data parameters (CRZ SAT, actual wind) to improve the accuracy of the computed predictions.

VERTICAL FLIGHT PLANNING

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

DATA ENTRY

The vertical flight plan provides the FMGS with all the data required to calculate performance and predictions. This data is either entered by the flight crew or calculated by the FMS.

There are three categories of data:

- Strategic data, that applies to the overall flight profile:
  - Cost Index (CI)
  - Cruise Flight Level (CRZ FL) and STEP ALTS if any
  - Zero-Fuel Weight (ZFW)
  - Zero-Fuel Weight Center of Gravity (ZFWCG)
  - Block Fuel.
- Weather data:
  - Winds (for climb, cruise, descent, approach)
  - Sea level atmospheric pressure (QNH) at destination
  - Surface temperature (TEMP) at destination
  - Temperature in cruise phase
  - The Tropopause altitude (TROPO).
- Tactical data for the flight phases:
  - Phase switching conditions:
    - Setting of the thrust levers to TOGA or FLEX positions
    - Reaching acceleration altitude (ACCEL ALT)
    - Entering cruise (T/C)
    - Initiation of descent (T/D)
    - Passing a deceleration pseudo waypoint (DECEL PSEUDO WPT)
    - Touchdown.
  - Speed profile:
    - V2
    - Economy climb speed or Mach (ECON CLB SPD/MACH)
    - Preselected speed or Mach (SPD/MACH PRESELECTION)
    - Economy cruise Mach (ECON CRZ MACH)
    - Constant Mach
    - Economy descent Mach or speed (ECON DES MACH/SPD)
    - Approach speed (VAPP).
  - Vertical limitations:
    - Speed limits (SPD LIMIT)
    - Speed and altitude constraints (SPD AND ALT CSTR)
    - Time constraints or Required Time of Arrival (RTA).

In addition to the data entered by the flight crew, the FMS uses some real flight data parameters (CRZ SAT, actual wind) to improve the accuracy of the computed predictions.

FLIGHT PHASES

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The vertical flight plan is divided into flight phases. For each phase, the FMGS computes the optimum speed or Mach Profile. These flight phases are:
Preflight - Takeoff - Climb - Cruise - Descent - Approach - Go-Around - Done.

FLIGHT PHASES	OPTIMUM SPEED PROFILE	SWITCHING CONDITIONS TO NEXT PHASE
PREFLIGHT	/	SRS takeoff mode engaged and N1 >85 % (EPR ≥1.25) or Ground Speed >90 kt
TAKEOFF	V2 (V2 + 10)	At acceleration altitude or by engagement of another vertical mode.
CLIMB	ECON CLB SPD / MACH	Reaching cruise FL
CRUISE	ECON CRZ MACH	No step descent, and distance to destination < 200 nm
DESCENT	ECON DES MACH / SPD	- Overflying (DECEL) pseudo waypoint with NAV (or LOC*/LOC) mode engaged and altitude <7 200 ft AGL - Manual activation of the approach phase.
APPROACH	VAPP (GS Min)	1. To Go-Around: When thrust levers at TOGA detent, or 2. To Done: 30 s after landing, or 3. To Climb: When inserting a new CRZ FL.
GO-AROUND	VAPP or current SPD, whichever is greater. Green Dot at ACC ALT	1. To Approach: Manual activation of the approach phase, or 2. To Climb: Above acceleration altitude by - Selecting ALTN, or - inserting NEW DEST and CRZ FL
DONE	/	To preflight: When INIT or PERF key depressed.

Note: During the preflight phase, the flight crew inserts the flight plan, which includes all data needed for the flight.
During the Done phase, the FMGC erases the data entered for the flight. If the descent or the approach phase is inadvertently activated (manual approach phase activation, for example), the flight crew may reselect a CRZ FL on the PROG page to reactivate the CRZ phase.

FLIGHT PHASES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

The vertical flight plan is divided into flight phases. For each phase, the FMGS computes the optimum speed or Mach Profile. These flight phases are:

Preflight - Takeoff - Climb - Cruise - Descent - Approach - Go-Around - Done.

FLIGHT PHASES	OPTIMUM SPEED PROFILE	SWITCHING CONDITIONS TO NEXT PHASE
PREFLIGHT	/	SRS takeoff mode engaged and N1 >85 %(EPR ≥1.25) or Ground Speed >90 kt
TAKEOFF	V2 (V2 + 10)	At acceleration altitude or by engagement of another vertical mode.
CLIMB	ECON CLB SPD / MACH	Reaching cruise FL
CRUISE	ECON CRZ MACH	No step descent, and distance to destination < 200 nm, or all engines operative and selected altitude below Max [FL 200, highest DES ALT CSTR]
DESCENT	ECON DES MACH / SPD	- Overflying (DECEL) pseudo waypoint with NAV (or LOC*/LOC) mode engaged and altitude <7 200 ft AGL - Manual activation of the approach phase.
APPROACH	VAPP (GS Min)	1. To Go-Around: When thrust levers at TOGA detent, or 2. To Done: 30 s after landing, or 3. To Climb: When inserting a new CRZ FL.
GO-AROUND	VAPP or current SPD, whichever is greater. Green Dot at ACC ALT	1. To Approach: Manual activation of the approach phase, or 2. To Climb: Above acceleration altitude by - Selecting ALTN, or - inserting NEW DEST
DONE	/	To preflight: When INIT or PERF key depressed.

Note: During the preflight phase, the flight crew inserts the flight plan, which includes all data needed for the flight.
During the Done phase, the FMGC erases the data entered for the flight. If the descent or the approach phase is inadvertently activated (manual approach phase activation, for example), the flight crew may reselect a CRZ FL on the PROG page to reactivate the CRZ phase.

FLIGHT PHASES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

The vertical flight plan is divided into flight phases. For each phase, the FMGS computes the optimum speed or Mach Profile. These flight phases are:
Preflight - Takeoff - Climb - Cruise - Descent - Approach - Go-Around - Done.

FLIGHT PHASES	OPTIMUM SPEED PROFILE	SWITCHING CONDITIONS TO NEXT PHASE
PREFLIGHT	/	SRS takeoff mode engaged and N1 >85 %(EPR ≥1.25) or Ground Speed >90 kt
TAKEOFF	V2 (V2 + 10)	At acceleration altitude or by engagement of another vertical mode.
CLIMB	ECON CLB SPD / MACH	Reaching cruise FL
CRUISE	ECON CRZ MACH	No step descent, and distance to destination < 200 nm, or all engines operative and selected altitude below Max [FL 200, highest DES ALT CSTR]
DESCENT	ECON DES MACH / SPD	- Overflying (DECEL) pseudo waypoint with NAV (or LOC*/LOC) mode engaged and altitude <9 500 ft AGL - Manual activation of the approach phase.
APPROACH	VAPP (GS Min)	1. To Go-Around: When thrust levers at TOGA detent, or 2. To Done: 30 s after landing, or 3. To Climb: When inserting a new CRZ FL.
GO-AROUND	VAPP or current SPD, whichever is greater. Green Dot at ACC ALT	1. To Approach: Manual activation of the approach phase, or 2. To Climb: Above acceleration altitude by - Selecting ALTN, or - inserting NEW DEST
DONE	/	To preflight: When INIT or PERF key depressed.

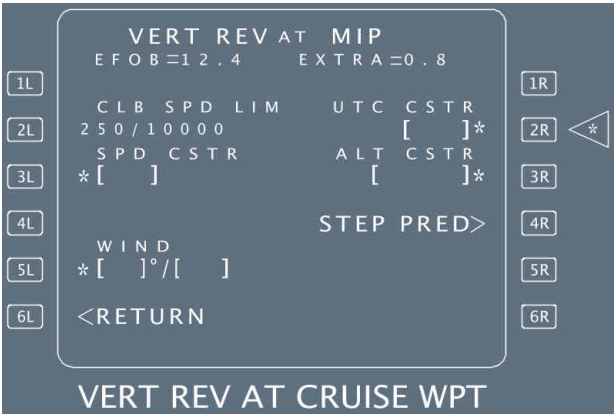
Note: During the preflight phase, the flight crew inserts the flight plan, which includes all data needed for the flight.
During the Done phase, the FMGC erases the data entered for the flight. If the descent or the approach phase is inadvertently activated (manual approach phase activation, for example), the flight crew may reselect a CRZ FL on the PROG page to reactivate the CRZ phase.

VERTICAL REVISION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The flight crew uses vertical revisions to enter or modify:
- The speed limit in the climb and descent phases
- An altitude or speed constraint at the revised waypoint
- A step climb or a step descent
- New wind data
- A time constraint ◁❄ .

The vertical revision page is accessed by pressing a right hand select key of the flight plan page.



VERTICAL REVISION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The flight crew uses vertical revisions to enter or modify:

- The speed limit in the climb and descent phases
- An altitude or speed constraint at the revised waypoint
- A step climb or a step descent
- New wind data
- A time constraint.

The vertical revision page is accessed by pressing a right hand select key of the flight plan page.



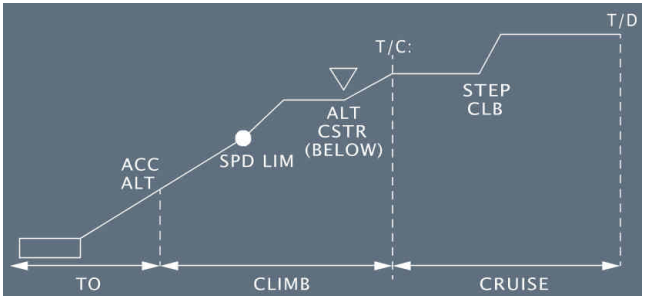
VERTICAL CONSTRAINTS (SPEED, ALTITUDE, TIME)

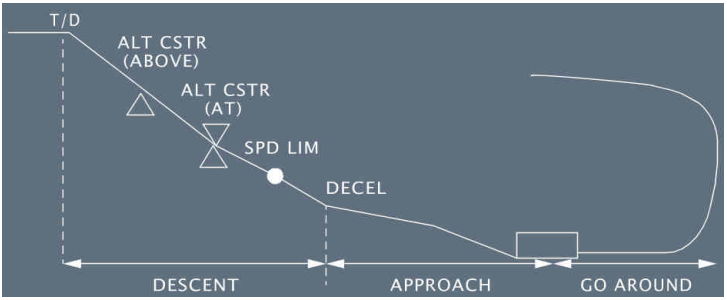
Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The flight crew enters speed, altitude and time constraint ⋖ , either to comply with ATC requests and specified procedures, or at the discretion of the flight crew, in response to operational variables.

SPEED LIMIT

A speed limit is associated with altitude as a maximum speed below a specified altitude (only one in climb and one in descent).





ALTITUDE CONSTRAINT

Altitude constraints may be attached to specific waypoints in the climb, descent, or approach phases.
To meet the altitude constraint, the aircraft must fly over the waypoint at an altitude equal, above or below the altitude constraint as specified by the flight crew or the database.
An altitude constraint is considered as missed if the system predicts more than 250 ft of difference between the constraint value and the predicted aircraft altitude.
Altitude constraints are observed in CLB or DES or APP NAV-FINAL modes.

Note: The database may contain an altitude constraint window (two altitudes between which the aircraft must fly passing over a given waypoint), but the flight crew cannot enter such a constraint manually.

SPEED CONSTRAINT

Speed constraints may be attached to specific waypoints in the climb, descent or approach phases. To meet the speed constraint, the aircraft must fly over the waypoint with a speed equal or less than the speed constraint.
A speed constraint is considered as missed if the system predicts an aircraft speed 10 kt greater than the speed constraint.
Speed constraints are observed when NAV mode is engaged and speed target is managed.
Otherwise speed constraints are disregarded.

TIME CONSTRAINT

Time constraint ⋘ may be attached to any waypoint except the "from" waypoint.

Note: No constraint can be associated with go-around waypoints.

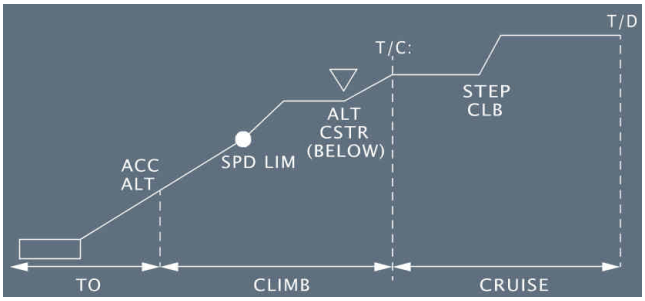
VERTICAL CONSTRAINTS (SPEED, ALTITUDE, TIME)

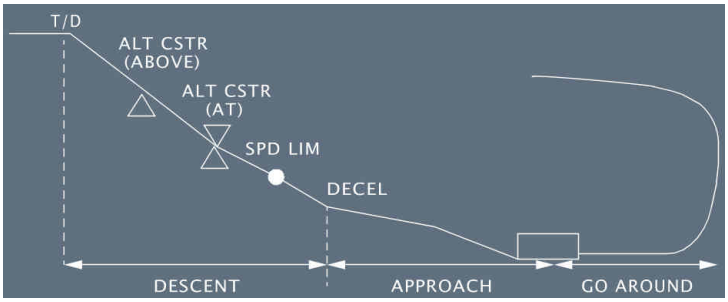
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The flight crew enters speed, altitude and time constraint, either to comply with ATC requests and specified procedures, or at the discretion of the flight crew, in response to operational variables.

SPEED LIMIT

A speed limit is associated with altitude as a maximum speed below a specified altitude (only one in climb and one in descent).





ALTITUDE CONSTRAINT

Altitude constraints may be attached to specific waypoints in the climb, descent, or approach phases.

To meet the altitude constraint, the aircraft must fly over the waypoint at an altitude equal, above or below the altitude constraint as specified by the flight crew or the database.

An altitude constraint is considered as missed if the system predicts more than 250 ft of difference between the constraint value and the predicted aircraft altitude.

Altitude constraints are observed in CLB or DES or APP NAV-FINAL modes.

Note: The database may contain an altitude constraint window (two altitudes between which the aircraft must fly passing over a given waypoint), but the flight crew cannot enter such a constraint manually.

SPEED CONSTRAINT

Speed constraints may be attached to specific waypoints in the climb, descent or approach phases. To meet the speed constraint, the aircraft must fly over the waypoint with a speed equal or less than the speed constraint.
A speed constraint is considered as missed if the system predicts an aircraft speed 10 kt greater than the speed constraint.
Speed constraints are observed when NAV mode is engaged and speed target is managed. Otherwise speed constraints are disregarded.

TIME CONSTRAINT

Time constraint may be attached to any waypoint except the "from" waypoint.

Note: No constraint can be associated with go-around waypoints.

FMS Legacy

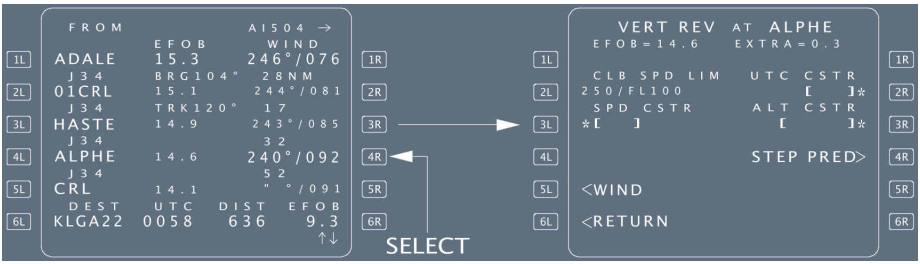
GENERAL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The vertical revision function allows the pilot to modify the following parts of the flight plan:

- Speed limit
- Speed and altitude constraints
- Wind
- Time constraint (optional)
- Step climb or step descent

The pilot selects these functions by pressing the right key on flight plan A or B.



Note: *This vertical functions section only describes the following two functions: Wind and time constraints.*
For other vertical revision functions: Refer to the Systems Related Procedures section.

TIME CONSTRAINT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

Without the relevant pin program, the pilot cannot insert a time constraint in the system but only an estimated takeoff time as described in the next chapter *Refer to PRO-NOR-SRP-01-10 Flight Plan Initialization - Vertical Flight Plan.*

WIND

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

In order to get the best predictions, the crew must enter wind values for the different phases and for various waypoints of the cruise phase.

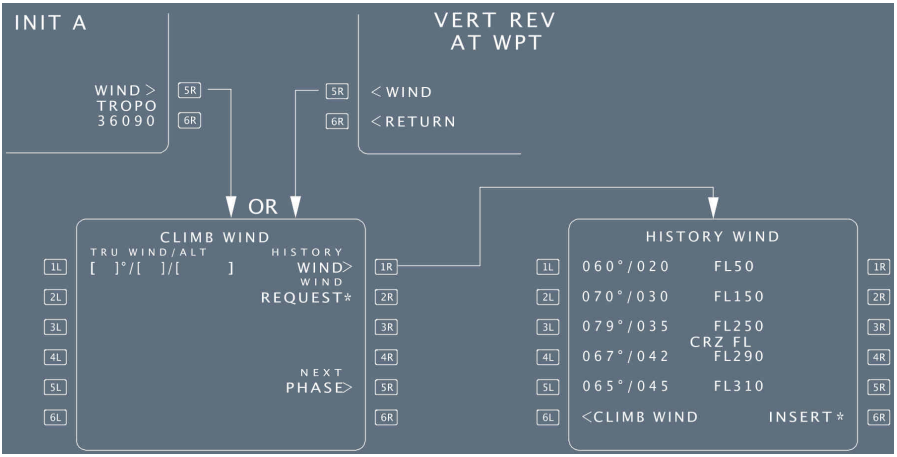
1 ENTERING THE CLIMB WINDS (F-PLN INITIALIZATION)

When completing the INIT A page, the pilot will enter the winds by depressing the WIND prompt. He will access the different wind pages using NEXT PHASE key and PREV PHASE key. He will slew the CRZ WIND page to access the various waypoints of the cruise winds.

The pilot will enter wind data as follows :

- for CLB phase ; by inserting either the HISTORY WIND data (as recorded during the last descent) or by inserting winds (at up to 5 altitudes) on the CLB WIND page.
- for CRZ phase ; by inserting winds at various CRZ waypoints on the CRZ WIND pages.
- for DES phase ; by inserting winds (at up to 5 altitudes) on the DES WIND page
- for the ALTN F-PLN, an average wind may be entered on the DES WIND page for alternate cruise flight level.

Note:
- *Cruise wind and alternate wind prompts are not displayed on the FUEL PRED page with this standard.*
- *Wind can be automatically received (and inserted) through ACARS system. (Refer to DSC-22_20 Auto Flight - Flight Management/70 AOC Functions/B.Wind Data/Wind Data - Procedure to Insert Wind Data).*
- *Once inserted, the F-PLN B page displays the forecast wind profile at all waypoints using interpolated values from manual entries.*



WIND ENTRY RULES

When from an empty field, a wind entry is performed, direction/velocity/altitude (or flight level) must be entered simultaneously. One entry in each bracket. Overwriting a wind cancels the previous one.

Wind data can be cleared, the field reverts to brackets.
All winds except the PERF APPR page wind (Tower wind) are true north referenced.

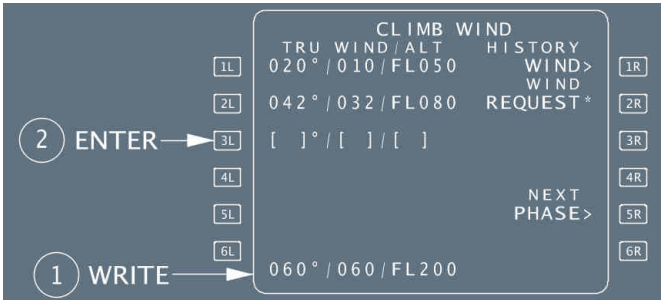
ENTERING THE HISTORY WIND (F-PLN INITIALIZATION)

The pilot may insert the history wind but cannot modify this page. If convenient, PRESS the (6R) prompt to insert. After insertion, the [6R] prompt is suppressed but the page still displays the wind values for information.

ENTERING THE CLIMB WIND (F-PLN INITIALIZATION)

If previous history winds are not convenient or have to be modified :

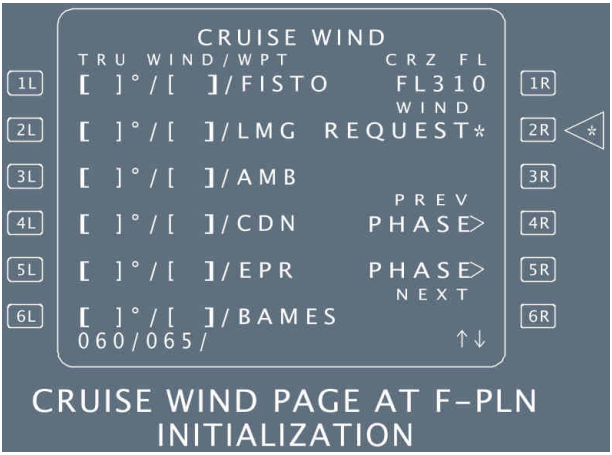
SELECT CLIMB WIND page from INIT A page or VERT REV page.
WRITE new winds into the scratchpad and ENTER



CLIMB WIND cannot be modified when the climb phase is active. At climb phase transition, wind data switch from blue to green colour and any attempted modification will trigger the “NOT ALLOWED” message.
The system interpolates winds between 2 entered levels.

2 **ENTERING THE CRUISE WINDS**

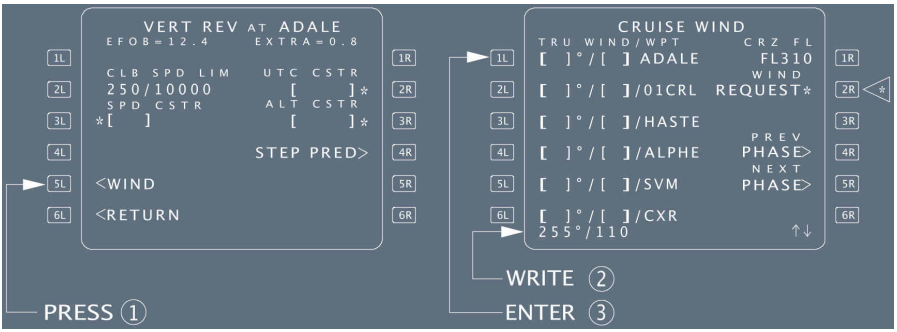
At flight plan initialization the cruise wind page displays all cruise waypoints with empty brackets. In flight, only down path waypoints are displayed.



CRUISE WIND PAGE AT F-PLN INITIALIZATION

SELECT VERT REV at WPT
PRESS the WIND prompt
(If necessary) SELECT NEXT PAGE
SLEW until relevant waypoint is displayed.
WRITE and ENTER the new wind data into the scratchpad.

WIND may be entered through ACARS pages system. (Refer to DSC-22_20 Auto Flight - Flight Management/70 AOC Functions/B.Wind Data/Wind Data - Procedure to Insert Wind Data).



The crew will modify the entered winds in flight if a significant difference is expected (greater than 30 kt or 30 °).

Note: - *Cruise wind may be entered directly into F-PLN B page. These entries are automatically transferred to cruise wind page.*
- *The CRUISE WIND page displays only ACARS or crew entered data. It never displays computed or propagated data (F-PLN B page only).*

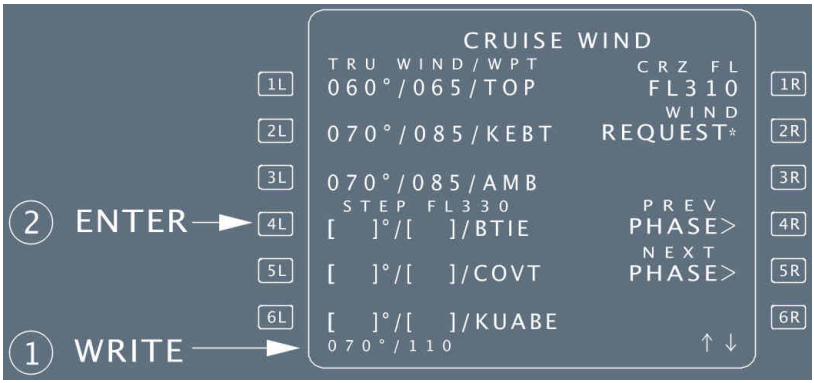
ENTERING A STEP CLIMB/STEP DESCENT WIND

If a step climb or a step descent is scheduled, the wind at the step level shall be entered for prediction purposes.

SELECT CRUISE WIND page.

Slew until the step waypoint is displayed.

WRITE the wind into the scratchpad and ENTER.



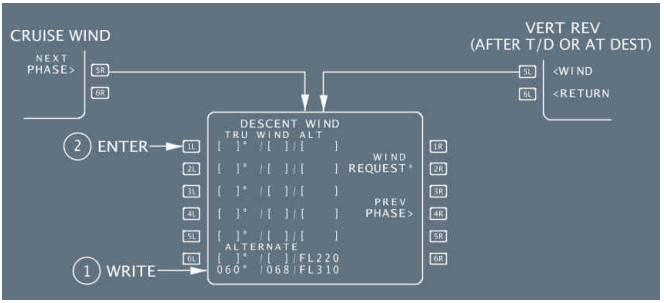
If the pilot does not enter the step wind, the FMGS continues to use the wind entered for the cruise flight level.
Clearing the manual entry reverts to brackets, but the FMGS will use the wind at cruise flight level for predictions and performance.

ENTERING THE DESCENT WINDS

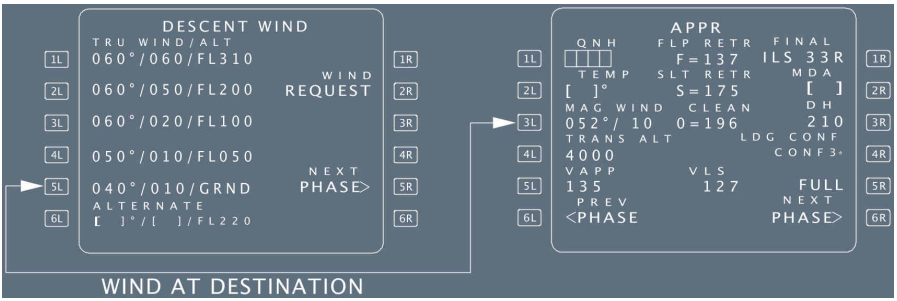
The pilot will enter as many as one wind at 5 different FL or altitudes. This wind data will be used for descent profile and prediction computation.
From the vertical revision page or from the CRUISE WIND page :

PRESS the WIND prompt.
SELECT the DESCENT WIND page.
ENTER up to 5 different “wind/altitude”.

Note: *It is recommended that at least one descent wind be entered at cruise FL. If no wind is entered, the system will assume a zero wind value (displayed on F-PLN B page) at TOD.*



A wind is written as true direction/velocity/flight level or altitude in feet.
If the crew enters “GRND”in the altitude field, the system uses the associated wind as wind at destination.
The descent profile is corrected as well as the tower wind entered in the PERF APPR page. (The wind direction is then modified of the magnetic variation).



When the winds have been entered, the F-PLN B page displays the forecast wind profile at all descent waypoints using values it has interpolated from manual entries. Descent winds are not modifiable when descent, approach or go around phase is active. At descent phase transition, wind data switch from blue to green colour and any attempted modification triggers the “NOT ALLOWED” message.

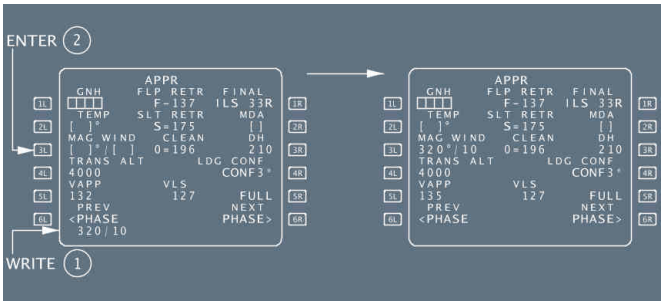
ENTERING THE ALTERNATE WIND

Alternate wind is entered on the DESCENT WIND page. If an ALTN wind is not defined, the predictions are computed with a wind defaulted to zero. Alternate wind can be modified at any time. In addition, the alternate cruise (ALTN CRZ) level defaults to :

- FL 220, if the length of the alternate flight plan (ALTN F-PLN) is less than 200 nm.
- FL 310, if the length of the ALTN F-PLN is greater or equal to 200 nm.

ENTERING THE APPROACH WIND

The wind at destination is entered on the PERF APPR page 3L field. It is a magnetic referenced wind, copied in true reference into DESCEND WIND page at ground level (GRND) and F-PLN B page at destination. A ground entry into DESCENT WIND page is in the same way, copied to F-PLN B page and PERF APPR page (Magnetic) automatically. This wind is modifiable in descent and approach and go around phase.



SELECT the PERF key on the MCDU
DEPRESS the NEXT PHASE key (6R)
WRITE QNH and ENTER it
WRITE the surface wind (magnetic) into the scratchpad and ENTER it.

Note: *At each wind entry, the descent profile is recomputed, therefore it is recommended to enter all winds, temperature and QNH at the same time to minimize recomputation time.*

Intentionally left blank

FMS2 Honeywell

GENERAL

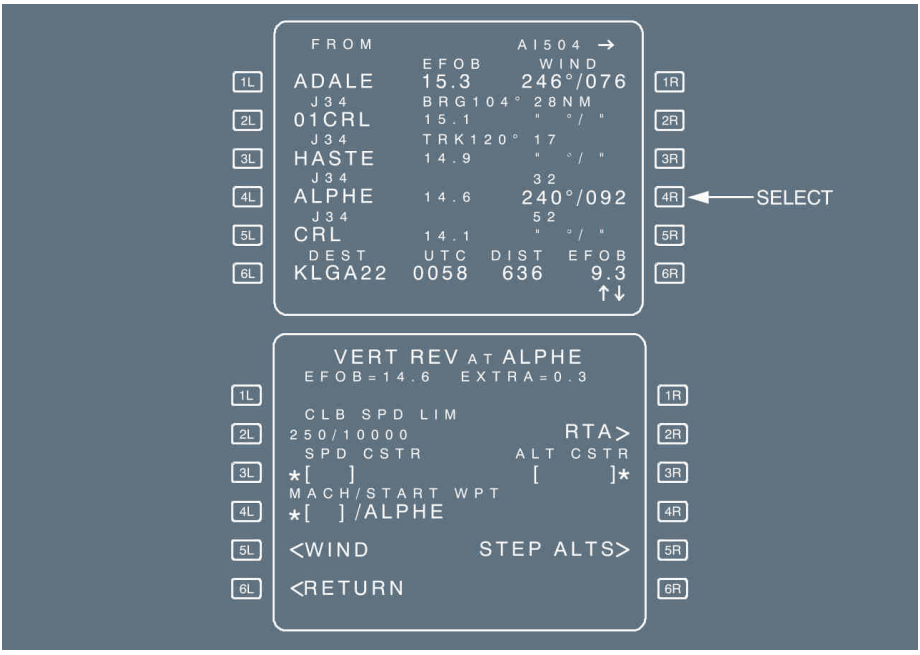
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

The vertical revision function allows the pilot to modify the following parts of the flight plan:

- Speed limit
- Speed and altitude constraints
- Time constraints
- Wind
- Step climb or step descent
- Constant Mach Segment

The pilot selects these functions by pressing the right key on flight plan A or B.

1



Note: *This vertical functions section only describes the following three functions: Wind and time constraints, and Constant Mach Segment.*
For other vertical revision functions: Refer to the Systems Related Procedures section.

GENERAL

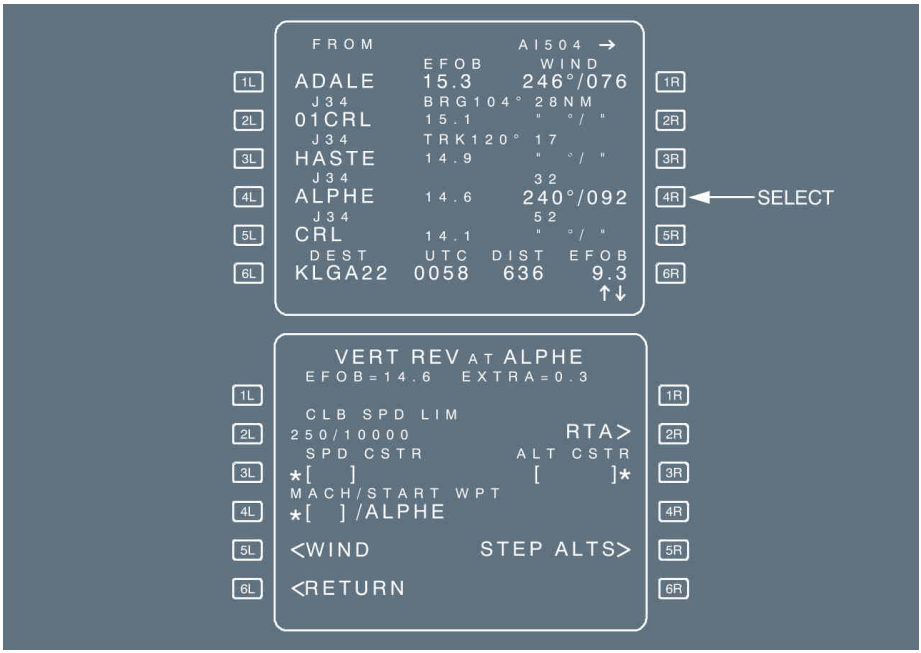
Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

2

The vertical revision function allows the pilot to modify the following parts of the flight plan:

- Speed limit
- Speed and altitude constraints
- Time constraints
- Wind
- Step climb or step descent
- Constant Mach Segment

The pilot selects these functions by pressing the right key on flight plan A or B.



Note: This vertical functions section only describes the following three functions: Wind and time constraints, and Constant Mach Segment.
For other vertical revision functions: Refer to the Systems Related Procedures section.

REQUIRED TIME OF ARRIVAL (RTA)

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

GENERAL

A Required Time of Arrival (RTA) is a time requirement to be met over a specified waypoint of the lateral flight plan, including destination but excluding the origin and FROM waypoints. When the predictions are available, the time constraint value is replaced by the predicted time at the related waypoint, highlighted by a star (*):

- If the RTA is predicted as matched, the star (*) is in magenta.
- If the RTA is predicted as missed, the star (*) is in amber.

No specific symbol is provided on the ND.
A time constraint is cleared in the same way as any other constraints. If a time constraint is automatically deleted. The MCDU displays an “RTA DELETED” message.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

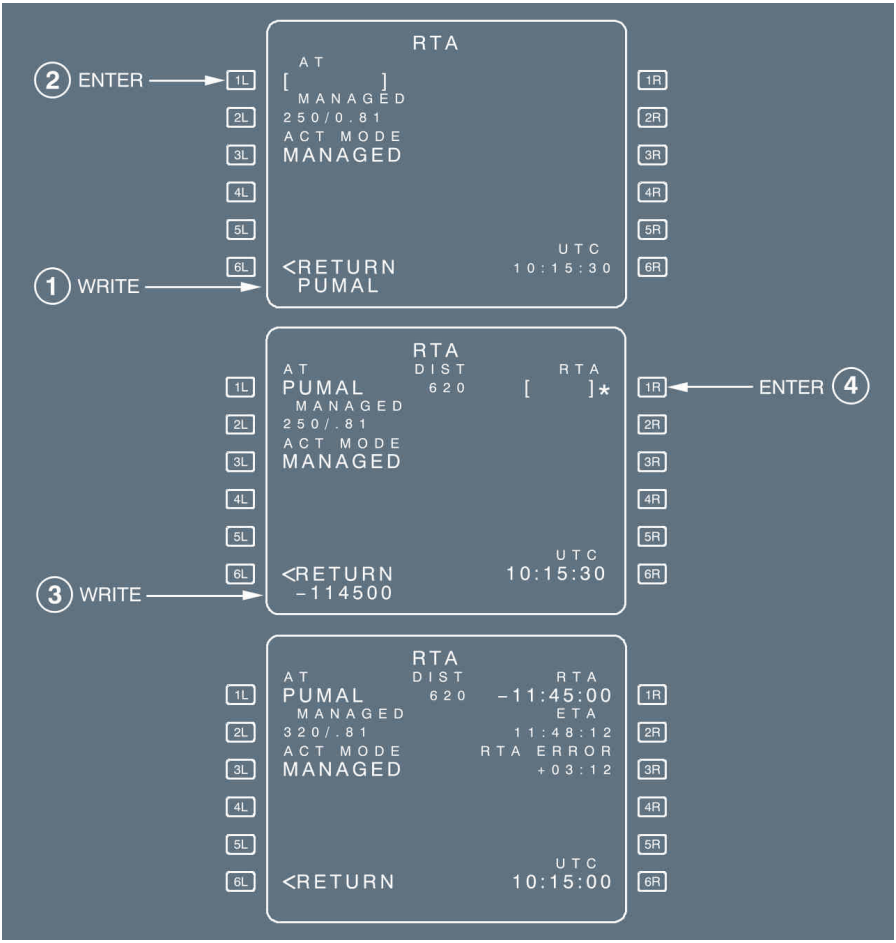
3 ENTERING A REQUIRED TIME OF ARRIVAL

SELECT the F-PLN key on the MCDU.
SELECT a VERT REV at the revised waypoint.
SELECT the RTA prompt (2R).

The MCDU displays the RTA page.

WRITE the identifier of the waypoint where the time constraint has to be defined.
ENTER it in the 1L field.

The RTA prompt and the distance indication appear.



WRITE the required time of arrival.

The format is +/- HHMMSS (entry of seconds is not mandatory).

ENTER it in the 1R field.

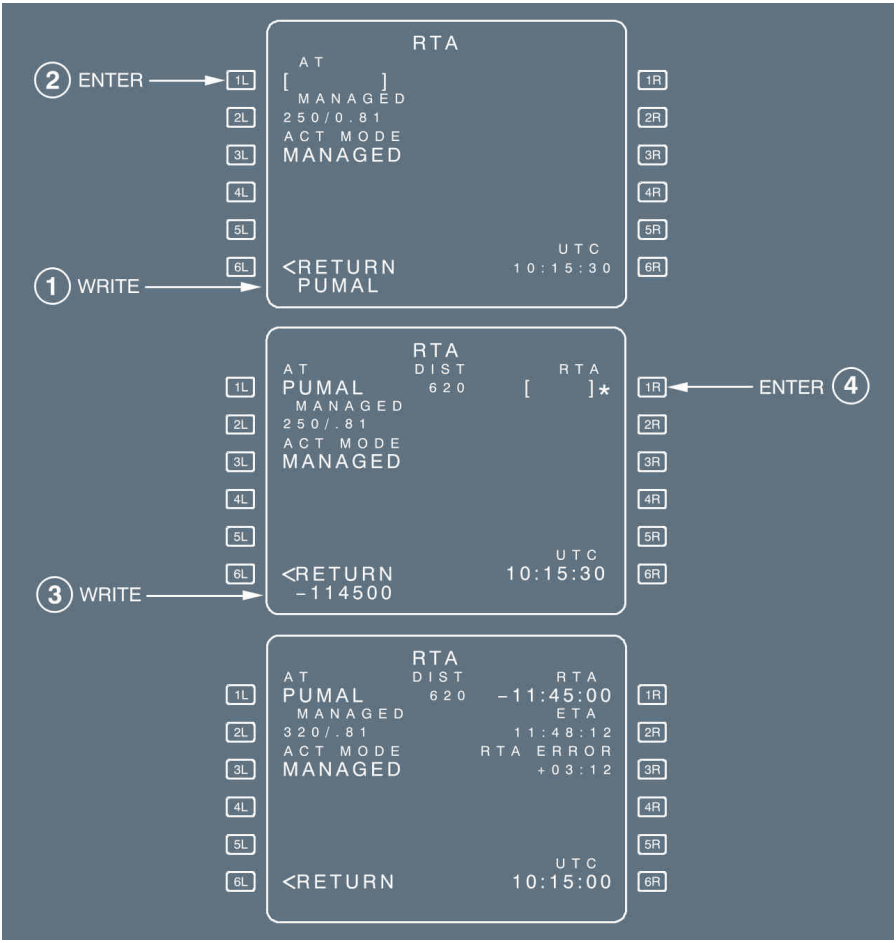
CHECK the 2R and 3R fields to determine whether the entered constraint can be met.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

4

ENTERING A REQUIRED TIME OF ARRIVAL

SELECT the F-PLN key on the MCDU.
SELECT a VERT REV at the revised waypoint.
SELECT the RTA prompt (2R).
CHECK, ENTER or MODIFY the identifier of the waypoint at which the time constraint is to be defined in the [1L] field.



WRITE the required time of arrival.

The format is +/- HHMMSS (entry of seconds is not mandatory).

ENTER it in the 1R field.

CHECK the 2R and 3R fields to determine whether the entered constraint can be met.

WIND - TEMPERATURE - QNH

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

GENERAL

In order to receive the best predictions, the pilot must enter wind and temperature values for the different phases and for the various waypoints of the cruise phase.
The system uses the temperature value at a given altitude, associated with the tropopause entered on the INIT A page, to optimize the temperature profile.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

ENTERING THE TRIP WIND AND TEMPERATURE DURING F-PLN INITIALIZATION

The trip wind is a mean wind component for the entire flight from origin to destination. The pilot can enter it on the INIT B page prior to engine start. It is usually defined by the airline's flight operations on the computerized flight plan.
The FMGS does not consider the trip wind for alternate predictions.
The trip wind is used as long as no winds are entered in the CLB, CRZ, and DES WIND pages.
When the pilot enters a CLB, CRZ or DES WIND, the FMGS disregards the trip wind.

PRESS the INIT key.
INSERT the temperature at cruise FL.
On the INIT B page, INSERT the TRIP WIND.

The trip wind is defined as a headwind component (HDXX, XXHD or –XX), or as a tailwind (TLXX, XXTL or +XX).
The FMGS uses the trip wind to compute preliminary performance, time and fuel predictions.

CHECK the predictions on the F-PLN B page.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

ENTERING THE WIND AND TEMPERATURE DURING F-PLN INITIALIZATION

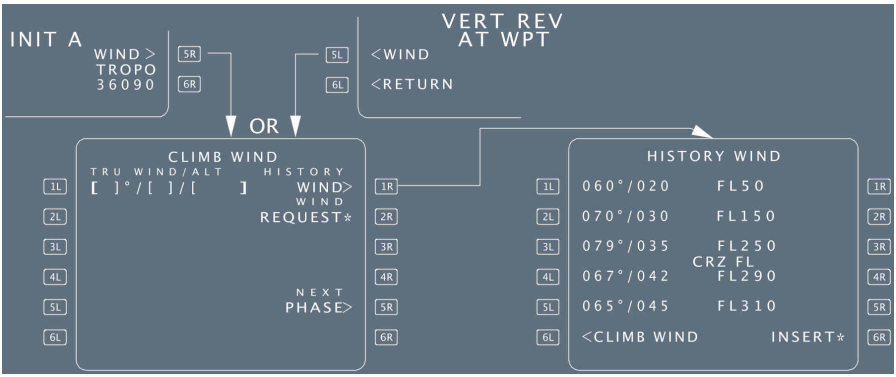
When completing the INIT A page, and once the wind and cruise FL temperature forecasts are available, the pilot may enter them, if significantly different, by pressing the wind prompt.
The pilot will access the different wind pages by using the NEXT PHASE and PREV PHASE prompts. He will slew the CRZ WIND page to access the various cruise wind waypoints.

The pilot will enter wind data as follows:
- For climb phase: By inserting either the HISTORY WIND data (as recorded during the last descent), or by inserting winds (at up to 5 altitudes) on the CLIMB WIND page.
- For cruise phase: By inserting winds (at up to 4 FL) at various CRZ waypoints on the CRZ WIND pages. The 4 levels are the same for all the cruise waypoints. The pilot may enter the temperature of each waypoint and at destination on this page.

- For descent phase: By inserting winds (at up to 5 FL/altitudes) on the DES WIND page.
- For the ALTN F-PLN, an average wind may be entered on the DES WIND page for alternate cruise flight level.

Note: *Wind can be automatically received (and inserted) through the ACARS system (Refer to DSC-22_20-70 Wind Data - Request for Wind Data).*

Once a CLIMB, CRZ, or DESCENT WIND is entered, the system ignores the TRIP WIND.
Once temperature and winds are inserted, the FMGS computes the ISA profile, and the F-PLN B page displays the forecast wind profile (by linear interpolation and propagation).



WIND ENTRY RULES

When a wind entry is performed from an empty field, direction/velocity/altitude (or flight level) must be entered simultaneously. One entry in each bracket.
Overwriting a wind cancels the previous one.
Entered wind data can be cleared: The field reverts to brackets.
Propagated wind cannot be cleared.
Entering a new altitude, over an existing altitude, replaces that existing altitude at all cruise waypoints. Any winds entered at the overwritten altitude are lost at all cruise waypoints.

ENTERING THE HISTORY WIND (F-PLN INITIALIZATION)

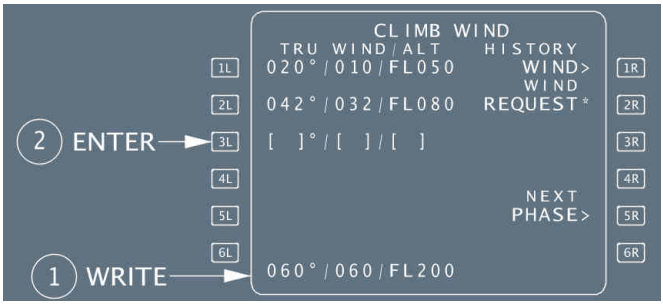
The pilot may insert the history wind, but cannot modify this page.
If convenient, PRESS the (6R) prompt to insert. After insertion, the [6R] prompt is suppressed, but the page still displays the wind values for information.

ENTERING THE CLIMB WIND (F-PLN INITIALIZATION)

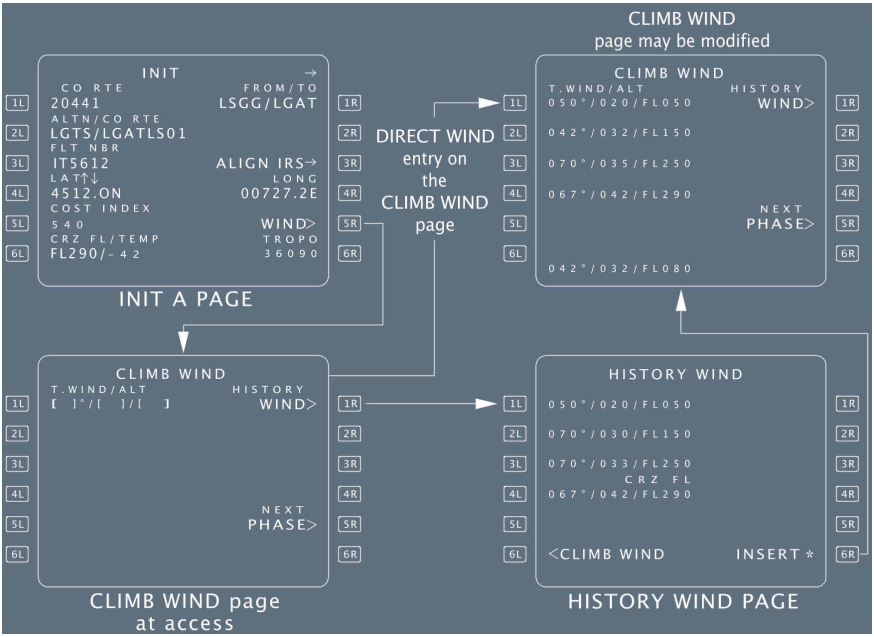
If history winds are not convenient:

SELECT CLIMB WIND page from INIT A page or VERT REV page.

WRITE new winds into the scratchpad and ENTER.



Winds entered on the CLIMB, CRZ, and DESCENT WIND pages are always true north referenced.
Tower wind, entered on PERF APPR page is magnetic-referenced.
The pilot can enter “GRND”in the altitude field for wind at destination.
CLIMB WIND cannot be modified when the climb phase is active.
At climb phase transition, wind data switches from blue to green, and any attempted modification will trigger the “NOT ALLOWED” message.
The system extrapolates the highest wind entry to all higher levels.
The system interpolates winds between 2 entered levels.



Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

5

ENTERING THE WIND AND TEMPERATURE DURING F-PLN INITIALIZATION

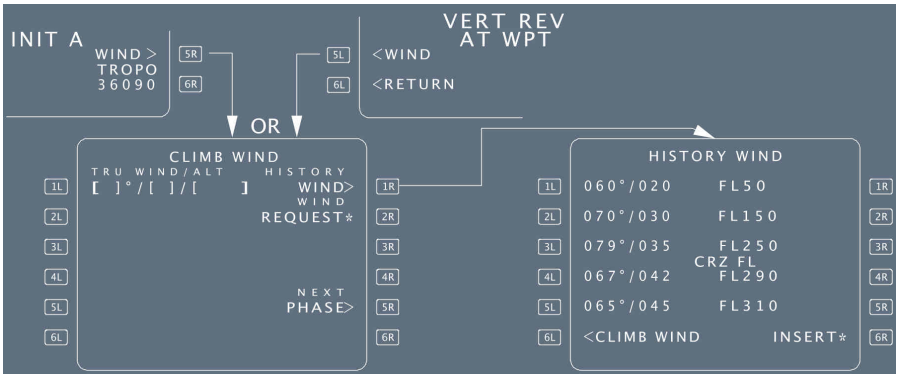
When completing the INIT A page, and once the wind and cruise FL temperature forecasts are available, the pilot may enter them, if significantly different, by pressing the wind prompt.
The pilot will access the different wind pages by using the NEXT PHASE and PREV PHASE prompts. He will slew the CRZ WIND page to access the various cruise wind waypoints.

The pilot will enter wind data as follows:

- For climb phase: By inserting either the HISTORY WIND data (as recorded during the last descent), or by inserting winds (at up to 5 altitudes) on the CLIMB WIND page.
- For cruise phase: By inserting winds (at up to 4 FL) at various CRZ waypoints on the CRZ WIND pages. The 4 levels are the same for all the cruise waypoints. The pilot may enter the temperature of each waypoint and at destination on this page.
- For descent phase: By inserting winds (at up to 5 FL/altitudes) on the DES WIND page.
- For the ALTN F-PLN, an average wind may be entered on the DES WIND page for alternate cruise flight level.

Note: Wind can be automatically received (and inserted) through the ACARS system (Refer to DSC-22_20-70 Wind Data - Request for Wind Data).

Once a CLIMB, CRZ, or DESCENT WIND is entered, the system ignores the TRIP WIND.
Once temperature and winds are inserted, the FMGS computes the ISA profile, and the F-PLN B page displays the forecast wind profile (by linear interpolation and propagation).



WIND ENTRY RULES

When a wind entry is performed from an empty field, direction/velocity/altitude (or flight level) must be entered simultaneously. One entry in each bracket.
Overwriting a wind cancels the previous one.
Entered wind data can be cleared: The field reverts to brackets.
Propagated wind cannot be cleared.
Entering a new altitude, over an existing altitude, replaces that existing altitude at all cruise waypoints. Any winds entered at the overwritten altitude are lost at all cruise waypoints.

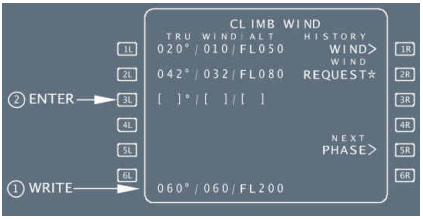
ENTERING THE HISTORY WIND (F-PLN INITIALIZATION)

The pilot may insert the history wind, but cannot modify this page.
If convenient, PRESS the (6R) prompt to insert. After insertion, the [6R] prompt is suppressed, but the page still displays the wind values for information.

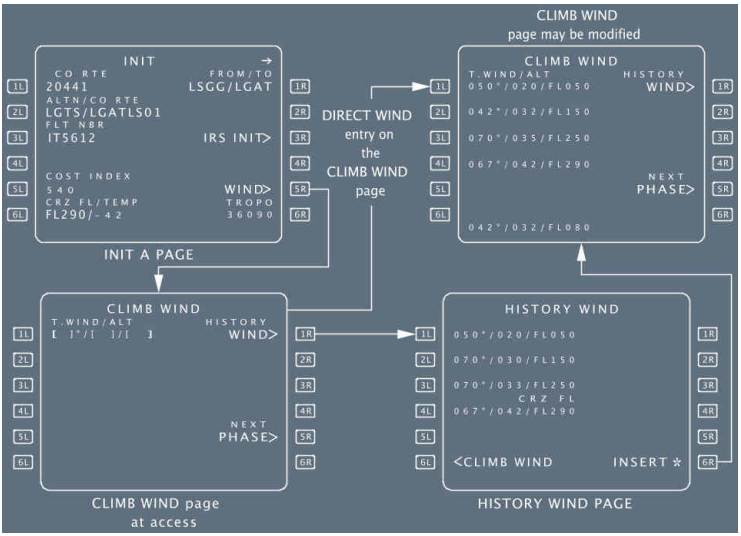
ENTERING THE CLIMB WIND (F-PLN INITIALIZATION)

If history winds are not convenient:

SELECT CLIMB WIND page from INIT A page or VERT REV page.
WRITE new winds into the scratchpad and ENTER.



Winds entered on the CLIMB, CRZ, and DESCENT WIND pages are always true north referenced.
Tower wind, entered on PERF APPR page is magnetic-referenced.
The pilot can enter “GRND”in the altitude field for wind at destination.
CLIMB WIND cannot be modified when the climb phase is active.
At climb phase transition, wind data switches from blue to green, and any attempted modification will trigger the “NOT ALLOWED” message.
The system extrapolates the highest wind entry to all higher levels.
The system interpolates winds between 2 entered levels.



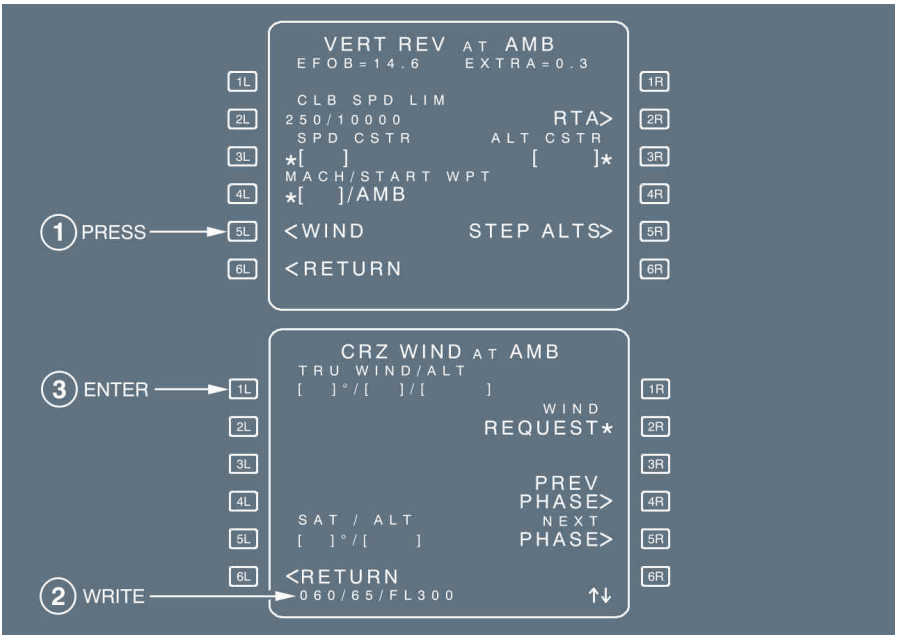
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

6 ENTERING THE CRUISE WINDS AND TEMPERATURES

At flight plan initialization, the CRZ WIND page displays all cruise waypoints with empty brackets.
In flight, only downpath waypoints are displayed.

SELECT VERT REV at WPT.
PRESS the WIND prompt.
SELECT NEXT PHASE.
SLEW until relevant waypoint is displayed.
WRITE and ENTER the new temperature into the scratchpad.
WRITE and ENTER the new wind data into the scratchpad.

WIND and temperature may be entered through the ACARS pages. (Refer to DSC-22_20-70 Wind Data - Procedure to Insert Wind Data).



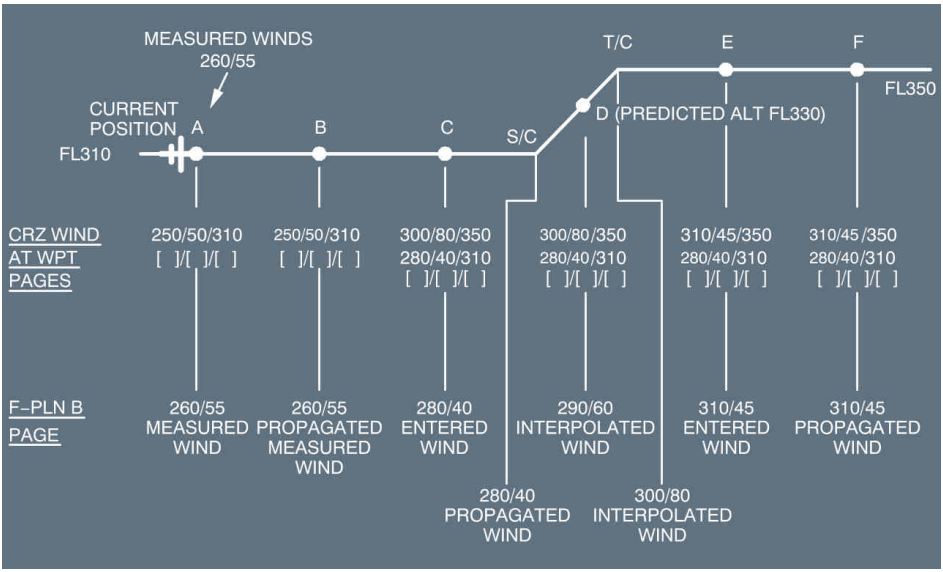
The crew will modify the entered winds and temperatures in flight, if a significant difference is expected (greater than 30 kt or 30 ° for the wind data and greater than 5 °C for the temperature). The system propagates the pilot's (or ACARS) wind and temperature entries downpath, until a waypoint for which a different temperature or wind has been entered (for the same flight level), or until the last cruise waypoint.

The forecast winds at a waypoint are determined as follows:

- If the predicted altitude at the waypoint matches an altitude defined in the CRZ WIND page, the forecast wind, is the corresponding entered or propagated wind, displayed at that waypoint on the CRZ WIND page.
- If the predicted altitude lies between two altitudes entered on the CRZ WIND page, the wind direction and velocity are linearly interpolated.
- If the predicted altitude is above or below the set of cruise altitudes, the forecast wind is a constant value extrapolated from the entered or propagated wind at the highest (or lowest) altitude displayed on the CRZ WIND page for that point.

Once in flight, the FMGS considers the actual measured wind up to 200 nm ahead of the aircraft to permanently update the wind profile. This updated wind profile is used to compute the predictions and the performance data, but is not displayed to the crew.
The CRZ WIND pages display the propagated values in small blue font, and the pilot (or ACARS) entries in large blue font.

Note: *The CRZ WIND page displays ACARS or crew-entered or propagated data. It never displays computed data (F-PLN B page only).*
Example:



Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

EFFECT OF WIND ENTRIES ON OPTIMUM FLIGHT LEVEL

The OPT FL computation considers the wind entries made at different altitudes (normally at the different CRZ FL).
When flying the subsequent CRZ FL, the OPT FL proposed by the PROG page may be affected by the wind entries made at the previous CRZ FL; these winds are automatically propagated and may be significantly different from the actual winds.
We recommend the following procedure: If the propagated winds at the lower altitudes are significantly different from the actual winds, enter the wind at these altitudes, or if not available, the wind measured at the current CRZ FL.

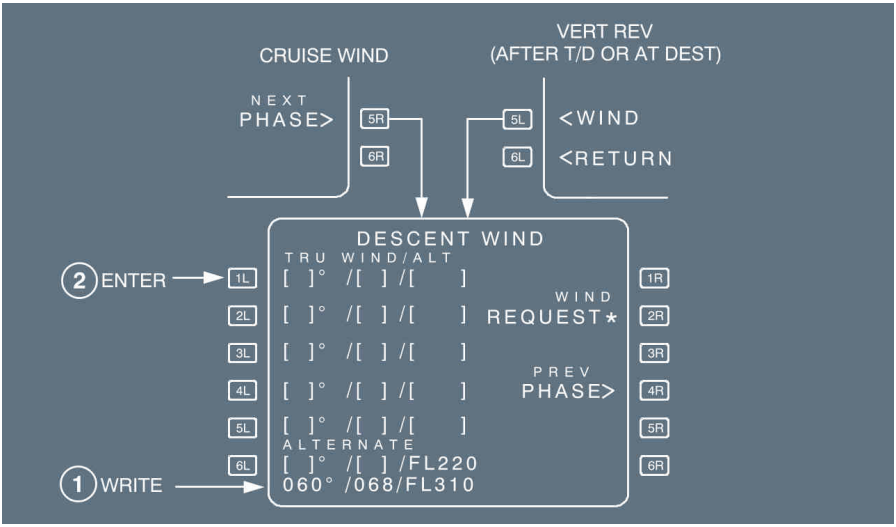
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

7 ENTERING THE DESCENT WINDS

The pilot will enter as many as one wind at 5 different FL or altitudes. This wind data will be used for descent profile and prediction computation.

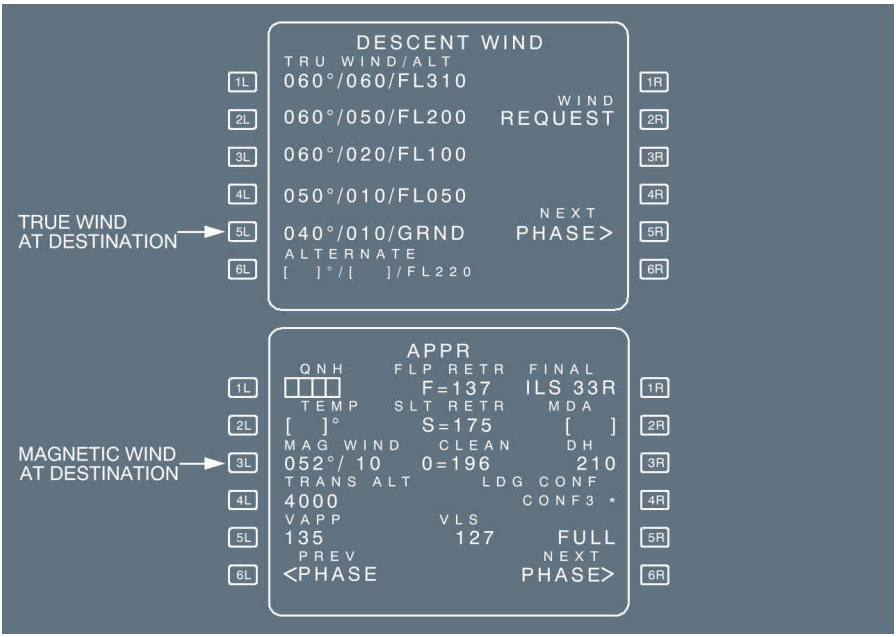
From the vertical revision page, or from the CRZ WIND page:

PRESS the WIND prompt.
SELECT the DESCENT WIND page.
ENTER up to 5 different “wind/altitude”.



A wind is written as true direction/velocity/flight level or altitude in feet.

If the crew enters “GRND”in the altitude field, the system uses the associated wind as wind at destination.
The descent profile is corrected, as well as the tower wind entered in the PERF APPR page.



When the winds have been entered, the F-PLN B page displays the forecasted wind profile at all descent waypoints, using values it has interpolated from manual entries. Descent winds are not modifiable when the descent, approach, or go-around phase is active. At descent phase transition, wind data switches from blue to green, and any attempted modification will trigger the “NOT ALLOWED” message.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

8

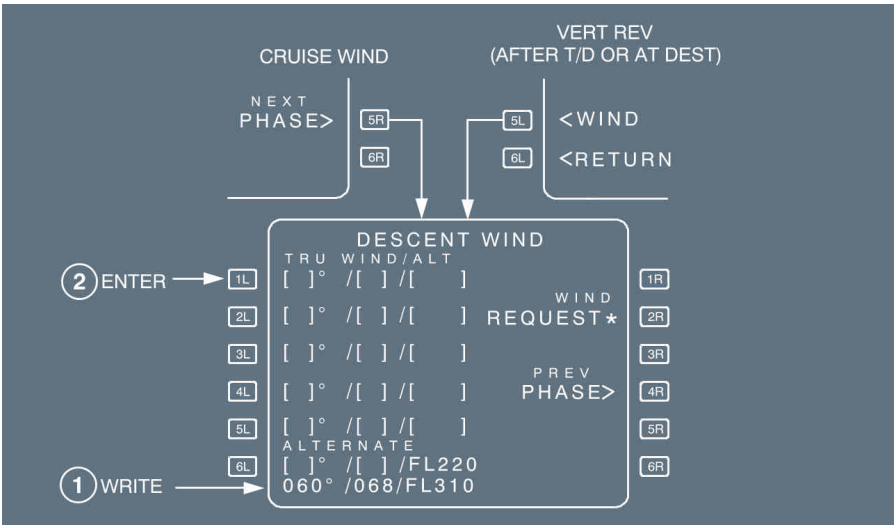
ENTERING THE DESCENT WINDS

The pilot will enter as many as one wind at 5 different FL or altitudes. This wind data will be used for descent profile and prediction computation.

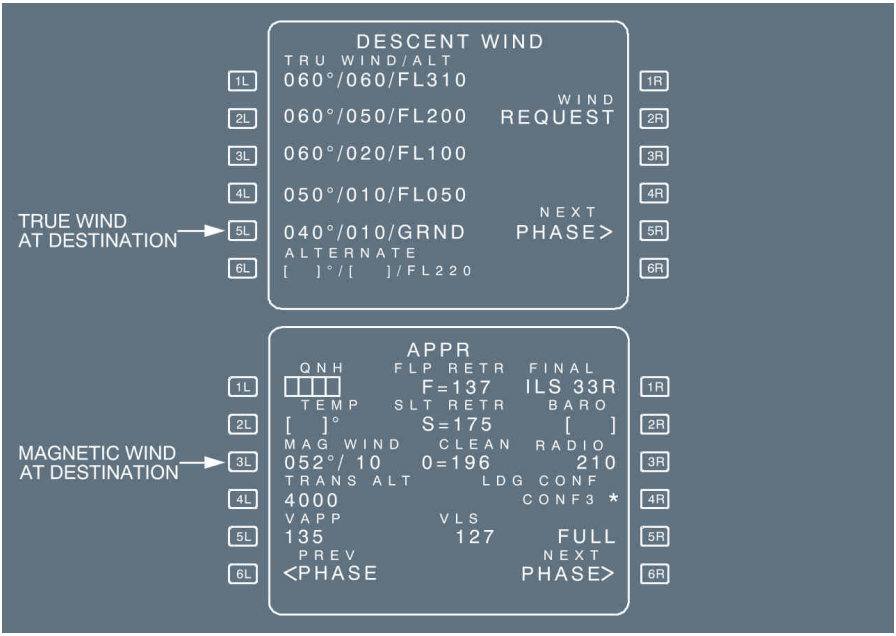
From the vertical revision page, or from the CRZ WIND page:

PRESS the WIND prompt.
SELECT the DESCENT WIND page.

ENTER up to 5 different “wind/altitude”.



A wind is written as true direction/velocity/flight level or altitude in feet.
If the crew enters “GRND”in the altitude field, the system uses the associated wind as wind at destination.
The descent profile is corrected, as well as the tower wind entered in the PERF APPR page.



When the winds have been entered, the F-PLN B page displays the forecasted wind profile at all descent waypoints, using values it has interpolated from manual entries. Descent winds are not modifiable when the descent, approach, or go-around phase is active. At descent phase transition, wind data switches from blue to green, and any attempted modification will trigger the “NOT ALLOWED” message.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

ENTERING THE ALTERNATE WIND

Alternate wind is entered on the DESCENT WIND page.

The alternate cruise (ALTN CRZ) level defaults to:
- FL 220 if the length of the ALTN F-PLN is less than 200 nm.
- FL 310 if the length of the ALTN F-PLN is greater than 200 nm.

If an alternate wind is not defined, the predictions are computed with a wind defaulted to zero. Alternate wind can be modified at any time.

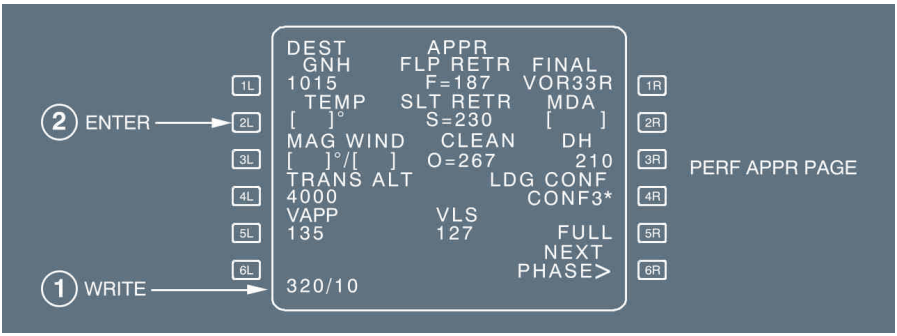
The alternate wind profile is as follows:

- ALTN CLB wind : Mean wind between ALTN CRZ wind (as entered on the DESCENT WIND page), and the wind at primary DEST (as entered on the PERF APPR page).
- ALTN CRZ wind : If no ALTN WIND has been entered on the DESCENT WIND page, the WIND at primary DEST (as entered on the PERF APPR page) is considered.
  In case no entry is made, zero wind is assumed.
- ALTN DES wind : Mean between ALTN CRZ WIND and wind at FL 100.
  Wind at FL 100 = Interpolation between wind at ALTN CRZ FL and zero at ALTN DEST.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

9 ENTERING THE APPROACH WIND TEMPERATURE AND QNH

The wind at destination is entered in the 3L field of the PERF APPR page.
It is copied in true reference into the DESCENT WIND page at ground level (GRND), and F-PLN B page at destination. A ground entry on the DESCENT WIND page is, in the same way, automatically copied to F-PLN B page and the PERF APPR page.
This wind is modifiable in descent, approach, and go-around phases.



SELECT the PERF key on the MCDU.
PRESS NEXT PHASE (6R).
WRITE QNH and temperature, and enter them.
WRITE the surface wind in the scratchpad, and enter it.

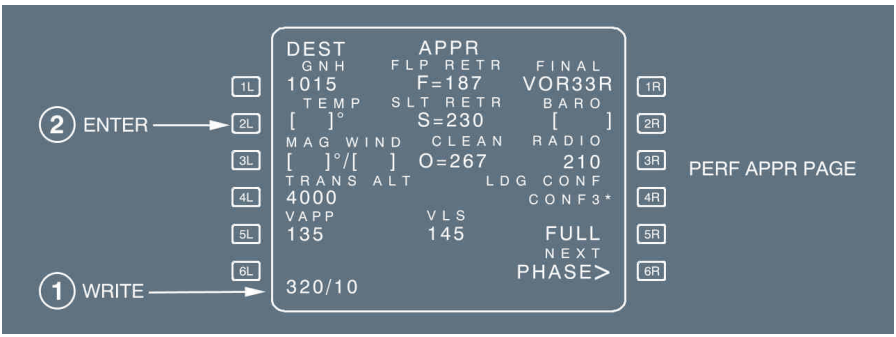
Note: *At each wind entry, the descent profile is recomputed. Therefore, it is recommended to enter all winds, temperature, and QNH at the same time in order to minimize recomputation time.*

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

10

ENTERING THE APPROACH WIND TEMPERATURE AND QNH

The wind at destination is entered in the 3L field of the PERF APPR page.
It is copied in true reference into the DESCENT WIND page at ground level (GRND), and F-PLN B page at destination. A ground entry on the DESCENT WIND page is, in the same way, automatically copied to F-PLN B page and the PERF APPR page.
This wind is modifiable in descent, approach, and go-around phases.



SELECT the PERF key on the MCDU.
PRESS NEXT PHASE (6R).
WRITE QNH and temperature, and enter them.
WRITE the surface wind in the scratchpad, and enter it.

Note: *At each wind entry, the descent profile is recomputed. Therefore, it is recommended to enter all winds, temperature, and QNH at the same time in order to minimize recomputation time.*

CONSTANT MACH SEGMENT

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

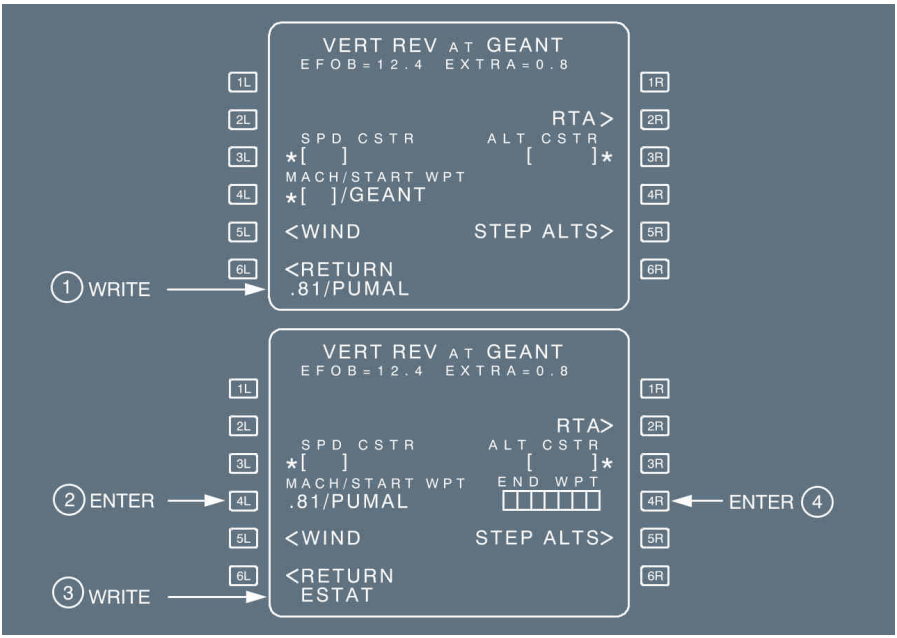
GENERAL

The pilot can enter the start and end points of a constant Mach segment, and its associated Mach number, from the VERT REV page.
Only one constant Mach segment may be defined in the active flight plan, and only one in the secondary flight plan. No constant Mach segment can be defined in the alternate flight plan.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

11 ENTERING A CONSTANT MACH SEGMENT

SELECT the F-PLN key on the MCDU.
SELECT VERT REV at a waypoint.
(Except the destination and alternate flight plan waypoint).
WRITE the Mach/start waypoint pair.
It is possible to enter only the Mach or the waypoint. But, for the first entry, a Mach entry is mandatory.
The waypoint must be located in front of the aircraft and must be part of the cruise.
ENTER it in the 4L field
The END WPT prompt appears in the 4R field.



WRITE the end waypoint.
The end waypoint must be part of the cruise.
ENTER it in the 4R field.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

12

ENTERING A CONSTANT MACH SEGMENT

SELECT the F-PLN key on the MCDU.
SELECT VERT REV at a waypoint.

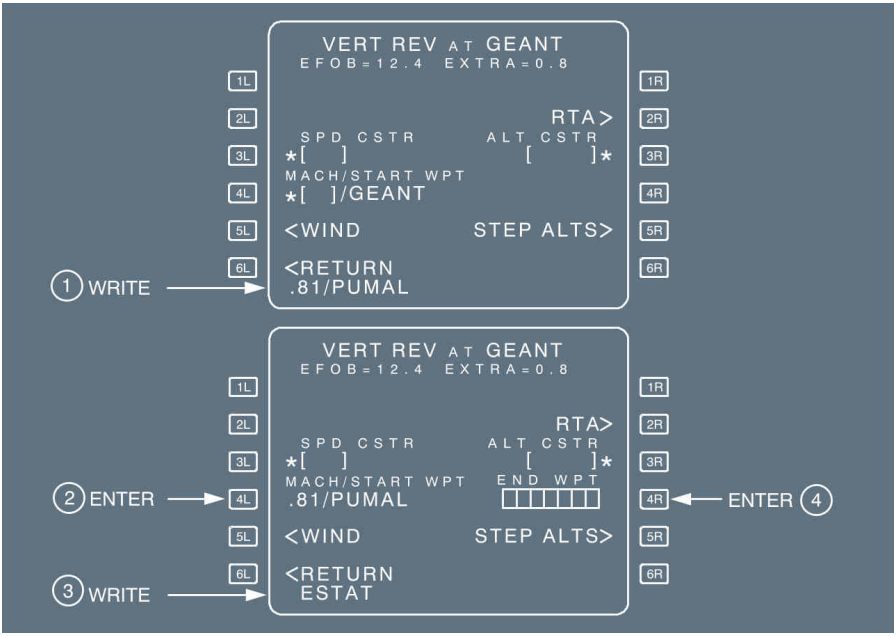
(Except the destination and alternate flight plan waypoint).

WRITE the Mach/start waypoint pair.

It is possible to enter only the Mach or the waypoint. But, for the first entry, a Mach entry is mandatory.
The waypoint must be located in front of the aircraft and must be part of the cruise.

ENTER it in the 4L field

The END WPT prompt appears in the 4R field.



WRITE the end waypoint.

The end waypoint must be part of the cruise.

ENTER it in the 4R field.

GENERAL

Applicable to: ALL

The performance function:
- Optimizes a flight plan
- Computes predictions.

OPTIMIZATION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The FMGC minimizes cost by optimizing the following items:
- Takeoff, approach, and go-around speeds (F, S, Green Dot, VAPP)
- Target speed for CLB, CRZ and DES phases (ECON SPD/MACH)
- Flight Level (for flight crew's information)
- Descent profile from CRZ FL down to the destination airport.

These items depend on the data the flight crew inserts during lateral and vertical flight planning and revision procedures.
Most are displayed on the PERF pages associated with the appropriate flight phases.

WIND PROFILE

To obtain the best predictions, the flight crew must enter the wind for the various flight phases and specifically for waypoints in cruise.

■ **ON GROUND:**

During flight planning initialization, enter the winds for the climb and cruise phases using the HISTORY WIND and WIND pages. Enter, manually or with ACARS, different wind values in the climb and cruise phases. The system will compute a wind for all waypoints of the F-PLN using linear interpolation between manual/ACARS entries.
The wind profile will be displayed on the F-PLN B page, and is called forecast wind profile.
Flight crew or ACARS entries are displayed in large font, and system-computed winds in small font.

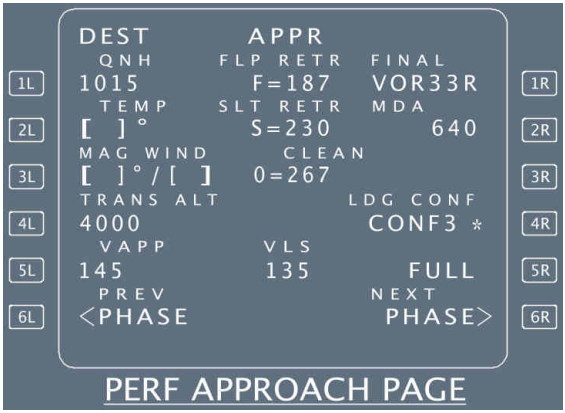
■ **IN FLIGHT:**

The system updates the predictions and the current ECON speed, using the measured wind at the present position. It combines actual wind and forecast winds to compute the wind ahead of the aircraft, but this is totally transparent to the flight crew.
During cruise, the flight crew will enter the descent winds and the approach wind. The system will update the final predictions, compute the optimum descent profile and compute the optimum speed in descent and approach.

The forecast wind profile will be used to compute fuel and time predictions, as well as ECON speed/Mach targets.

OPTIMUM TAKEOFF, APPROACH AND GO-AROUND SPEEDS

The FMGC computes takeoff speeds (F, S, Green Dot) during the preflight and takeoff phases, using the performance model in the database and the takeoff weight.
The flight crew has to insert V1, VR, and V2 in the PERF TO page manually.
The FMGC uses the performance model and either the predicted landing weight or the current gross weight at transition to the approach phase to compute approach speeds (VLS, VAPP, F, S, Green Dot).
On the PERF APPR page, the selected LDG CONF determines the applicable VLS and VAPP, the latter being updated by the WIND correction that the flight crew enters on the same page. The FMGC uses the performance model and gross weight to compute go-around speeds (F, S, Green Dot).



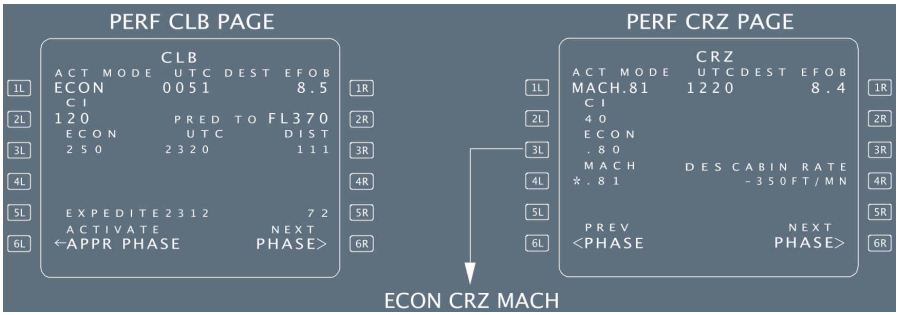
OPTIMUM TARGET SPEED FOR CLIMB, CRUISE AND DESCENT (ECON SPD/MACH)

The FMGS computes the optimum target speed (ECON SPD/MACH) as a function of:
- Cost index (CI)
- Cruise flight level (CRZ FL)
- Gross weight (GW)
- Wind and temperature models
- Performance factor.

The computer processes the ECON SPDs for the climb and descent phases before the initiation of the flight phase, and freezes the values once the flight phase becomes active.
When there is no time or speed constraint/limit, ECON SPEED is the optimum speed for the selected cost index. It refers to fuel and time cost and not directly to fuel saving.
The FM calculates ECON CLB, ECON DES and the associated top of climb and top of descent as a function of cost index, cruise FL, and meteo data.

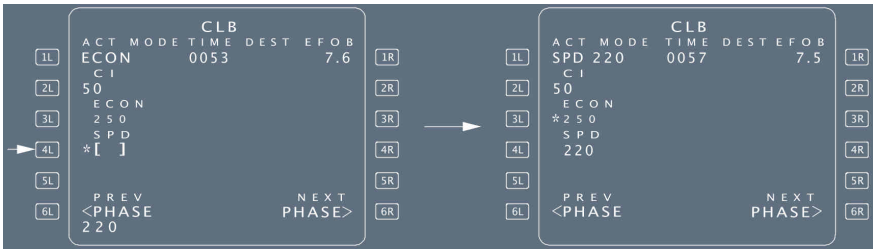
The computer continually updates ECON CRUISE MACH (SPD), taking into account current weather conditions and modifications to the flight plan.

Note: *If the cruise FL is below FL 250, ECON CRUISE SPEED is computed.*
If the cruise FL is above FL 250, ECON CRUISE MACH is computed.



PRESET TARGET SPEED FOR CLB PHASE

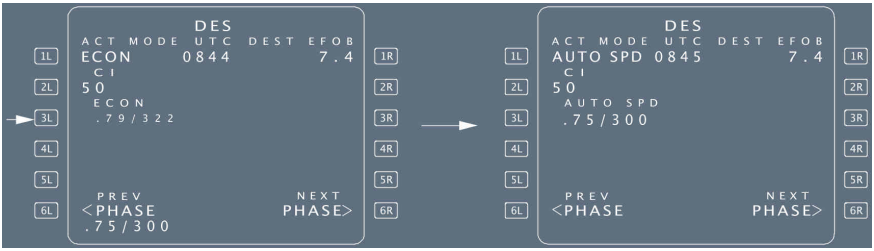
The flight crew can preselect the climb speed before the CLB phase begins, by inserting a speed in the SPD field:



The active mode field changes from ECON to SPD XXX (XXX being the speed entered in the SPD field), and the FM will use the entered speed for climb predictions computation.
The flight crew can revert to managed mode by pressing the 3L key.

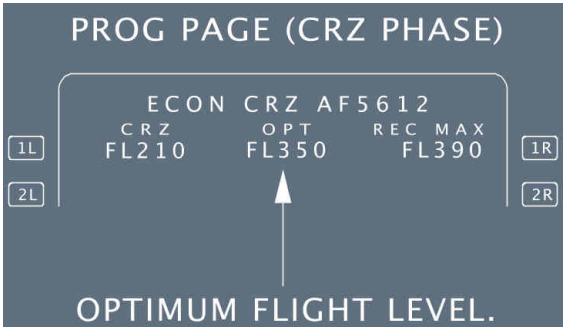
PRESET TARGET SPEED/MACH FOR DES PHASE

The flight crew can change the speed and/or Mach displayed in the ECON field before the DES phase begins by inserting a speed and/or Mach in the ECON field. The 3L field name changes from ECON to AUTO SPD.
Although the entered speed is chosen by the flight crew, the FMGS uses it to compute the descent flight path and top of descent. It is therefore part of the managed descent profile.



The flight crew can revert to the optimum speed/Mach by clearing the 3L field.

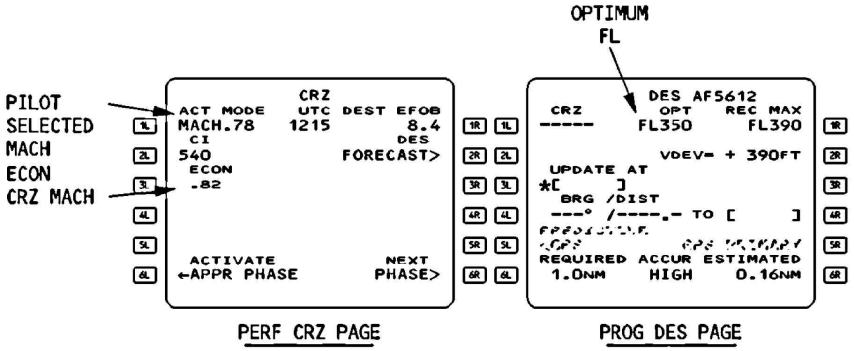
OPTIMUM FLIGHT LEVEL



The optimum flight level (OPT FL) indicates the most economic flight level for a given cost index, weight, weather data. It is continuously updated in flight.
The OPT FL is a compromise between fuel and time saving. As a result, the flight crew may observe jumps in OPT FL due to GW, ISA, or wind changes. The computation of the OPT FL considers the wind entries made at the different altitudes (normally at the different CRZ FL).
When flying the subsequent CRZ FL, the OPT FL proposed by the PROG page may be affected by the wind entries made at the previous CRZ FL; these winds are automatically propagated and may be significantly different from the actual winds.

Note: *For simplification purposes, the FCOM/QRH gives the OPT FL at a given Mach number. It does not consider the cost index, therefore the FMGS and the FCOM/QRH values are different.*

FM displays OPT FL on the PROG page. The PROG page displays dashes for this quantity:
- At least 15 nm before top of descent
- When the system detects an engine-out condition
- When DES phase is activated.



OPTIMUM DESCENT PATH

The vertical flight path is computed to minimize fuel consumption, while satisfying the various altitude constraints and the descent speed profile, in order to reach VAPP at 1 000 ft.

The computer calculates the descent profile before the descent phase is initiated, taking into account:

- All lateral and vertical flight plan data
- The descent and approach winds, as inserted into the DESCENT WIND page and PERF APPR page, and the required maximum cabin rate of descent.

During descent, the descent profile is updated only if the flight plan is modified, or if data for the APPR phase (WIND, VAPP, or LDG CONF) are changed.

OPTIMIZATION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

The FMGC minimizes cost by optimizing the following items:

- Takeoff, approach, and go-around speeds (F, S, Green Dot, VAPP)
- Target speed for CLB, CRZ and DES phases (ECON SPD/MACH)
- Flight Level (for flight crew's information)
- Descent profile from CRZ FL down to the destination airport.

These items depend on the data the flight crew inserts during lateral and vertical flight planning and revision procedures.
Most are displayed on the PERF pages associated with the appropriate flight phases.

WIND PROFILE

To obtain the best predictions, the flight crew must enter the wind for the various flight phases and specifically for waypoints in cruise.

- **ON GROUND:**

  During flight planning initialization, enter the winds for the climb and cruise phases using the HISTORY WIND and WIND pages. Enter, manually or with ACARS, different wind values in the climb and cruise phases. The system will compute a wind for all waypoints of the F-PLN using linear interpolation between manual/ACARS entries.

  The wind profile will be displayed on the F-PLN B page, and is called forecast wind profile. Flight crew or ACARS entries are displayed in large font, and system-computed winds in small font.

- **IN FLIGHT:**

  The system updates the predictions and the current ECON speed, using the measured wind at the present position. It combines actual wind and forecast winds to compute the wind ahead of the aircraft, but this is totally transparent to the flight crew.

  During cruise, the flight crew will enter the descent winds and the approach wind. The system will update the final predictions, compute the optimum descent profile and compute the optimum speed in descent and approach.

The forecast wind profile will be used to compute fuel and time predictions, as well as ECON speed/Mach targets.

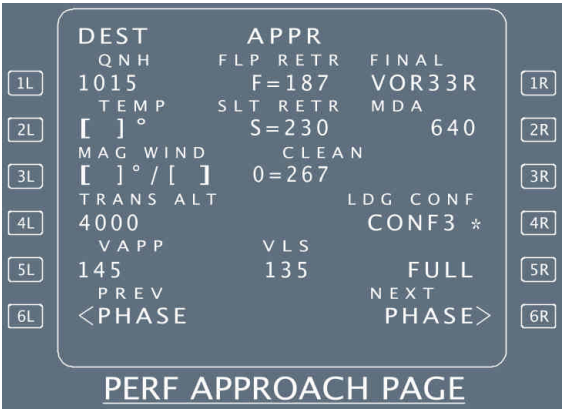
OPTIMUM TAKEOFF, APPROACH AND GO-AROUND SPEEDS

The FMGC computes takeoff speeds (F, S, Green Dot) during the preflight and takeoff phases, using the performance model in the database and the takeoff weight.

The flight crew has to insert V1, VR, and V2 in the PERF TO page manually.

The FMGC uses the performance model and either the predicted landing weight or the current gross weight at transition to the approach phase to compute approach speeds (VLS, VAPP, F, S, Green Dot).

On the PERF APPR page, the selected LDG CONF determines the applicable VLS and VAPP, the latter being updated by the WIND correction that the flight crew enters on the same page. The FMGC uses the performance model and gross weight to compute go-around speeds (F, S, Green Dot).



OPTIMUM TARGET SPEED FOR CLIMB, CRUISE AND DESCENT (ECON SPD/MACH)

The FMGS computes the optimum target speed (ECON SPD/MACH) as a function of:
- Cost index (CI)
- Cruise flight level (CRZ FL)
- Gross weight (GW)
- Wind and temperature models
- Performance factor.

The computer processes the ECON SPDs for the climb and descent phases before the initiation of the flight phase, and freezes the values once the flight phase becomes active.
When there is no time or speed constraint/limit, ECON SPEED is the optimum speed for the selected cost index. It refers to fuel and time cost and not directly to fuel saving.
The FM calculates ECON CLB, ECON DES and the associated top of climb and top of descent as a function of cost index, cruise FL, and meteo data.
The computer continually updates ECON CRUISE MACH (SPD), taking into account current weather conditions and modifications to the flight plan.

Note: *If the cruise FL is below FL 250, ECON CRUISE SPEED is computed.*
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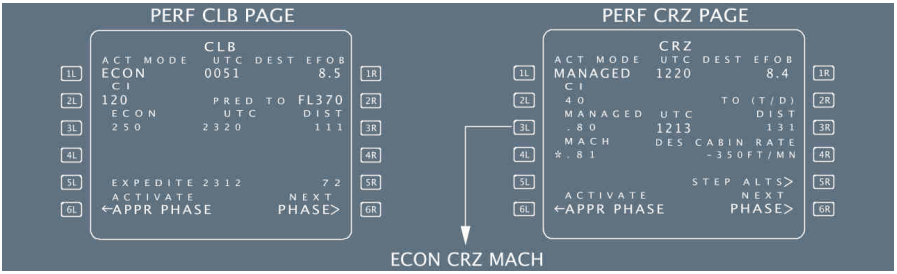
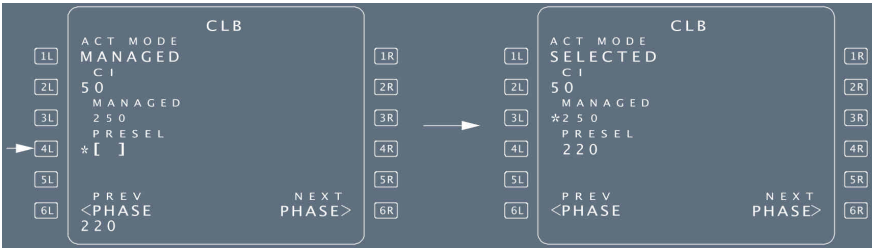


PRESET TARGET SPEED FOR CLB PHASE

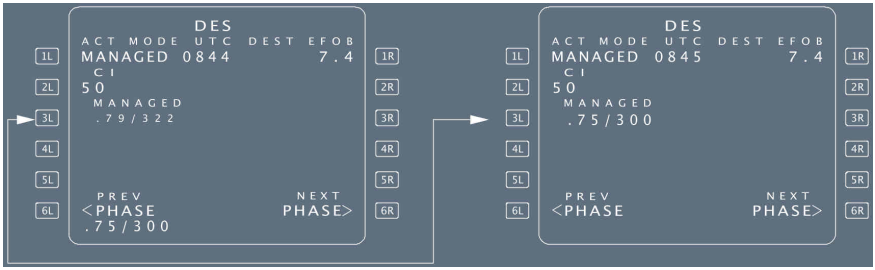
The flight crew can preselect the climb speed before the CLB phase begins, by inserting a speed in the PRESEL field:



The active mode field changes from MANAGED to SELECTED, and the FM will use the entered speed for climb predictions computation.
The flight crew can revert to managed mode by pressing the 3L key.

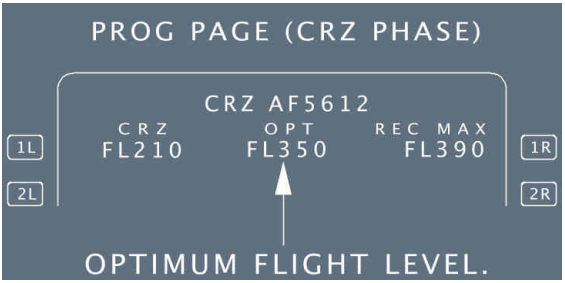
PRESET TARGET SPEED/MACH FOR DES PHASE

The flight crew can change the speed and/or Mach displayed in the MANAGED field, before the DES phase begins by inserting a speed and/or Mach in the MANAGED field.
Although the entered speed is chosen by the flight crew, the FMGS uses it to compute the descent flight path and top of descent. It is therefore part of the managed descent profile.



The flight crew can revert to the optimum speed/Mach by clearing the 3L field.

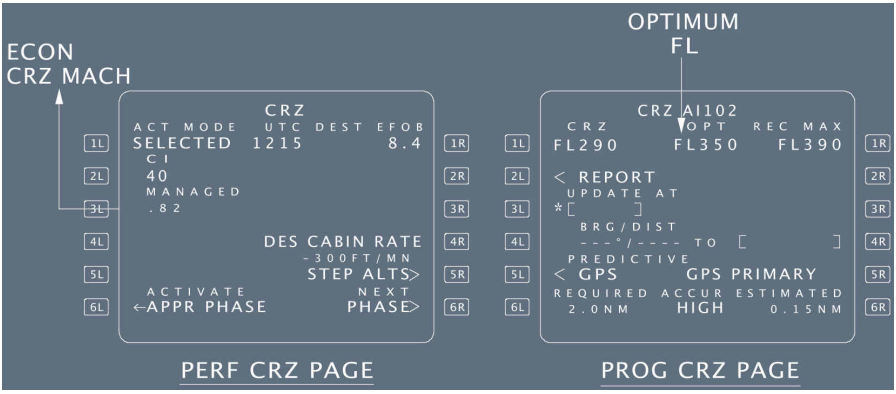
OPTIMUM FLIGHT LEVEL



The optimum flight level (OPT FL) indicates the most economic flight level for a given cost index, weight, weather data. It is continuously updated in flight. It requires a 15 min minimum cruise time. The OPT FL is a compromise between fuel and time saving. As a result, the flight crew may observe jumps in OPT FL due to GW, ISA, or wind changes. The computation of the OPT FL considers the wind entries made at the different altitudes (normally at the different CRZ FL). When flying the subsequent CRZ FL, the OPT FL proposed by the PROG page may be affected by the wind entries made at the previous CRZ FL; these winds are automatically propagated and may be significantly different from the actual winds.

Note: *For simplification purposes, the FCOM/QRH gives the OPT FL at a given Mach number. It does not consider the cost index, therefore the FMGS and the FCOM/QRH values are different.*

FM displays OPT FL on the PROG page. The PROG page displays dashes for this quantity when the system detects an engine-out condition.



OPTIMUM DESCENT PATH

The vertical flight path is computed to minimize fuel consumption, while satisfying the various altitude constraints and the descent speed profile, in order to reach VAPP at 1 000 ft.

The computer calculates the descent profile before the descent phase is initiated, taking into account:

- All lateral and vertical flight plan data
- The descent and approach winds, as inserted into the DESCENT WIND page and PERF APPR page, and the required maximum cabin rate of descent.

During descent, the descent profile is updated only if the flight plan is modified, or if data for the APPR phase (WIND, VAPP, or LDG CONF) are changed.

OPTIMIZATION

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

1

The FMGC minimizes cost by optimizing the following items:

- Takeoff, approach, and go-around speeds (F, S, Green Dot, VAPP)
- Target speed for CLB, CRZ and DES phases (ECON SPD/MACH)
- Flight Level (for flight crew's information)
- Descent profile from CRZ FL down to the destination airport.

These items depend on the data the flight crew inserts during lateral and vertical flight planning and revision procedures.
Most are displayed on the PERF pages associated with the appropriate flight phases.

WIND PROFILE

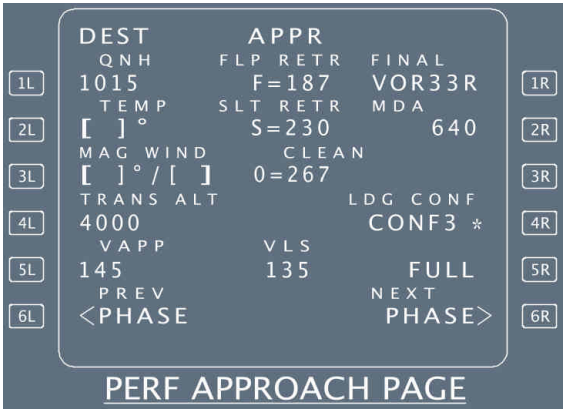
To obtain the best predictions, the flight crew must enter the wind for the various flight phases and specifically for waypoints in cruise.

- **ON GROUND:**
  During flight planning initialization, enter the winds for the climb and cruise phases using the HISTORY WIND and WIND pages. Enter, manually or with ACARS, different wind values in the climb and cruise phases. The system will compute a wind for all waypoints of the F-PLN using linear interpolation between manual/ACARS entries.
  The wind profile will be displayed on the F-PLN B page, and is called forecast wind profile.
  Flight crew or ACARS entries are displayed in large font, and system-computed winds in small font.
- **IN FLIGHT:**
  The system updates the predictions and the current ECON speed, using the measured wind at the present position. It combines actual wind and forecast winds to compute the wind ahead of the aircraft, but this is totally transparent to the flight crew.
  During cruise, the flight crew will enter the descent winds and the approach wind. The system will update the final predictions, compute the optimum descent profile and compute the optimum speed in descent and approach.

The forecast wind profile will be used to compute fuel and time predictions, as well as ECON speed/Mach targets.

OPTIMUM TAKEOFF, APPROACH AND GO-AROUND SPEEDS

The FMGC computes takeoff speeds (F, S, Green Dot) during the preflight and takeoff phases, using the performance model in the database and the takeoff weight.
The flight crew has to insert V1, VR, and V2 in the PERF TO page manually.
The FMGC uses the performance model and either the predicted landing weight or the current gross weight at transition to the approach phase to compute approach speeds (VLS, VAPP, F, S, Green Dot).
On the PERF APPR page, the selected LDG CONF determines the applicable VLS and VAPP, the latter being updated by the WIND correction that the flight crew enters on the same page. The FMGC uses the performance model and gross weight to compute go-around speeds (F, S, Green Dot).

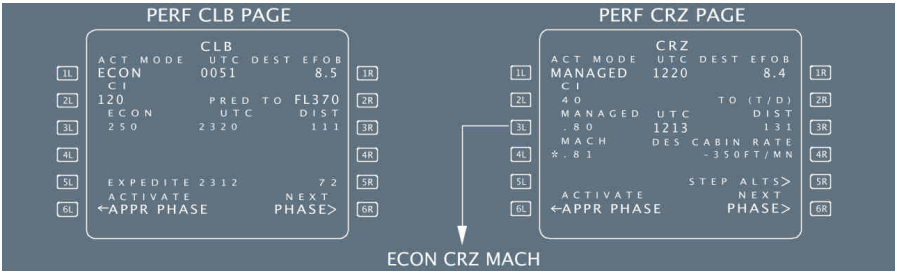


OPTIMUM TARGET SPEED FOR CLIMB, CRUISE AND DESCENT (ECON SPD/MACH)

The FMGS computes the optimum target speed (ECON SPD/MACH) as a function of:
- Cost index (CI)
- Cruise flight level (CRZ FL)
- Gross weight (GW)
- Wind and temperature models
- Performance factor.

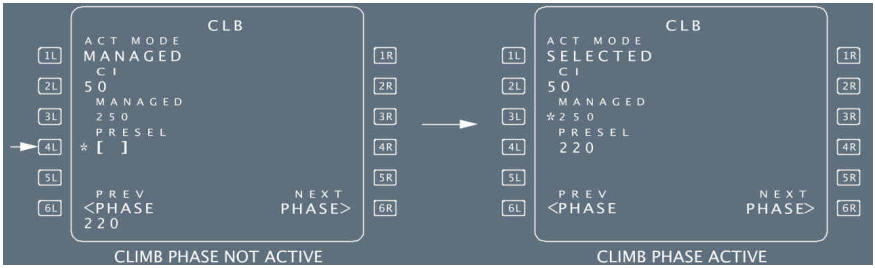
The computer processes the ECON SPDs for the climb and descent phases before the initiation of the flight phase, and freezes the values once the flight phase becomes active.
When there is no time or speed constraint/limit, ECON SPEED is the optimum speed for the selected cost index. It refers to fuel and time cost and not directly to fuel saving.
The FM calculates ECON CLB, ECON DES and the associated top of climb and top of descent as a function of cost index, cruise FL, and meteo data.
The computer continually updates ECON CRUISE MACH (SPD), taking into account current weather conditions and modifications to the flight plan.

Note: *If the cruise FL is below FL 250, ECON CRUISE SPEED is computed.*
If the cruise FL is above FL 250, ECON CRUISE MACH is computed.



PRESET TARGET SPEED FOR CLB PHASE

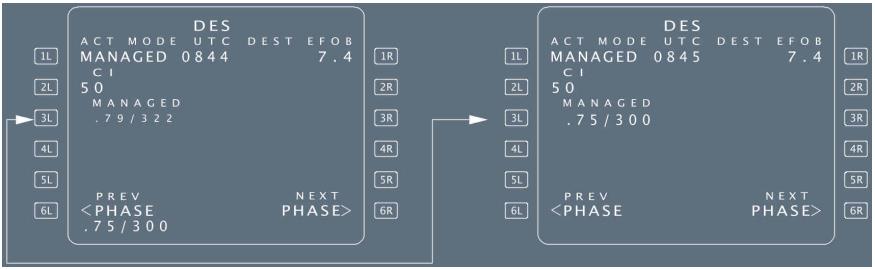
The flight crew can preselect the climb speed before the CLB phase begins, by inserting a speed in the PRESEL field:



The active mode field changes from MANAGED to SELECTED, and the FM will use the entered speed for climb predictions computation.
The flight crew can revert to managed mode by pressing the 3L key.

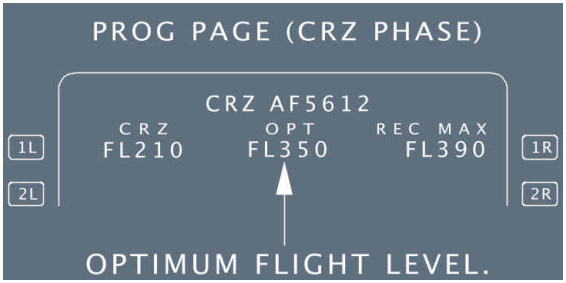
PRESET TARGET SPEED/MACH FOR DES PHASE

The flight crew can change the speed and/or Mach displayed in the MANAGED field by inserting a speed and/or Mach in the MANAGED field.
Although the entered speed is chosen by the flight crew, the FMGS uses it to compute the descent flight path and top of descent. It is therefore part of the managed descent profile.



The flight crew can revert to the optimum speed/Mach by clearing the 3L field.

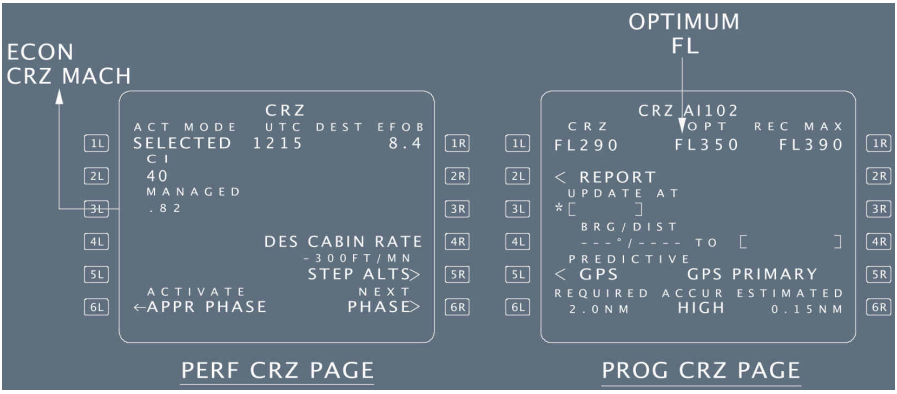
OPTIMUM FLIGHT LEVEL



The optimum flight level (OPT FL) indicates the most economic flight level for a given cost index, weight, weather data. It is continuously updated in flight. It requires a 5 min minimum cruise time, at a minimum cruise flight level of FL 100.
The OPT FL is a compromise between fuel and time saving. As a result, the flight crew may observe jumps in OPT FL due to GW, ISA, or wind changes. The computation of the OPT FL considers the wind entries made at the different altitudes (normally at the different CRZ FL).
When flying the subsequent CRZ FL, the OPT FL proposed by the PROG page may be affected by the wind entries made at the previous CRZ FL; these winds are automatically propagated and may be significantly different from the actual winds.

Note: For simplification purposes, the FCOM/QRH gives the OPT FL at a given Mach number. It does not consider the cost index, therefore the FMGS and the FCOM/QRH values are different.

FM displays OPT FL on the PROG page. The PROG page displays dashes for this quantity when the system detects an engine-out condition.



OPTIMUM DESCENT PATH

The vertical flight path is computed to minimize fuel consumption, while satisfying the various altitude constraints and the descent speed profile, in order to reach VAPP at 1 000 ft.

The computer calculates the descent profile before the descent phase is initiated, taking into account:

- All lateral and vertical flight plan data
- The descent and approach winds, as inserted into the DESCENT WIND page and PERF APPR page, and the required maximum cabin rate of descent.

During descent, the descent profile is updated only if the flight plan is modified, or if data for the APPR phase (WIND, VAPP, or LDG CONF) are changed.

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COST INDEX (CI)

Applicable to: ALL

The cost index is a fundamental input for the ECON SPEED or ECON MACH computation. ECON SPEED and ECON MACH reduce the total flight cost in terms of flight time and fuel consumption (and not only in terms of fuel saving).
CI is the ratio of flight time cost (CT) to fuel cost (CF).
CI = CT/CF (kg/min or 100 lb/h).
CI = 0 corresponds to minimum fuel consumption (Max Range).
CI = 999 corresponds to minimum time.
CI = Long Range Cruise (*Refer to PRO-NOR-SRP-01-50 Preparation for Descent and Approach - Cost Index for Long-Range Cruise*).

Note: *The airline's operations department usually defines the cost index, to optimize each company route. The flight crew does not ordinarily modify the cost index during a flight.*

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GENERAL

Applicable to: ALL

The FMGC computes predictions for the primary and secondary flight plans and displays them on the Multipurpose Control and Display Units (MCDUs), and on the navigation display (ND) of the Electronic Flight Instrument System (EFIS).
The computations use the current state of the aircraft (GW, CG, position, altitude, speed, engaged mode of the autopilot or flight director, time, wind, temperature) for the active flight plan.
The computations use data entered by the flight crew for the secondary flight plan when it is not a copy of the active flight plan. When the secondary flight plan is a copy of the active flight plan, it uses the same data.

PREDICTIONS FOR THE PRIMARY FLIGHT PLAN

Applicable to: ALL

The predictions displayed on the MCDU assume that the FMGS will guide the aircraft along the preplanned lateral and vertical flight plans.
The predictions displayed on the ND assume that the aircraft will continue to operate in the modes (selected or managed) that are currently active.
As long as the aircraft is flying the flight plan under managed guidance, the predictions on the MCDU will match those on the ND.

If the flight crew does not fly the flight plan, the MCDU predictions assume that:
- The flight crew will fly back towards the flight-planned route
- The flight crew will immediately resume flying the FMGC managed modes.

If the flight crew does not fly the managed speed profile, the MCDU predictions assume that they will maintain the selected speed until they reach:
- In the climb or descent phase, the next speed limit or speed constraint if any, or next phase
- In cruise, the top of descent.

Then, the predictions assume that the flight crew will revert to managed speed.

COMPUTATION OF PREDICTIONS

Applicable to: ALL

The system calculates various predictions for the active flight plan and updates them continually during flight as functions of:
- Revisions to the lateral and vertical flight plans
- Cost index
- Current winds and temperature
- Present position versus lateral and vertical flight plans

- Current guidance modes
- Speed control (managed/selected).

The MCDU and the ND show these predictions, each of which is based on specific assumptions.

Note: During computation, prediction fields on the MCDU pages display dashes.

PREDICTIONS DISPLAYED ON THE NAVIGATION DISPLAY

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

These predictions consist of symbols positioned along the lateral flight plan (NAV mode engaged) or the track line (NAV mode not engaged). These symbols (named as pseudo waypoints) and their meanings are:

Pseudo waypoint	Definition
	Level symbol at the position (top of climb or level-off) where the aircraft will reach: - The FCU selected altitude (blue) or - The constrained altitude, if it is more restrictive than the FCU altitude and if appropriate modes are engaged (magenta).
	Top of descent or continue descent symbol: - Top of descent (always white) - Continue descent symbol (white if DES is not armed, blue if it is).
	Start of CLIMB symbol: - White if CLB is not armed - Blue if CLB is armed.
	Intercept point symbol: The point where the aircraft is predicted to intercept the descent path, if there is any vertical deviation when the aircraft is in DES mode (white if DES is not engaged, blue if it is).
•	Speed change symbol: The point at which the aircraft will initiate an automatic ACCEL or DECEL from current speed to a new computed speed if it encounters a SPD LIM, SPD CSTR, or HOLDING SPD (magenta).
	Decelerate point symbol, magenta: Indicates the point at which the aircraft will start an automatic deceleration toward VAPP (and thus switch to the approach phase). Although the symbol is always displayed, automatic deceleration only occurs if in managed speed and NAV or approach mode is engaged.
	ALT CSTR symbol set around the constrained waypoint: - Magenta, when the ALT CSTR is predicted to be met - Amber, when the ALT CSTR is predicted to be missed - White, when the ALT CSTR is not taken into account by the FMGS, and the NAV mode is engaged.

Continued on the following page

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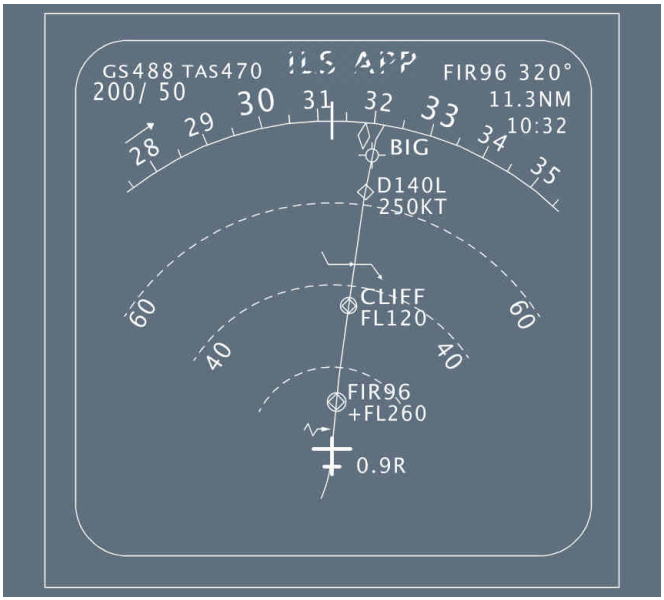
Pseudo waypoint	Definition
	Energy circle symbol (green arc) centered on the aircraft position and oriented to the current track line. Represents the Required Distance to Land. Only displayed if the lateral guidance mode is heading or track, and the current FMS flight phase is in cruise, descent or approach, and the aircraft is within 180 nm of the destination.
Crosstrack error XX.XR or XX.XL (X is a number)	The crosstrack error displays the lateral deviation between the aircraft position and the track of the F-PLN active leg. The value is limited to 99.9 nm left or right.
INTCPT	Intercept waypoint is displayed on the ND at the point at which the present track intercepts the F-PLN.

The predicted time of arrival at the TO WPT is located in the upper right-hand corner of the ND. It assumes direct distance from the aircraft position to the TO WPT and assumes current ground speed will be constant.



As a general rule, the ND indicates what the aircraft will fly, with the current active FG modes.

For example:

- The continuous green line on the ND represents the track the aircraft is currently flying:
  - If HDG/TRK is engaged, the track line is green and the flight plan is dashed
  - If NAV mode is engaged, the green line is the flight plan.
- If the speed target is manually selected, the speed-change symbol is no longer displayed because it will not be taken into account.
- When the aircraft is not following the vertical flight plan (OP CLB, OP DES, V/S) but the NAV mode is engaged, the system disregards any altitude constraints and puts white circles around the waypoints that have these constraints and positions level symbols accordingly.
- Pseudo waypoints are adjusted each time predictions are updated.

PREDICTIONS DISPLAYED ON THE NAVIGATION DISPLAY

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

These predictions consist of symbols positioned along the lateral flight plan (NAV mode engaged) or the track line (NAV mode not engaged). These symbols (named as pseudo waypoints) and their meanings are:

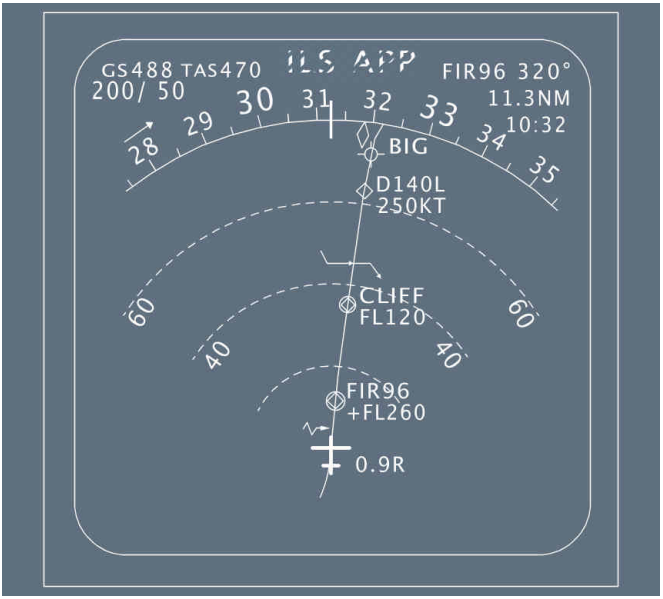
Pseudo waypoint	Definition
	Level symbol at the position (top of climb or level-off) where the aircraft will reach: - The FCU selected altitude (blue) or - The constrained altitude, if it is more restrictive than the FCU altitude and if appropriate modes are engaged (magenta).
	Top of descent or continue descent symbol: - Top of descent (always white) - Continue descent symbol (white if DES is not armed, blue if it is).
	Start of CLIMB symbol: - White if CLB is not armed - Blue if CLB is armed.
	Intercept point symbol: The point where the aircraft is predicted to intercept the descent path, if there is any vertical deviation when the aircraft is in DES mode (white if DES is not engaged, blue if it is).
•	Speed change symbol: The point at which the aircraft will initiate an automatic ACCEL or DECEL from current speed to a new computed speed if it encounters a SPD LIM, SPD CSTR, or HOLDING SPD (magenta).

Continued on the following page

Continued from the previous page

Pseudo waypoint	Definition
	Decelerate point symbol: - Indicates the point at which the aircraft is predicted to decelerate for approach (and thus switch to the approach phase) - Magenta, if in managed speed and NAV or approach mode is engaged - White, if in selected speed or HDG/TRK mode - Automatic deceleration only occurs when displayed in magenta.
	ALT CSTR symbol set around the constrained waypoint: - Magenta, when the ALT CSTR is predicted to be met - Amber, when the ALT CSTR is predicted to be missed - White, when the ALT CSTR is not taken into account by the FMGS, and the NAV mode is engaged.
(10 45) (ETP)	Time marker and equitime point symbols appear in green to indicate where the aircraft reaches the time marker or equitime point.
	Energy circle symbol (green arc) centered on the aircraft position and oriented to the current track line. Represents the Required Distance to Land. Only displayed if the lateral guidance mode is heading or track, and the current FMS flight phase is in cruise, descent or approach, and the aircraft is within 180 nm of the destination.
Crosstrack error XX.XR or XX.XL (X is a number)	The crosstrack error displays the lateral deviation between the aircraft position and the track of the F-PLN active leg. The value is limited to 99.9 nm left or right.
INTCPT	Intercept waypoint is displayed on the ND at the point at which the present track intercepts the F-PLN.

The predicted time of arrival at the TO WPT is located in the upper right-hand corner of the ND. It assumes direct distance from the aircraft position to the TO WPT and assumes current ground speed will be constant.



As a general rule, the ND indicates what the aircraft will fly, with the current active FG modes.

For example:

- The continuous green line on the ND represents the track the aircraft is currently flying:
  - If HDG/TRK is engaged, the track line is green and the flight plan is dashed
  - If NAV mode is engaged, the green line is the flight plan.
- If the speed target is manually selected, the speed-change symbol is no longer displayed because it will not be taken into account.
- When the aircraft is not following the vertical flight plan (OP CLB, OP DES, V/S) but the NAV mode is engaged, the system disregards any altitude constraints and puts white circles around the waypoints that have these constraints and positions level symbols accordingly.
- Pseudo waypoints are adjusted each time predictions are updated.

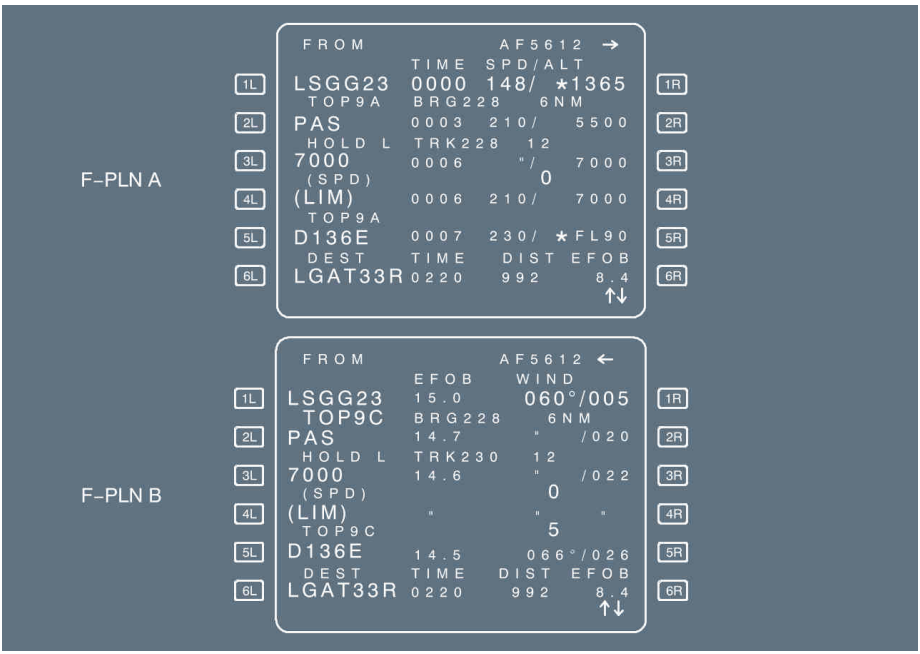
PREDICTIONS DISPLAYED ON THE MCDU

Applicable to: ALL

1 The predictions displayed on the MCDU assume that AP (or FD order) is controlling the aircraft and flying it along the preplanned lateral and vertical flight plan.

Therefore:

- If the aircraft is guided along the flight plan (managed guidance), the MCDU predictions correspond exactly to what the aircraft is doing
- If the aircraft is not guided along the flight plan (selected guidance), the MCDU predictions assume that it will return immediately to the flight plan, intercepting at a predetermined angle, and will then proceed under managed guidance
- If the aircraft does not fly the managed speed profile (ECON, SPD CSTR...), the MCDU predictions assume that it will remain at the present selected speed/Mach until it reaches the next SPD CSTR or SPD LIM or enters the next flight phase.



Note: *For secondary flight plan predictions, Refer to DSC-22_20-60-50 Secondary Flight Plan.*

TYPE OF PREDICTIONS

Applicable to: B-HSD, B-HSE

	MCDU PAGE
Pseudo waypoints: T/C, T/D, S/C, S/D, I/P, SPD LIM, DECEL	F-PLN A and B
TIME/SPD/ALT at each WPT and pseudo-WPT	F-PLN A
ETA/DIST TO DEST along F-PLN/EFOB at destination	F-PLN A and B
EFOB/T-WIND at each WPT and pseudo-WPT	F-PLN B
Constraint symbol * at each constrained WPT (TIME/SPD/ALT)	F-PLN A and B
Altitude error in case of missed ALT constraint	VERT REV
EFOB/EXTRA FUEL at each WPT	VERT REV
TIME/EFOB at destination	FUEL PRED/PERF CLB/CRZ/DES
TIME/DIST to a selected altitude	PERF CLB or DES
Fuel prediction prior engine start	INIT B
REC MAX FL	PROG
TIME/EFOB at Alternate	FUEL PRED
XTRA FUEL for various Alternates	ALTN
VDEV vertical deviation from vertical flight path	PROG
Required Distance to Land	PROG
Direct Distance to Destination	PROG

TYPE OF PREDICTIONS

Applicable to: ALL 321, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

	MCDU PAGE
Pseudo waypoints: T/C, T/D, S/C, S/D, I/P, SPD LIM, DECEL	F-PLN A and B
TIME/SPD/ALT at each WPT and pseudo-WPT	F-PLN A
ETA/DIST TO DEST along F-PLN/EFOB at destination	F-PLN A and B
EFOB/T-WIND at each WPT and pseudo-WPT	F-PLN B
Constraint symbol * at each constrained WPT (TIME/SPD/ALT)	F-PLN A and B
Altitude error in case of missed ALT constraint	VERT REV
EFOB/EXTRA FUEL at each WPT	VERT REV
TIME/EFOB at destination	FUEL PRED/PERF CLB/CRZ/DES
TIME/DIST to a selected altitude	PERF CLB or DES
Fuel prediction prior engine start	INIT B
REC MAX FL	PROG
TIME/EFOB at Alternate	FUEL PRED
XTRA FUEL for various Alternates	ALTN
VDEV vertical deviation from vertical flight path	PROG

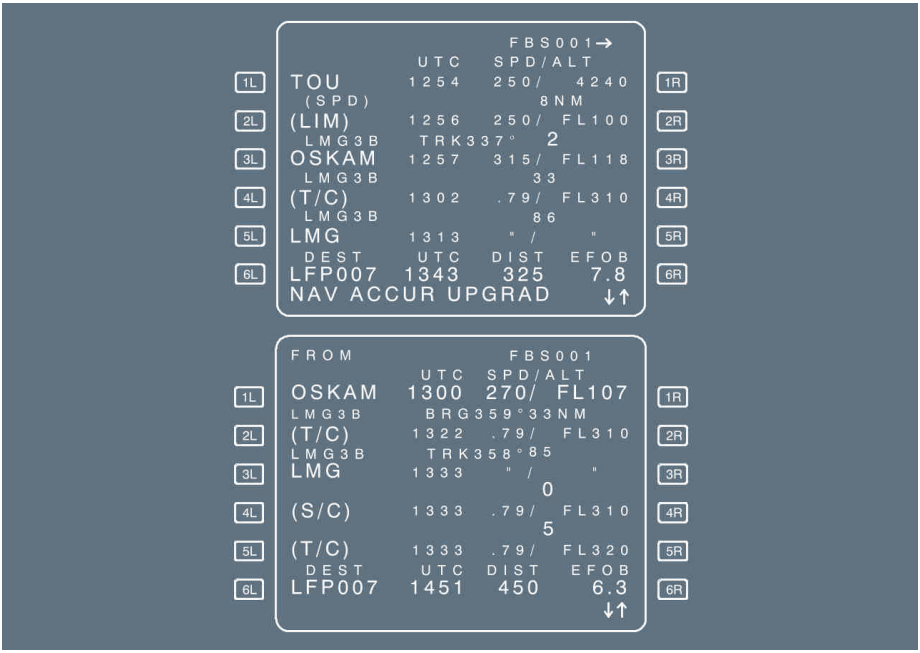
EXAMPLES OF MCDU PREDICTIONS

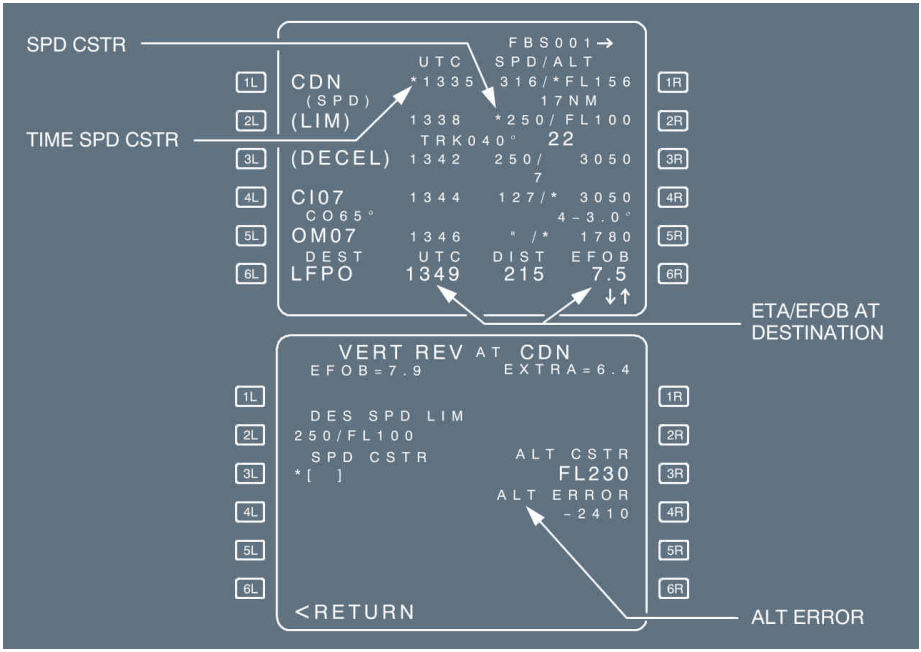
Applicable to: ALL

2

The following MCDU pages display some of the prediction types.

- Pseudo-waypoints:
  Top of Climb (T/C), Top-of-Descent (T/D), Start of Climb (S/C) or Start of Descent (S/D) for Step Climb/Descent, Speed Limit (SPD LIM), deceleration to approach phase (DECEL)
- Time, speed, and altitude predictions:
  TIME/SPD/ALT for all waypoints and pseudo-waypoints.

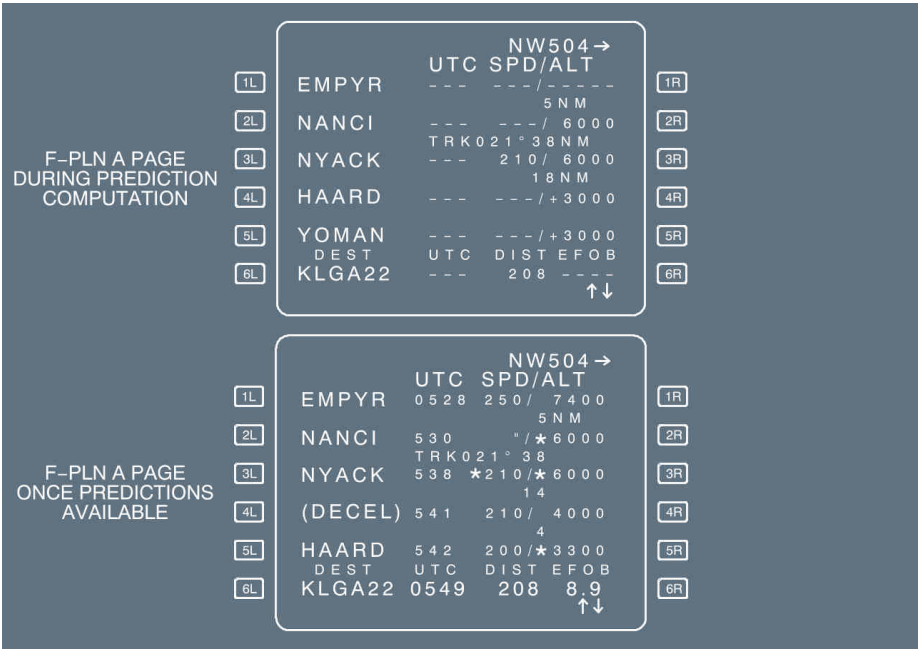




CONSTRAINT SYMBOLS (STAR)

Applicable to: ALL

3 When a time speed or an altitude constraint is part of the vertical flight plan, it appears on the F-PLN A page only at the time of insertion, or when predictions are not yet available.
Once available, the time speed and altitude predictions are displayed for all F-PLN waypoints: when a speed or an altitude constraint is at a waypoint, a star symbol appears adjacent to the speed or altitude prediction. If the star is magenta, the constraint is predicted to be matched. If the star is amber, the constraint is predicted to be missed.



Note: *If an altitude constraint is predicted as missed, the system tells you what will be the error at the specific waypoint.*

VERTICAL DEVIATION

Applicable to: ALL

During descent, the system indicates to the flight crew the vertical deviation from the computed descent profile (PFD and MCDU) and predicts where the flight crew can rejoin it.
VDEV on the PFD and PROG page, predictions on the MCDU F-PLN page, symbols on the ND, enable assess to the vertical position versus the computed flight profile.

OPERATION RULES CONCERNING PREDICTIONS

Applicable to: ALL

The flight crew must properly update the flight plan data during the flight, in order to obtain accurate and meaningful predictions.
The flight crew should rely on the ND for short-term predictions. It indicates what the aircraft will do under the currently engaged modes (selected or managed).

The flight crew should rely on the MCDU for long-term predictions, when managed guidance is active or about to be reengaged.

OTHER COMPUTATIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

ENGINE-OUT CASE

The FMGS computes an engine-out target speed for each flight phase. It computes an engine-out maximum altitude at long-range cruise speed, and displays it on the PROG page.
When the aircraft loses an engine, it also loses predictions for the active flight plan, in the takeoff, climb, and cruise phases. However, the system restores predictions for twin-engine operation in the descent and approach phases.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

ENGINE-OUT CASE

The FMGS computes an engine-out target speed for each flight phase. It computes an engine-out maximum altitude at long-range cruise speed, and displays it on the PROG page.
The new speed target becomes Green Dot in climb, and EO CRZ SPD in cruise.
The system computes the flight plan predictions down to the primary destination. If the aircraft is above EO MAX ALT, the predictions are computed, assuming that a drift down descent will immediately be performed to reach EO MAX ALT.

Applicable to: ALL

RECOMMENDED MAXIMUM ALTITUDE (REC MAX)

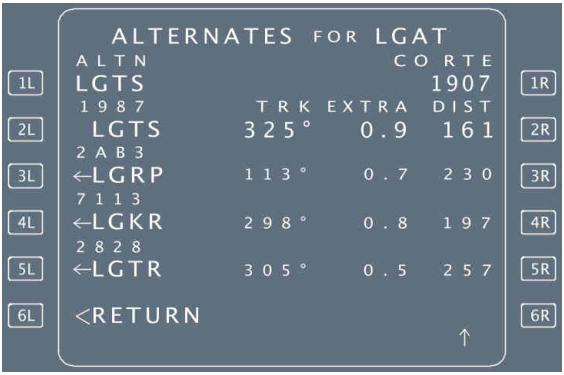
The recommended maximum altitude is the lowest of the maximum altitude that:
- The aircraft can reach with a 0.3 g buffet margin
- The aircraft can fly in level flight at MAX CRZ rating
- The aircraft can maintain a V/S of 300 ft/min at MAX CLB thrust
- The aircraft can fly at a speed higher than Green Dot and lower than VMO/MMO
- The aircraft is certified at.

The REC MAX altitude is displayed on the PROG page.
Anti-ice is not taken into account for this computation. Refer to QRH graphs if icing conditions are expected.
A maximum altitude using a 0.2 g buffet margin is also computed. It is not displayed, but the system uses it to limit CRZ ALT entry.

Applicable to: ALL

PREDICTIONS FOR ALTERNATES

Predictions for alternates are displayed on the ALTERNATES page.



They are based on:

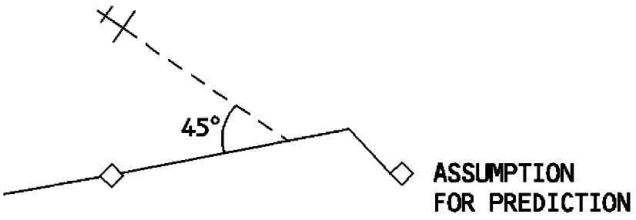
- A default cruise FL equal to 220, if the airway distance is less than 200 nm. Otherwise, it is FL 310
- Simplified wind/temperature models, based on flight crew entries:
  - ALT CRZ wind, as entered on the FUEL PRED page
  - CRZ temperature interpolated from the temperature model for the primary flight plan.
- Airway distance, or direct distance, as provided by the database (manual entry, if not in the database)
- Cost index = 0 (minimum fuel)
- Initial aircraft weight equal to landing weight at primary destination.

Note: *1. No step can be inserted in an alternate flight plan*
2. No predictions are displayed for the selected alternate on flight plan pages. However, the flight crew can read ALTN trip fuel and time on the INIT B page before engine start, and estimated time and estimated fuel on board at alternate on the FUEL PRED page after engine start.

RETURN-TO-TRAJECTORY ASSUMPTIONS

Applicable to: ALL

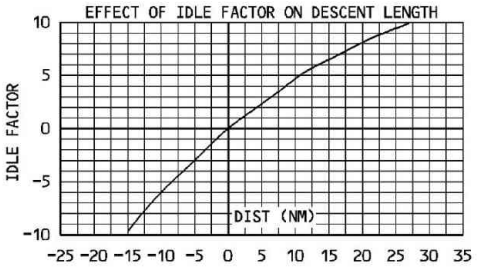
If the aircraft is not on the lateral flight plan, predictions assume an immediate return to the active lateral leg with a 45 ° convergence angle, or that it will fly directly to the “TO” waypoint, when the required convergence angle is greater than 45 °.



IDLE FACTOR

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

IDLE and PERF factors follow the same principle.
The PERF factor is mainly used for prediction during the cruise phase.
The IDLE factor is dedicated to the FM descent segment.
The aim of the IDLE factor is to adjust FM descent predictions. In particular, the Top of Descent (T/D) position, with the actual engine idle thrust used during descent.
A positive IDLE factor gives an earlier T/D (shallower path).
A negative IDLE factor delays the T/D (steeper path).
The following graph provides an example (average values) of the IDLE factor's effect on descent length:



Example: An IDLE factor of -3 decreases the computed descent length by 5 nm.

IDLE FACTOR AT DELIVERY

The IDLE factor set at delivery is 0 %.

PROCEDURE TO MODIFY THE IDLE FACTOR

Refer to DSC-22_20-40-30 PERF Factor - Procedure to Modify the PERF Factor (On Ground only).

ENERGY CIRCLE

Applicable to: ALL

The energy circle is a green arc, centered on the aircraft's position and oriented towards the current track line. It is displayed on the NDs during descent, when HDG or TRK mode is selected. It represents the required distance to land from the aircraft's position down to airport elevation at VAPP speed, considering all speed constraints on the vertical profile.

PERF FACTOR

Applicable to: ALL

GENERAL

The PERF factor is a positive or negative percentage that is used to correct the predicted fuel flow, used for fuel prediction computation within the FMGS. It is necessary when the aircraft's performance differs from the performance model stored in the FMGS database.

This difference can be due to one or both of the following cases:

1. The FMS contains a performance database, used to compute the predictions and the performance data. Due to the numerous possible aircraft configurations, the same performance database is sometimes used for aircraft with slightly different behaviors. In these cases, a PERF factor is entered to correct the computations performed with a database not exactly tailored for the given configuration. As a result, the aircraft or engine type identification on the MCDU's A/C STATUS page may not correspond to that of the actual aircraft.
2. Since the actual aircraft drag and engine performance deviate from the nominal model, due to the aircraft's age, airline Flight Operations will periodically apply a correction factor to adapt fuel predictions to actual fuel consumption.

The PERF factor modifies the predicted fuel flow, according to the following formula:

$$FFpred = FFmodel \times (1 + \frac{PERF\,FACTOR}{100})$$

FFpred is the FF used for prediction.
FFmodel is the FF from the aero-engine model.

This correction is applied throughout the flight, and modifies the performance predictions and the ECON speed or Mach.
For example: Entering a PERF factor of +1.5 means that Flight Operations have evaluated the aircraft fuel deviation as 1.5 %, compared to the basic performance model (0.0).

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

PROCEDURE TO MODIFY THE PERF FACTOR (ON GROUND ONLY)

- PRESS the MCDU DATA key and then the A/C STATUS prompt in order to access the A/C STATUS page
- ENTER the new PERF factor in the MCDU scratchpad
- PRESS the MCDU [6R] key to insert the new PERF factor.

The new PERF factor is displayed in large blue font.

Note: *Only authorized personnel should take the responsibility to update the PERF factor value.*

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

PROCEDURE TO MODIFY THE PERF FACTOR (ON GROUND ONLY)

- PRESS the MCDU DATA key and then the A/C STATUS prompt in order to access the A/C STATUS page
- ENTER the change code in the CHG CODE field [5L].
  The default value for this code is “ARM” but it is possible to modify it on airline request (the applicable code is then coded in the Airline Modifiable Information (AMI) file).
  When a valid change code is entered, the IDLE and PERF factors are displayed in blue.
- ENTER “ / ” and the new PERF factor in the MCDU scratchpad.
- PRESS the MCDU [6L] key to insert the new PERF factor.

The new PERF factor is displayed in large blue font.

Note: *Only authorized personnel should take the responsibility to update the PERF factor value.*

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

PERF FACTOR VALUE

The PERF factors to be used on FMS1 at delivery, depending on engine type, are:

- For CFM 56-5B engines only:
  Depending on the engine type: CFM 56–5B SAC (Single Annular Chamber) or DAC (Double Annular Chambers), or /P and /2P (new LP and HP blade compressor), a negative performance factor has to be entered on the MCDU STATUS page to decrease the FMGS'predicted fuel consumption and match the actual fuel burnt.

		NON/P		/P	
		SAC	DAC	SAC	DAC
A321-111	CFM56-5B1	0.0	0.0	-2.0	-1.5
A321-112	CFM56-5B2	0.0	0.0	-2.0	-1.5
A321-211	CFM56-5B3	0.0	0.0	-2.0	-1.5
A321-212	CFM56-5B1	0.0	0.0	-2.0	-1.5
A321-213	CFM56-5B2	0.0	0.0	-2.0	-1.5
A320-214	CFM56-5B4	0.0	0.0	-3.0	-2.0
A319-111	CFM56-5B5	0.0	0.0	-4.5	-3.5
A319-112	CFM56-5B6	0.0	0.0	-4.5	-3.5
A319-115	CFM56-5B7	0.0	0.0	-4.5	-3.5

- For other engines:
  - A321-232 V2530-A5: -0.5 %
  - A321-231 V2533-A5: -0.5 %
  - A321-131 V2530-A5: -0.5 %
  - A320-233 V2527E-A5: +0.5 %
  - A320-232 V2527-A5: +0.5 %
  - A320-231 V2500-A1: 0.0 %
  - A320-212 CFM 56–5A3: +0.5 %
  - A320-211 CFM 56–5A1: +0.5 %
  - A320-111 CFM 56–5A1: 0.0 %
  - A319-133 V2527M-A5: -0.5 %
  - A319-132 V2524-A5: -0.5 %
  - A319-131 V2522-A5: -0.5 %
  - A319-114 CFM 56-5A5: 0.0 %
  - A319-113 CFM 56-5A4: 0.0 %

All these numbers assume that:

- The aircraft is brand-new
- Anti-ice is OFF

- The air conditioning is on NORMAL
- The conservative Fuel Lower Heating Value (FLHV) is 18400 btu/lb.

When an aircraft ages, fuel consumption degradation will be measured to determine the so-called “monitored fuel factor”. This factor corresponds to the deviation of the aircraft’s actual fuel consumption from the nominal model. Generally, the FLHV that is used during fuel factor monitoring is higher than the FMS value.
In order not to penalize FMS predictions, it is necessary to correct the “monitored fuel factor”.
For example, add -1 % to the “monitored fuel factor”, when an FLHV of 18590 btu/lb is used.
Once this factor is established by the airline, it should be arithmetically added to the above-noted performance factor.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

PERF FACTOR VALUE

The PERF factors to be used on FMS2, depending on engine type, are:

- For CFM 56-5B engines only:
  Depending on the engine type: CFM 56–5B SAC (Single Annular Chamber) or DAC (Double Annular Chambers), or non/P (without the new LP and HP blade compressor), a positive performance factor has to be entered on the MCDU STATUS page to increase the FMGS'predicted fuel consumption and match the actual fuel burnt.

		NON/P		/P	
		SAC	DAC	SAC	DAC
A321-111	CFM56-5B1	2	2	0	1
A321-112	CFM56-5B2	2	2	0	1
A321-211	CFM56-5B3	2	2	0	1
A321-212	CFM56-5B1	2	2	0	1
A321-213	CFM56-5B2	2	2	0	1
A321-214	CFM56-5B4	-	-	1	-
A320-214	CFM56-5B4	3	3	0	1
A320-215	CFM56-5B5	-	-	0	-
A320-216	CFM56-5B6	-	-	0	-
A319-111	CFM56-5B5	4.5	4.5	0	1
A319-112	CFM56-5B6	4.5	4.5	0	1
A319-115	CFM56-5B7	4.5	4.5	0	1
A318-111	CFM56-5B8	-	-	0	-
A318-112	CFM56-5B9	-	-	0	-

- For other engines:
  - A318 "PW": 0.0 %
  - A319/A320 "CFM" Family fitted with CFM 56-5A engines: 0.0 %
  - A319/A320/A321 "IAE" Family: 0.0 %

All these numbers assume that:

- The aircraft is brand-new
- Anti-ice is OFF
- The air conditioning is on NORMAL for "IAE" engines and on LOW for "CFM" engines
- The conservative Fuel Lower Heating Value (FLHV) is 18400 btu/lb.

When an aircraft ages, fuel consumption degradation will be measured to determine the so-called "monitored fuel factor". This factor corresponds to the deviation of the aircraft's actual fuel

consumption from the nominal model. Generally, the FLHV that is used during fuel factor monitoring is higher than the FMS value.
In order not to penalize FMS predictions, it is necessary to correct the “monitored fuel factor”. For example, add -1 % to the “monitored fuel factor”, when an FLHV of 18590 btu/lb is used.
Once this factor is established by the airline, it should be arithmetically added to the above-noted performance factor.

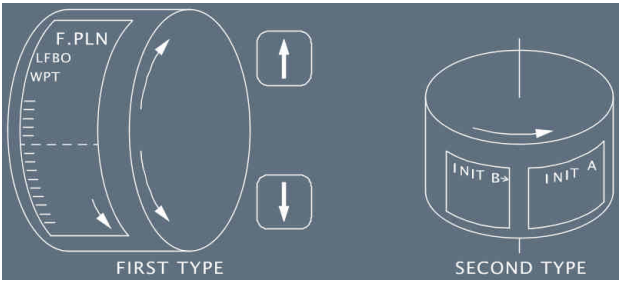
Note:
1. *At delivery, ENTER the PERF factor (given in the table above) directly in the MCDU (no correction factor is needed).*
2. *When replacing an FMS1 Legacy by an FMS2, on any given aircraft model, the performance model that is stored in the FMS2 may be different from the one that was previously stored in the FMS1 Legacy.*
   As a result, DISREGARD the PERF factor previously entered in the MCDU.
   ADD the “monitored fuel factor” (when available) to the PERF factor (given above), and ENTER the resulting factor in the MCDU.

FMS Legacy

GENERAL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The FMGS (flight management and guidance system) displays information on various “pages”. When a page cannot display all the information assigned, it cues the pilot to call up additional information. There are three types of pages, and each type has its particular way of cuing the pilot to call up additional information.



FIRST TYPE

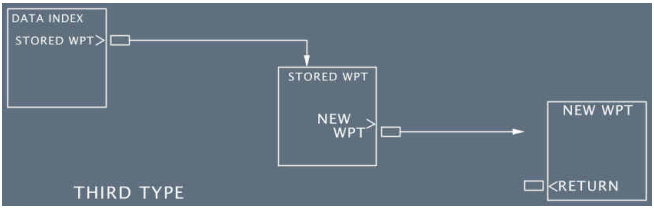
When this page cannot display all the information on the screen simultaneously (more information than the six pairs of lines on the screen can hold), the pilot can scroll the page up or down.
When this is the case, the screen displays a ↑ ↓ symbol in its bottom righthand corner (F-PLN pages, secondary F-PLN page, departure/arrival pages,...).

SECOND TYPE

When successive pages hold the information, the pilot presses the “NEXT PAGE” key to call up these pages sequentially.
In this case, the page displays an arrow in the top righthand corner of the screen (INIT pages).

THIRD TYPE

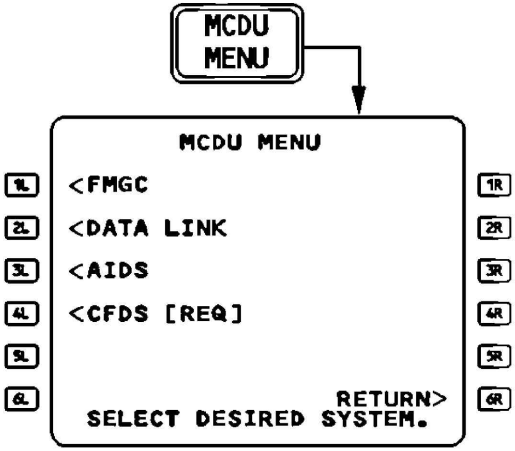
When successive pages hold different types of information, the pilot calls these up by pressing the key adjacent to the prompts >, < or *.



MCDU MENU PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This page lists the various systems to which the pilot can gain access through the MCDU.



The pilot selects a system by pressing the key adjacent to the name of that system. The screen shows the name of the selected system in green, all others in white. If the MCDU cannot establish communication with the selected system, it displays “TIME OUT”.
When a system calls for pilot attention, the MCDU displays “REQ” next to the system name, and the “MCDU MENU” annunciator lights up.
When the pilot presses the key next to the name of the system that requires attention, the “MCDU MENU” annunciator light goes out.

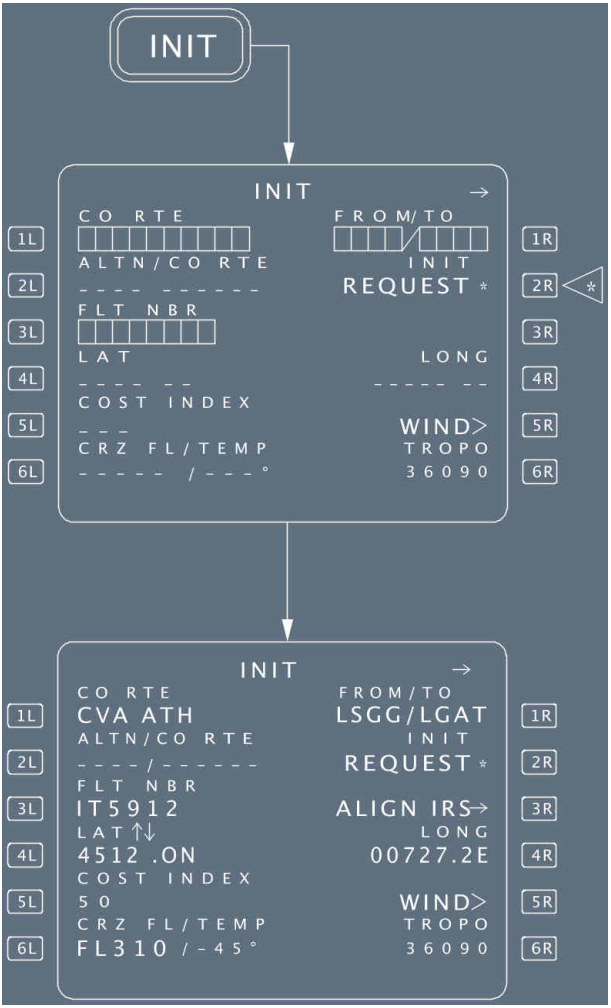
Note: When the MCDU is communicating with a system other than the FMGC, the pilot should use the MCDU MENU page to revert to the FMGC system.
The MCDU may freeze if the pilot tries to gain access to a system directly by selecting it with an access key.

INIT A PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The pilot uses the INIT A page to initialize the flight plan and align the inertial reference system.

- The pilot accesses this page by pressing the INIT key on the MCDU console, but only during the preflight phase.
- The pilot may also call up this page by:
  - Pressing the “NEXT PAGE” key on the MCDU console, while on the INIT B page, or
  - Pressing the key next to “RETURN” or “INSERT” on the route selection page.
- When in the done phase, the pilot may press the INIT key to begin the next preflight phase.



[1L] CO RTE

If the flight crew enters a company route number, the screen displays all data associated with that route (8 or 10 characters, depending on the pin program).
Inserting the CO RTE into the RTE selection page also enters the CO RTE number in this field.

[2L] ALTN/CO RTE (blue)

This field is dashed until a primary destination is entered in the 1R field.
If a preferred alternate is associated with the primary destination, it is displayed in this field with the company route identification. The crew may enter an alternate and a company route manually.
If preferred alternate is not associated with the primary destination, NONE is displayed in this field.
When the alternate route and the primary destination do not match, the MCDU scratchpad displays “DEST/ALTN MISMATCH”.
If the primary destination is changed, this field is modified accordingly.

[3L] FLIGHT NUMBER

The flight number appears in this field automatically if it is stored with the company route. The flight crew may modify it or enter a new number here.

[4L] LAT

The latitude of the departure airport reference point appears here.
The flight crew may modify it by slewing or overwriting.

[5L] COST INDEX

This is usually stored in the data base along with the company route.
The flight crew may modify it or enter a new value here. It defaults to the last entered value if a value is not stored in the data base.

[6L] CRZ FL/TEMP (cruise flight level and temperature)

The cruise flight level is usually stored in the data base along with the company route. If not, it has to be entered manually.
If no cruise flight level is entered, the system will not furnish predictions while the aircraft is on the ground.
The flight crew has to enter the temperature at cruise flight level in order to refine the predictions. Otherwise these are computed for ISA conditions. (If no sign is entered, the system uses plus).



[1R] FROM/TO	This field enables the flight crew to enter a city pair (ICAO codes for city of origin and destination). This entry automatically deletes any previously entered company route, and calls up the ROUTE SELECTION page. If one airfield of the pair is not in the database, the display changes to the NEW RWY page.
[2R] INIT REQUEST	This prompt is displayed, if the pilot did not enter an active flight plan, or entered a flight number or a company route that is not in the aircraft database. Selecting this prompt sends the ground a request for active flight plan initialization (downlink message). When the star is not displayed, a downlink message cannot be sent. The uplink flight plan is automatically inserted in the active flight plan, prior to engine start, provided an active flight plan does not exist. After engine start, the uplink flight plan is sent to the secondary flight plan and manually inserted or rejected. (*Refer to DSC-22_20-70 Flight Plan Initialization Through ACARS*).
[3R] ALIGN IRS	This field only displays this legend if the LAT and LONG fields are filled in, and at least one of the inertial reference systems is in ALIGN status (IRS in NAV position and alignment process not over). If the flight crew presses this key when its field is displaying this legend, the present coordinates are sent to the IRSs and this completes the alignment process.
[4R] LONG	This field displays the longitude of the departure airport reference point. The flight crew may modify by slewing or overwriting.
[5R] WIND >	The flight crew presses this key to access the CLIMB WIND page, unless a temporary flight plan exists. In this case, the scratchpad displays “TEMPORARY F-PLN EXISTS”.
[6R] TROPO	The default tropopause altitude is 36 090 ft. The flight crew can use this field to modify it (39 000 ft maximum).

ROUTE SELECTION PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This page displays all the company routes, stored in the database, that are associated with the inserted city pair. It can be called up manually, or displayed automatically.

- Manually : The pilot presses the FROM/TO or ALTN key on the INIT A page, when a city pair is displayed.
- Automatically : The system displays it, when the pilot enters a city pair, defines an alternate on the INIT A page of the active or secondary flight plan, or when the flight crew enters an OTHER ALTN on the alternate page.



TITLE	Idents for the city pair are inserted on the INIT A page. (The numbers in the upper righthand corner are the total number of company routes from this city pair stored in the database).
[1L]	This field shows the name of the company route displayed on the page. NONE appears, if there is no company route for this city pair.
Line 2 to Line 5	These fields display the various elements of the company route: Waypoints in large green font, and airways in small white font.
[6L] RETURN	The pilot presses this key to return to the INIT A page.
[6R] INSERT or SELECT	This prompt displays an amber INSERT (blue for the secondary flight plan), if the pilot accessed the page from the INIT A (or secondary INIT A) page. It displays SELECT (blue) if the crew accessed the page from the alternate page. The pilot presses this key to insert the displayed company route in the respective flight plan and to return the display to the accessing page.

Note: *The pilot can slew the display to show the rest of the route, if one page does not show it all, or to display other company routes for this city pair.*

WIND PAGES

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

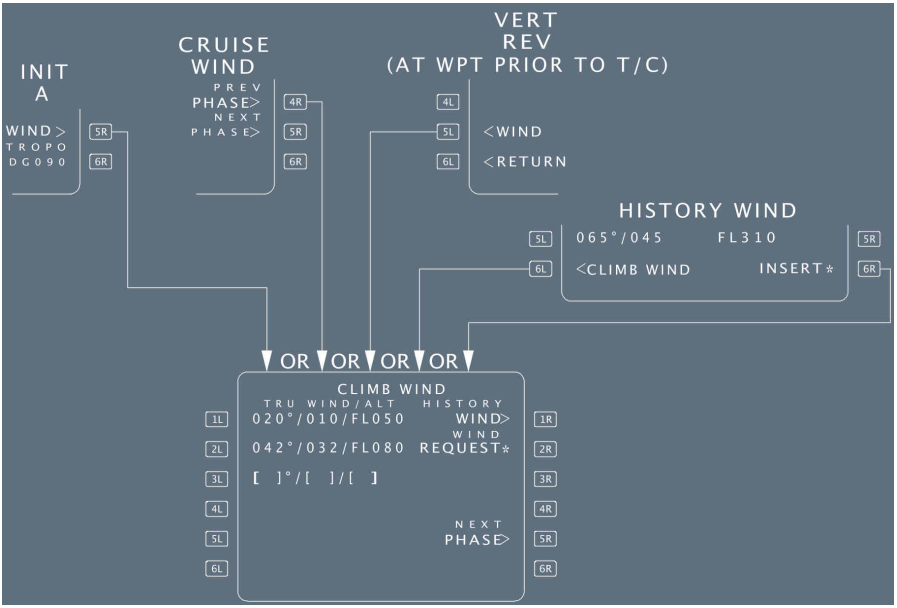
Winds in climb, cruise, descent and approach are necessary to provide the pilot with reliable predictions and performance. Wind pages enable the pilot to enter and/or review the winds propagated by the FMGS or sent by ACARS for the various flight phases.

Note: *On WIND pages, wind direction is always true referenced.*

CLIMB WIND PAGE

This page enables the pilot to enter and/or review predicted wind vectors (direction and velocity) at up to 5 different levels.

CLIMB WIND page is accessed from



TITLE CLIMB WIND in large white font.

[1L] TRU WIND/ALT to [5L] This field displays the winds, entered at various climb altitudes : In blue before climb phase activation, and in green after climb phase activation.
This field may also display history winds or uplink winds.
Large blue brackets are displayed before any wind entry.
Pilot-entered and uplinked winds are displayed in large font.
History wind data is displayed in small font.
Upon sequencing the top of climb, the climb winds are deleted.

Note: *Climb winds are not deleted, when the origin airport is changed.*

[1R] HISTORY WIND Displayed in preflight phase only. This key calls up the history wind page. This page is not modifiable (small green font), but can be inserted into the CLIMB WIND page by using the 6R key and modified accordingly.

[2R] WIND REQUEST Pressing this key sends a request for ACARS winds. (Refer to DSC-22_20 Auto Flight - Flight Management / 70 AOC Functions / B Wind Data / Wind Data - Request for Wind Data). This prompt is only active on ACARS-equipped aircraft.

[5R] NEXT PHASE Pressing this key calls up the CRUISE WIND page, or the DESCENT WIND page, if no cruise waypoint exists.

HISTORY WIND PAGE

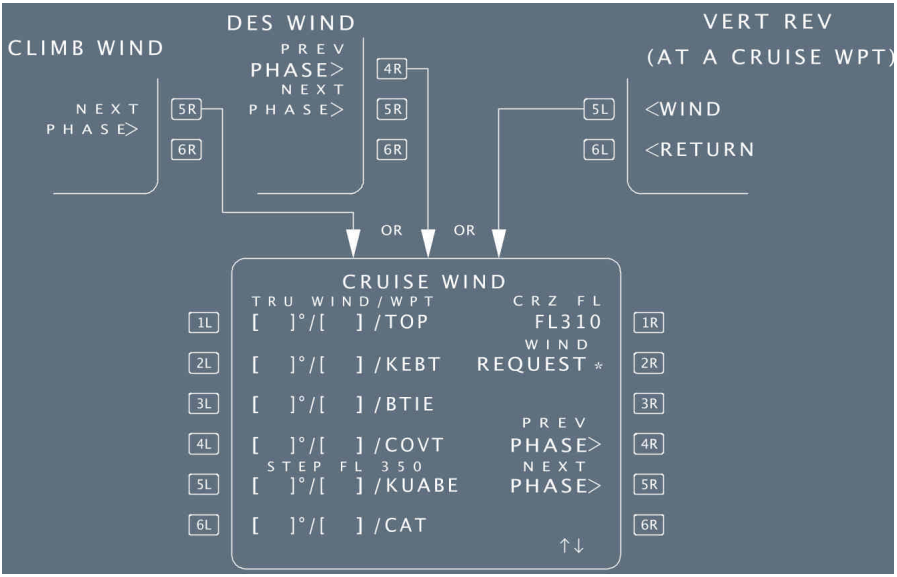


[6L] CLIMB WIND This key reverts the display to the CLIMB WIND page.

[6R] INSERT This key inserts the history wind values into the CLIMB WIND page.

CRUISE WIND PAGE

This page displays the wind (direction and velocity) for each cruise waypoint.
Cruise wind page is accessed as following.

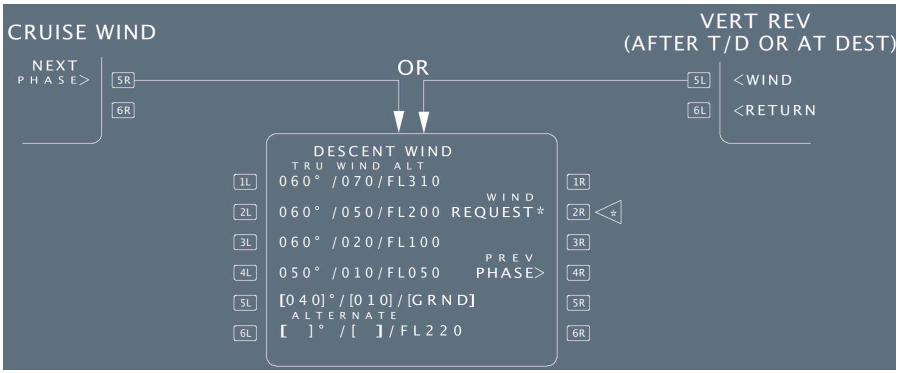


TITLE	CRUISE WIND in white large font.
[1L] TRU WIND/WPT to [6L]	These lines display the cruise wind at associated waypoint. Winds are sorted in waypoint flight plan order. The crew cannot modify the waypoints on this page. Step flight level is displayed in the label line of the first waypoint of the step. Any modification of the cruise wind page modifies the winds of the flight plan B page accordingly. Both uplinked winds and pilot entered winds are displayed in blue large font. Wind data are modifiable during the cruise.
[1R] CRZ or STEP FL	This field displays in green large font, the predicted flight level of the [1L] waypoint. If a cruise flight level is not defined, dashes are displayed.
[2R] WIND REQUEST *	Pressing this key sends a request for ACARS winds. (Refer to DSC-22_20 Auto Flight - Flight Management / 70 AOC Functions / B Wind Data / Wind Data - Request for Wind Data)
[4R] PREV PHASE	This prompt is displayed in Preflight, Takeoff, Climb and Done phases. Pressing this prompt calls up the CLIMB WIND page.
[5R] NEXT PHASE	Pressing this prompt calls up the DES WIND page.

Any new entry performed on the CRUISE WIND page is immediately inserted into the corresponding flight plan. Predictions are dashed on the F-PLN pages during the recomputation time.
CRUISE WIND page reverts automatically to F-PLN page if a temporary flight plan is created or the secondary flight plan is activated.

DESCENT WIND PAGE

This page allows the pilot to define and display the winds used for computing the descent profile. The pilot calls it up by selecting NEXT PHASE on the CRUISE WIND page or WIND prompt on VERT REV page.



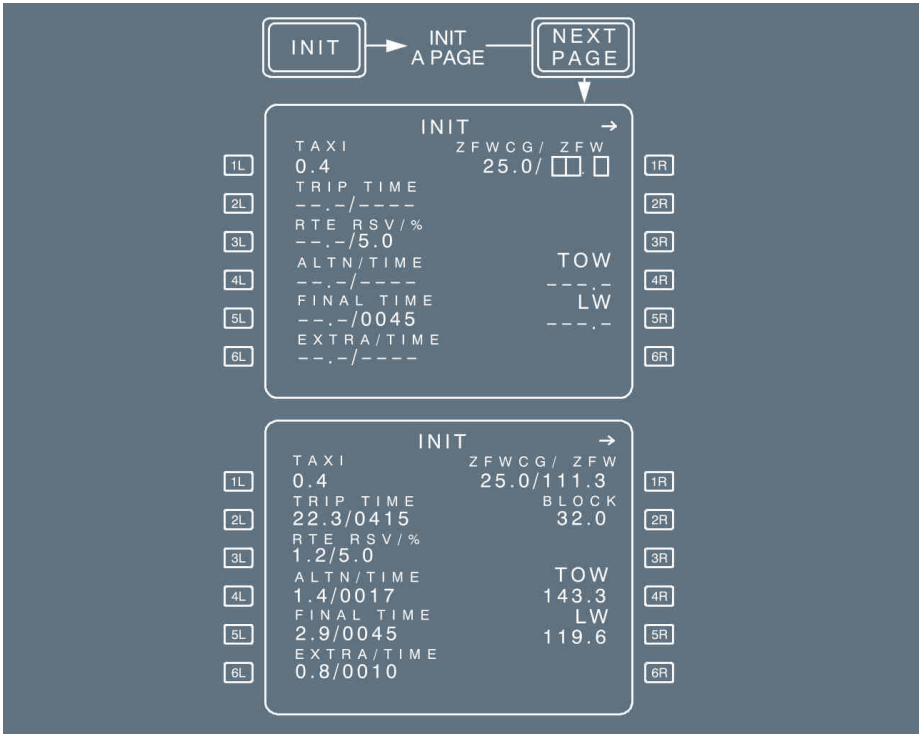
[1L] to [5L]	This displays inserted winds or uplinked winds in blue large fonts prior to activating the descent phase (modifiable values) and in green colour after descent phase activation (not modifiable values). An entry of “GRND”in the “ALT”field is seen as the wind at ground level. This wind is copied on the PERF APPR page (and corrected for the magnetic variation). A clear action on one key reverts the line to blue bracket.
[6L] ALTERNATE	This field is displayed only when an alternate is defined. The pilot entered value or uplinked value is displayed in blue large font. Always modifiable by the pilot.
[2R] WIND REQUEST*	Pressing this key sends a request for ACARS winds. (Refer to DSC-22_20 Auto Flight - Flight Management / 70 AOC Functions / B Wind Data / Wind Data - Request for Wind Data)
[4R] PREV PHASE	Pressing this key calls up the CRUISE WIND page. The field is erased after the top of descent has sequenced.

Note: *Descent winds and alternate wind are deleted if the destination airport is changed.*

INIT B PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

1 The pilot uses this page to initialize gross weight and center of gravity before starting the engines. The pilot can call it up from the INIT A page by pressing the NEXT PAGE key (or the [→] key depending on the MCDU keyboard) on the MCDU console, as long as both engines have not been started.
This page automatically reverts to the FUEL PRED page after the first engine is started.
The FMGC computes its predictions based on the FOB indicated by the FQI (or FAC as backup) from that moment on.



[1L] TAXI — This is the taxi fuel, which defaults to a preset value, (usually 200 kg or 400 lb). The pilot can change the value through this field.

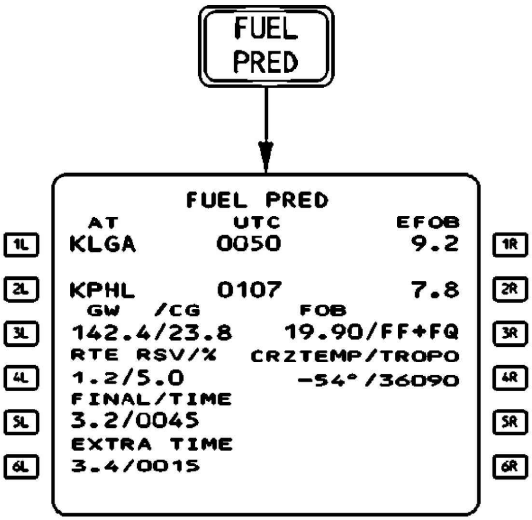
[2L] TRIP/TIME (green)	This field displays trip fuel and time when predictions become available. The pilot cannot modify this data.
[3L] RTE RSV/% (blue)	This field displays the reserve fuel for the route and the corresponding percentage of trip fuel. It may be blank, if such is the policy of the operator. The pilot can enter either a route reserve or a percentage, and the system then computes the nominal value automatically.
[4L] ALTN/TIME (green)	This field displays alternate trip fuel and time, assuming that Cost Index = 0, and that the aircraft flies at the default cruise flight level. This field displays its information in a small font, and the flight crew cannot modify it.
[5L] FINAL/TIME (blue)	This field displays hold fuel and time associated with continued flight to the alternate airport (or destination airport if no alternate is defined). The pilot may enter a final fuel or time (at alternate or destination) and the system will compute associated holding fuel/time available. Assumptions include a racetrack pattern 1 500 ft above the alternate airport, with the aircraft in clean configuration at green dot speed (or in accordance with Operator fuel policy established in the database).
[6L] EXTRA/TIME (green)	This field displays the amount of extra fuel and the available time it represents for holding over the alternate or primary destination, if the flight crew did not define an alternate. EXTRA FUEL = BLOCK – (TAXI + TRIP + RSV + ALTN + FINAL) The field displays this information in a small font, and the flight crew cannot modify it.
[1R] ZFWCG/ZFW	This field displays the location of the zero fuel weight CG. It is an optional entry that defaults to 25 %. The flight crew can modify this data. The zero fuel weight is a mandatory entry that allows the system to compute speed management and predictions.
[2R] BLOCK	The block fuel in this field is a mandatory entry that allows the system to predict the estimated fuel on board (EFOB).
[4R] TOW (green)	This field displays the computed takeoff weight. The pilot cannot modify it (small font).
[5R] LW (green)	This field displays the computed landing weight at the primary destination. This field displays its information in a small font, and the flight crew cannot modify it.

Note: If the flight crew enters a number in field 1R or 2R that exceeds the limits, the field displays "ENTRY OUT OF RANGE" and does not accept the value.

FUEL PREDICTION PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The pilot presses the FUEL PRED key on the MCDU console to display fuel prediction information at destination and alternate, as well as fuel management data after the engines are started.



Line 1
AT-UTC/TIME-EFOB

These fields display predictions of time and fuel to the primary destination. TIME is displayed before takeoff, UTC predictions after takeoff. After the pilot enters an Estimated Takeoff Time (ETT), the UTC is displayed.

Line 2
AT-UTC/TIME-EFOB

These fields display predictions of time and fuel to the alternate airport. *Refer to DSC-22_20-30-10-10 Alternate Function.*

[3L] GW/CG

GW

The system continually updates gross weight during the flight. If no zero fuel weight has been entered, the screen displays amber boxes next to this key. The pilot must enter information in these boxes in order to obtain a speed profile, speed computations, and predictions. The field displays dashes, as long as the system is not calculating fuel on board.

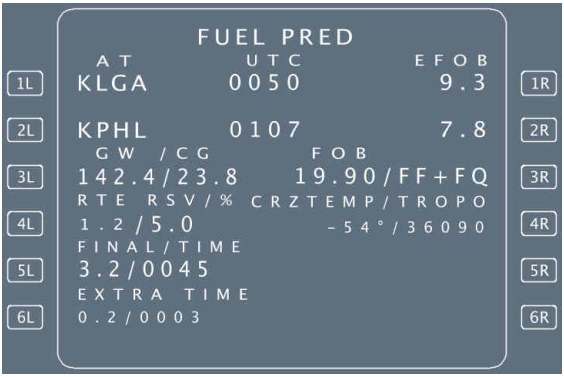
CG

The system continually updates the center of gravity location along the flight path.

The pilot can modify both the GW and CG.

[4L] RTE RSV/%

Prior to departure, this field displays the route reserve fuel and the corresponding percentage of trip fuel. After takeoff, it displays the percentage of the remaining trip fuel from the present position to the destination. The field may be blank, depending on the fuel policy of the operating airline. The crew can enter either a RTE RSV or a RTE RSV %. The system automatically computes the other value.



[5L] FINAL/TIME

This field displays the amount of fuel available for holding and the amount of hold time that will be available over the alternate airport (or primary destination if no alternate is defined). The pilot may enter either a final fuel or a time, although the system computes a nominal value automatically.
The system assumes that the holding will be in a racetrack pattern 1 500 ft above the alternate airport, with the aircraft in clean configuration at green dot speed (or will obey the “airline fuel policy” of the data base).

[6L] EXTRA/TIME

This field displays the amount of extra fuel and the resulting time available for holding over the primary destination.
EXTRA FUEL = BLOCK – (TAXI + TRIP + RSV + ALTN + FINAL)
The pilot cannot modify this field (displayed in green, small font).

[3R] FOB

This field displays the fuel on board, computed:
- with information from the fuel flow and fuel quantity sensor (FF + FQ), or
- from FF only (enter/FF to deselect FQ), or
- from FQ only (enter/FQ to deselect FF)

The pilot can modify this number.

[4R] CRZ TEMP/TROPO

This field displays the temperature at the cruise flight level and the altitude of the tropopause.
The pilot can modify both values.
This field is dashed when the aircraft sequences the top of climb.

Note: *All fields except [4R] show dashes until the pilot starts an engine.*

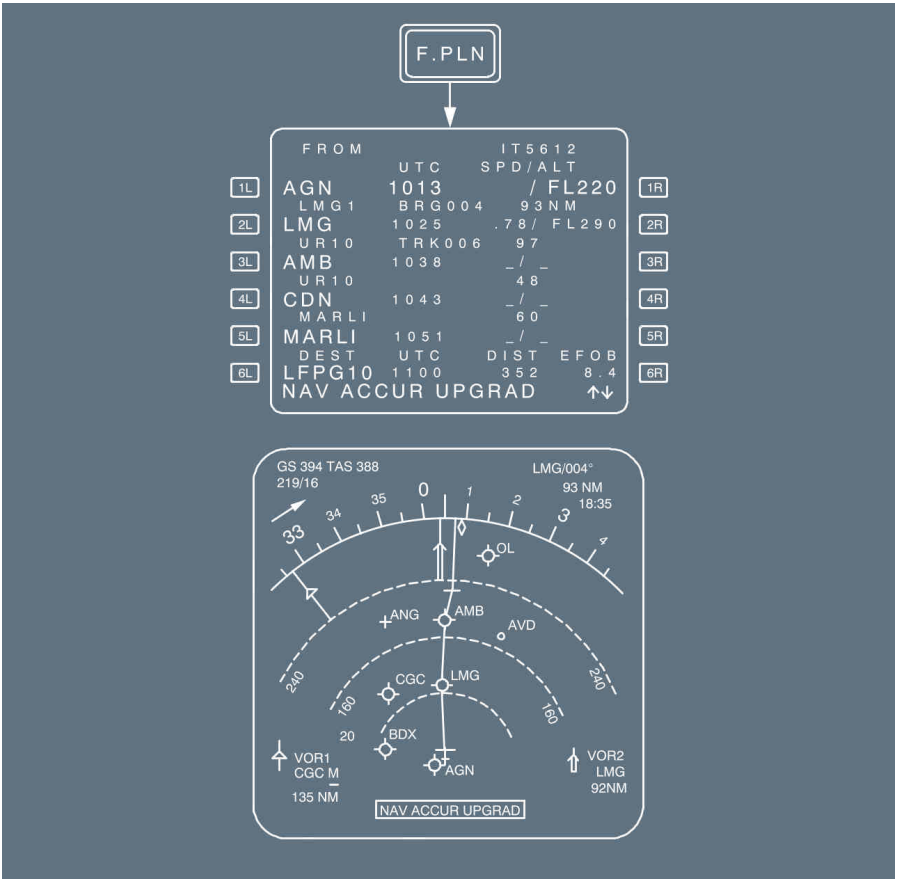
FLIGHT PLAN PAGES

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

These pages display all waypoints of the active and alternate flight plans, along with associated predictions.
The pilot can make all revisions to the lateral and vertical flight plans through these pages: he presses the left key to revise the lateral flight plan and the right key to revise the vertical flight plan. He presses the F-PLN key on the MCDU console to gain access to the A page of the active flight plan.

2 ### FLIGHT PLAN A PAGE

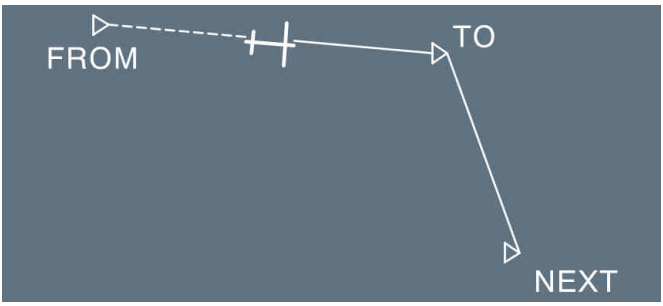
The A page displays time, speed, and altitude predictions for each waypoint of the active flight plan.



TITLE	FLIGHT NUMBER (blank if no flight number has been entered) This line may display yellow TMPY if a temporary flight plan exists, white OFST if a lateral offset is flown or yellow OFST if a lateral offset revision is pending.
Line 1 to Line 5 WPT, UTC, SPD, ALT	These lines display consecutive waypoints along with associated predictions of time, speed or Mach and altitude for each. TIME is displayed before takeoff and UTC after takeoff. After the pilot enters an estimated takeoff time (ETT), UTC is displayed. The time and flight level display at the FROM waypoint (first line of the flight plan) are values that the system memorized at waypoint sequencing.

[1R] SPD/ALT	The field dedicated to SPEED or MACH is blank at the FROM waypoint except at airport of departure. (V1 is displayed associated with runway elevation).
Line 6, DEST UTC/TIME DIST, EFOB	DIST is the distance to the destination along the displayed flight plan. EFOB is the estimated fuel on board at destination. The sixth line is permanent, and is displayed in a white font once predictions are available, except when a TMPY F-PLN is displayed or, in some cases, when an ALT CSTR is entered ("*CLB or DES*" prompt appears).

Note: *The predicted altitude at a waypoint is related to the QNH below the transition altitude, and is given as a flight level above the transition altitude.*



The generic flight plan page displays the FROM waypoint (last waypoint to be overflown) on the first line, and the TO waypoint (in white) on the second line. The FROM/TO flight plan leg is called the active leg.

The flight crew can use the scroll keys to review all flight plan legs down to the last point of the alternate flight plan. The AIRPORT key serves as a fast slew key. The pilot can press it to call up the next airport (DEST, ALTN, ORIGIN) to be displayed on the flight plan page.

In order to return to the beginning of the flight plan page, the pilot presses the F-PLN key on the MCDU console.

The display shows the name of the leg between two waypoints and the distance between them on a line between the lines that identify them. During an approach, this in-between line also defines the angle of the final descent path. For example, "2-3°" indicates that the leg is two nautical miles long, and the flight path angle is -3 °.

The display shows the bearing between FROM and TO waypoints, as the bearing from the aircraft position to the TO waypoint. It shows track (TRK) between the waypoints shown in lines 2 and 3. This is the outbound track of the next leg.

If the database contains a published missed-approach procedure, or if someone has inserted one manually, the display shows it in blue after the destination runway identification. It turns green when the go-around phase becomes active.
After the last waypoint of the missed approach, the display shows the alternate flight plan in NAV mode.
When airborne, the flight crew can clear or modify the TO waypoint by using the DIR key on the MCDU console.

PREDICTIONS

The system calculates and displays predictions for all waypoints.
It uses current wind to compute predictions for the TO waypoint, and uses predicted winds for computing all others.

CONSTRAINTS

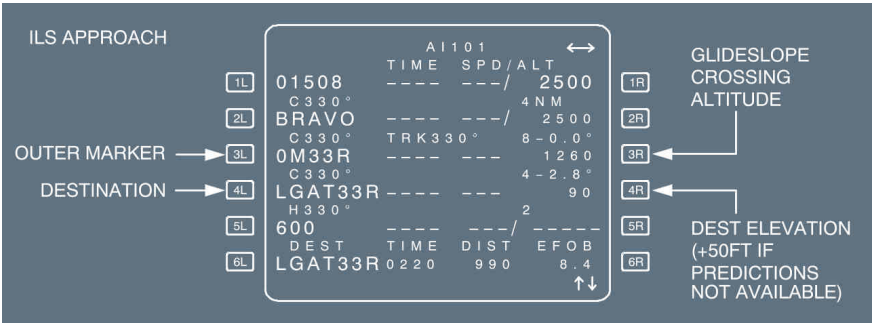
The database may define an altitude constraint and speed constraint for each waypoint of the climb, descent, and approach phases, or the pilot may insert such constraints manually. (Except at origin, destination, FROM and pseudo waypoints).
The constraints are displayed in magenta as long as predictions are not completed.
Once predictions are available, constraints are replaced by speed and altitude predictions preceded by stars. If the star is magenta the system is predicting that the aircraft will match the constraint (altitude within 250 ft, speed not more than 10 kt above the constraints). If the star is amber, the system is predicting that the aircraft will miss the constraint and the MCDU displays “SPD ERROR AT WPT”message.

PSEUDO WAYPOINTS

Pseudo waypoints are geographical positions corresponding to an event in the vertical flight plan; T/C (top of climb), T/D (top of descent), SPD LIM (speed limit), DECEL (deceleration for approach) etc. The display shows them as waypoints in parentheses.

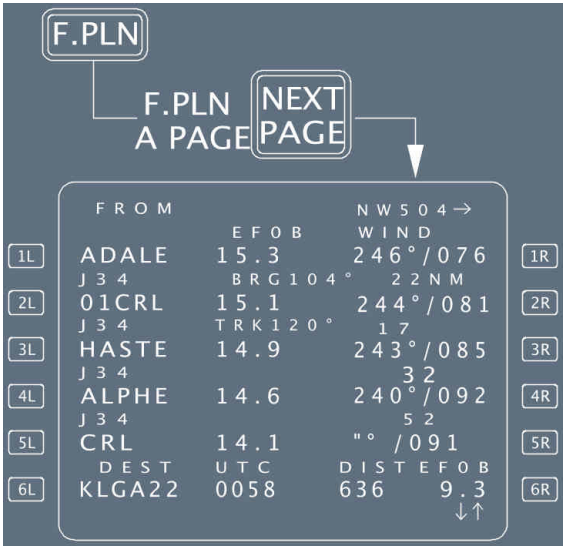
APPROACH DISPLAY

The flight crew cannot enter an altitude constraint at destination or Missed Approach Point (MAP).



FLIGHT PLAN B PAGE

This page displays fuel predictions and forecast winds at each waypoint.
The pilot calls it up by pressing the NEXT PAGE key when the display is showing the A page.



TITLE — FLIGHT NUMBER (blank if no flight number has been entered)

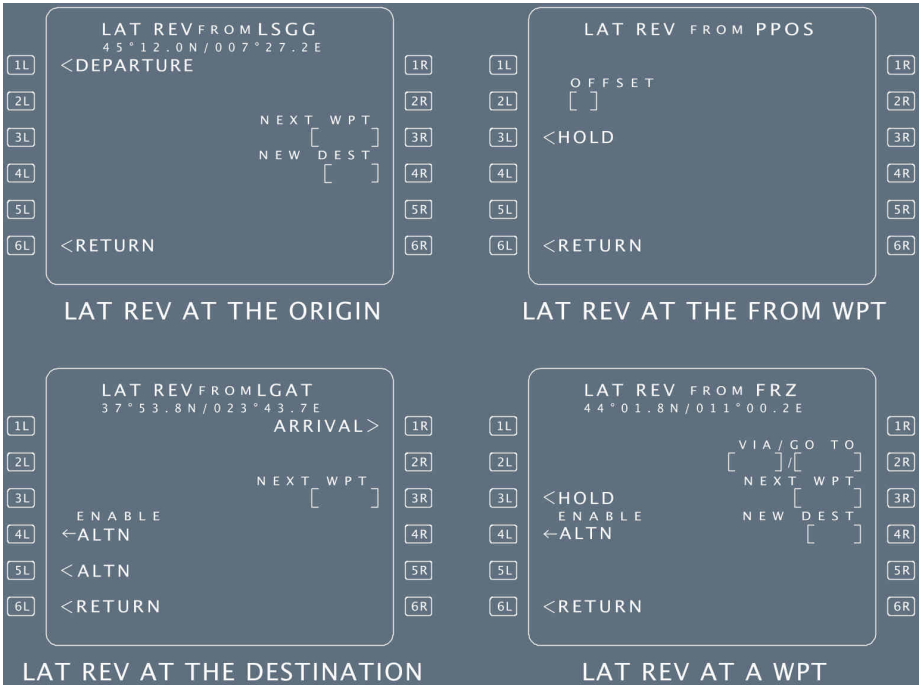
Line 1 WPT-EFOB-WIND to Line 5	These lines display consecutive waypoints and associated fuel predictions, and the forecast wind profile. The direction of forecast winds is relative to true north. Forecast winds include winds entered by the pilot (large font) and the resulting interpolated winds at intermediate waypoints (small font).
Line 6 DEST-UTC/DIST-EFOB	Identical to F-PLN A page.

Note: *The system interpolates manual wind entries in order to forecast winds throughout the flight plan.*

LATERAL REVISION PAGES

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

These pages give the pilot a list of the lateral flight plan revisions he can use to change the flight plan beyond a selected waypoint.
The pilot calls up these pages from the flight plan pages (A or B) by pressing the left key adjacent to the selected waypoint.
Different lateral flight plan revisions are available for different waypoints.



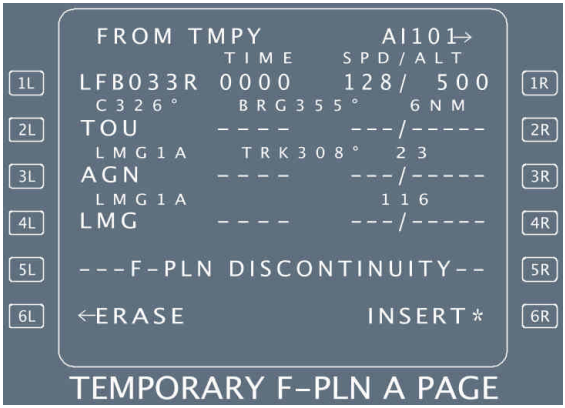
TITLE	The ident of the waypoint or airport selected for revision, along with its latitude and longitude. If the selected waypoint is the FROM waypoint, the title omits the aircraft latitude and longitude, and displays “PPOS”(present position) instead.
[1L] DEPARTURE	This prompt gives the pilot access to the departure pages, where he can select runways, SIDs, and TRANSs and insert them.
[2L] OFFSET [ ]	This prompt allows the pilot to enter a lateral offset, left or right, in the flight plan. The offset may be from 1 to 50 nm. When the pilot enters an offset, the OFFSET field becomes yellow, and the 6L and 6R fields display ERASE and INSERT. The pilot can delete an inserted offset by pressing the CLR pushbutton, by entering a zero for the amount of the offset, or by selecting a DIR TO.
[3L] HOLD	This prompt gives the pilot access to the hold pages.

[4L] ENABLE ALTN	This prompt allows the pilot to switch to the alternate flight plan at the selected revision waypoint and use it as a new active flight plan. The system never displays this prompt at the FROM waypoint.
[5L] ALTN	This prompt gives the pilot access to alternate airport page. The system displays it only at the destination.
[6L] RETURN	This prompt returns the display to the flight plan page.
[1R] ARRIVAL	The pilot uses this prompt to call up the arrival pages, where he can select and insert RWY, APPR, STAR TRANS and VIA.
[2R] VIA/GOTO See (1)	This prompt allows the pilot to insert an airway (VIA) between the revised waypoint and another waypoint (GOTO)
[3R] NEXT WPT See (1)	The pilot uses this prompt to enter the next waypoint.
[4R] NEW DEST See (1)	The pilot uses this prompt to enter a new destination.
[6R] INSERT	The system displays this prompt when the pilot has created a temporary flight plan. The pilot can use it to activate the temporary flight plan.

For details: *Refer to DSC-22_20-30-10-10 Inserting an Airway with Via/Go TO.*
For details: *Refer to DSC-22_20-30-10-10 Inserting a Waypoint*
For details: *Refer to DSC-22_20-30-10-10 Inserting a New Destination*

TEMPORARY REVISION

When the pilot selects a lateral revision, the system creates a “Temporary F-PLN”and displays it in yellow on the MCDU and as a yellow dashed line on the ND to allow the pilot to review the data before inserting. As long as the temporary flight plan is not inserted, the previous flight plan is still active and the system guides the aircraft along it.



DEPARTURE PAGES

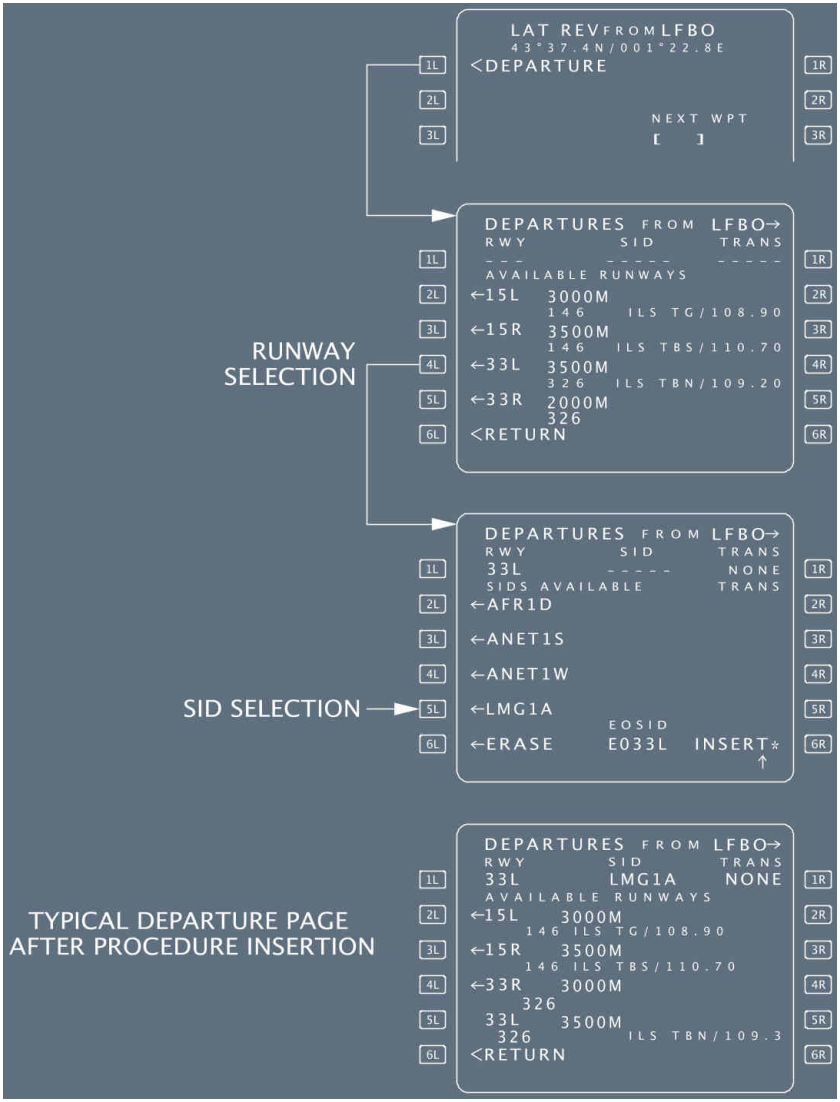
Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

These pages allow the pilot to review departure procedures (RWY, SID, TRANS) and enter them into the active flight plan.

The pilot calls them up by pressing the 1L key when the display is showing the lateral revision page for the origin.

Three pages are available : RWY, and SIDs and TRANS (if any).

The pilot calls up each page sequentially either by selecting a data item (such as RWY) or by pressing the NEXT PAGE key on the MCDU console.

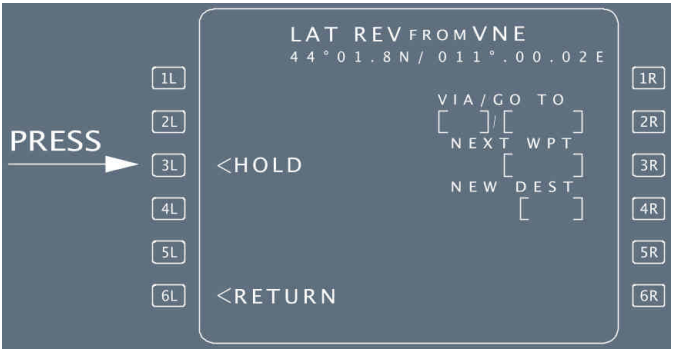

LAT REV FROM LFBO
43°37.4N/001°22.8E
<DEPARTURE
NEXT WPT
DEPARTURES FROM LFBO→
RWY SID TRANS
AVAILABLE RUNWAYS
←15L 3000M
146 ILS TG/108.90
←15R 3500M
146 ILS TBS/110.70
←33L 3500M
326 ILS TBN/109.20
←33R 2000M
326
<RETURN
RUNWAY SELECTION
DEPARTURES FROM LFBO→
RWY SID TRANS
33L NONE
SIDS AVAILABLE TRANS
←AFR1D
←ANET1S
←ANET1W
←LMG1A
SID SELECTION
EOSID
←ERASE E033L INSERT*
DEPARTURES FROM LFBO→
RWY SID TRANS
33L LMG1A NONE
AVAILABLE RUNWAYS
←15L 3000M
146 ILS TG/108.90
←15R 3500M
146 ILS TBS/110.70
←33R 3000M
326
33L 3500M
326 ILS TBN/109.3
<RETURN
TYPICAL DEPARTURE PAGE
AFTER PROCEDURE INSERTION

Line 1 RWY, SID TRANS	This line displays the RWY, SID, and TRANS in green after they have been inserted into the active flight plan. They are displayed in yellow, if selected but not yet inserted. If nothing has been selected or inserted, the line displays dashes.
[2L] RWY/SIDs to [5L]	These fields display selectable and selected RWYs or SIDs (including EOSID and NO SID option). The pilot can slew each list. Selectable RWYs and SIDs are displayed in blue with an arrow. Once a RWY or SID is selected, the arrow disappears. A RWY or SID, already inserted in the flight plan, is displayed in green. The display shows the length, heading, and, if available, the ILS ident and frequency for each runway.
[6L] ERASE or RETURN	The pilot presses this key to erase a selected data item and revert to the previous selection. If the pilot erases the page, the display reverts to the active flight plan page. The display shows RETURN, instead of ERASE, when the pilot has not created a temporary flight plan.
[2R] TRANS to [5R]	This field displays the selectable and selected enroute transitions in blue and green respectively. They are blank, if there are no transitions.
[6R] INSERT or BLANK	The pilot uses this key to insert a temporary procedure into the flight plan. The page reverts to the active flight plan page when the insertion is completed. It is associated with RETURN (6L).
[6M] EOSID	Once a runway is inserted into the flight plan, this field displays any ENG OUT SID for that runway. If there is none, it displays NONE.

HOLD PAGES

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

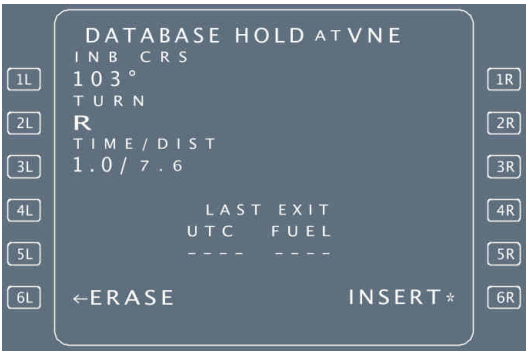
These pages allow the pilot to review and modify the holding pattern parameters at the selected revise waypoint.
The flight crew calls up these pages by pressing the HOLD key on the LAT REV page for the waypoint. The flight crew can insert database holds, holds computed by the FMS, or holds that they manually define.



At first access, the HOLD page appears as follows:

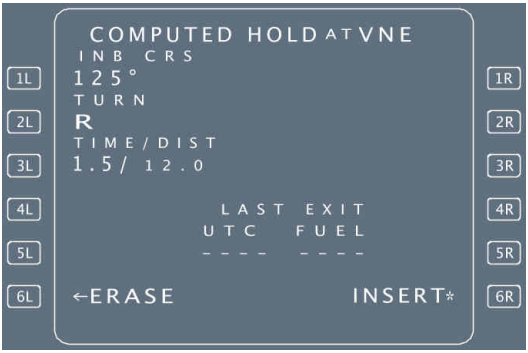
■ **DATABASE HOLD**

If a hold is defined in the navigation database for the revised waypoint, and can be inserted, then the parameters in [1L], [2L] and [3L] appear in yellow.



■ **COMPUTED HOLD**

If a default hold is computed by the FMS and can be inserted, the parameters in [1L], [2L] and [3L] appear in yellow.



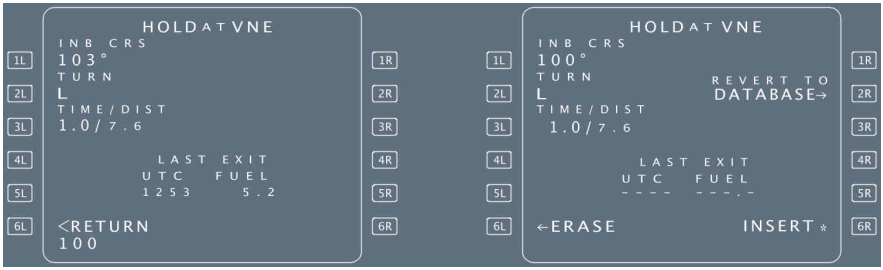
A computed hold has the following default parameters:

[1L] INB CRS	In-bound track of the F-PLN leg leading to the revised waypoint
[2L] TURN	Direction right (R) to turn in the hold
[3L] TIME/DIST	Time on outbound leg is 1.5 min above 14 000 ft, 1 min below 14 000 ft
[2R]	This field shows “REVERT TO COMPUTED” when the flight crew has modified the holding pattern.

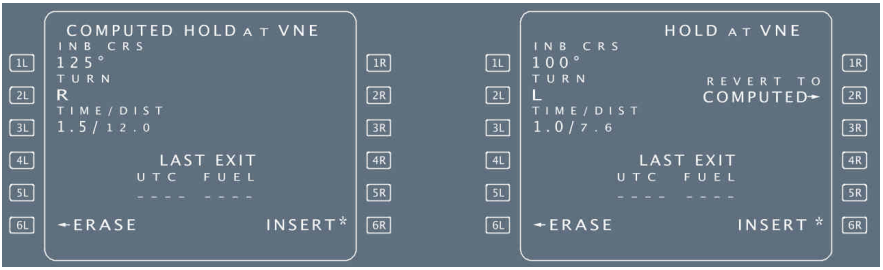
■ HOLD MODIFIED BY FLIGHT CREW

If the flight plan contains a holding pattern that was defined by the pilot from an existing database or computed hold, the parameters in [1L], [2L] and [3L] appear in blue.

If the pilot has modified holding pattern data from the database, the field next to [2R] displays “REVERT TO DATABASE” or “REVERT TO COMPUTED”, to enable the pilot to revert to default parameters.



EXAMPLE	The pilot modifies the inbound course.



[1L] INB CRS — This field displays the inbound course of the holding pattern. The data may be manually or automatically modified.

[2L] TURN — This field shows the direction to turn in the hold (L or R). The data may be modified.

[3L] TIME/DIST — This field shows the time and distance for the outbound leg. The data may be modified, but time and distance cannot be entered simultaneously.
Time and distance are dependent values that the system calculates from the predicted true airspeed which, in turn, depend upon the holding speed (speed for maximum endurance, ICAO speed limit, or constraint speed, whichever is lower).

[6L] ERASE or RETURN — The pilot presses this key, when the field shows “ERASE”, to erase the holding pattern.
The pilot presses this key, when the field shows “RETURN”, to return to the LAT REV page, if the hold is already inserted in the flight plan.

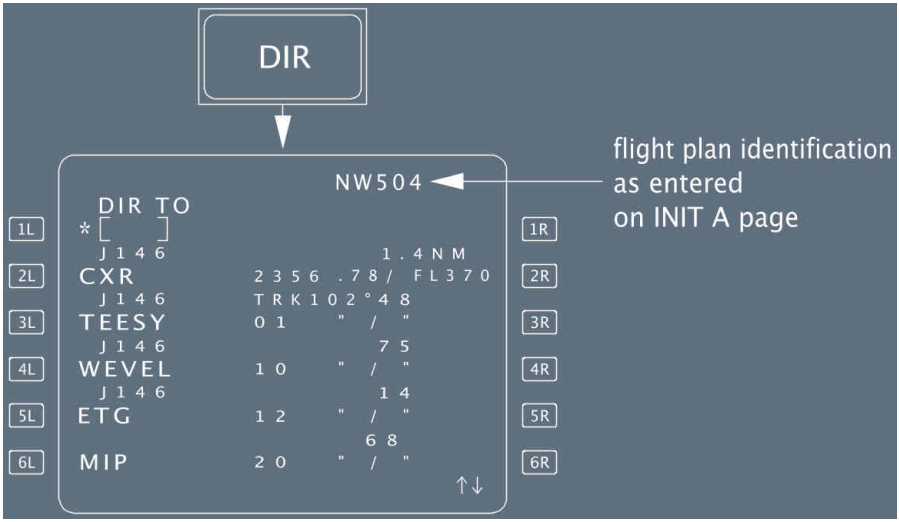
[2R] REVERT TO... — The pilot presses this key to delete manual modifications to the database hold (or computed hold), and to revert to the database (or computed) holding data.

[6R] INSERT — The pilot presses this key to insert the hold into the active flight plan.

LAST EXIT UTC FUEL — This field displays the time at which the aircraft must leave the holding pattern, in order to meet fuel policy criteria (extra fuel = 0). The system also displays the estimated fuel on board at that time in thousands of kg or lb.

DIRECT TO PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



Pressing the “DIR”key under the MCDU screen brings up this page. The [1L] key on this page is the DIR TO key. The pilot presses it to modify the flight plan by creating a direct leg from the aircraft’s present position to any selected waypoint. When in NAV mode, the pilot must use this key to modify the active leg or the TO waypoint. Pilot cannot call up this page when the aircraft’s present position is not valid.

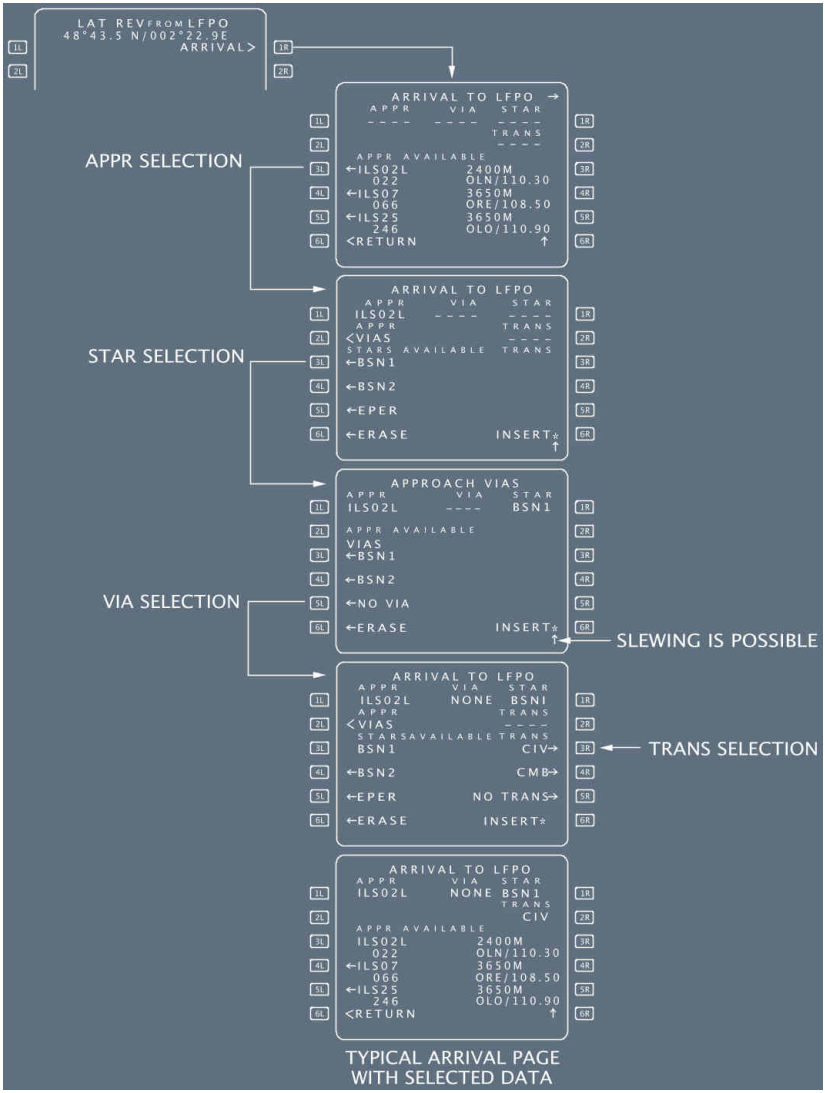
[1L] DIR TO	Pressing this key activates the DIRECT TO function, routing the aircraft from present position to the waypoint inserted in the scratchpad. The pilot can identify the waypoint to be inserted by using its identifier, its latitude and longitude, place/bearing/distance, or place-bearing/place-bearing.
Line 2 to Line 6	These lines display the active flight plan with time/speed/distance predictions. The display may be slewed ↑ ↓. Pressing any key activates the DIRECT TO function from present position to the waypoint adjacent to that key.

ARRIVAL PAGES

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

These pages allow the pilot to review arrival procedures (approaches, VIAs, STARs, TRANS) and enter them into the active flight plan.
The pilot calls them up from the LAT REV page for the destination by pressing 1R key.
Three pages, APPR, STAR, and VIA, are available, along with a fourth, TRANS, if there are any transitions.
The pilot calls up each page sequentially either by selecting a data item (such as APPR) or by pressing the NEXT PAGE key on the MCDU console.

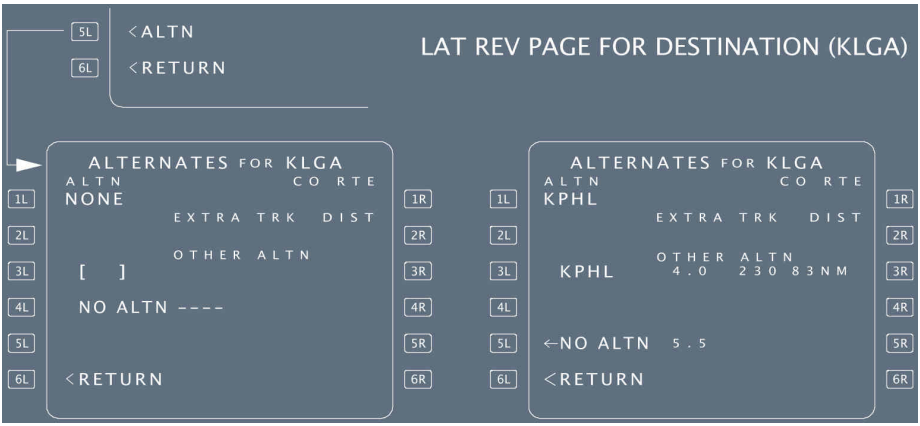
Line [1L] - [1R] [2R]	This line displays the APPR, VIA, STAR, and TRANS in green if they have been inserted in the flight plan, and in yellow, as temporary flight plan, if they have been selected but not yet inserted. It displays dashes or "NONE", if nothing has been selected or inserted.
[2L] APPR VIAS	The pilot presses this key to call up transitions from the last point of the STAR to the first point of the approach.
[3L] to [5L]	These fields list selectable and selected APPRs, STARs, and VIAs. The flight crew can slew the pages, when necessary. Selectable APPRs, STARs, and VIAs are displayed in blue with an arrow. Once the pilot has selected an APPR, STAR, or VIA, the arrow disappears. After the APPR, STAR, or VIA is inserted into the flight plan, it is displayed in green. For each approach, the display shows runway length, heading, and the frequency and identifier of the ILS when ILS is available.
[6L] ERASE or RETURN	The pilot presses this key to erase selected data and revert to the previous selection. The page reverts to the LAT REV page. The field displays “RETURN” instead of ERASE when the flight crew has not created a temporary flight plan.
[3R] TRANS to [5R]	These fields display selectable and selected en route transitions (if any). They are blue when selected, and become green when inserted into the active flight plan.
[6R] INSERT	The pilot presses this key to insert the temporary procedure into the active flight plan. The page reverts to the active flight plan page when this happens.


LAT REV FROM LFPO
48°43.5 N/002°22.9E
ARRIVAL>
ARRIVAL TO LFPO
APPR SELECTION
STAR SELECTION
VIA SELECTION
SLEWING IS POSSIBLE
TRANS SELECTION
TYPICAL ARRIVAL PAGE
WITH SELECTED DATA

ALTERNATE PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This page enables the pilot to review, in the NAV database, the alternate airports that are paired with the destination, and define additional alternates, if needed. (Alternate airports are linked to the destination). The pilot calls up this page with the ALTN prompt, from the lateral revision page for the destination.



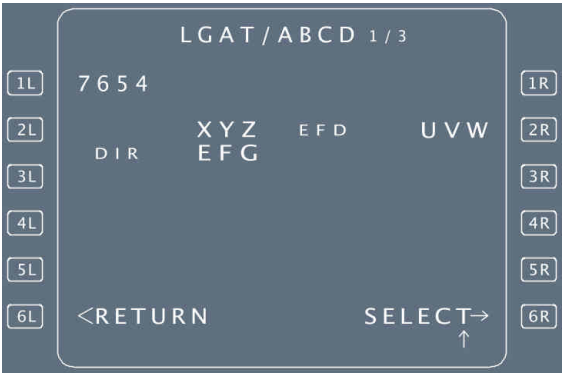
TITLE	The destination airport is displayed in large green font.
[1L] ALTN	This field displays the selected alternate: In green, if it is active; in yellow, if it is temporary. “NONE” is displayed, if NO ALTN option is selected, or if the destination has no alternate.
Line 2 to line 5	These lines display the identifications of alternates (up to 6), the extra fuel weight remaining after landing at the alternates, and the great-circle track and the distances to them from the destination. If the database contains a company route between the destination and the alternate, the distance shown is an airway distance (not a great-circle distance). When the database defines a preferred alternate, it is displayed on line 2 (if no scrolling has been performed).

[4L] OTHER ALTN	The pilot can enter an airport identifier in the brackets (Line 3). If that airport is not stored in the data base, the NEW RUNWAY page appears for the pilot to use in defining it. If it is stored in the data base, the ROUTE SELECTION page appears, and the pilot can use it to select the best route. The pilot may enter a distance in the DIST field of the OTHER ALTN prompt in order to get preliminary fuel predictions. However, once he has selected the alternate airfield as a temporary alternate and then inserted it, the ALTN distance reverts either to the airway distance if he has selected a company route, or otherwise to the direct distance to the alternate. The pilot can use OTHER ALTN to overwrite and replace the previous OTHER ALTN.
NO ALTN	The pilot uses this key to select the NO ALTN option.
[6L] RETURN or ERASE	The pilot presses this key to make the display revert to the LAT REV page Pressing this key erases the temporary selection.
[1R] CO RTE	The pilot presses this key to display the active company route between the destination and the selected alternate.
[1R] INSERT	Pressing this key activates the temporary selection.

ROUTE SELECTION PAGE FOR ALTERNATE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This page allows the pilot to review the company route between the destination and the alternate, and select a different route, if that seems appropriate.
This page comes up automatically when the flight crew enters an IDENT in the OTHER ALTN field.
See *Refer to DSC-22_20-50-10-20 Route Selection Page* for a description of this page.

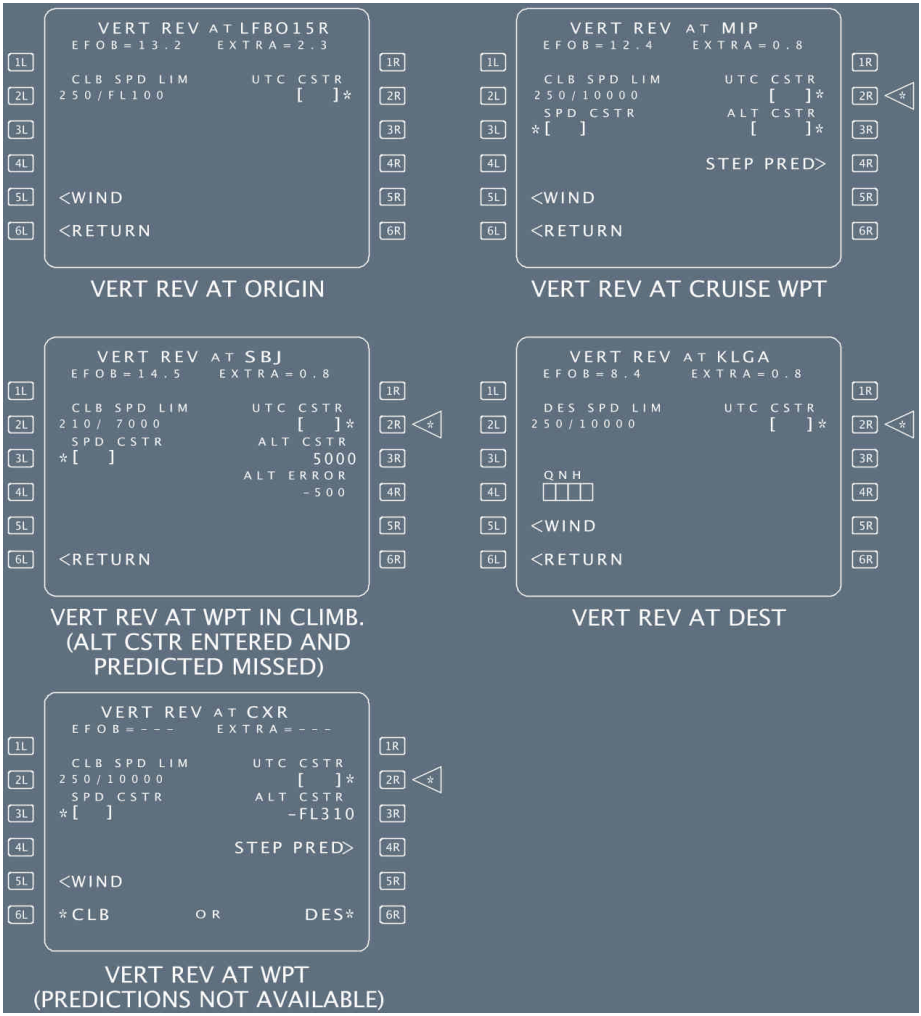


[6R] SELECT — When the pilot presses this key the display reverts to the alternate page. (The distance between the destination and the alternate is then the airway distance).

VERTICAL REVISION PAGES

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

These pages contain the menu of available vertical flight plan revisions that can be applied at a selected waypoint.
The pilot calls up these pages from the flight plan A or B pages by pressing the right hand key next to the selected revise waypoint.
The flight crew may make several different vertical revisions (although some may not be available at all waypoints): speed limit, speed constraint, altitude constraint, wind, estimated takeoff time, step climb, and step descent.



TITLE (white)	"VERT REV AT [location]" (Second line shows remaining fuel and extra fuel at the revised waypoint)
[1L] "TOO STEEP PATH BEYOND" (amber)	This message is displayed if the waypoint is part of a leg with too steep a descent path.

[2L] CLB/DES SPD LIM (magenta)	This field displays the speed limit applicable to the climb or descent phase. It displays it in a large font when data has been inserted manually and in a small font when data comes from the database. The speed limit comprises a speed and an altitude.
[3L] SPD CSTR (magenta)	This field displays any speed constraint assigned to the revised waypoint. It applies to climb and descent waypoints. It is in a large font when inserted manually, and in a small font when it comes from the database. It is not displayed at the origin airport, a FROM waypoint, a speed limit pseudo waypoint, or the destination airport.
[4L] QNH	This field functions only when the revised waypoint is the primary destination. It allows the pilot to enter the sea-level atmospheric pressure. This field is identical to the QNH field of the PERF APPR page.
[5L] WIND (blue)	The pilot press this key to access to the wind pages. Any wind direction entry into the wind pages, should be relative to true north. The first wind page that is displayed, corresponds to the selected waypoint e.g. climb page if the selected waypoint is a climb phase waypoint. A CLR action reverts it to brackets.
[6L] RETURN or CLB	The pilot presses this key to return to the last displayed flight plan page. When displayed, pressing this key assigns the constraint to CLB phase and inserts it into the vertical flight plan. The page R reverts to the flight plan page.
[2R] UTC CSTR	This field displays this legend only at the origin. It allows the pilot to enter an estimated takeoff time.

[3R] ALT CSTR (magenta) This field displays the altitude constraint assigned to this revise waypoint.
It uses a large font when the constraint is entered manually, a small font when it is from the data base.
A CLR action reverts it to brackets.

The constraint may be:
- "At", entered as XXXXX (FL 180, for example)
- "At or above", entered as + XXXXX or XXXXX + (FL + 310, for example)
- "At or below", entered as – XXXXX or XXXXX – (FL -5 000 for example)
- A "window" constraint
  The window consists of two altitudes between which the aircraft should fly. The crew cannot enter a window constraint manually.

[4R] ALT ERROR (green) When the aircraft misses a predicted altitude constraint, this field displays the difference between the altitude constraint and the predicted altitude.
If, for example, "– 500" appears in this field in green, the aircraft will reach the waypoint at an altitude 500 ft below the constraint altitude.
This applies only to waypoints in the climb and descent phases.

or STEP PRED This legend appears for waypoints in the cruise phase.
This gives the pilot access to the step prediction page.

[6R] DES → When this field displays "DES", pressing this key assigns the constraints to the descent phase and inserts them into the vertical flight plan. The page reverts to the F-PLN page. (See).

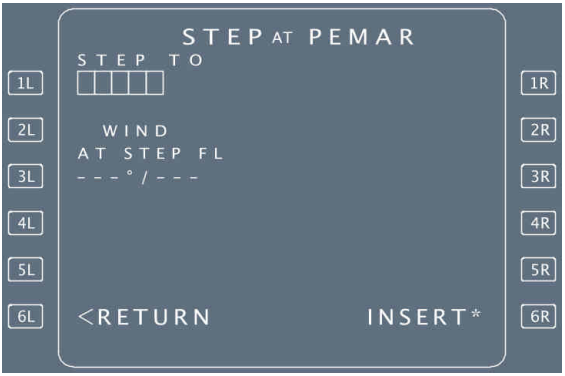
Note: *Altitude and speed constraints may apply to the climb, descent, or approach phase, but never to the cruise phase.*
The 6L/6R fields display "CLB/DES"when the revised waypoint is a cruise phase waypoint, and the FMGS needs to know if the new constraint is to be applied in climb or descent phase. The FMGS will modify the cruise phase accordingly.
These 2 prompts also display "CLB/DES"when the predictions are not computed. (Top of climb and top of descent not yet defined).

STEP PRED PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This page allows the pilot to insert a step climb or a step descent altitude into the flight plan.

The pilot calls it up from the vertical revision page by pressing the STEP PRED prompt, which is displayed at all fixed waypoints of the cruise segment except the FROM waypoint.



TITLE — STEP AT — (the selected vertical revise waypoint at which the step is to be initiated)

[1L] STEP TO — This is the step altitude entry field.

[boxes] — If the step altitude is higher than the cruise flight level, the step is a step climb.
If the step altitude is lower than the cruise flight level, the step is a step descent.

[3L] WIND AT STEP FL — °/ — — This field allows the flight crew to enter and display a wind for the step altitude. This can be the wind as calculated by the FMGC (small blue font) or as entered by the pilot (large blue font). If the flight crew clears a pilot-entered wind, the value reverts to the calculated wind.
The pilot cannot clear the calculated wind.

[6L] RETURN — If the pilot presses this key the page reverts to the previously displayed vertical revision page.

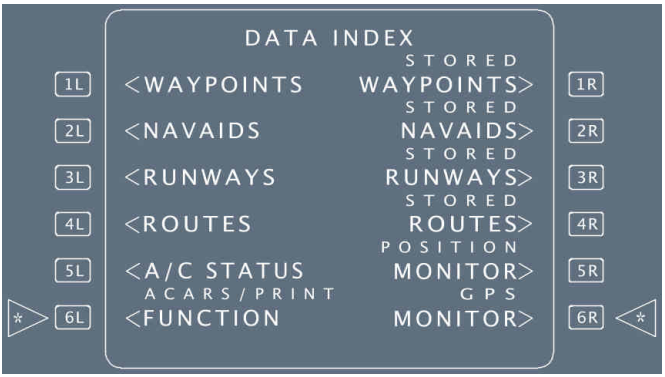
[6R] INSERT — If the pilot presses this key the system inserts the step and reverts to flight plan page.
This prompt is displayed after a step FL entry only.

DELETE STEP — If the pilot presses the key while this legend is showing, the step is deleted and the display reverts to the vertical revision page.

DATA INDEX PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

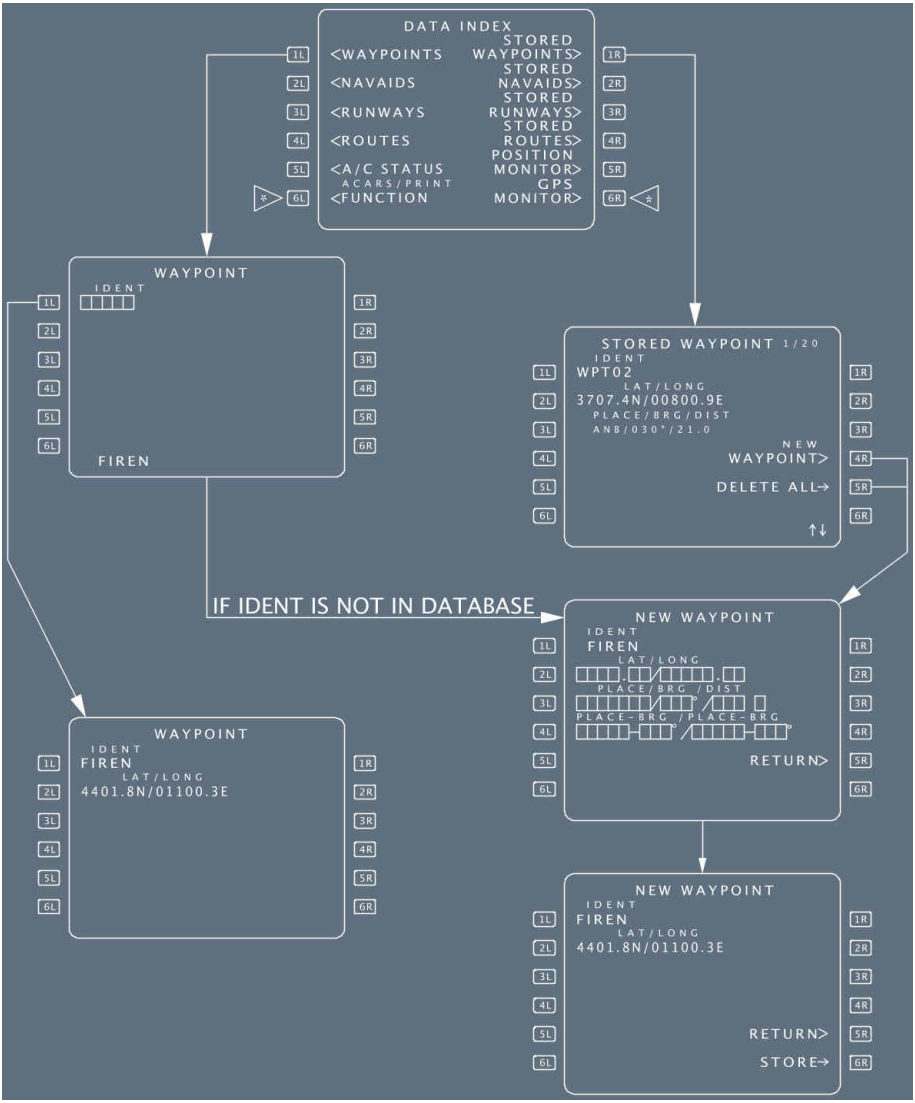
This page lists the navigation data entered in the FMGS.
The pilot enters those items labeled “stored” and can modify them. The pilot can call up the others, but cannot modify them.
The pilot calls up this page by pressing the DATA key on the MCDU console.



[1L] WAYPOINTS [2L] NAVAIDS [3L] RUNWAYS [4L] ROUTES	These keys call up descriptions of waypoints, NAVAIDs, runways, and routes stored in the data base so that the pilot can review it.
[5L] A/C STATUS	This key calls up the aircraft status page.
[6L] ACARS/PRINT ◁ FUNCTION	This key calls up the PRINT function pages and the ACARS function pages.
[1R] STORED WAYPOINTS [2R] STORED NAVAIDS [3R] STORED RUNWAYS [4R] STORED ROUTES	These keys call up waypoints, NAVAIDs, runways, and routes that the flight crew has stored, allowing the crew to review them and to store them in or delete them from the data base. They are erased automatically in the done phase when a specific pin program is activated.
[5R] POSITION MONITOR	When the flight crew presses this key, the display shows all essential navigation data.
[6R] GPS MONITOR ◁	This key calls up the GPS MONITOR page. Displayed if the GPS option is installed.

WAYPOINT/STORED WAYPOINT/NEW WAYPOINT PAGES

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



WAYPOINT PAGE

The pilot can call up this page by pressing the 1L key, on the DATA INDEX page. The display then shows waypoint information associated with the identifier the flight crew inserts in the [1L] field. From this page, it is possible to call up any waypoint not stored in the stored waypoint list, if they belong to the active, temporary, or secondary flight plan.

STORED WAYPOINT PAGE

The pilot calls up this page by pressing the 1R key, on the DATA INDEX page.
This page displays waypoints defined and stored by the pilot. It lists each stored waypoint, along with a number that shows the relative order in which it was inserted in the database. This number is displayed in the upper righthand corner of the page. For example, “1/20” indicates that the waypoint was the first of 20 stored.

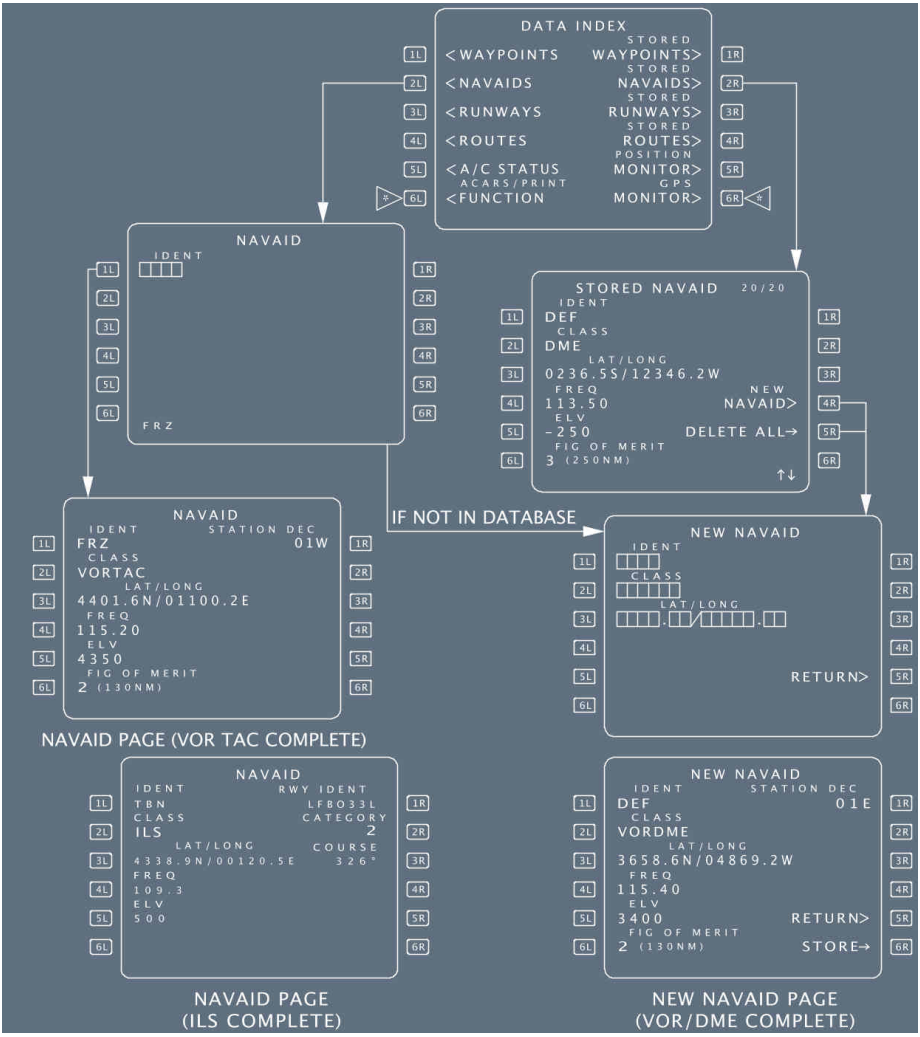
[1L] IDENT	To delete a waypoint, the pilot clears the 1L IDENT display.
[2L] LAT/LONG	Latitude and longitude of the waypoint are displayed in this field.
[3L]	This field displays either a PLACE/BRG/DIST or a PLACE-BRG/PLACE-BRG, depending on how the waypoint was defined.
[5R] NEW WAYPOINT	The pilot presses this key to call up the NEW WAYPOINT page.
[6R] DELETE ALL	The pilot presses this key to delete all the waypoints stored by the flight crew, except those currently used in the active or secondary flight plan. (“F-PLN ELEMENT RETAINED” appears on the MCDU).

NEW WAYPOINT PAGE

- The pilot calls up this page by pressing 4R, on the STORED WAYPOINT page.
- The pilot can use this page to define and store up to 20 waypoints. Entering an additional waypoint deletes the first one.
  The pilot defines a waypoint by entering its ident in the data field next to 1L, then by entering its position in the amber boxes: Latitude and longitude, place/bearing/distance from a waypoint (or place) in the database, or place-bearing/place-bearing (bearings from two different waypoints in the database).
  The STORE prompt appears next to 6R when the boxes are filled in, and the pilot presses the key to store the waypoint in the database.
  If the pilot enters the waypoint's position as place/bearing/distance, or place-bearing/place-bearing, the FMGC computes its latitude and longitude.

NAVAID/STORED NAVAID/NEW NAVAID PAGES

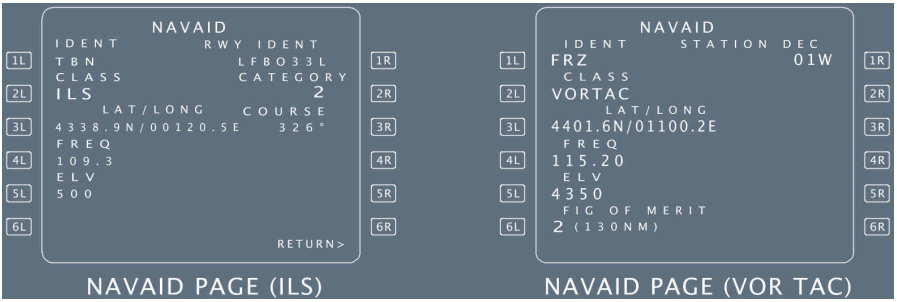
Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



NAVAID PAGE

The pilot calls up this page by pressing 2L on the DATA INDEX page.

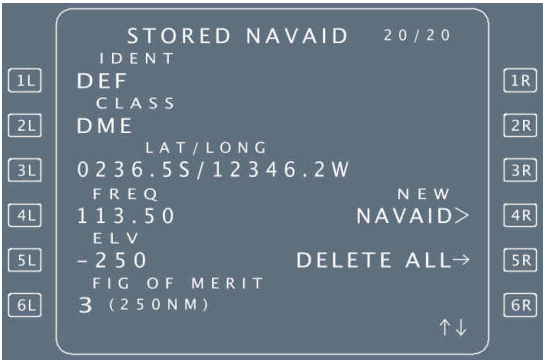
This page displays the NAVAID information associated with the identifier the pilot inserts in the [1L] field.



[2L] CLASS	This field identifies the NAVAID as VOR, DME, VOR DME, VORTAC, NDB, LOC, ILS, or ILS DME
[4L] FREQ	This field displays the frequency of the selected NAVAID.
[5L] ELV	This field gives the elevation of the NAVAID in feet above sea level. It is not displayed for VOR or NDB.
[6L] FIG OF MERIT	This field shows how far out the FMGS can autotune a VOR, VOR/DME, VORTAC, or DME for display or for computing position. 0 : Up to 40 nm 1 : Up to 70 nm 2 : Up to 130 nm 3 : Up to 250 nm
[1R] STATION DEC or RWY IDENT	This is the magnetic declination in the NAVAID area (used only for VOR, VOR/DME, and VORTAC). The field displays this, if the NAVAID is an ILS or ILS/DME.
[2R] CATEGORY	This field shows the NAVAID's category, if it is an ILS or a LOC
[3R] COURSE	This is the localizer course, if the NAVAID is an ILS or a LOC.
[6R] RETURN	This prompt is displayed, if the page is accessed from the SELECTED NAVAID page. The pilot presses this key to return to the SELECTED NAVAID page.

STORED NAVAID PAGE

The pilot calls up this page by pressing the 2R key on the data index page.
He uses this page to display or delete NAVAID he has defined and stored.



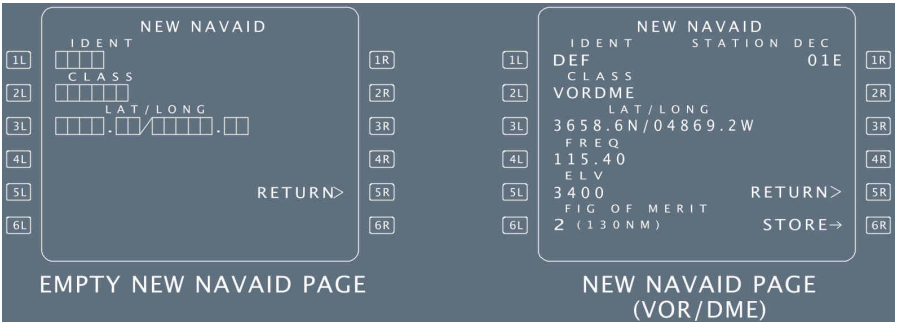
A number in the upper right hand corner of the screen shows the relative order in which the NAVAIDs were stored. (For example, 3/7 means third out of seven stored).
Slew keys give the pilot access to the different stored NAVAIDs.

[1L] IDENT — The pilot deletes a stored NAVAID by entering its IDENT in this field, then pressing the CLR key at the bottom of the MCDU control panel.

[5R] DELETE ALL — The pilot presses this key to erase all the stored NAVAIDs, except those currently in use in the active or secondary flight plan. (The MCDU displays “F-PLN ELEMENT RETAINED.”).

NEW NAVAID PAGE

The pilot calls up this page by pressing 4R on the stored NAVAID page.



It can be used to define and store up to 20 NAVAID. The NAVAID elements must be entered in two steps:

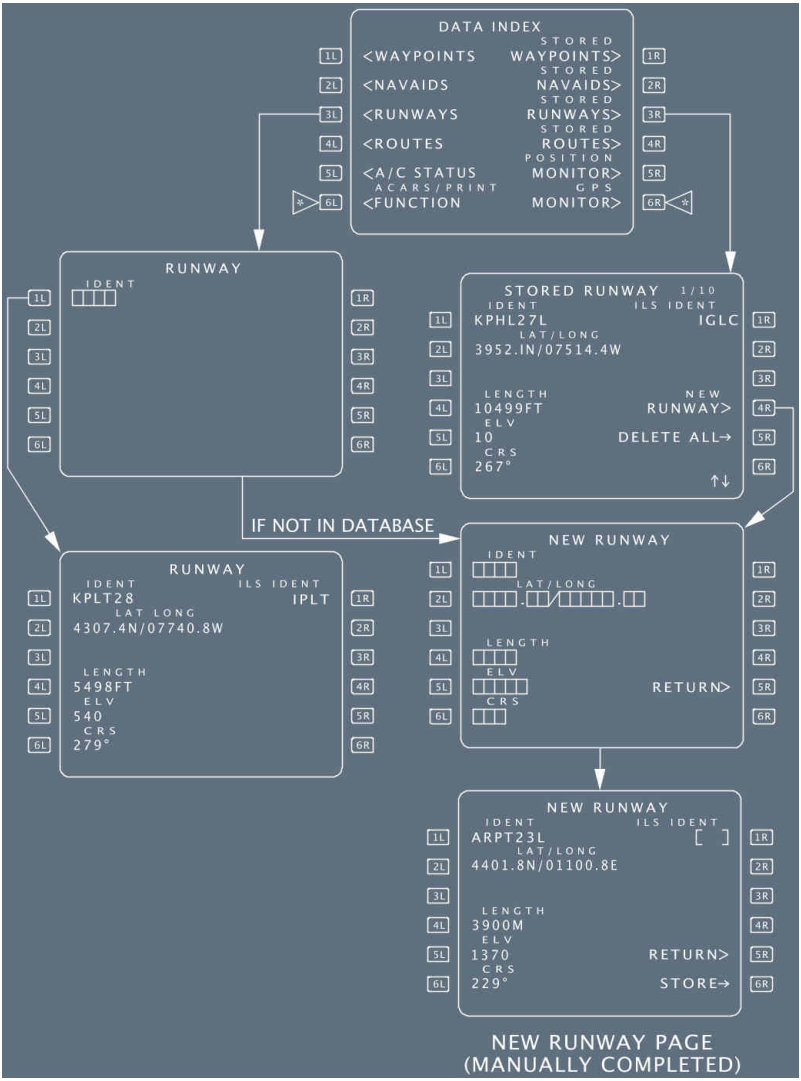
1. Enter the data in the lines of amber boxes.
2. Enter frequency, elevation, figure of merit, and station declination or ILS category and course, if applicable.
   The STORE prompt appears next to 6R, when all the amber boxes are filled. The pilot presses 6R to store the new NAVAID.

Note: *The pilot cannot create an ILS/DME or an uncollocated NAVAID.*
If the runway associated with the ILS has been entered through the new runway page, the ILS course, ILS IDENT, and runway IDENT are already displayed on the new NAVAID page when it comes up (copied from the new runway page). For details, Refer to DSC-22_20-50-10-20 Runway/Stored Runway/New Runway Pages.

[1R] STATION DEC	The pilot must enter the magnetic declination, if the prompt is displayed. This prompt is displayed only for VOR, VORTAC or VORDME.
[3R] COURSE	If the NAVAID is an ILS, or LOC, enter the course.

RUNWAY/STORED RUNWAY/NEW RUNWAY PAGES

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



RUNWAY PAGE

This page displays the following information:

[1L] IDENT	The runway IDENT, which comprises the airport identification and the runway direction, uses six or seven digits (Example: CYYZ 24L and LFRJ 08).
[2L] LAT/LONG	The latitude and longitude of the runway threshold.
[4L] LENGTH	The runway length in meters (M) or feet (ft), in four digits (9 999 ft).
[5L] ELV	The threshold elevation in feet above sea level.
[6L] CRS	The runway course (degrees magnetic).
[1R] ILS IDENT	The LOC, ILS or identifier.

STORED RUNWAY PAGE

The pilot uses this page to display or delete defined and stored runways. The stored runways are listed and numbered in the order in which they were inserted. The number is displayed in the upper righthand corner of the page. (For example, 2/4 means the runway is the second of four stored runways).
The pilot can delete any stored runway from the database by displaying its IDENT in the 1L field, then by pressing the CLR key on the MCDU control panel.

[5R] DELETE ALL	The pilot presses this key to erase all the stored runways, except those used in the active or secondary flight plan. (The MCDU displays “F-PLN ELEMENT RETAINED”).
[1L] to [6L]	These fields are similar to the RUNWAY page fields.

NEW RUNWAY PAGE

The pilot can use this page to define and store up to 10 runways.
When the pilot enters an ILS/LOC IDENT in the [1R] field, the new NAVAID page comes up.
When the pilot has entered and stored the necessary data in the new NAVAID page, the new runway page reappears.

The new runway page and the new NAVAID page (ILS/LOC) are not independent:

- When the flight crew first defines the ILS/LOC (on the new NAVAID page), the new runway page, when called up, already displays the RWY course, RWY IDENT, and ILS IDENT (copied from the new NAVAID page)
- When the flight crew first defines the runway (on the new runway page), the new NAVAID page, when called up, already displays the ILS course, ILS IDENT, and runway IDENT.

The pilot must enter the two runway directions on two different new runway pages (Example: LFRJ 08 and LFRJ 26) to allow the flight plan to select either one.

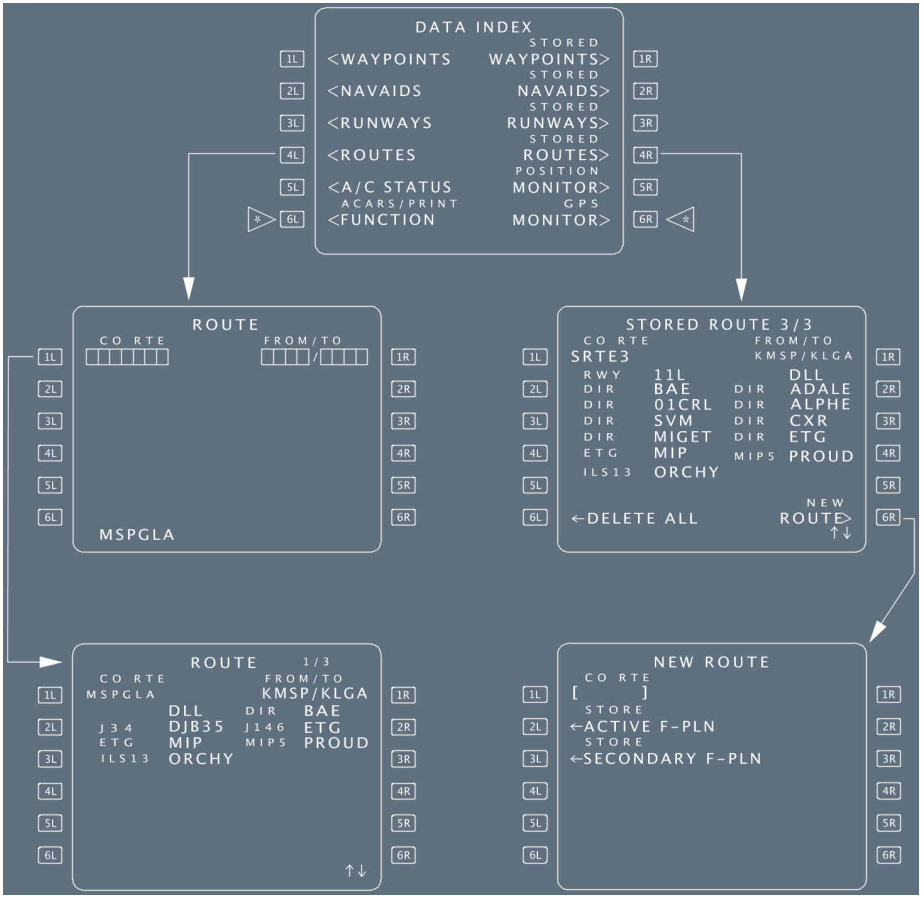
Note: When 10 runways are stored, entering a new stored runway deletes the first one of the list (1/10).

[1L] to [6L]	Enter information about the new runway.
[1R] ILS IDENT	Enter the ILS/LOC IDENT. The NEW NAVAID page comes up.
[5R] RETURN	When displayed, pressing this key return to NEW NAVAID page.
[6R] STORE	This prompt appears only when all the amber boxes have been filled.

Note: The NEW RUNWAY may be used as departure or destination but no SID or STAR can be associated or stored with this runway. Therefore the pilot will use it as an "independent" airport.
A new runway is identified by the 4 letter ICAO airport identifier although all six or seven digits must be entered.

ROUTE/STORED ROUTE/NEW ROUTE PAGES

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



ROUTE PAGES

(Not-modifiable)

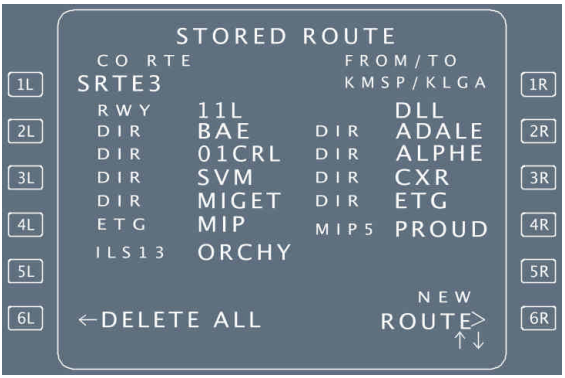
[1L] CO RTE — Any company route IDENT entered in this field causes all the elements of the route to be displayed.

Line 2 to Line 6 — These lines display the various elements of the route, including waypoints and airways.

[1R] FROM/TO — This field is automatically fitted when the pilot enters the IDENT for a company route. When the pilot enters a city pair manually, the MCDU displays “NOT IN DATA BASE” if the city pair is not in the navigation data base. If the city pair is in the data base, the CO RTE field displays the first route stored (small font, blue). If more than one route is stored, the pilot can slew to see the different routes.

STORED ROUTE PAGE

The pilot can store up to 3 new routes.



[1L] CO RTE — This field identifies the stored route. Clearing this field deletes the stored route.

Line 2 to Line 5 — The fields in these lines are identical to the corresponding fields in the route page.

[6L] DELETE ALL — Pressing this key deletes all routes previously stored by the crew.

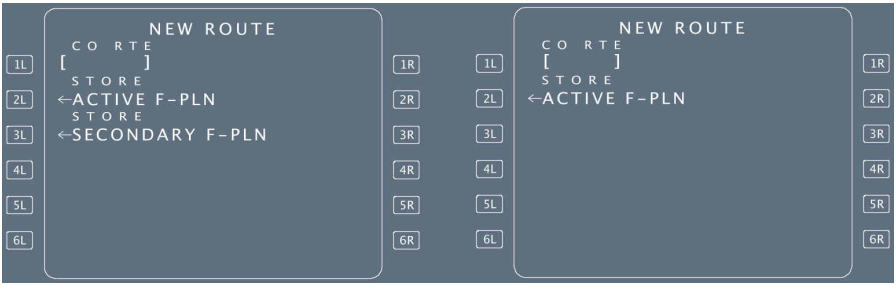
[1R] FROM/TO — This identifies the city pair of the stored route.

[6R] NEW ROUTE — Pressing this key calls up the new route page.

Note: *Stored routes are automatically erased in the DONE phase when a specific pin program is activated.*
When the pilot wants to enter a fourth route, the message “STORED ROUTE FULL” is displayed and a route has to be deleted prior to inserting a new one.

NEW ROUTE PAGE

The pilot calls up this page by pressing the NEW ROUTE key on the stored route page. The pilot can use it to store up to three new routes that have been already defined in the active or secondary flight plan.



[1L] CO RTE — This field enables the pilot to enter a new company route IDENT. If that IDENT has already been assigned, the entry is rejected.

[2L] STORE ACTIVE F-PLN (blue) — Pressing this key stores parameters of the active flight plan as a new route.
The display shows this prompt when the system contains a FROM/TO, but only during preflight.

[3L] STORE SECONDARY F-PLN (blue) — Pressing this key stores parameters of the secondary flight plan as a new route. This prompt appears when the system contains a FROM/TO, and the secondary flight plan has not yet been sequenced.

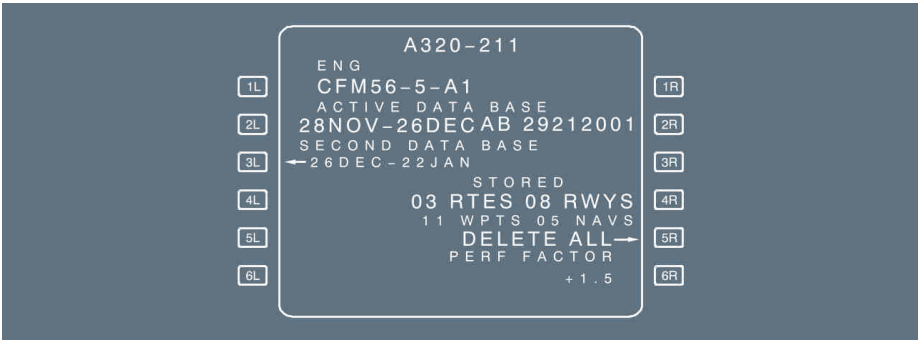
Note:
- *If it has not already been named, a stored route is named automatically when stored: SRTE 1 or 2 or 3, for example*
- *When 3 routes are already stored, the pilot cannot insert a new route. The "STORED ROUTE FULL" message is displayed, and the pilot must manually delete a route in order to store a new one*
- *Several elements of the flight plan are not retained, when the route is stored:*
  - *Pilot-entered holds*
  - *Offset*
  - *Pilot-entered constraints*
  - *Modifications to terminal procedures*
  - *Pseudo-waypoints*

  The MCDU then displays "REVISIONS NOT STORED".

AIRCRAFT STATUS PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

3 The system automatically displays this page at power up, but the pilot may also call it up by pressing the DATA key on the MCDU console.



TITLE — AIRCRAFT TYPE

[1L] ENGINE TYPE — The system uses this to calculate predictions.

Note: *When the same performance database is used for different aircraft configurations, the aircraft type displayed may differ from the actual aircraft.*

[2L] ACTIVE DATABASE — The validity period and part number are displayed in large font.

[3L] SECOND DATABASE — The validity period is displayed in small font. The pilot can press the 3L key to switch to the second database as the active database.

CAUTION	Cycling the database erases the primary and secondary flight plans, as well as the stored data. The flight crew must never do this in flight.

[4R] STORED — This field displays pilot-stored data in large green font. The field is blank, if no data is stored. (The system automatically erases this data at the done phase, when a specific pin program is activated).

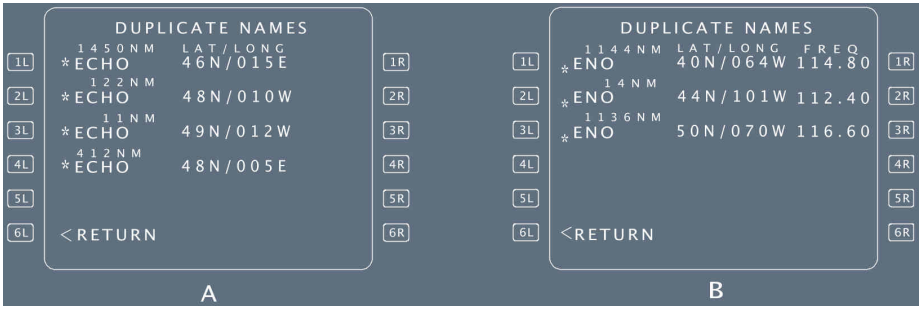
[5R] DELETE ALL — The pilot presses this key to delete all pilot-stored data, except data that is part of the active and secondary flight plans.

[6R] PERF FACTOR — This factor can be only modified while the aircraft is on ground.

DUPLICATE NAMES PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This page, which appears automatically, allows the pilot to select a specific waypoint, airport, or NAVAID when the data base holds more than one under the same identifier.



The pilot presses the key adjacent to a waypoint, NAVAID, or airport to select it as the one to be entered. When the pilot has finished, the page reverts automatically to the page displayed previously.

LAT/LONG COLUMN

This column lists the rounded off latitudes and longitudes, of the different points using the same identifier.

FREQ COLUMN

This column lists the frequencies of the NAVAIDs, if any.

DISTANCE (SHOWN ABOVE IDENTIFIER)

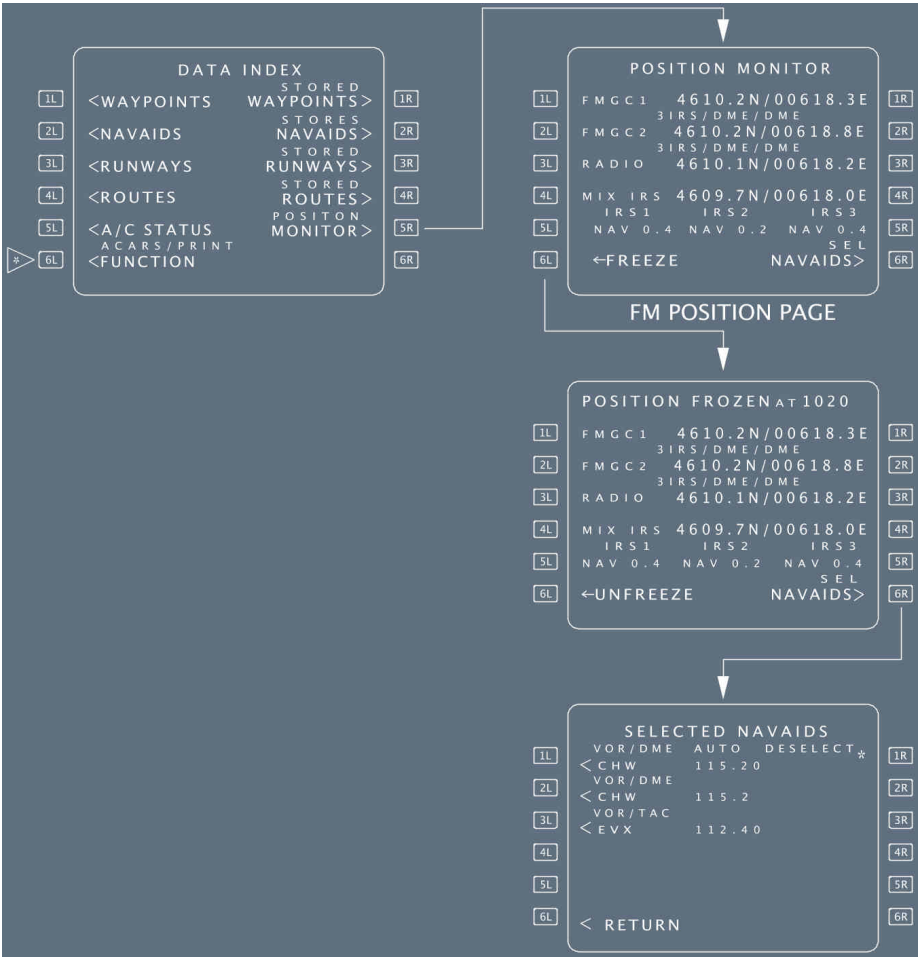
Each of these distances is the distance from present position to the waypoint displayed directly underneath.

Note: The DUPLICATE NAMES page is not displayed when 2 waypoints with the same IDENT belongs to the same airway. The system selects the first waypoint found in the database.

POSITION MONITOR PAGE

Applicable to: B-HSD, B-HSE

This page displays all the different positions that the FMGC has computed with the different methods of navigation available. It also shows which method obtained each position. (The positions should be almost identical).
The flight crew calls up this page by pressing the 5R key on the data index page.



4 **POSITION MONITOR AND POSITION FROZEN PAGE**

Line 1 FMGC 1	This line displays the latitude and longitude, as calculated by the FMGC 1, and the navigation method used by the FMGC for that calculation (Example: “3 IRS/DME/DME”).
Line 2 FMGC 2	This line displays the latitude and longitude, as calculated by the FMGC 2, and the navigation method used.

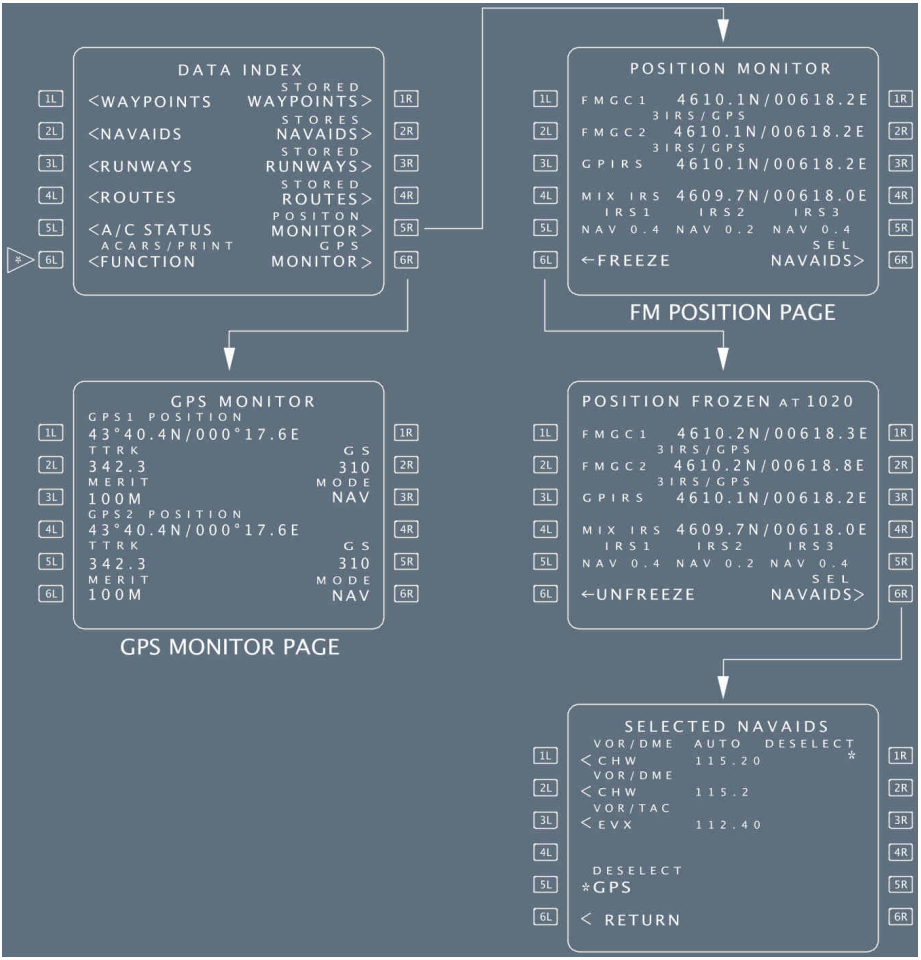
Line 3 RADIO	This line displays the latitude and longitude, calculated by the onside FMGC from selected radio NAVAIDs (Example: DME/DME VOR/DME, or LOC).
Line 4 MIX IRS	This line displays the latitude and longitude of the weighted mean inertial reference system (IRS) calculated by the onside FMGC from the available IRSs.
Line 5 IRS 1, 2, 3	This line displays the deviation in nautical miles of each IRS position from the onside FMGC position. It also displays the IRS mode, which can be INVAL, ALIGN, NAV or ATT. *Note: INVAL is displayed when an ADIRS has failed or the IRS position is not refreshed.*
[6L] FREEZE/UNFREEZE	The flight crew presses this key to freeze (or unfreeze) all the data displayed on the page. When the data is frozen, the title of the page specifies the time at which it was frozen.
[6R] SEL NAVAIDS	The flight crew presses this key to access the selected NAVAIDs page.

POSITION MONITOR PAGE

Applicable to: B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This page displays all the different positions that the FMGC has computed with the different methods of navigation available. It also shows which method obtained each position. (The positions should be almost identical).

The flight crew calls up this page by pressing the 5R key on the data index page.



5 **POSITION MONITOR AND POSITION FROZEN PAGE**

Line 1 FMGC 1	This line displays the latitude and longitude, as calculated by the FMGC 1, and the navigation method used by the FMGC for that calculation (Example: “3 IRS/DME/DME”).
Line 2 FMGC 2	This line displays the latitude and longitude, as calculated by the FMGC 2, and the navigation method used.

Line 3 RADIO or GPS or GPIRS	This line displays the latitude and longitude, calculated by the onside FMGC from selected radio NAVAIDs (Example: DME/DME VOR/DME, or LOC) or from GPS or GPIRS.
Line 4 MIX IRS	This line displays the latitude and longitude of the weighted mean inertial reference system (IRS) calculated by the onside FMGC from the available IRSs.
Line 5 IRS 1, 2, 3	This line displays the deviation in nautical miles of each IRS position from the onside FMGC position. It also displays the IRS mode, which can be INVAL, ALIGN, NAV or ATT. *Note: INVAL is displayed when an ADIRS has failed or the IRS position is not refreshed.*
[6L] FREEZE/UNFREEZE	The flight crew presses this key to freeze (or unfreeze) all the data displayed on the page. When the data is frozen, the title of the page specifies the time at which it was frozen.
[6R] SEL NAVAIDS	The flight crew presses this key to access the selected NAVAIDs page.

SELECTED NAVAIDS PAGE

Applicable to: B-HSD, B-HSE

MODIFIABLE ONLY FOR DESELECTION

Line 1	This line displays the NAVAID tuned for display purposes, and the tuning mode (AUTO, MAN, or RMP).
Line 2 and 3	These lines display the NAVAIDs, if any, tuned for the calculation of radio position by the FMGC.
[4L]	This field displays the tuned ILS, if any.
[6L] RETURN	The pilot presses this key to return to the POSITION MONITOR page.

[1R] DESELECT to [6R]	The pilot deselects a NAVAID by entering its identifier in one of these six fields. Once deselected in this way, the NAVAID can no longer be tuned manually through the entry of its IDENT, nor can it be autotuned for display or determination of the position for the rest of the flight. The deselection is cleared: - Manually, by a CLR action into this field, or - Automatically upon transition to the done or preflight phase, or upon activation of the second database. The pilot may deselect as many as six stations.

SELECTED NAVAIDS PAGE

Applicable to: B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

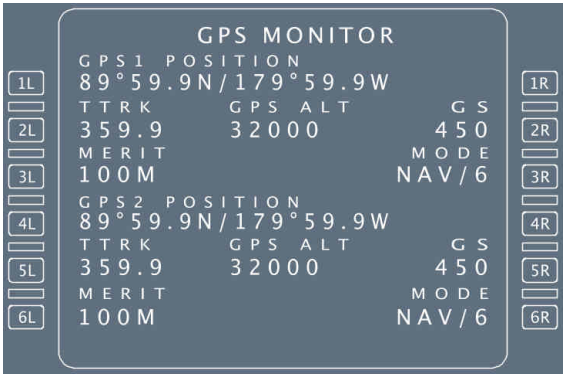
MODIFIABLE ONLY FOR DESELECTION

Line 1	This line displays the NAVAID tuned for display purposes, and the tuning mode (AUTO, MAN, or RMP).
Line 2 and 3	These fields display the NAVAIDs, if any, tuned for the calculation of radio position and the tuning mode by the FMGC.
[4L]	This field displays the tuned ILS, if any.
[5L] DESELECT/SELECT GPS	The crew presses this key to manually select or deselect the GPS for position computation. Upon transition to the DONE phase, the prompt returns to DESELECT status. If the pilot deselects the GPS, “GPS IS DESELECTED” is displayed when the aircraft is less than 80 nm from the top of descent, or in approach phase.
[6L] RETURN	The pilot presses this key to return to the POSITION MONITOR page.
[1R] DESELECT to [6R]	The pilot deselects a NAVAID by entering its identifier in one of these six fields. Once deselected in this way, the NAVAID can no longer be tuned manually through the entry of its IDENT, nor can it be autotuned for display or determination of the position for the rest of the flight. The deselection is cleared: - Manually, by a CLR action into this field, or - Automatically upon transition to the done or preflight phase, or upon activation of the second database. The pilot may deselect as many as six stations.

GPS MONITOR PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This page displays the GPS data. The pilot calls up this page by pressing the GPS MONITOR prompt of the DATA INDEX page.



Line 1 and 4 GPS 1, 2 — POSITION

[2L] and [5L] TTRK — GPS 1, 2 True Track

[3L] and [6L] MERIT — GPS 1, 2 Figure of Merit (M or FT) (meters or feet)

[2R] and [5R] GS — GPS 1, 2 Ground Speed

[3R] and [6R] MODE — GPS 1, 2 mode: INIT, ACQ, NAV, TEST, FAULT or ALTAID

- INIT : system initialization
- ACQ : satellite acquisition
- NAV : normal mode
- TEST : system test
- FAULT : invalid system
- ALTAID : degraded modes. GPS uses aircraft inputs for computation purposes.

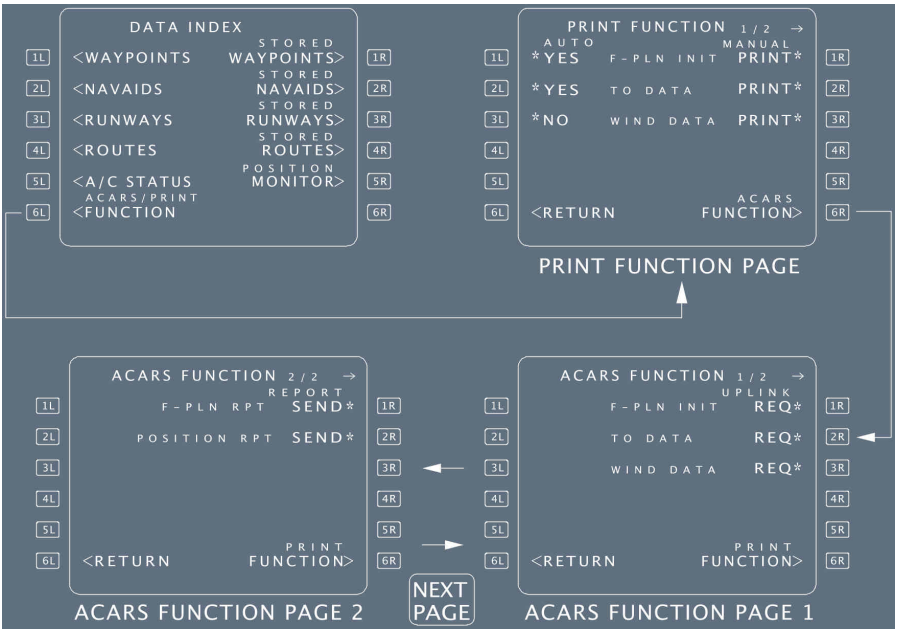
[2] and [5] GPS ALT — GPS altitude is displayed for informational purposes only. It is not used by the FMGS. No guarantee can be given regarding its accuracy.

ACARS FUNCTION PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

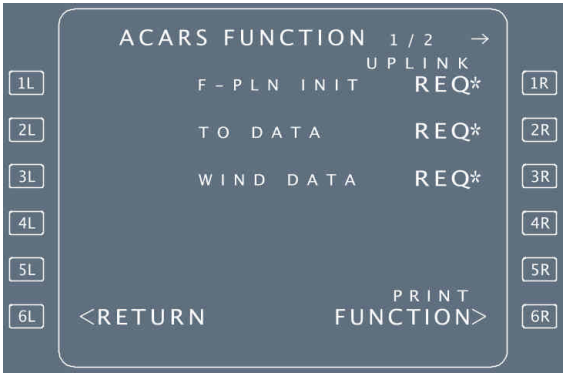
GENERAL

The ACARS FUNCTION pages display the functions that enable the crew to send manual requests or reports to the ground.
All functions, displayed on pages 1 and 2, may be inhibited via a pin program of the NAV database policy file.
The ACARS/PRINT FUNCTION prompt is displayed on the DATA INDEX page. Pressing this key displays the PRINT FUNCTION page, from which the ACARS FUNCTION page can be accessed.



Page 2 of the ACARS FUNCTION is accessed by using the NEXT PAGE key on page 1, and vice versa.

ACARS FUNCTION PAGE 1



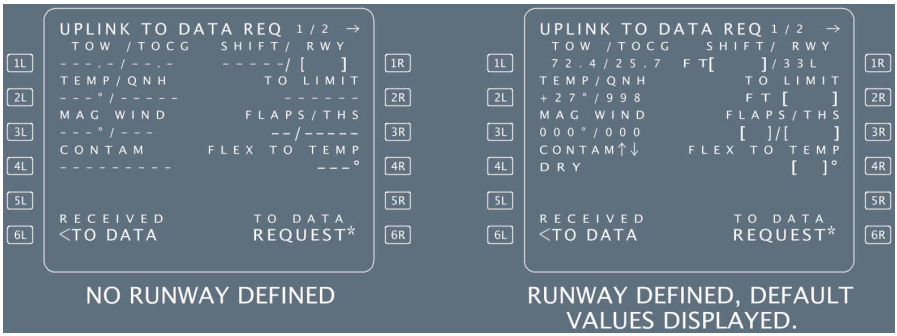
TITLE	ACARS FUNCTION 1/2 in white
Line 1 F-PLN INIT REQ*	Pressing this key sends a request for flight plan to the ground (downlink message). INIT REQUEST prompt of the INIT A page provides the same function.
Line 2 TO DATA REQ*	Pressing this key sends a request for takeoff data. Displayed in DONE and PREFLIGHT phases. TO DATA REQUEST prompt of the UPLINK TO DATA REQ page provides the same function.
Line 3 WIND DATA REQ*	Pressing this key sends a request for wind data. WIND REQUEST prompt of the CLIMB, CRUISE, and DESCENT WIND pages provides the same function.

Note: *If "REQ" is not followed by a star, the request cannot be sent (downlink message). When a function (line 1 or 2 or 3) is deactivated using the NAV database policy file, the corresponding line is blank.*

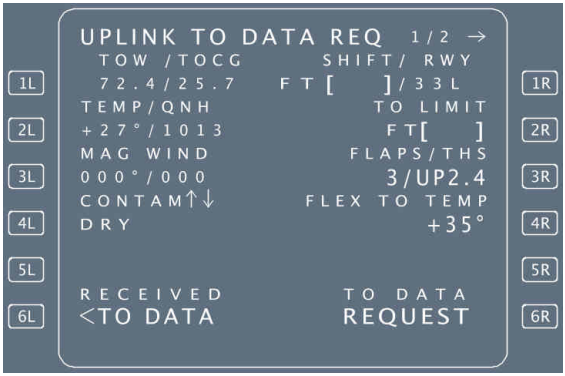
[6L] RETURN	The pilot presses this key to make the display revert to the DATA INDEX page.
[6R] PRINT FUNCTION	The pilot presses this key to access the PRINT FUNCTION page. (Refer to DSC 22_20 50 10 20 C. Print Function Page)

UPLINK TO DATA REQ

This page allows the pilot to send a request for takeoff data for up to 2 runways. There is one page for each runway. The page is accessed from the PERF TAKEOFF page or from the UPLINK XXX TO DATA page by pressing UPLINK TO DATA prompt.



TITLE	White.
[1L] TOW/TOCG (green)	This field is dashed, until a runway is defined in the [1R] field. The TOW/TOCG is defaulted to the values of the INIT B and FUEL PRED pages. If not available, dashes are displayed. Not modifiable by the pilot.
[2L] TEMP/QNH or QFE (green/blue)	This field is dashed until a runway is defined in [1R] field; TEMP = defaulted to SAT, and cannot be modified by the crew. BARO = defaulted to FCU selection and can be modified by the pilot.
[3L] MAG WIND (blue)	This field is dashed, until a runway is defined in the [1R] field. It displays the wind at the origin. Modifiable by the pilot.
[4L] CONTAM (blue)	This field is dashed, until a runway is defined in the [1R] field. The display is defaulted to DRY. The slew keys allow the crew to modify the runway contamination DRY, WET, ¼ WATER, ½ WATER, ¼ SLUSH, ½ SLUSH, COMP SNOW.
[6L] RECEIVED TO DATA	This field calls up the UPLINK MAX (or FLX) TO DATA page that displays the data received by ACARS.



[1R] SHIFT/RWY (blue) This field is dashed until a runway is defined in the F-PLN. If a runway is defined in the F-PLN, it is automatically filled:
SHIFT = Value from the PERF TO page, or blue brackets if no value is defined.
RWY = F-PLN departure runway.
This field is modifiable by the pilot.

[2R] TO LIMIT (blue) It is dashed until a runway is defined in [1R] field.
It displays blue brackets [ ], when a runway is defined.
The pilot may enter a length considering obstacles on the runway

[3R] FLAPS/THS (blue) This field is dashed, until a runway is defined in the [1R] field; then defaulted to values from PERF TO page. Blue brackets are displayed if PERF TO page has no defined values.

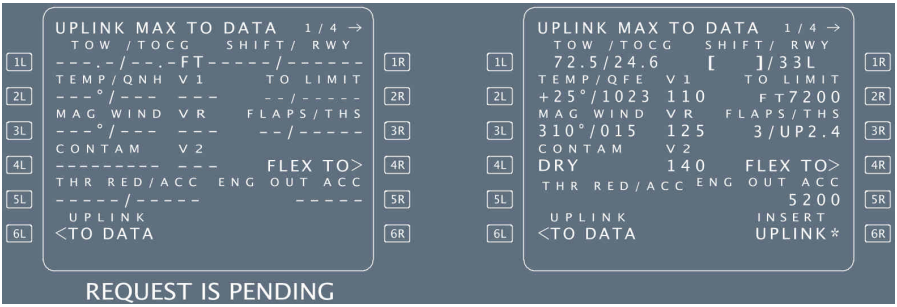
[4R] FLEX TO TEMP (blue) This field is dashed, until a runway is defined in the [1R] field; then it is defaulted to values from the PERF TO page. Blue brackets are displayed if PERF TO page has no defined values.This field is modifiable by the pilot. The pilot may enter a FLEX TO temperature (FXX).

[6R] TO DATA REQUEST* (amber) Pressing this key sends the takeoff data request message to the ground.
The star disappears when the request is sent. The star is displayed again when data are available.

Page 2/2 is a page used for requesting a second runway data.

Note: *If the UPLINK TO DATA REQ Page 2 is accessed (Page 1 being filled), the fields on this page are filled in with default values after entry of a runway in [1R]. BARO and wind are common with Page 1.*

UPLINK MAX TO DATA PAGES



This page is accessed via the UPLINK TO DATA REQ page, by pressing the RECEIVED TO DATA key.
There is a set of 2 pages (MAX TO DATA and FLEX TO DATA) for each of the 4 uplinked runway data. Uplinked data is displayed in green (not modifiable by the pilot).

[1L] TOW/TOCG	Uplinked reference Takeoff Gross Weight and Takeoff Center of Gravity.
[2L] TEMP/QNH (or QFE)	Uplinked assumed Temperature and BARO Setting.
[3L] MAG WIND	Uplinked takeoff runway wind
[4L] CONTAM	Uplinked takeoff runway contamination.
[5L] THR RED/ACC	Uplinked Thrust Reduction and Acceleration altitudes.
[6L] UPLINK TO DATA	Pressing the key calls up the UPLINK TO DATA REQ page
V1 , VR, V2	Uplinked takeoff speeds.
[1R] SHIFT/RWY	Uplinked TO runway IDENT, runway intersection, and position shift.
[2R] TO LIMIT	Uplinked runway length remaining.
[3R] FLAPS/THS	Uplinked FLAPS/SLATS CONF and TRIM position.
[4R] FLEX TO	Pressing this key calls up the UPLINK FLEX TO DATA pages.
[5R] ENG OUT ACC	Uplinked engine-out acceleration altitude.

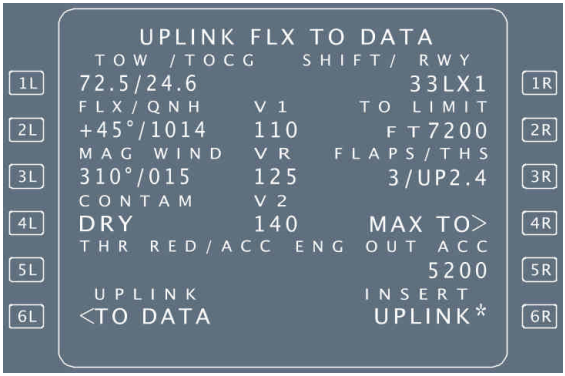
[6R] INSERT UPLINK* Uplinked Takeoff data is available for insertion.

Selecting this prompt inserts the following data in the PERF TO page:
- V1, VR, V2
- THR RED/ACC, ENG OUT ACC altitudes
- MAG WIND
- FLAPS/THS
- SHIFT
- FLEX.

The display reverts to the PERF TO page, the asterisk disappears. This field is not displayed, if the runway does not match the active runway, or if the uplinked TOW/TOCG differs from the current TOW/TOCG (if it already exists). The “CHECK TAKEOFF DATA” message is displayed on the MCDU scratchpad.

Note: *All previously received data is replaced by the new uplinked data.*

UPLINK FLX DATA PAGES

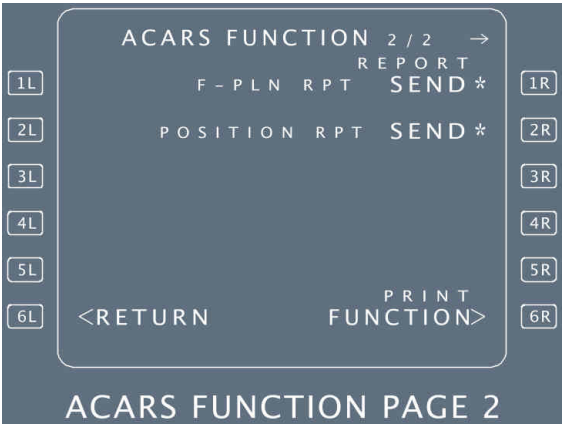


[2L]FLX/QNH (or QFE) Uplinked assumed Flex Temperature and BARO setting.

[4R] MAX TO Pressing the key calls up the MAX TO DATA page.
For all other fields, refer to the MAX TO DATA page.

All other fields are identical to the UPLINK MAX TO DATA page.

ACARS FUNCTION PAGE 2



Line 1 F-PLN RPT SEND	This key, when depressed, sends the flight plan report to the ground.
Line 2 POSITION RPT SEND	This key, when pressed, sends a Position Report to the ground.

Note: - *No report can be sent if "SEND" is not followed by a star*
- *When a function (line 1 or 2) is deactivated through the navigation database policy file, the corresponding line is blank.*

[6L] RETURN	The pilot presses this key to make the display revert to the DATA INDEX page.
[6R] PRINT FUNCTION	The pilot presses this key to access the PRINT FUNCTION page.

PRINT FUNCTION PAGES

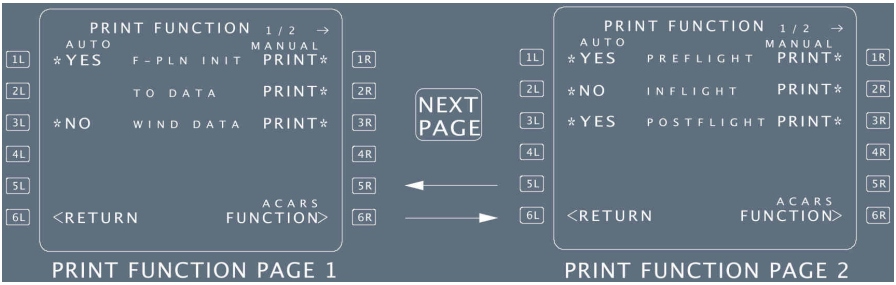
Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

GENERAL

The PRINT FUNCTION pages enable the crew to print the data relative to the current flight.

These data comes from 2 different sources:
- ACARS uplink messages
- Active data from the current flight.

The pilot may access these pages from the “DATA INDEX” page by depressing the [6L] key “ACARS/PRINT FUNCTION”.



Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

PRINT FUNCTION PAGE 1/2

This page displays the status of the automatic printing capabilities, for the uplink messages (left column) and the status of the current active data (right column).

LEFT COLUMN

AUTO

* YES (blue)
  - Line 1 : Uplink messages relative to F-PLN INIT data are automatically printed when received.
  - Line 2 : Uplink messages relative to takeoff data are automatically printed when received.
  - Line 3 : Uplink messages relative to wind data are automatically printed when received.

* NO (blue) — When “NO” preceded by a star is displayed in front of a line, the automatic printing is deselected. The pilot can reactivate it by depressing the left key of the line.

NO (without a star) — The automatic printing is internally deselected for the data of the line. The pilot cannot reactivate it manually.

Blank — The ACARS function is not available for this line. Uplink message cannot be received nor automatically printed.

RIGHT COLUMN

MANUAL — Displays the status of the manual printing capability of the active data (and not the ACARS uplink data)

PRINT * (amber) — Pressing the right keys prints the following active data:
- Line 1 Active flight plan INIT data
- Line 2 Active takeoff data
- Line 3 Active wind data

If the star is not displayed, the printing is not possible.
When the key has been pressed, the star is removed until the data are printed.

[6L] RETURN — Pressing this key reverts the display to the DATA INDEX page.

[6R] ACARS FUNCTION — Pressing this key reverts the display to the ACARS FUNCTION page.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

PRINT FUNCTION PAGE 2/2

This page describes the printing capabilities of the reports displayed on line 1 to 3.

LEFT COLUMN

AUTO (white)

* YES (blue)
- Line 1 : the PREFLIGHT report is automatically printed at engine start
- Line 2 : the INFLIGHT report is automatically printed at takeoff.
- Line 3 : The POSTFLIGHT report is automatically printed at engine shut down.

* NO (blue) — The report displayed on the line is not automatically printed. You can reactivate the function by pressing the left key of the line.

NO (without a star) — The automatic printing is deactivated internally for the report. The pilot cannot reactivate it.

RIGHT COLUMN

MANUAL — Pressing a right key prints the report displayed on the line.

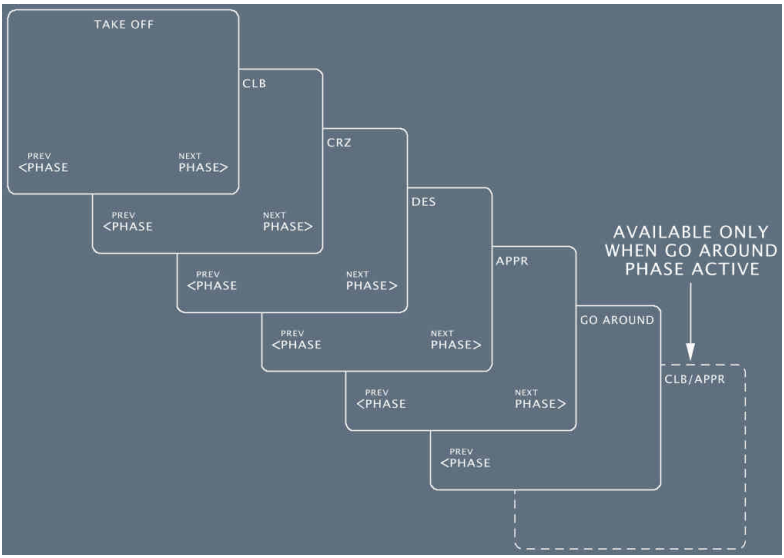
PRINT * — If the star is not displayed, the printing is not possible.
When the key is pressed, the star is removed until the report is printed.

PERF PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The flight plan is divided into several phases:
PREFLIGHT, TAKEOFF, CLIMB, CRUISE, DESCENT, APPROACH, GO-AROUND, DONE.
Each phase except the preflight and done phases has a performance (PERF) page. The PERF pages display performance data, speeds related to the various phases, and predictions.

Pressing the PERF key on the MCDU console calls up the performance page for the current active phase. Performance pages relating to phases already flown are not available.
In the preflight and done phases, pressing the PERF key brings up the takeoff performance page.
Pressing the PERF key in the done phase makes the phase transition to the preflight phase.

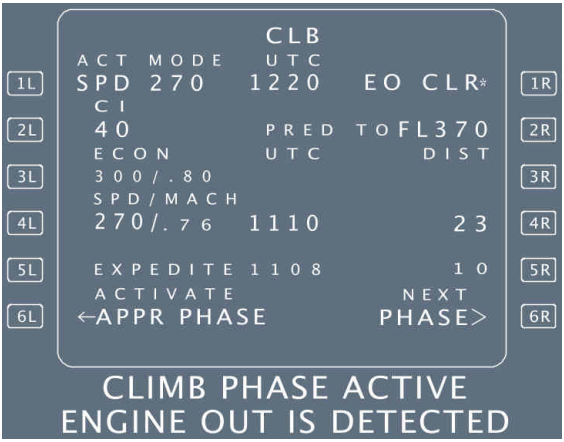


The FMGS flight phases are not related to the FWC flight phases.

Line 6	Fields may display two different prompts, depending upon whether the phase is active or not.
[6L] PREV PHASE	To review the performance page for the previous phase. The prompt is unavailable on the takeoff performance page. It is also unavailable for phases already flown.
[6L] ACTIVATE APPR PHASE	To activate, then confirm, the APPR phase. Available only on the page corresponding to the active phase.
[6R] NEXT PHASE	To review the performance page for the next phase.

Note: ***"EO CLR*" prompt***

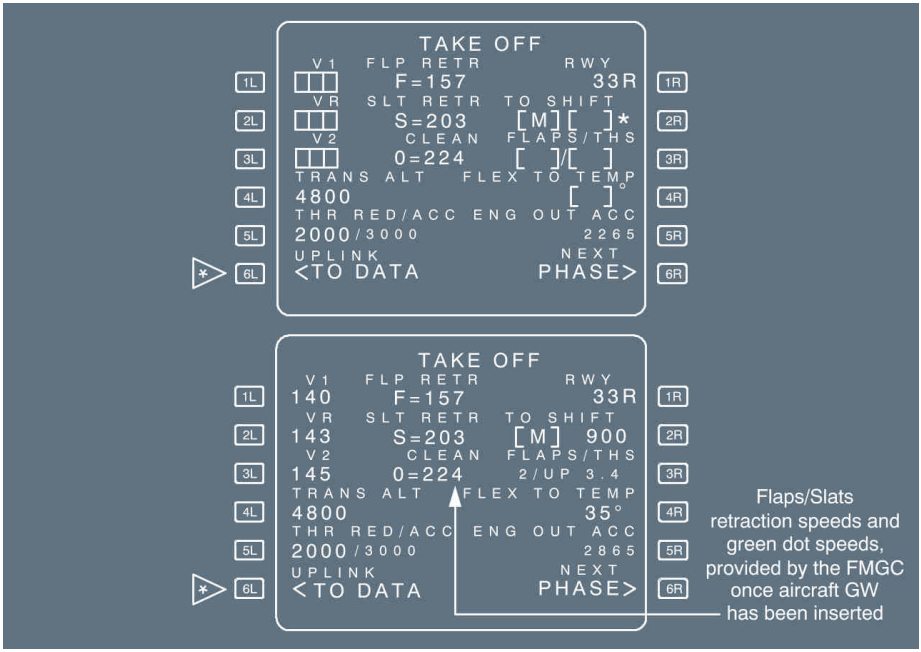
- *When the FMGS detects an engine-out condition, the system automatically calls up the performance page for the current flight phase (except when this occurs before the diversion point during takeoff or no EOSID exists in the flight plan) and displays "EO CLR*" in the [1R] field.*
  If the pilot presses the [1R] key, the system reverts to the normal processing (with no engine failed) and suppresses the EO information. (Refer to DSC-22_20-30-10-10 General).
- *If the engine-out condition is detected before the diversion point at takeoff, a temporary flight plan is created.*



PERF TAKEOFF PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

6 During the preflight phase, the pilot presses the PERF key to call up the takeoff performance page.



TITLE	TAKE OFF white large font when the takeoff phase is not active, green large font when it is.
[1L] V1 [2L] VR [3L] V2	The boxes are amber as long as the pilot does not make entries in them. The pilot can modify any entry as long as the takeoff phase is not active.

Note: *If the pilot does not enter V2, the SRS mode will be unavailable at takeoff.*

[4L] TRANS ALT (transition altitude)	The pilot calls this up from the database after the origin airfield is defined. The pilot can modify it. The pilot can modify it.

[5L] THR RED (thrust reduction altitude)

This is the altitude at which the pilot should reduce the thrust from TOGA/FLX to MAX CLIMB (CL detent) with all engines operative

- "CLB"or "LVR CLB"flashing on the FMA flashing amber
- The default thrust reduction is 1 500 ft above the runway elevation
- The pilot can modify this altitude: the minimum is 400 ft above the runway elevation.

ACC (Acceleration altitude)

This is the altitude at which the climb phase is triggered.

- The target speed jumps to the initial climb speed
- The default value is 1 500 ft above runway elevation
- The flight crew can modify the value. The minimum value is 400 ft above runway elevation, though it is always higher than, or equal to, THR RED.

Note:

- *A clearing action reverts both values to the defaulted ones.*
- *When the crew selects an altitude on the FCU that is:*
  - *below ACC, it brings the ACC down to this altitude*
  - *below THR RED, it brings THR RED and ACC down to this altitude. (The 400 ft minimum still applies).*

[6L] UPLINK TO DATA

This key calls up the UPLINK TO DATA REQ page. It is only displayed in the preflight and done phasess, when ACARS is installed.

[1R] RWY

This field shows the takeoff runway selected on the active flight plan. The flight crew cannot make an entry from this field. The field shows dashes, if no runway has been inserted in the flight plan.

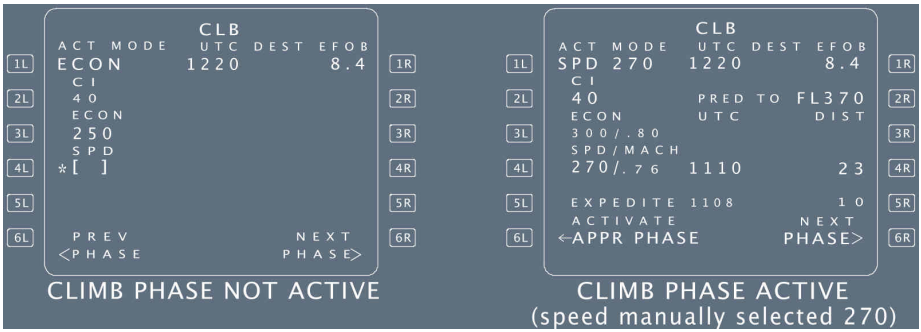
[2R] TO SHIFT

The takeoff shift is the distance in meters or feet between the beginning of the runway and the aircraft's takeoff position. When taking off from an intersection, the flight crew should insert this value to ensure a correct update of the FM position. The takeoff shift value must be positive, and cannot be greater than the runway length.

[3R] FLAPS/THS	This is a flight crew entry for the positions of the flaps and the trimmable horizontal stabilizer (THS) at takeoff. The flight crew can modify it until takeoff, by entering “UP X.X” or “X.X UP”, or “DN X.X” or “X.X DN”for the THS.
[4R] FLX TO TEMP or DRT TO or FLX TO ◁✻	The pilot inserts the FLX TO temperature for FLX takeoff setting purposes, or a derated thrust (if installed). It can only be entered during preflight. The system sends it to the FADEC and displays the entered data on the upper ECAM display. The TEMP value is always entered in degrees Celsius.
[5R] ENG OUT ACC	This field displays the engine-out acceleration altitude, as defined in the database, or is manually entered by the flight crew. This is for display only, as a reminder. It cannot be cleared. The above ACC altitude rules of [5L] apply to this field.
[6R] NEXT PAGE	This key calls up the climb performance page.

PERF CLIMB PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



The system calls up this page when an engine out is detected before the top of climb.

TITLE	CLB in a white large font when the climb phase is not active and in a green large font if it is active.
[1L] ACT MODE	This field displays the active target speed (ECON, selected SPEED/MACH, EXPEDITE ◁✻).

[2L] CI (Cost Index)	This field displays the cost index as initialized on the INIT A page or defaulted from the database.
[3L] ECON	ECON is the optimum speed, considering time and fuel cost ratio for the active flight plan, weather data, cruise flight level, and aircraft gross weight. Speed limits and speed constraints, if any, may prevent the aircraft from flying at the ECON speed. The system switches from airspeed to Mach number automatically at the SPD/MACH crossover altitude.
[4L] SPD or SPD/MACH or blank	If climb phase is not active: The pilot can enter a preselected speed. If climb phase is active: This field displays the selected or preselected SPD or MACH target. The pilot cannot modify it directly in this field, but can adjust it with the SPD/MACH selection knob on the FCU. Pushing in the FCU SPD/MACH selection knob to revert to managed speed, the system selects (or reselects) ECON SPD/MACH and [4L] is blank.

Note: *When the CLB phase is not yet active, a * symbol appears next to the selectable speed. It allows the flight crew to preselect a specific speed, either ECON, or a manually-entered speed, as the initial CLB speed target.*

Example:

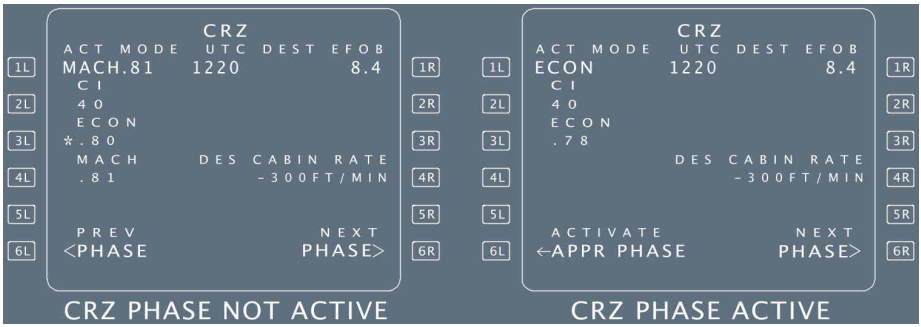
*ECON *250 SPD 210*	*The preselected active speed target is 210 kt (no asterisk). Pressing the [3L] key selects the ECON speed.*

[5L] Blank or EXPEDITE	This field is blank, as long as the aircraft is in preflight. This field displays this legend, when the takeoff or CLB phase is active. The flight crew cannot engage EXPEDITE from this field. It indicates the time and distance required to reach the altitude displayed in the [2R] field, in case of climb at green dot.
[6L] PREV PHASE or [6L] ACTIVATE APPR PHASE	1. This field displays this legend, if the climb phase is not active. The flight crew presses this key to call up the takeoff page. 2. The field displays this legend, if the climb phase is active. Pressing this key once displays “CONFIRM APPR PHASE*”. Pressing it again activates the approach phase.

[1R] TIME/UTC, DEST EFOB	Before takeoff, this field displays the flight time to destination and the predicted remaining fuel on board. After takeoff, it displays the predicted arrival time at destination (UTC) and the remaining fuel on board. If the flight crew enters an estimated takeoff time, the field displays automatically the predicted arrival time (UTC) at destination.
[2R] PRED TO...	This field displays the target altitude for the predictions shown in 3R, 4R, or 5L. - Defaults to the FCU altitude - Modifiable to any altitude below CRZ FL.
[3R] or [4R]	These fields show predictions for the target altitude selected in [2R] for the current vertical mode and target speed. [3R] field: ECON speed predictions [4R] field: Manually-selected SPD predictions Fields [3R] and [4R] are only displayed, while the takeoff or climb phase is active.
[6R] NEXT PHASE	The flight crew presses this key to call up the cruise page.

PERF CRUISE PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



TITLE	CRZ in white large font, when cruise phase is not active, in green large font, when it is.
[1L] ACT MODE	This field shows the active speed/Mach target (ECON, MACH or SPD XXX). The pilot cannot modify it from this field.

[2L] CI — This field shows the cost index as initialized on the INIT A page or defaulted from the data base, or as inserted in this field by the crew.

[3L] ECON — ECON is the optimum speed or Mach, in terms of time and fuel cost ratio, related to the active flight plan, weather, cruise flight level, and gross weight.

[4L] SPD/MACH or Blank — If the cruise phase is not active:
The pilot can enter a preselected speed or Mach number.
If the cruise phase is active:
This field is blank.

Note: *When the cruise phase is not active, a * symbol appears beside the selectable speed (or Mach).*
It allows the flight crew to preselect a Mach (or Speed), either the ECON value or a value entered manually.

Example:

- *ECON [3L] * 0.80 MACH [4L] .0.78* — *The preselected active Mach target is 0.78 (no star). Pressing the [3L] key selects the ECON Mach*

[6L] PREV PHASE or — The flight crew can press this key to call up the climb page, if the cruise phase is not yet active.

[6L] ACTIVATE APPR PHASE — This field displays this legend if the cruise phase is active. The flight crew presses the key once to change the legend to “CONFIRM APPR PHASE*”.
A second press activates the approach phase.

Note: *If the flight crew activates the approach phase inadvertently, it can reselect the cruise flight level into the progress page to reactivate the cruise phase.*

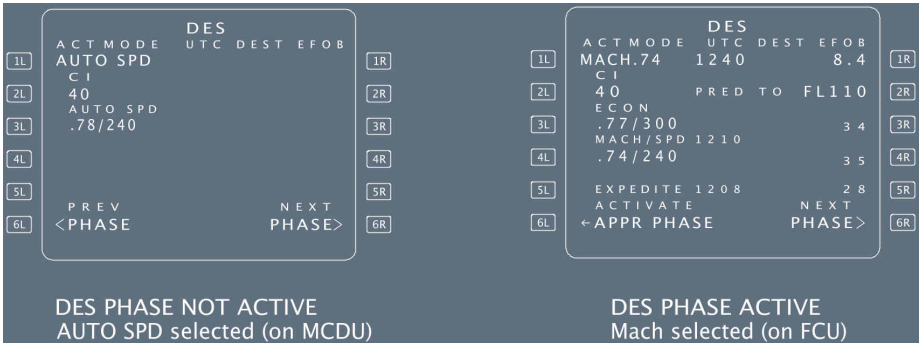
[1R] TIME/UTC DEST EFOB — Before takeoff this field displays the flight time to destination and the predicted remaining fuel on board. If the crew enters an estimated takeoff time, the field displays automatically the predicted arrival time (UTC) at destination. After takeoff it displays the predicted arrival time at destination (UTC) and the remaining fuel on board.

[4R] CAB RATE — This field displays the defaulted value of the cabin altitude descent rate used for computing the descent path and if necessary deletes a repressurization segment.
The flight crew may modify the value.
A clear action reverts to the default value. CAB RATE being a negative value, “minus” is not a necessary entry.

[6R] NEXT PHASE	This key calls up the descent page.

PERF DESCENT PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



TITLE	DES in a white large font when the descent phase is not active and in a green large font, when it is active.
[1L] ACT MODE	This field displays the active speed target (ECON, AUTO SPD, SPD XXX or MACH. XX, EXPEDITE). The flight crew cannot modify it through this field.
[2L] CI	This field displays the cost index, as initialized on the INIT A page or defaulted from the data base, or inserted in this field by the flight crew. The flight crew cannot modify it when the descent phase is active.

[3L] ECON/AUTO SPD	If the descent phase is not active: This field displays "ECON"in blue, along with the associated economy descent Mach or speed, also in blue, before the flight crew makes any entry. The crew may overwrite the ECON DES MACH/SPD by entering a Mach number or a speed in this field. The title then reverts to "AUTO SPD". To compute the top of descent and descent path, the system uses a descent speed profile that is either ECON MACH/SPD or AUTO MACH/SPD, plus SPD CSTR, SPD LIM, GD etc... *Note: Auto MACH/SPD is a selected value entered by the crew but it will be used as a managed MACH/SPEED to compute and fly the descent profile when the speed target is managed.* If the descent phase is active: The flight crew cannot make an entry in this field. The display shows ECON (upper line), .XX/XXX (lower line) or AUTO SPD (upper line), .XX/XXX (lower line).
[4L] MACH/SPD	If the descent phase is not active, this field is blank. If descent phase is active: This field displays the speed or Mach target when the flight has selected a Mach or a speed manually. The system then displays the speed or Mach target in the speed window of the flight control unit (FCU) and in the [1L] field. The flight crew cannot modify the value in this field. The pilot can adjust it with the SPD/MACH selector knob on the FCU when the speed/Mach has been selected manually. Pushing in the FCU speed selector knob activates the managed SPD/MACH target, which is either ECON or AUTO SPD. [4L] is then blank.
[5L] EXPEDITE ⋘ or BLANK	This field displays this legend if the descent phase is active. The flight crew cannot select the expedite mode through this field. The field is blank as long as the descent phase is not active.
[6L] PREV PHASE or ACTIVATE APPR PHASE	This key calls up the cruise phase page if the descent phase is not yet active. This field displays this legend if the descent phase is active. If the flight crew presses the key once, "CONFIRM APPR PHASE*" appears. Pressing it a second time activates the approach phase.

[1R] TIME/UTC DEST EFOB — Before takeoff, this field displays the flight time to destination and the predicted remaining fuel on board. If the crew enters an estimated takeoff time, the field displays automatically the predicted arrival time (UTC) at destination.
After takeoff, it displays the predicted arrival time at destination (UTC) and the remaining fuel on board.

[2R] PRED TO... — This field displays the target altitude for the predictions in [3R] [4R], or [5R].
The display defaults to the altitude selected on the FCU. The flight crew can modify it to any altitude lower than present altitude.

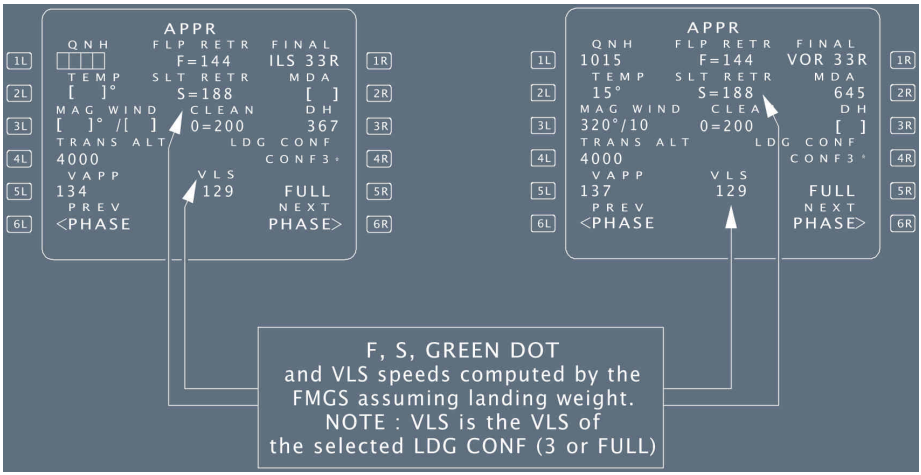
[3R] or [4R] — These fields display altitude predictions down to the target altitude selected in [2R], computed for the current vertical mode (DES or OP DES, EXPEDITE) and the indicated target speed.
The [3R] field shows predictions for the ECON or AUTO SPD/MACH profile.
The [4R] field shows predictions for a SPD/MACH selected manually.

[5R] — This field displays predictions for EXPEDITE mode.
Fields [3R] [4R] [5R] are displayed only when DES phase is active.

[6R] NEXT PHASE — Pressing this key calls up the approach page.

PERF APPR PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

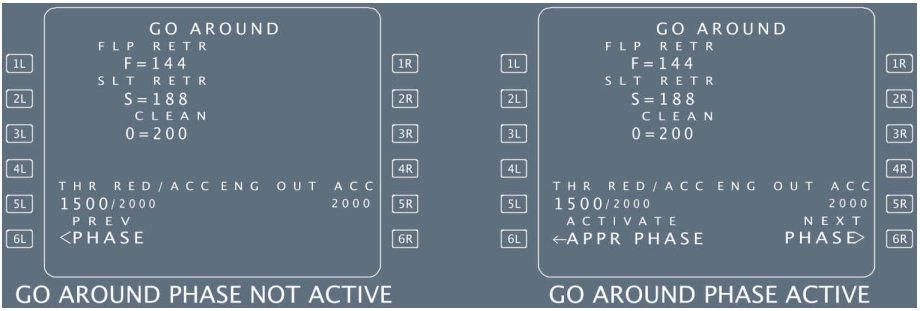


TITLE	APPR is in large white font, if the approach phase is not active; it is in large green font, if it is.
[1L] QNH	This field displays brackets, when the aircraft is more than 180 nm from the destination. Inside 180 nm , a mandatory amber box appears. The flight crew must enter the QNH in HPA or in inches of mercury. - For HPA, enter three or four digits - For inches of mercury: • Enter two digits, or • Enter two digits followed by a decimal point and two additional digits. The system interprets: - 1 003 as 1 003 hPa - 29 as 29.00 inHg - 29.92 as 29.92 inHg. Note: *An erroneous entry of an OAT in QNH field, for example 22 °C, or a higher value, is accepted by the system.* The flight crew can modify this entry at any time. The Cabin Pressure Controller (CPC) uses the QNH to compute the cabin repressurization segment. Therefore, an erroneous QNH entry may result in a cabin pressurization that is not appropriate.
[2L] TEMP	This field displays the temperature at destination. The field displays brackets until the pilot enters the temperature. The pilot can modify this figure. The system uses this temperature to refine its computation of the descent profile (ISA model).
[3L] MAG WIND	The pilot enters the magnetic wind in knots at the destination in this field. The system transmits any entry made in this field to the vertical revision and flight plan B pages (which display wind direction as true, not magnetic).
[4L] TRANS ALT	This field displays the transition altitude taken from the data base (small font) or entered by the pilot (large font). The pilot can modify it at any time.

[5L] VAPP	The FMGC computes this approach speed, using the formula: VAPP = VLS + 1/3 of the headwind components (limited to VLS +5 as a minimum and VLS +15 as a maximum). The flight crew can modify VAPP. A clear action reverts VAPP to the computed value. Note: *VLS = 1.23 VS1G of the selected landing configuration (full or 3).*
[6L] PREV PAGE	This field displays this legend if the approach phase is not active. Pressing this key calls up the descent performance page.
[1R] FINAL	This field displays the approach specified in the flight plan. The pilot cannot modify it through this field.
[2R] MDA or MDH	This field displays the minimum descent altitude (or minimum descent height if the QFE pin program is activated), with associated brackets. The pilot inserts the value, which it can modify at any time. If the flight crew makes an entry in [3R] or changes the approach, it clears this figure.
[3R] DH	If If the flight plan includes an ILS approach, this field displays “DH”and empty brackets. The pilot inserts the decision height. The system will accept an entry of “NO”. If the flight crew inserts an MDA or an MDH, this erases the decision height, and this field reverts to brackets. The DH range is from 0 to 700 ft.
[4R] LDG CONF CONF 3	The flight crew can select configuration 3 by pressing the 4R key. This moves the * down to the [5R] field, that displays “FULL”.
[5R] FULL	The pilot can use this key to select configuration FULL when necessary. Configuration FULL is the default landing configuration.
[6R] NEXT PHASE	Pressing this key calls up the PERF GO AROUND page.

PERF GO AROUND PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



TITLE	GO AROUND in a white large font if the go-around phase is not active, in a green large font if it is.
[5L] THR RED ACC	This field displays the thrust reduction altitude and the acceleration altitude. Thrust reduction altitude - Altitude at which thrust must be reduced from takeoff/go-around thrust to maximum climb thrust - "CLB"or "LVR CLB"flashing on flight mode annunciator - Defaults to 1 500 ft above destination runway elevation - Can be modified by the crew (minimum 400 ft above destination runway elevation). Acceleration altitude - Altitude at which target speed jumps to green-dot speed (see the note below) - Defaults to 1 500 ft above destination runway elevation - Can be modified by the crew but always equal to or higher than thrust reduction altitude.
[6L] PREV PHASE or	This field displays this legend if the go-around phase is not active. Pressing the key calls up the PERF APPR page.
ACTIVATE APPR PHASE	This field displays this legend if the go-around phase is active. Pressing it once makes "CONFIRM APPR"appear. A second press activates the approach phase.
[5R] ENG OUT ACC	This display has the same characteristics as the display beside the 5R key on the takeoff page. It is for display only, and the pilot can modify it.

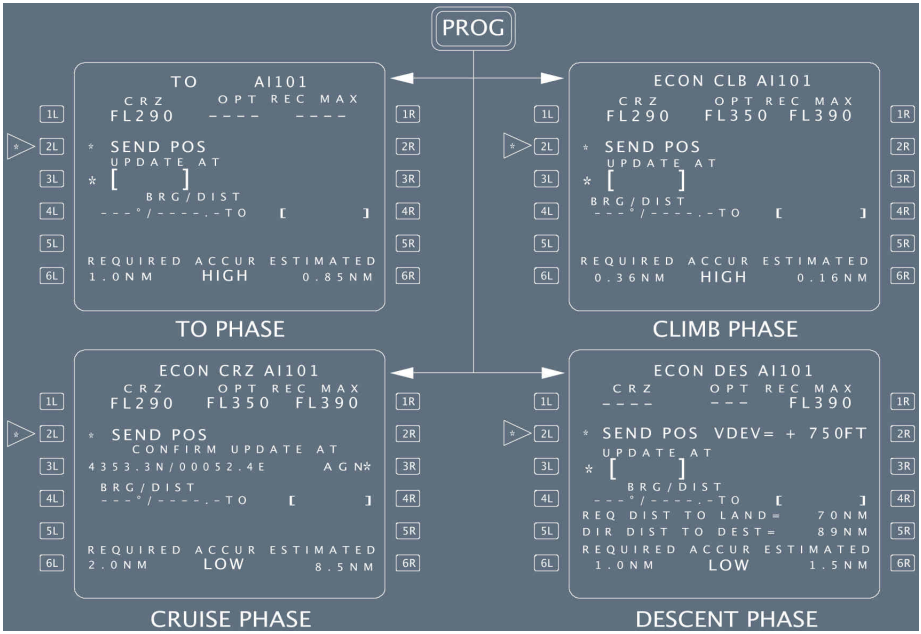
[6R] NEXT PHASE — Pressing this key calls up the PERF APPR page.

Note: *When the go-around phase is active, if the pilot enables ALTN or if the pilot inserts a new destination in the active flight plan and a new cruise flight level on the progress page, the go-around phase shifts automatically into the climb phase. (The target speed jumps from green dot speed to initial climb speed).*

PROG PAGES

Applicable to: B-HSD, B-HSE

The progress page is a multifunction page that allows the pilot to:
- Select a new cruise flight level
- Crosscheck the Flight Management (FM) system's navigation accuracy, and validate it
- Update the FM position
- Monitor the descent.



TITLE — Different for each flight phase (see above diagrams). The vertical phase is in large green font. The flight number is in large white font. The EO is in large amber font, if the engine-out condition is detected.

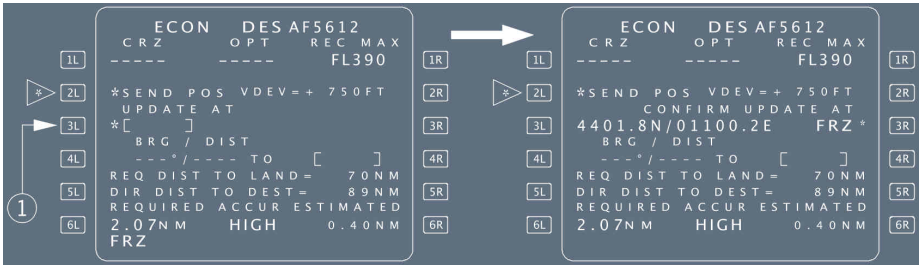
Line 1 CRZ (blue)	This line shows the cruise flight level inserted on the INIT A page, or directly in this field, in blue. If the flight crew uses the FCU to select an altitude that is higher than that displayed in this field, the system changes the displayed number to match the value selected via the FCU. The flight crew cannot insert a flight level that is lower than the FCU-selected altitude. This field displays dashes, when the descent or approach phase is active.
OPT	This field displays the optimum flight level (in green), that is computed based on the current gross weight, cost index and temperature. It displays dashes: - In cruise, when the aircraft is less than 15 nm from the Top of Descent - If an engine-out is detected.
REC MAX	This field displays the recommended maximum altitude (in magenta), that is computed based on the current gross weight and temperature, and assuming that the anti-ice is off (Refer to QRH graphs, if icing conditions are expected). It provides the aircraft with a 0.3 g buffet margin, a minimum rate of climb at MAX CL thrust, and level flight at MAX CRZ thrust. This field is limited to FL 391. If one engine is out, this field displays the recommended maximum engine-out altitude, that is computed based on the long-range cruise speed and assuming that anti-ice is off.
[2R] VDEV	This field is displayed during the descent and approach phases, when NAV mode is engaged, or in HDG mode, provided that the crosstrack error (XTK) is less than 5 nm. It displays the vertical deviation between the aircraft's current altitude and the FMS-computed vertical profile.



Line 3 UPDATE AT

The flight crew can update the FMS position via this field by entering either the ident of a waypoint, a NAVAID, an airport, a latitude and longitude (L/L), a place/bearing/distance (PBD), or a place-bearing/place-bearing (PBX).
When the flight crew has entered this data, this field changes its format to: "CONFIRM UPDATE AT", followed by the latitude/longitude and ident of the inserted position with an asterisk.
The flight crew presses the right-hand key adjacent to the asterisk to confirm the update, when the aircraft overflies the inserted position.

Note: *If no ident has been inserted, the field displays "ENTRY", instead of an ident.*

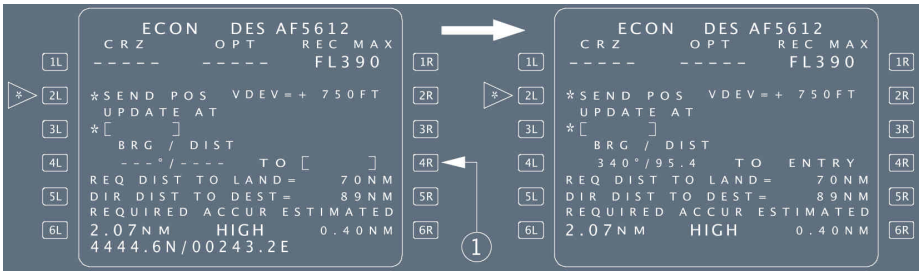


Line 4 BRG/DIST

The pilot can enter an airport, a waypoint, a NAVAID, or a runway on this line. The pilot may enter each as an ident, a latitude/longitude (L/L), a place/bearing/distance (PBD), or a place-bearing/place-bearing (PBX). The field then shows the FMGC-computed bearing and the distance of this site from the aircraft's present position. If it does not have an ident, the point is called "ENTRY".

Example:

BRG/DIST
340 °/95.4 to ENTRY

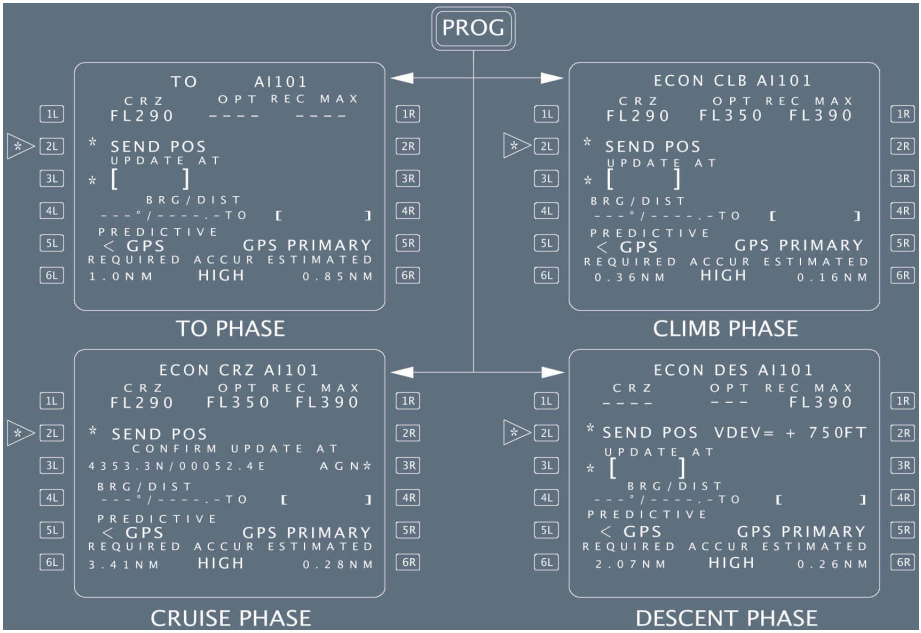


Line 5 REQUIRED DISTANCE TO LAND DIRECT DISTANCE TO DESTINATION	These lines display these distances, when the descent phase is active and NAV mode is not engaged. The required distance to land is the distance for the aircraft to descend from its present level at its current speed, down to the destination elevation at VAPP, taking into account the current speed, speed limit, and VAPP in the vertical flight plan.
[6L] REQUIRED	REQUIRED - ACCUR - ESTIMATED This field displays the default value for the required navigation accuracy level, and it can be modified by the flight crew. Provided no pilot entry has been made, the default value changes according to the actual flight area. (*Refer to DSC-22_20-20-20 Navigation Accuracy Check*).
ACCUR HIGH/LOW	This field shows the Flight Management (FM) system's estimate of navigational accuracy. "HIGH" indicates that the FMS estimates that the navigational accuracy matches the accuracy criteria of the area currently flown. "LOW" indicates that the criteria is not matched.
[6R] ESTIMATED	This field displays the current estimated navigation accuracy value (EPE), as computed by the FMS.

PROG PAGES

Applicable to: B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The progress page is a multifunction page that allows the pilot to:
- Select a new cruise flight level
- Crosscheck the Flight Management (FM) system's navigation accuracy, and validate it
- Update the FM position
- Monitor the descent.



TITLE	Different for each flight phase (see above diagrams). The vertical phase is in large green font. The flight number is in large white font. The EO is in large amber font, if the engine-out condition is detected.
Line 1 CRZ (blue)	This line shows the cruise flight level inserted on the INIT A page, or directly in this field, in blue. If the flight crew uses the FCU to select an altitude that is higher than that displayed in this field, the system changes the displayed number to match the value selected via the FCU. The flight crew cannot insert a flight level that is lower than the FCU-selected altitude. This field displays dashes, when the descent or approach phase is active.
OPT	This field displays the optimum flight level (in green), that is computed based on the current gross weight, cost index and temperature. It displays dashes: - In cruise, when the aircraft is less than 15 nm from the Top of Descent - If an engine-out is detected.

REC MAX

This field displays the recommended maximum altitude (in magenta), that is computed based on the current gross weight and temperature, and assuming that the anti-ice is off (Refer to QRH graphs, if icing conditions are expected). It provides the aircraft with a 0.3 g buffet margin, a minimum rate of climb at MAX CL thrust, and level flight at MAX CRZ thrust. This field is limited to FL 391.
If one engine is out, this field displays the recommended maximum engine-out altitude, that is computed based on the long-range cruise speed and assuming that anti-ice is off.

[2L] SEND POS (blue)

The flight crew may send a position report by pressing the key adjacent to this field. The report will include ETA at the "TO" waypoint and the NEXT waypoint.

[2R] VDEV

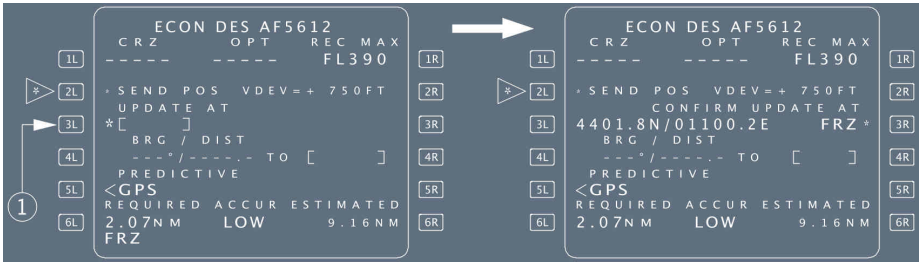
This field is displayed during the descent and approach phases, when NAV mode is engaged, or in HDG mode, provided that the crosstrack error (XTK) is less than 5 nm. It displays the vertical deviation between the aircraft's current altitude and the FMS-computed vertical profile.



Line 3 UPDATE AT

The flight crew can update the FMS position via this field by entering either the ident of a waypoint, a NAVAID, an airport, a latitude and longitude (L/L), a place/bearing/distance (PBD), or a place-bearing/place-bearing (PBX).
When the flight crew has entered this data, this field changes its format to: "CONFIRM UPDATE AT", followed by the latitude/longitude and ident of the inserted position with an asterisk.
The flight crew presses the right-hand key adjacent to the asterisk to confirm the update, when the aircraft overflies the inserted position.

Note: *If no ident has been inserted, the field displays "ENTRY", instead of an ident.*



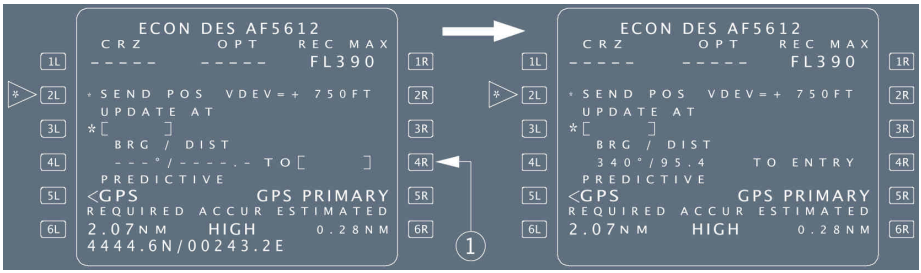
Line 4 BRG/DIST

The pilot can enter an airport, a waypoint, a NAVAID, or a runway on this line. The pilot may enter each as an ident, a latitude/longitude (L/L), a place/bearing/distance (PBD), or a place-bearing/place-bearing (PBX). The field then shows the FMGC-computed bearing and the distance of this site from the aircraft's present position. The last distance digit is in 1/10 of a NM. If it does not have an ident, the point is called "ENTRY".

Example:

BRG/DIST

340 °/95.4 to ENTRY



[5L] PREDICTIVE GPS

This prompt gives access to the PREDICTIVE GPS page.

[5R] GPS PRIMARY

This prompt is displayed, when the FMS navigation mode is GPS PRIMARY. When GPS PRIMARY is not available, or the navigation mode is not GPS/IRS, this field is blank.

The scratchpad displays the relevant "GPS PRIMARY" message, when this prompt appears; and, "GPS PRIMARY LOST", when the field turns to blank.

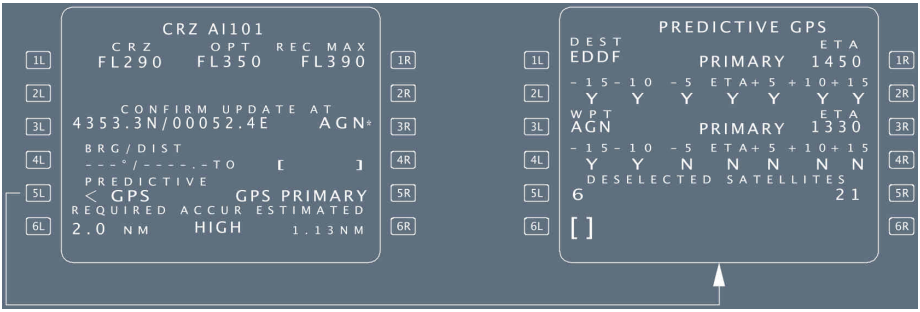
[6L] REQUIRED	REQUIRED - ACCUR - ESTIMATED This field displays the default value for the required navigation accuracy level, and it can be modified by the flight crew. Provided no pilot entry has been made, the default value changes according to the actual flight area. (*Refer to DSC-22_20-20-20 Navigation Accuracy Check*).
ACCUR HIGH/LOW	This field shows the Flight Management (FM) system's estimate of navigational accuracy. "HIGH" indicates that the FMS estimates that the navigational accuracy matches the accuracy criteria of the area currently flown. "LOW" indicates that the criteria is not matched.
[6R] ESTIMATED	This field displays the current estimated navigation accuracy value (EPE), as computed by the FMS.

PREDICTIVE GPS PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

Note: *This page is only operative with Honeywell GPS. With GPS Litton, all fields are blank.*

The pilot accesses this page by pressing the PREDICTIVE GPS prompt of the PROG page. This page displays information relative to predictive availability of GPS PRIMARY at destination, and at any waypoint selected by the crew.



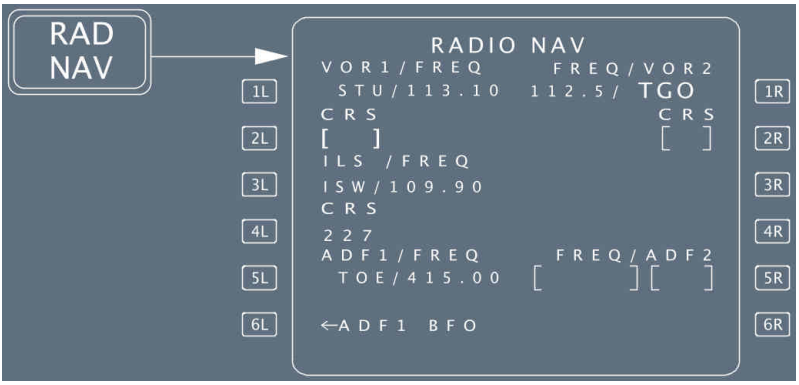
[1L] DEST	:	Destination airport, as currently selected in the active flight plan. It is not modifiable. This field displays dashes when no destination airport exists.
[1R] ETA	:	This field is defaulted to the Estimated Arrival Time, as computed by the FMS (small blue font). The pilot may enter a value in this field (large blue font). Amber boxes are displayed, when no prediction exists, or the crew entry has been cleared.

Line 2 PRIMARY Y/N	:	Predicted primary status at destination airport, at the following times: Estimated Time of Arrival ±5, 10, 15 min. Availability of GPS PRIMARY at the corresponding time is indicated by Y, when PRIMARY is predicted to be available; and, by N, when GPS PRIMARY is predicted not to be available. These fields are blanked when the destination [1L] field, or the time [1R] field is not defined.
[3L] WPT	:	The pilot may enter a reference waypoint in this field. Blue brackets are displayed when no entry has been made.
[3R] ETA	:	When a reference waypoint has been entered in [3L], amber boxes are displayed. The crew is requested to enter a reference time in this field.
Line 4 PRIMARY Y/N	:	Equivalent information to [2L]/[2R] displayed for any pilot selected waypoint. Corresponding time of arrival is also displayed.
Line 5 DESELECTED SATELLITES and Line 6 SATELLITES		Allow the pilot to deselect up to four satellites by inserting the corresponding satellite number, the number is then displayed in blue large font. When deactivated, the satellites are not considered for predictive GPS availability at destination or at selected waypoint. The deselection is cancelled when the entry is cleared (blue brackets are displayed) or the field is overwritten by a different satellite number.

RADIO NAV PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This page allows the pilot to select or verify the radio navaids tuned for display purposes only.
Among these navaids are VOR, VOR/DME, TAC, VORTAC, ILS, and ADF.
If either RMP is set on NAV, this page is blanked on both MCDUs.



Line 1 VOR1/FREQ FREQ/VOR2	This line displays the identifiers and frequencies of VOR1 and VOR2, whether they are autotuned or tuned manually. To tune one VOR manually, the pilot inserts the ident or frequency. If the ident is not in the database, the new navaid page comes up. A “clear” action reverts the selection to the autotuned navaid.
Line 2 CRS	This line displays courses for the navaids in Line 1. The pilot can enter the courses manually through these fields.
[3L] ILS/FREQ	This field displays the ident and frequency of an ILS. It is autotuned if this ILS is associated with the departure runway, or if the flight plan shows an ILS approach selected for the destination. The ILS may also be entered manually. When the manually entered ILS differs from the ILS that would be autotuned, “RWY-ILS MISMATCH” appears.
[4L] CRS	This field displays the course associated with the ILS in line 3. It comes up automatically when an ILS is autotuned or if an ILS has been manually tuned via its ident. Otherwise the course must be entered manually.
Line 5 ADF1/FREQ FREQ/ADF2	This line displays the identifiers and frequencies of ADFs 1 and 2. The pilot can use the ident or the frequency to tune the ADF manually. If he uses the frequency, he must always include a decimal point (as 370.).
Line 6 ADF1/BFO BFO/ADF2	When an ADF is selected, these fields display an ADF/BFO prompt. The flight crew presses the key once to erase the arrow and put the ADF in BFO mode. A clear action brings the arrow back and cancels BFO.

Note:
- *The autotune function works only for navaids stored in the data base*
- *When tuning manually, the operator should use the ident rather than the frequency unless the navaid is not in the data base*
- *Manually tuned frequencies are displayed in a large font*
- *Second ADF is optional.*

SECONDARY PAGES

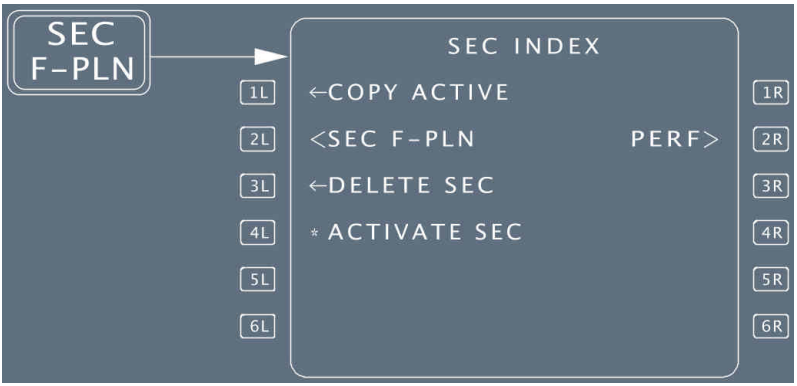
Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

GENERAL

The SEC F-PLN key on the MCDU console allows the pilot to call up the secondary index page and the secondary flight plan page. The secondary flight plan is generally for a diversion, for predictable runway changes for takeoff or landing, or for training.
There are two types of secondary index pages. The type selected depends on the presence of a secondary flight plan.

SECONDARY INDEX PAGE

A SECONDARY FLIGHT PLAN IS ALREADY DEFINED



[1L] COPY ACTIVE (blue) — The pilot presses this key to copy the active flight plan into the secondary flight plan and erase the previous secondary plan.

[2L] SEC F-PLN (white) — The pilot presses this key to call up the secondary flight plan pages.

[3L] DELETE SEC (blue) — The pilot presses this key to delete the current secondary flight plan.

[4L] ACTIVATE SEC (amber) — The pilot presses this key to activate the secondary flight plan as the active flight plan.

Note: *"ACTIVATE SEC"appears routinely if the HDG/TRK mode is active. If the NAV mode is active, "ACTIVATE SEC"appears only if the active and secondary flight plans have a common active leg.*

[1R] INIT — This field displays this prompt when the secondary flight plan is not defined as a copy of the active flight plan. Pressing this key calls up the secondary INIT page.

[2R] PERF (white) — The pilot presses this key to call up the performance pages for the secondary flight plan.
When the active flight plan has been copied, the field displays this prompt only if the first lateral leg of the secondary flight plan is identical to the active leg of the primary flight plan.

A SECONDARY FLIGHT PLAN IS NOT DEFINED



[1L] COPY ACTIVE (blue)	The pilot presses this key to copy the primary active flight plan into the secondary flight plan.
[2L] SEC F-PLN (white)	The pilot presses this key to call up the secondary flight plan pages.
[1R] INIT (white)	The pilot presses this key to call up the secondary INIT page. It is similar to the active INIT page, but blue brackets replace all the amber boxes

SECONDARY FLIGHT PLAN PAGES

The secondary flight plan A and B pages are identical to those for the active flight plan, but are automatically sequenced, only when the secondary is copied from the primary and their active legs are identical.
Active and secondary flight plans page differ from each other, as follows:

Secondary Lateral Revision Pages

- "ERASE" and "INSERT" are not displayed
- OFFSET is not available.

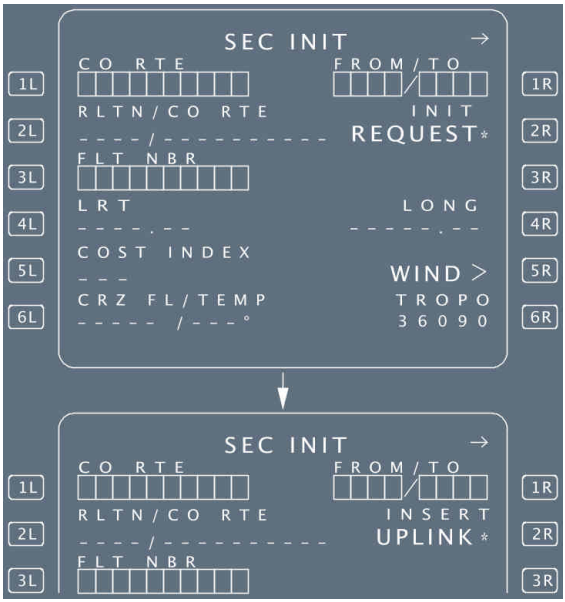
Secondary INIT A and B Pages

- They use blue brackets, instead of amber boxes
- They have no align prompt
- They do not provide for slewing or entering data in the 4L-4R fields (airport reference)
- They have no history wind page
- They have no temporary flight plan pages.

Predictions become available, as soon as the FGMS receives data relevant to the secondary flight plan.

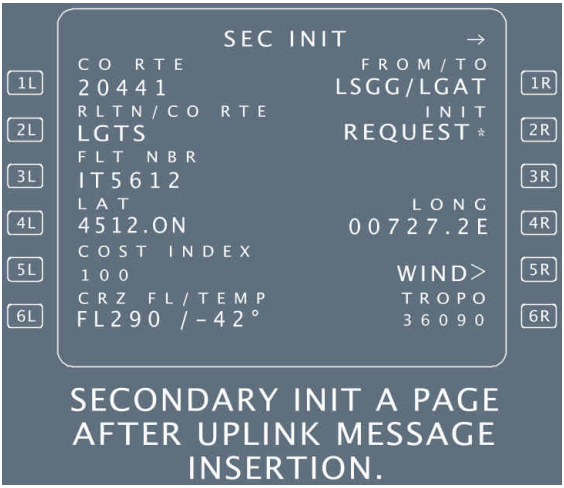
Secondary INIT A page is also used to request or display an uplink INIT message received after engine start

This uplink INIT message can be cleared or inserted as SECONDARY INIT data.



[2R] INIT REQUEST* Enable to request init data from the ground or,

[2R] INSERT UPLINK* A downlink message has been received following a request. The message can be cleared or entered in the SEC INIT page.



SECONDARY INIT A PAGE AFTER UPLINK MESSAGE INSERTION.

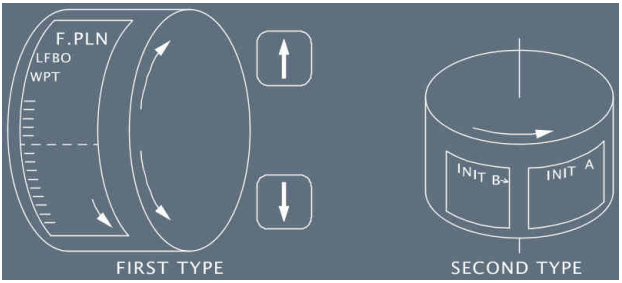
Intentionally left blank

FMS2 Honeywell

GENERAL

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The Flight Management and Guidance System (FMGS) displays information on various "pages". When a page cannot display all of the assigned information, it cues the pilot to call up additional information. There are three types of pages, and each type has its particular way of cuing the pilot to call up additional information.



FIRST TYPE

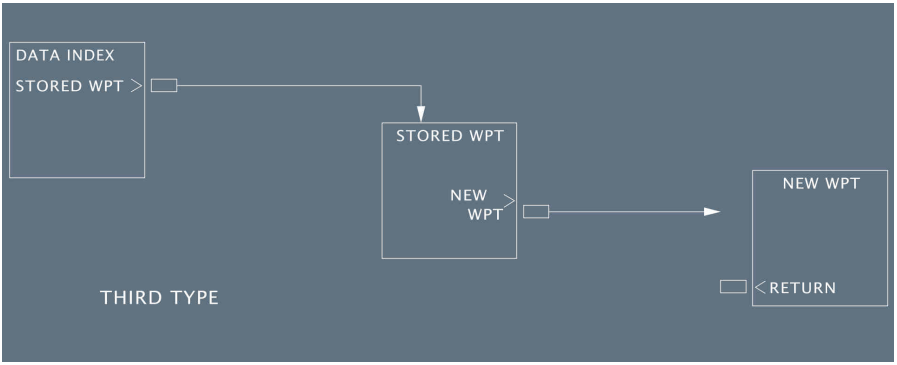
When this page cannot simultaneously display all the information on the screen (more information than the six pairs of lines can hold), the pilot can scroll the page up or down.
In this case, the screen displays a ↑ ↓ symbol in the bottom righthand corner (F-PLN pages, secondary F-PLN page, departure/arrival pages,...).

SECOND TYPE

When the information is on successive pages, the pilot presses the "NEXT PAGE" key to sequentially call up these pages.
In this case, an arrow is displayed in the top righthand corner of the screen (INIT pages).

THIRD TYPE

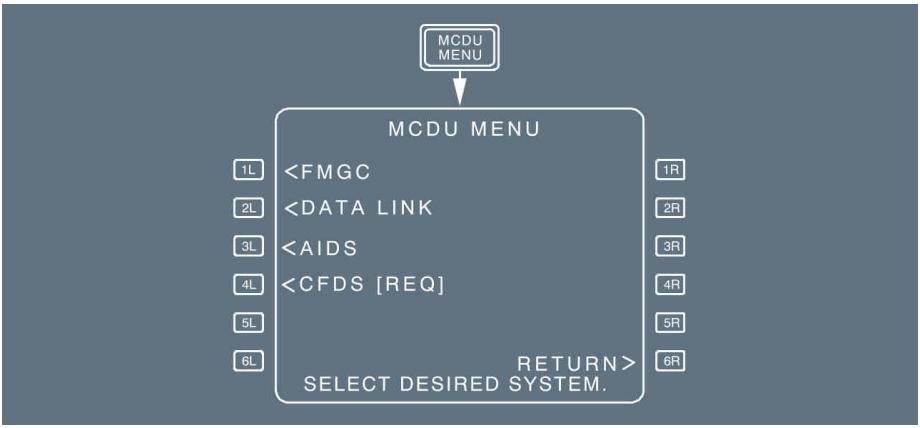
When different types of information are on successive pages, the pilot calls up these pages by pressing the key adjacent to the prompts >, < or *.



MCDU MENU PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTG, B-HTH, B-HTI

1 This page lists the various systems which the pilot can access via the MCDU.

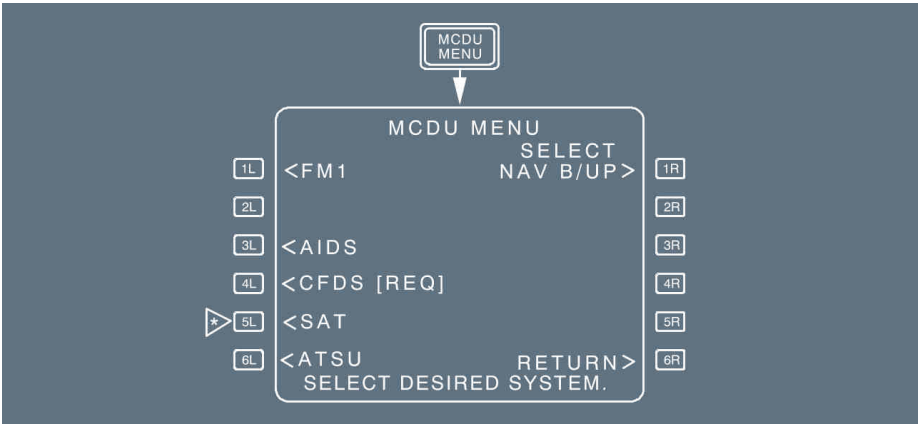


The pilot selects a system by pressing the key adjacent to the name of that system. The name of the selected system is displayed in green, all others in white.
If the MCDU cannot establish communication with the selected system, it displays “OUT”.
When a system calls for the pilot's attention, the MCDU displays “REQ” next to the system's name, and the “MCDU MENU” annunciator lights up.
When the pilot presses the key next to the name of the system requiring attention, the “MCDU MENU” annunciator light goes out.

MCDU MENU PAGE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

2 This page lists the various systems which the pilot can access via the MCDU.



The flight crew selects a system by pressing the key adjacent to the name of that system.
The name of the selected system is displayed in green, all others in white.
If the MCDU cannot establish communication with the selected system, it displays “OUT”.
When a system calls for the flight crew attention, the MCDU displays “REQ” next to the system’s name, and the “MCDU MENU” annunciator lights up.
When the flight crew presses the key next to the name of the system requiring attention, the “MCDU MENU” annunciator light goes out.

SELECT NAV B/UP — Pressing the [1R] key selects the NAV B/UP function and DESELECT NAV B/UP appears in the [1R] field.
If the NAV B/UP is inoperative, the field is blank.

RETURN — This field is displayed when a function is active

When the MCDU communicated with a system other than the FMGC, the flight crew should use the MCDU MENU page to revert to the FMGC system.

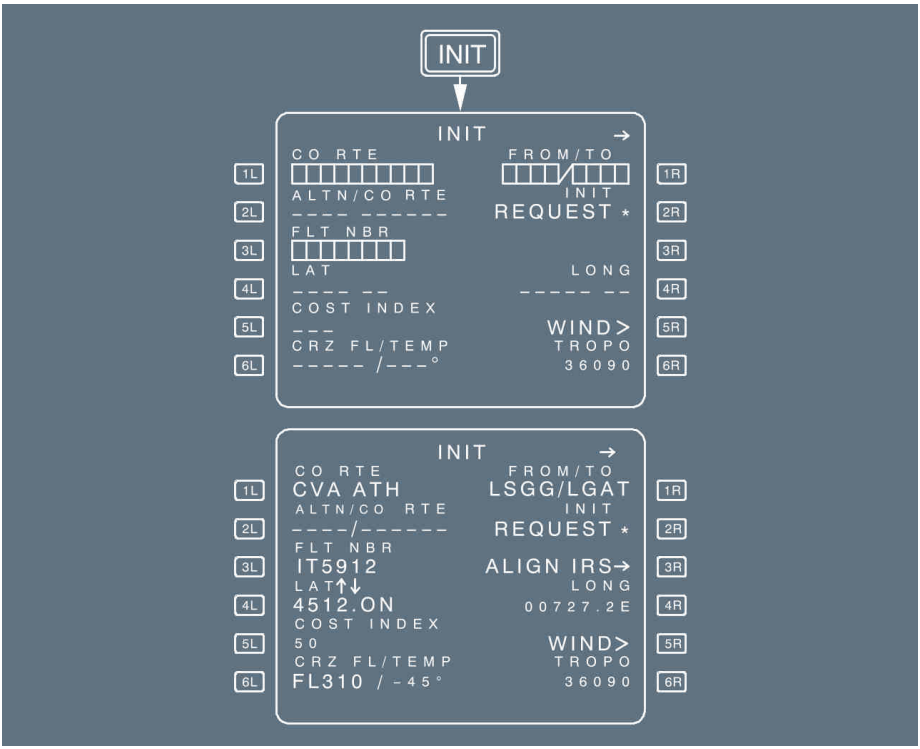
INIT A PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

3

The flight crew uses the INIT A page to initialize the flight plan and align the inertial reference system.

- The flight crew accesses to this page by pressing the INIT key on the MCDU console, but only during the preflight phase.
- The flight crew may also call up this page by:
  - Pressing the “NEXT PAGE” key on the MCDU console, while on the INIT B page, or
  - Pressing the key next to “RETURN” or “INSERT” on the route selection page, or
  - Pressing the key next to “INSERT” on the wind page.
- When in the done phase, the pilot may press the INIT key to begin the next preflight phase.



[1L] CO RTE	If the flight crew enters a company route number, the screen displays all data associated with that route (8 or 10 characters, depending on the pin program). Inserting the CO RTE into the RTE selection page also enters the CO RTE number in this field.
[2L] ALTN/CO RTE (blue)	This field is dashed, until a primary destination is entered in the 1R field. If a preferred alternate is associated with the primary destination, it is displayed in this field with the company route identification. The crew may manually enter an alternate and company route. If preferred alternate is not associated with the primary destination, NONE is displayed in this field. When the alternate route and the primary destination do not match, the MCDU scratchpad displays “DEST/ALTN MISMATCH”. If the primary destination is changed, this field is modified accordingly.
[3L] FLIGHT NUMBER	The flight number automatically appears in this field, if it is stored with the company route. The flight crew may modify it, or enter a new number here.
[4L] LAT	The latitude of the departure airport reference point appears here. The flight crew may modify it by slewing or overwriting.
[5L] COST INDEX	This is usually stored in the database along with the company route. The flight crew may modify it, or enter a new value here. It defaults to the last entered value, if a value is not stored in the database.
[6L] CRZ FL/TEMP (cruise flight level and temperature)	The cruise flight level is usually stored in the database along with the company route. If not, it has to be entered manually. If no cruise flight level is entered, the system will not furnish predictions, while the aircraft is on the ground. The flight crew has to enter the temperature at cruise flight level in order to refine the predictions. Otherwise, these are computed for ISA conditions. (If no sign is entered, the system uses a plus).



[1R] FROM/TO

This field allows the pilot to enter a city pair (ICAO codes for city of origin and destination).
This entry automatically deletes any previously entered company route and calls up the route selection page. If one airfield of the pair is not in the database, the display changes to the NEW RWY page.

[2R] INIT REQUEST

This prompt is displayed if the pilot did not enter an active flight plan or entered a flight number or a company route that is not in the aircraft database. Selecting this prompt sends the ground a request for active flight plan initialization (downlink message). When the star is not displayed, a downlink message cannot be sent.
The uplink flight plan is automatically inserted in the active flight plan, prior to engine start, provided an active flight plan does not exist.
After engine start, the uplink flight plan is sent to the secondary flight plan and manually inserted or rejected. (*Refer to DSC-22_20-70 Flight Plan Initialization Through ACARS*).

[3R] ALIGN IRS

This field displays this legend only if the LAT and LONG fields are filled in, and at least one of the inertial reference systems is in ALIGN status (IRS in NAV position and alignment process not over). If the pilot presses this key when its field is displaying this legend, the present coordinates are sent to the IRSs and this completes the alignment process.
If one of the three IRSs indicates an ALIGN FAULT occurrence, the prompt becomes REALIGN IRS.

[4R] LONG

This field displays the longitude of the departure airport reference point. The pilot may modify by slewing or overwriting.

[5R] WIND >

The pilot presses this key in order to gain access to the climb wind page, unless a temporary flight plan exists. In this case, the scratchpad displays TEMPORARY F-PLN EXISTS.

[6R] TROPO	The default tropopause altitude is 36 090 ft. The pilot can use this field to modify it (60 000 ft maximum).

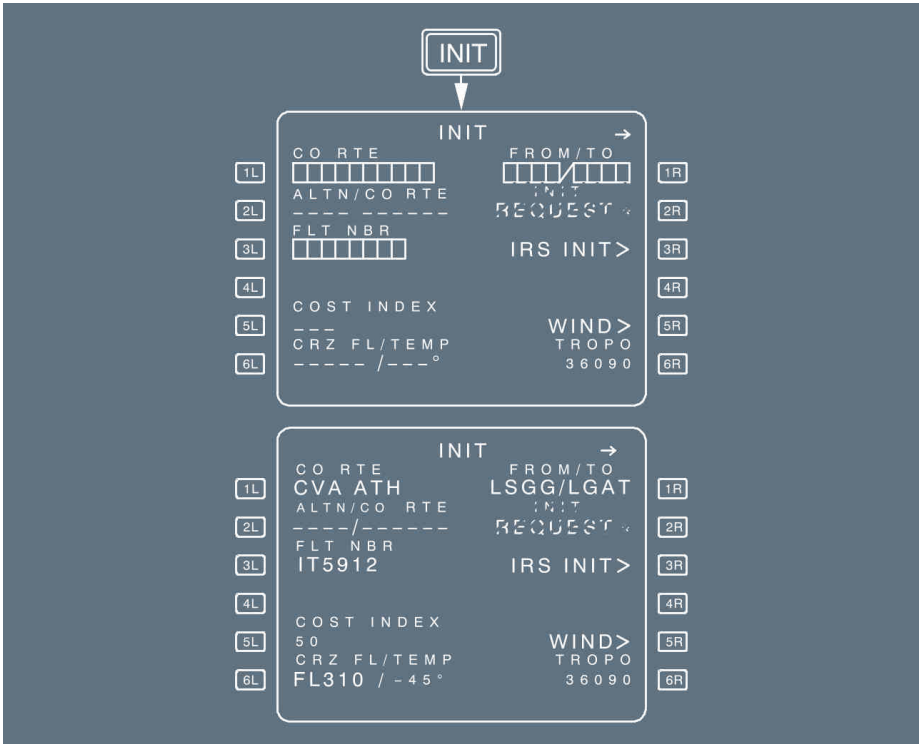
INIT A PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

4

The flight crew uses the INIT A page to initialize the flight plan and align the inertial reference system.

- The flight crew accesses to this page by pressing the INIT key on the MCDU. The INIT A page can be accessed on ground or in flight.
- The flight crew may also call up this page by:
  - Pressing the “NEXT PAGE” key on the MCDU console, while on the INIT B page, or
  - Pressing the key next to “RETURN” or “INSERT” on the route selection page, or
  - Pressing the key next to “INSERT” on the wind page.
- When in the done phase, the pilot may press the INIT key to switch to the next preflight phase.



[1L] CO RTE

If the flight crew enters a company route number, the screen displays all data associated with that route (8 or 10 characters, depending on the pin program).
Inserting the CO RTE into the RTE selection page also enters the CO RTE number in this field.

[2L] ALTN/CO RTE (blue)

This field is dashed, until a primary destination is entered in the 1R field.
If a preferred alternate is associated with the primary destination, it is displayed in this field with the company route identification. The crew may manually enter an alternate and company route.
If preferred alternate is not associated with the primary destination, NONE is displayed in this field.
When the alternate route and the primary destination do not match, the MCDU scratchpad displays “DEST/ALTN MISMATCH”.
If the primary destination is changed, this field is modified accordingly.

[3L] FLIGHT NUMBER	The flight number automatically appears in this field, if it is stored with the company route. The flight crew may modify it, or enter a new number here.
[5L] COST INDEX	This is usually stored in the database along with the company route. The flight crew may modify it, or enter a new value here. It defaults to the last entered value, if a value is not stored in the database.
[6L] CRZ FL/TEMP (cruise flight level and temperature)	The cruise flight level is usually stored in the database along with the company route. If not, it has to be entered manually. If no cruise flight level is entered, the system will not furnish predictions, while the aircraft is on the ground. The flight crew has to enter the temperature at cruise flight level in order to refine the predictions. Otherwise, these are computed for ISA conditions. (If no sign is entered, the system uses a plus).
[1R] FROM/TO	This field allows the pilot to enter a city pair (ICAO codes for city of origin and destination). This entry automatically deletes any previously entered company route and calls up the route selection page. If one airfield of the pair is not in the database, the display changes to the NEW RWY page.
[2R] INIT REQUEST	This prompt is displayed if the pilot did not enter an active flight plan or entered a flight number or a company route that is not in the aircraft database. Selecting this prompt sends the ground a request for active flight plan initialization (downlink message). When the star is not displayed, a downlink message cannot be sent. The uplink flight plan is automatically inserted in the active flight plan, prior to engine start, provided an active flight plan does not exist. After engine start, the uplink flight plan is sent to the secondary flight plan and manually inserted or rejected. (*Refer to DSC-22_20-70 Flight Plan Initialization Through ACARS*).
[3R] IRS INIT	The flight crew presses this key to access the IRS INIT page.
[5R] WIND	The pilot presses this key in order to gain access to the climb wind page, unless a temporary flight plan exists. In this case, the scratchpad displays TEMPORARY F-PLN EXISTS.
[6R] TROPO	The default tropopause altitude is 36 090 ft. The pilot can use this field to modify it (60 000 ft maximum).

ROUTE SELECTION PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

This page displays all the company routes, stored in the database, that are associated with the inserted city pair. They can be called up manually, or displayed automatically.

- Manually : The pilot presses the FROM/TO or ALTN key on the INIT A page when a city pair is displayed.
- Automatically : The system displays it, when the pilot enters a city pair, or defines an alternate on the INIT A page of the active or secondary flight plan.



TITLE	Idents for the city pair inserted on the INIT A page. (The numbers in the upper righthand corner are the total number of company routes from this city pair stored in the database).
[1L]	This field shows the name of the company route. NONE appears, if there is no company route for this city pair.
Line 2 to Line 5	These fields display the various elements of the company route: Waypoints in large green font, and airways in small white font.
[6L] RETURN	The pilot presses this key to return to the INIT A page.
[6R] INSERT	The pilot presses this key to insert the displayed company route in the flight plan, and return to the INIT A page.

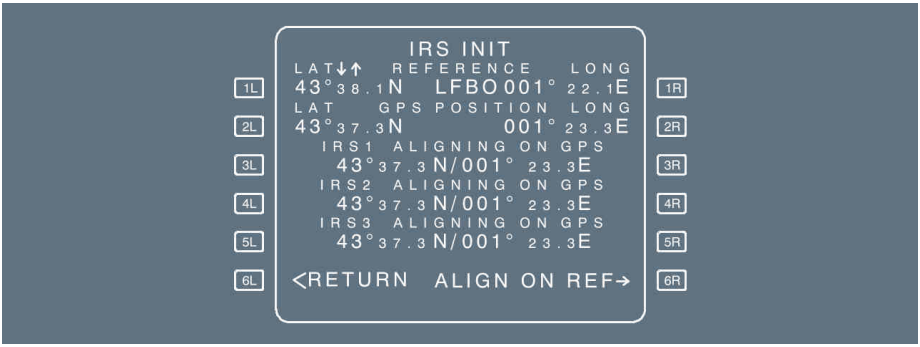
Note: The pilot can slew the display to show the rest of the route, if one page does not show it all, or to display other company routes for this city pair.

IRS INIT PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

5

The flight crew uses the IRS INIT page to align the inertial reference system. The crew accesses this page, by pressing the IRS INIT key on the INIT A page.



Line 1 LAT-REFERENCE-LONG	This line provides the latitude and longitude of the FM reference position. This reference is extracted from the navigation database. The flight crew can modify this reference. Only when the FM reference position matches the origin airport position, the airport identifier is displayed in green. Otherwise, there are dashes at the place of the airport identifier. Latitude and longitude of the FM reference position are displayed in blue. The flight crew can modify the latitude and longitude values using the scroll keys.
Line 2 LAT-GPS POSITION-LONG	This line displays the GPS position latitude and longitude.
Line 3 to 5	These lines display the IRS 1-2-3 alignment state, source and latitude/longitude. The alignment status can be ALIGNING ON XXX, or ALIGNED ON XXX or IN ATT. XXX is the alignment source and can be GPS or CDU or REF. It is displayed in white font. The latitude and longitude values are displayed in green.
[6L] RETURN	This prompt enables the flight crew to return to the INIT A page.

[6R] If a reference is available, field displays ALIGN ON REF → in blue which is replaced by CONFIRM ALIGN* in amber when 6R prompt is pressed. Pressing again the 6R prompt enables the transmission of the FM reference position displayed in line 1.

WIND PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

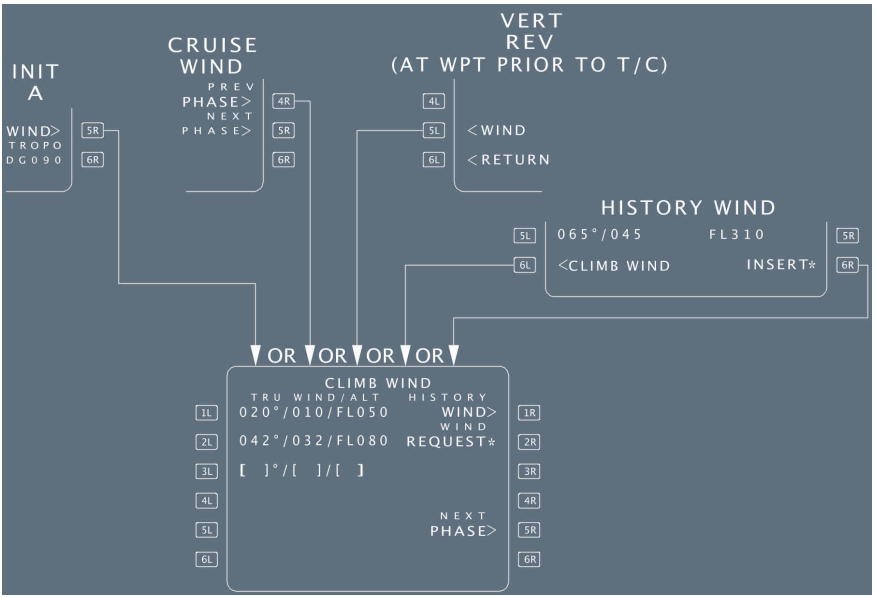
Winds in climb, cruise, descent and approach are necessary to provide the pilot with reliable predictions and performance. Wind pages enable the pilot to enter and/or review the winds propagated by the FMGS or sent by ACARS for the various flight phases.

Note: *On WIND pages, wind direction is always true-referenced.*

CLIMB WIND PAGE

This page enables the pilot to enter and/or review predicted wind vectors (direction and velocity) at up to 5 different levels.

THE CLIMB WIND PAGE IS ACCESSED FROM:



TITLE CLIMB WIND in large white font.

[1L] to [5L] TRU WIND/ALT

This field displays the winds, entered at various climb altitudes : In blue before climb phase activation, and in green after climb phase activation.
This field may also display history winds or uplink winds. Large blue brackets are displayed before any wind entry. Pilot-entered and uplinked winds are displayed in large font. History wind data is displayed in small font.
Upon sequencing the top of climb, the climb winds are deleted.

Note: *Climb winds are not deleted, when the origin airport is changed.*

[1R] HISTORY WIND

Displayed in preflight phase only. This key calls up the history wind page. This page is not modifiable (small green font), but can be inserted into the CLIMB WIND page by using the 6R key and modified accordingly.

[2R] WIND REQUEST

Pressing this key sends a request for ACARS winds. (*Refer to DSC-22_20-70 Wind Data - Request for Wind Data*).

[5R] NEXT PHASE

Pressing this key calls up the CRUISE WIND page, or the DESCENT WIND page, if no cruise waypoint exists.

HISTORY WIND PAGE



[6L] CLIMB WIND

This key reverts the display to the CLIMB WIND page.

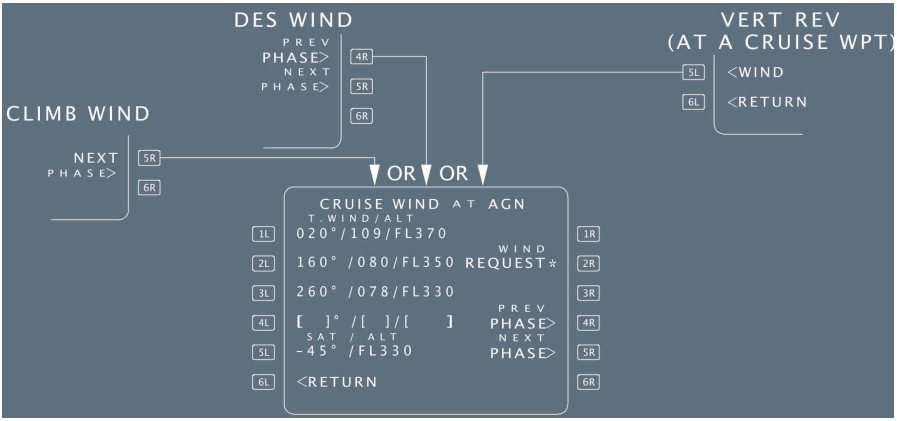
[6R] INSERT

This key inserts the history wind values into the CLIMB WIND page.

CRUISE WIND PAGE

This page displays the wind direction and velocity for each cruise waypoint.

The cruise wind page enables the definition of a temperature at a given altitude, and is accessed as follows:

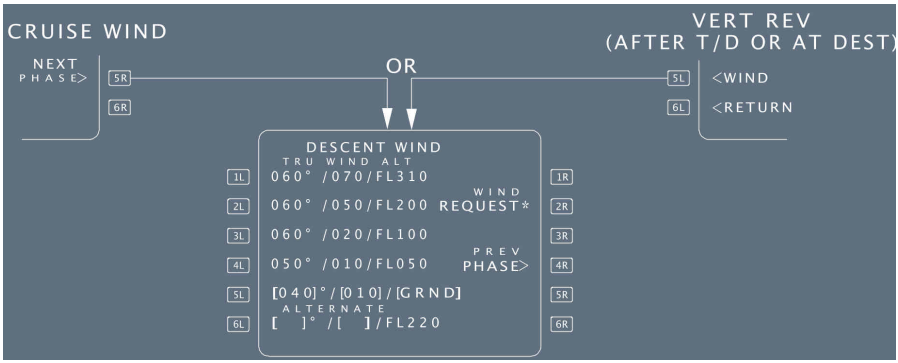


TITLE	CRUISE WIND AT in large white font.
[1L] to [4L] TRU WIND/ALT	These fields display the entered wind at various altitudes in blue. The entered winds are propagated at the same altitude to the downpath cruise waypoints, if no other winds are entered. The propagated wind direction and velocity are displayed in small fonts. Both uplinked winds and pilot-entered winds are displayed in large blue font. Wind data is modifiable during cruise.
[5L] SAT/ALT	This field allows the pilot to enter a temperature at a given flight level, or to display a propagated value. The crew must enter both temperature and altitude at the first entry. They can then independently modify the temperature, or the altitude.
[2R] WIND REQUEST	Pressing this key sends a request for ACARS winds. (*Refer to DSC-22_20-70 Wind Data - Request for Wind Data*)
[4R] PREV PHASE	This prompt is displayed in Preflight, Takeoff, Climb and Done phases. Pressing this prompt calls up the CLIMB WIND page.
[5R] NEXT PHASE	Pressing this prompt calls up the DES WIND page.

Any new entry performed on the CRUISE WIND page is immediately inserted into the corresponding flight plan. Predictions are dashed on the F-PLN pages during the recomputation time. CRUISE WIND page automatically reverts to F-PLN page, if a temporary flight plan is created or the secondary flight plan is activated.

DESCENT WIND PAGE

This page enables the pilot to define and display the winds used for computing the descent profile. The pilot calls it up by selecting NEXT PHASE on the CRUISE WIND page, or the WIND prompt on the VERT REV page.



[1L] to [5L] — This displays inserted winds or uplinked winds, in large blue fonts, prior to activating the descent phase (modifiable values), and in green after descent phase activation (not modifiable values).
An entry of “GRND”in the “ALT”field is seen as the wind at ground level. This wind is copied on the PERF APPR page (and corrected for the magnetic variation).
A clear action on one key reverts the line to blue brackets.

[6L] ALTERNATE — This field is only displayed when an alternate is defined.
The pilot-entered value or uplinked value is displayed in large blue font. It is always modifiable by the pilot.

[2R] WIND REQUEST* — Pressing this key sends a request for ACARS winds. (*Refer to DSC-22_20-70 Wind Data - Request for Wind Data*).

[4R] PREV PHASE — Pressing this key calls up the CRUISE WIND page. The field is erased after the top of descent has sequenced.

Note: *Descent winds and alternate wind are deleted, if the destination airport is changed.*

WIND PAGES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

6

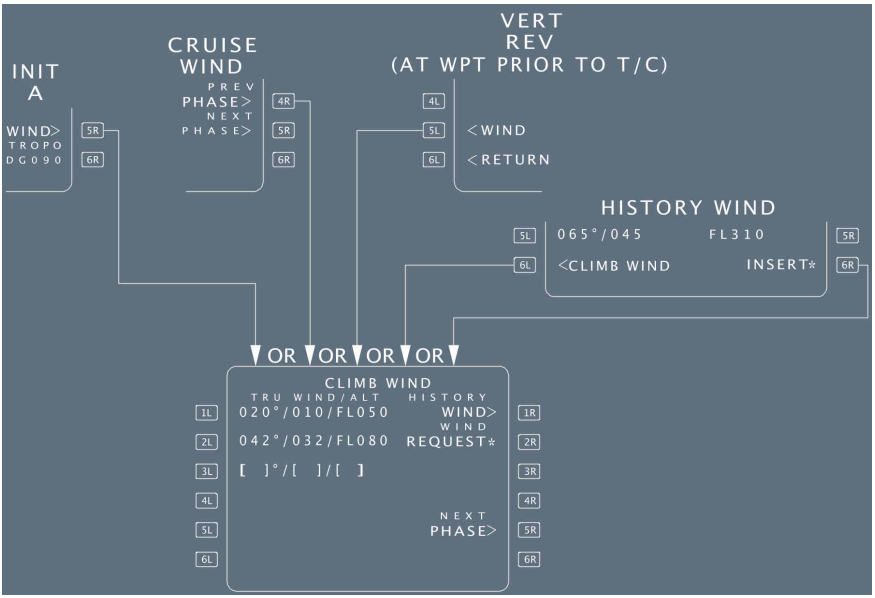
Winds in climb, cruise, descent and approach are necessary to provide the pilot with reliable predictions and performance. Wind pages enable the pilot to enter and/or review the winds propagated by the FMGS or sent by ACARS for the various flight phases.

Note: On WIND pages, wind direction is always true-referenced.

CLIMB WIND PAGE

This page enables the pilot to enter and/or review predicted wind vectors (direction and velocity) at up to 5 different levels.

THE CLIMB WIND PAGE IS ACCESSED FROM:



TITLE CLIMB WIND in large white font.

[1L] to [5L] TRU WIND/ALT

This field displays the winds, entered at various climb altitudes : In blue before climb phase activation, and in green after climb phase activation.
This field may also display history winds or uplink winds. Large blue brackets are displayed before any wind entry. Pilot-entered and uplinked winds are displayed in large font. History wind data is displayed in small font.
Upon sequencing the top of climb, the climb winds are deleted.

Note: *Climb winds are not deleted, when the origin airport is changed.*

[1R] HISTORY WIND

Displayed in preflight phase only. This key calls up the history wind page. This page is not modifiable (small green font), but can be inserted into the CLIMB WIND page by using the 6R key and modified accordingly.

[2R] WIND REQUEST

Pressing this key sends a request for ACARS winds. (*Refer to DSC-22_20-70 Wind Data - Request for Wind Data*).

[5R] NEXT PHASE

Pressing this key calls up the CRUISE WIND page, or the DESCENT WIND page, if no cruise waypoint exists.

HISTORY WIND PAGE



[6L] CLIMB WIND

This key reverts the display to the CLIMB WIND page.

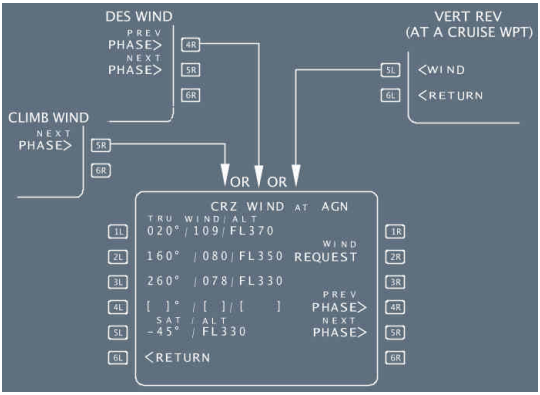
[6R] INSERT

This key inserts the history wind values into the CLIMB WIND page.

CRZ WIND PAGE

This page displays the wind direction and velocity for each cruise waypoint.

The cruise wind page enables the definition of a temperature at a given altitude, and is accessed as follows:



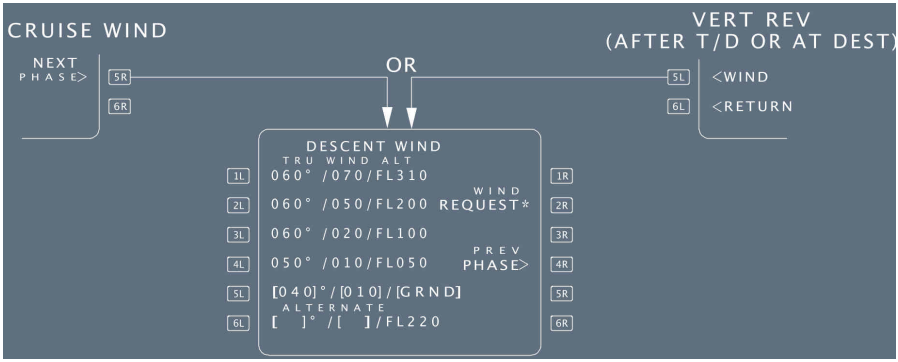
TITLE	CRZ WIND AT in large white font.
[1L] to [4L] TRU WIND/ALT	These fields display the entered wind at various altitudes in blue. The entered winds are propagated at the same altitude to the downpath cruise waypoints, if no other winds are entered. The propagated wind direction and velocity are displayed in small fonts. Both uplinked winds and pilot-entered winds are displayed in large blue font. Wind data is modifiable during cruise.
[5L] SAT/ALT	This field allows the pilot to enter a temperature at a given flight level, or to display a propagated value. The crew must enter both temperature and altitude at the first entry. They can then independently modify the temperature, or the altitude.
[2R] WIND REQUEST	Pressing this key sends a request for ACARS winds. (*Refer to DSC-22_20-70 Wind Data - Request for Wind Data*)
[4R] PREV PHASE	This prompt is displayed in Preflight, Takeoff, Climb and Done phases. Pressing this prompt calls up the CLIMB WIND page.
[5R] NEXT PHASE	Pressing this prompt calls up the DES WIND page.

Any new entry performed on the CRZ WIND page is immediately inserted into the corresponding flight plan. Predictions are dashed on the F-PLN pages during the recomputation time. CRZ WIND page automatically reverts to F-PLN page, if a temporary flight plan is created or the secondary flight plan is activated.

DESCENT WIND PAGE

This page enables the pilot to define and display the winds used for computing the descent profile.

The pilot calls it up by selecting NEXT PHASE on the CRUISE WIND page, or the WIND prompt on the VERT REV page.



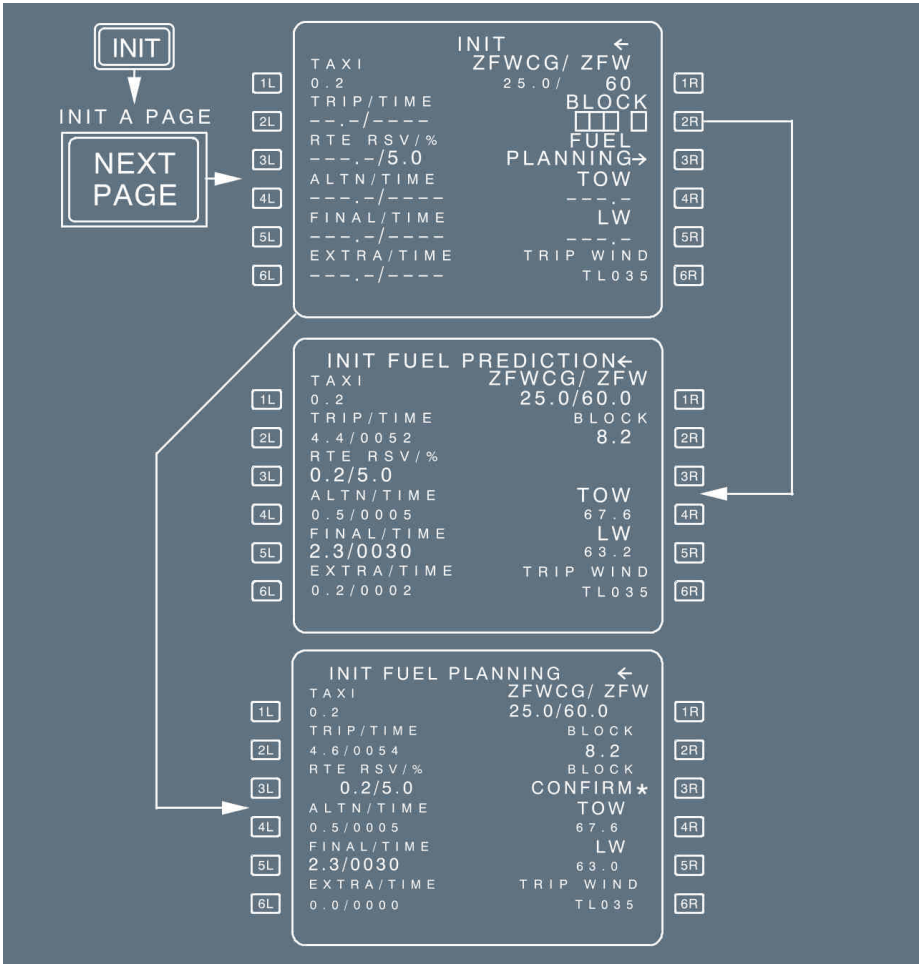
[1L] to [5L]	This displays inserted winds or uplinked winds, in large blue fonts, prior to activating the descent phase (modifiable values), and in green after descent phase activation (not modifiable values). An entry of “GRND”in the “ALT”field is seen as the wind at ground level. This wind is copied on the PERF APPR page (and corrected for the magnetic variation). A clear action on one key reverts the line to blue brackets.
[6L] ALTERNATE	This field is only displayed when an alternate is defined. The pilot-entered value or uplinked value is displayed in large blue font. It is always modifiable by the pilot.
[2R] WIND REQUEST*	Pressing this key sends a request for ACARS winds. (*Refer to DSC-22_20-70 Wind Data - Request for Wind Data*).
[4R] PREV PHASE	Pressing this key calls up the CRUISE WIND page. The field is erased after the top of descent has sequenced.

Note: *Descent winds and alternate wind are deleted, if the destination airport is changed.*

INIT B PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

7 The pilot uses this page to initialize the gross weight and center of gravity, before starting the engines.
The pilot can call it up from the INIT A page by pressing the NEXT PAGE key on the MCDU console, as long as engines have not been started.
This page automatically reverts to the FUEL PRED page after the first engine is started.



[1L] TAXI — This is the taxi fuel, which defaults to a preset value, (usually 200 kg or 400 lb). The pilot can change the value through this field.

[2L] TRIP/TIME (green) — This field displays trip fuel and time when predictions become available. The pilot cannot modify this data.

[3L] RTE RSV/% (blue)	This field displays the reserve fuel for the route and the corresponding percentage of trip fuel. It may be blank, if such is the policy of the operator. The pilot can either enter a route reserve, or a percentage, and the system then automatically computes the nominal value.
[4L] ALTN/TIME (green)	This field displays alternate trip fuel and time, assuming that the Cost Index = 0 and that the aircraft flies at the default cruise flight level. This field displays its information in small font, and it cannot be modified by the flight crew.
[5L] FINAL/TIME (blue)	This field displays hold fuel and time, associated with continued flight to the alternate airport (or destination airport if no alternate is defined). The pilot may enter a final fuel or time (at alternate or destination) and the system will compute associated holding fuel/time available. Assumptions include a racetrack pattern 1 500 ft above the alternate airport, with the aircraft in CONF 1 at maximum endurance speed (or in accordance with the airline fuel policy established in the database).
[6L] EXTRA/TIME (green)	This field displays the amount of extra fuel and the available time it represents for holding over the alternate or primary destination, if the pilot did not define an alternate. EXTRA FUEL = BLOCK - (TAXI + TRIP + RSV + ALTN + FINAL) The field displays this information in small font, and it cannot be modified by the flight crew.
[1R] ZFWCG/ZFW	The zero fuel weight and the location of the zero fuel weight CG are mandatory entries that allow the system to compute speed management and predictions. The pilot can modify this data.
[2R] BLOCK	The block fuel in this field is a mandatory entry that allows the system to predict the estimated fuel on board (EFOB). When the pilot enters a block fuel, the page title changes to INIT FUEL PREDICTION. The FMGC may also compute the block, if the pilot selects the FUEL PLANNING function.
[3R] FUEL PLANNING (amber)	Pressing this key initiates an FMGC block fuel computation. When the pilot selects this function, FUEL PLANNING becomes green, and the BLOCK field is dashed during FMGC computation. The title of the page changes to INIT FUEL PLANNING, and BLOCK CONFIRM* replaces the FUEL PLANNING prompt, when the block fuel is computed by the FMGC. If the pilot modifies the parameters used for the prediction computation before confirmation, the computation automatically restarts and FUEL PLANNING is displayed in green.

Note: *If the pilot enters a number in the 1R or 2R field that exceeds the limits, the field displays "ENTRY OUT OF RANGE" and does not accept the value.*

[4R] TOW (green) — This field displays the computed takeoff weight. The pilot cannot modify it (small font).

[5R] LW (green) — This field displays the computed landing weight at the primary destination. The pilot cannot modify it (small font).

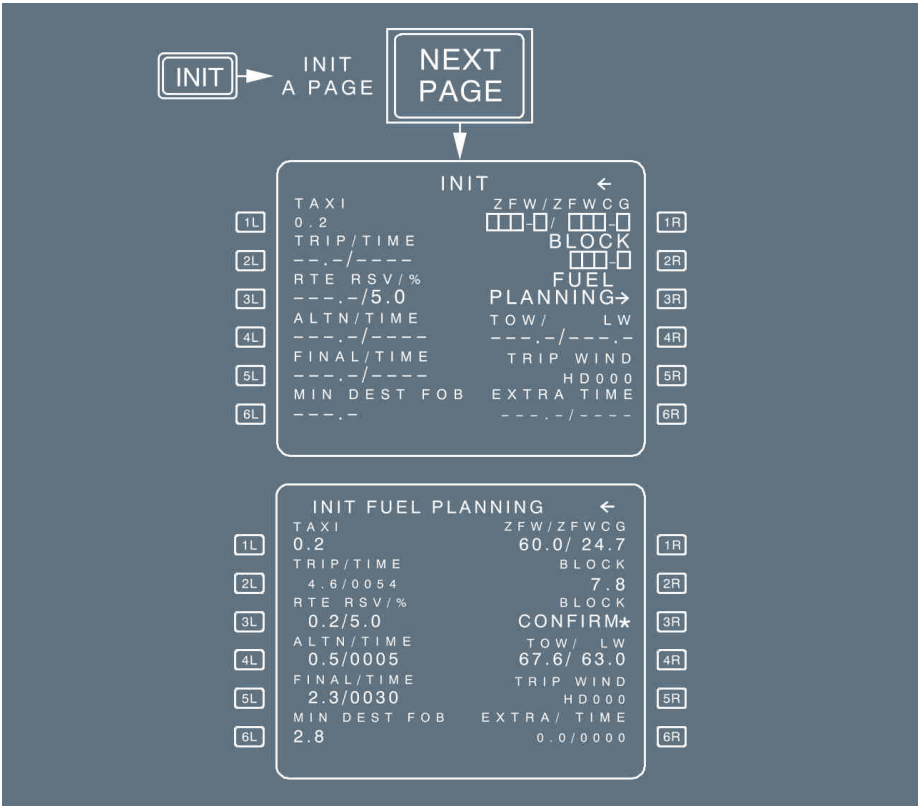
[6R] TRIP WIND — This field allows the entry of a mean wind component for the trip from the primary origin to the primary destination. Upon entry of a CO RTE or FROM/TO pair, this field defaults to HD 000 in small blue font.
An entry preceded by –, H, HD is considered as headwind, +, T, TL as tailwind. The entered velocity is displayed in large blue font.
As soon as the crew inserts a wind on the CLIMB, CRUISE or DESCENT WIND page, the system no longer considers the trip wind.

INIT B PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

8

The pilot uses this page to initialize the gross weight and center of gravity, before starting the engines.
The pilot can call it up from the INIT A page during preflight phase prior to engine start, by pressing the NEXT PAGE key on the MCDU console, as long as engines have not been started.
This page automatically reverts to the FUEL PRED page after the first engine is started.
The FMGC will stop using the pilot-entered block fuel and will compute its predictions based on the FOB indicated by the FQI computer (or the FAC as a back up) from that moment on.



[1L] TAXI	This is the taxi fuel, which defaults to a preset value, (usually 200 kg or 400 lb in the AMI file). The crew can change the value through this field.
[2L] TRIP/TIME (green)	This field displays trip fuel and time when predictions become available. The pilot cannot modify this data.
[3L] RTE RSV/% (blue)	This field displays the contingency fuel for the route and the corresponding percentage of trip fuel. It may be equal to 0.0, if such is the policy of the operator. The flight crew can either enter a fuel quantity, or a percentage.
[4L] ALTN/TIME (blue/green)	Displays alternate trip fuel and time, assuming that the Cost Index = 0 and that the aircraft flies at the default cruise flight level. (*Refer to DSC-22_20-30-10-15 Alternate Function - Review and Selection of Alternate Airport*). The flight crew can modify the alternate fuel as required. In this case, alternate time will be dashed.

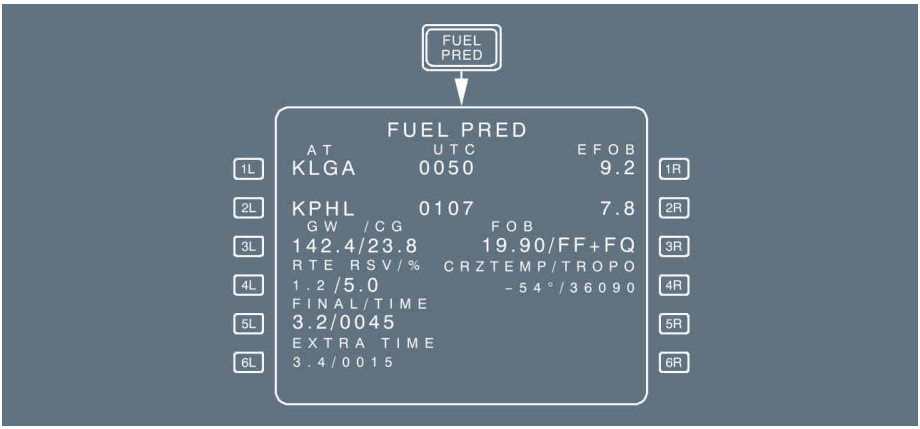
[5L] FINAL/TIME (blue)	Displays the final reserve fuel and time calculated at the alternate airport (or destination airport, if selected in the "airline fuel policy" section of the AMI). Before any crew entry, the FINAL field is dashed and FINAL TIME field is defaulted to the value specified in the AMI file (typically 30 min). The flight crew may enter a final fuel or time, and the system will compute associated holding time/fuel available. The system assumes a holding pattern at 1 500 ft AGL, with the aircraft in CONF 1 at maximum endurance speed (racetrack pattern, altitude and selected airport can be modified through the "airline fuel policy" section of the AMI).
[6L] MIN DEST FOB (blue)	Displays the expected minimum fuel at destination. It is equal by default to the ALTN + FINAL fuel. This field can be modified directly by the flight crew, and is also impacted by the modification of ALTN and/or FINAL fuel. *Note:* *If pilot entry of MIN DEST FOB is lower than ALTN + FINAL fuel, the message "CHECK MIN DEST FOB" is triggered on the MCDU.*
[1R] ZFW/ZFWCG (blue)	Displays the Zero Fuel Weight (ZFW) and Zero Fuel Weight CG (ZFWCG). The flight crew must enter the ZFW/ZFWCG values (as appropriate) to obtain a speed profile and predictions. *Note:* *If the flight crew enters a ZFW value that exceeds the acceptable range (as defined in the OPC or in the performance database), the "ENTRY OUT OF RANGE" message appears and the value is rejected.*
[2R] BLOCK	The block fuel in this field is a mandatory entry. When the flight crew enters a block fuel, the page title changes to INIT FUEL PREDICTION.
[3R] FUEL PLANNING (amber)	Initiates an FMGC block fuel computation using current hypothesis and extra = 0. When the pilot selects this function, FUEL PLANNING becomes green, and the BLOCK field is dashed during FMGC computation. The title of the page changes to INIT FUEL PLANNING, and BLOCK CONFIRM* replaces the FUEL PLANNING prompt, when the block fuel is computed by the FMGC. If the pilot modifies the parameters used to compute prediction before confirmation, the computation automatically restarts and FUEL PLANNING is displayed in green.
[4R] TOW/LW (green)	Displays the computed Takeoff Weight (TOW) and Landing Weight (LW) at the primary destination. This cannot be modified.

[5R] TRIP WIND (blue)	This field allows the entry of a mean wind component for the trip from the origin to the destination. Upon entry of a CO RTE or FROM/TO pair, this field defaults to HD 000 in small font. An entry preceeded by –, H, HD is considered to be headwind, +, T, TL to be tailwind. The entered speed is displayed in large blue font. When the flight crew inserts a wind on the CLIMB, CRUISE or DESCENT WIND page, or on the PERF APP page, the system no longer considers the trip wind, and the corresponding field is dashed.
[6R] EXTRA/TIME (green)	Displays the amount of extra fuel, and the resulting time available for holding over the primary destination. EXTRA FUEL = BLOCK – (TAXI + TRIP + RSV + MIN DEST FOB). The field displays its information in small font, and it cannot be modified by the flight crew.

FUEL PREDICTION PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

9 The pilot presses the FUEL PRED key on the MCDU console to display fuel prediction information at destination and alternate, as well as fuel management data after the engines are started.



Line 1 AT-UTC/TIME-EFOB	These fields display time and fuel predictions to the primary destination. TIME is displayed before takeoff. UTC predictions are displayed after takeoff. After the pilot enters an Estimated Takeoff Time (ETT), the UTC is displayed.

Line 2
AT-UTC/TIME-EFOB

These fields display time and fuel predictions to the alternate airport. (*Refer to DSC-22_20-30-10-15 Alternate Function - General*).

[3L] GW/CG

GW

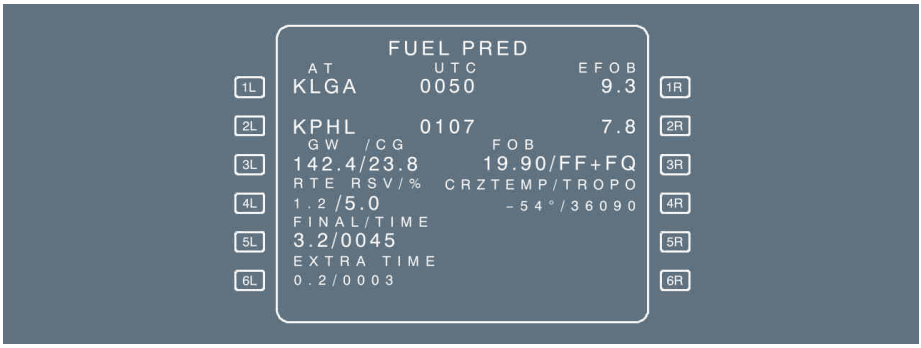
The system continually updates gross weight during the flight. If no zero fuel weight has been entered, the screen displays amber boxes next to this key. The pilot must enter information in these boxes in order to obtain a speed profile, speed computations, and predictions. The field displays dashes, as long as the system is not calculating fuel on board.

CG

The system continually updates the center of gravity location along the flight path. If no center of gravity has been entered, the screen displays amber boxes next to this key. The pilot must enter information in these boxes in order to obtain a speed profile, speed computations and predictions.
The pilot can modify both the GW and the CG.

[4L] RTE RSV/%

Prior to departure, this field displays the route reserve fuel and the corresponding percentage of trip fuel. After takeoff, it displays the percentage of the remaining trip fuel from the present position to the destination. The field may be blank, depending on the fuel policy of the operating airline. The crew can enter either a RTE RSV or a RTE RSV %. The system automatically computes the other value.



[5L] FINAL/TIME

This field displays the amount of fuel available for holding, and the amount of hold time that will be available over the alternate airport (or primary destination, if no alternate is defined). The pilot may enter either a final fuel, or a time, although the system automatically computes a nominal value. The system assumes that the holding will be in a racetrack pattern, 1 500 ft above the alternate airport, with the aircraft in clean configuration at green dot speed (or will obey the “airline fuel policy” of the database).

[6L] EXTRA/TIME	This field displays the amount of extra fuel, and the resulting time available for holding over the primary destination. EXTRA FUEL = BLOCK - (TAXI + TRIP + RSV + ALTN + FINAL). The pilot cannot modify this field (displayed in small green font).
[3R] FOB	This field displays the fuel on board, which is computed: - With information from the fuel flow and fuel quantity sensor (FF + FQ), or - From FF only (enter/FF to deselect FQ), or - From FQ only (enter/FQ to deselect FF). The pilot can modify this number.
[4R] CRZ TEMP/TROPO	This field displays the temperature at the cruise flight level and the altitude of the tropopause. The pilot can modify both values. This field is dashed, when the aircraft sequences the top of climb.

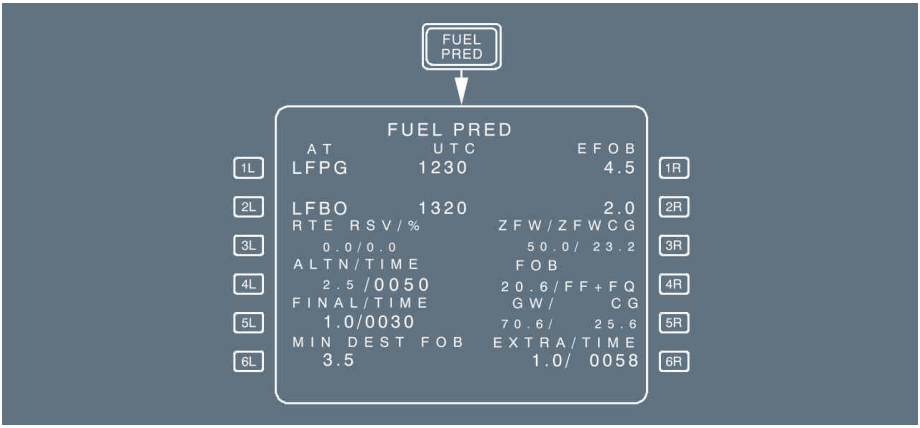
Note: *All fields, except [4R], show dashes until the pilot starts an engine.*

FUEL PREDICTION PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

10

The pilot presses the FUEL PRED key on the MCDU console to display fuel prediction information at destination and alternate, as well as fuel management data after the engines are started.



[1L] - [1R] AT-UTC/TIME-EFOB (green)	Display time and fuel predictions to the primary destination. TIME is displayed before takeoff. UTC predictions are displayed after takeoff. If the flight crew has entered an Estimated Takeoff Time (ETT), the UTC is displayed. The EFOB at destination will turn to amber, if it becomes less than the MIN DEST FOB value.
[2L] - [2R] AT-UTC/TIME-EFOB (green)	These lines display time and fuel predictions to the alternate airport. (*Refer to DSC-22_20-30-10-15 Alternate Function - General*).
[3L] RTE RSV% (blue)	Before departure, this field displays the route reserve fuel and the corresponding percentage of trip fuel. It may be equal to 0.0, if such is the policy of the operator. The crew can either enter a fuel quantity or a percentage. After takeoff, it becomes green 0.0/0.0, and the corresponding fuel is added to the EXTRA fuel.
[4L] ALTN/TIME (blue/green)	Displays alternate trip fuel and time, assuming that the Cost Index = 0 and that the aircraft flies at the default cruise flight level. (*Refer to DSC-22_20-30-10-15 Alternate Function - Review and Selection of Alternate Airport*). The flight crew can modify the alternate fuel as required. In this case, alternate time will be dashed.
[5L] FINAL/TIME (blue)	Displays the final reserve fuel and time calculated at the alternate airport (or destination airport, if selected in the “airline fuel policy” section of the AMI). The flight crew may enter a final fuel or time, and the system will compute associated holding time/fuel available. The system assumes a holding pattern at 1 500 ft AGL, with the aircraft in CONF 1 at maximum endurance speed (racetrack pattern, altitude and selected airport can be modified through the “airline fuel policy” section of the AMI).
[6L] MIN DEST FOB (blue)	Displays the expected Minimum Fuel at Destination. It is equal to the FINAL + ALTN fuel. The field can be modified directly by the flight crew, and is also impacted by the modification of the ALTN and/or the FINAL fuel.
[3R] ZFW/ZFWCG (blue)	Displays the Zero Fuel Weight (ZFW) and Zero Fuel Weight Center of Gravity (ZFWCG) values, as entered before engine start on the INIT B page. The flight crew can re-enter or modify these values after engine start on the FUEL PRED page. If at engine start, no ZFW or ZFWCG values have been entered, amber boxes are displayed in the corresponding field. The flight crew must enter the ZFW/ZFWCG values to obtain a speed profile and predictions.

[4R] FOB (blue)	Displays the Fuel On Board (FOB) calculated by the FMGS and the following fuel sensors: - Fuel flow and fuel quantity sensors (/FF+FQ) - Fuel flow sensors only (/FF). - Fuel quantity sensors only (/FQ). The flight crew can modify the FOB value in flight, or modify the sensors used by entering "/FF", "/FQ" or "/FF+FQ", as required.
[5R] GW/CG (green)	The FMS continuously updates the GrossWeight (GW) and Center of Gravity (CG) during the flight. The field displays dashes, as long as the system is not calculating the Fuel On Board, or the ZFW has not been entered by the flight crew. The field cannot be modified.
[6R] EXTRA/TIME (green)	Displays the amount of extra fuel, and the resulting time available for holding over the primary destination. EXTRA FUEL = FOB –(TAXI + TRIP + RSV + MIN DEST FOB). This field displays its information in small green font, and it cannot be modified by the flight crew.

Note: All fields are dashed before engines are started.

FLIGHT PLAN PAGES

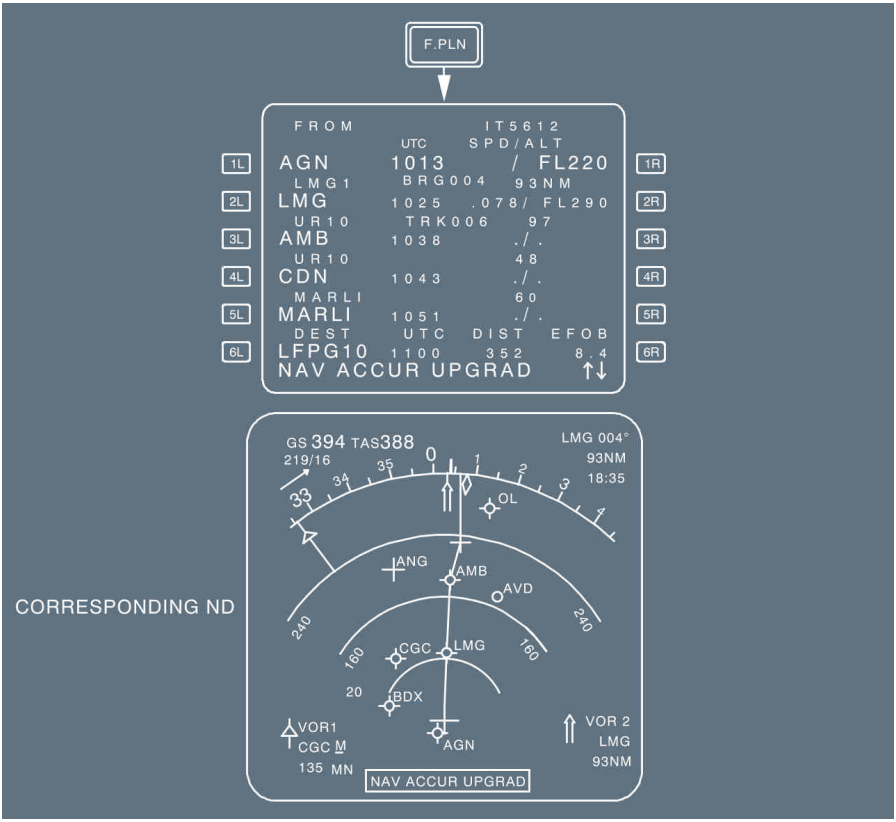
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

These pages display all waypoints of the active and alternate flight plans, along with associated predictions.

The pilot can make all revisions to the lateral and vertical flight plans from these pages:
He presses the left key to revise the lateral flight plan, and the right key to revise the vertical flight plan.
He presses the F-PLN key on the MCDU console to access the page A of the active flight plan.

11 FLIGHT PLAN A PAGE

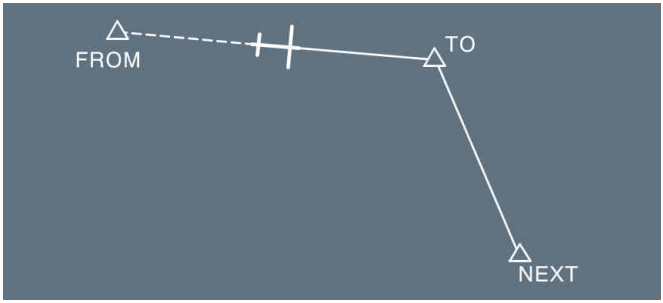
Page A displays time, speed, and altitude predictions for each waypoint of the active flight plan.



TITLE	FLIGHT NUMBER (blank, if no flight number has been entered). This line may display: TMPY in yellow if a temporary flight plan exists; OFST in white, if a lateral offset is flown; or, OFST in yellow, if a lateral offset revision is pending.
Line 1 to Line 5 WPT, UTC, SPD, ALT	These lines display consecutive waypoints along with associated predictions of time, speed or Mach and altitude for each. TIME is displayed before takeoff, and UTC after takeoff. After the pilot enters an estimated takeoff time (ETT), UTC is displayed. The time and flight level display at the FROM waypoint (first line of the flight plan) are values that the system memorized at waypoint sequencing.

[1R] SPD/ALT	The field dedicated to SPEED or MACH is blank at the FROM waypoint, except at the departure airport. (V1 associated with runway elevation, is displayed).
Line 6, DEST UTC/TIME DIST, EFOB	DIST is the distance to destination along the displayed flight plan. EFOB is the estimated fuel on board at destination. The sixth line is permanent and is displayed in white font once predictions are available, except when a TMPY F-PLN is displayed or in some cases when an ALT CSTR is entered ("*CLB or DES*" prompt appears).

Note: *The predicted altitude at a waypoint is related to the QNH below the transition altitude, and is given as a flight level above the transition altitude.*



The generic flight plan page displays the FROM waypoint (last waypoint to be overflown) on the first line, and the TO waypoint (in white) on the second line. The FROM/TO flight plan leg is called the active leg.
The flight crew can use the scroll keys to review all flight plan legs down to the last point of the alternate flight plan. The AIRPORT key serves as a fast slew key. The pilot can press it to call up the next airport (DEST, ALTN, ORIGIN) to be displayed on the flight plan page.
In order to return to the beginning of the flight plan page, the pilot presses the F-PLN key on the MCDU console.
The display shows the name of the leg between two waypoints, and the distance between them on a line between the lines that identify them. During an approach, this in-between line also defines the angle of the final descent path. For example, "2-3 °"indicates that the leg is two nautical miles long, and the flight path angle is -3 °.
The display shows the bearing between FROM and TO waypoints as the bearing from the aircraft position to the TO waypoint. It shows track (TRK) between the waypoints shown in lines 2 and 3. This is the outbound track of the next leg.

If the database contains a published missed approach procedure, or if someone has inserted one manually, the display shows it in blue after the destination runway identification. It turns green when the go-around phase becomes active.
After the last waypoint of the missed approach, the display shows the alternate flight plan in NAV mode.
When NAV mode is engaged, the flight crew can only clear or modify the TO waypoint by using the DIR key on the MCDU console.

PREDICTIONS

The system calculates and displays predictions for all waypoints.
It uses the current wind to compute TO waypoint predictions, and uses predicted winds to compute all others.

CONSTRAINTS

The database may define an altitude and speed constraint for each waypoint of the climb, descent, and approach phases, or the pilot may manually insert such constraints (except at origin, destination, FROM, and pseudo-waypoints).
The constraints are displayed in magenta, as long as predictions are not completed.
Once predictions are available, constraints are replaced by speed and altitude predictions, preceded by stars. If the star is in magenta, the system predicts that the aircraft will match the constraint (altitude within 250 ft, speed not more than 10 kt above the constraints). If the star is in amber, the system predicts that the aircraft will miss the constraint and the MCDU displays: “SPD ERROR AT WPT”.

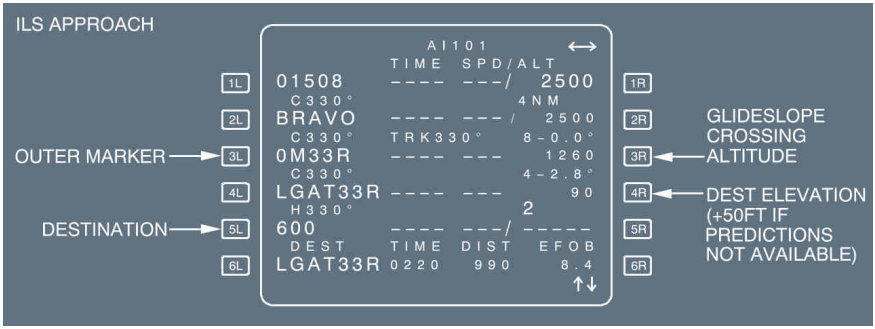
Note: SPD and ALT CSTR may either be entered on the VERT REV page or directly on the F-PLN A page, whereas TIME CSTR may only be entered from the RTA page.

PSEUDO-WAYPOINTS

Pseudo-waypoints are geographical positions corresponding to an event in the vertical flight plan: T/C (top of climb), T/D (top of descent), SPD/LIM (speed limit), DECEL (deceleration for approach), etc. The display shows them as waypoints in parentheses.

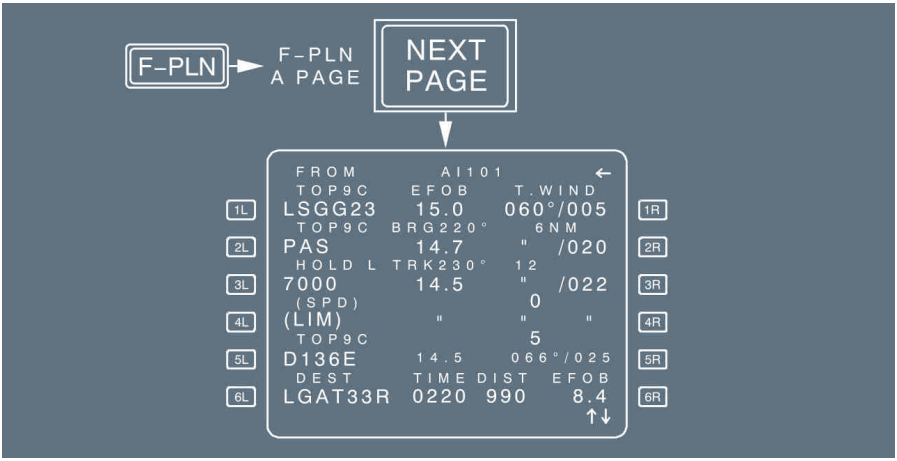
APPROACH DISPLAY

The flight crew cannot enter an altitude constraint at destination or Missed Approach Point (MAP).



12 **FLIGHT PLAN B PAGE**

This page displays fuel predictions and forecast winds at each waypoint.
The pilot calls it up by pressing the NEXT PAGE key when the FLIGHT PLAN A page is displayed.



TITLE FLIGHT NUMBER (blank if no flight number has been entered).

Line 1 to Line 5 WPT-EFOB-WIND	These lines display consecutive waypoints and associated fuel predictions, and the forecast wind profile. The direction of forecast winds is relative to true north. Forecast winds include winds entered by the pilot (large font) and the propagated winds at intermediate waypoints (small font). If the flight crew uses a trip wind, it will be displayed for each waypoint. If no other wind entry is made after takeoff, the FROM waypoint will display the actually recorded wind, and the waypoints downpath will still display the trip wind.
Line 6 DEST-UTC/DIST-EFOB	Identical to F-PLN A page.

FLIGHT PLAN PAGES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

13

These pages display all waypoints of the active and alternate flight plans, along with associated predictions.

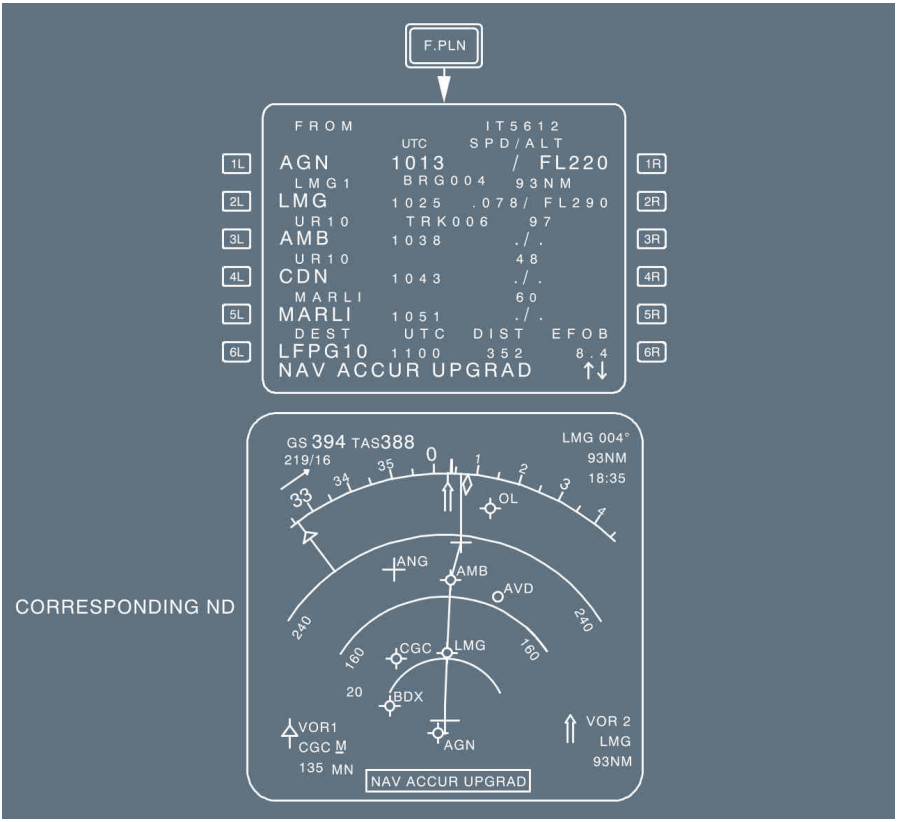
The pilot can make all revisions to the lateral and vertical flight plans from these pages:

He presses the left key to revise the lateral flight plan, and the right key to revise the vertical flight plan.

He presses the F-PLN key on the MCDU console to access the page A of the active flight plan.

FLIGHT PLAN A PAGE

Page A displays time, speed, and altitude predictions for each waypoint of the active flight plan.



TITLE	FLIGHT NUMBER (blank, if no flight number has been entered). This line may display: TMPY in yellow if a temporary flight plan exists; OFST in white, if a lateral offset is flown; or, OFST in yellow, if a lateral offset revision is pending.
Line 1 to Line 5 WPT, UTC, SPD, ALT	These lines display consecutive waypoints along with associated predictions of time, speed or Mach and altitude for each. TIME is displayed before takeoff, and UTC after takeoff. After the pilot enters an estimated takeoff time (ETT), UTC is displayed. The time and flight level display at the FROM waypoint (first line of the flight plan) are values that the system memorized at waypoint sequencing.

[1R] SPD/ALT

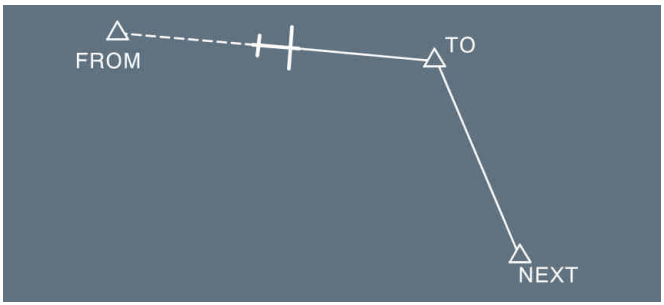
The field dedicated to SPEED or MACH is blank at the FROM waypoint, except at the departure airport. (V1 associated with runway elevation, is displayed).

Note: *When the HOLD marker is slewed, the HOLD SPD Label will overwrite the TIME/UTC title.*

Line 6, DEST UTC/TIME DIST, EFOB

DIST is the distance to destination along the displayed flight plan.
EFOB is the estimated fuel on board at destination. The EFOB at destination will turn to amber, if it becomes less than the MIN DEST FOB value.
The sixth line is permanent and is displayed in white font once predictions are available, except when a TMPY F-PLN is displayed or in some cases when an ALT CSTR is entered ("*CLB or DES*" prompt appears).

Note: *The predicted altitude at a waypoint is related to the QNH below the transition altitude, and is given as a flight level above the transition altitude.*



The generic flight plan page displays the FROM waypoint (last waypoint to be overflown) on the first line, and the TO waypoint (in white) on the second line. The FROM/TO flight plan leg is called the active leg.
The flight crew can use the scroll keys to review all flight plan legs down to the last point of the alternate flight plan. The AIRPORT key serves as a fast slew key. The pilot can press it to call up the next airport (DEST, ALTN, ORIGIN) to be displayed on the flight plan page.
In order to return to the beginning of the flight plan page, the pilot presses the F-PLN key on the MCDU console.
The display shows the name of the leg between two waypoints, and the distance between them on a line between the lines that identify them. During an approach, this in-between line also defines the angle of the final descent path. For example, "2-3 °"indicates that the leg is two nautical miles long, and the flight path angle is -3 °.

The display shows the bearing between FROM and TO waypoints as the bearing from the aircraft position to the TO waypoint. It shows track (TRK) between the waypoints shown in lines 2 and 3. This is the outbound track of the next leg.
If the database contains a published missed approach procedure, or if someone has inserted one manually, the display shows it in blue after the destination runway identification. It turns green when the go-around phase becomes active.
After the last waypoint of the missed approach, the display shows the alternate flight plan in NAV mode.
When NAV mode is engaged, the flight crew can only clear or modify the TO waypoint by using the DIR key on the MCDU console.

PREDICTIONS

The system calculates and displays predictions for all waypoints.
It uses the current wind to compute TO waypoint predictions, and uses predicted winds to compute all others.

CONSTRAINTS

The database may define an altitude and speed constraint for each waypoint of the climb, descent, and approach phases, or the pilot may manually insert such constraints (except at origin, destination, FROM, and pseudo-waypoints).
The constraints are displayed in magenta, as long as predictions are not completed.
Once predictions are available, constraints are replaced by speed and altitude predictions, preceded by stars. If the star is in magenta, the system predicts that the aircraft will match the constraint (altitude within 250 ft, speed not more than 10 kt above the constraints). If the star is in amber, the system predicts that the aircraft will miss the constraint and the MCDU displays: “SPD ERROR AT WPT”.

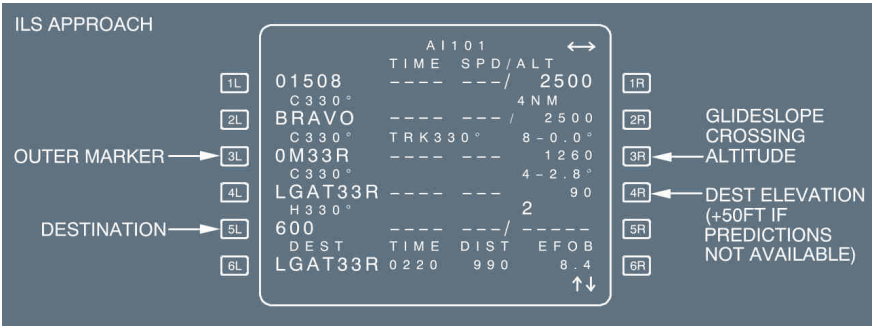
Note: SPD and ALT CSTR may either be entered on the VERT REV page or directly on the F-PLN A page, whereas TIME CSTR may only be entered from the RTA page.

PSEUDO-WAYPOINTS

Pseudo-waypoints are geographical positions corresponding to an event in the vertical flight plan: T/C (top of climb), T/D (top of descent), SPD/LIM (speed limit), DECEL (deceleration for approach), etc. The display shows them as waypoints in parentheses.

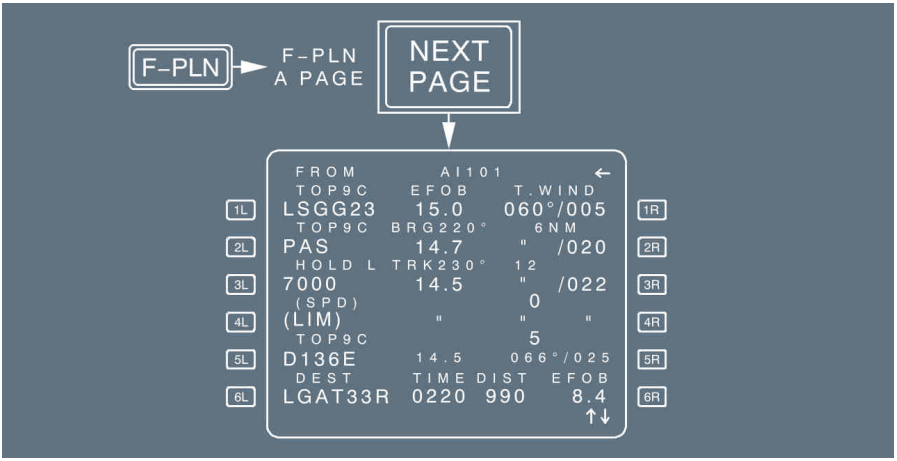
APPROACH DISPLAY

The flight crew cannot enter an altitude constraint at destination or Missed Approach Point (MAP).



FLIGHT PLAN B PAGE

This page displays fuel predictions and forecast winds at each waypoint.
The pilot calls it up by pressing the NEXT PAGE key when the FLIGHT PLAN A page is displayed.



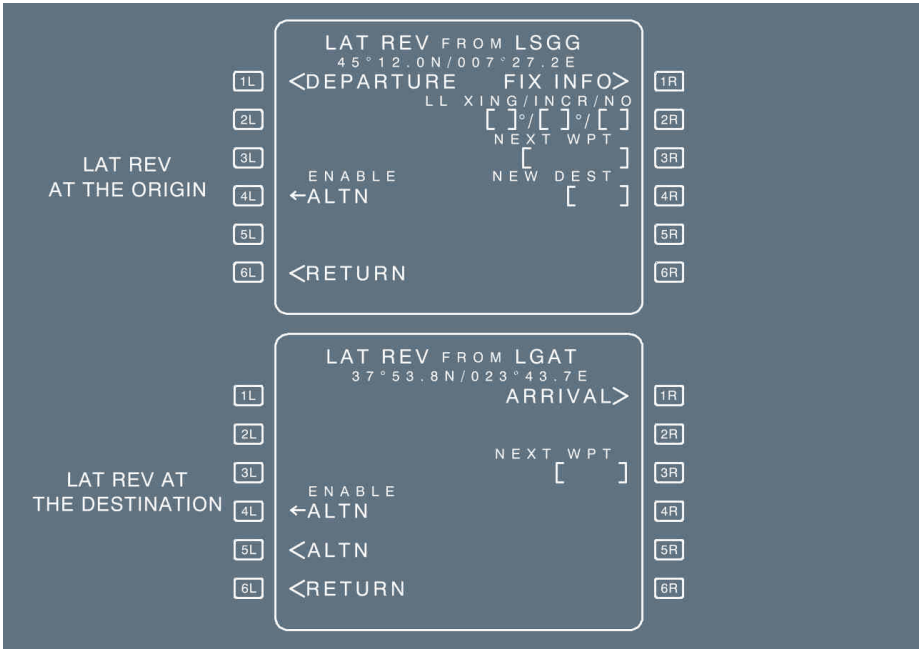
TITLE — FLIGHT NUMBER (blank if no flight number has been entered).

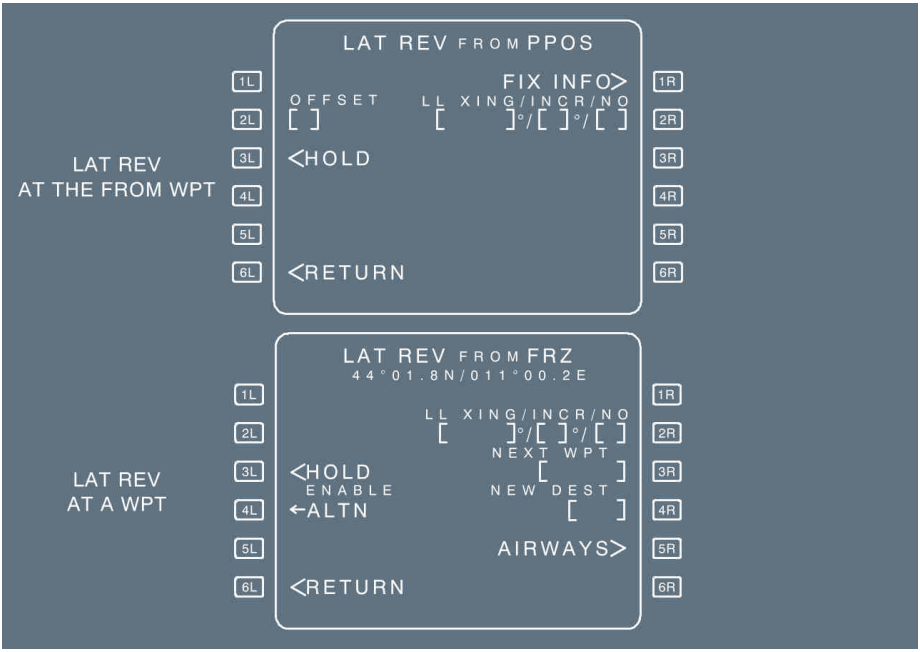
Line 1 to Line 5 WPT-EFOB-WIND	These lines display consecutive waypoints and associated fuel predictions, and the forecast wind profile. The direction of forecast winds is relative to true north. Forecast winds include winds entered by the pilot (large font) and the propagated winds at intermediate waypoints (small font). If the flight crew uses a trip wind, it will be displayed for each waypoint. If no other wind entry is made after takeoff, the FROM waypoint will display the actually recorded wind, and the waypoints downpath will still display the trip wind.
Line 6 DEST-UTC/DIST-EFOB	Identical to F-PLN A page.

LATERAL REVISION PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

14 These pages give the pilot a list of the lateral flight plan revisions, which can be used to change the flight plan beyond a selected waypoint.
The pilot calls up these pages from the flight plan pages (A or B) by pressing the left key adjacent to the selected waypoint.
Different lateral flight plan revisions are available for different waypoints.


LAT REV AT THE ORIGIN
LAT REV FROM LSGG
45°12.0N/007°27.2E
<DEPARTURE
FIX INFO>
LL XING/INCR/NO
[ ]°/[ ]°/[ ]
NEXT WPT
[ ]
ENABLE
NEW DEST
←ALTN
[ ]
<RETURN
LAT REV AT THE DESTINATION
LAT REV FROM LGAT
37°53.8N/023°43.7E
ARRIVAL>
NEXT WPT
[ ]
ENABLE
←ALTN
<ALTN
<RETURN
1L
2L
3L
4L
5L
6L
1R
2R
3R
4R
5R
6R

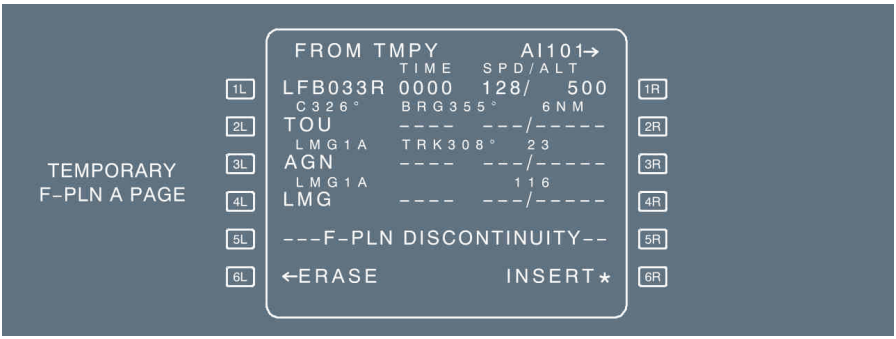


TITLE	The ident of the waypoint or airport selected for revision, along with its latitude and longitude. If the selected waypoint is the FROM waypoint, the title omits the aircraft latitude and longitude, and displays the “PPOS”(present position) instead.
[1L] DEPARTURE	This prompt gives the pilot access to the departure pages, where he can select and insert runways, SIDs, and TRANSs.
[2L] OFFSET [ ]	This prompt allows the pilot to enter a lateral offset, left or right, in the flight plan. The offset may be between 1 and 50 nm. When the pilot enters an offset, the OFFSET field becomes yellow and the 6L and 6R fields display ERASE and INSERT. The pilot can delete an inserted offset either by pressing the CLR pushbutton, by entering a zero for the amount of the offset, or by selecting a DIR TO.
[3L] HOLD	This prompt gives access to the hold pages.
[4L] ENABLE ALTN	This prompt allows the pilot to switch to the alternate flight plan at the selected revision waypoint, and use it as a new active flight plan. The system never displays this prompt at the FROM waypoint.

[5L] ALTN	This prompt gives access to the alternate airport page. The system displays it only at the destination.
[6L] RETURN	This prompt returns the display to the flight plan page.
[1R] ARRIVAL	This prompt calls up the arrival pages, where RWY, APPR, STAR TRANS and VIA can be selected and inserted.
[1R] FIX INFO	FIX INFO is only displayed on the lateral revision page at the origin or FROM waypoint. It gives access to the FIX INFO page.
[2R] LLXING/INCR/NO	This prompt allows the pilot to create the latitude/longitude crossing point. The increment (INCR) ranges from 1 to 20 °, and the number of crossing points from 1 to 99. This prompt is not displayed for waypoints belonging to the descent procedure.
[3R] NEXT WPT	The pilot uses this prompt to enter the next waypoint. If this waypoint is a latitude/longitude, or is neither in the database nor in the pilot-defined elements, the display reverts to the NEW WAYPOINT PAGE.
[4R] NEW DEST	The pilot uses this prompt to enter a new destination.
[5R] AIRWAYS	The pilot uses this prompt to access the AIRWAYS page.
[6R] INSERT	This prompt is displayed when the pilot has created a temporary flight plan. It can be used to activate the temporary flight plan.

TEMPORARY REVISION

When the pilot selects a lateral revision, the system creates a “Temporary F-PLN”and displays it in yellow on the MCDU, and as a dashed yellow line on the ND, enabling the pilot to review the data before inserting it. As long as the temporary flight plan is not inserted, the previous flight plan remains active and the system guides the aircraft along it.

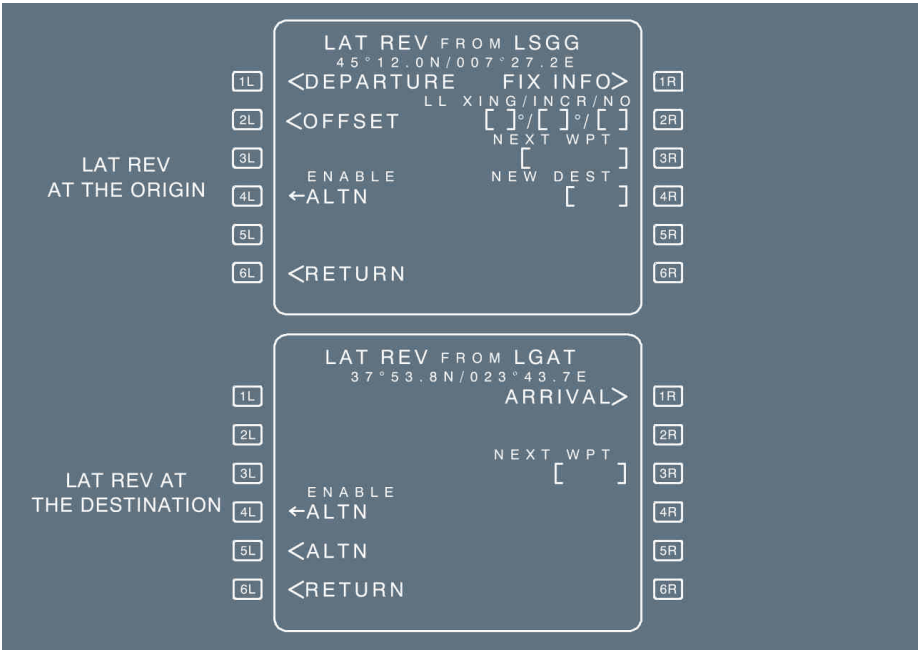


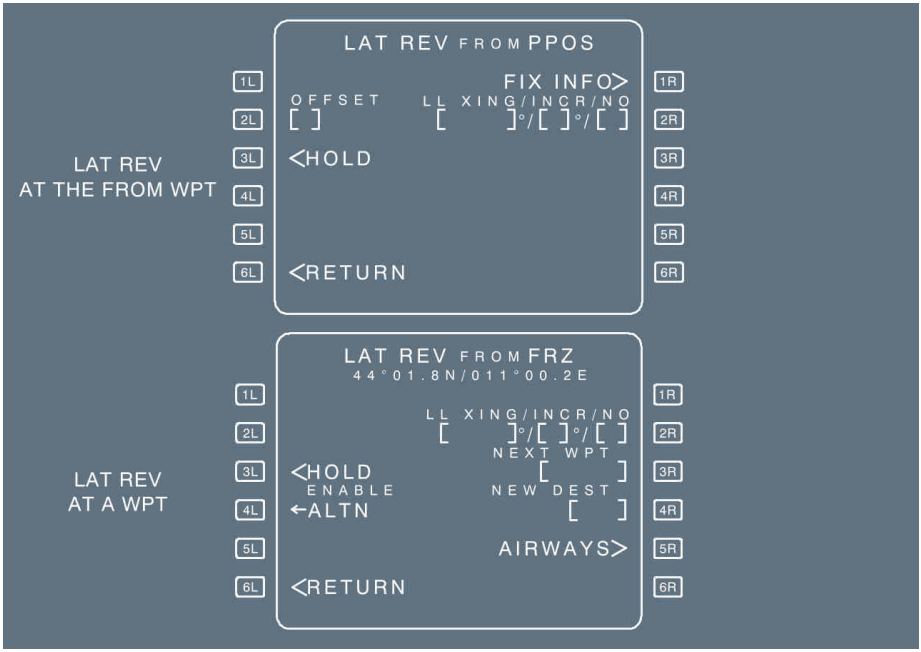
LATERAL REVISION PAGES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

15

These pages give the pilot a list of the lateral flight plan revisions, which can be used to change the flight plan beyond a selected waypoint.
The pilot calls up these pages from the flight plan pages (A or B) by pressing the left key adjacent to the selected waypoint.
Different lateral flight plan revisions are available for different waypoints.



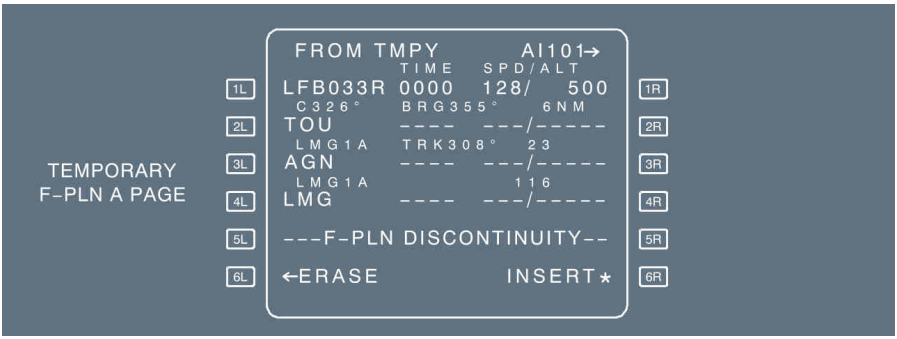


TITLE	The ident of the waypoint or airport selected for revision, along with its latitude and longitude. If the selected waypoint is the FROM waypoint, the title omits the aircraft latitude and longitude, and displays the “PPOS”(present position) instead.
[1L] DEPARTURE	This prompt gives the pilot access to the departure pages, where he can select and insert runways, SIDs, and TRANSs.
[2L] OFFSET	This prompt gives the flight crew access to the OFFSET page.
[3L] HOLD	This prompt gives access to the hold pages.
[4L] ENABLE ALTN	This prompt allows the pilot to switch to the alternate flight plan at the selected revision waypoint, and use it as a new active flight plan. The system never displays this prompt at the FROM waypoint.
[5L] ALTN	This prompt gives access to the alternate airport page. The system displays it only at the destination.
[6L] RETURN	This prompt returns the display to the flight plan page.
[1R] ARRIVAL	This prompt calls up the arrival pages, where RWY, APPR, STAR TRANS and VIA can be selected and inserted.

[1R] FIX INFO	FIX INFO is only displayed on the lateral revision page at the origin or FROM waypoint. It gives access to the FIX INFO page.
[2R] LLXING/INCR/NO	This prompt allows the pilot to create the latitude/longitude crossing point. The increment (INCR) ranges from 1 to 20 °, and the number of crossing points from 1 to 99. This prompt is not displayed for waypoints belonging to the descent procedure.
[3R] NEXT WPT	The pilot uses this prompt to enter the next waypoint. If this waypoint is a latitude/longitude, or is neither in the database nor in the pilot-defined elements, the display reverts to the NEW WAYPOINT PAGE.
[4R] NEW DEST	The pilot uses this prompt to enter a new destination.
[5R] AIRWAYS	The pilot uses this prompt to access the AIRWAYS page.
[6R] INSERT	This prompt is displayed when the pilot has created a temporary flight plan. It can be used to activate the temporary flight plan.

TEMPORARY REVISION

When the pilot selects a lateral revision, the system creates a “Temporary F-PLN”and displays it in yellow on the MCDU, and as a dashed yellow line on the ND, enabling the pilot to review the data before inserting it. As long as the temporary flight plan is not inserted, the previous flight plan remains active and the system guides the aircraft along it.

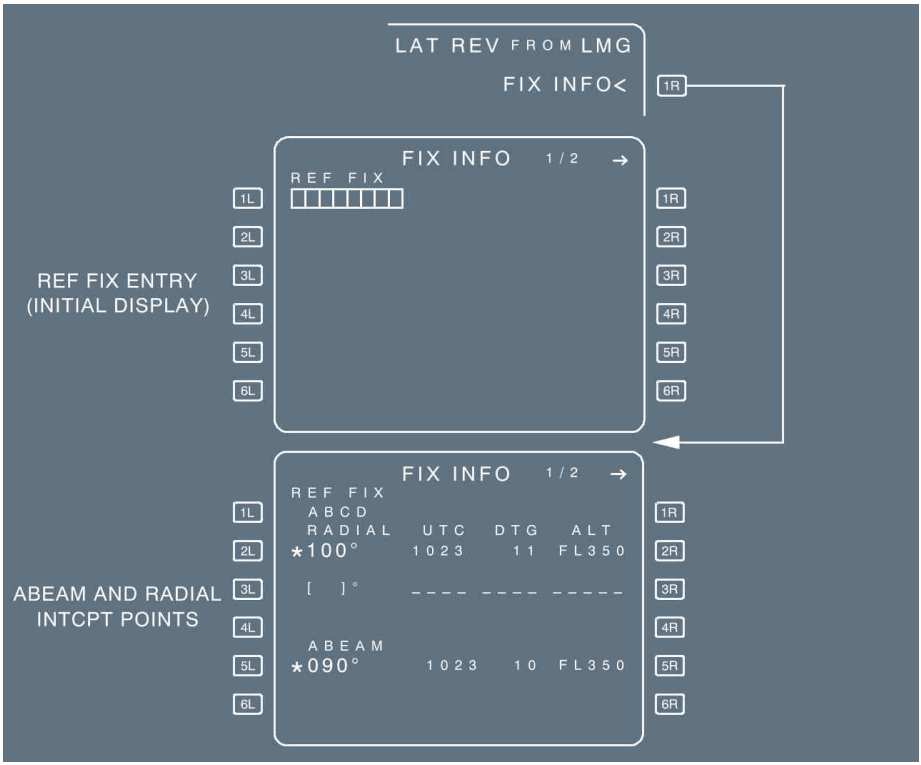


FIX INFO PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

16 This page provides access to the RADIAL intercept function.
The reference may be one or more radial bearings, based on a given database fix or a pilot-defined element.

If the radial intercepts the active flight plan, the intersection point can be converted to a waypoint and inserted into the flight plan. In addition, the ABEAM function may be used.
The FIX INFO page may be accessed from the lateral revision page at origin, or at the FROM waypoint.



[1L] REF FIX (blue) — Allows entries of the REF FIX. This reference may be any database element (navaid, waypoint, NDB, airport, runway) or a pilot-defined element. Prior to entry, amber boxes are displayed.

Line 2 to line 4 RADIAL (blue) — Allows entry of a radial from the REF FIX.

If the radial line intersects the active flight plan, the FMGS will compute the time, the along path DTG (Distance To Go), and the altitude at the intersection point (small green font). A large blue star is then displayed to insert the intersection waypoint into the flight plan. This waypoint is not part of the pilot-stored elements. Format of the created waypoint is:

XXXNNN — XXX = First 3 letters of REF FIX ident.
NNN = Value of the radial

[5L] - [5R] ABEAM — This function enables the pilot to create waypoints on a flight plan (primary or secondary) that are abeam a reference fix.
Once computed, the page displays the radial number in large green font.
Time, distance and altitude predictions are displayed in small green font.
Selecting the key adjacent to the star creates the waypoint and inserts it into the flight plan.
The waypoint is identified by AB + the REF FIX ident e.g. AB TLS.
Abeam waypoints are not stored in the pilot-stored waypoint database.

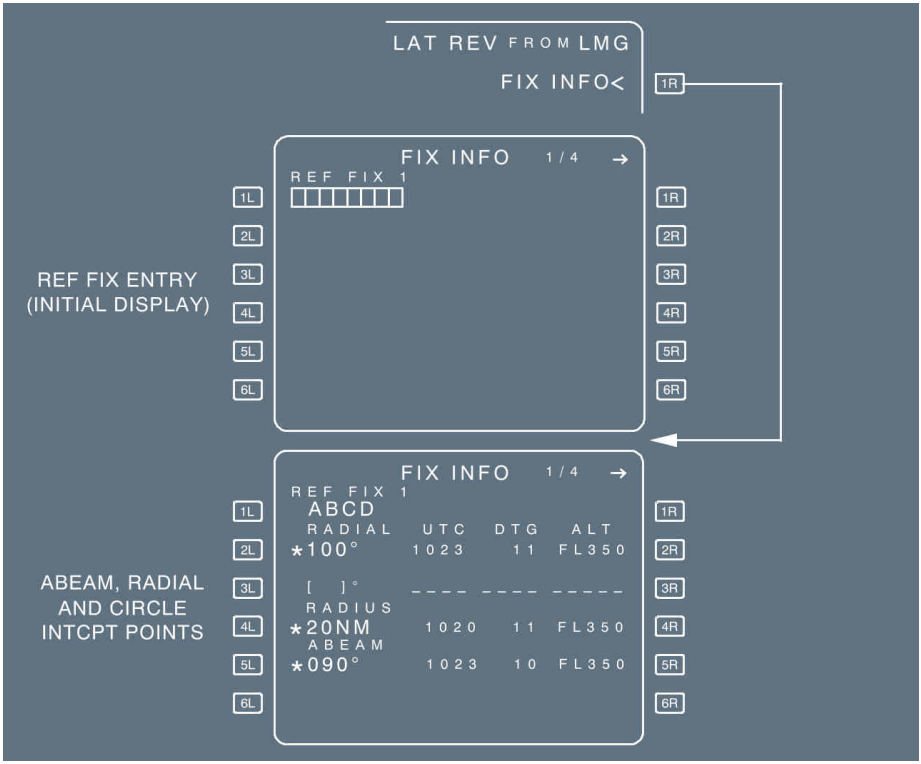
Note: Two FIX INFO pages, providing the capability to define two different REF FIX elements, are available.

FIX INFO PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

17

This page provides access to the RADIAL, CIRCLE, and ABEAM intercept functions.
The reference may be a given database fix or a pilot-defined element.
If the radial, circle or abeam intercepts the active flight plan, the intersection point can be converted to a waypoint and inserted into the flight plan.
The FIX INFO page may be accessed from the LAT REV page at the origin airport, or at FROM.



[1L] REF FIX (blue)

Allows entries of the REF FIX. This reference may be any database element (navaid, waypoint, NDB, airport, runway) or a pilot-defined element. Prior to entry, amber boxes are displayed.

[2L] - [2R] RADIAL (blue) and [3L] - [3R] (blue)

Enables entry of a radial from the REF FIX.

If the radial line intersects the active flight plan, the FMGS will compute the time, the along path DTG (Distance To Go), and the altitude at the intersection point (small green font). A large blue star is then displayed to insert the intersection waypoint into the flight plan. This waypoint is not part of the pilot-stored elements. Format of the created waypoint is:

XXXNNN XXX = First 3 letters of REF FIX ident.
NNN = Value of the radial

[4L] - [4R] RADIUS (blue)

This function enables the flight crew to enter a radius that defines a circle around the REF FIX.
When the circle intercepts the current flight path, the FMGS will compute the time, the along path distance and the altitude at the first intersection point, from the current aircraft position (small green front).
A large blue star is then displayed to insert the intersection waypoint into the flight plan. This waypoint is not part of the pilot stored element.

The waypoint is automatically labelled:

"DNNNXXX" NNN = Value of the radius
XXX = First 3 letters of the REF FIX ident.

[5L] - [5R] ABEAM

This function enables the pilot to create waypoints on a flight plan (primary or secondary) that are abeam a reference fix.
Once computed, the page displays the radial number in large green font.
Time, distance and altitude predictions are displayed in small green font.
Selecting the key adjacent to the star creates the waypoint and inserts it into the flight plan.
The waypoint is identified by AB + the REF FIX ident e.g. AB TLS.
Abeam waypoints are not stored in the pilot-stored waypoint database.

Note: Four FIX INFO pages, providing the capability to define four different REF FIX elements, are available.

OFFSET PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

18

This page allows the flight crew to insert a preplanned offset into the flight plan by entering:
- A start waypoint
- An end waypoint
- An offset distance to the left or to the right
- The intercept angle value.

The flight crew calls up this page from the LATERAL REVISION page, by pressing [2L] key.



TITLE	OFFSET in white large font. If a temporary flight plan exists, it is displayed in yellow large font.
[1L] OFFSET	This field displays the lateral offset distance, left or right, in the flight plan. The offset may be between 1 and 50 nm. Blue brackets are displayed until an offset is inserted. When the flight crew enters an offset, or modifies another element in the OFFSET page, the OFFSET field becomes yellow. One time the temporary flight plan is inserted, the field becomes blue. The flight crew can delete an inserted offset either by pressing the CLR key, by entering a zero for the amount of the offset, or by pressing OFFSET DELETE in 6L field.
[2L] START WPT	The START WPT ident for the offset is displayed in yellow if a temporary flight plan exists, in blue if already inserted, or in green when the field is not modifiable. The default START WPT shall be the waypoint where the lateral revision is performed, the first waypoint offsettable, or PPOS if the offset is currently flown. This waypoint can also be selected from the list of waypoints in the fields 3L to 5L, or can be manually entered by the flight crew.
[3L] to [5L]	Display the start waypoints available for selection. Two scrolling list are available. The active start waypoint is displayed in green in the list. Other waypoints are displayed in blue. The currently selected start waypoint does not have selection arrow associated.
[6L] RETURN ERASE	RETURN: The flight crew presses this key to return to the last displayed LAT REV page. ERASE: It is displayed when a temporary flight plan has been created, and it enables the flight crew to erase the temporary flight plan.

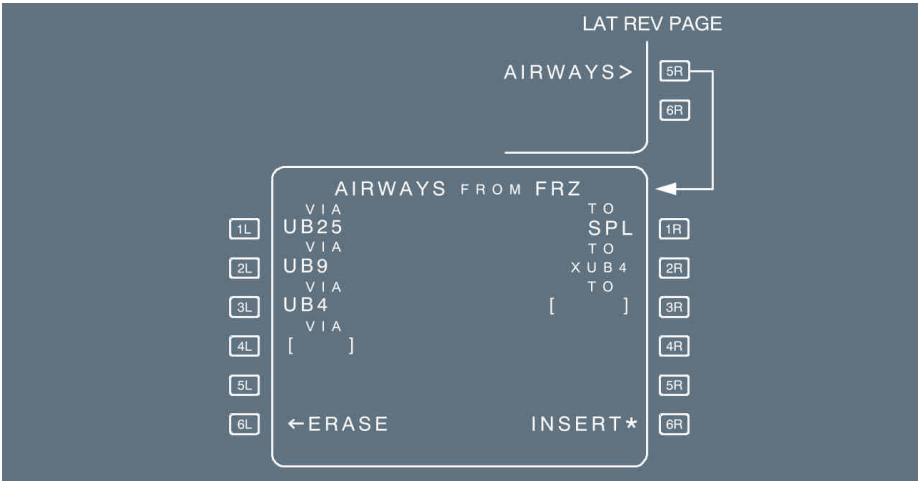
[1R] INTCPT ANGLE	This field displays the intercept angle. The angle may be between 10 ° and 50 °. The intercept angle in the AMI is the default value, and is shown in blue. When the flight crew enters an intercept angle, or modifies another element in the OFFSET page, the field becomes yellow. One time the temporary flight plan is inserted, the field becomes blue.
[2R] END WPT	The END WPT ident for the offset is displayed in yellow if a temporary flight plan exists, or in blue if already inserted. The default END WPT shall be the waypoint terminating the last consecutive offsettable leg from default or currently selected START WPT. This waypoint can also be selected from the list of waypoints in the fields 3R to 5R, or can be manually entered by the flight crew.
[3R] to [5R]	Display the end waypoints available for selection. Two scrolling lists are available. The active end waypoint is displayed in green in the lists. Other waypoints are displayed in blue. The currently selected end waypoint does not have selection arrow associated.
[6R] INSERT OFFSET DELETE	INSERT: This field allows the flight crew to activate the temporary flight plan and reverts the display to the active flight plan. This field is displayed when the offset segment is completely defined on OFFSET page. OFFSET DELETE: This prompt enables the flight crew to create a temporary flight plan where the predefined offset is canceled. This field is displayed when an offset exists in the active flight plan.

Note: If the waypoint lists in lines 3 to 5 do not fit in one page, the flight crew can scroll in an open loop, two lines by two lines. To keep the initial order of the list, two markers appear:
- *- START OF LIST - : This marker is displayed at the beginning of the list*
- *- END OF LIST - : This marker is displayed at the end of the list.*

AIRWAYS PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

19 This page allows the pilot to select up to five airways for stringing into the flight plan, after the revise waypoint.
The pilot calls up this page by pressing the lateral revision page [5R] key.



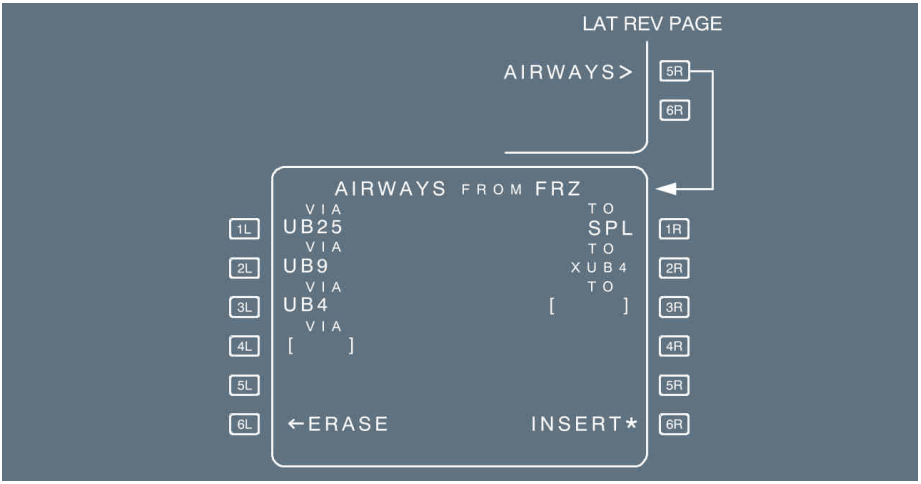
TITLE	Revise point ident (large green font)
[1L] to [5L] VIA	This field displays the airways entered by the pilot.
[6L] ERASE or RETURN	The flight crew presses this key to return to the lateral revision page. This field displays ERASE when a temporary flight plan is created. It enables the temporary flight plan to be erased.
[1R] to [5R] TO	Displays the end points of the corresponding airways entered on the [1L] to [5L] entries. The ending point is displayed in large blue font, if manually-entered, in blue small font if FMGC-computed.
[6R] INSERT (amber)	Allows the entered VIA/TO segments to be inserted into the flight plan. The display reverts to the F-PLN page.

AIRWAYS PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

20

This page allows the pilot to select up to five airways for stringing into the flight plan, after the revise waypoint.
The pilot calls up this page by pressing the lateral revision page [5R] key.



TITLE	Revise point ident (large green font)
[1L] to [5L] VIA	This field displays the airways entered by the pilot.
[6L] ERASE or RETURN	The flight crew presses this key to return to the lateral revision page. This field displays ERASE when a temporary flight plan is created. It enables the temporary flight plan to be erased.
[1R] to [5R] TO	Displays the end points of the corresponding airways entered on the [1L] to [5L] entries. The ending point is displayed in large blue font, if manually-entered, in blue small font if FMGC-computed.
[6R] INSERT (amber)	Allows the entered VIA/TO segments to be inserted into the flight plan. The display reverts to the F-PLN page.

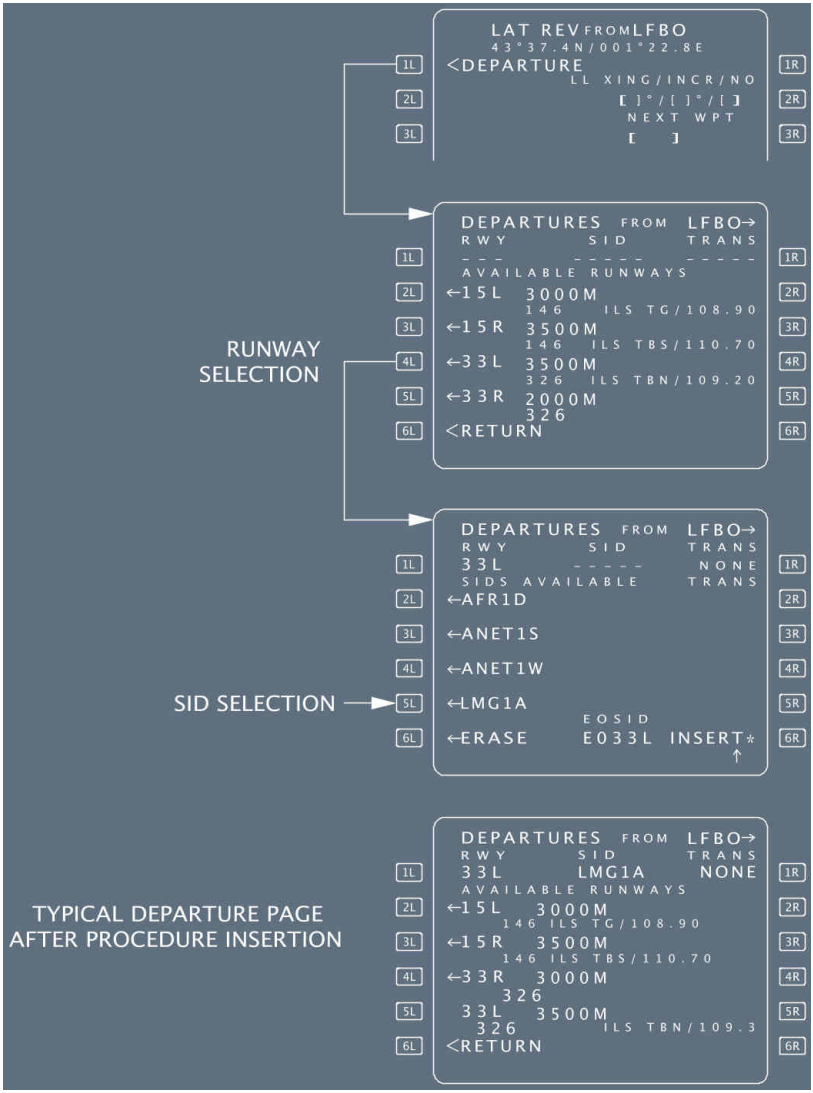
Note:
1. *If the entered airway contains at least one fixed radius transition waypoint as defined in the navigation database, and the TO waypoint is defined and, the fixed radius transition waypoint is in the flight plan, then, "FIXED TURN RADIUS AWY"is displayed between the VIA and TO fields.*
2. *If the condition for display "FIXED TURN RADIUS AWY"is satisfied for two consecutives airways lines, the second line displays (") instead of the whole message.*

DEPARTURE PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

These pages allow the pilot to review departure procedures (RWY, SID, TRANS) and enter them into the active flight plan.

When the display shows the lateral revision page for the origin, the pilot calls them up by pressing the 1L key.
Three pages are available: RWY, and SIDS and TRANS (if any).
The pilot sequentially calls up each page by selecting a data item (such as RWY), or by pressing the NEXT PAGE key on the MCDU console.



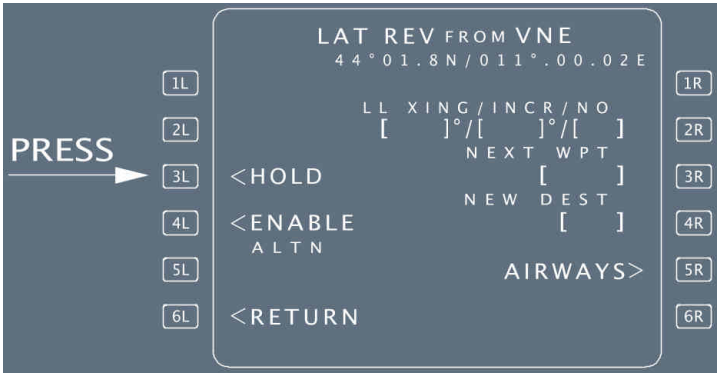
Line 1 RWY, SID TRANS	This line displays the RWY, SID, and TRANS in green after they have been inserted into the active flight plan, or in yellow if selected but not yet inserted. If nothing has been selected or inserted, the line displays dashes.

[2L] to [5L] RWY/SIDs	These fields display selectable and selected RWYs or SIDs (including EOSID and NO SID option). The pilot can slew each list. Selectable RWYs and SIDs are displayed in blue with an arrow. Once a RWY or SID is selected, the arrow disappears. A RWY or SID, already inserted in the flight plan, is displayed in green. The display shows the length, heading, and, if available, the ILS ident and frequency for each runway.
[6L] ERASE or RETURN	The pilot presses this key to erase a selected data item and revert to the previous selection. If the pilot erases the page, the display reverts to the active flight plan page. The display shows RETURN instead of ERASE, when the pilot has not created a temporary flight plan.
[2R] to [5R] TRANS	This field displays the selectable and selected enroute transitions in blue and green respectively. They are blank, if there are no transitions.
[6R] INSERT or BLANK	The pilot uses this key to insert a temporary procedure into the flight plan. The page reverts to the active flight plan page, when the insertion is completed. It is associated with RETURN (6L).
[6M] EOSID	Once a runway is inserted into the flight plan, this field displays any ENG OUT SID for that runway. If there is none, it displays NONE.

HOLD PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

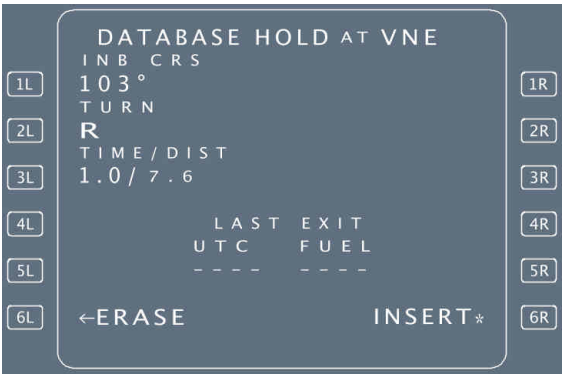
These pages allow the pilot to review and modify the holding pattern parameters at the selected revise waypoint.
The flight crew calls up these pages by pressing the HOLD key on the LAT REV page for the waypoint. The flight crew can insert database hold, holds computed by the FMS or holds that they manually define.



At first access, the HOLD page appears as follow:

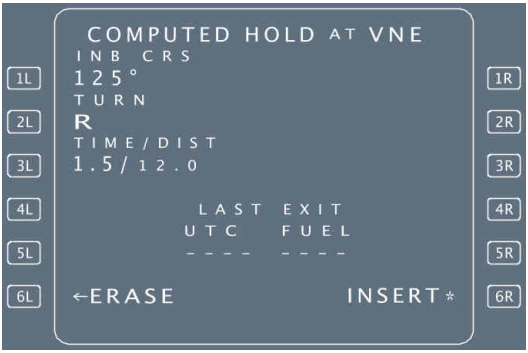
DATABASE HOLD

If a hold is defined in the navigation database for the revised waypoint, and can be inserted, the parameters in [1L], [2L] and [3L] appear in yellow.



COMPUTED HOLD

If a default hold is computed by the FMS and can be inserted, the parameters in [1L], [2L] and [3L] appear in yellow.

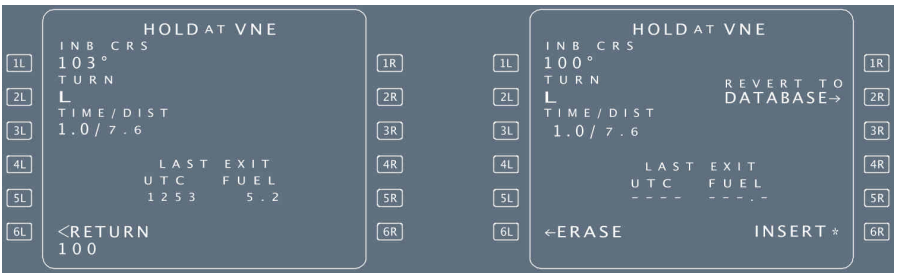


A computed hold has the following default parameters:

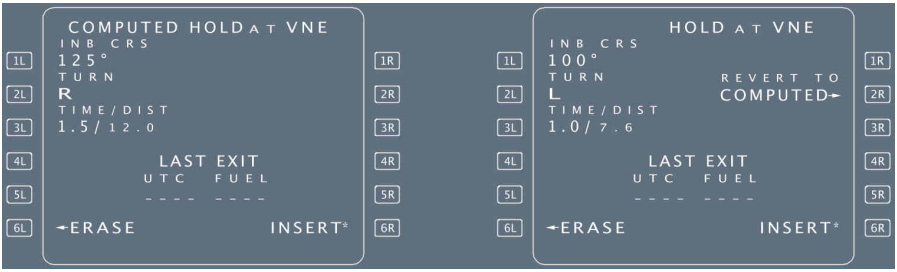
[1L] INB CRS	Inbound track of the F-PLN leg leading to the revised waypoint
[2L] TURN	Direction right (R) to turn in the hold
[3L] TIME/DIST	TIME on outbound leg is 1.5 min above 14 000 ft, 1 min below 14 000 ft.
[2R]	This field shows “REVERT TO COMPUTED” when the flight crew has modified the holding pattern.

HOLD MODIFIED BY FLIGHT CREW

If the flight plan contains a holding pattern that was defined by the pilot from an existing database or computed hold, the parameters in [1L], [2L] and [3L] appear in blue.
If the pilot has modified holding pattern data from the database, the field next to [2R] displays “REVERT TO DATABASE” or “REVERT TO COMPUTED” to enable the pilot to revert to default parameters.



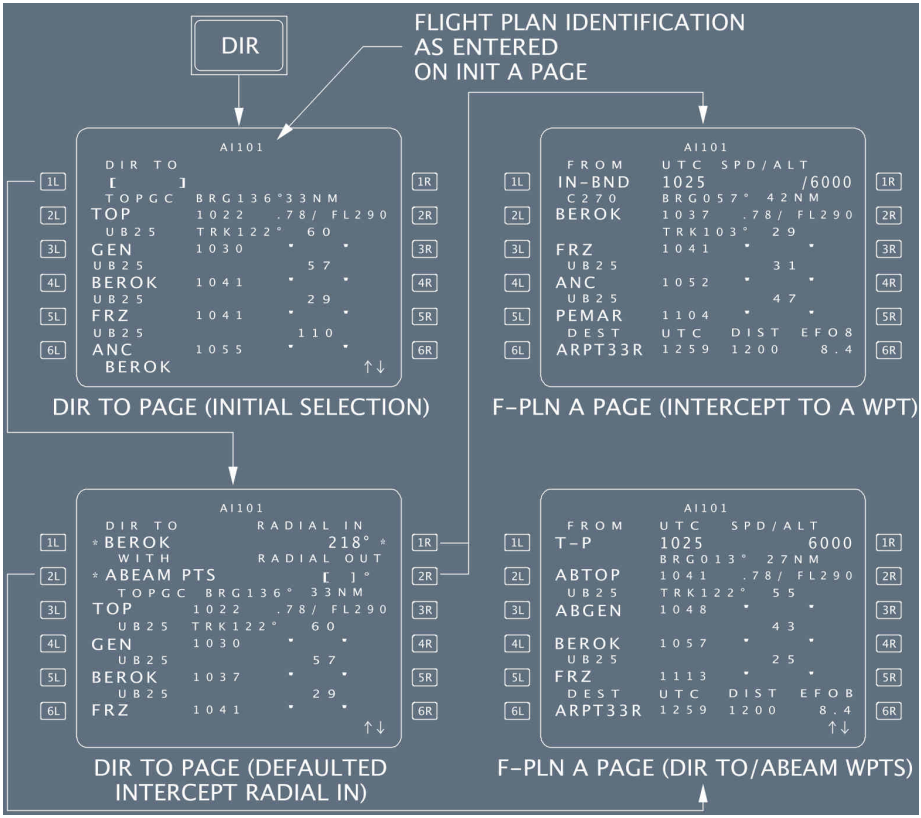
EXAMPLE	The pilot modifies the inbound course.



[1L] INB CRS	This field displays the inbound course of the holding pattern. The data may be manually or automatically modified.
[2L] TURN	This field shows the direction to turn in the hold (L or R). The data may be modified.
[3L] TIME/DIST	This field shows the time and distance for the outbound leg. The data may be modified, but time and distance cannot be entered simultaneously. Time and distance are dependent values that the system calculates from the predicted true airspeed, which in turn depends upon the holding speed (speed for maximum endurance, ICAO speed limit, or constraint speed, whichever is lower).
[6L] ERASE or RETURN	The pilot presses this key when the field shows “ERASE”, to erase the holding pattern. The pilot presses this key when the field shows “RETURN”, to return to the LAT REV page, if the hold is already inserted in the flight plan.
[2R] REVERT TO...	The pilot presses this key to delete manual modifications to the database hold (or computed hold), and to revert to the database (or computed) holding data.
[6R] INSERT	The pilot presses this key to insert the hold into the active flight plan.
LAST EXIT UTC FUEL	This field displays the time at which the aircraft must leave the holding pattern in order to meet fuel policy criteria (extra fuel = 0). The system also displays the estimated fuel on board at that time. Always displayed in thousand of kilograms or pounds.

DIRECT TO PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



Pressing the “DIR”key under the MCDU screen brings up the DIR TO page. On this page, the [1L] key is the DIR TO key. The pilot presses it to modify the flight plan by creating a direct leg from the aircraft's present position to any selected waypoint. When in NAV mode, the pilot must use this key to modify the active leg or the TO waypoint. The pilot cannot call up this page when the aircraft's present position is not valid.

[1L] DIR TO — Pressing this key selects the DIRECT TO or INTERCEPT waypoint. The pilot can identify the waypoint to be inserted by using its identifier, its latitude and longitude, place/bearing/distance, or place-bearing/place-bearing.

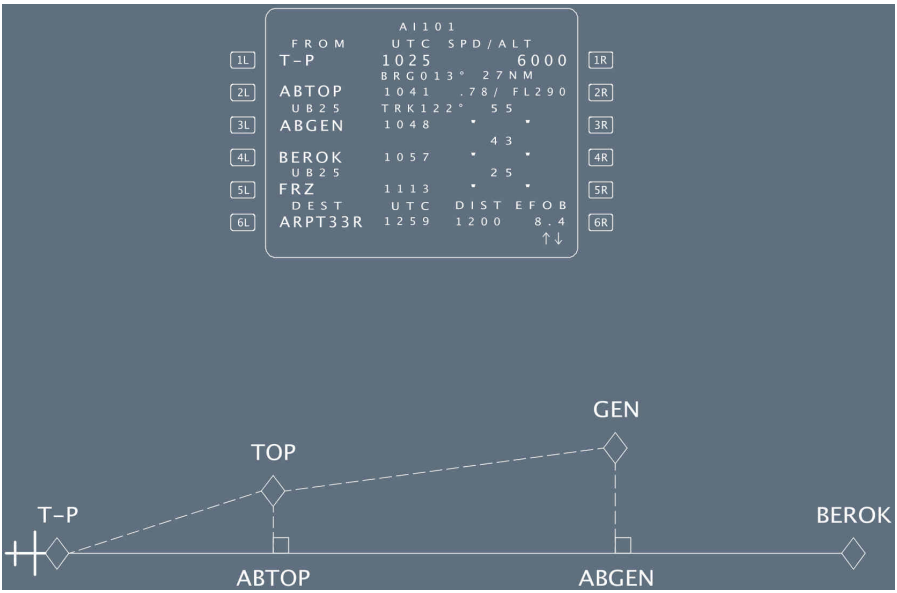
Note: *If the entered DIR TO is a latitude/longitude, the NEW WAYPOINT page is automatically called up.*

If the pilot does not select the RADIAL IN (1R) or RADIAL OUT (2R) or ABEAM PTS (2L), the DIR TO function routes the aircraft from the present position to the waypoint inserted in the DIR TO field.

Line 3 to Line 6 — These lines display the active flight plan with time/speed/distance predictions. The display may be slewed ↑ ↓.
Pressing any key activates the DIRECT TO function from the present position to the waypoint adjacent to that key.

[2L] ABEAM PTS — The flight crew presses this key to activate the DIR TO/ABEAM function which projects the flight plan waypoints perpendiculary on the DIR TO leg:

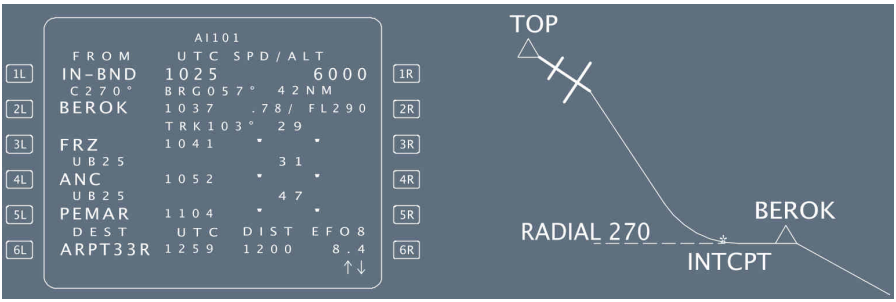
EXAMPLE: DIR TO BEROK - ABEAM.



[1R] RADIAL IN and [2R] RADIAL OUT

The pilot fills in these fields to define a radial, associated to the waypoint defined in 1L. These keys respectively activate the DIR TO/INTERCEPT TO and DIR TO/INTERCEPT FROM functions. The pilot enters the radial in, or radial out, as : XXX, XXX being the radial.
The aircraft intercepts from its current position and tracks the selected waypoint and radial to (or from) this waypoint.

EXAMPLE: RADIAL INBND - DIR TO BEROK - RADIAL 270 ° INBOUND



If the DIR TO/INTCPT WPT entry is to a waypoint already in the flight plan, a default RADIAL IN is displayed in small font. However, no radial is displayed on the ND for this default radial. No default radial is provided for the RADIAL OUT field.

Selecting the INTCPT TO (RADIAL IN [1R]) function:
- Activates the intercept radial INTO the WPT.
- Sets the course = radial IN + 180 °.
- Reverts the display to the F-PLN A page.

Selecting the INTCPT FROM (RADIAL OUT [2R]) function:
- Activates the intercept radial FROM the WPT.
- Sets the course = radial OUT.
- Reverts the display to F-PLN A page.

For details, DSC_22_20_30 Flight Planning.

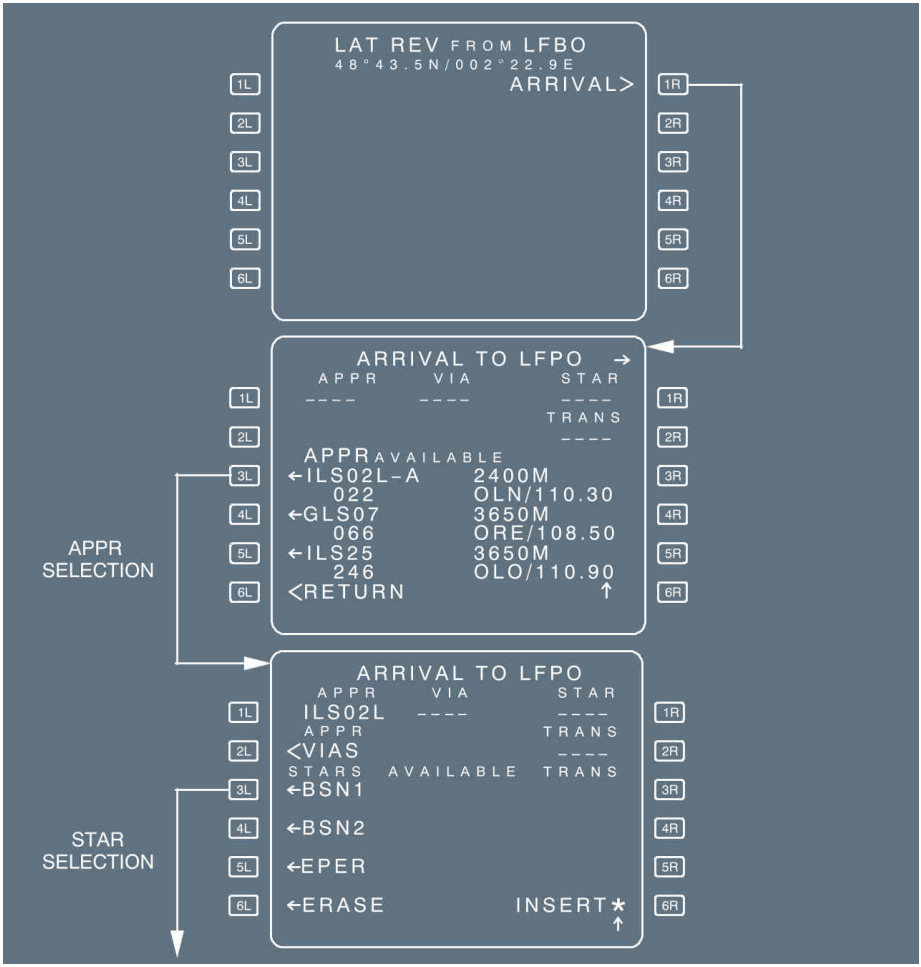
ARRIVAL PAGES

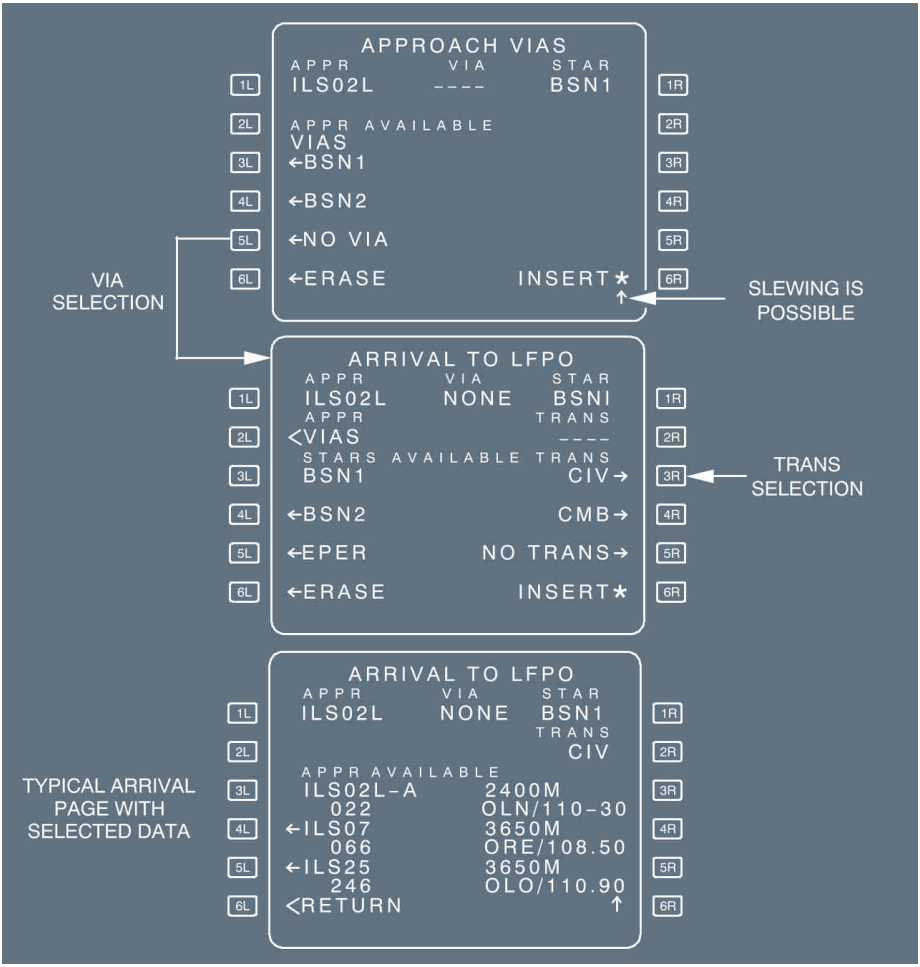
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

21 These pages enable the pilot to review arrival procedures (approaches, VIAs, STARs, TRANS) and enter them into the active flight plan.
The pilot calls them up from the LAT REV page for the destination by the pressing the 1R key.

Three pages, APPR, STAR, and VIA, are available, along with a fourth,TRANS, if there are any transitions.
The pilot calls up each page sequentially, either by selecting a data item (such as APPR), or by pressing the NEXT PAGE key on the MCDU console.

Line [1L] - [1R] [2R]	This line displays the APPR, VIA, STAR, and TRANS in green, if they have been inserted in the flight plan, and in yellow, as a temporary flight plan, if they have been selected but not yet inserted. It displays dashes or NONE, if nothing has been selected or inserted.
[2L] APPR VIAS	The pilot presses this key to call up transitions from the last point of the STAR to the first point of the approach.
[3L] to [5L]	These fields list selectable and selected APPRs, STARs, and VIAs. The flight crew can slew the pages, when necessary. Selectable APPRs, STARs, and VIAs are displayed in blue with an arrow. Once the pilot has selected an APPR, STAR, or VIA, the arrow disappears. After the APPR, STAR, or VIA is inserted into the flight plan, it is displayed in green. For each approach, the display shows runway length, heading, and the frequency and identifier of the ILS when ILS is available.
[6L] ERASE or RETURN	The pilot presses this key to erase selected data and to revert to the previous selection. The page reverts to the LAT REV page. The field displays “RETURN”, instead of ERASE, when the flight crew has not created a temporary flight plan.
[3R] TRANS to [5R]	These fields display selectable and selected enroute transitions (if any). They are blue when selected, and become green when inserted into the active flight plan.
[6R] INSERT	The pilot presses this key to insert the temporary procedure into the active flight plan. The page reverts to the active flight plan page when this occurs.


LAT REV FROM LFBO
48°43.5N/002°22.9E
ARRIVAL>
ARRIVAL TO LFPO
APPR VIA STAR
TRANS
APPR AVAILABLE
←ILS02L-A 2400M
022 OLN/110.30
←GLS07 3650M
066 ORE/108.50
←ILS25 3650M
246 OLO/110.90
<RETURN
APPR SELECTION
ARRIVAL TO LFPO
APPR VIA STAR
ILS02L
APPR TRANS
<VIAS
STARS AVAILABLE TRANS
←BSN1
←BSN2
←EPER
←ERASE
INSERT*
STAR SELECTION



ARRIVAL PAGES

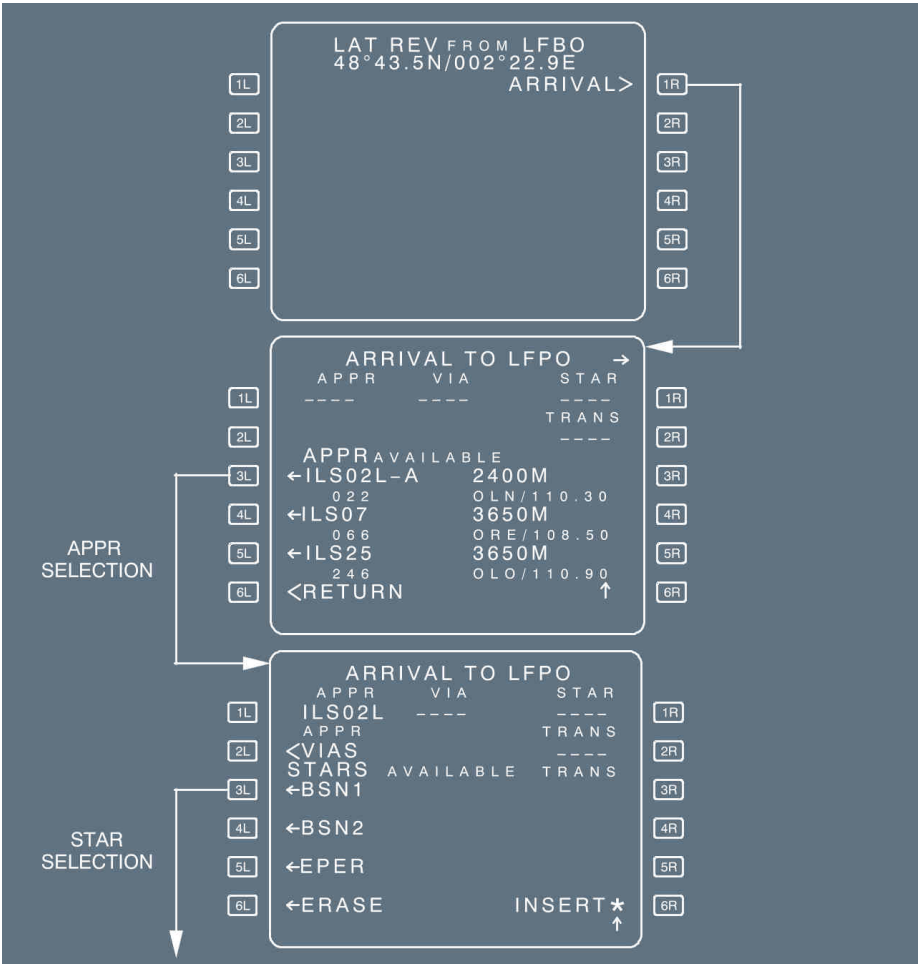
Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

22

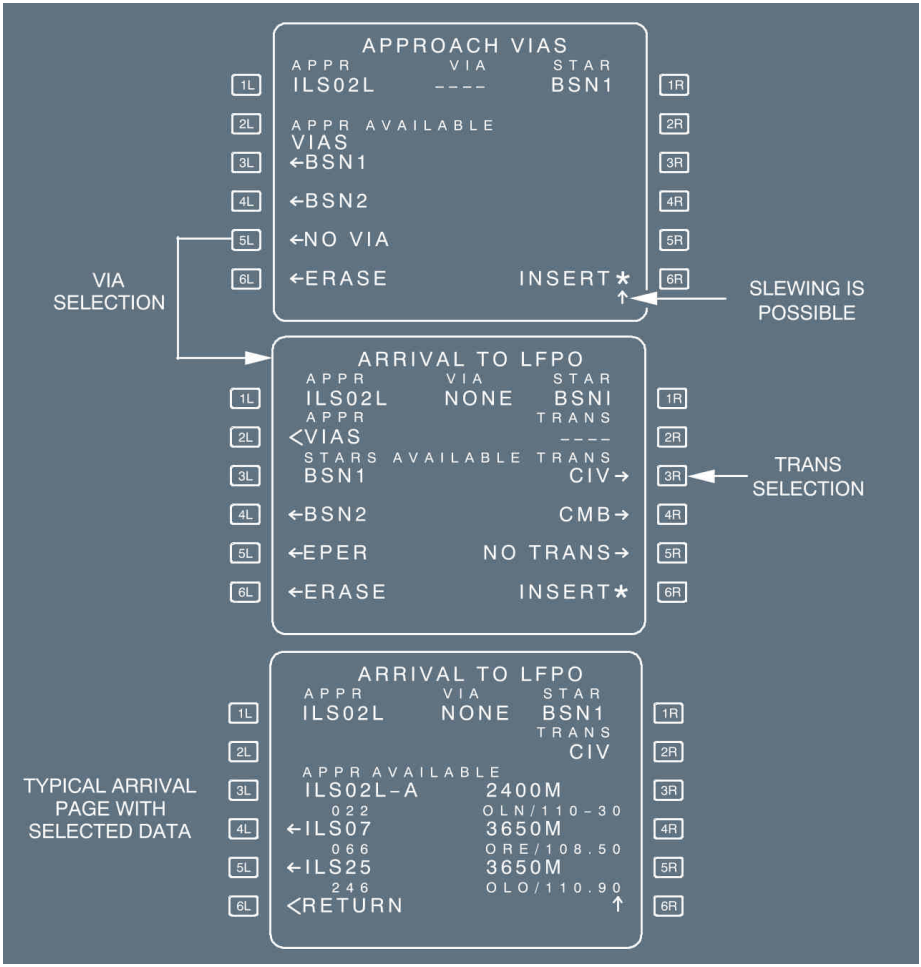
These pages enable the pilot to review arrival procedures (approaches, VIAs, STARs, TRANS) and enter them into the active flight plan.
The pilot calls them up from the LAT REV page for the destination by the pressing the 1R key.

Three pages, APPR, STAR, and VIA, are available, along with a fourth,TRANS, if there are any transitions.
The pilot calls up each page sequentially, either by selecting a data item (such as APPR), or by pressing the NEXT PAGE key on the MCDU console.

Line [1L] - [1R] [2R]	This line displays the APPR, VIA, STAR, and TRANS in green, if they have been inserted in the flight plan, and in yellow, as a temporary flight plan, if they have been selected but not yet inserted. It displays dashes or NONE, if nothing has been selected or inserted.
[2L] APPR VIAS	The pilot presses this key to call up transitions from the last point of the STAR to the first point of the approach.
[3L] to [5L]	These fields list selectable and selected APPRs, STARs, and VIAs. The flight crew can slew the pages, when necessary. Selectable APPRs, STARs, and VIAs are displayed in blue with an arrow. Once the pilot has selected an APPR, STAR, or VIA, the arrow disappears. After the APPR, STAR, or VIA is inserted into the flight plan, it is displayed in green. For each approach, the display shows runway length, heading, and the frequency and identifier of the ILS when ILS is available. In case there are multiple approaches for the same runway, the approach is identified with the runway plus the multiple indicator (i.e. ILS 33L-S).
[6L] ERASE or RETURN	The pilot presses this key to erase selected data and to revert to the previous selection. The page reverts to the LAT REV page. The field displays “RETURN”, instead of ERASE, when the flight crew has not created a temporary flight plan.
[3R] TRANS to [5R]	These fields display selectable and selected enroute transitions (if any). They are blue when selected, and become green when inserted into the active flight plan.
[6R] INSERT	The pilot presses this key to insert the temporary procedure into the active flight plan. The page reverts to the active flight plan page when this occurs.


LAT REV FROM LFBO
48°43.5N/002°22.9E
ARRIVAL>
ARRIVAL TO LFPO
APPR VIA STAR
---- ---- ----
TRANS

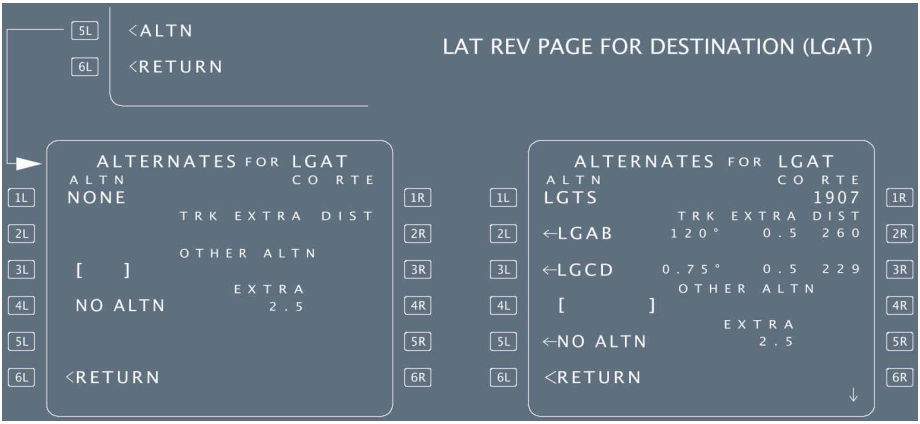
APPR AVAILABLE
←ILS02L-A 2400M
022 OLN/110.30
←ILS07 3650M
066 ORE/108.50
←ILS25 3650M
246 OLO/110.90
<RETURN
APPR SELECTION
ARRIVAL TO LFPO
APPR VIA STAR
ILS02L ---- ----
APPR TRANS
<VIAS ----
STARS AVAILABLE TRANS
←BSN1
←BSN2
←EPER
←ERASE
INSERT*
STAR SELECTION



ALTERNATE PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

This page enables the pilot to review, in the NAV database, the alternate airports that are paired with the destination, and define additional alternates, if needed. (Alternate airports are linked to the destination). The pilot calls up this page with the ALTN prompt, from the lateral revision page for the destination.



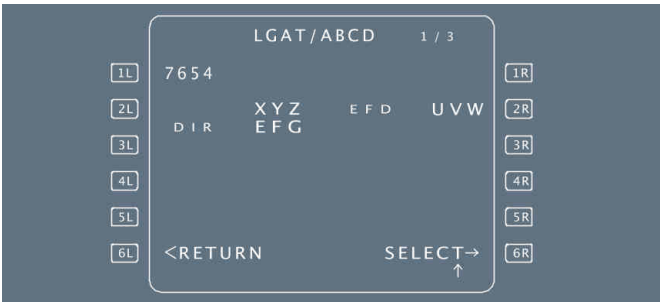
TITLE	The destination airport is displayed large green font.
[1L] ALTN	This field displays the selected alternate: In green, if it is active; in yellow, if it is temporary. “NONE” is displayed, if NO ALTN option is selected, or if the destination has no alternate.
Line 2 to line 5	These lines display the identifications of alternates (up to 6), the extra fuel weight remaining after landing at the alternates, and the great-circle track and distances to them from the destination. If the database contains a company route between the destination and the alternate, the distance shown is an airway distance, not a great-circle distance. When the database defines a preferred alternate, it is displayed on Line 2 (if no scrolling has been performed).
[4L] OTHER ALTN	The pilot can enter an airport identifier in the brackets (Line 3). If that airport is not stored in the database , the NEW RUNWAY page appears for the pilot to use in defining it. If it is stored in the database, the ROUTE SELECTION page appears, and the pilot can use it to select the best route. The pilot may enter a distance in the DIST field of the OTHER ALTN prompt, in order to get preliminary fuel predictions. However, once he has selected the alternate airfield as a temporary alternate and then inserted it, the ALTN distance reverts either to the airway distance, if he has selected a company route, or otherwise to the direct distance to the alternate. The pilot can use OTHER ALTN to overwrite and replace the previous OTHER ALTN.

NO ALTN	The pilot uses this key to select the NO ALTN option.
[6L] RETURN or ERASE	The pilot presses this key to make the display revert to the LAT REV page. Pressing this key erases the temporary selection.
[1R] CO RTE	Pressing this key displays the active company route between the destination and the selected alternate.
[6R] INSERT	Pressing this key activates the temporary selection.

ROUTE SELECTION PAGE FOR ALTERNATE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

This page enables the pilot to review the company route between the destination and the alternate, and to select a different route, if that seems appropriate.
This page comes up automatically, when the flight crew enters an ident in the OTHER ALTN field.
See the “Route Selection” page *Refer to DSC-22_20-50-10-25 Route Selection Page*for a description of this page.

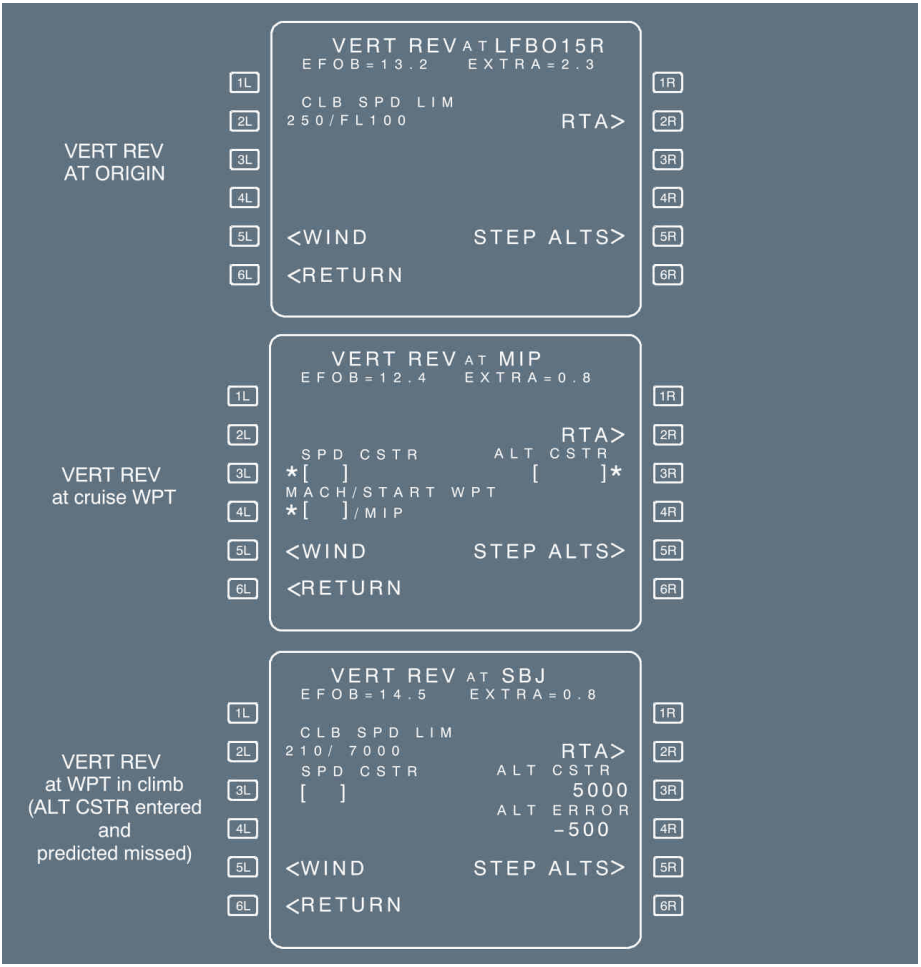


[6R] SELECT	Pressing this key reverts the display to the alternate page. (The distance between the destination and the alternate is then the airway distance).

VERTICAL REVISION PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

23 These pages contain the menu of available vertical flight plan revisions that can be applied at a selected waypoint.
The pilot calls up these pages from the flight plan A or B pages by pressing the right hand key next to the selected revised waypoint.
The pilot may make several different vertical revisions (although some may not be available at all waypoints): Speed limit, speed constraint, altitude constraint, time constraint, wind page and STEP ALTS page.


VERT REV AT ORIGIN
VERT REV AT LFBO15R
EFOB=13.2 EXTRA=2.3
CLB SPD LIM
250/FL100
RTA>
<WIND
STEP ALTS>
<RETURN
VERT REV at cruise WPT
VERT REV AT MIP
EFOB=12.4 EXTRA=0.8
RTA>
SPD CSTR
ALT CSTR
*[ ]
[ ]*
MACH/START WPT
*[ ]/MIP
<WIND
STEP ALTS>
<RETURN
VERT REV at WPT in climb (ALT CSTR entered and predicted missed)
VERT REV AT SBJ
EFOB=14.5 EXTRA=0.8
CLB SPD LIM
210/ 7000
RTA>
SPD CSTR
ALT CSTR
[ ]
5000
ALT ERROR
-500
<WIND
STEP ALTS>
<RETURN
1L
2L
3L
4L
5L
6L
1R
2R
3R
4R
5R
6R

VERT REV AT DEST



VERT REV at WPT (predictions not available)



VERT REV with constant MACH segment defined between N47E005 and N47W009 (both waypoints are in CRZ phase)



TITLE (white)	"VERT REV AT [location]" The second line shows remaining fuel and extra fuel at the waypoint being revised.
[1L] "TOO STEEP PATH BEYOND" (amber)	This message is displayed, if the waypoint is part of a leg with too steep a descent path.

[2L] CLB/DES SPD LIM (magenta)	This field displays the speed limit applicable to the climb or descent phase. It displays it in large font when data has been inserted manually, and in small font when data comes from the database.
[3L] SPD CSTR (magenta)	This field displays any speed constraint assigned to the revised waypoint. It is in large font when inserted manually, and in small font when it comes from the database. It is not displayed at the origin airport, at a FROM waypoint, a speed limit pseudo waypoint, or the destination airport.
[4L] QNH	This field only functions when the revised waypoint is the primary destination. It allows the pilot to enter the atmospheric pressure at sea level. This field is identical to the QNH field of the PERF APPR page.
[4L] MACH/START WPT (blue)	This prompt allows the pilot to enter or modify the start point of a constant Mach segment, and its associated Mach. It is not displayed at primary destination and alternate flight plan waypoints. (*Refer to DSC-22_20-30-20-25 Constant Mach Segment - Entering a Constant Mach Segment*).
[5L] WIND (blue)	The pilot presses this key to access the wind pages. The first wind displayed page, corresponds to the selected waypoint (e.g. climb page), if the selected waypoint is a climb phase waypoint. A CLR action reverts it to brackets.
[6L] RETURN or CLB	The pilot presses this key to return to the last displayed flight plan page. When displayed, pressing this key assigns the constraint to CLB phase and inserts it into the vertical flight plan. The page reverts to the flight plan page.
[2R] RTA prompt	This prompt gives access to the RTA page. It is not displayed when the VERT REV page is accessed from the alternate F-PLN.
[3R] ALT CSTR (magenta)	This field displays the altitude constraint assigned to this revised waypoint. It uses large font when the constraint is manually-entered, and small font when it is from the database. A CLR action reverts it to brackets. The constraint may be: - “At”, entered as XXXXX (Example: FL 180). - “At or above”, entered as + XXXXX or XXXXX + (Example: FL + 310). - “At or below”, entered as – XXXXX or XXXXX – (Example: -5 000). - A “window” constraint. The altitude window consists of two altitudes between which the aircraft should fly. The crew cannot manually enter a “window” constraint.

G/S INTCP (green)	This field displays the glide intercept altitude for an ILS approach on the vertical revision page at destination.
[4R] ALT ERROR (green)	When the aircraft misses a predicted altitude constraint, this field displays the difference between the altitude constraint and the predicted altitude. If, for example, "- 500"appears in this field in green, the aircraft will reach the waypoint at an altitude 500 ft below the constraint altitude. This only applies to waypoints in the climb and descent phases.
[4R] END WPT (blue)	This prompt allows the pilot to enter or modify the endpoint of a constant Mach segment. It is displayed when a pair Mach/start exists in 4L field. This prompt is not displayed on the destination VERT REV page. (*Refer to DSC-22_20-30-20-25 Constant Mach Segment - Entering a Constant Mach Segment*).
[5R] STEP ALTS (white)	This legend appears for any waypoint, once a cruise altitude has been entered. It is not available in engine-out, descent, approach, and go-around phases. This gives the pilot access to the STEP ALTS page.
[6R] DES	When this field displays "DES", pressing this key assigns the constraints to the descent phase and inserts them into the vertical flight plan. The page reverts to the F-PLN page. (See note below).

Note: Altitude and speed constraints may apply to the climb, descent, or approach phase, but never to the cruise phase. Fields 6L/6R display "CLB/DES"when the revised waypoint is a cruise phase waypoint and the FMGS needs to know if the new constraint is to be applied in climb or descent phase. The FMGS will modify the cruise phase accordingly. These 2 prompts also display "CLB/DES"when the predictions are not computed. (Top of climb and top of descent not yet defined).

VERTICAL REVISION PAGES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

24

These pages contain the menu of available vertical flight plan revisions that can be applied at a selected waypoint.
The pilot calls up these pages from the flight plan A or B pages by pressing the right hand key next to the selected revised waypoint.
The pilot may make several different vertical revisions (although some may not be available at all waypoints): Speed limit, speed constraint, altitude constraint, time constraint, wind page and STEP ALTS page.

VERT REV
AT ORIGIN

```
VERT REV AT LFBO15R
EFOB=13.2   EXTRA=2.3
CLB SPD LIM
250/FL100              RTA>
<WIND          STEP ALTS>
<RETURN
```

VERT REV
at cruise WPT

```
VERT REV AT MIP
EFOB=12.4   EXTRA=0.8
                       RTA>
SPD CSTR        ALT CSTR
*[  ]             [    ]*
MACH/START WPT
*[  ]/MIP
<WIND          STEP ALTS>
<RETURN
```

VERT REV
at WPT in climb
(ALT CSTR entered
and
predictied missed)

```
VERT REV AT SBJ
EFOB=14.5   EXTRA=0.8
CLB SPD LIM
210/ 7000              RTA>
SPD CSTR        ALT CSTR
[  ]                 5000
                ALT ERROR
                     -500
<WIND          STEP ALTS>
<RETURN
```

VERT REV AT DEST



VERT REV AT WPT (Predictions not available)



VERT REV with constant MACH segment defined between N47E005 and N47W009 (both waypoints are in CRZ phase)



TITLE (white)	"VERT REV AT [location]" The second line shows remaining fuel and extra fuel at the waypoint being revised.
[1L] "TOO STEEP PATH BEYOND" (amber)	This message is displayed, if the waypoint is part of a leg with too steep a descent path.

[2L] CLB/DES SPD LIM (magenta)	This field displays the speed limit applicable to the climb or descent phase. It displays it in large font when data has been inserted manually, and in small font when it comes from the database.
[3L] SPD CSTR (magenta)	This field displays any speed constraint assigned to the revised waypoint. It is in large font when inserted manually, and in small font when it comes from the database. It is not displayed at the origin airport, at a FROM waypoint, a speed limit pseudo waypoint, or the destination airport.
[4L] QNH	This field only functions when the revised waypoint is the primary destination. It allows the pilot to enter the atmospheric pressure at sea level. This field is identical to the QNH field of the PERF APPR page.
[4L] MACH/START WPT (blue)	This prompt allows the pilot to enter or modify the start point of a constant Mach segment, and its associated Mach. It is not displayed at primary destination and alternate flight plan waypoints. (*Refer to DSC-22_20-30-20-25 Constant Mach Segment - Entering a Constant Mach Segment*).
[5L] WIND (blue)	The pilot presses this key to access the wind pages. The first wind displayed page, corresponds to the selected waypoint (e.g. climb page), if the selected waypoint is a climb phase waypoint. A CLR action reverts it to brackets.
[6L] RETURN or CLB	The pilot presses this key to return to the last displayed flight plan page. When displayed, pressing this key assigns the constraint to CLB phase and inserts it into the vertical flight plan. The page reverts to the flight plan page.
[2R] RTA prompt	This prompt gives access to the RTA page. It is not displayed when the VERT REV page is accessed from the alternate F-PLN.
[3R] ALT CSTR (magenta)	This field displays the altitude constraint assigned to this revised waypoint. It uses large font when the constraint is manually-entered, and small font when it is from the database. A CLR action reverts it to brackets. The constraint may be: - "At", entered as XXXXX (Example: FL 180). - "At or above", entered as + XXXXX or XXXXX + (Example: FL + 310). - "At or below", entered as – XXXXX or XXXXX – (Example: -5 000). - A "window" constraint. The altitude window consists of two altitudes between which the aircraft should fly. The crew cannot manually enter a "window" constraint.

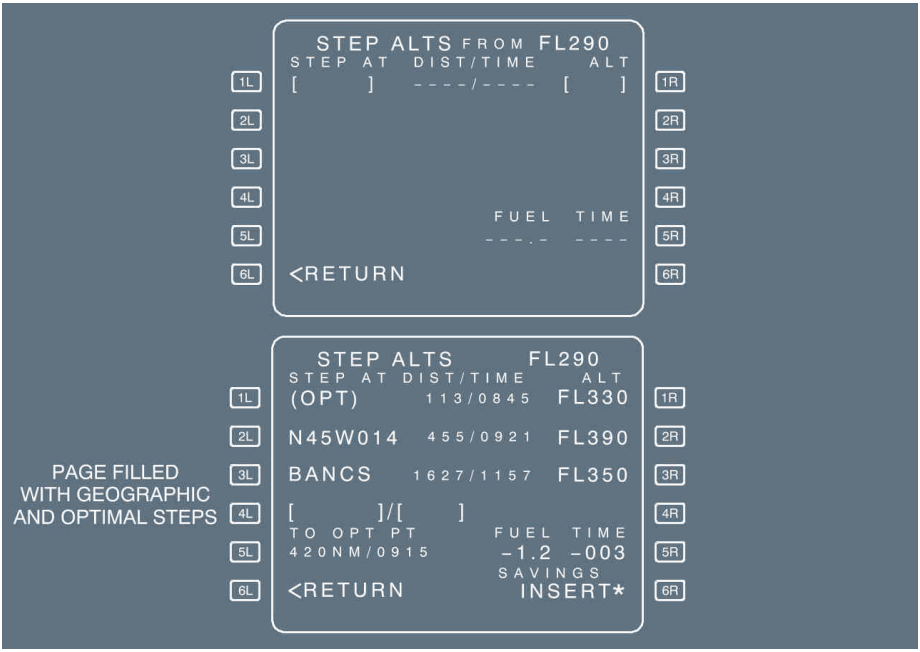
G/S INTCP (green)	This field displays the glide intercept altitude for an ILS approach on the vertical revision page at destination.
[4R] ALT ERROR (green)	When the aircraft misses a predicted altitude constraint, this field displays the difference between the altitude constraint and the predicted altitude. If, for example, "- 500"appears in this field in green, the aircraft will reach the waypoint at an altitude 500 ft below the constraint altitude. This only applies to waypoints in the climb and descent phases.
[4R] END WPT (blue)	This prompt allows the pilot to enter or modify the endpoint of a constant Mach segment. It is displayed when a pair Mach/start exists in 4L field. This prompt is not displayed on the destination VERT REV page. (*Refer to DSC-22_20-30-20-25 Constant Mach Segment - Entering a Constant Mach Segment*).
[5R] STEP ALTS (white)	This legend appears for any waypoint, once a cruise altitude has been entered. It is not available in engine-out, descent, approach, and go-around phases. This gives the pilot access to the STEP ALTS page.
[6R] DES	When this field displays "DES", pressing this key assigns the constraints to the descent phase and inserts them into the vertical flight plan. The page reverts to the F-PLN page. (See note below).

Note: Altitude and speed constraints may apply to the climb, descent, or approach phase, but never to the cruise phase. Fields 6L/6R display "CLB/DES"when the revised waypoint is a cruise phase waypoint and the FMGS needs to know if the new constraint is to be applied in climb or descent phase. The FMGS will modify the cruise phase accordingly. These 2 prompts also display "CLB/DES"when the predictions are not computed. (Top of climb and top of descent not yet defined).

STEP ALTS PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

25 This page allows the pilot to insert up to four geographic step points and one optimal step point into the flight plan. This page also displays the cost savings associated with the optional step.
The pilot calls it up either from the vertical revision page, or from the performance cruise page.



TITLE	STEP ALTS followed by the current cruise altitude
Line 1	In this field, the pilot can enter either a geographic step or an altitude for an optimal step.
Line 2 to line 4 STEP	AT (large blue font) The pilot can only enter geographic steps in these fields. Displays the point at which the active step begins. It may either be an active (or secondary) flight plan waypoint, or an inserted optimal point (OPT).
DIST / TIME (UTC) (small green font)	Displays the distance to go, and time from the present aircraft position along the flight plan to the step point.

ALT

Displays the altitude to step to, and allows entry of the optimal step format: FL or ALT.

Note: *The following messages may be displayed in the DIST/TIME field:*
- *ABOVE MAX, if the step altitude exceeds the MAX altitude.*
- *IGNORED, if the start step point is less than 50 nm from the top of descent.*
- *STEP NOW when the aircraft is within 20 nm of the step point.*
- *NO OPTIMAL, if an inserted optimal step falls in a discontinuity due to a flight plan change, or if a time constraint exists in the flight plan.*

[5L] TO OPT PT (green small font)

This field displays the distance and time to an uninserted optimal step point, if one exists.

[6L] RETURN

The flight crew presses this key to return to the previous page.

Note: *On any flight plan change, an inserted optimal step remains in the flight plan at a fixed distance to destination.*

[5R] SAVINGS

This field displays the fuel and time savings prior to the insertion of the optimal step point.

Fuel savings are displayed in thousand of kilograms (or pounds) (maxi 99.9). The value is preceded by:
"–"in case of fuel saving,
"+" in case of additional fuel cost.

Time savings are displayed in hours and minutes. The value is preceded by
"–"in case of time saving,
"+" in case of additional time cost.

Note: *If no optimal step point exists for the altitude displayed in [1R], the "NO OPTIMAL" message is displayed in the FUEL/TIME field. This message is also displayed, if the optimal step falls into a discontinuity.*

[6R] INSERT (amber)

This field displays INSERT, when an optimal step point exists but is not yet inserted. When INSERT is selected:
- The optimal step point is inserted into the flight plan.
- OPT is displayed in line 1L.
- Optimal step distance and time are deleted in line 5L.
- The * UPDATE blue prompt replaces the INSERT prompt.

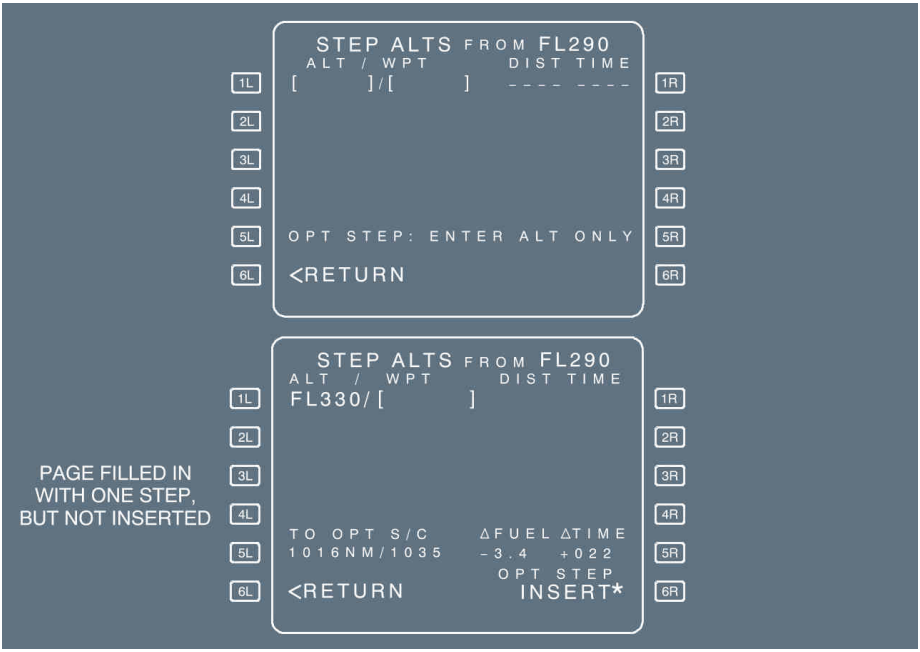
UPDATE — This prompt enables the computation of another optimal step point. The UPDATE prompt is then replaced by the *INSERT prompt.

STEP ALTS PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

26

This page allows the pilot to insert up to four geographic step points and one optimal step point into the flight plan. This page also displays the fuel/time savings associated with the optional step. The flight crew calls it up either from the vertical revision page.



TITLE [1L] - [1R] [4L] - [4R] — STEP ALTS in white followed by the current cruise altitude in green.

ALT/WPT {blue} : The waypoint identifier, as well as the altitude to step, can be entered in this field. Both are displayed in large font. The waypoint may either be an active (or secondary) flight plan waypoint, or an inserted optimal point (OPT). When an entry is made, a temporary F-PLN is created.

DIST / TIME (UTC) (small green font)

Displays the distance to go, and time from the present aircraft position along the flight plan to the step point.

Note: *The following messages may be displayed in the DIST/TIME field:*
- *ABOVE MAX, if the step altitude exceeds the MAX altitude.*
- *"IGNORED", if the step start or end point is less than 50 nm from the top of descent or if the step climb is located prior to the top of climb or after the top of descent.*
- *"STEP AHEAD", when the aircraft is within 20 nm of the start step point.*
- *"NO OPTIMAL" if a non inserted optimal step falls in a discontinuity due to a flight plan change, or when no new optimal exists after an UPDATE or when no optimal step point exists for the entered altitude.*

Note: *If no optimal step point exists for the altitude displayed in [1L], the "NO OPTIMAL" message is displayed in the FUEL/TIME field. This message is also displayed, if the optimal step falls into a discontinuity.*

[5L] OPT STEP: ENTER ONLY ALT (white) TO OPT S/C (green small front)

This field displays the distance and time to an uninserted optimal step point, if one exists. It is displayed to guide the flight crew for the entry format of an optional step.

Note: *On any flight plan change, an inserted optimal step remains in the flight plan at a fixed distance to destination.*

[6L] RETURN

The flight crew presses this key to return to the previous page.

[5R] SAVINGS

This field displays the fuel and time savings prior to the insertion of the optimal step point.

Fuel savings are displayed in thousand of kilograms (or pounds) (maxi 99.9). The value is preceded by:
"–"in case of fuel saving,
"+" in case of additional fuel cost.

Time savings are displayed in hours and minutes. The value is preceded by
"–"in case of time saving,
"+" in case of additional time cost.

[6R] INSERT* (amber) This field displays INSERT*, when an optimal step point exists but is not yet inserted. When INSERT is selected:
- The optimal step point is inserted into the flight plan.
- OPT is displayed in line 1L.
- Optimal step distance and time are deleted in line 5L.
- The UPDATE* blue prompt replaces the INSERT* prompt.

UPDATE* This prompt enables the computation of another optimal step point. The UPDATE* prompt is then replaced by the INSERT* prompt.

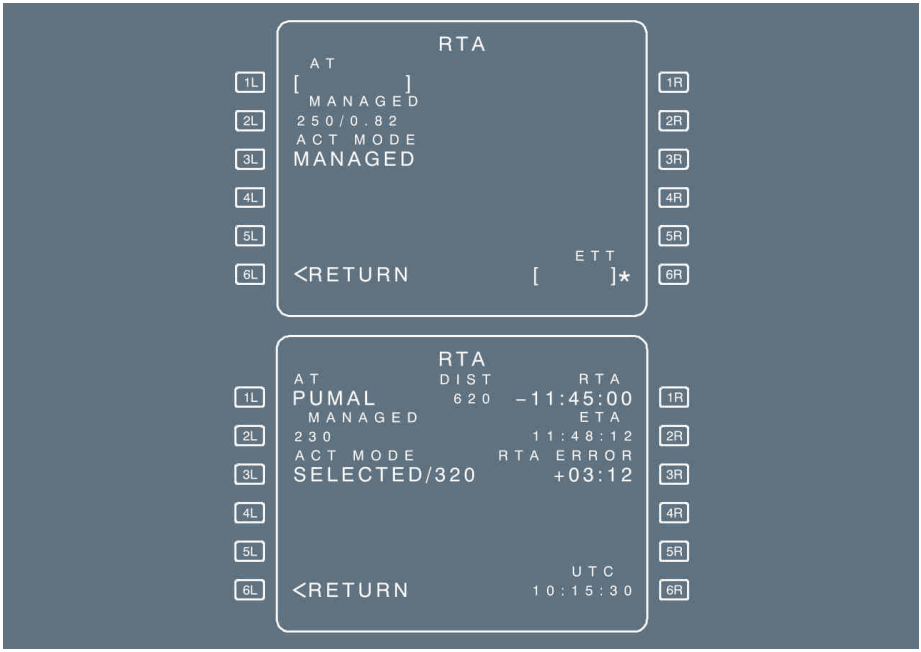
RTA PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

27

The Required Time of Arrival (RTA) page allows the entry and display of a waypoint identifier, with associated time constraints. The page also displays the entered or computed Estimated Takeoff Time (ETT), as well as the following data:
- Predicted ETA at the time-constrained waypoint;
- Performance adjusted SPD target;
- Time error;
- Distance to time constrained waypoint;
- Active speed mode;

The pilot calls up this page with the RTA prompt from the vertical revision page.



TITLE	RTA (large white font)
line 1	This line displays AT and blue brackets, if no time constraints exist, or AT, DIST and RTA when a time constraint has been defined. The waypoint identifier is displayed in large blue font. If only the waypoint identifier has been defined, blue brackets and a blue star are displayed facing the 1R prompt. The pilot enters the time constraint as “HHMMSS”, preceeded by: - for at or before; + for at or after; no sign for at.
[2L] MANAGED	This field displays the FMGS-computed ECON speed/Mach (*Refer to DSC-22_20-40-10 Optimization*)
[3L] ACT MODE	This field displays the active speed mode : MANAGED or SELECTED/NNN (NNN is the selected target speed). The pilot cannot modify it through this field.
[6L] RETURN	The pilot presses this key to revert the display to the VERT REV page.

[2R] ETA	When a required time at arrival has been defined, the 2R field displays the estimated time of arrival as “HHMMSS”.
[3R] RTA ERROR	This field is blank when the RTA is predicted as made. If the RTA is predicted as missed, “RTA ERROR” is displayed in small white font, and the time error between ETA and RTA is displayed in small amber font.
[6R] ETT	The Estimated Takeoff Time (ETT) field is available in the preflight phase. If no ETT is available, the 6R field displays blue brackets and a blue star. Once available, the ETT is displayed in magenta.
UTC	Universal time is displayed in green for takeoff, climb, cruise, descent and approach phases.

RTA PAGE

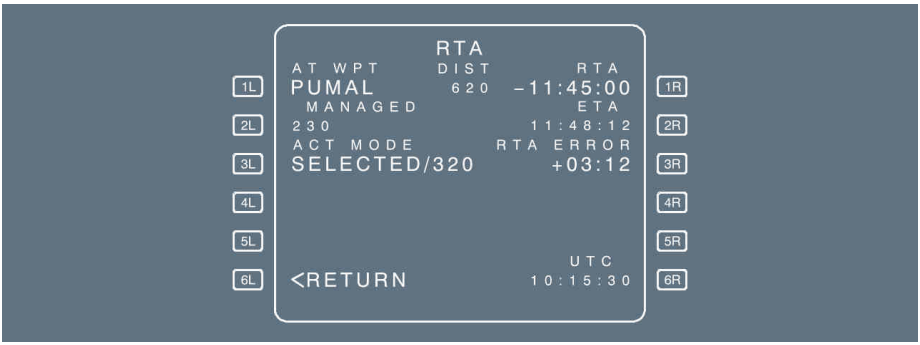
Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

28

The Required Time of Arrival (RTA) page allows the entry and display of a waypoint identifier, with associated time constraints. The page also displays the entered or computed Estimated Takeoff Time (ETT), as well as the following data:

- Predicted ETA at the time-constrained waypoint;
- Performance adjusted SPD target;
- Time error;
- Distance to time constrained waypoint;
- Active speed mode;

The flight crew calls up this page with the RTA prompt from the vertical revision page.



TITLE	RTA (large white font)

line 1	This line displays: - AT WPT, DIST and RTA when a time constraint can be defined. The identifier of the revised waypoint or the first following waypoint at which the time constraint can be defined, is displayed by default in large blue font - AT WPT, DIST and RTA when a time constraint has already been defined. The associated constrained waypoint identifier is displayed by default in large blue font - AT WPT and white dashes when no time constraint can be defined - AT WPT and blue brackets if a time constraint can only be introduced before the waypoint at which the VERT REV has been initiated. Only when the waypoint identifier has been defined (by the flight crew or by default), blue brackets and a blue start are displayed in [1R] field. The flight crew enters the time constraint as “HHMMSS”, preceded by: - for at or before; + for at or after; no sign for at.
[2L] MANAGED	This field displays the FMGS-computed ECON speed/Mach (*Refer to DSC-22_20-40-10 Optimization*)
[3L] ACT MODE	This field displays the active speed mode : MANAGED or SELECTED/NNN (NNN is the selected target speed). The pilot cannot modify it through this field.
[6L] RETURN	The pilot presses this key to revert the display to the VERT REV page.
[2R] ETA	When a required time at arrival has been defined, the 2R field displays the estimated time of arrival as “HHMMSS”.
[3R] RTA ERROR	This field is blank when the RTA is predicted as made. If the RTA is predicted as missed, “RTA ERROR” is displayed in small white font, and the time error between ETA and RTA is displayed in small amber font.
[6R] ETT	The Estimated Takeoff Time (ETT) field is available in the preflight phase. If no ETT is available, the 6R field displays blue brackets and a blue star. Once available, the ETT is displayed in magenta.
UTC	Universal time is displayed in green for takeoff, climb, cruise, descent and approach phases.

DATA INDEX PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

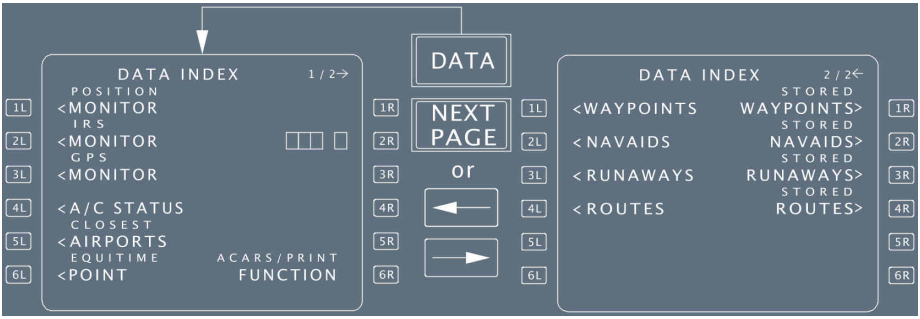
There are two INDEX pages:

The DATA INDEX 1/2 page gives access to various pages devoted to navigation.

The DATA INDEX 2/2 page lists the navigation data, entered in the FMGS.

The pilot enters those items labeled “stored” and can modify them. The pilot can call up the others, but cannot modify them.

The pilot calls up these pages by pressing the DATA key on the MCDU console:



DATA INDEX 1/2 PAGE

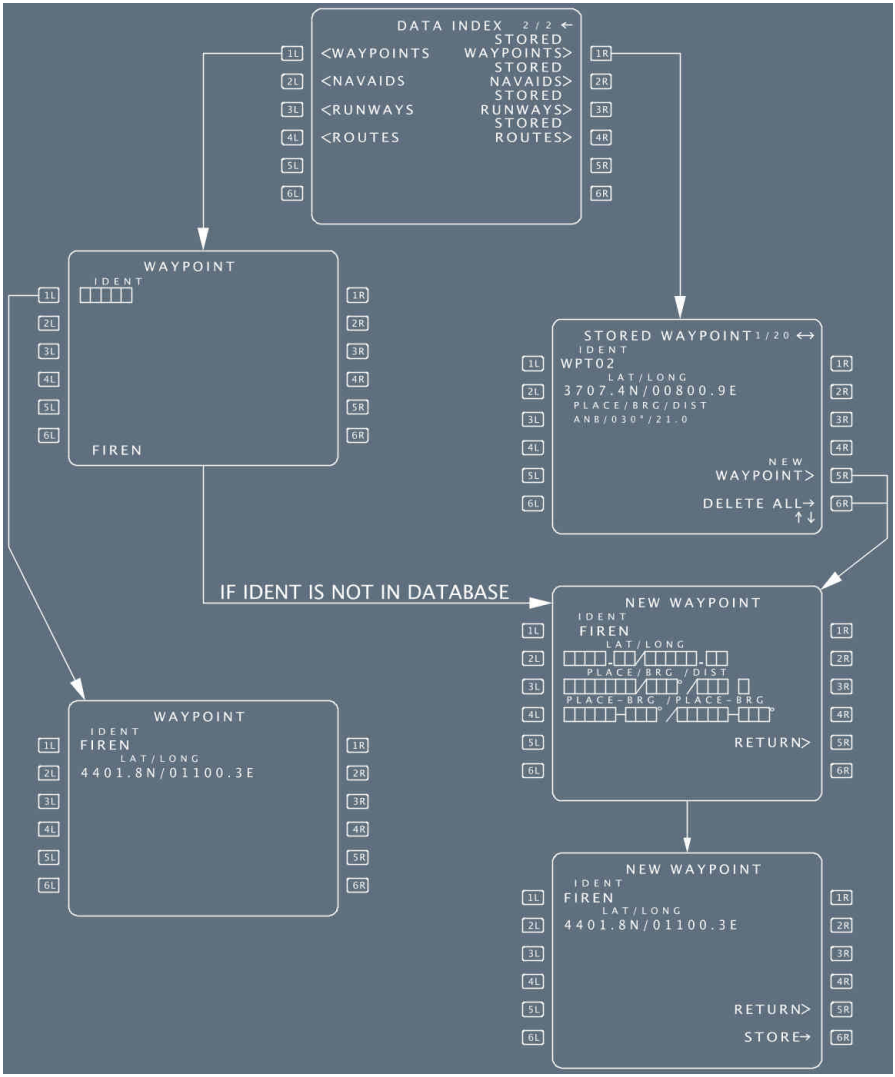
[1L] POSITION MONITOR - [2L] IRS MONITOR	When the flight crew presses these keys, the display shows all essential navigation data.
[3L] GPS MONITOR	This key calls up the GPS MONITOR page.
[4L] A/C STATUS	This key calls up the aircraft status page.
[5L] CLOSEST AIRPORTS.	This key calls up the closest airports page.
[6L] EQUITIME POINT	This key calls up the equitime point page.
[6R] ACARS/PRINT	This key calls up the PRINT function pages and the ACARS function pages.

DATA INDEX 2/2 PAGE

[1L] WAYPOINTS [2L] NAVAIDS [3L] RUNWAYS [4L] ROUTES	These keys call up descriptions of waypoints, NAVAIDs, runways, and routes stored in the database, so that they can be reviewed.
[1R] STORED WAYPOINTS [2R] STORED NAVAIDS [3R] STORED RUNWAYS [4R] STORED ROUTES	These keys call up waypoints, NAVAIDs, runways, and routes that the pilot has stored, enabling the pilot to review and store them in, or delete them from, the database. The airline can choose to automatically have all pilot-stored data erased in the done phase.

WAYPOINT/STORED WAYPOINT/NEW WAYPOINT PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



WAYPOINT PAGE

- The pilot can call up this page by pressing the 1L key on the DATA INDEX page. The display then shows waypoint information associated with the identifier the flight crew inserts it in the [1L] field.
- With this page it is possible to call any waypoint not stored in the stored waypoint list, if they belong to the active, temporary, or secondary flight plan.

STORED WAYPOINT PAGE

The pilot calls up this page by pressing the 1R key on the DATA INDEX page.
This page displays waypoints, defined and stored by the pilot. It lists each stored waypoint, along with a number that shows the relative order in which it was inserted in the database. This number is displayed in the upper righthand corner of the page. For example, “1/20” indicates that the waypoint was the first of 20 stored.

Note: Latitude/Longitude crossing points and Abeam/Radial Intercept points are never included in the stored waypoint list.

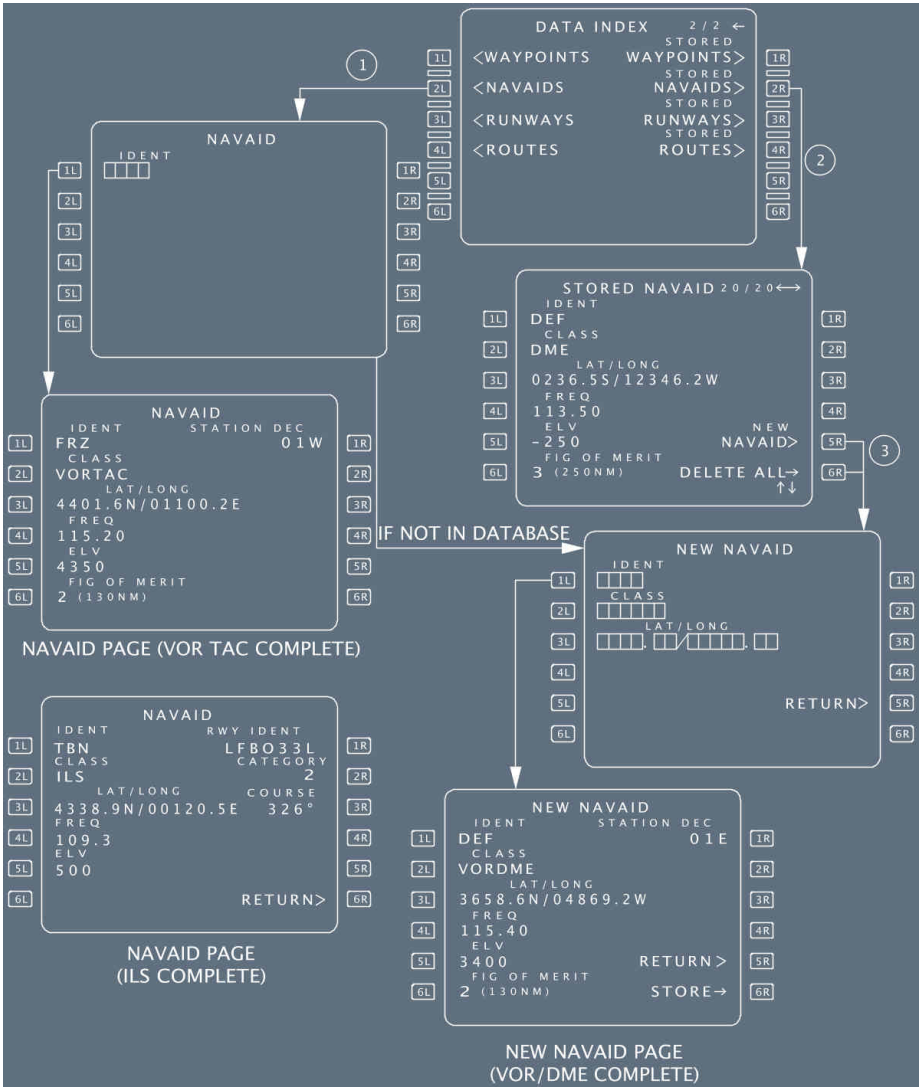
[1L] IDENT	To delete a waypoint, the pilot clears the 1L ident display.
[2L] LAT/LONG	Latitude and longitude of the waypoint are displayed in this field.
[3L]	This field either displays PLACE/BRG/DIST or PLACE-BRG/ PLACE-BRG or PLACE/DIST, depending on how the waypoint was defined.
[5R] NEW WAYPOINT	The pilot presses this key to call up the NEW WAYPOINT page.
[6R] DELETE ALL	The pilot presses this key and the label changes to amber CONFIRM DELETE ALL. Pressing this key a second time deletes all the waypoints, stored by the flight crew, except those currently used in the active or secondary flight plan. (“F-PLN ELEMENT RETAINED” appears on the MCDU).

NEW WAYPOINT PAGE

- The pilot calls up this page by pressing the 5R key on the STORED WAYPOINT page.
- The pilot can use this page to define and store up to 20 waypoints. Entering an additional waypoint deletes the first one.
  The pilot defines a waypoint by entering its ident in the data field next to 1L, then by entering its position in the amber boxes.
  The STORE prompt appears next to 6R when the boxes are filled in, and the pilot presses the key to store the waypoint in the database.
  If the pilot enters the waypoint's position as place/bearing/distance, or place-bearing/place-bearing, the FMGC computes its latitude and longitude.

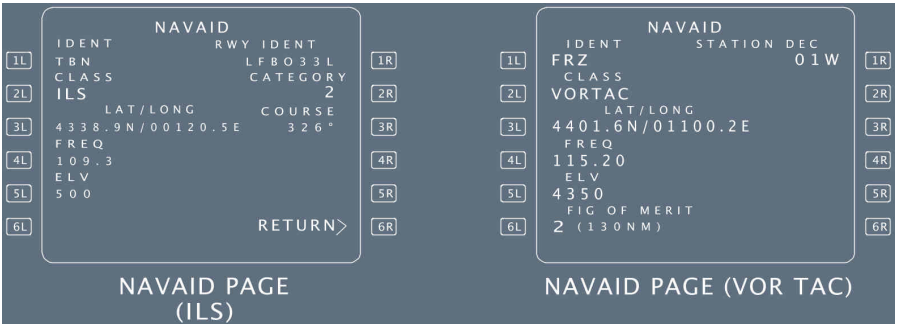
NAVAID/STORED NAVAID/NEW NAVAID PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



NAVAID PAGE

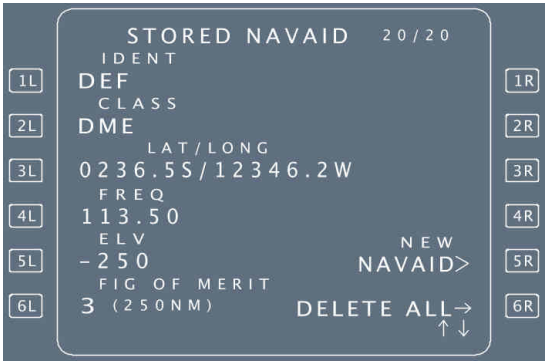
The pilot calls up this page by pressing the 2L key on the DATA INDEX page 2.
This page displays NAVAID information associated with the identifier the pilot inserts in the [1L] field.



[2L] CLASS	This field identifies the NAVAID as VOR, DME, VOR DME, VORTAC, NDB, LOC, ILS, MLS, ILS/DME, MLS/DME, ILS/TAC or TACAN. It displays NON COLLOCATED, if the NAVAID is uncollocated.
[4L] FREQ or CHAN	CHAN is displayed, if the class of NAVAID is an MLS or an MLS DME.
[5L] ELV	This field gives the NAVAID elevation in feet above sea level. It is not displayed for VOR or NDB.
[6L] FIG OF MERIT	This field shows how far out the FMGS can autotune a VOR, VOR/DME, VORTAC, or DME for display or for computing position. 0 : up to 40 nm 1 : up to 70 nm 2 : up to 130 nm 3 : up to 250 nm
[1R] STATION DEC or RWY IDENT	This is the magnetic declination in the NAVAID area (used only for VOR, VOR/DME, and VORTAC). The field displays RWY IDENT, if the NAVAID is a LOC, ILS, MLS, ILS/DME, MLS/DME or ILS/TAC.
[2R] CATEGORY	This field shows the NAVAID's category, if it is an ILS, ILS/DME, MLS, MLS/DME or ILS/TAC. A LOC DME has a category = 0.
[3R] COURSE	This is the localizer course, if the NAVAID is an ILS or a LOC.
[6R] RETURN	This prompt is displayed, if the page has been accessed from the SELECTED NAVAID page. The pilot presses this key to return to the SELECTED NAVAID page.

STORED NAVAID PAGE

The pilot calls up this page by pressing the 2R key on the DATA INDEX page. This page is used to display or delete defined and stored NAVAIDs.

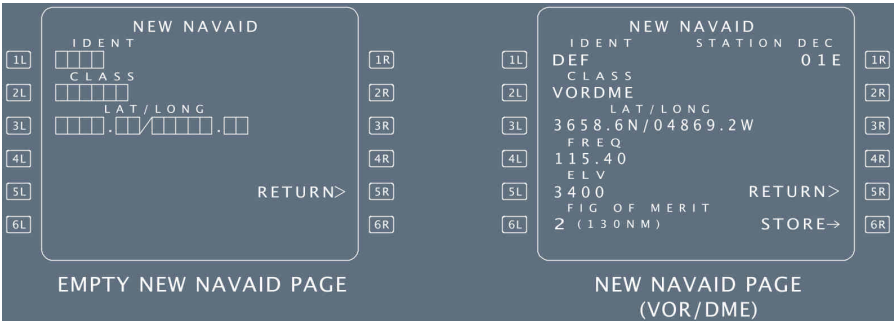


A number in the upper righthand corner of the screen shows the relative order in which the NAVAIDs were stored. (For example, 3/7 means the third out of the seven stored).
Slew keys give the pilot access to the different stored NAVAIDs.

[1L] IDENT	The pilot deletes a stored NAVAID by entering its ident in this field, then by pressing the CLR key at the bottom of the MCDU control panel.
[6R] DELETE ALL and CONFIRM DELETE ALL	The pilot presses this key to erase all the stored NAVAIDs, except those currently used in the active or secondary flight plan. (The MCDU displays “F-PLN ELEMENT RETAINED.”).

NEW NAVAID PAGE

The pilot calls up this page by pressing the 5R key on the STORED NAVAID page.



It can be used to define and store up to 20 NAVAIDs. Entering an additional waypoint deletes the first one. The NAVAID elements must be entered in two steps:

1. Enter the data in the lines of amber boxes.
2. Enter frequency, elevation, figure of merit, and station declination or ILS category and course, if applicable.

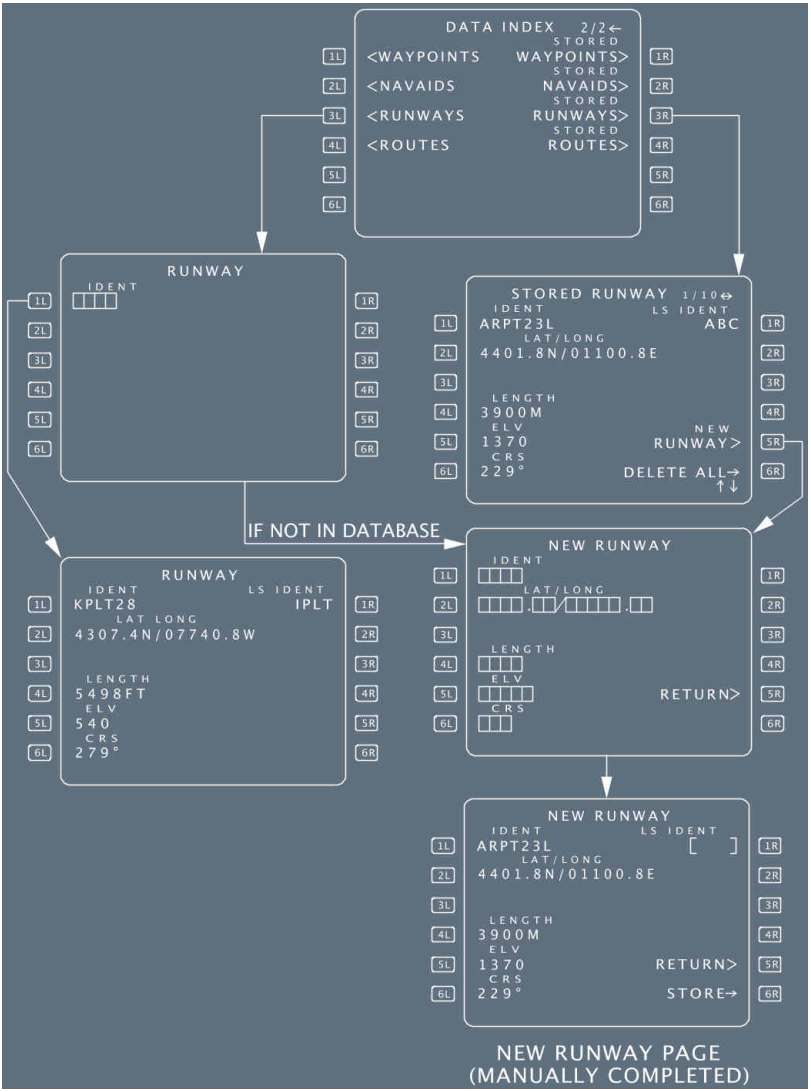
Note: *The pilot cannot create an ILS/DME or an uncollocated NAVAID.*
If the runway associated with the ILS has been entered through the new runway page, the course, IDENT, and runway IDENT are already displayed on the new NAVAID page when it comes up (copied from the new runway page). For details, see the new runway page info below.

[1R] STATION DEC	The pilot must enter the magnetic declination, if the prompt is displayed. This prompt is displayed only for VOR, VORTAC or VOR/DME.
[3R] COURSE	If the NAVAID is an ILS, LOC, enter the course.
[6R] STORE	This prompt appears when all the amber boxes are filled in. The pilot presses the key to store the NAVAID.

A stored NAVAID is never used for position computation.

RUNWAYS/STORED RUNWAYS/NEW RUNWAY PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



RUNWAY PAGE

This page displays the following information:

[1L] IDENT	The runway IDENT, which comprises the airport identification and the runway direction, uses six or seven digits (Example: CYYZ 24L and LFRJ 08).
[2L] LAT/LONG	The latitude and longitude of the runway threshold.
[4L] LENGTH	The runway length in meters (M) or feet (ft), in five digits (9 999 ft).
[5L] ELV	The elevation of the threshold in feet above sea level.
[6L] CRS	The runway course (degrees magnetic).
[1R] LS IDENT	The LOC or ILS identifier.

STORED RUNWAY PAGE

The pilot uses this page to display or delete the defined and stored runways. The stored runways are listed and numbered in the order in which they were inserted. The number is displayed in the upper righthand corner of the page. (For example, 2/4 means the runway is the second of the four stored runways).
The pilot can delete any stored runway from the database by displaying its IDENT in the 1L field, then by pressing the CLR key on the MCDU control panel.

[6R] DELETE ALL and CONFIRM DELETE ALL	The pilot presses this key to erase all the stored runways, except those used in the active or secondary flight plan. (The MCDU displays “F-PLN ELEMENT RETAINED”).
[1L] to [6L]	These fields are similar to the RUNWAY page fields.

NEW RUNWAY PAGE

The pilot can use this page to define and store up to 10 runways.

- **When the pilot enters an ILS/LOC IDENT in the [1R] field the new NAVAID page comes up. When the pilot has entered and stored the necessary data in the new NAVAID page, the new runway page reappears.**

The new runway page and the new NAVAID page (ILS/LOC) are not independent:

- **When the flight crew first defines the ILS/LOC (on the new NAVAID page) the new runway page, when called up, already displays the RWY course, RWY IDENT, and ILS IDENT (copied from the new NAVAID page).**
- **When the flight crew first defines the runway (on the new runway page) the new NAVAID page, when called up, already displays the ILS course, ILS IDENT, and runway IDENT.**

The pilot must enter the two runway directions on two different new runway pages (Example: LFRJ 08 and LFRJ 26) to allow the flight plan to select either one.

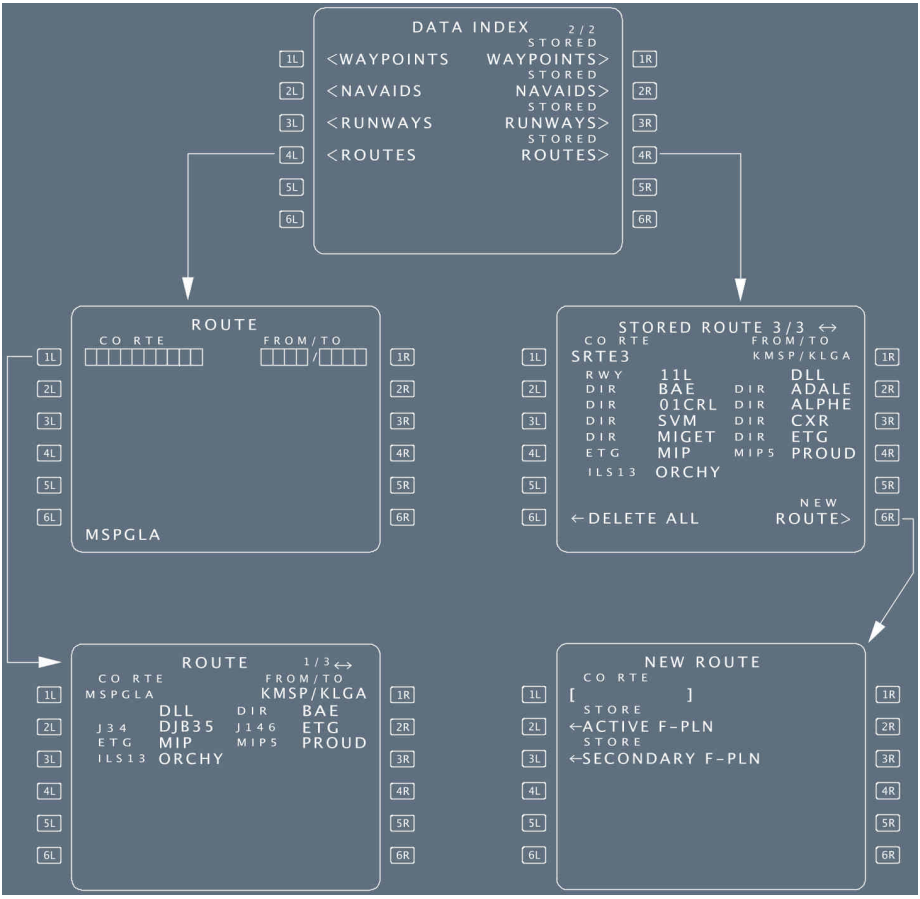
Note: *When 10 runways are stored, entering a new stored runway deletes the first one of the list (1/10).*

[1L] to [6L]	Enter information about the new runway.
[1R] LS IDENT	Enter the ILS/LOC IDENT. The NEW NAVAID page comes up.
[5R] RETURN	The pilot presses this key to return to the NEW NAVAID page.
[6R] STORE	This prompt only appears when all the amber boxes have been filled in.

Note: *The NEW RUNWAY may be used for departure or destination, but no SID or STAR can be associated or stored with this runway. Therefore, the pilot will use it as an "independent" airport.*
A new runway is identified by the 4–letter ICAO airport identifier, although all six or seven digits must be entered.

ROUTE/STORED ROUTE/NEW ROUTE PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



ROUTE PAGES

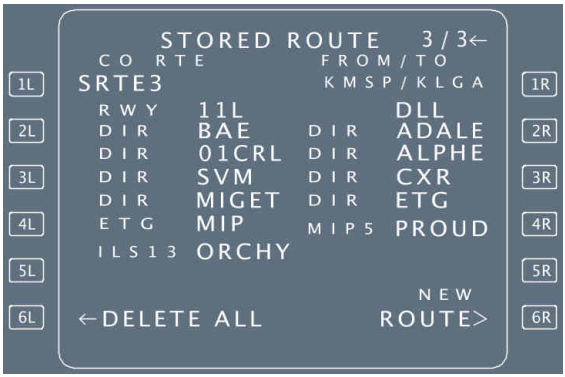
(Not-modifiable)

[1L] CO RTE — Any company route IDENT, entered in this field, causes all the elements of the route to be displayed.

Line 2 to Line 6 — These lines display the various route elements, including waypoints and airways.

[1R] FROM/TO — This field is automatically filled in, when the pilot enters the IDENT for a company route. When the pilot manually enters a city pair, the MCDU displays “NOT IN DATA BASE” if the city pair is not in the navigation database. If the city pair is in the database, the CO RTE field displays the first route stored (small blue font). If more than one route is stored, the pilot can slew to see the different routes.

STORED ROUTE PAGE



This page displays up to 5 routes, stored by the pilot. The stored routes are listed and numbered in the order of insertion. The number is displayed in the upper right-hand corner of the page.

[1L] CO RTE — This field identifies the stored route. Clearing this field deletes the stored route.

Line 2 to Line 5 — The fields in these lines are identical to the corresponding fields in the route page.

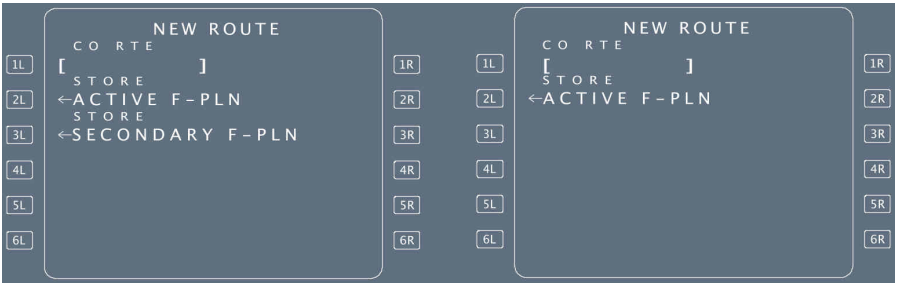
[6L] DELETE ALL — Pressing this key changes the label to amber CONFIRM DELETE ALL. Pressing this key a second time deletes all previously-stored routes.

[1R] FROM/TO — This identifies the city pair of the stored route.

[6R] NEW ROUTE — Pressing this key calls up the new route page.

NEW ROUTE PAGE

The pilot calls up this page by pressing the NEW ROUTE key on the stored route page. It can be used to store up to five new routes that have already been defined in the active or secondary flight plan.



[1L] CO RTE	This field enables the pilot to enter a new company route IDENT. If that IDENT has already been assigned, the entry is rejected.
[2L] STORE ACTIVE F-PLN (blue)	Pressing this key stores parameters of the active flight plan as new route. The display shows this prompt when the system contains a FROM/TO, but only during preflight.
[3L] STORE SECONDARY F-PLN (blue)	Pressing this key stores parameters of the secondary flight plan as new route. The display shows this prompt when the system contains a FROM/TO and the secondary flight plan has not yet been sequenced.

Note:
- *If it has not already been named, a stored route is automatically named when stored: SRTE 1 to SRTE 5.*
- *When 5 routes are already stored, the pilot cannot insert a new stored route. The "STORED ROUTE FULL" message is displayed, and the pilot must manually delete a route in order to store a new one.*
- *Several flight plan elements are not retained when the route is stored:*
  - *Pilot-entered holds*
  - *Offset*
  - *Pilot-entered constraints*
  - *Modifications to terminal procedures*
  - *Pseudo-waypoints*
  - *Step at optimum.*
  - *Pilot-entered constant Mach segment.*
    The MCDU then displays "REVISIONS NOT STORED".

AIRCRAFT STATUS PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The system automatically displays this page at power up, but the pilot may also call it up by pressing the DATA key on the MCDU console.



TITLE — AIRCRAFT TYPE

[1L] ENGINE TYPE — The system uses this to calculate predictions.

Note: *When the same performance database is used for various aircraft configurations, the aircraft type displayed may differ from the actual aircraft.*

[2L] ACTIVE DATABASE — The validity period and part number are displayed in large font.

[3L] SECOND DATABASE — The validity period is displayed in small font. The pilot can press the 3L key to switch to the second database as the active database.

CAUTION	Cycling the database erases the primary and secondary flight plans, as well as the stored data. The flight crew must never do this in flight.

[5L] CHG CODE — This field allows the entry of a code to change the IDLE and/or PERF factor, displayed in 6L. It is displayed in the PREFLIGHT and DONE phases. The label is displayed in small white font. The brackets, or the entered value, is displayed in large blue font.

[6L] IDLE/PERF

It is only possible to modify these factors when the aircraft is on ground. If no value was entered, the FMS displays default values coded in the Airline Modifiable Information (AMI) file.
Default values are displayed in small font, although manually entered values are displayed in large font.

When it is necessary to modify the IDLE or the PERF factor:
- ENTER the change code in the CHG CODE field [5L].
  The default value for this code is “ARM” but it is possible to modify it on airline request (the applicable code is then coded in the Airline Modifiable Information (AMI) file).
  When a valid change code is entered, the IDLE and PERF factors are displayed in blue.
- ENTER the new IDLE and/or PERF factor(s) in the scratchpad.
- PRESS the [6L] key to insert the new IDLE and/or PERF factor(s).
  The new IDLE and/or PERF factor(s) is (are) displayed in large blue font.

[4R] STORED

This field displays pilot-stored data in a large green font. The field is blank, if no data is stored. (The airline can choose to have this data automatically erased at the done phase).

[5R] DELETE ALL

Pressing this key changes the label to amber CONFIRM DELETE ALL. Pressing this key a second time deletes all pilot-stored data, except data that is part of the active and secondary flight plans.

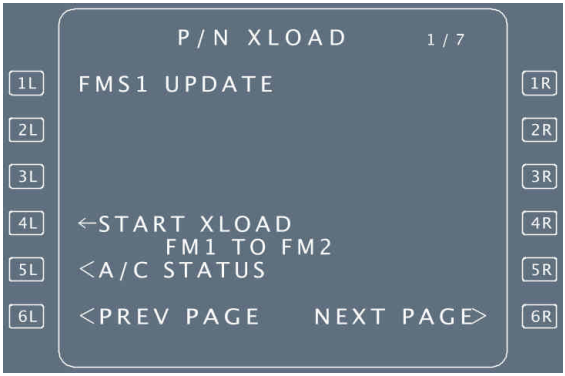
[6R] STATUS/XLOAD

This prompt gives access to the P/N STATUS and P/N XLOAD pages.

P/N XLOAD PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

This page allows the crossloading of all databases or configuration files part numbers which are different between both sides. Crossloading from this page avoids reviewing each individual P/N STATUS page.



TITLE	P/N XLOAD
[1L]	FMS 1 UPDATE: FMS 1 can be loaded on the right side MCDU. FMS 2 UPDATE: FMS 2 can be loaded on the left side MCDU
[4L]	START XLOAD: This blue prompt is displayed, only if the system detects a difference between both sides' part numbers. FMS 1/FMS 2 IDENTICAL: Displayed in green, when there is no difference between both sides' part numbers.
Line 5	FM 1 TO FM 2 or FM 2 TO FM 1: Indicates the crossloading direction. This line is not displayed when there is no difference between both side part numbers.
[5L]	A/C STATUS: This white prompt is displayed, when there is no crossloading in process. It gives access to the A/C STATUS page. MM: SS MIN REMAINING: Indicates the time remaining for crossload completion, when a crossload is in process.
[6L] PREV PAGE	The pilot presses this key to return to the A/C STATUS page.
[6R] NEXT PAGE	Pressing this key calls up the next P/N XLOAD page.

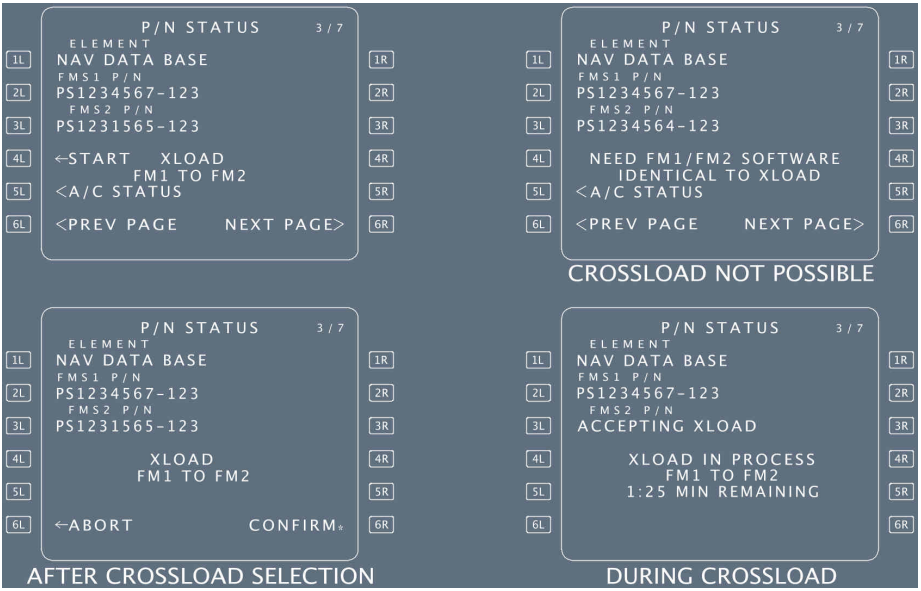
P/N STATUS PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

These pages allow reviewing and crossloading the following databases and configuration files between both FMS:

- Page 2 FMS SOFTWARE part numbers
- Page 3 NAV DATA BASE part numbers
- Page 4 FM AIRLINE CONFIG part numbers
- Page 5 FM OPTIONS CONFIG part numbers

- Page 6 PERF DATA BASE part numbers
- Page 7 FLIGHT TEST DATA BASE



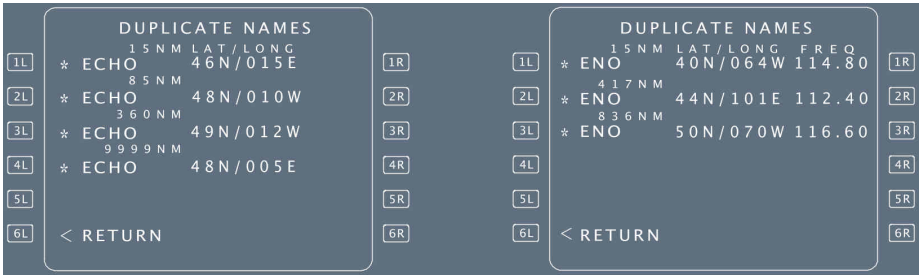
TITLE	P/N STATUS
Line 1 ELEMENT	Indicates the name of the database or configuration file that can be crossloaded: - FMS SOFTWARE on Page 2 - NAV DATA BASE on Page 3 - FM AIRLINE CONFIG on Page 4 - FM OPTIONS CONFIG on Page 5 - PERF DATA BASE on Page 6 - FLIGHT TEST DATABASE on Page 7.
Line 2 FMS1 P/N Line 3 FMS2 P/N	These fields display the part numbers of the database or configuration file (stated on line 1), that are installed on the FMS 1 and 2. Identical part numbers are displayed in green, different ones in amber. During crossload, the updated part number is replaced by the amber “ACCEPTING XLOAD” message.

Line 4	This line is empty when the active flight phase is not Preflight or Done. XLOAD FMx TO FMy or START XLOAD FMx TO FMy: This blue prompt is displayed when the database or configuration file (stated on line 1) can be crossloaded. XLOAD ARMED: Displayed in blue on the receiving FM when the crossload has been requested, but not yet confirmed. XLOAD IN PROCESS: Displayed in white when the crossload is ongoing. XLOAD NOT SUPPORTED: Crossloading is unavailable for this element. NO P/N TO XLOAD: The element is missing. NEED FG 1/FG 2 IDENTICAL TO XLOAD: The receiving side's FG software is incompatible with the FG software to be crossloaded. NEED FM 1/FM 2 SOFTWARE IDENTICAL TO XLOAD: The crossloaded element is incompatible with the receiving side's FM software.
[5L] A/C STATUS	This prompt is available, when no crossload is in process. This gives the pilot access to the aircraft status page. MM: SS MIN REMAINING: Displays the time remaining to complete the crossload, when a crossload is in process.
[6L] PREV PAGE ABORT	This key calls up the previous P/N STATUS page. This amber prompt is displayed when a crossload is in process. The pilot uses it to stop the crossload.
[6R] NEXT PAGE CONFIRM*	This key calls up the next P/N STATUS page. This amber prompt is displayed when a crossload has been armed. The pilot presses it to start the crossload.

DUPLICATE NAMES PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

This page, which automatically appears, allows the pilot to select a specific waypoint, airport, or NAVAID when the database holds more than one under the same identifier.



The pilot presses the key adjacent to a waypoint, NAVAID, or airport to select it as the one to be entered. When the pilot has finished, the page automatically reverts to the previously displayed page.

DISTANCE

The direct distance to the aircraft is displayed in green above each name. If this distance is greater than 9 999 nm, 9 999 nm is displayed.

LAT/LONG COLUMN

This column lists the rounded off latitudes and longitudes of the different points, using the same identifier.

FREQ/CHAN COLUMN

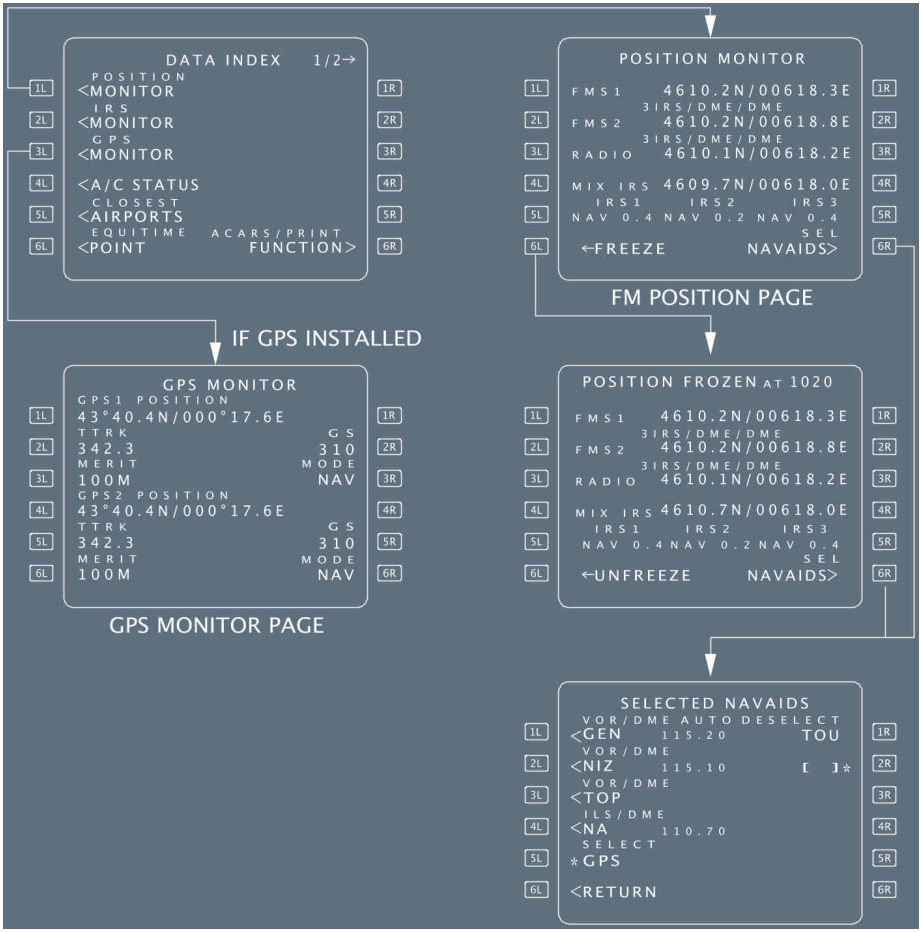
This column lists the NAVAIDs frequencies, if any. It displays CHAN for a MLS.

Note:
- *The DUPLICATE NAMES page is not displayed when 2 waypoints with the same IDENT belong to the same airway. The system selects the first waypoint found in the database.*
- *The waypoints or NAVAIDs are ranked by their distance from the aircraft position.*
- *When a waypoint is named using ICAO phonetic alpha characters, a minus sign and the ICAO code of the country where the waypoint is located, are displayed. e.g. Alpha in France becomes A-LF; Bravo in England becomes B-EG.*

POSITION MONITOR PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

This page displays all the different positions that the FMGC has computed with the various available methods of navigation. It also shows which method obtained each position. (The positions should be almost identical).
The pilot calls up this page by pressing the 1L key on the data index page.



POSITION MONITOR AND POSITION FROZEN PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

29 Line 1 FMGC 1 — This line shows the latitude and longitude, as calculated by the FMGC 1, and the navigation method used by the FMGC for that calculation (Example: “3 IRS/DME/DME”).

Line 2 FMGC 2	This line shows the latitude and longitude, as calculated by the FMGC 2, and the navigation method used.
Line 3 RADIO or GPS or GPIRS	This line shows the latitude and longitude, calculated by the onside FMGC from selected radio NAVAIDs (Example: DME/DME, VOR/DME, or LOC) or from GPS or GPIRS.
Line 4 MIX IRS	This line shows the latitude and longitude of the weighted mean inertial reference system (IRS) calculated by the onside FMGC from the available IRSs.
Line 5 IRS 1,2,3	This line shows the deviation in nautical miles of each IRS position from the onside FMGC position. It also displays the IRS mode, which can be INVAL, ALIGN, NAV or ATT. *Note: INVAL is displayed when an ADIRS has failed, or the IRS position is not refreshed.*
[6L] FREEZE/UNFREEZE	The pilot presses this key to freeze (or unfreeze) all the data displayed on the page. When the data is frozen, the title of the page specifies the time at which it was frozen.
[6R] SEL NAVAIDS	The pilot presses this key to access the selected NAVAIDs page.

SELECTED NAVAIDS PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

MODIFIABLE ONLY FOR DESELECTION

Line 1	This field displays the NAVAID tuned for display purposes, and the tuning mode (AUTO, MAN, or RMP).
Line 2 and 3	These fields display the NAVAIDs, if any, tuned for the calculation of radio position by the FMGC.
[4L]	This field displays the tuned ILS, if any.
[5L] DESELECT/SELECT GPS	The crew presses this key to manually select or deselect the GPS for position computation. Upon transition to the DONE phase, the prompt returns to DESELECT status. If the pilot deselects the GPS, “GPS IS DESELECTED” is displayed when the aircraft is less than 80 nm from the top of descent, or in approach phase.
[6L] RETURN	The pilot presses this key to return to the POSITION MONITOR page.

[1R] DESELECT to [6R]

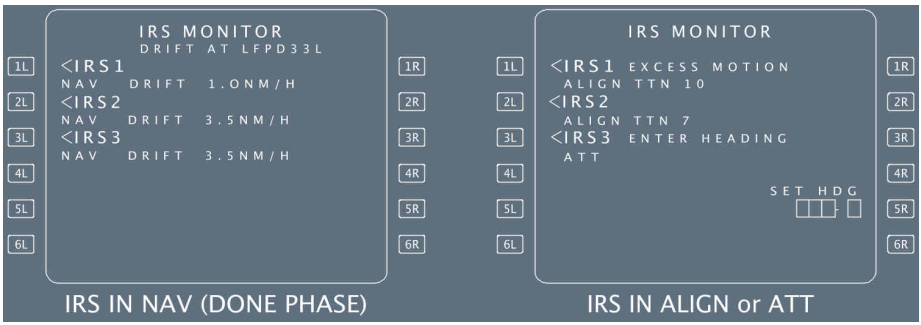
The pilot deselects a NAVAID by entering its identifier in one of these six fields. Once deselected in this way, the NAVAID can no longer be tuned manually through the entry of its IDENT, nor can it be autotuned for display or determination of the position for the rest of the flight.

The deselection is cleared:
- Manually, by a CLR action into this field, or
- Automatically upon transition to the done or preflight phase, or upon activation of the second database.
  The pilot may deselect as many as six stations.

IRS MONITOR PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

This page displays the IRS data. The crew calls up this page by pressing the IRS monitor prompt of the DATA INDEX page.



TITLE DRIFT AT XXXX (amber)

Displays “DRIFT AT” runway identifier, if at least one IRS average drift is displayed.

[1L] to [3L] IRS 1(2) (3) (white)

These prompts allow access to the associated IRS pages. Each label line displays the mode (NAV, ALIGN, ATT or INVAL), the average drift (upon transition to DONE phase), and the Time To NAV (if IRS in align) for each IRS.

[1R] to [3R] Displays the status message of the associated IRS in small green font.

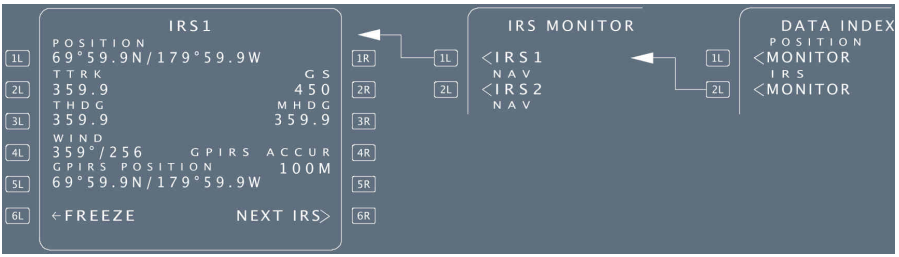
List of available messages:
- IR FAULT
- CHECK C/B
- DELAYED MAINT
- CDU FAULT
- ENTER PPOS
- ENTER HEADING
- SELECT ATT
- REENTER PPOS
- EXCESS MOTION
- SYS BELOW -15 °
- SWITCH ADR

[5R] SET HDG (white) This field is displayed, if at least one IRS is in ATT mode.

This function allows initialization of a heading for IRS in ATT mode:
- If a heading has been entered in this field, or on the ADIRS panel, the value is displayed in blue.
- If not, amber boxes are displayed.

IRS 1 (2)(3) PAGE

This page displays the IRS parameters and GPS/IRS hybrid parameters. The pilot calls up this page by pressing either the 1L key from the IRS MONITOR page, or the NEXT IRS prompt on another IRS page (closed loop).



TITLE Displays the selected IRS in large white font.
When data is frozen, IRS is replaced by “IRS FROZEN AT”, followed by the time at which the pilot has frozen the display.

[1L] POSITION Displays the latitude/longitude given by the selected IRS.

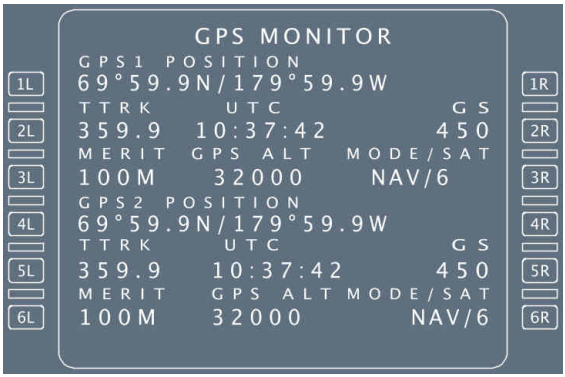
[2L] TTRK True track

[3L] THDG	True heading
[4L] WIND	True wind direction/velocity
[5L] GPIRS	GPS/IRS hybrid position of the IRS
[6L] FREEZE/UNFREEZE	Allows the crew to freeze or unfreeze all data displayed on all three IRS pages. When the data is frozen, the title of the page specifies the time at which it was frozen. It is automatically unfrozen when exiting the page.
[2R] GS	Ground speed
[3R] MHDG	Magnetic heading
[4R] GPIRS ACCUR	GPS/IRS Figure of Merit (meters or feet)
[6R] NEXT IRS	This prompt enables another IRS page (closed loop IRS 1 → 2 → 3 → 1) to be displayed.

GPS MONITOR PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

This page displays the GPS data. The pilot calls up this page by pressing the GPS MONITOR prompt of the DATA INDEX page.



Line 1 and 4 GPS 1,2	POSITION
[2L] and [5L] TTRK	GPS 1, 2 true track
[3L] and [6L] MERIT	GPS 1, 2 figure of merit (meters or feet)
[2R] and [5R] GS	GPS 1, 2 ground speed

[3R] and [6R] MODE/SAT : GPS 1, 2 mode (INIT, ACQ, NAV, TEST, FAULT, AIDED or ALTAID) and Number of satellites tracked.

INIT	:	System initialization
ACQ	:	Satellite acquisition
NAV	:	Normal mode
TEST	:	System test
FAULT	:	Invalid system
ALTAID/AIDED	:	Degraded modes. GPS uses aircraft inputs for computation purposes.

[2] and [5] UTC : GPS 1, 2 UTC

[3] and [6] GPS ALT : GPS altitude is displayed for information purposes. It is not used by the FMGS.

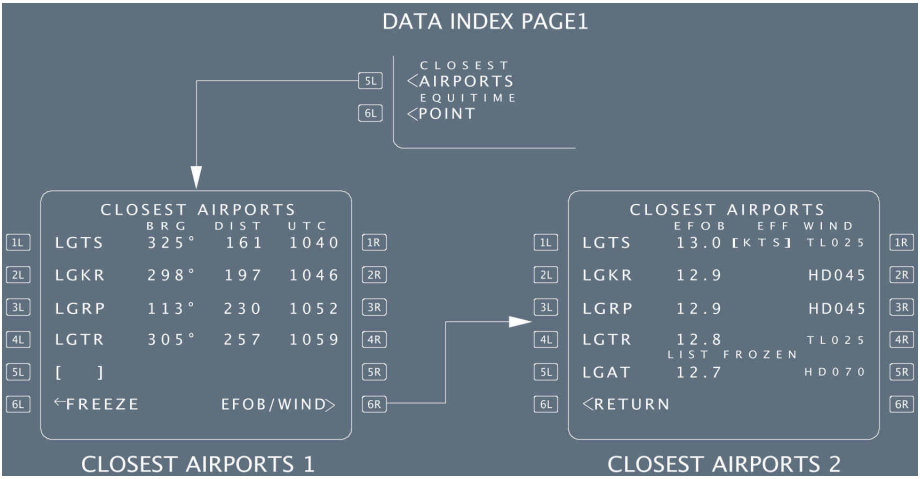
CLOSEST AIRPORTS PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The system automatically selects the closest 4 airports from the current aircraft position, and displays them on these pages. A fifth one can be selected by the pilot.

Page 1 displays the bearing, distance, and time to go to each airport; page 2 displays the EFOB and allows the crew to enter an effective wind to be flown to each airport.

The flight crew accesses the CLOSEST AIRPORTS page 1 by pressing the 5L key from the DATA INDEX A page. They access the CLOSEST AIRPORTS page 2 by pressing the EFOB/WIND prompt (6R key) on page 1.



[1L] - [1R] to [4L] - [4R] The closest four airports are extracted from the database, and ranked by distance from the aircraft position.

- BRG — Displays the current bearing from the aircraft's position to the airport.
- DIST — Displays the current great-circle distance from the aircraft's position to the airport.
- TIME or UTC — Displays the predicted time to the airport, computed using the current wind or a wind vector entered on page 2, and the speed according to the current mode (managed or selected).
  The time is only computed in cruise phase.

[5L] The crew may enter a fifth airport here, using the 4-letter code. The entry may be modified at any time, even when “LIST FROZEN” is displayed.
If the pilot enters an airport that is not in the database, then “NOT IN DATABASE” appears in the scratchpad.

[1L] - [1R] EFOB to [5L] - [5R] EFF WIND Displays the EFOB at each airport. EFOB is only computed in cruise phase.
Used to enter an anticipated headwind or tailwind along the bearing to the airport. If the entry is preceded by +, T, or TL, a tailwind is assumed.
If the entry is preceded by -, H, or HD, a headwind is assumed.
Before pilot entry, a default value may be displayed, based on the current wind.
The effective wind is used to compute the EFOB and time to the airport.

[6L] FREEZE/UNFREEZE This prompt enables the pilot to freeze and unfreeze the list of four airports.
The list is automatically frozen when accessing page 2. It will remain frozen upon returning to page 1.
The “LIST FROZEN” message is always displayed on page 2.

RETURN Returns to page 1.

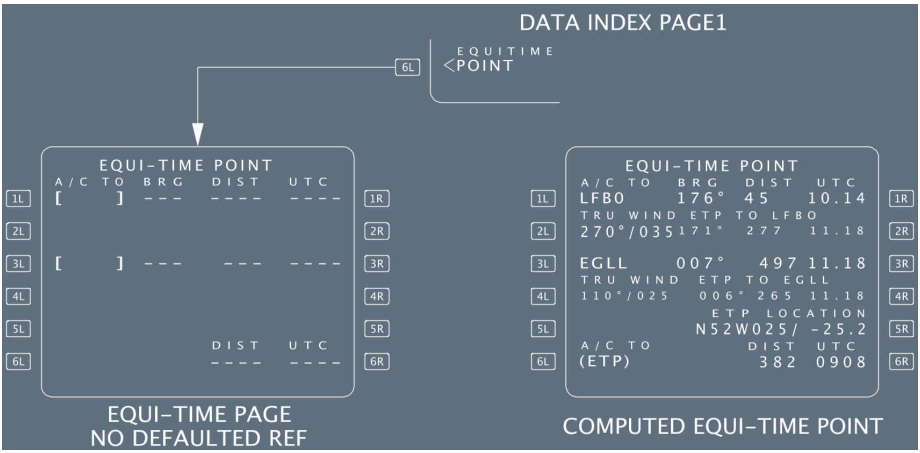
[6R] EFOB/WIND Gives access to page 2.
Pressing this prompt automatically freezes the list of the four closest airports.

Note: - *If the aircraft position becomes invalid, all fields are dashed, FREEZE/UNFREEZE and EFOB/WIND prompts are removed, LIST FROZEN is displayed, and the A/C POSITION INVALID message is displayed in the scratchpad. Page 2 cannot be accessed.*
- *Predictions (EFOB, TIME) displayed on the page assume:*
  - *ECON CRZ speed (managed) or current selected speed (selected)*
  - *CI (for managed speed only) and CRZ FL from primary F-PLN are kept*
  - *constant wind value*
  - *In case of engine out, the aircraft altitude is the minimum of (CRZ FL, EO MAX ALT)*
  - *Downpath steps are not considered*
  - *Descent fuel burn is a conservative value which only depends on the difference between current CRZ ALT and destination altitude.*

EQUI-TIME POINT PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The pilot uses this page to require an equitime point computation between two different points (airport, NAVAID, runway, NDB or waypoint). This pseudo-waypoint (ETP) is displayed on the navigation display along the F-PLN. The EQUI-TIME POINT page is accessed by pressing the 6L key from the DATA INDEX page:



[1L] A/C TO and (blue) Displays reference waypoint 1.
[3L] Displays reference waypoint 2.

Note: *Origin and destination airports are used by default for respective reference points 1 and 2, until a pilot entry is made.*

[1R] BRG/DIST/UTC and (TIME)	This field displays the bearing, distance, time, from the aircraft's current position to the reference waypoint 1. Idem for the reference waypoint 2.
[3R] (green)	BRG: Displays the current great-circle bearing from the aircraft's position to the reference waypoint. DIST: Displays the current great-circle distance from the aircraft's position to the reference waypoint. TIME: Displays the predicted time to the reference waypoint (computed using the current wind or a wind vector, entered by the crew). Time is only computed in the cruise phase. In other cases, it is dashed.
[2L] and [4L] TRU WIND and (blue)	The pilot may enter the wind (direction/velocity) at the reference waypoint and the CRZ FL: This wind is used to compute the time from the aircraft's position to the reference waypoint, and to locate the equitime point. If no entry is made, the wind/velocity field will read zero.
[2R] and [4R] EPT TO XXX and (green)	This field displays the bearing distance and the time from the equitime point position (ETP) to the reference waypoint.
[5R] ETP LOCATION	This field displays the ident of the next waypoint following the equitime point. It provides the distance along the flight plan from the equitime point to the indicated waypoint.
[6L] - [6R] A/C TO (ETP) DIST/UTC (green)	This field displays the distance and time from the aircraft's current position to the equitime point along the flight plan. If at least one reference waypoint exists, but no equitime point exists, the field is blank and NO ETP is displayed in 6L.

Note: *The assumptions for the equitime point computation include the cost index, speed managed (with SPD LIM), and winds.*
In case of engine-out, the EO LRC speed is considered.

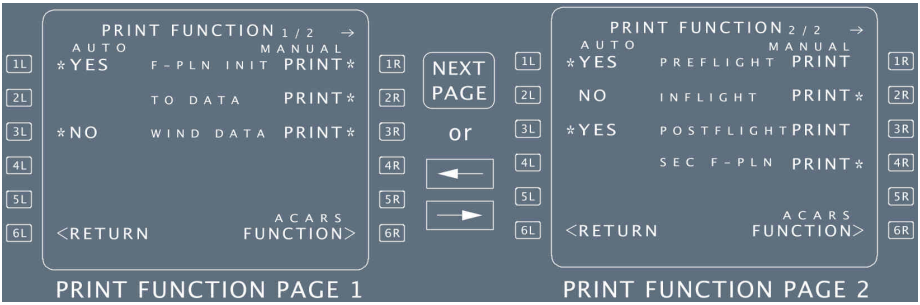
PRINT FUNCTION PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The PRINT FUNCTION pages enable the crew to print the data relative to the current flight.

This data comes from 2 different sources:
- ACARS uplink messages, and
- Active data from the current flight.

The pilot may access these pages from the “DATA INDEX” page1/2 by pressing the [6R] ACARS/PRINT FUNCTION key.



PRINT FUNCTION PAGE 1/2

This page displays the status of the automatic printing capabilities, for the uplink messages (left column), and the status of the manual printing capabilities of the current active data (right column).

LEFT COLUMN

AUTO

* YES (blue)	Line 1:	Uplink messages related to flight plan INIT data are automatically printed when received.
	Line 2:	Uplink messages related to takeoff data are automatically printed when received.
	Line 3:	Uplink messages related to wind data are automatically printed when received.
* NO (blue)		When "NO", preceded by a star, is displayed in front of a line, automatic printing is deselected. The pilot can reactivate it by pressing the left key of the line.
NO (without a star)		Automatic printing is internally deactivated for the data of the line. The pilot cannot reactivate it manually.
Blank		The ACARS function is not available for this line. Uplink messages can neither be received nor automatically printed.

RIGHT COLUMN

MANUAL		Displays the status of the manual printing capability of the active data (and not of the ACARS uplink data).
PRINT * (amber)		Pressing the right keys prints the following active data:
	Line 1:	Active flight plan INIT data
	Line 2:	Active takeoff data
	Line 3:	Active wind data

If the star is not displayed, printing is not possible.
When the key is pressed, the star is removed until the data is printed.

[6L] RETURN	Pressing this key reverts the display to the DATA INDEX page.
[6R] ACARS FUNCTION	Pressing this key reverts the display to the ACARS FUNCTION page.

PRINT FUNCTION PAGE 2/2

This page describes the printing capabilities of the reports displayed on lines 1 to 4.

LEFT COLUMN

AUTO (white)

* YES (blue)
  - Line 1: The PREFLIGHT report is automatically printed at engine start.
  - Line 2: The INFLIGHT report is automatically printed at takeoff.
  - Line 3: The POSTFLIGHT report is automatically printed at engine shutdown.

* NO (blue): The report, displayed on the line, is not printed automatically. The pilot can reactivate the function by pressing the left key of the line.

NO (without a star): Automatic printing is internally deactivated for the report. The pilot cannot reactivate it.

RIGHT COLUMN

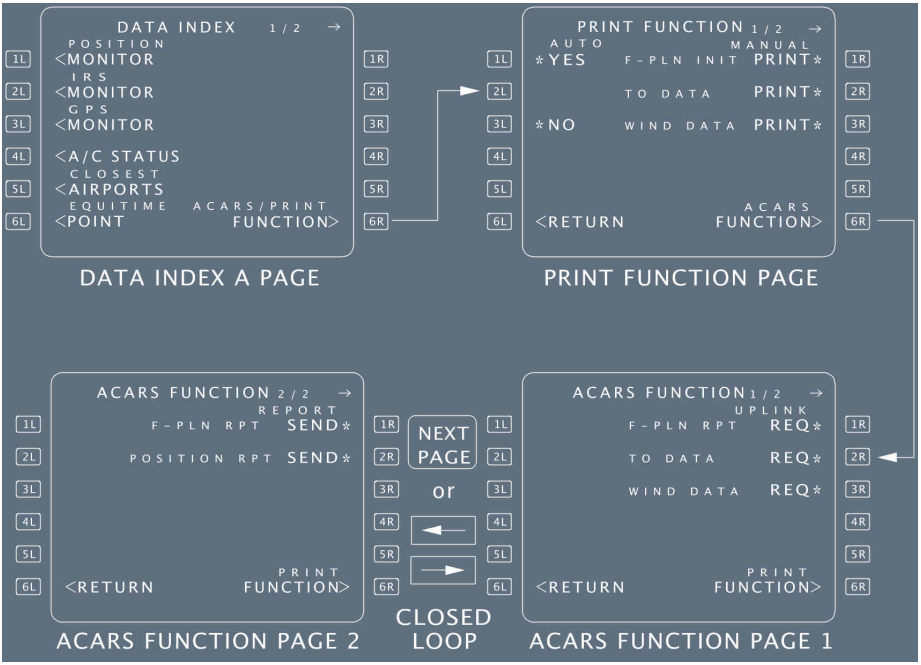
MANUAL PRINT *

Pressing a right key prints the report displayed on the line.
If the star is not displayed, printing is not possible.
When the key is pressed, the star is removed until the report is printed.
For the PREFLIGHT, INFLIGHT and POSTFLIGHT reports, only one type of report is available for printing at any given time, depending on the current flight phase.
For the SEC F-PLN report, the print selection start is only displayed if a secondary flight plan exists.

ACARS FUNCTION PAGE

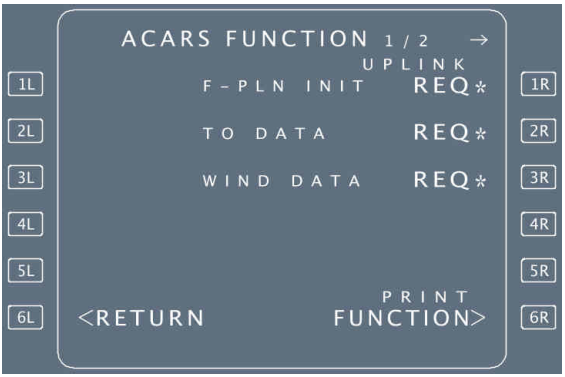
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The ACARS FUNCTION pages display the functions enabling the crew to send manual requests or reports to the ground.
All functions, displayed on pages 1 and 2, may be inhibited through a pin program.
The ACARS/PRINT FUNCTION prompt is displayed on the DATA INDEX page 1/2. Pressing this key displays the PRINT FUNCTION page from which the ACARS FUNCTION page can be accessed.



ACARS FUNCTION PAGE 1

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



TITLE ACARS FUNCTION 1/2 in white

Line 1 F-PLN INIT REQ* Pressing this key sends a request for flight plan to the ground (downlink message)
The INIT REQUEST prompt of the INIT A page provides the same function.

Line 2 TO DATA REQ* Pressing this key sends a request for takeoff data.
Displayed in the DONE and PREFLIGHT phases.
The TO DATA REQUEST prompt of the UPLINK TO DATA REQ page provides the same function.

Line 3 WIND DATA REQ* Pressing this key sends a request for wind data.
The WIND REQUEST prompt of the CLIMB, CRUISE, and DESCENT WIND pages provides the same function.

Note: *If "REQ" is not followed by a star, the request cannot be sent (downlink message).*
When a function (line 1 or 2 or 3) is deactivated internally, the corresponding line is blank.

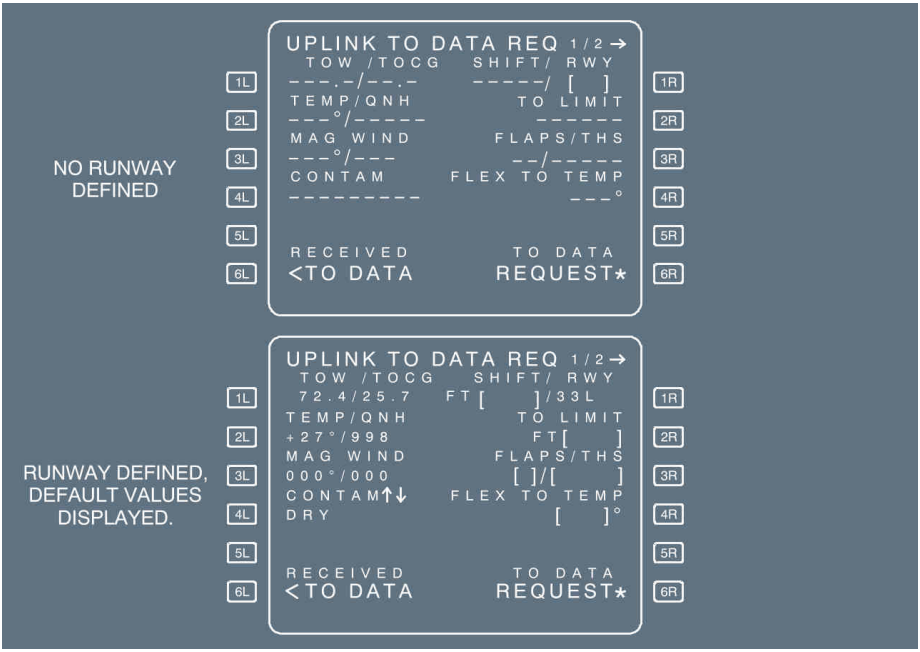
[6L] RETURN The pilot presses this key to make the display revert to the DATA INDEX page.

[6R] PRINT FUNCTION The pilot presses this key to access the PRINT FUNCTION page. (*Refer to DSC-22_20-50-10-25 Print Function Pages*).

UPLINK TO DATA REQ PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

30 This page allows the pilot to send a request for takeoff data for up to 2 runways. There is one page for each runway. The page is accessed from the PERF TAKEOFF page, or from the UPLINK XXX (MAX or FLX) TO DATA page, by pressing the UPLINK TO DATA prompt.



TITLE	White.
[1L] TOW/TOCG (green)	This field is dashed, until a runway is defined in the [1R] field. The TOW/TOCG is defaulted to the values of the INIT B and FUEL PRED pages. If not available, dashes are displayed. It cannot be modified by the pilot.
[2L] TEMP/QNH or QFE (green/blue)	This field is dashed, until a runway is defined in the [1R] field; TEMP = Defaulted to SAT, and cannot be modified by the crew. BARO = Defaulted to FCU selection and can be modified by the pilot.
[3L] MAG WIND (blue)	This field is dashed, until a runway is defined in the [1R] field. It displays the wind at the origin. The pilot can modify this field.
[4L] CONTAM (blue)	This field is dashed, until a runway is defined in the [1R] field. The display is defaulted to DRY. The slew keys allow the crew to modify the runway contamination. DRY, WET, 1/4 WATER, 1/2 WATER, 1/4 SLUSH, 1/2 SLUSH, COMP SNOW.

[6L] RECEIVED TO DATA — This field calls up the UPLINK MAX (or FLX) TO DATA page that displays the data received by ACARS.



[1R] SHIFT/RWY (blue) — This field is dashed, until a runway is defined in the F-PLN. If a runway is defined in the F-PLN, it is automatically filled:

- SHIFT = Value from the PERF TO page, or blue bracket if no value is defined.
- RWY = F-PLN departure runway. The pilot can modify this field.

[2R] TO LIMIT (blue) — It is dashed, until a runway is defined in the [1R] field.
It displays blue brackets [ ], when a runway is defined.
The pilot may enter a length, considering runway obstacles.

[3R] FLAPS/THS (blue) — This field is dashed, until a runway is defined in the [1R] field; it is then defaulted to values from the PERF TO page. Blue brackets are displayed, if the PERF TO page does not have any defined values.

[4R] FLEX TO TEMP (blue) — This field is dashed, until a runway is defined in the [1R] field; it is then defaulted to values from the PERF TO page. Blue brackets are displayed, if the PERF TO page does not have any defined values.
The pilot can modify this field and enter a FLEX TO temperature (FXX).

[6R] TO DATA REQUEST* (amber) — Pressing the key sends the takeoff data request message to the ground. The star disappears when the request is sent. It reappears when the data is available.

Page 2/2 is a page used for requesting a second runway data.

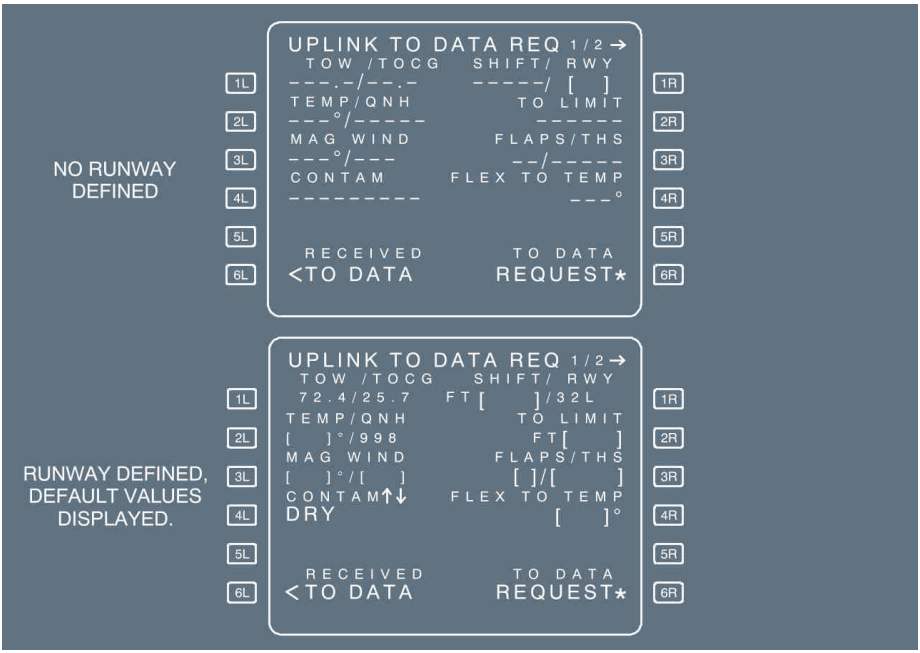
Note: *If the UPLINK TO DATA REQ Page 2 is accessed (Page 1 being filled), the fields of this page are filled with default values after entry of a runway in [1R]. QNH or QFE and wind are common with Page 1.*

UPLINK TO DATA REQ PAGES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

31

This page allows the flight crew to send a request for takeoff data for up to 2 runways. There is one page for each runway. The page is accessed from the PERF TAKEOFF page, or from the UPLINK XXX (MAX or DRT or FLX) TO DATA page, by pressing the UPLINK TO DATA prompt.



TITLE	White.
[1L] TOW/TOCG (green)	This field is dashed, until a runway is defined in the [1R] field. The TOW/TOCG is defaulted to the values of the INIT B and FUEL PRED pages. If not available, dashes are displayed. It cannot be modified by the pilot.
[2L] TEMP/QNH or QFE (green/blue)	This field is dashed, until a runway is defined in the [1R] field. It displays the temperature at origin and baro setting. TEMP = If the temperature is not defined, blue brackets are displayed, and the flight crew can modify this field according to the weather information. BARO = Defaulted to FCU selection and can be modified by the pilot.

[3L] MAG WIND (blue) This field is dashed, until a runway is defined in the [1R] field. It displays the wind at the origin.
If the wind is not defined, blue brackets are displayed.
The pilot can modify this field.

[4L] CONTAM (blue) This field is dashed, until a runway is defined in the [1R] field. The display is defaulted to DRY.
The scroll keys allow the crew to modify the runway contamination.
DRY, WET, 1/4 WATER, 1/2 WATER, 1/4 SLUSH, 1/2 SLUSH, COMP SNOW.

[6L] RECEIVED TO DATA This field calls up the UPLINK MAX (or FLX or DRT) TO DATA page that displays the data received by AOC.



[1R] SHIFT/RWY (blue) This field is dashed, until a runway is defined in the F-PLN. If a runway is defined in the F-PLN, it is automatically filled in as:

- SHIFT = Value from the PERF TO page, or blue brackets [ ], if no value is defined.
- RWY = F-PLN departure runway. The pilot can modify this field.

[2R] TO LIMIT (blue) It is dashed, until a runway is defined in the [1R] field.
It displays blue brackets [ ], when a runway is defined.
The pilot may enter a length, considering runway obstacles.

[3R] FLAPS/THS (blue) This field is dashed, until a runway is defined in the [1R] field; it is then defaulted to values from the PERF TO page. Blue brackets are displayed, if the PERF TO page does not have any defined values.

[4R] FLEX TO TEMP (blue) This field is dashed, until a runway is defined in the [1R] field; it is then defaulted to values from the PERF TO page. Blue brackets are displayed, if the PERF TO page does not have any defined values.
The pilot can modify this field and enter a FLEX TO temperature (FXX).

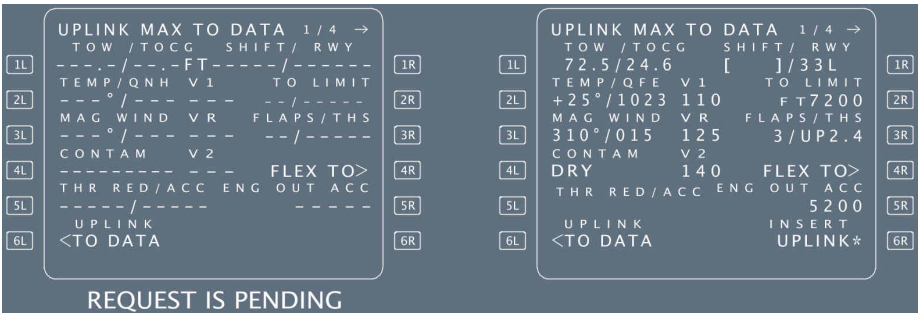
[6R] TO DATA REQUEST* (amber)	Pressing the key sends the takeoff data request message to the ground. The asterisk disappears when the request is sent. It reappears when the data is available.

Page 2/2 is a page used for requesting a second runway data.

Note: *If the UPLINK TO DATA REQ Page 2 is accessed (Page 1 being filled), the fields of this page are filled with default values after entry of a runway in [1R]. QNH or QFE and wind are common with Page 1.*

UPLINK MAX TO DATA PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI



This page is accessed from the UPLINK TO DATA REQ page by pressing the RECEIVED TO DATA key.

There is a set of 2 pages (MAX TO DATA and FLEX TO DATA) for each of the 4 uplinked runway data. Uplinked data is displayed in green. (It cannot be modified by the flight crew).

[1L] TOW/TOCG	Uplinked reference Takeoff Gross Weight and Takeoff Center of Gravity.
[2L] TEMP/QNH (or QFE)	Uplinked assumed temperature and BARO setting.
[3L] MAG WIND	Uplinked takeoff runway wind.
[4L] CONTAM	Uplinked takeoff runway contamination.
[5L] THR RED/ACC	Uplinked Thrust Reduction and Acceleration altitudes.
[6L] UPLINK TO DATA	Pressing the key calls up the UPLINK TO DATA REQ page.
V1, VR, V2	Uplinked takeoff speeds.
[1R] SHIFT/RWY	Uplinked TO runway IDENT, runway intersection and position shift.
[2R] TO LIMIT	Uplinked runway length remaining.
[3R] FLAPS/THS	Uplinked FLAPS/SLATS CONF and TRIM position.

[4R] FLEX TO — Pressing this key calls up the UPLINK FLEX TO DATA pages.

[5R] ENG OUT ACC — Uplinked engine-out acceleration altitude.

[6R] INSERT UPLINK* — Uplinked takeoff data is available for insertion.

Selecting this prompt inserts the following data on the PERF TO page:
- V1, VR, V2
- THR RED/ACC, ENG OUT ACC altitudes
- MAG WIND
- FLAPS/THS
- SHIFT
- FLEX

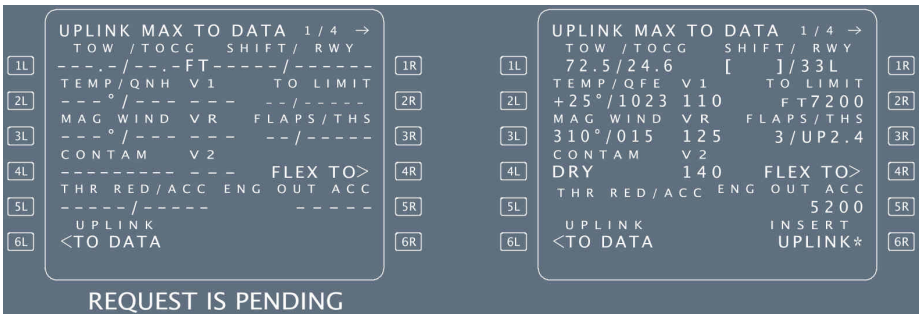
The display reverts to the PERF TO page, the asterisk disappears.
This field is not displayed, if the runway does not match the active runway, or if the uplinked TOW/TOWCG differs from the current TOW/TOWCG (if already exists). The “CHECK TAKE OFF DATA” message is displayed on the MCDU scratchpad.

Note: *All previously-received data is replaced by the new uplinked data.*

UPLINK MAX TO DATA PAGES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

32



This page is accessed from the UPLINK TO DATA REQ page by pressing the RECEIVED TO DATA key.
There is a set of 2 pages (MAX TO DATA and FLEX TO DATA) for each of the 4 uplinked runway data. Uplinked data is displayed in green. (It cannot be modified by the flight crew).

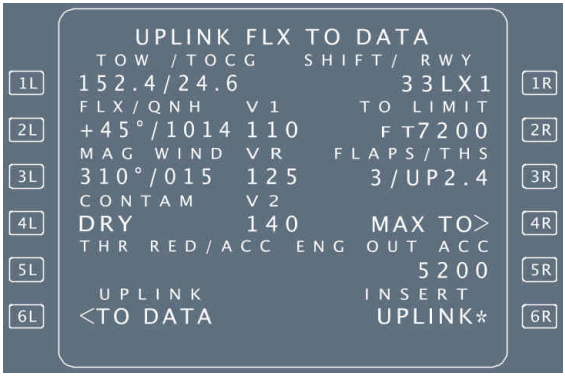
[1L] TOW/TOCG — Uplinked reference Takeoff Gross Weight and Takeoff Center of Gravity.

[2L] TEMP/QNH (or QFE)	Uplinked assumed temperature and BARO setting.
[3L] MAG WIND	Uplinked takeoff runway wind.
[4L] CONTAM	Uplinked takeoff runway contamination.
[5L] THR RED/ACC	Uplinked Thrust Reduction and Acceleration altitudes.
[6L] UPLINK TO DATA	Pressing the key calls up the UPLINK TO DATA REQ page.
V1, VR, V2	Uplinked takeoff speeds.
[1R] SHIFT/RWY	Uplinked TO runway IDENT, runway intersection and position shift.
[2R] TO LIMIT	Uplinked runway length remaining.
[3R] FLAPS/THS	Uplinked FLAPS/SLATS CONF and TRIM position.
[4R] FLEX TO	Pressing this key calls up the UPLINK FLEX TO DATA pages.
[5R] ENG OUT ACC	Uplinked engine-out acceleration altitude.
[6R] INSERT UPLINK*	Uplinked takeoff data is available for insertion. Selecting this prompt inserts the following data on the PERF TO page: - V1, VR, V2 - THR RED/ACC, ENG OUT ACC altitudes - FLAPS/THS - SHIFT - FLEX The display reverts to the PERF TO page, the asterisk disappears. This field is not displayed, if the runway does not match the active runway. If the runway matches the active runway but the uplinked TOW differs from the current TOW (the uplinked TOW is 3 t greater or 1 t lower than the TOW estimated by the FMS): - The asterisk disappears and the insertion is not possible - The TOW value is displayed in amber in [1L] field.

Note: *All previously-received data is replaced by the new uplinked data.*

UPLINK FLX TO DATA PAGES

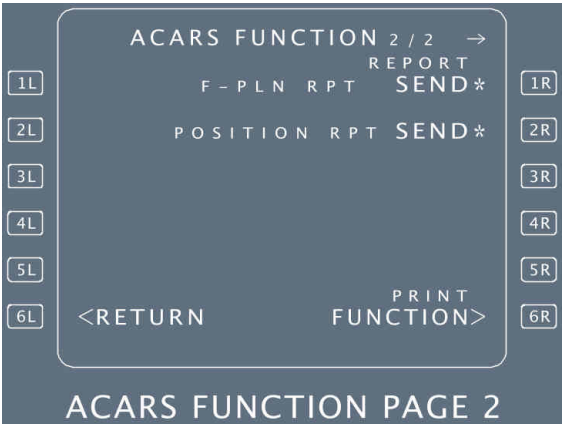
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



TITLE	UPLINK FLX TO DATA.
[2L]	FLX/QNH (or QFE) When the UPLINK FLEX TO DATA page is selected, it displays uplink assumed Flex Temperature and BARO setting (QNH or QFE).
[4R] MAX TO	Pressing this key calls up the MAX TO DATA page. For all other fields, *Refer to DSC-22_20-50-10-25 Uplink MAX TO Data Pages*

ACARS FUNCTION PAGE 2

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



Line 1 F-PLN RPT SEND — Pressing this key sends the flight plan report to the ground.

Line 2 POSITION RPT SEND — Pressing this key sends a Position Report to the ground.

Note: - *No report can be sent, if "SEND" is not followed by a star*
- *When a function (line 1 or 2) is deactivated through the navigation database policy file, the corresponding line is blank.*

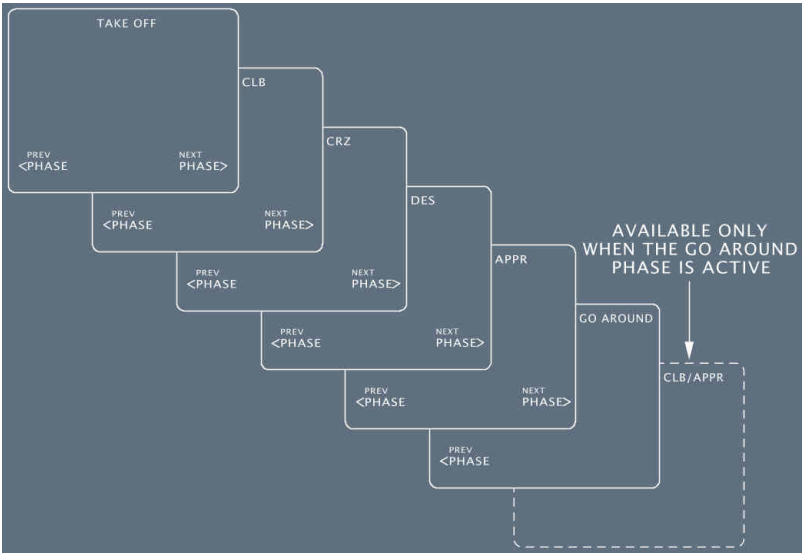
[6L] RETURN — The pilot presses this key to revert to the DATA INDEX page.

[6R] PRINT FUNCTION — The pilot presses this key to access the PRINT FUNCTION page.

PERF PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The flight plan is divided into the following phases:
PREFLIGHT, TAKEOFF, CLIMB, CRUISE, DESCENT, APPROACH, GO-AROUND, DONE.
Each phase, except for the preflight and done phases, has a performance (PERF) page. The PERF pages display performance data, speeds related to the various phases, and predictions.
Pressing the PERF key on the MCDU console calls up the performance page for the current active phase. Performance pages, relating to phases already flown, are not available.
In the preflight and done phases, pressing the PERF key brings up the takeoff performance page.
Pressing the PERF key in the done phase makes the phase transition to the preflight phase.

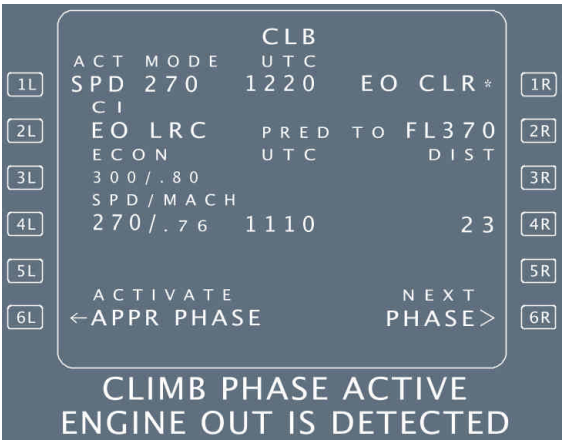


The FMGS flight phases are not related to the FWC flight phases.

Line 6	Fields may display two different prompts, depending upon whether the phase is active or not.
[6L] PREV PHASE	To review the performance page for the previous phase. The prompt is unavailable on the takeoff performance page. It is also unavailable for phases already flown.
[6L] ACTIVATE APPR PHASE	To activate, then confirm, the APPR phase. Available only on the page corresponding to the active phase.
[6R] NEXT PHASE	To review the performance page for the next phase.

Note: ***Engine-out condition***

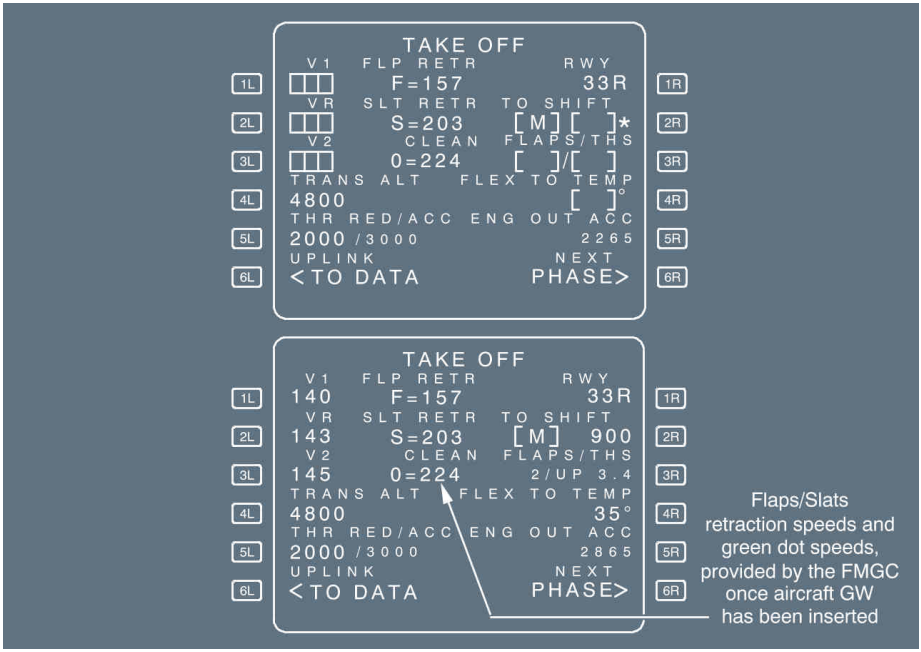
- *When the FMGS detects an engine-out condition, the system automatically calls up the performance page for the current flight phase (except when this occurs before the diversion point during takeoff or no EOSID exists in the flight plan) and displays "EO CLR*" in the [1R] field and EO LRC (engine-out long range cruise) in the [2L] field. On the CLB, CRZ and DES (when the descent phase is not active) PERF pages, the pilot can enter a cost index value and overwrite to "EO LRC". Clearing the cost index reverts to EO LRC.*
  If the pilot presses the [1R] key, the system reverts to the normal processing (with no engine failed) and suppresses the EO information. (Refer to DSC-22_20-30-10-15 General).
- *If the engine-out condition is detected before the diversion point at takeoff, a temporary flight plan is created.*



PERF TAKEOFF PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

33 During the preflight phase, the pilot presses the PERF key to call up the takeoff performance page.



TITLE

TAKE OFF is in large white font, when the takeoff phase is not active, and in large green font when it is.

Note: *If the takeoff shift or the runway is changed after V1, V2 or VR insertion, but the origin airport remains the same, the MCDU message "CHECK TAKEOFF DATA" is displayed, but all takeoff parameters are retained.*

[1L] V1[2L] VR [3L] V2

The boxes remain amber, as long as the pilot does not make entries in them. The pilot can modify any entry, as long as the takeoff phase is not active.

Note: *If the pilot does not enter V2, the SRS mode will not be available at takeoff.*

[4L] TRANS ALT (transion altitude)

This field displays the navigation database default altitude (if defined) once the origin airport is entered. The pilot can modify it.

[5L] THR RED (thrust reduction altitude)	This is the altitude at which the pilot should reduce the thrust from TOGA/FLX to MAX CLIMB (CL detent) with all engines operative. - The thrust reduction altitude defaults to 1 500 ft above the runway elevation, or to the altitude set by the airline - The pilot can modify this altitude: The minimum is 400 ft above the runway elevation.
ACC (Acceleration altitude)	This is the altitude at which the climb phase is triggered. - The target speed jumps to the initial climb speed - The default value is 1 500 ft above runway elevation - The flight crew can modify the value. The minimum value is 400 ft above runway elevation, though it is always higher than, or equal to, THR RED. *Note:* - *A clearing action reverts both values to the defaulted ones* - *When the flight crew selects an altitude on the FCU that is below THR RED, it brings THR RED and ACC down to this altitude. (The 400 ft minimum still applies).*
[6L] UPLINK TO DATA	This key calls up the UPLINK TO DATA REQ page. It is only displayed in the preflight and done phases.
[1R] RWY or EO CLR	This field shows the takeoff runway selected on the active flight plan. The flight crew cannot make an entry from this field. If no runway has been inserted in the flight plan the field shows dashes, if no runway has been inserted in the flight plan EO CLR is displayed when an engine-out is detected.
[2R] TO SHIFT	The takeoff shift is the distance in meters or feet between the beginning of the runway and the aircraft's takeoff position. When taking off from an intersection, the flight crew should insert this value to ensure a correct update of the FM position. The takeoff shift value must be positive, and cannot be greater than the runway length.
[3R] FLAPS/THS	This is a flight crew entry for the positions of the flaps and the trimmable horizontal stabilizer (THS) at takeoff. The flight crew can modify it until takeoff, by entering “UP X.X” or “X.X UP”, or “DN X.X” or “X.X DN”for the THS.
[4R] FLX TO TEMP	The flight crew inserts the FLX TO temperature for FLX takeoff setting purposes. The flight crew can only enter it during preflight. The system sends it to the FADEC and displays the entered data on the upper ECAM display. The TEMP value is always entered in degrees Celsius.

[5R] ENG OUT ACC — This field displays the engine-out acceleration altitude, as defined in the database, or is manually entered by the flight crew. This is for display only, as a reminder. It cannot be cleared. The above ACC altitude rules of [5L] apply to this field.

[6R] NEXT PAGE — This key calls up the climb performance page.

PERF TAKEOFF PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

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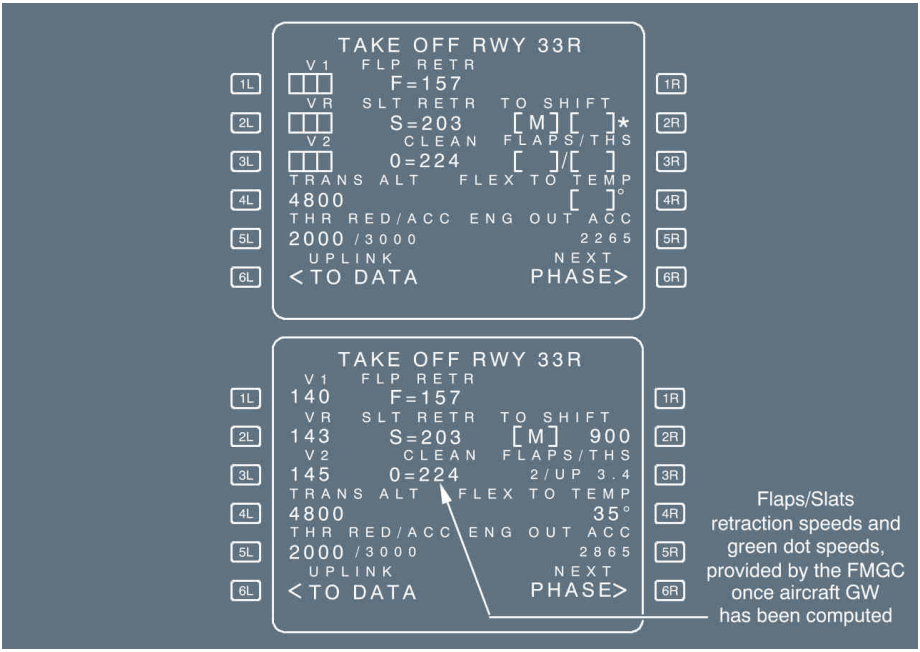
During the preflight phase, the pilot presses the PERF key to call up the takeoff performance page.



TITLE	TAKE OFF RWY is in large green font when the takeoff phase is active, and in large white font when it is inactive. The active flight plan selected runway is displayed in large green font. Note: *If the takeoff shift, or the flaps/THS, or the runway is changed after V1, VR or V2 insertion, but the origin airport remains the same, the MCDU "CHECK TAKE OFF DATA" message appears. All takeoff parameters are retained except in case of runway change. In case of runway change, the parameters are invalidated, but still displayed adjacent to each field. The "CONFIRM TO DATA" prompt in [6R] allows reverting to the previous values.*
[1L] V1 [2L] VR [3L] V2	The boxes remain amber, as long as the pilot does not make entries in them. The pilot can modify any entry, as long as the takeoff phase is not active. Note: *1. If the flight crew does not enter V2, the SRS mode will be unavailable at takeoff.* *2. The MCDU "V1/VR/V2 DISAGREE" amber message appears if the inserted V1, VR, V2 speeds do not satisfy the condition: V1 ≤VR ≤V2.* *3. The MCDU "TO SPEED TOO LOW" amber message appears if the inserted V1, VR, V2 speeds do not satisfy the existing regulatory conditions regarding VMC and VS1G speeds.*
[4L] TRANS ALT (transion altitude)	This field displays the navigation database default altitude (if defined) once the origin airport is entered. The pilot can modify it.
[5L] THR RED (thrust reduction altitude)	This is the altitude at which the pilot should reduce the thrust from TOGA/FLX to MAX CLIMB (CL detent) with all engines operative ("CLB"or "LVR CLB"flashing on the FMA). - The thrust reduction altitude defaults to 1 500 ft above the runway elevation, or to the altitude set by the airline - The pilot can modify this altitude: The minimum is 400 ft above the runway elevation.

ACC (Acceleration altitude)	This is the altitude at which the climb phase is triggered. - The target speed jumps to the initial climb speed - The default value is 1 500 ft above runway elevation - The flight crew can modify the value. The minimum value is 400 ft above runway elevation, and it can be higher than, or equal to, or lower than THR RED. *Note:* - *A clearing action reverts both values to the defaulted ones* - *When the flight crew selects an altitude on the FCU that is below THR RED, it brings THR RED and ACC down to this altitude. (The 400 ft minimum still applies).*
[6L] UPLINK TO DATA	This key calls up the UPLINK TO DATA REQ page. It is only displayed in the preflight and done phases.
[1R] EO CLR	EO CLR is displayed when an engine-out is detected and when active flight phase is takeoff.
[2R] TO SHIFT	The takeoff shift is the distance in meters or feet between the beginning of the runway and the aircraft's takeoff position. When taking off from an intersection, the flight crew should insert this value to ensure a correct update of the FM position. The takeoff shift value must be positive, and cannot be greater than the runway length.
[3R] FLAPS/THS	This is a flight crew entry for the positions of the flaps and the trimmable horizontal stabilizer (THS) at takeoff. The flight crew can modify it until takeoff, by entering “UP X.X” or “X.X UP”, or “DN X.X” or “X.X DN”for the THS.
[4R] FLX TO TEMP	The flight crew inserts the FLX TO temperature for FLX takeoff setting purposes. The flight crew can only enter it during preflight. The system sends it to the FADEC and displays the entered data on the upper ECAM display. The TEMP value is always entered in degrees Celsius.
[5R] ENG OUT ACC	This field displays the engine-out acceleration altitude, as defined in the database, or is manually entered by the flight crew. This is for display only, as a reminder. It cannot be cleared. The above ACC altitude rules of [5L] apply to this field.
[6R] NEXT PAGE or CONFIRM TO DATA*	This key calls up the climb performance page, or allows the flight crew to revert to the previously-entered T.O. parameters, in case of runway change with the same origin airport.

PERF CLIMB PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

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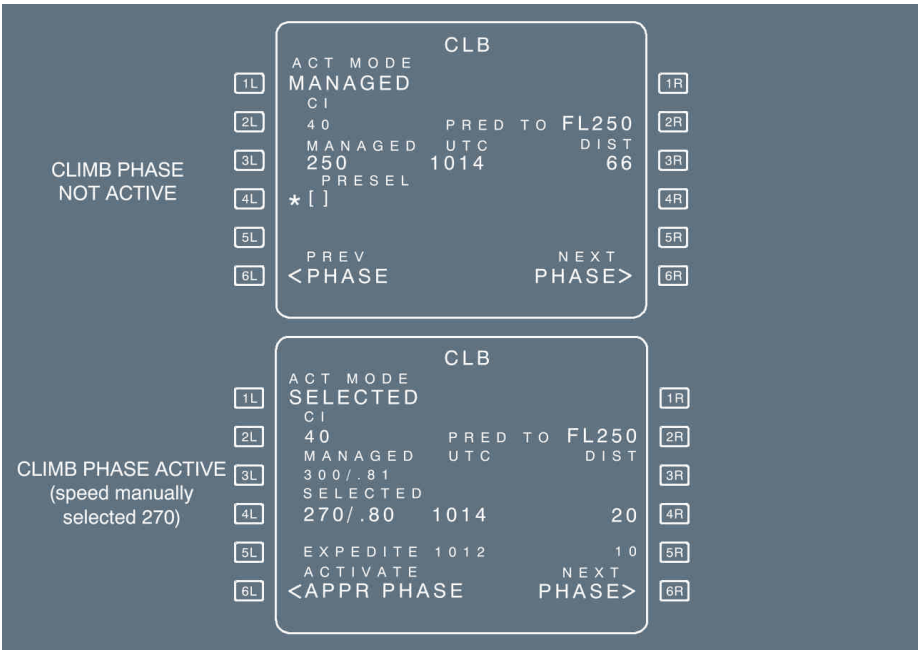
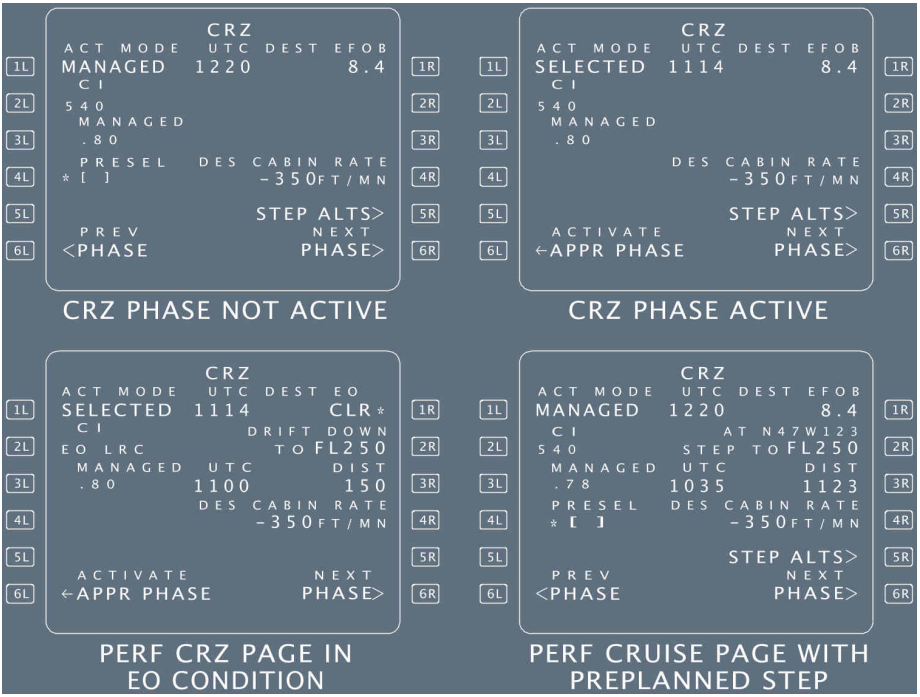


TITLE	CLB is displayed in large white fonts when the climb phase is inactive, and in large green fonts if it is active.
[1L] ACT MODE	This field displays the preselected or active speed mode: SELECTED or MANAGED. The pilot cannot modify it from this field.
[2L] CI (Cost Index)	This field displays the cost index, as initialized on the INIT A or defaulted from the database, or inserted in this field by the pilot. EO LRC automatically replaces the cost index value in case of engine-out.
[3L] MANAGED	This field displays the FMGS computed ECON speed/Mach (*Refer to DSC-22_20-40-10 Optimization*). Before CLIMB phase is active, if the preselected speed mode is SELECTED, a star is displayed next to the MANAGED speed. Pressing the 3L key in this case preselects MANAGED speed, and 4L reverts to brackets.

[4L] PRESEL or SELECTED	If the climb phase is not active: This field displays PRESEL as long as the climb phase is not active. The pilot can enter a preselected speed only. If the climb phase is active: The title of this field becomes SELECTED. This field displays the selected (or preselected) SPD or MACH target. The pilot cannot modify it directly in this field, but can adjust it with the SPD/MACH selection knob on the FCU. If the pilot pushes in the FCU SPD/MACH selection knob to revert to managed speed, the system selects (or reselects) ECON SPD/MACH and [4L] is blank.
[5L] Blank or EXPEDITE	This field is blank as long as the aircraft is in preflight. This field displays this legend when the takeoff or climb phase is active. The flight crew cannot engage EXPEDITE from this field. It indicates the time and distance required to reach the altitude displayed in the 2R field, in case of climb at green dot.
[6L] PREV PHASE	This field displays this legend if climb phase is not active. The pilot presses this key to call up the takeoff page.
[6L] ACTIVATE APPR PHASE	The field displays this legend if the climb phase is active. Pressing this key once displays “CONFIRM APPR PHASE*”. Pressing it again activates the approach phase.
[1R] EO CLR	The system displays the EO CLR prompt in case of engine out in climb.
[2R] PRED TO...	This field displays the target altitude for the predictions shown in 3R, 4R, or 5L. It defaults to FCU altitude, but the pilot can modify it to any altitude below CRZ FL.
[3R] [4R] [5R]	These fields show time and distance predictions for the target altitude selected in [2R], computed for the current vertical mode and speed mode (MANAGED, SELECTED). These fields are displayed only while the takeoff, or climb phase is active.
[6R] NEXT PHASE	The flight crew presses this key to call up the PERF CRZ page.

PERF CRUISE PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI



TITLE	CRZ in white large font, when cruise phase is not active, in green large font, when it is.
[1L] ACT MODE	This field shows the preselected or active speed mode: SELECTED or MANAGED. The pilot cannot modify it through this field.
[2L] CI	This field shows the cost index as initialized on the INIT A page or defaulted from the database, or as inserted in this field by the crew. EO LRC replaces automatically the cost index value in case of engine out.
[3L] MANAGED	This field displays the FMGS computed ECON speed/Mach (*Refer to DSC-22_20-40-10 Optimization*). Before CRUISE phase is active, if the preselected speed mode is SELECTED, a star is displayed next to the MANAGED speed. Pressing the 3L key in this case preselects MANAGED speed, and 4L reverts to brackets.

[4L] PRESEL	If cruise phase is not active: The pilot can enter a preselected speed or Mach number. If cruise phase is active: This field is blank.
[6L] PREV PHASE or	The pilot can press this key to call up the climb page, if the cruise phase is not yet active.
[6L] ACTIVATE APPR PHASE	This field displays this legend if the cruise phase is active. The flight crew presses the key once to change the legend to “CONFIRM APPR PHASE*”. A second press activates the approach phase. *Note: If the pilot activates the approach phase inadvertently, it can reselect the cruise flight level into the progress page to reactivate the cruise phase.*
[1R] TIME/UTC DES EFOB	Before takeoff this field displays the flight time to destination and the predicted remaining fuel on board. If the crew enters an estimated takeoff time, the field displays automatically the predicted arrival time (UTC) at destination. After takeoff it displays the predicted arrival time at destination (UTC) and the remaining fuel on board. EO CLR is displayed when an engine out is detected.
[2R] STEP TO FL XX, DRIFT DOWN TO FL XX, or TO T/D	The field, in combination with 3R, displays the predictions for the step point and the step altitude, the drift down altitude, or the Top of Descent.
[3R] TIME/UTC and DIST	This field displays the time and distance to go to the various points identified in 2R.
[4R] DES CABIN RATE	This field displays MAX [computed DES cabin rate, maximum descent cabin rate]. The pilot may modify the value: the FM recomputes then the top of descent in order to match this value. If the FM cannot match the pilot entry, the FM computed value overwrites the pilot entry. A clear action reverts to the default value (- 350 ft/min). DES CAB RATE being a negative value, 'minus” is not a necessary entry.
[5R] STEP ALTS	This key calls up the STEP ALTS page (vertical revision *Refer to DSC-22_20-50-10-25 VERTICAL REVISION Pages*).
[6R] NEXT PHASE	This key calls up the DES page.

PERF CRUISE PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

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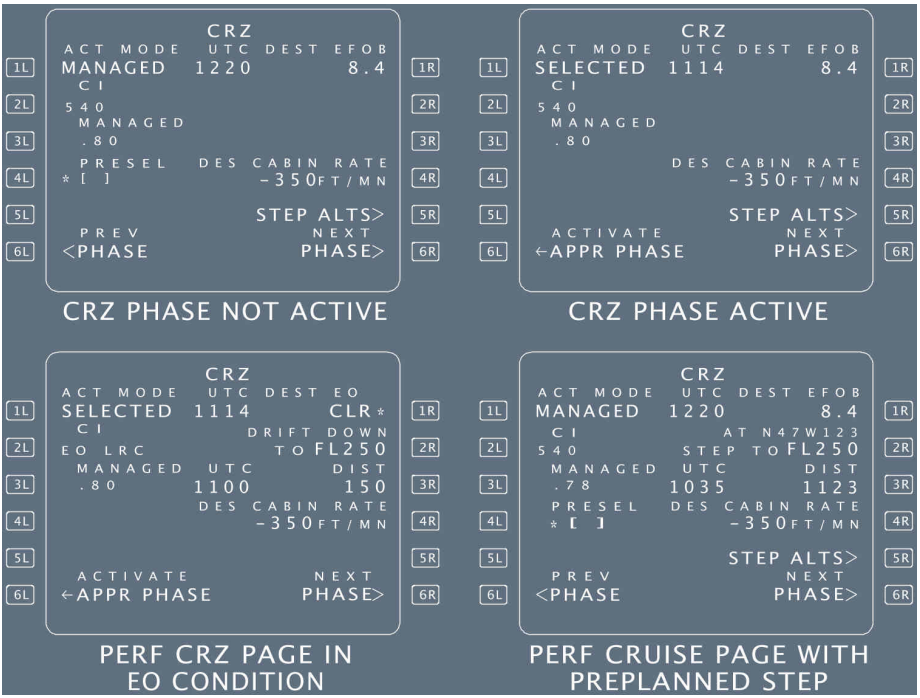


TITLE	CRZ in white large font, when cruise phase is not active, in green large font, when it is.
[1L] ACT MODE	This field shows the preselected or active speed mode: SELECTED or MANAGED. The pilot cannot modify it through this field.
[2L] CI	This field shows the cost index as initialized on the INIT A page or defaulted from the database, or as inserted in this field by the crew. EO LRC replaces automatically the cost index value in case of engine out.

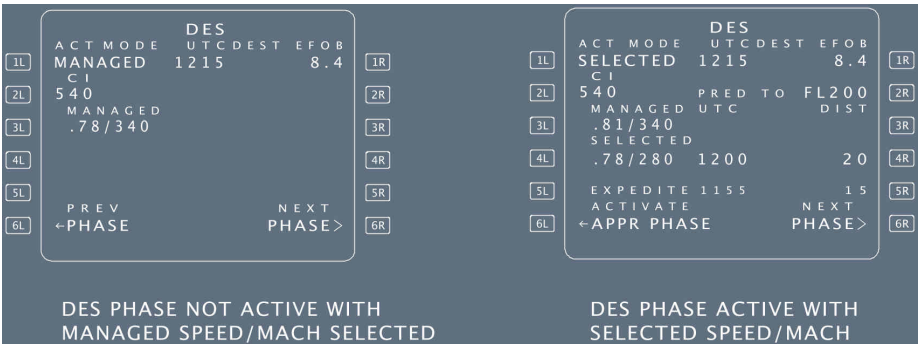
[3L] MANAGED	This field displays the FMGS computed ECON speed/Mach (*Refer to DSC-22_20-40-10 Optimization*). Before CRUISE phase is active, if the preselected speed mode is SELECTED, a star is displayed next to the MANAGED speed. Pressing the 3L key in this case preselects MANAGED speed, and 4L reverts to brackets.
[4L] PRESEL	If cruise phase is not active: The pilot can enter a preselected speed or Mach number. If cruise phase is active: This field is blank.
[6L] PREV PHASE or	The pilot can press this key to call up the climb page, if the cruise phase is not yet active.
[6L] ACTIVATE APPR PHASE	This field displays this legend if the cruise phase is active. The flight crew presses the key once to change the legend to “CONFIRM APPR PHASE*”. A second press activates the approach phase. *Note: If the pilot activates the approach phase inadvertently, it can reselect the cruise flight level into the progress page to reactivate the cruise phase.*
[1R] TIME/UTC DES EFOB	Before takeoff this field displays the flight time to destination and the predicted remaining fuel on board. If the crew enters an estimated takeoff time, the field displays automatically the predicted arrival time (UTC) at destination. After takeoff it displays the predicted arrival time at destination (UTC) and the remaining fuel on board (DEST EFOB) at destination, in green font. The DEST EFOB field will turn to amber, if the EFOB at destination becomes less than the MIN DEST FOB value displayed on the FUEL PRED page. EO CLR is displayed when an engine-out is detected.
[2R] STEP TO FL XX, DRIFT DOWN TO FL XX, or TO T/D	The field, in combination with 3R, displays the predictions for the step point and the step altitude, the drift down altitude, or the Top of Descent.
[3R] TIME/UTC and DIST	This field displays the time and distance to go to the various points identified in 2R.
[4R] DES CABIN RATE	This field displays MAX [computed DES cabin rate, maximum descent cabin rate]. The pilot may modify the value: the FM recomputes then the top of descent in order to match this value. If the FM cannot match the pilot entry, the FM computed value overwrites the pilot entry. A clear action reverts to the default value (- 350 ft/min). DES CAB RATE being a negative value, 'minus” is not a necessary entry.

[5R] STEP ALTS — This key calls up the STEP ALTS page (vertical revision *Refer to DSC-22_20-50-10-25 VERTICAL REVISION Pages*).

[6R] NEXT PHASE — This key calls up the DES page.

PERF DESCENT PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI



TITLE — DES is in large white font if the descent phase is not active; it is in large green font, if it is.

[1L] ACT MODE — This field displays the preselected or active speed mode (MANAGED or SELECTED). The flight crew cannot modify it through this field.

[2L] CI — This field displays the cost index, as initialized on the INIT A page or defaulted from the database, or inserted in this field by the flight crew. The flight crew cannot modify it when the descent phase is active.

[3L] MANAGED

<u>If the descent phase is not active</u>:

Before the flight crew makes any entry. This field displays MANAGED in white, with the associated ECON descent Mach or speed in blue. The crew may overwrite the ECON descent Mach or speed by entering a Mach number or a speed in this field. The system uses the pilot entry to compute the descent profile. The descent may be flown in managed using this new pilot entry.

The entry is modifiable. It can be cleared to revert to ECON speed/Mach.

<u>If the descent phase is active</u>:

The flight crew cannot make an entry in this field.

The field displays the ECON speed/Mach or the speed/Mach value previously entered by the pilot.

[4L] blank or SELECTED	If the descent phase is not active, or the descent phase is active but the active speed mode is MANAGED: This field is blank. If the descent phase is active and the active speed mode is SELECTED: The field displays the speed or Mach target manually selected by the pilot. "SELECTED" is displayed in the [1L] field. To modify the field value, the pilot will use the SPD/MACH selector knob of the FCU. [4L] field and FCU window will display the same value. Pushing in the FCU speed selector knob activates the managed SPD/MACH target displayed in the [3L] field.
[5L] Blank or EXPEDITE	If the descent phase is not active this field is blank. Displays this legend if the descent phase is active. It indicates the time and distance required to reach the altitude displayed in the 2R field at MMO/VMO speed. The pilot cannot select the EXPEDITE mode through this field.
[6L] PREV PHASE or ACTIVATE APPR PHASE	This key calls up the cruise phase page if the descent phase is not yet active. Displayed if the descent phase is active. First press causes "CONFIRM APPR PHASE" to be displayed. Second press activates the approach phase.
[1R] TIME/UTC DEST EFOB	Before takeoff, this field displays the flight time to destination and the predicted remaining fuel on board. If the crew enters an estimated takeoff time, the field displays automatically the predicted arrival time (UTC) at destination. After takeoff, it displays the predicted arrival time at destination (UTC) and the remaining fuel on board. EO CLR is displayed when an engine-out is detected.
[2R] PRED TO...	This field displays the target altitude for the predictions in [3R] [4R], or [5R]. The display defaults to the altitude selected on the FCU. The flight crew can modify it to any altitude lower than present altitude.
[3R] [4R] [5R]	These fields display time and distance predictions down to the target altitude selected in [2R], computed for the current vertical mode (DES or OP DES) and the indicated speed mode (MANAGED, SELECTED).
[6R] NEXT PHASE	The pilot presses this key to call up the PERF APPR page.

PERF DESCENT PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

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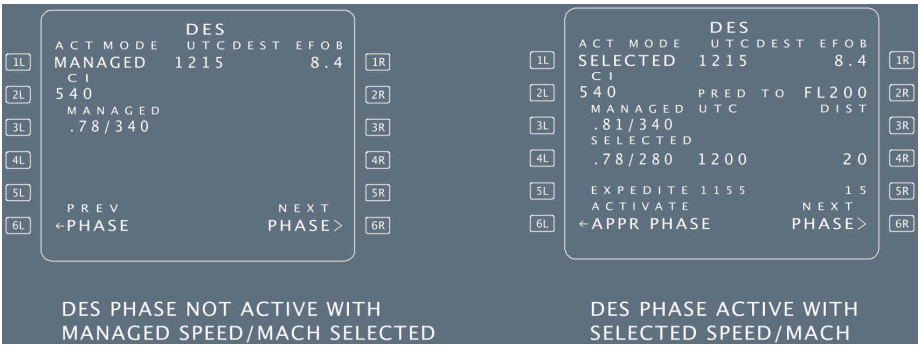

TITLE — DES is in large white font if the descent phase is not active; it is in large green font, if it is.

[1L] ACT MODE — This field displays the preselected or active speed mode (MANAGED or SELECTED). The flight crew cannot modify it through this field.

[2L] CI — This field displays the cost index, as initialized on the INIT A page or defaulted from the database, or inserted in this field by the flight crew. The flight crew cannot modify it when the descent phase is active.

[3L] MANAGED

<u>If the descent phase is not active</u>:

Before the flight crew makes any entry. This field displays MANAGED in white, with the associated ECON descent Mach or speed in blue. The crew may overwrite the ECON descent Mach or speed by entering a Mach number or a speed in this field. The system uses the pilot entry to compute the descent profile. The descent may be flown in managed using this new pilot entry.

The entry is modifiable. It can be cleared to revert to ECON speed/Mach.

<u>If the descent phase is active</u>:

The flight crew cannot make an entry in this field.

The field displays the ECON speed/Mach or the speed/Mach value previously entered by the pilot.

[4L] blank or SELECTED	If the descent phase is not active, or the descent phase is active but the active speed mode is MANAGED: This field is blank. If the descent phase is active and the active speed mode is SELECTED: The field displays the speed or Mach target manually selected by the pilot. "SELECTED" is displayed in the [1L] field. To modify the field value, the pilot will use the SPD/MACH selector knob of the FCU. [4L] field and FCU window will display the same value. Pushing in the FCU speed selector knob activates the managed SPD/MACH target displayed in the [3L] field.
[5L] Blank or EXPEDITE	If the descent phase is not active this field is blank. Displays this legend if the descent phase is active. It indicates the time and distance required to reach the altitude displayed in the 2R field at MMO/VMO speed. The pilot cannot select the EXPEDITE mode through this field.
[6L] PREV PHASE or ACTIVATE APPR PHASE	This key calls up the cruise phase page if the descent phase is not yet active. Displayed if the descent phase is active. First press causes "CONFIRM APPR PHASE" to be displayed. Second press activates the approach phase.
[1R] TIME/UTC DEST EFOB	Before takeoff, this field displays the flight time to destination and the predicted remaining fuel on board. If the crew enters an estimated takeoff time, the field displays automatically the predicted arrival time (UTC). After takeoff, it displays the predicted arrival time at destination (UTC) and the remaining fuel on board (DEST EFOB) at destination in green font. The DEST EFOB field will turn to amber, if the EFOB at destination becomes less than the MIN DEST FOB value displayed on the FUEL PRED page. EO CLR is displayed when an engine-out is detected.
[2R] PRED TO...	This field displays the target altitude for the predictions in [3R] [4R], or [5R]. The display defaults to the altitude selected on the FCU. The flight crew can modify it to any altitude lower than present altitude.
[3R] [4R] [5R]	These fields display time and distance predictions down to the target altitude selected in [2R], computed for the current vertical mode (DES or OP DES) and the indicated speed mode (MANAGED, SELECTED).
[6R] NEXT PHASE	The pilot presses this key to call up the PERF APPR page.

PERF APPR PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

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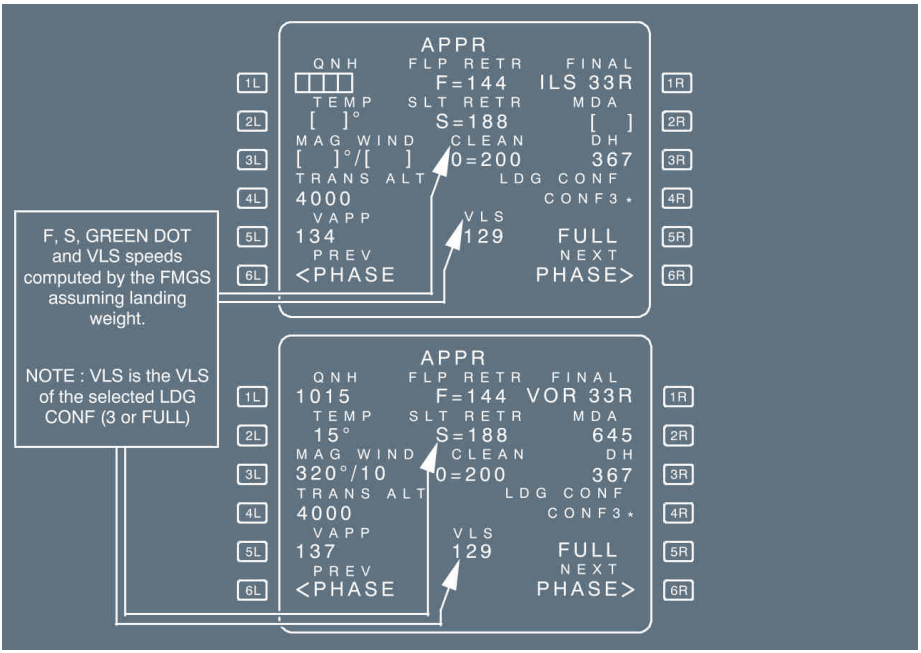

TITLE — APPR is in large white font, if the approach phase is not active; it is in large green font, if it is.

[1L] QNH

This field displays brackets, when the aircraft is more than 180 nm from the destination. Inside 180 nm, a mandatory amber box appears. The flight crew must enter the QNH in hPa or in inches of mercury.

- For hPa, enter three or four digits
- For inches of mercury:
  - Enter two digits, or
  - Enter two digits followed by a decimal point and two additional digits.

The system interprets:
- 1 003 as 1 003 hPa;
- 29 as 29.00 in.
- 29.92 as 29.92 in.

Note: *An erroneous entry of an OAT in QNH field, for example 22 °C, or a higher value, is accepted by the system.*

The flight crew can modify this entry at any time.
The Cabin Pressure Controller (CPC) uses the QNH to compute the cabin repressurization segment. Therefore, an erroneous QNH entry may result in a cabin pressurization that is not appropriate.

[2L] TEMP

This field displays the temperature at destination. The field displays brackets until the pilot enters the temperature. The pilot can modify this figure.
The system uses this temperature to refine its computation of the descent profile (ISA model).

[3L] MAG WIND

The flight crew enters the magnetic wind in knots at the destination in this field. The system transmits any entry made in this field to the vertical revision and flight plan B pages (which display wind direction as true, not magnetic).

[4L] TRANS ALT

This field displays the transition altitude taken from the data base (small font) or entered by the flight crew (large font).
The flight crew can modify it at any time.

[5L] VAPP

The FMGC computes this approach speed, using the formula
VAPP = VLS + 1/3 of the headwind components (limited to VLS + 5 as a minimum and VLS + 15 as a maximum).
The flight crew can modify VAPP. A clear action reverts VAPP to the computed value.

Note: *VLS = 1.23 VS1G of the selected landing configuration (full or 3).*

[6L] PREV PAGE

This field displays this legend if the approach phase is not active.
Pressing this key calls up the descent performance page.

[1R] FINAL	This field displays the approach specified in the flight plan. The flight crew cannot modify it through this field.
[2R] MDA/MDH	This field displays the minimum descent altitude (or minimum descent height if the QFE pin program is activated), with associated brackets. The flight crew inserts the value, which it can modify at any time. If the flight crew makes an entry in [3R] or changes the approach, it clears this figure.
[3R] DH	If the flight plan includes an ILS approach, this field displays “DH”and empty brackets. The flight crew inserts the decision height. The system will accept an entry of “NO”. If the flight crew inserts an MDA or an MDH, this erases the decision height, and this field reverts to brackets. The DH range is 0 to 700 ft.
[4R] LDG CONF CONF 3	The flight crew can select configuration 3 by pressing the 4R key. This moves the * down to the [5R] field, which is displaying “FULL”.
[5R] FULL	The flight crew can use this key to select configuration FULL when necessary configuration FULL is the default landing configuration.
[6R] NEXT PHASE	Pressing this key calls up the go-around performance page.

PERF APPR PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

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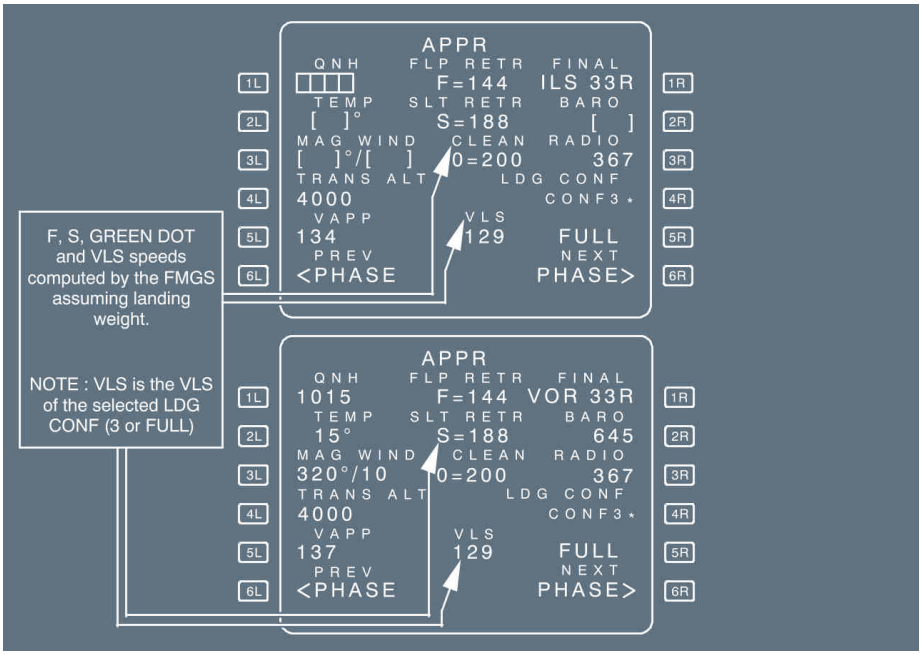


TITLE — APPR is in large white font, if the approach phase is not active; it is in large green font, if it is.

[1L] QNH

This field displays brackets, when the aircraft is more than 180 nm from the destination. Inside 180 nm, a mandatory amber box appears. The flight crew must enter the QNH in hPa or in inches of mercury.

- For hPa, enter three or four digits
- For inches of mercury:
  - Enter two digits, or
  - Enter two digits followed by a decimal point and two additional digits.

The system interprets:
- 1 003 as 1 003 hPa;
- 29 as 29.00 in.
- 29.92 as 29.92 in.

Note: *An erroneous entry of an OAT in QNH field, for example 22 °C, or a higher value, is accepted by the system.*

The flight crew can modify this entry at any time.
The Cabin Pressure Controller (CPC) uses the QNH to compute the cabin repressurization segment. Therefore, an erroneous QNH entry may result in a cabin pressurization that is not appropriate.

[2L] TEMP

This field displays the temperature at destination. The field displays brackets until the pilot enters the temperature. The pilot can modify this figure.
The system uses this temperature to refine its computation of the descent profile (ISA model).

[3L] MAG WIND

The flight crew enters the magnetic wind in knots at the destination in this field. The system transmits any entry made in this field to the vertical revision and flight plan B pages (which display wind direction as true, not magnetic).

[4L] TRANS ALT

This field displays the transition altitude taken from the data base (small font) or entered by the flight crew (large font).
The flight crew can modify it at any time.

[5L] VAPP

The FMGC computes this approach speed, using the formula
VAPP = VLS + 1/3 of the headwind components (limited to VLS + 5 as a minimum and VLS + 15 as a maximum).
The flight crew can modify VAPP. A clear action reverts VAPP to the computed value.

Note: *VLS = 1.23 VS1G of the selected landing configuration (full or 3).*

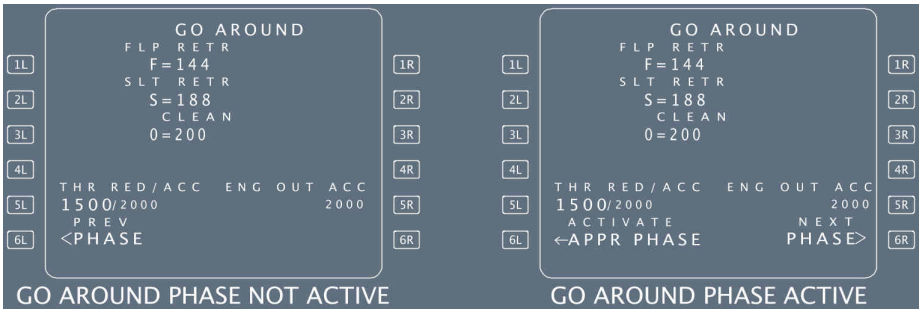
[6L] PREV PAGE

This field displays this legend if the approach phase is not active.
Pressing this key calls up the descent performance page.

[1R] FINAL	This field displays the approach specified in the flight plan. The flight crew cannot modify it through this field.
[2R] BARO (blue)	This field displays the minimum descent altitude (or minimum descent height if the QFE pin program is activated), with associated brackets. The referenced altitude is barometric altitude. The flight crew inserts the value, which it can modify at any time. If the flight crew makes an entry in [3R] or changes the approach, it clears this figure. The BARO range is 0 to 5 000 ft above landing elevation.
[3R] RADIO (blue)	If the flight plan includes an ILS or MLS approach, this field displays "RADIO" and empty brackets. For a Cat II or Cat III approach, the flight crew inserts the decision height. The decision height is a radio altimeter height. The system will accept an entry of "NO", "NODH" or " NO DH". If the flight crew inserts a BARO value in [2R] field, this erases the decision height, and this field reverts to brackets. The RADIO range is 0 to 700 ft.
[4R] LDG CONF CONF 3	The flight crew can select configuration 3 by pressing the 4R key. This moves the * down to the [5R] field, which is displaying "FULL".
[5R] FULL	The flight crew can use this key to select configuration FULL when necessary configuration FULL is the default landing configuration.
[6R] NEXT PHASE	Pressing this key calls up the go-around performance page.

PERF GO AROUND PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



TITLE	GO AROUND is in large white font, if the go-around phase is not active; it is in large green font, if it is.

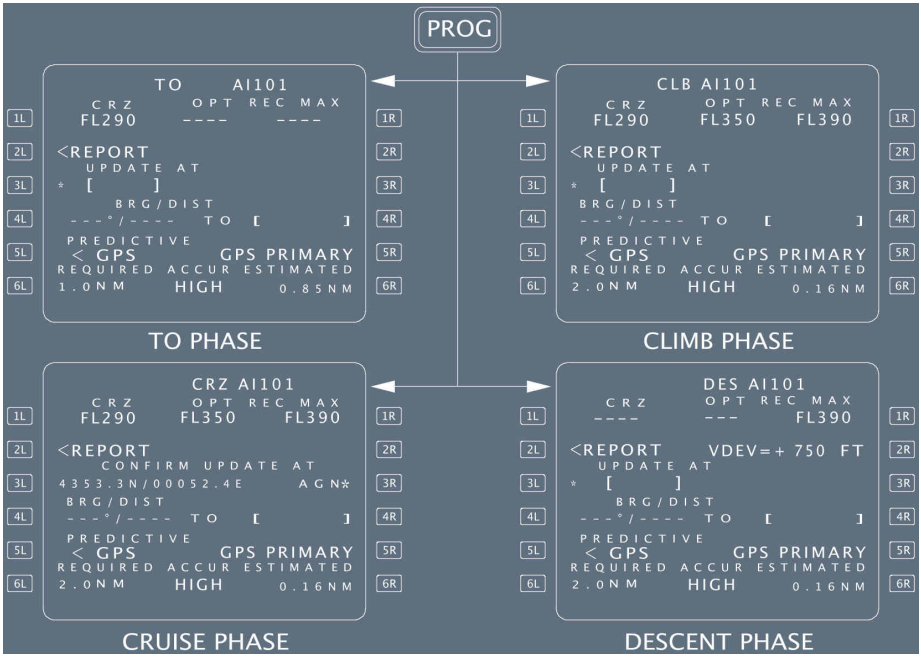
[5L] THR RED ACC	This field displays the thrust reduction altitude and the acceleration altitude. **Thrust reduction altitude:** - Altitude at which thrust must be reduced from takeoff/go-around thrust to maximum climb thrust - "CLB"or "LVR CLB"flashing on flight mode annunciator - Defaults to 1 500 ft above destination runway elevation, or to the altitude set by the airline - Can be modified by the crew (minimum 400 ft above destination runway elevation). **Acceleration altitude:** - Altitude at which target speed jumps to green-dot speed (see the note below) - Defaults to 1 500 ft above destination runway elevation, or to the altitude set by the airline. - Can be modified by the crew, but is always equal to (or higher than) the thrust reduction altitude.
[6L] PREV PHASE or	This field displays this legend if the go-around phase is not active. Pressing the key calls up the PERF APPR page.
ACTIVATE APPR PHASE	This field displays this legend if the go-around phase is active. Pressing it once makes "CONFIRM APPR"appear. A second press activates the approach phase.
[5R] ENG OUT ACC	This display has the same characteristics as the display beside the 5R key on the takeoff page. It is for display only, and the pilot can modify it.
[6R] NEXT PHASE	Pressing this key calls up the PERF APPR page.
[IR] Blank or EO CLR*	This field is normally blank. EO CLR* is displayed when GO AROUND is the active phase and an engine-out condition is detected.

Note: *When the go-around phase is active, if the pilot enables ALTN or if the pilot inserts a new destination in the active flight plan and a new cruise flight level on the progress page, the go-around phase shifts automatically into the climb phase. (The target speed jumps from green dot speed to initial climb speed).*

PROG PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

The progress page is a multifunction page that enables the pilot to:
- Select a new cruise flight level
- Crosscheck the navigation accuracy of the Flight Management (FM) system and validate it
- Update the FM position
- Monitor the descent.



TITLE	Different for each flight phase (see above). The vertical phase is in large green font. The flight number is in large white font. EO is large amber font, if the engine-out condition is detected.
Line 1 CRZ (blue)	This line displays the cruise flight level, inserted on the INIT A page or directly in this field in blue. If the flight crew uses the FCU to select an altitude that is higher than the one displayed in this field, the system changes the number displayed to agree. In this line, the flight crew cannot insert a flight level that is lower than the FCU-selected altitude. This field shows dashes when the descent or approach phase is active.

OPT — This field displays the optimum flight level (in green), that is computed based on the current gross weight, cost index, temperature, wind and a minimum estimated cruising time of 15 min.
It displays dashes if an engine-out is detected.

REC MAX — This field displays the recommended maximum altitude (in magenta), that is computed based on the current gross weight and temperature, and assuming that the anti-ice is off (*Refer to QRH/FPE-AEO 00011009*, if icing conditions are expected). It provides the aircraft with a 0.3 g buffet margin, a minimum rate of climb at MAX CL thrust, and level flight at MAX CRZ thrust. This field is limited to FL 398.
If one engine is out, this field displays the recommended maximum engine-out altitude, that is computed based on the long-range cruise speed and assuming that anti-ice is off.

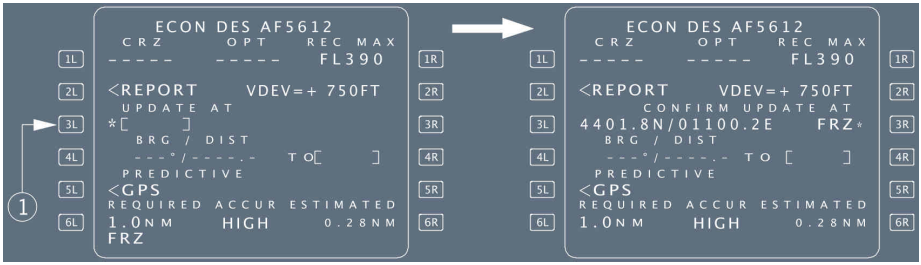
[2L] REPORT — This key calls up the REPORT PAGE.

[2R] VDEV — This field is displayed during the descent and approach phases, when NAV mode is engaged, or in HDG mode, provided that the crosstrack error (XTK) is less than 5 nm. It displays the vertical deviation between the aircraft's current altitude and the FMS-computed vertical profile.



Line 3 UPDATE AT — The flight crew can update the FMS position via this field by entering either the IDENT of a waypoint, a NAVAID, an airport, a latitude and longitude (LL), a place/bearing/distance, or a place-bearing/place-bearing (PBX).
When the flight crew has entered this data, this field changes its format to: "CONFIRM UPDATE AT", followed by the latitude/longitude and IDENT of the inserted position with an asterisk.
The flight crew presses the right-hand key adjacent to the asterisk to confirm the update, when the aircraft overflies the inserted position.

Note: *If no IDENT has been inserted, the field displays "ENTRY" instead of an IDENT.*



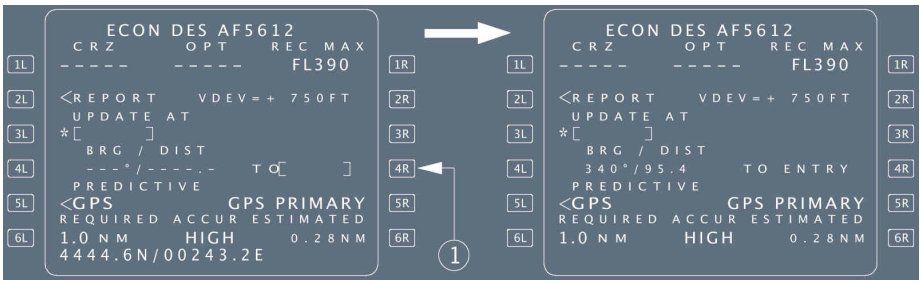
Line 4 BRG/DIST

On this line, the pilot can enter an airport, a waypoint, a NAVAID, or a runway. The pilot may enter each as an IDENT, a latitude/longitude (LL), a place/bearing/distance (PBD), or a place-bearing/place-bearing (PBX). The field then shows the FMGC-computed bearing and distance from this site to the aircraft's present position. The last distance digit is in 1/10 of a NM. If it does not have an IDENT, the point is called “ENTRY”.

Example:

BRG/DIST

340 °/95.4 to ENTRY



[5L] PREDICTIVE GPS

This prompt gives access to the PREDICTIVE GPS page.

[5R] GPS PRIMARY

This prompt is displayed, when the FMS navigation mode is GPS PRIMARY. When GPS PRIMARY is not available, or navigation mode is not GPS/IRS, this field is blank.

The scratchpad displays the relevant “GPS PRIMARY” message when this prompt appears; and “GPS PRIMARY LOST”, when the field turns to blank.

[6L] REQUIRED

This field displays the default value for the required navigation accuracy level. The pilot can modify it. Provided no pilot entry has been made, the default value changes according to the actual flight area (En route, terminal, approach *Refer to DSC-22_20-20-20 Navigation Accuracy Check*).

ACCUR HIGH/LOW — This field shows the flight management system's estimate of the navigational accuracy. “HIGH” indicates that the FMS estimates that the navigational accuracy matches the accuracy criteria of the area currently flown. “LOW” indicates that the criteria are not matched.

[6R] ESTIMATED — This field displays the current estimated navigation accuracy value (EPE) as computed by the FMS.

PROG PAGES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

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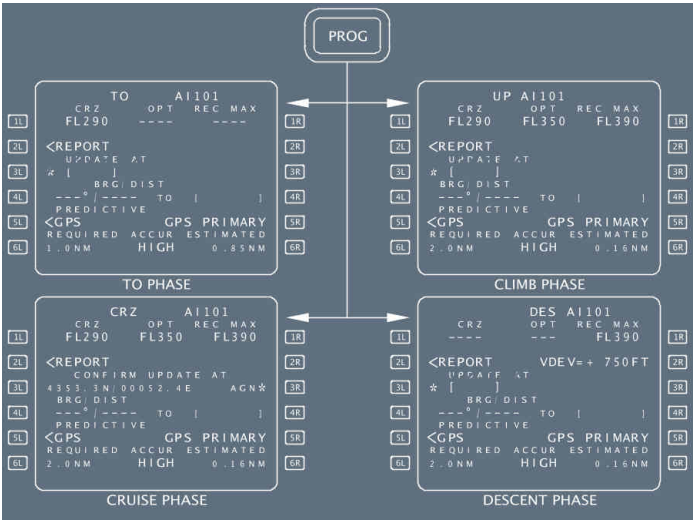
The progress page is a multifunction page that enables the pilot to:

- Select a new cruise flight level
- Crosscheck the navigation accuracy of the Flight Management (FM) system and validate it
- Update the FM position
- Monitor the descent.



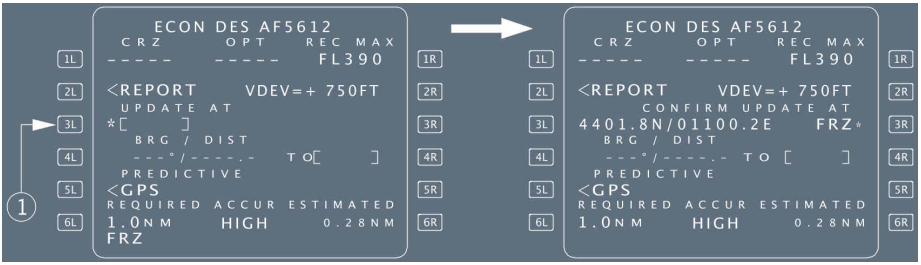
TITLE — Different for each flight phase (see above). The vertical phase is in large green font. The flight number is in large white font. EO is large amber font, if the engine-out condition is detected.

Line 1 CRZ (blue)	This line displays the cruise flight level, inserted on the INIT A page or directly in this field in blue. If the flight crew uses the FCU to select an altitude that is higher than the one displayed in this field, the system changes the number displayed to agree. In this line, the flight crew cannot insert a flight level that is lower than the FCU-selected altitude. This field shows dashes when the descent or approach phase is active.
OPT	This field displays the optimum flight level (in green), that is computed based on the current gross weight, cost index, temperature and wind. This flight level requires a 5 min minimum cruise at a minimum cruise flight level of FL 100. It displays dashes if an engine-out is detected.
REC MAX	This field displays the recommended maximum altitude (in magenta), that is computed based on the current gross weight and temperature, and assuming that the anti-ice is off (*Refer to QRH/FPE-AEO 00011009*, if icing conditions are expected). It provides the aircraft with a 0.3 g buffet margin, a minimum rate of climb at MAX CL thrust, and level flight at MAX CRZ thrust. This field is limited to FL 398. If one engine is out, this field displays the recommended maximum engine-out altitude, that is computed based on the long-range cruise speed and assuming that anti-ice is off.
[2L] REPORT	This key calls up the REPORT PAGE.
[2R] VDEV	This field is displayed during the descent and approach phases, when NAV mode is engaged, or in HDG mode, provided that the crosstrack error (XTK) is less than 5 nm. It displays the vertical deviation between the aircraft's current altitude and the FMS-computed vertical profile.



Line 3 POSITION UPDATE AT ◁*	The flight crew can update the FMS position via this field by entering either the IDENT of a waypoint, a NAVAID, an airport, a latitude and longitude (LL), a place/bearing/distance, or a place-bearing/place-bearing (PBX). When the flight crew has entered this data, this field changes its format to: "CONFIRM UPDATE AT", followed by the latitude/longitude and IDENT of the inserted position with an asterisk. The flight crew presses the right-hand key adjacent to the asterisk to confirm the update, when the aircraft overflies the inserted position.

Note: *If no IDENT has been inserted, the field displays "ENTRY" instead of an IDENT.*



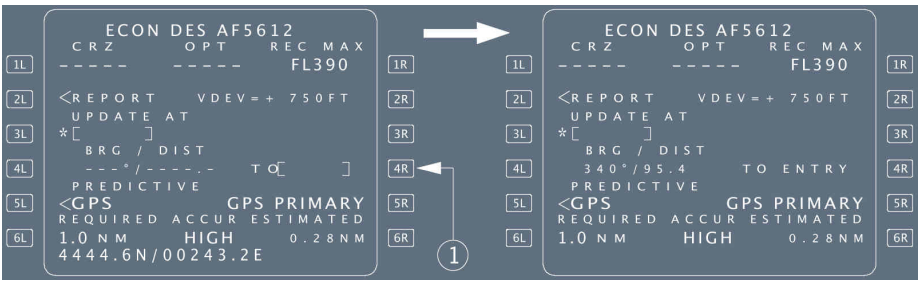
Line 4 BRG/DIST

On this line, the pilot can enter an airport, a waypoint, a NAVAID, or a runway. The pilot may enter each as an IDENT, a latitude/longitude (LL), a place/bearing/distance (PBD), or a place-bearing/place-bearing (PBX). The field then shows the FMGC-computed bearing and distance from this site to the aircraft's present position. The last distance digit is in 1/10 of a NM. If it does not have an IDENT, the point is called “ENTRY”.

Example:

BRG/DIST

340 °/95.4 to ENTRY



[5L] PREDICTIVE GPS

This prompt gives access to the PREDICTIVE GPS page.

[5R] GPS PRIMARY

This prompt is displayed, when the FMS navigation mode is GPS PRIMARY. When GPS PRIMARY is not available, or navigation mode is not GPS/IRS, this field is blank.

The scratchpad displays the relevant “GPS PRIMARY” message when this prompt appears; and “GPS PRIMARY LOST”, when the field turns to blank.

[6L] REQUIRED

This field displays the default value for the required navigation accuracy level. The pilot can modify it. Provided no pilot entry has been made, the default value changes according to the actual flight area (En route, terminal, approach *Refer to DSC-22_20-20-20 Navigation Accuracy Check*).

ACCUR HIGH/LOW — This field shows the flight management system's estimate of the navigational accuracy. “HIGH” indicates that the FMS estimates that the navigational accuracy matches the accuracy criteria of the area currently flown. “LOW” indicates that the criteria are not matched.

[6R] ESTIMATED — This field displays the current estimated navigation accuracy value (EPE) as computed by the FMS.

PREDICTIVE GPS PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

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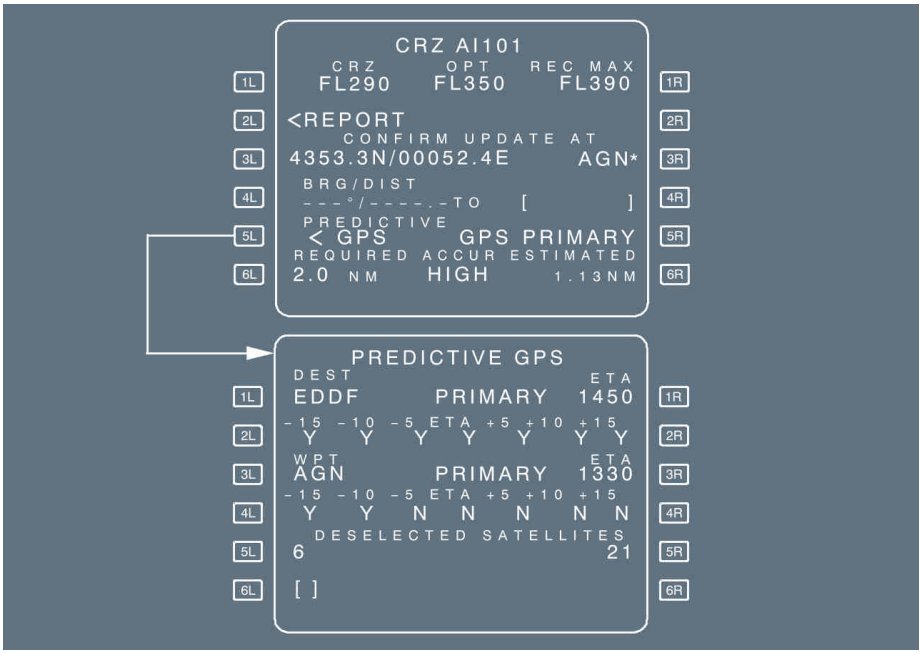
Note: This page is only operative with Honeywell ADIRS. All fields are blank with Litton ADIRS.

The pilot accesses this page by pressing the PREDICTIVE GPS prompt of the PROG page. This page displays information relative to predictive availability of GPS PRIMARY at destination, and at any waypoint selected by the crew.



[1L] DEST — Destination, airport as currently selected in active flight plan. It is not modifiable. This field displays dashes, when no destination airport exists.

[1R] ETA	This field is defaulted to the Estimated Arrival Time, as computed by the FMS (small blue font). The pilot may enter a value in this field (large blue font). Amber boxes are displayed, when no prediction exists, or the crew entry has been cleared.
Line 2 PRIMARY Y/N	Predicted primary status at destination airport, at the following times: Estimated time of arrival ±5, 10, 15 min. Availability of GPS PRIMARY at the corresponding time is indicated by Y, when PRIMARY is predicted to be available; and, by N, when GPS PRIMARY is predicted not to be available. These fields are blanked when the destination [1L] field, or the time [1R] field is not defined.
[3L] WPT	The pilot may enter a reference waypoint in this field. Blue brackets are displayed, when no entry has been made.
[3R] ETA	When a reference waypoint has been entered in the [3L] field, amber boxes are displayed. The crew is requested to enter a reference time in this field.
Line 4 PRIMARY Y/N	Information equivalent to [2L] / [2R] is displayed for any pilot-selected waypoint. The corresponding time of arrival is also displayed.
Line 5 DESELECTED SATELLITES and Line 6 SATELLITES	Enables the pilot to deselect up to four satellites by inserting the corresponding satellite number ; the number is then displayed in large blue font. When deactivated, the satellites are not considered for predictive GPS availability at destination, or at the selected waypoint. The deselection is cancelled when the entry is cleared (blue brackets are displayed), or the field is overwritten by a different satellite number.

ERRONEOUS GPS PREDICTIONS

The following procedure must be followed whenever a GPS RAIM availability Check is necessary.

If the predictive GPS status appears at the different times (ETA -15 min, -10 min, -5 min, 0 min, +5 min, +10 min, +15 min) as for example N, N, N, Y, N, N, N, the displayed N may be spurious.
To determine the GPS availability at ETA -15:

- Enter the destination in the WPT field [3L],
- Enter, the ETA -15 value in the ETA field [3R] on the MCDU PREDICTIVE GPS page and check that a “Y” is displayed at the ETA time.

Repeat this last action as necessary for each different times: -10, -5, 0, +5, +10, +15.

PREDICTIVE GPS PAGES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

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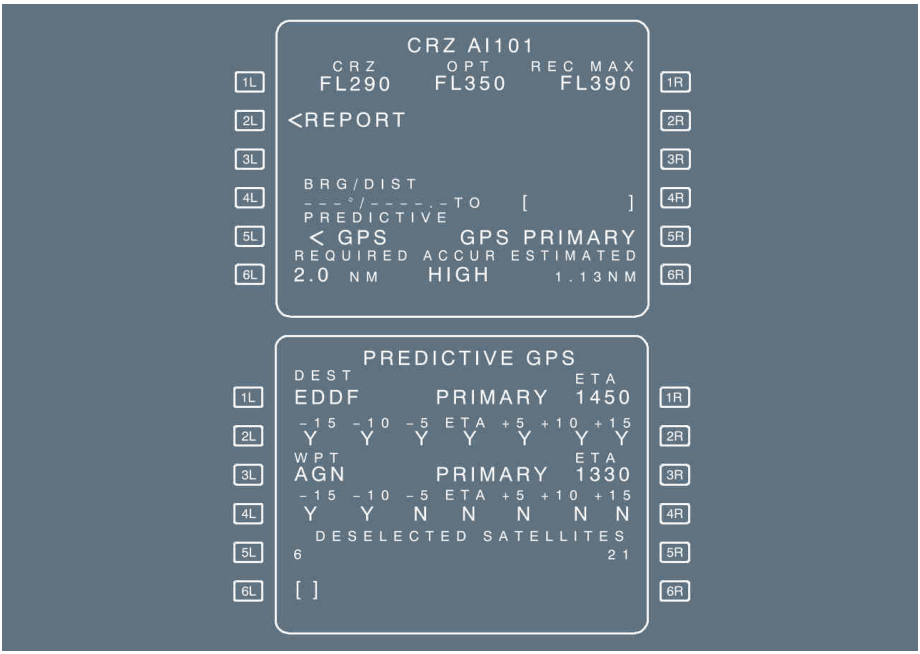
Note: This page is only operative with Honeywell ADIRS. All fields are blank with Litton ADIRS.

The pilot accesses this page by pressing the PREDICTIVE GPS prompt of the PROG page. This page displays information relative to predictive availability of GPS PRIMARY at destination, and at any waypoint selected by the crew.



[1L] DEST — Destination, airport as currently selected in active flight plan. It is not modifiable. This field displays dashes, when no destination airport exists.

[1R] ETA — This field is defaulted to the Estimated Arrival Time, as computed by the FMS (small blue font). The pilot may enter a value in this field (large blue font). Amber boxes are displayed, when no prediction exists, or the crew entry has been cleared.

Line 2 PRIMARY Y/N	Predicted primary status at destination airport, at the following times: Estimated time of arrival ±5, 10, 15 min. Availability of GPS PRIMARY at the corresponding time is indicated by Y, when PRIMARY is predicted to be available; and, by N, when GPS PRIMARY is predicted not to be available. These fields are blanked when the destination [1L] field, or the time [1R] field is not defined.
[3L] WPT	The pilot may enter a reference waypoint in this field. Blue brackets are displayed, when no entry has been made.
[3R] ETA	When a reference waypoint has been entered in the [3L] field, amber boxes are displayed. The crew is requested to enter a reference time in this field.
Line 4 PRIMARY Y/N	Information equivalent to [2L] / [2R] is displayed for any pilot-selected waypoint. The corresponding time of arrival is also displayed.
Line 5 DESELECTED SATELLITES and Line 6 SATELLITES	Enables the pilot to deselect up to four satellites by inserting the corresponding satellite number ; the number is then displayed in large blue font. When deactivated, the satellites are not considered for predictive GPS availability at destination, or at the selected waypoint. The deselection is cancelled when the entry is cleared (blue brackets are displayed), or the field is overwritten by a different satellite number.

ERRONEOUS GPS PREDICTIONS

The following procedure must be followed whenever a GPS RAIM availability Check is necessary.

If the predictive GPS status appears at the different times (ETA -15 min, -10 min, -5 min, 0 min, +5 min, +10 min, +15 min) as for example N, N, N, Y, N, N, N, the displayed N may be spurious.
To determine the GPS availability at ETA -15:

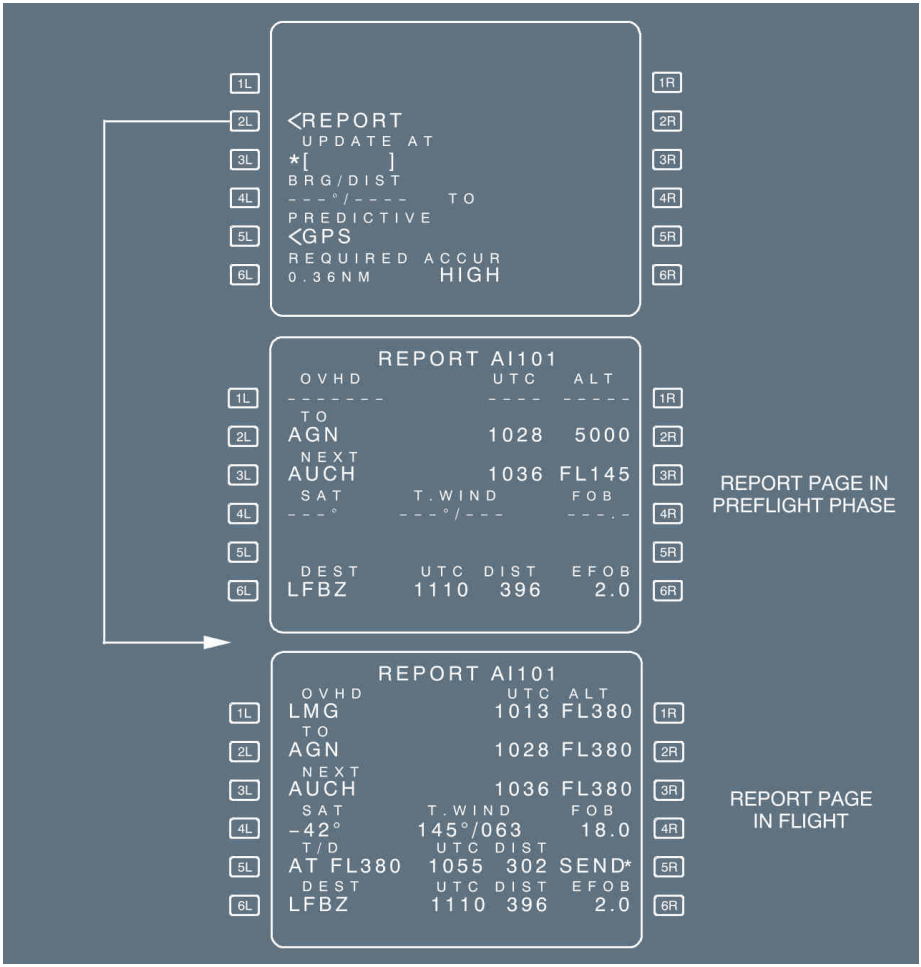
- Enter the destination in the WPT field [3L],
- Enter, the ETA -15 value in the ETA field [3R] on the MCDU PREDICTIVE GPS page and check that a “Y” is displayed at the ETA time.

Repeat this last action as necessary for each different times: -10, -5, 0, +5, +10, +15.

REPORT PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

43 The pilot calls this page by pressing the [2L] key on the PROG page:



This page displays information related to the FROM, TO, NEXT and DEST waypoints, as well as the current wind, temperature, distance and time to the next cruise profile change.

TITLE (White) — Displays the flight number. This line displays EO in amber, in case an engine-out is detected.

[1L] OVHD (green) — Displays the last sequenced waypoint. This field never displays the pseudo-waypoints and the F-PLN markers (T-P, PPOS, IN-BND, OUT-BND).

[1R] UTC/TIME ALT (green)	This field displays the time and altitude recorded at the time of sequence.
[2L]-[2R] TO (green)	This field displays the active waypoint, predicted time of arrival and predicted altitude at this waypoint. *Note: Time and altitude values are identical to those values on the F-PLN pages.*
[3L]-[3R] NEXT (green)	Same information for the next waypoint.
[4L] [4R] SAT/T.WIND/FOB (green)	This field displays the static air temperature, the wind direction and velocity, and the FOB recorded at waypoint sequencing.
[5L] T/D/UTC/DIST (green)	This field displays the estimated time, and the distance to go to the next change of the cruise profile (T/D, S/C, S/D). These data are only displayed when the cruise phase is active.
[5R] SEND* (blue)	The crew uses this prompt to downlink a position report. This field may be blank, depending on airline policy.
Line 6 DEST/UTC/DIST/EFOB	This field displays the estimated time of arrival, the distance along the F-PLN, and the estimated fuel on board at destination. This display is identical to the information on the F-PLN pages.

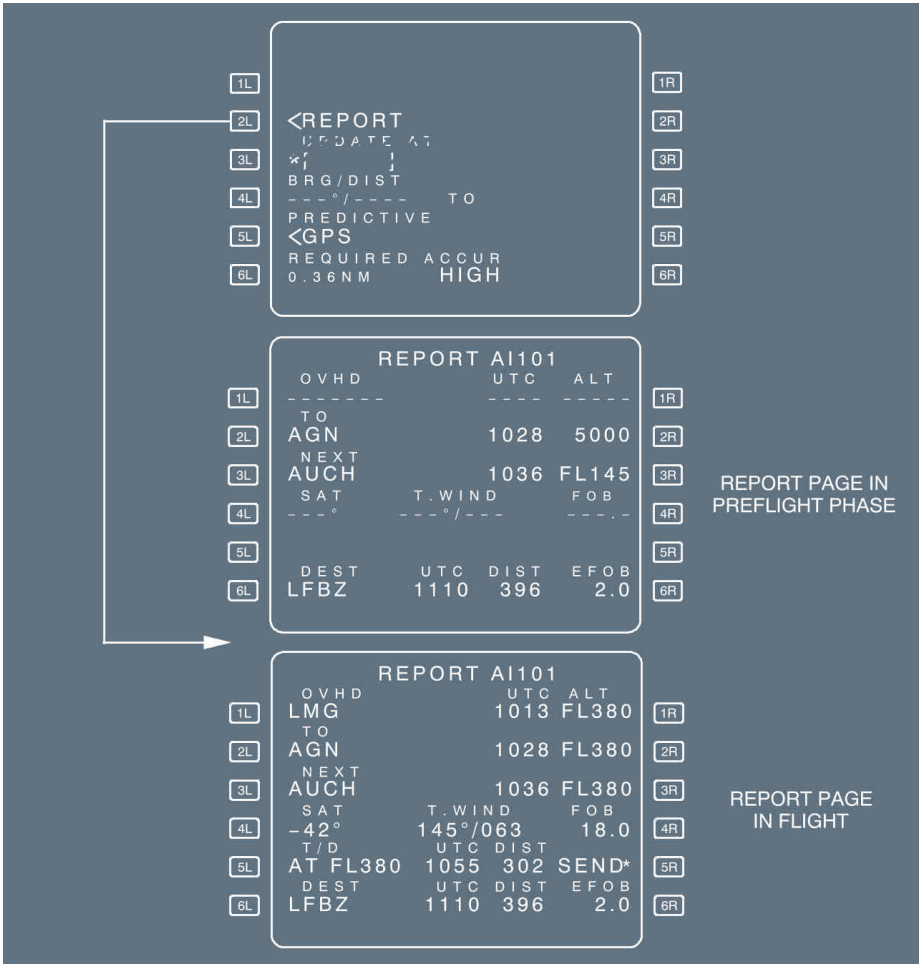
Note: No data can be inserted or modified on the REPORT page.

REPORT PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

44

The pilot calls this page by pressing the [2L] key on the PROG page:



This page displays information related to the FROM, TO, NEXT and DEST waypoints, as well as the current wind, temperature, distance and time to the next cruise profile change.

TITLE (White) — Displays the flight number. This line displays EO in amber, in case an engine-out is detected.

[1L] OVHD (green) — Displays the last sequenced waypoint. This field never displays the pseudo-waypoints and the F-PLN markers (T-P, PPOS, IN-BND, OUT-BND).

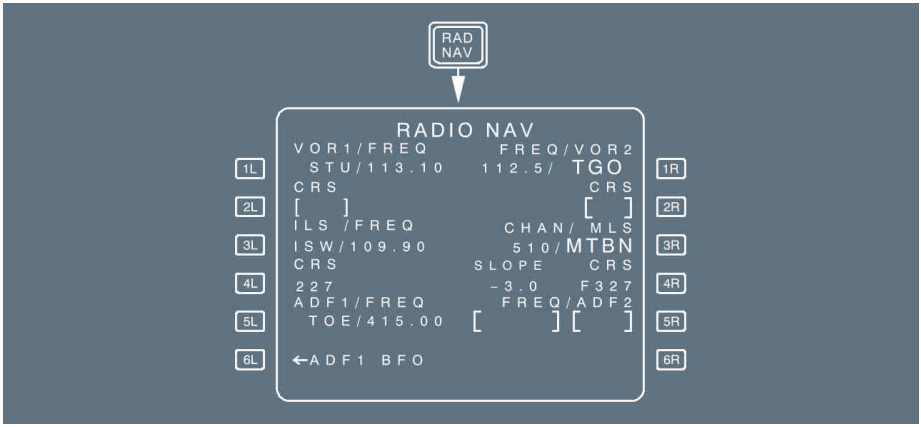
[1R] UTC/TIME ALT (green)	This field displays the time and altitude recorded at the time of sequence.
[2L]-[2R] TO (green)	This field displays the active waypoint, predicted time of arrival and predicted altitude at this waypoint. *Note: Time and altitude values are identical to those values on the F-PLN pages.*
[3L]-[3R] NEXT (green)	Same information for the next waypoint.
[4L] [4R] SAT/T.WIND/FOB (green)	This field displays the static air temperature, the wind direction and velocity, and the FOB recorded at waypoint sequencing.
[5L] T/D/UTC/DIST (green)	This field displays the estimated time, and the distance to go to the next change of the cruise profile (T/D, S/C, S/D). These data are only displayed when the cruise phase is active.
[5R] SEND* (blue)	The crew uses this prompt to downlink a position report. This field may be blank, depending on airline policy.
Line 6 DEST/UTC/DIST/EFOB	This field displays the estimated time of arrival, the distance along the F-PLN, and the estimated fuel on board (DEST EFOB) at destination. The DEST EFOB field will turn to amber, if the EFOB at destination becomes less than the MIN DEST FOB value displayed on the FUEL PRED page.. This display is identical to the information on the F-PLN pages.

Note: No data can be inserted or modified on the REPORT page.

RADIO NAV PAGE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

45 This page enables the pilot to select or verify the radio NAVAIDs, tuned for display purposes only.
These NAVAIDs include: VOR, VOR/DME, TAC, VORTAC, ILS, and ADF.
If either RMP is set on NAV, this page is blanked on both MCDUs.



Line 1 VOR1/FREQ
FREQ/VOR2

This line displays the identifiers and frequencies of VORs 1 and 2, whether they are automatically or manually tuned.
To manually tune a VOR, the pilot inserts the IDENT or frequency. If the IDENT is not in the database, the new NAVAID page comes up. A “clear” action reverts the selection to the autotuned NAVAID.

Line 2 CRS

This line displays courses for the NAVAIDs in Line 1.
The pilot can manually enter the courses through these fields.

[3L] ILS/FREQ

This field displays the IDENT and frequency of an ILS. It is autotuned, if the ILS is associated with the departure runway, or if the flight plan shows an ILS approach selected for the destination. The ILS may also be entered manually. When the manually-entered ILS differs from the ILS that would be autotuned,
RWY-ILS MISMATCH appears.

[4L] CRS

This field displays the course associated with the ILS in Line 3. It comes up automatically, when an ILS is autotuned, or if an ILS has been manually tuned via its IDENT. Otherwise, the course must be entered manually.
The course may be backbeam (Bxxx) or frontbeam (Fxxx).

[3R] CHAN/MLS

The pilot manually tunes an MLS by its IDENT or its channel. The system automatically tunes the associated course and slope.

Note: *If an MLS is tuned while an ILS was tuned, the ILS is deselected.*

[4R] SLOPE CRS

In this field, the pilot enters the slope and course of the MLS.
The course may be backbeam (Bxxx) or frontbeam (Fxxx).

Line 5 ADF1/FREQ FREQ/ADF2	This line displays the identifiers and frequencies of ADFs 1 and 2. The pilot can use the IDENT or the frequency to manually tune the ADF.
Line 6 ADF1/BFO BFO/ADF2	When an ADF is selected, these fields display an ADF/BFO prompt. The flight crew presses the key once to erase the arrow and put the ADF in BFO mode. A clear action brings the arrow back and cancels BFO.

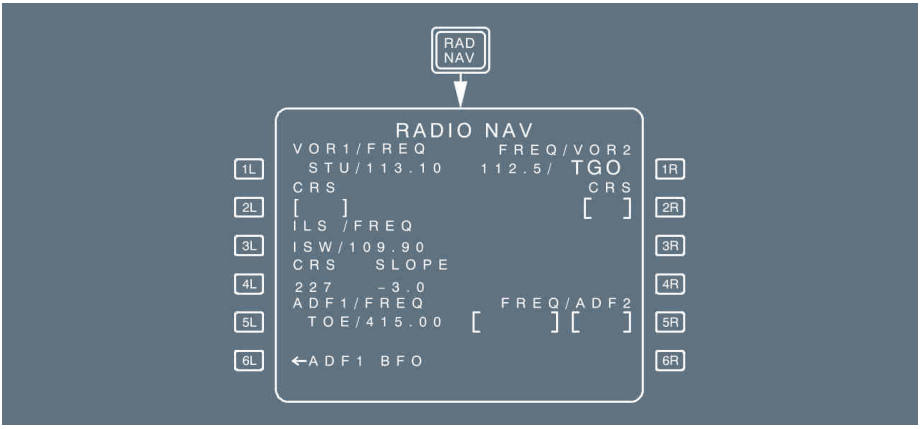
Note:
- *The autotune function only works for NAVAIDs stored in the database.*
- *When tuning manually, the operator should use the IDENT, rather than the frequency, unless the NAVAID is not in the database.*
- *Manually-tuned frequencies are displayed in large font.*

RADIO NAV PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

46

This page enables the pilot to select or verify the radio NAVAIDs, tuned for display purposes only. These NAVAIDs include: VOR, VOR/DME, TAC, VORTAC, ILS, and ADF.



Line 1 VOR1/FREQ FREQ/VOR2	This line displays the identifiers and frequencies of VORs 1 and 2, whether they are automatically or manually tuned. To manually tune a VOR, the pilot inserts the IDENT or frequency. If the IDENT is not in the database, the new NAVAID page comes up. A “clear” action reverts the selection to the autotuned NAVAID.
Line 2 CRS	This line displays courses for the NAVAIDs in Line 1. The pilot can manually enter the courses through these fields.

[3L] LS/FREQ — This field displays the IDENT of an ILS and its frequency (for ILS). It is autotuned, if the ILS is associated to the departure runway, or if the flight plan contains an ILS approach. The flight crew may also enter an ILS manually. When the manually entered ILS differs from the ILS that the FMS would autotune, “RWY-LS MISMATCH” appears.

[4L] CRS SLOPE — CRS: This field displays the course associated with the LS displayed in Line 3. It comes up automatically if an LS is autotuned, or if an LS has been manually tuned via its IDENT. Otherwise, the course must be entered manually. The course may be backbeam (Bxxx) or frontbeam (Fxxx)..
SLOPE: This field displays the slope associated with the LS displayed in Line 3. It comes up automatically if an LS is autotuned for approach, or if an LS has been manually tuned via its IDENT.

Note: *1. The slope does not apply to LOC only, LDA, SDF or Backbeam approaches.*
2. If the flight crew intends to manually tune an ILS that is not in the navigation database or to manually tune an ILS by its frequency (ident not entered), and if they do not enter the course, the flight crew will to arm approach modes.

Line 5 ADF1/FREQ
FREQ/ADF2 — This line displays the identifiers and frequencies of ADFs 1 and 2. The pilot can use the IDENT or the frequency to manually tune the ADF.

Line 6 ADF1/BFO
BFO/ADF2 — When an ADF is selected, these fields display an ADF/BFO prompt. The flight crew presses the key once to erase the arrow and put the ADF in BFO mode. A clear action brings the arrow back and cancels BFO.

Note:
- *The autotune function only works for NAVAIDs stored in the database.*
- *When tuning manually, the operator should use the IDENT, rather than the frequency, unless the NAVAID is not in the database.*
- *Manually-tuned frequencies are displayed in large font.*

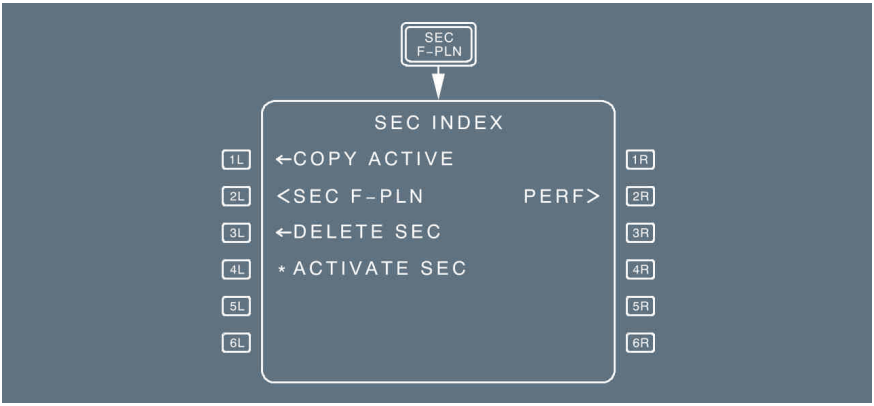
SECONDARY PAGES

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

The SEC F-PLN key on the MCDU console allows the flight crew to call up the secondary index page and the secondary flight plan page. The secondary flight plan is generally for a diversion, for predictable runway changes for takeoff or landing, or for training.
There are two types of secondary index pages. The type selected depends on the presence of a secondary flight plan.

47 **SECONDARY INDEX PAGE**

A SECONDARY FLIGHT PLAN IS ALREADY DEFINED

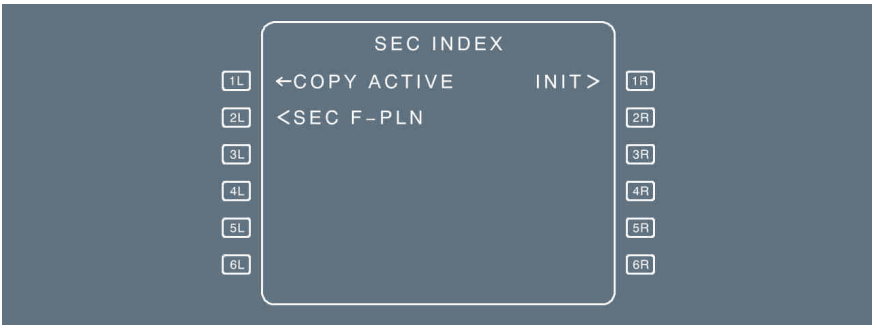


[1L] COPY ACTIVE (blue)	The flight crew presses this key to copy the active flight plan into the secondary flight plan and delete the previous secondary plan.
[2L] SEC F-PLN (white)	The flight crew presses this key to call up the secondary flight plan pages.
[3L] DELETE SEC (blue)	The flight crew presses this key to delete the current secondary flight plan.
[4L] ACTIVATE SEC (amber)	The flight crew presses this key to activate the secondary flight plan as the active flight plan.

Note: *"ACTIVATE SEC"routinely appears if the HDG/TRK mode is active. If the NAV mode is active, "ACTIVATE SEC"appears only if the active and secondary flight plans have a common active leg.*

[1R] INIT (white)	This field displays this prompt when the secondary flight plan is not defined as a copy of the active flight plan. Pressing this key calls up the SEC INIT A and B pages.
[2R] PERF (white)	The flight crew presses this key to call up the performance pages for the secondary flight plan.

A SECONDARY FLIGHT PLAN IS NOT DEFINED



[1L] COPY ACTIVE (blue)	The pilot presses this key to copy the primary active flight plan into the secondary flight plan.
[2L] SEC F-PLN (white)	The pilot presses this key to call up the secondary flight plan pages.
[1R] INIT (white)	The pilot presses this key to call up the secondary INIT page. It is similar to the active INIT page, but blue brackets replace all the amber boxes.

48 **SECONDARY FLIGHT PLAN PAGES**

The secondary flight plan pages A and B are identical to those of the active flight plan, but are automatically sequenced, only when the secondary is copied from the primary and their active legs are identical.
The active and secondary flight plans pages differ from each other as follows:

SECONDARY LATERAL REVISION PAGES:

- ERASE and INSERT are not displayed.
- OFFSET and FIX INFO are not available.
- A lateral revision of the secondary flight plan does not create a temporary flight plan: All revisions are directly applied to the secondary flight plan.

SECONDARY VERTICAL REVISION PAGES:

A vertical revision on the secondary flight plan does not create a temporary flight plan.

SECONDARY INIT A AND B PAGES:

- They use blue brackets, instead of amber boxes.
- They have no align prompt.
- They do not provide for slewing or entering data in the 4L-4R fields (airport reference).

SECONDARY STEP ALTITUDE PAGES:

These pages operate as the primary STEP ALTS page, except that optimal step, savings are not available.

SECONDARY WIND PAGES:

They have no history wind page.

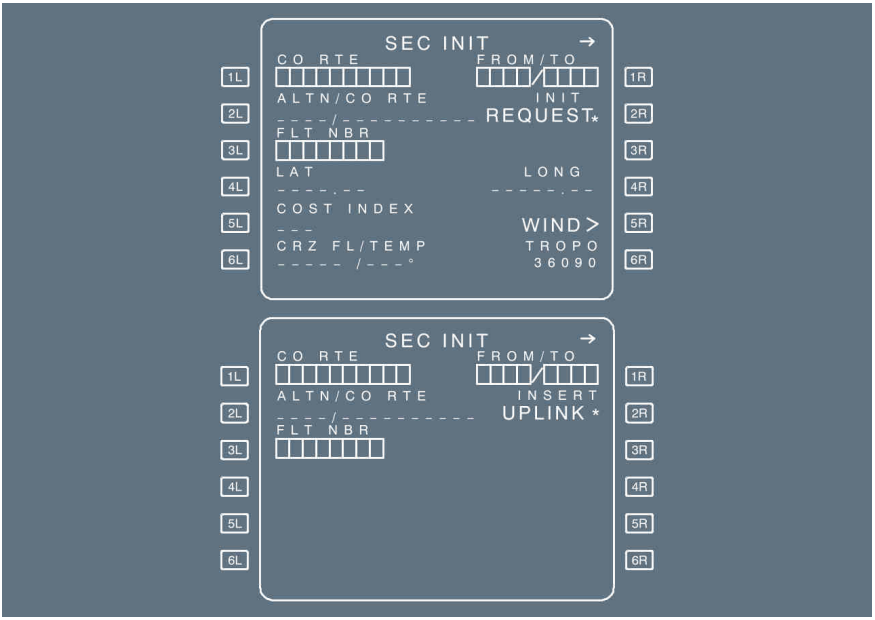
SECONDARY PERFORMANCE PAGES:

- All boxes are replaced by blue brackets.
- They have no engine-out mode, no engine-out long range cruise cost index.
- They have no expedite predictions.
- They have no ACTIVATE/CONFIRM APPROACH PHASE prompt.
- They have no PRED TO ALTN predictions on the PERF CLB and PERF DES pages.
- They have no engine-out drift down, no top of descent, no cabin descent rate information on the PERF CRZ page.

The secondary flight plan has no FUEL PRED page.

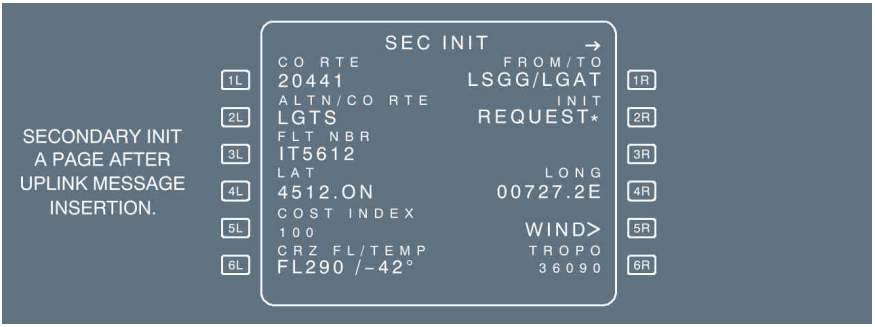
SECONDARY INIT A PAGE IS ALSO USED TO REQUEST OR DISPLAY AN UPLINK INIT MESSAGE RECEIVED AFTER ENGINE START.

This uplink INIT message can be cleared or inserted as SECONDARY INIT data.



[2R] INIT REQUEST* Enable to request init data from the ground or,

[2R] INSERT UPLINK* A downlink message has been received following a request. The message can be cleared or entered in the SEC INIT page.



SECONDARY PAGES

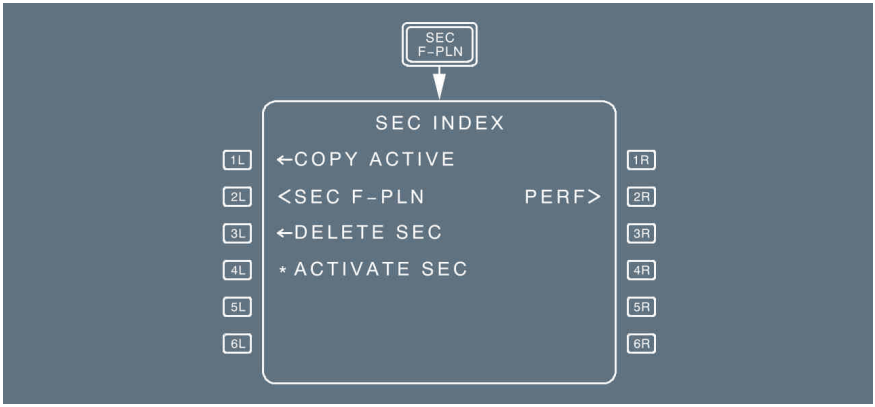
Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

49

The SEC F-PLN key on the MCDU console allows the flight crew to call up the secondary index page and the secondary flight plan page. The secondary flight plan is generally for a diversion, for predictable runway changes for takeoff or landing, or for training.
There are two types of secondary index pages. The type selected depends on the presence of a secondary flight plan.

SECONDARY INDEX PAGE

A SECONDARY FLIGHT PLAN IS ALREADY DEFINED



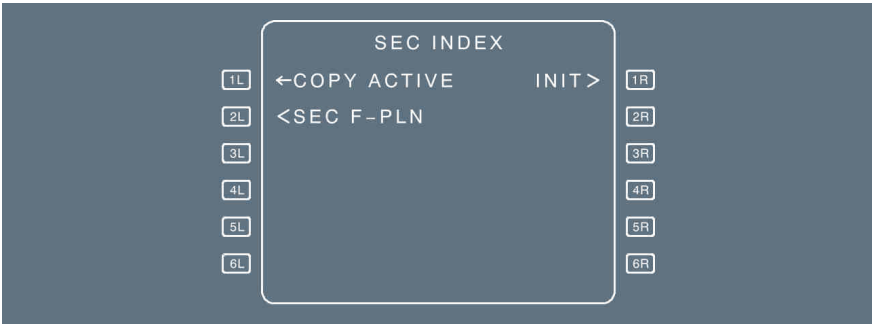
[1L] COPY ACTIVE (blue)	The flight crew presses this key to copy the active flight plan into the secondary flight plan and delete the previous secondary plan.
[2L] SEC F-PLN (white)	The flight crew presses this key to call up the secondary flight plan pages.
[3L] DELETE SEC (blue)	The flight crew presses this key to delete the current secondary flight plan.
[4L] ACTIVATE SEC (amber)	The flight crew presses this key to activate the secondary flight plan as the active flight plan.

Note: "ACTIVATE SEC"routinely appears if the HDG/TRK mode is active. If the NAV mode is active, "ACTIVATE SEC"appears only if the active and secondary flight plans have a common active leg.

[1R] INIT (white) The flight crew presses this key to call up the SEC INIT A page.

[2R] PERF (white) The flight crew presses this key to call up the performance pages for the secondary flight plan.

A SECONDARY FLIGHT PLAN IS NOT DEFINED



[1L] COPY ACTIVE (blue) The pilot presses this key to copy the primary active flight plan into the secondary flight plan.

[2L] SEC F-PLN (white) The pilot presses this key to call up the secondary flight plan pages.

[1R] INIT (white) The pilot presses this key to call up the secondary INIT page.
It is similar to the active INIT page, but blue brackets replace all the amber boxes.

SECONDARY FLIGHT PLAN PAGES

The secondary flight plan pages A and B are identical to those of the active flight plan, but are automatically sequenced, only when the secondary is copied from the primary and their active legs are identical.
The active and secondary flight plans pages differ from each other as follows:

SECONDARY LATERAL REVISION PAGES:

- ERASE and INSERT are not displayed.
- FIX INFO is not available.
- A lateral revision of the secondary flight plan does not create a temporary flight plan:
  All revisions are directly applied to the secondary flight plan.

SECONDARY VERTICAL REVISION PAGES:

A vertical revision on the secondary flight plan does not create a temporary flight plan.

SECONDARY INIT A AND B PAGES:

- They use blue brackets, instead of amber boxes.
- They have no align prompt.
- They do not provide for slewing or entering data in the 4L-4R fields (airport reference).

SECONDARY STEP ALTITUDE PAGES:

These pages operate as the primary STEP ALTS page, except that optimal step, savings are not available.

SECONDARY WIND PAGES:

They have no history wind page.

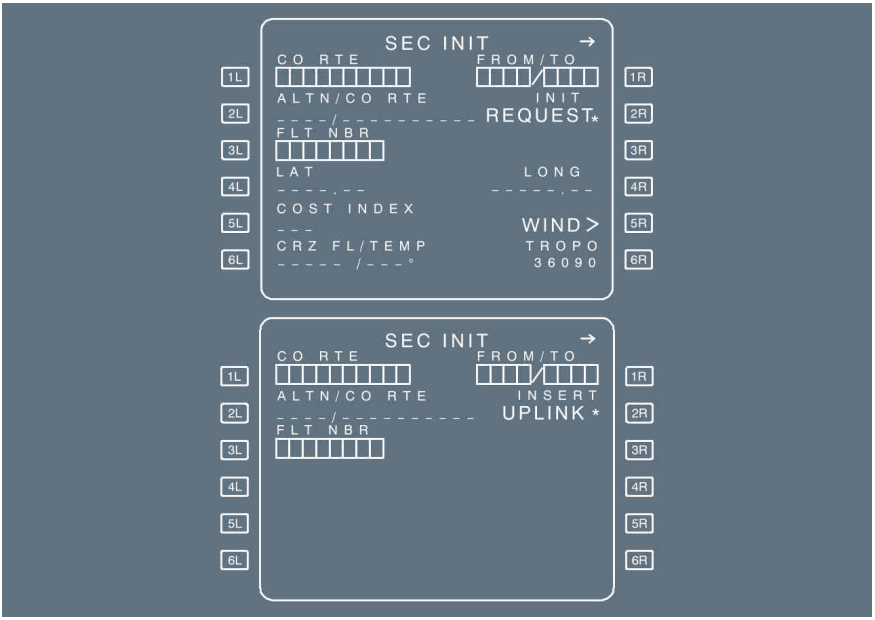
SECONDARY PERFORMANCE PAGES:

- All boxes are replaced by blue brackets.
- They have no engine-out mode, no engine-out long range cruise cost index.
- They have no expedite predictions.
- They have no ACTIVATE/CONFIRM APPROACH PHASE prompt.
- They have no PRED TO ALTN predictions on the PERF CLB and PERF DES pages.
- They have no engine-out drift down, no top of descent, no cabin descent rate information on the PERF CRZ page.

The secondary flight plan has no FUEL PRED page.

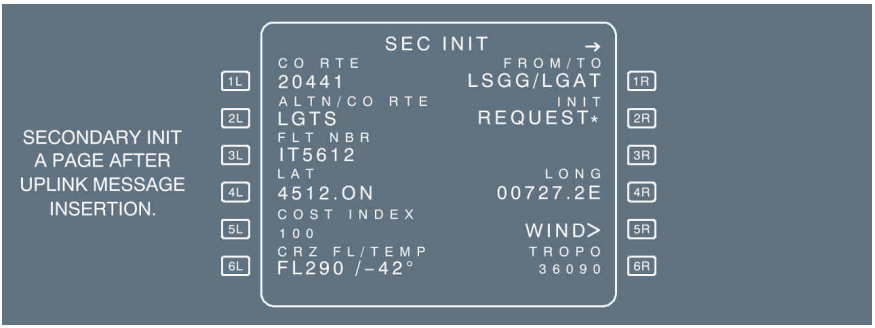
SECONDARY INIT A PAGE IS ALSO USED TO REQUEST OR DISPLAY AN UPLINK INIT MESSAGE RECEIVED AFTER ENGINE START.

This uplink INIT message can be cleared or inserted as SECONDARY INIT data.



[2R] INIT REQUEST* Enable to request init data from the ground or,

[2R] INSERT UPLINK* A downlink message has been received following a request. The message can be cleared or entered in the SEC INIT page.



BACK UP NAV PAGES

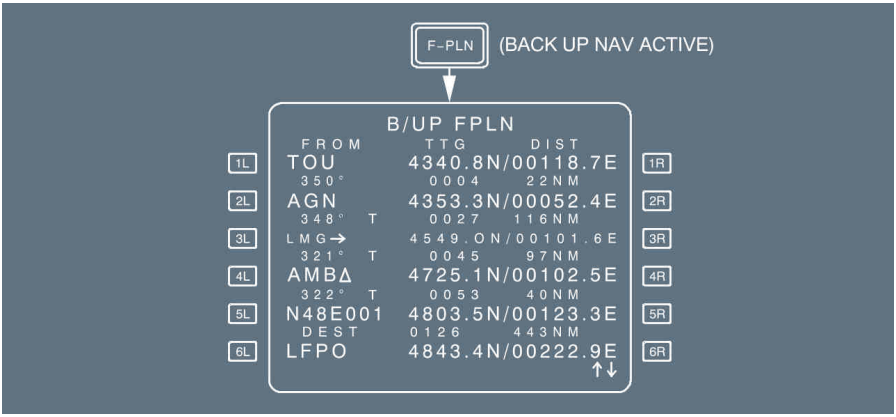
Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The MCDU features a back up navigation function which provides simplified point-to-point GPIRS and IRS based navigation in case of a dual FM failure.
The backup Navigation mode allows limited lateral flight planning within the MCDU, that can be used to drive the Navigation Display and provides relative path position information and auto-sequencing of the Backup Navigation flight plan. The Backup Navigation flight plan reflects, as much as possible, the active primary FM flight plan upon its initial activation.
During FM normal operation, the F-PLN is continuously downloaded in the MCDU memory: the BACK UP NAV function links the MCDU of the failed FM to its onside IRS. All navigation data related to the MCDU F-PLN are displayed on the associated ND.
BACK UP NAV function is activated on the MCDU MENU page by pressing the NAV B/UP prompt.
The MCDU back-up F-PLN may accept a maximum of 165 legs, including information such as waypoint position/identification, leg type, discontinuity, overfly and turn direction information (radial, pattern, heading leg... cannot be part of the MCDU F-PLN). No secondary or temporary F-PLN exists.

pages available while BACK UP NAV is active:
- B/UP F-PLN
- B/UP F-PLN for DIRECT TO
- B/UP PROG
- B/UP IRS for onside IRS (1+2)
- B/UP IRS 3
- B/UP GPS (if the GPS is installed)

50 **B/UP F-PLN PAGE**

The B/UP F-PLN page displays the MCDU F-PLN data. The pilot calls up this page by pressing the F-PLN key while B/UP NAV is active.



TITLE line 1 to line 5

B/UP F-PLN is displayed in a white large font

Display consecutive waypoints with their associated latitude/longitude.

If a waypoint is to be overflown, an overfly symbol (w) is displayed after the identifier.

If a turn is specified into the next leg, a large font arrow is displayed after the identifier.

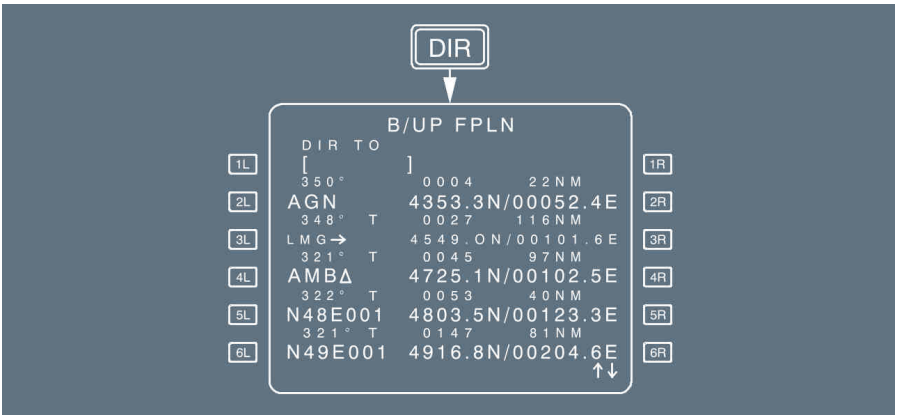
Label lines contain the bearing, time to go and distance to the next waypoint displayed in small font.

white	bearing
green	time to go and distance
BRG	Between FROM and TO waypoints: True or Mag depending on the TRUE pb position. T is displayed when the bearing is true referenced. Between other waypoints: out bound true track of the great circle joining the 2 related waypoints, independant of TRUE pb-sw.
TTG	HHMM limited to 9 959. Time between the 2 related waypoints.
DIST	NM limited to 9 999.

line 6 DEST	DEST airport identifier and associated latitude/longitude. DIST to destination is computed as the direct distance from the aircraft to the active waypoint plus the along flight plan distances. time to go to destination is computed as distance to destination divided by ground speed. TTG and DEST are dashed if aircraft position is unavailable.

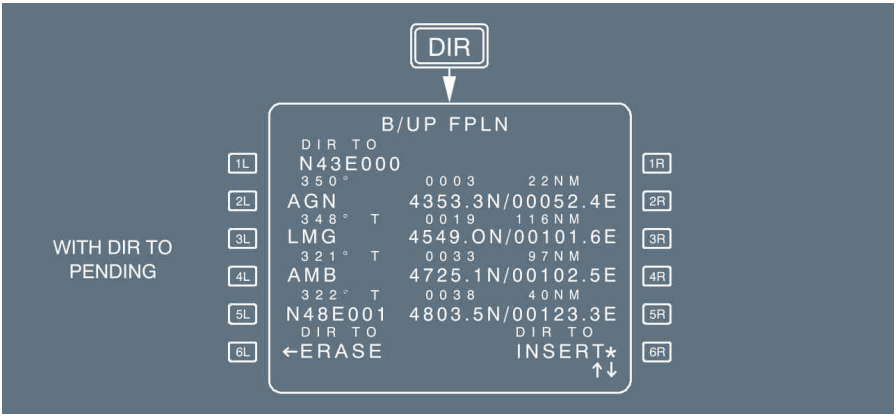
51 **B/UP F-PLN (DIR TO)PAGE**

The pilot calls up this page using the DIR key on MCDU while BACK UP NAV is active and aircraft position is valid.



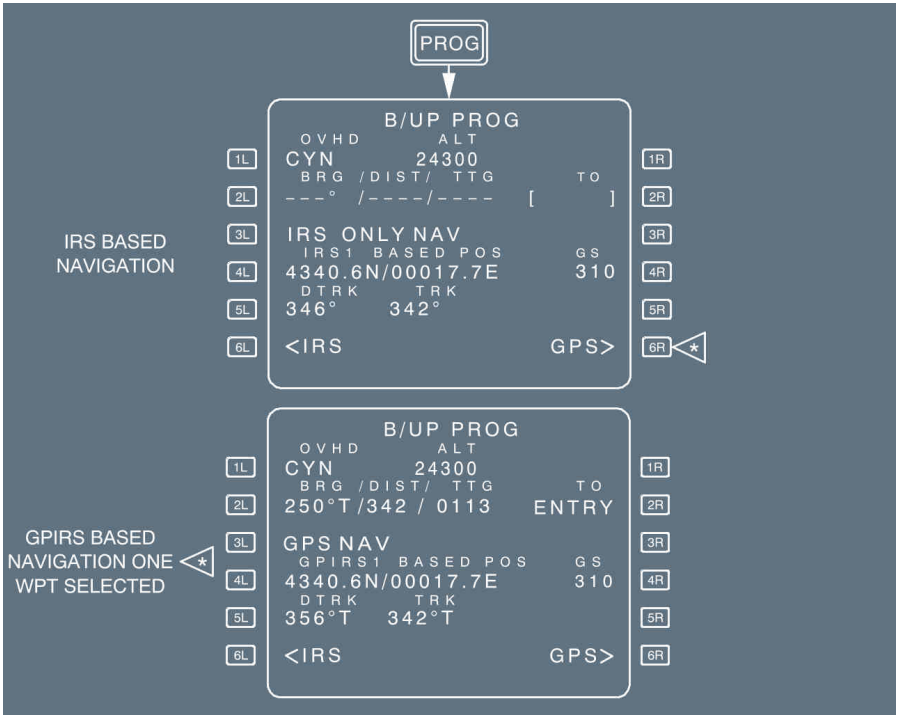
TITLE [1L] DIR TO	B/UP F-PLN is displayed in a white large font Allows DIRECT TO selection to the desired waypoint. This waypoint can be selected from the F-PLN or manually entered through the scratchpad (IDENT/LAT/LONG or LAT/LONG)
line 2 to line 6	Display consecutive waypoints of the F-PLN. Same as the B/UP F-PLN page. The TO WAYPOINT is displayed in [2L]. Vertical slewing function is available.

When a DIR TO is pending, the page displays the prompts “DIR TO INSERT” and “DIR TO ERASE” in line 6.



52 **B/UP PROG PAGE**

It displays flight parameters relative to the F-PLN or a selected waypoint.
The flight crew calls up this page by pressing the PROG key on MCDU when BACK UP NAV is active.



TITLE line 1 OVHD/ALT B/UP PROG is displayed in a white large font.
Displays the identifier of the last sequenced waypoint and the altitude at the time of the sequence.

line 2 BRG/DIST/TTG/TO — Allows the flight crew to enter an existing MCDU F-PLN waypoint identifier or LAT/LONG or IDENT/LAT/LONG.
MCDU then computes bearing, distance and time to go to that waypoint from the present position.
The pilot may modify or clear this entry (2R field).

- BRG True or magnetic outbound track of the great circle joining aircraft present position to the entered waypoint: dependent on the TRUE pb-sw position.
- DIST limited to 9 999.
- TTG HHMM limited to 9 959. time to go to the entered position computed assuming current ground speed.

These fields are displayed in a green small font.
They are dashed if present position is unavailable.

[3L] — Means of navigation used by the Back-Up Navigation. If GPS is fitted and is the navigation source, “GPS NAV”is displayed, otherwise “IRS ONLY NAV”is displayed.
If the GPS is not installed, this field is blank.

[4L] IRS 1 (2 or 3) BASED POS GPIRS 1 (2 or 3) (green) — Current aircraft position provided by the selected IRS GPIRS
IRS 1 (or 3 if IRS 1 failed) on MCDU 1
IRS 2 (or 3 if IRS 2 failed) on MCDU 2
GPIRS 1 (or GPIRS 3) or MCDU 1 ◁
GPIRS 2 (or GPIRS 3) or MCDU 2 ◁

[4R] GS (green) — Current ground speed from the selected IRS or GPS ◁ .

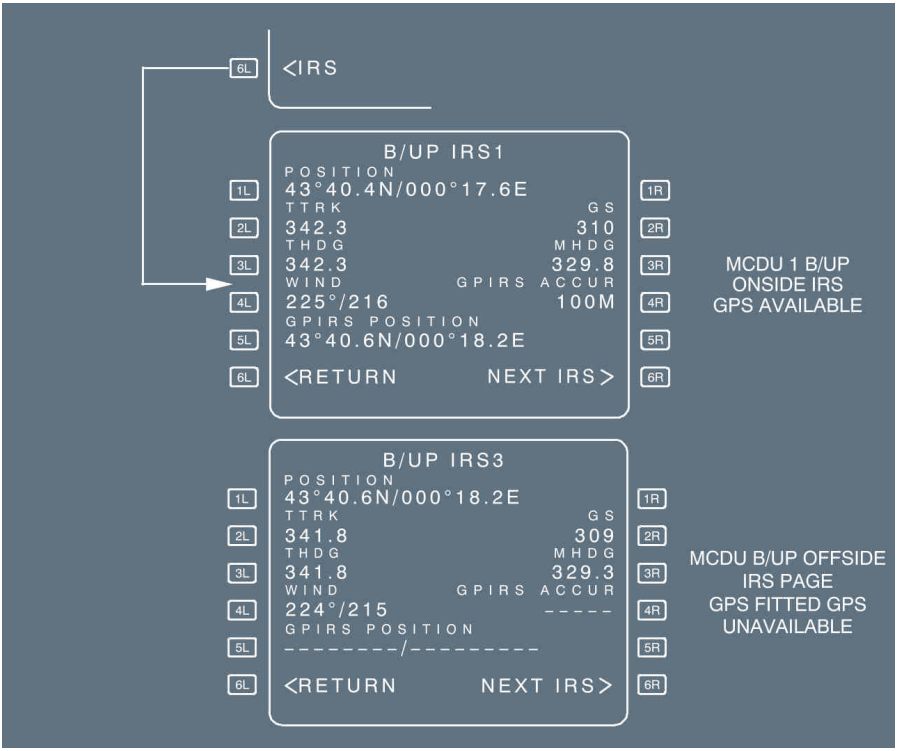
[5L] DTRK/TRK (green) — Desired track of the MCDU F-PLN active leg and current aircraft track from the selected IRS/GPS (True or Mag).
These tracks are true or magnetic depending on TRUE pb position.

[6L] IRS 1 (2) — Gives access to onside B/UP IRS (1 or 2) page

[6R] GPS — Gives access to B/UP GPS page.
This prompt only appears when the GPS is installed.

53 **B/UP IRS 1 OR 2 OR 3 PAGE**

Display IRS 1, 2, 3 navigation data.
The pilot calls up this page from B/UP PROG page, by pressing the corresponding prompt.



TITLE	B/UP IRS 1, 2, 3 displayed in a white large font.
[1L] POSITION	Current aircraft position from selected IRS
[2L] T TRK	True track
[2R] GS	Ground speed
[3L] T HDG	True heading
[3R] M HDG	Magnetic heading Dashed when in polar area.
[4L] WIND	Wind direction and velocity Wind direction is always true referenced.
[4R] GPIRS ACCUR	GPS accuracy in meters as in the IRS page.
[5R] GPIRS POSITION	If GPS is installed, the GPS IRS position is provided as in the IRS page.
[6L] RETURN	Gives access to B/UP PROG page

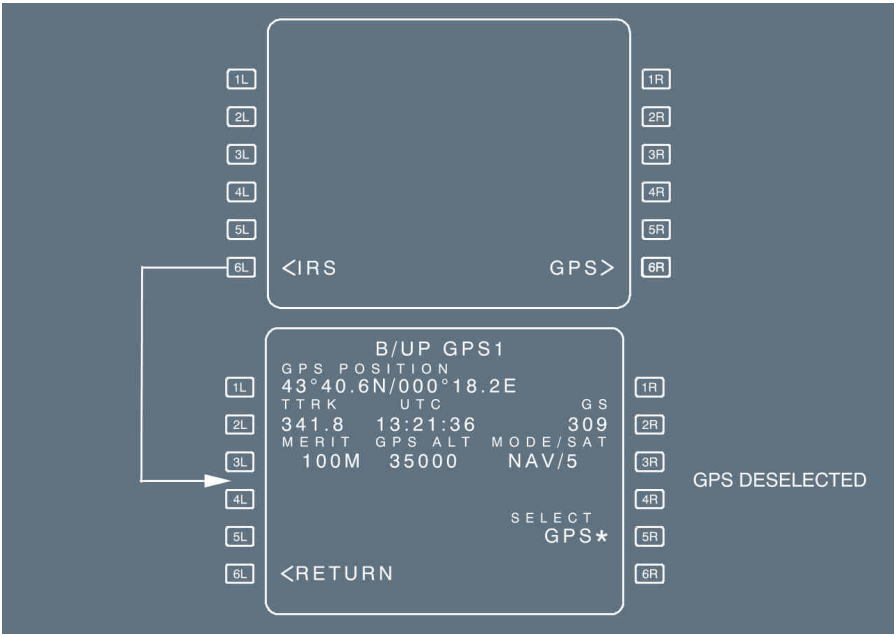
[6R] NEXT IRS — Gives access to the next IRS page.
(Closed loop 1 → 2 → 3 → 1)

This page is not modifiable by the crew.

Note: *The fields [4R] and [5L] are blanked when the GPS is not installed.*

54 **B/UP GPS** ⋖

Display GPS navigation data.
The flight crew calls up this page from B/UP PROG page, by pressing the corresponding prompt.



TITLE — B/UP GPS 1, 2 displayed in a white large font.

[1L] — GPS POSITION

Line 2: — TTRK GPIRS position (latitude/longitude)
UTC: Time
GS: Ground Speed

Line 3: — MERIT: GPS figure of merit
GPS ALT: GPS altitude
MODE/SAT: Navigation mode and number of tracked satellites. These values are displayed as in the FM GPS page.

[5R]	DESELECT/SELECT GPS: The flight crew may select and deselect the GPS for navigation Backup function. The default configuration is GPS selected.

Intentionally left blank

FMS Legacy

MCDU MESSAGE LIST

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

Messages displayed on the MCDU are of two types and displayed in two colors.

Type I : a direct result of a pilot action

Type II : information about a situation or a call for pilot action

Type II messages are stored in a first-in/first-out message queue (5 messages max.)

They are suppressed if correct data is entered or when they no longer apply.

The flight crew can clear all messages by pressing the CLEAR key on the MCDU console.

Amber : important

White : less important

MESSAGE	TYPE/COLOR	CONDITIONS
A/C POSITION INVALID	II/A	The aircraft position has become invalid. If the message has been cleared and the flight crew attempts to call up the HOLD at PPOS or DIR TO page while the aircraft position is still invalid, then the message is displayed again.
ACT RTE UPLNK ◁ (ACARS msg)	II/W	A flight plan is stored in the active flight plan.
ALIGN IRS	II/A	Appears when the IRS are ready for alignment, but the INIT A page is not displayed on either side of the flight deck. The ALIGN IRS message requires that one of the flight crew call up the INIT A page and take whatever action it calls for.
ALT F-PLN DELETED	II/W	The Alternate Flight Plan has been deleted automatically. This occurs when the flight plan memory is full and the system attempts to store more data in it.
AWY/WPT MISMATCH	I/W	The pilot has attempted to enter a VIA or a GO TO on the LAT REV page, and the new point is not on the entered airway.
CABIN RATE EXCEEDED	II/W	This message appears when the aircraft gets within 200 nm of the destination and the computed rate of descent makes it impossible for the cabin to be repressurized at the maximum rate.
CHECKA/C POSITION	II/A	The radio position is more than 12 nm from the IRS position while the DME/DME/Inertial or VOR/DME/inertial position mode remains valid.
CHECK ALTN WIND ◁ (ACARS msg)	II/W	The uplinked alternate cruise differs from the default alternate cruise flight level.

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MESSAGE	TYPE/COLOR	CONDITIONS
CHECK APPR GUIDANCE (On PFD : "CHECK APP GUIDANCE" (A), or "CHECK APP SEL" (W) (if CPIP3 installed))	II/A	Displayed, when a non-LS approach is part of the flight plan and the flight crew has manually tuned an ILS on the RAD NAV page. This is to remind the flight crew that the available guidance modes for the approach are APP NAV and FINAL. Displayed: - In cruise, when less than 100 nm from the Top of Descent; - At initiation of the descent phase; - In the descent and approach phases.
CHECK CO RTE ◁✻ (ACARS msg)	II/W	The uplinked company route identifier differs from the one specified in the request.
CHECK DATA BASE CYCLE	II/W	The current date does not match the effective date of the active database, and someone attempts to enter a FROM/TO or CO RTE.
CHECK DEST DATA ◁✻ (ACARS msg)	II/A	The aircraft is at 180 nm from destination, and the destination QNH, TEMP or WIND (displayed on the PERF APPR page received by ACARS uplink) has to be checked. If a modification of these parameters is performed, creating a conflict with previous data, the message is triggered again.
CHECK FLT NUMBER ◁✻ (ACARS msg)	II/A	The uplinked flight number differs from the flight number specified in the request.
CHECK GW	II/A	The gross weights computed by the Flight Management Computer and the Flight Augmentation Computer disagree by more than 7 t.
CHECK QFE	II/A	This appears, at the transition from QNH to QFE reference, when the QFE altitude differs by more than 100 ft from the altitude predicted with the QNH set on the MCDU by means of the airport elevation in the NAV database.
CLK IS TAKEOFF TIME	II/W	This appears when the flight crew has entered an Estimated Takeoff Time (ETT) and actual time is equal to ETT.
CROSSLOAD COMPLETE ◁✻	II/W	The database crossload from one FMGC to the other was successfully completed.
CROSSLOAD ABORTED ◁✻	II/W	Message displayed on the transmitting MCDU, indicating an error in the transmission process.
CRZ FL ABOVE MAX FL	II/W	This appears when the flight crew enters a cruise altitude that is above the computed maximum altitude.
CSTR DEL ABOVE CRZ FL	II/W	This appears when a flight plan altitude constraint has been deleted because the flight crew has inserted a cruise flight level or step-down altitude that is at or below the flight plan constraint.

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MESSAGE	TYPE/COLOR	CONDITIONS
CSTR DEL UP TO WPT01	II/W	This appears when constraints get deleted because the aircraft transitions to a go-around flight phase before the FMGS sequences the flight plan destination.
DECELERATE Also displayed on PFD	II/A	The aircraft is still in cruise phase and managed speed after it reaches the top of descent, and it has not begun the descent.
DEFAULT STATE ASSUMED	II/W	This appears when all initialization data has been cleared after a very-long-term (VLT) power interruption. The flight crew should see this only when powering up a new MCDU.
DELETING OFFSET	II/W	This appears when the system is deleting an offset automatically, which it does under certain specific conditions, such as: - change of active leg due to lateral revision - the next leg is not a CF, FM or TF leg, or the next leg termination waypoint is the destination runway, and the current distance to go is less than or equal to the distance to reach the path.
DES/ALTN MISMATCH	I/W	The flight crew attempts to enter an alternate CO RTE (which starts at an origin that is not the primary flight plan destination).
DIR TO IN PROCESS	I/W	The flight crew calls up the vertical or lateral revision page on one MCDU while the direct to page is displayed on the other MCDU.
ENTER DEST DATA	II/A	The flight crew has not entered wind, QNH, or temperature for the destination, and the aircraft is 180 nm out.
ENTRY OUT OF RANGE	I/W	The flight crew attempts to enter data that is out of the range specified for the selected field.
FLT NBR UPLINK ◁✻ (ACARS msg)	II/W	A flight number has been added to the uplink flight plan without previous request.
F-PLN ELEMENT RETAINED	I/W	The pilot attempts to delete stored navaids, waypoints or runways that are contained in any flight plan or that are being tuned.
F-PLN FULL	II/W	There is not enough memory in the flight plan allotment for the computer to accept more flight plan data.
FMS1/FMS2 A/C STS DIFF	II/W	This message always precedes a transition to independent mode, and appears at power-up if the system detects a difference in one of the following: - NAV Data Base Serial Number - Performance Data Base - FM Operational Program - Aircraft and Airline Program Pins
FMS1/FMS2 GW DIFF	II/W	Onside and offside aircraft weight differ by 2 t or more.

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MESSAGE	TYPE/COLOR	CONDITIONS
FMS1/FMS2 POS DIFF	II/A	Onside and offside positions differ by 5 nm (0.5 nm if GPS installed) or more.
FMS1/FMS2 SPD TGT DIFF	II/W	Onside and offside target speeds differ displayed on the "PFD"differ by 5 kt or more.
FORMAT ERROR	I/W	A data entry does not meet the specified entry format for a given field.
GPS PRIMARY LOST ◁✻ (also displayed on ND)	II/A	Displayed when GPS PRIMARY mode is lost.
GPS PRIMARY ◁✻ (also displayed on ND)	II/W	Displayed when the FMS is transitioning to GPS PRIMARY.
GPS IS DESELECTED ◁✻	II/A	This message appears when GPS has been manually deselected and the aircraft is 80 nm before the top of descent or in approach phase.
INDEPENDENT OPERATION	II/A	The FMGCs are operating independently of each other.
INITIALIZE WEIGHTS	II/A	The zero-fuel weight or block fuel (FOB) is undefined after engine start.
INVALID FLT NBR UPLINK ◁✻ (ACARS msg)	II/W	The uplink message contains a valid flight plan but no flight number.
INVALID PERF UPLINK ◁✻ (ACARS msg)	II/W	Performance uplink message has been rejected.
INVALID RTE UPLINK ◁✻ (ACARS msg)	II/W	An error was detected in the uplink message and it is rejected.
INVALID TAKEOFF UPLINK ◁✻ (ACARS msg)	II/W	The current uplink takeoff data message is rejected.
INVALID WIND UPLINK ◁✻ (ACARS msg)	II/W	The current uplink wind message is rejected.
IRS ONLY NAVIGATION	II/A	The aircraft is not in an approach or terminal area and: - the aircraft has been in IRS mode for more than 10 min, or - the aircraft is in IRS only and starts the descent phase.
LAT DISCONT AHEAD	II/A	The next leg is a discontinuity and the aircraft is 30 s from flying the leg.
LIST OF 10 IN USE	I/W	The flight crew has tried to enter more than ten stored runways into the data base, and all of the first ten are included in a flight plan or a pilot-stored route.
LIST OF 20 IN USE	I/W	The flight crew has tried to create a PBD, LAT/LONG, or PBX, or store a pilot-defined waypoint or navaid when 20 are already in use (in a flight plan or pilot-stored routes).
NAV ACCUR DOWNGRAD (also displayed on ND)	II/A	NAV accuracy has been downgraded from HIGH to LOW. (See FMGS principles for an explanation).

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MESSAGE	TYPE/COLOR	CONDITIONS
NAV ACCUR UPGRAD (*EFIS ND)	II/W	NAV accuracy has been upgraded from LOW to HIGH.
NEW ACC ALT-HHHH	II/W	The acceleration altitude has been changed.
NEW CRZ ALT-HHHHH	II/W	The cruise altitude has been changed.
NEW THR RED ALT-HHHH	II/W	The thrust reduction altitude has been changed.
NO ANSWER TO REQUEST ⋘ (ACARS msg)	I/W	A crew request, was previously sent to the ground and no answer has been received for 4 min.
NON UNIQUE ROUTE IDENT	I/W	The flight crew has tried to enter on the new route page a company route ident that is identical to an existing company route ident (pilot-defined or in the data base).
NOT ALLOWED	I/W	Data entry is not allowed in the selected field, or a selection action (LSK push or mode push) is not allowed.
NOT ALLOWED IN NAV	I/W	An attempt to modify the TO waypoint is made while in NAVmode.
NOT IN DATA BASE	I/W	The pilot is trying to enter or call up a company route ident, a FROM /TO pair, a place defined by place-bearing-distance (PBD) or place-bearing/place-bearing (PBX), or an airport navaid, waypoint runway, or navaid frequency (including pilot-defined elements) that is not in the current data base.
NOT XMITTED TO ACARS ⋘ (ACARS msg)	II/W	A pilot request or a pilot report was sent but the communication was not established or not acknowledged.
ONLY SPD ENTRY ALLOWED	I/W	The pilot is trying to enter a Mach number for a preselected speed value on the CLIMB page.
OPP FMGC IN PROCESS	II/W	The offside FMGC is unhealthy, and the FM system mode is SINGLE. The message indicates that the MCDU on which the message is displayed is being driven by the FMGC on the other side.
PAGE UPDATE IN PROCESS	I/W	The pilot presses a key on the flight plan page while predictions are being updated.
PERF DATA UPLINK ⋘ (ACARS msg)	II/W	Performance data are received from ground.
PLEASE WAIT	I/W	Resynchronization between both FMGCs is in progress.
PRESS MCDU MENU KEY	II/W	The SUBSYSTEM (TIMEOUT) page is displayed and the system which was selected does not respond.
PRINTER NOT AVAILABLE ⋘	II/W	A printer communication error has been detected while printing a report. The printing is terminated.
RESET IRS TO NAV	II/A	The system has an initial position for IRS alignment, or the initial position has changed since IRS alignment, but none of the IRSs are in align mode.

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MESSAGE	TYPE/COLOR	CONDITIONS
REVISIONS NOT STORED	II/W	This message, displayed when a pilot-defined route or company route (active or secondary flight plan) is stored, indicates that the following elements are not retained: - Pilot-entered holds - Offsets - Modifications to terminal area procedures - Pilot-entered constraints - Pseudo waypoints
RTE DATALINK IN PROG ◁✻ (ACARS msg)	I/W	A flight plan modification is performed after a F-PLN INIT request has been sent. This message is displayed until the uplink is entirely received.
RWY/ILS MISMATCH	II/A	- During climb, cruise, descent, approach, or go-around, the ILS frequency entered on the RAD NAV page does not match the ILS associated with the destination runway - During preflight or takeoff, the ILS frequency entered on the RAD NAV page does not match the ILS associated with the takeoff runway.
SEC F-PLN DELETED	II/W	The secondary flight plan has been deleted automatically because the memory entries exceeded the capacity of the computer memory used for flight plans.
SEC RTE UPLINK ◁✻ (ACARS msg)	II/W	A flight plan is stored in the secondary flight plan.
SELECT DESIRED SYSTEM	II/W	The MCDU displays its MENU page.
SENSOR IS INVALID	I/W	- The pilot has selected FF or FQ, or FF + FQ, or FQ + FF on the FUEL PRED page and the sole sensor or both of the selected sensors are invalid, or - The flight crew has entered fuel on board only, and the FF sensor is invalid.
SET HOLD SPEED (also displayed on PFD)	II/A (W)	This instruction appears when the aircraft is in selected speed, the pilot has inserted a hold in the flight plan, the aircraft is 30 s or less from the point where it must start decelerating toward hold speed, and the selected speed differs from the hold speed by more than 5 kt.
SET SPEED AUTO (″SET MANAGED SPD″is displayed on PFD)	II/A (W)	The target speed is selected for the current phase, but there is no preselected speed for the next flight phase. When this is so, this message is displayed at transitions from climb to cruise, and from climb or cruise to descent. The message is always displayed at the transition to descent from climb or cruise if selected speed is active. It is not displayed if managed speed is active.

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MESSAGE	TYPE/COLOR	CONDITIONS
SET VFTO (″SET GREEN DOT″ displayed on PFD)	II/A (W)	This message appears when the following conditions are all met: - Engine-out condition - Climb phase - Aircraft in selected speed mode - FCU-selected speed equal to or greater than green-dot speed +10 kt, and ALT* or ALT not active, or FCU-selected speed equal to or less than green-dot speed -10 kt.
SPECIF NDB UNAVAIL	II/A	The NDB to be autotuned (specified for a NDB approach) has previously been deselected by the flight crew.
SPECIF VOR-D UNAVAIL (also displayed on ND)	II/A	- The VOR, VOR-DME, or VORTAC to be autotuned (specified for an RNAV or VOR approach) has previously been deselected by the flight crew, or - The bearing, the frequency, or the ident of the VOR (or VORDME or VORTAC) to be autotuned is invalid.
SPD ERROR AT WPT01	II/W	In lateral managed flight, the system predicts that the aircraft will miss a speed constraint by more than 10 kt. When the prediction changes to bring the miss within 5 kt, the message is cleared.
SPD LIM EXCEEDED	II/A	The aircraft is more than 300 ft below the speed limit altitude and more than 10 kt over the speed limit.
STEP ABOVE MAX FL	II/W	The pilot has entered a step altitude that is above the predicted maximum altitude.
STEP DEFINED AT WPT01	I/W	The system has a step in it and the step prediction page is called up at a revise point other than that where the step is defined.
STEP DELETED	II/W	A step has been automatically deleted.
STORED ROUTES FULL	I/W	The system already contains three pilot-defined routes. (Only three are allowed.)
SYSTEM RNP IS XX.XX	II/A	Displayed when the RNP value, manually entered in the PROG page is larger than the RNP value associated with the current flight area (FMGS default value: *Refer to DSC-22_20-20-20 Estimated Position Uncertainty*). It is also displayed when the RNP value associated to the current flight area becomes smaller than the manually entered RNP value.
TAKEOFF DATA UPLINK ◁⊠ (ACARS msg)	II/W	A takeoff data message is received.

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MESSAGE	TYPE/COLOR	CONDITIONS
TMPY F-PLN EXISTS	I/W	The flight crew has selected any LS key (except ERASE or INSERT) or attempted a flight planning operation on the secondary flight plan while the system is displaying a temporary flight plan.
TIME CSTR DELETED	II/W	A time constraint is deleted automatically, or the flight crew enters a second time constraint, deleting the first one.
TIME CSTR EXISTS	I/W	The crew attempts to clear an ETT (estimated takeoff time) computed by the FMGS.
TIME ERROR AT WPT01	II/W	While the aircraft is not airborne, or is airborne and in NAV mode, the FMGC predicts that it will miss a time constraint by more than two minutes.
TIME TO EXIT	II/A	The aircraft must leave holding immediately to satisfy fuel reserve requirements. (Extra fuel is zero).
TOO STEEP PATH AHEAD	II/A	The system displays this message in cruise phase if the aircraft is within 150 nm of its destination or in descent or approach phase and in NAV mode and the descent profile contains a segment that is too steep.
TUNE BBB FFF.FF	II/A	The system cannot autotune the VOR for approach or position because of a manual VOR selection.
UNKNOWN PROGRAM PIN	II/W	The system has been unable to initialize because of an incompatible or undefined aircraft pin program combination (A/C type, engine type, VMO/MMO parity) in the FMGC software.
UPLINK INSERT IN PROG ◁ (ACARS msg)	II/W	Displayed when an uplink message is currently inserted in the FMGS.
USING COST INDEX-NNN	I/W	The system contains a flight plan, and the flight crew tries to enter a zero fuel weight or a gross weight into it before defining a Cost Index (CI). The FMGC defaults to the cost index from the last flight.
VERT DISCONT AHEAD (also displayed on PFD)	II/A	The aircraft is in CLB or DES mode, the next leg has a segment that is too steep, and the aircraft is less than 30 s from the discontinuity.
WAIT FOR SYSTEM RESPONSE	II/W	During the time between a subsystem selection and the display of the subsystem page, the MCDU MENU page remains displayed with this message.
WIND DATA UPLINK ◁ (ACARS msg)	II/W	Uplink wind message have been received.
WIND UPLINK EXISTS ◁ (ACARS msg)	I/W	A flight plan modification (active or secondary) is attempted when uplink winds are not inserted yet.

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MESSAGE	TYPE/COLOR	CONDITIONS
WIND UPLINK PENDING ◁✻ (ACARS msg)	II/A	A temporary flight plan exists or a DIR TO page is displayed and a wind uplink is received and stored.
XXXX IS DESELECTED	I/W	The flight crew attempts to deselect a navaid, via the SELECTED NAVAID page, that has already been deselected.

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FMS2 Honeywell

MCDU MESSAGE LIST

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI

Messages displayed on the MCDU are of two types and displayed in two colors.

Type I : A direct result of a pilot action;

Type II : Information about a situation, or a call for pilot action;

Type II messages are stored in a first-in/first-out message queue (5 messages max)

They are suppressed, if correct data is entered or when they no longer apply

The flight crew can clear all messages by pressing the CLEAR key on the MCDU console.

Amber (A) : Important

White (W) : Less important

MESSAGE	TYPE/COLOR	CONDITIONS
A/C POSITION INVALID	II/A	The aircraft position has become invalid. If the message has been cleared and the flight crew attempts to call up the HOLD at PPOS or DIR TOpage while the aircraft position is still invalid, then the message is displayed again.
ACT RTE UPLINK (ACARS msg)	II/W	A flight plan is stored in the active flight plan.
ALIGN IRS	II/A	Appears when the IRS are ready for alignment, but the INIT A page is not displayed on either side of the flight deck. The ALIGN IRS message requires that one of the flight crew call up the INIT A page and take whatever action it calls for.
AREA RNP IS XX-XX	II/A	Displayed when the RNP value, manually-entered on the PROG page, is larger than the default RNP value associated to the current flight area and when there is no RNP value defined in the navigation database for the active leg or route.
AWY/WPT MISMATCH	I/W	The pilot entered VIA on the AIRWAYS page does not contain the revised point. If you enter a second airway IDENT, it must contain the first airway ending point.
BLOCK IGNORES RTA	II/W	A time constraint existing at initiation of flight planning, or an entry of a time constraint made after initiation of flight planning, are ignored by the fuel planning function.
CABIN RATE EXCEEDED	II/W	This message appears when the aircraft gets within 200 nm of the destination and the computed rate of descent makes it impossible for the cabin to be repressurized at the maximum rate.
CHECK ALTN WIND (ACARS msg)	II/W	The uplinked alternate cruise flight level differs from the defaulted alternate cruise flight level.

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MESSAGE	TYPE/COLOR	CONDITIONS
CHECK APPR SELECTION (ON PFD: "CHECK APPGUIDANCE" (A), or "CHECK APP SEL" (W) (if CPIP3 ◁)	II/W	Displayed when a NON ILS approach is part of the F-PLN and an ILS is manually tuned on RAD NAV page. This message reminds the flight crew that available guidance modes for the approach are APP NAV/FINAL. Displayed when in cruise at less than 100 nm from the top of descent or in descent or approach phase.
CHECK CO RTE (ACARS msg)	II/W	The uplinked company route identifier differs from the one specified in the request.
CHECK DATA BASE CYCLE	II/W	The current date does not match the effective date of the active database, and someone attempts to enter a FROM/TO or CO RTE.
CHECK IRS 1(2)(3)/FM POSITION	II/A	Each IRS position is compared to the FM position. The difference is greater than a threshold function of time.
CHECK DEST DATA (ACARS msg)	II/A	The aircraft is at 180 nm from destination and the destination QNH, TEMP or WIND displayed on the PERF APPR page received by ACARS uplink has to be checked. If a modification of these parameters is performed creating a conflict with previous data, the message is triggered again.
CHECK FLT NBR (ACARS msg)	II/A	The uplinked flight number differs from the flight number specified in the request.
CHECK GW	II/A	The gross weights computed by the flight management computer and the flight augmentation computer disagree by more than 7 t
CHECK NORTH REF * EFIS ND	II/A	The MAG/TRUE sw does not correspond to the airport MAG/TRUE bearing reference (as stored in the FMGS navigation database), either at the departure airport (during preflight), or at the destination airport (when entering the ARRIVAL area).
CHECK QFE	II/A	This appears at the transition from QNH to QFE reference, when the QFE altitude differs by more than 100 ft from the predicted altitude, with the QNH set on the MCDU by means of the airport elevation in the NAV database.
CHECK TAKEOFF DATA	II/W	Following a flight crew entry or modification of one of the take-off parameters, there may be an inconsistency between the take-off runway or the TO shift and V1, V2, VR, FLEX TO temperature or derated level. The flight crew activated the secondary F-PLN in PREFLIGHT or DONE phase.
CLK IS TAKEOFF TIME	II/W	This appears when the flight crew has entered an Estimated Takeoff Time (ETT), and the actual time is equal to ETT.
CLOCK/GPS TIME DIFF XX	II/A	Aircraft clock time and GPS time differ by more than XX minutes.
CROSSLOAD ABORTED	II/W	Message displayed on the transmitting MCDU, indicating an error in the transmission process.
CROSSLOAD COMPLETE	II/W	The database crossload from one FMGC to the other was successfully completed.

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MESSAGE	TYPE/COLOR	CONDITIONS
CRZ FL ABOVE MAX FL	II/W	This appears when the flight crew enters a cruise altitude that is above the computed maximum altitude.
CSTR DEL ABOVE CRZ FL	II/W	This appears when a flight plan altitude constraint has been deleted because the flight crew has inserted a cruise flight level, or step-down altitude that is at or below the flight plan constraint.
CSTR DEL UP TO WPT 01	II/W	This appears when constraints get deleted because the aircraft transitions to a go-around flight phase, before the FMGS sequences the flight plan destination.
DECELERATE Also displayed on PFD	II/W	The aircraft is still in the cruise phase and managed speed, after it reaches the Top of Descent and has not begun the descent.
DELETING OFFSET	II/W	This appears when the system is deleting an offset automatically, which it does under certain specific conditions, such as: - Change of active leg due to lateral revision. - Termination of next leg at destination runway and the current distance to go is less than or equal to the distance required to reach the path, or the next leg is not a CF, FM or TF leg.
DEST/ALTN MISMATCH	I/W	The pilot attempts to enter an alternate CO RTE (which starts at an origin that is not the primary flight plan destination).
DIR TO IN PROCESS	I/W	The flight crew calls up the vertical or lateral revision page on one MCDU while the direct to page is displayed on the other MCDU.
ENTER DEST DATA	II/A	The flight crew has not entered wind, QNH, or temperature for the destination, and the aircraft is 180 nm out.
ENTRY OUT OF RANGE	I/W	The flight crew attempts to enter data that is out of the range specified for the selected field.
FLT NBR UPLINK (ACARS msg)	II/W	A flight number has been added to the uplink flight plan without previous request.
F-PLN ELEMENT RETAINED	I/W	The flight crew attempts to delete stored NAVAIDs, waypoints or runways that are contained in any flight plan or that are being tuned.
F-PLN FULL	II/W	There is not enough memory in the flight plan allotment for the computer to accept more flight plan data.
FMS 1/FMS 2 A/C STS DIFF	II/W	This message always precedes a transition to independent mode, and appears at power-up if the system detects a difference in one of the following: - NAV database serial number - Performance database - FM operational program - Aircraft and airline program pins
FMS 1/FMS 2 GW DIFF	II/W	Onside and offside aircraft weight differ by 2 t or more.
FMS 1/FMS 2 PGM PIN DIFF	II/W	Onside and offside program pins are different.

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MESSAGE	TYPE/COLOR	CONDITIONS
FMS 1/FMS 2 POSDIFF	II/A	Onside and offside positions differ by 0.5 nm or more (5 nm when GPS is not installed).
FMS 1/FMS 2 SPD TGT DIFF	II/W	Onside and offside target speeds displayed on the PFD differ by 5 kt or more.
FORMAT ERROR	I/W	A data entry does not meet the specified entry format for a given field.
GPS PRIMARY LOST (also displayed on ND)	II/A	Displayed when GPS PRIMARY mode is lost.
GPS PRIMARY	II/W	Displayed when the FMS is transitioning to GPS PRIMARY
GPS IS DESELECTED	II/A	This message appears when GPS has been manually deselected and the aircraft is 80 nm before the top of descent or in approach phase.
INDEPENDENT OPERATION	II/A	The FMGCs operate independently of each other.
INITIALIZE WEIGHT/CG	II/A	The zero-fuel weight or block fuel (FOB) is undefined after engine start.
INVALID FLT NBR UPLINK (ACARS msg)	II/W	The uplink message contains a valid flight plan but no flight number.
INVALID PERF UPLINK (ACARS msg)	II/W	Performance uplink message has been rejected.
INVALID RTE UPLINK (ACARS msg)	II/W	An error was detected into the uplink message and it is rejected.
INVALID TAKEOFF UPLINK (ACARS msg)	II/W	The current uplink takeoff data message is rejected.
INVALID WIND UPLINK (ACARS msg)	II/W	The current uplink wind message is rejected.
LAT DISCONT AHEAD	II/A	The next leg is a discontinuity and the aircraft is 30 s from flying the leg.
LIST OF 10 IN USE	I/W	The flight crew has tried to enter more than ten stored runways into the database, and all of the first ten are included in a flight plan or a pilot-stored route.
LIST OF 20 IN USE	I/W	The flight crew has tried to create a PBD, LAT/LONG, or PBX, or store a pilot-defined waypoint or NAVAID when 20 are already in use (in a flight plan or pilot-stored routes).
MACH SEGMENT DELETED	II/W	A constant Mach segment of the active flight plan has been automatically deleted. This occurs when the secondary flight plan or the alternate is activated, or engine out is detected or when the flight phase changes from CRZ to another one.
MCDU OVERHEATED	II/A	This message is displayed for 15 s in case of MCDU overheating.
MORE DRAG (EFIS PFD)	II/W	DES mode is engaged, idle is selected and the aircraft must decelerate in order to recover the path, or to respect an altitude constraint, a speed limit or a speed constraint.

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MESSAGE	TYPE/COLOR	CONDITIONS
NAV ACCUR DOWNGRAD (also displayed on ND)	II/A	NAV accuracy has been downgraded from HIGH to LOW. (See FMGS principles for an explanation).
NAV ACCUR UPGRAD (*EFIS ND)	II/W	NAV accuracy has been upgraded from LOW to HIGH.
NEW ACC ALT-HHHH	II/W	The acceleration altitude has been changed.
NEW CRZ ALT-HHHHH	II/W	The cruise altitude has been changed.
NEW THR RED ALT-HHHH	II/W	The thrust reduction altitude has been changed.
NO ANSWER TO REQUEST (ACARS msg)	I/W	A crew request, was previously sent to the ground and no answer has been received for 4 min.
NO INTERSECTION FOUND	I/W	The system could not find any common waypoint nor intersection point through the airway.
NON UNIQUE ROUTE IDENT	I/W	The flight crew has tried to enter on the new route page a company route IDENT that is identical to an existing company route IDENT (pilot-defined or in the database).
NOT ALLOWED	I/W	Data entry is not allowed in the selected field, or a selection action is not allowed.
NOT ALLOWED IN NAV	I/W	An attempt to modify the TO waypoint is made while in NAV mode.
NOT IN DATA BASE	I/W	The pilot is trying to enter or call up a company route IDENT, a FROM/TO pair, a place defined by place-bearing-distance (PBD) or place-bearing/place-bearing (PBX) or an airport NAVAID, waypoint runway, or NAVAID frequency (including pilot-defined elements) that is not in the current database.
NOT XMITTED TO ACARS (ACARS msg)	II/W	A pilot request or a crew report was sent but the communication was not established or not acknowledged.
ONLY SPD ENTRY ALLOWED	I/W	The pilot is trying to enter a Mach number for a preselected speed value on the CLIMB page.
OPP FMGC IN PROCESS	II/W	The offside FMGC is unhealthy, and the FM system mode is SINGLE. The message indicates that the MCDU on which the message is displayed is being driven by the FMGC on the other side.
PAGE UPDATE IN PROCESS	I/W	The pilot presses a key on the flight plan page while predictions are being updated.
PERF DATA UPLINK (ACARS msg)	II/W	Performance data are received from ground.
PLEASE WAIT	I/W	Resynchronization between both FMGCs is in progress.
PROCEDURE RNP IS XX.XX	II/A	Displayed when the RNP value, manually-entered on the PROG page, is larger than the RNP value defined in the navigation database for the active leg or route.
PRINTER NOT AVAILABLE (ACARS msg)	II/W	A printer communication error has been detected while printing a report. The printing is terminated.

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MESSAGE	TYPE/COLOR	CONDITIONS
REVISIONS NOT STORED	II/W	This message, displayed when a pilot-defined route or company route (active or secondary flight plan) is stored, indicates that the following elements are not retained: - Pilot-entered holds - Offsets - Modifications to terminal area procedures - Pilot-entered constraints - Pseudo waypoints - Step at optimum.
RTA DELETED	II/W	A time constraint is automatically deleted: - In case of engine-out - When entering the holding pattern - In case of go-around - At phase transition from descent or approach to climb or cruise - When a time constraint is inserted in the same flight plan at a different waypoint - When the alternate flight plan is activated - When a DIR TO/ABEAM is performed, only if the time constrained waypoint is projected as an ABEAM waypoint - The time constrained waypoint is cleared or sequenced (regardless of active lateral mode) - Valid clock data is lost - The time constraint belongs to the active flight plan and the secondary flight plan is activated - The time constraint belongs to the secondary flight plan and COPY ACTIVE is performed.
RTA EXISTS	I/W	Displayed if the pilot tries to clear an estimated takeoff time defined by the system.
RTE DATALINK IN PROG (ACARS msg)	I/W	A flight plan modification is performed after a F-PLN INIT request has been sent. This message is displayed until the uplink is entirely received.
RWY/LS MISMATCH	II/A	- During climb, cruise, (ILS or MLS) descent approach, or go-around, the LS frequency entered on the RAD NAV page does not match the LS associated with the destination runway. - During preflight or takeoff, the LS frequency entered on the RAD NAV page does not match the LS associated with the takeoff runway.
SEC RTE UPLINK (ACARS msg)	II/W	A flight plan is stored in the secondary flight plan.
SELECT DESIRED SYSTEM	I/W	The MCDU displays its MENU page.

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MESSAGE	TYPE/COLOR	CONDITIONS
SELECT TRUE (also displayed on the ND)	II/A	The MAG/TRUE switch is set to MAG, while the IRS send true HDG/TRK.
SENSOR IS INVALID	I/W	- The pilot has selected FF or FQ, or FF + FQ, or FQ + FF on the FUEL PRED page and the sole sensor or both of the selected sensors are invalid, or - The flight crew has entered fuel on board only, and the FF sensor is invalid.
SET GREEN DOT SPEED ("SET GREEN DOT" displayed on PFD)	II/W (W)	This message appears when the following conditions are all met: - Engine-out condition - Aircraft in selected speed mode - FCU-selected speed equal to or greater than green-dot speed +10 kt, and ALT* or ALT not active, or FCU-selected speed equal to or less than green-dot speed -10 kt.
SET HOLD SPEED (also displayed on PFD)	II/W (W)	This instruction appears when the aircraft is in selected speed, the pilot has inserted a hold in the flight plan, the aircraft is 30 s or less from the point where it must start decelerating towards hold speed, and the selected speed differs from the hold speed by more than 5 kt.
SET MANAGED SPEED ("SET MANAGED SPD"is displayed on PFD)	II/W (W)	The target speed is selected for the current phase, but there is no preselected speed for the next flight phase. When this is so, this message is displayed at transitions from climb to cruise, and from climb or cruise to descent. The message is always displayed at the transition to descent from climb or cruise if selected speed is active. It is not displayed if managed speed is active.
SETTING SPD/RTA	II/W	Displayed when the system recomputes its managed speed target to satisfy the RTA constraints.
SPECIF NDB UNAVAIL	II/A	The NDB to be autotuned (specified for a NDB approach) is not available.
SPECIF VOR-D UNAVAIL (also displayed on ND)	II/A	- The VOR, VOR-DME, or VORTAC to be autotuned (specified for an RNAV or VOR approach) has previously been deselected by the flight crew, or - The bearing, the frequency, or the IDENT of the VOR (or VORDME or VORTAC) to be autotuned is invalid.
SPD ERROR AT WPT 01	II/W	In lateral managed flight, the system predicts that the aircraft will miss a speed constraint by more than 10 kt. When the prediction changes to bring the miss within 5 kt, the message is cleared.
SPD LIM EXCEEDED	II/A	The aircraft is more that 150 ft below the speed limit altitude and more than 10 kt over the speed limit.
STEP ABOVE MAX FL	II/W	The pilot has entered a step altitude that is above the predicted maximum altitude.

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MESSAGE	TYPE/COLOR	CONDITIONS
STEP DELETED	II/W	A step has been automatically deleted.
STORED ROUTES FULL	I/W	The system already contains five pilot-defined routes. (Only five are allowed.)
TAKEOFF DATA UPLINK (ACARS msg)	II/W	A takeoff data message is received.
TEMPORARY F-PLN EXISTS	I/W	The flight crew has selected any key (except ERASE or INSERT) or attempted a flight planning operation on the secondary flight plan while the system is displaying a temporary flight plan.
TIME ERROR AT WPT 01	II/W	While the aircraft is in lateral managed flight the FMGC predicts that it will miss a time constraint (*Refer to DSC-22_20-30-20-25 Required Time of Arrival (RTA) - Entering a Required Time of Arrival*).
TIME MARKER LIST FULL	I/W	The system already contains four time markers. (Only four are allowed).
TIME TO EXIT	II/A	The aircraft must leave holding immediately to satisfy fuel reserve requirements. (Extra fuel is zero).
TOO STEEP PATH AHEAD	II/A	The system displays this message in cruise phase if the aircraft is within 150 nm of its destination or in descent or approach phase and in NAV mode and the descent profile contains a segment that is too steep.
TUNE BBB FFF.FF	II/A	The system cannot autotune the VOR for approach or position because of a manual VOR selection.
UNKNOWN PROGRAM PIN	II/W	The system has been unable to initialize because of an incompatible or undefined aircraft pin program combination (A/C type, engine type, VMO/MMO parity) in the FMGC software.
UPLINK INSERT IN PROG (ACARS msg)	II/W	Displayed when an uplink message is currently inserted in the FMGS.
USING COST INDEX-NNN	I/W	The system contains a flight plan, and the flight crew tries to enter a zero fuel weight or a gross weight into it before defining a Cost Index (CI). The FMGC defaults to the cost index from the last flight.
WAIT FOR SYSTEM RESPONSE	I/W	During the time between a subsystem selection and the display of the subsystem page, the MCDU MENU page remains displayed with this message.
WIND DATA UPLINK (ACARS msg)	II/W	Uplink wind message has been received.
WIND UPLINK EXISTS (ACARS msg)	I/W	A flight plan modification (active or secondary) is attempted when uplink winds are not inserted yet.
WIND UPLINK PENDING (ACARS msg)	II/A	A temporary flight plan exists or a DIR TO page is displayed and a wind uplink is received and stored.
XXXX IS DESELECTED	I/W	The flight crew attempts to enter a deselected NAVAID, via the SELECTED NAVAID page, that has already been deselected.

MCDU MESSAGE LIST

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

Messages displayed on the MCDU are of two types and displayed in two colors.

Type I : A direct result of a pilot action;

Type II : Information about a situation, or a call for pilot action;

Type II messages are stored in a first-in/first-out message queue (5 messages max)

They are suppressed, if correct data is entered or when they no longer apply

The flight crew can clear all messages by pressing the CLEAR key on the MCDU console.

Amber (A) : Important

White (W) : Less important

MESSAGE	TYPE/COLOR	CONDITIONS
A/C POSITION INVALID	II/A	The aircraft position has become invalid. If the message has been cleared and the flight crew attempts to call up the HOLD at PPOS or DIR TOpage while the aircraft position is still invalid, then the message is displayed again.
ACT RTE UPLINK (ACARS msg)	II/W	A flight plan is stored in the active flight plan.
ALIGN IRS	II/A	Appears when the IRS are ready for alignment, but the INIT A page is not displayed on either side of the flight deck. The ALIGN IRS message requires that one of the flight crew call up the INIT A page and take whatever action it calls for.
AREA RNP IS XX-XX	II/A	Displayed when the RNP value, manually-entered on the PROG page, is larger than the default RNP value associated to the current flight area and when there is no RNP value defined in the navigation database for the active leg or route.
AWY/WPT MISMATCH	I/W	The pilot entered VIA on the AIRWAYS page does not contain the revised point. If you enter a second airway IDENT, it must contain the first airway ending point.
BLOCK IGNORES RTA	II/W	A time constraint existing at initiation of flight planning, or an entry of a time constraint made after initiation of flight planning, are ignored by the fuel planning function.
CABIN RATE EXCEEDED	II/W	This message appears when the aircraft gets within 200 nm of the destination and the computed rate of descent makes it impossible for the cabin to be repressurized at the maximum rate.
CHECK ALTN WIND (ACARS msg)	II/W	The uplinked alternate cruise flight level differs from the defaulted alternate cruise flight level.
CHECK APPR SELECTION (ON PFD: "CHECK APPGUIDANCE" (A), or "CHECK APP SEL" (W) (if CPIP3 ◁)	II/W	Displayed when a NON ILS approach is part of the F-PLN and an ILS is manually tuned on RAD NAV page. This message reminds the flight crew that available guidance modes for the approach are APP NAV/FINAL. Displayed when in cruise at less than 100 nm from the top of descent or in descent or approach phase.

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MESSAGE	TYPE/COLOR	CONDITIONS
CHECK CO RTE (ACARS msg)	II/W	The uplinked company route identifier differs from the one specified in the request.
CHECK DATA BASE CYCLE	II/W	The current date does not match the effective date of the active database, and someone attempts to enter a FROM/TO or CO RTE.
CHECK IRS 1(2)(3)/FM POSITION	II/A	Each IRS position is compared to the FM position. The difference is greater than a threshold function of time.
CHECK DEST DATA (ACARS msg)	II/A	The aircraft is at 180 nm from destination and the destination QNH, TEMP or WIND displayed on the PERF APPR page received by ACARS uplink has to be checked. If a modification of these parameters is performed creating a conflict with previous data, the message is triggered again.
CHECK FLT NBR (ACARS msg)	II/A	The uplinked flight number differs from the flight number specified in the request.
CHECK GW	II/A	The gross weights computed by the flight management computer and the flight augmentation computer disagree by more than 7 t
CHECK NORTH REF * EFIS ND	II/A	The MAG/TRUE sw does not correspond to the airport MAG/TRUE bearing reference (as stored in the FMGS navigation database), either at the departure airport (during preflight), or at the destination airport (when entering the ARRIVAL area).
CHECK QFE	II/A	This appears at the transition from QNH to QFE reference, when the QFE altitude differs by more than 100 ft from the predicted altitude, with the QNH set on the MCDU by means of the airport elevation in the NAV database.
CHECK TAKEOFF DATA	II/W	Following a flight crew entry or modification of one of the take-off parameters, there may be an inconsistency between the take-off runway or the TO shift and V1, V2, VR, FLEX TO temperature or derated level. The flight crew activated the secondary F-PLN in PREFLIGHT or DONE phase.
CLK IS TAKEOFF TIME	II/W	This appears when the flight crew has entered an Estimated Takeoff Time (ETT), and the actual time is equal to ETT.
CLOCK/GPS TIME DIFF XX	II/A	Aircraft clock time and GPS time differ by more than XX minutes.
CROSSLOAD ABORTED	II/W	Message displayed on the transmitting MCDU, indicating an error in the transmission process.
CROSSLOAD COMPLETE	II/W	The database crossload from one FMGC to the other was successfully completed.
CRZ FL ABOVE MAX FL	II/W	This appears when the flight crew enters a cruise altitude that is above the computed maximum altitude.
CSTR DEL ABOVE CRZ FL	II/W	This appears when a flight plan altitude constraint has been deleted because the flight crew has inserted a cruise flight level, or step-down altitude that is at or below the flight plan constraint.

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MESSAGE	TYPE/COLOR	CONDITIONS
CSTR DEL UP TO WPT 01	II/W	This appears when constraints get deleted because the aircraft transitions to a go-around flight phase, before the FMGS sequences the flight plan destination.
DECELERATE Also displayed on PFD	II/W	The aircraft is still in the cruise phase and managed speed, after it reaches the Top of Descent and has not begun the descent.
DELETING OFFSET	II/W	This appears when the system is deleting an offset automatically, which it does under certain specific conditions, such as: - Change of active leg due to lateral revision. - Termination of next leg at destination runway and the current distance to go is less than or equal to the distance required to reach the path, or the next leg is not a CF, FM or TF leg.
DEST/ALTN MISMATCH	I/W	The pilot attempts to enter an alternate CO RTE (which starts at an origin that is not the primary flight plan destination).
DIR TO IN PROCESS	I/W	The flight crew calls up the vertical or lateral revision page on one MCDU while the direct to page is displayed on the other MCDU.
ENTER DEST DATA	II/A	The flight crew has not entered wind, QNH, or temperature for the destination, and the aircraft is 180 nm out.
ENTRY OUT OF RANGE	I/W	The flight crew attempts to enter data that is out of the range specified for the selected field.
FLT NBR UPLINK (ACARS msg)	II/W	A flight number has been added to the uplink flight plan without previous request.
F-PLN ELEMENT RETAINED	I/W	The flight crew attempts to delete stored NAVAIDs, waypoints or runways that are contained in any flight plan or that are being tuned.
F-PLN FULL	II/W	There is not enough memory in the flight plan allotment for the computer to accept more flight plan data.
FMS 1/FMS 2 A/C STS DIFF	II/W	This message always precedes a transition to independent mode, and appears at power-up if the system detects a difference in one of the following: - NAV database serial number - Performance database - FM operational program - Aircraft and airline program pins
FMS 1/FMS 2 GW DIFF	II/W	Onside and offside aircraft weight differ by 2 t or more.
FMS 1/FMS 2 PGM PIN DIFF	II/W	Onside and offside program pins are different.
FMS 1/FMS 2 POSDIFF	II/A	Onside and offside positions differ by 0.5 nm or more (5 nm when GPS is not installed).
FMS 1/FMS 2 SPD TGT DIFF	II/W	Onside and offside target speeds displayed on the PFD differ by 5 kt or more.

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MESSAGE	TYPE/COLOR	CONDITIONS
FORMAT ERROR	I/W	A data entry does not meet the specified entry format for a given field.
GPS PRIMARY LOST (also displayed on ND)	II/A	Displayed when GPS PRIMARY mode is lost.
GPS PRIMARY	II/W	Displayed when the FMS is transitioning to GPS PRIMARY
GPS IS DESELECTED	II/A	This message appears when GPS has been manually deselected and the aircraft is 80 nm before the top of descent or in approach phase.
INDEPENDENT OPERATION	II/A	The FMGCs operate independently of each other.
INITIALIZE WEIGHT/CG	II/A	The zero-fuel weight or block fuel (FOB) is undefined after engine start.
INVALID FLT NBR UPLINK (ACARS msg)	II/W	The uplink message contains a valid flight plan but no flight number.
INVALID PERF UPLINK (ACARS msg)	II/W	Performance uplink message has been rejected.
INVALID RTE UPLINK (ACARS msg)	II/W	An error was detected into the uplink message and it is rejected.
INVALID TAKEOFF UPLINK (ACARS msg)	II/W	The current uplink takeoff data message is rejected.
INVALID WIND UPLINK (ACARS msg)	II/W	The current uplink wind message is rejected.
LAT DISCONT AHEAD	II/A	The next leg is a discontinuity and the aircraft is 30 s from flying the leg.
LIST OF 10 IN USE	I/W	The flight crew has tried to enter more than ten stored runways into the database, and all of the first ten are included in a flight plan or a pilot-stored route.
LIST OF 20 IN USE	I/W	The flight crew has tried to create a PBD, LAT/LONG, or PBX, or store a pilot-defined waypoint or NAVAID when 20 are already in use (in a flight plan or pilot-stored routes).
MACH SEGMENT DELETED	II/W	A constant Mach segment of the active flight plan has been automatically deleted. This occurs when the secondary flight plan or the alternate is activated, or engine out is detected or when the flight phase changes from CRZ to another one.
MCDU OVERHEATED	II/A	This message is displayed for 15 s in case of MCDU overheating.
MORE DRAG (EFIS PFD)	II/W	DES mode is engaged, idle is selected and the aircraft must decelerate in order to recover the path, or to respect an altitude constraint, a speed limit or a speed constraint.
NAV ACCUR DOWNGRAD (also displayed on ND)	II/A	NAV accuracy has been downgraded from HIGH to LOW. (See FMGS principles for an explanation).
NAV ACCUR UPGRAD (*EFIS ND)	II/W	NAV accuracy has been upgraded from LOW to HIGH.
NEW ACC ALT-HHHH	II/W	The acceleration altitude has been changed.

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MESSAGE	TYPE/COLOR	CONDITIONS
NEW CRZ ALT-HHHHH	II/W	The cruise altitude has been changed.
NEW THR RED ALT-HHHH	II/W	The thrust reduction altitude has been changed.
NO ANSWER TO REQUEST (ACARS msg)	I/W	A crew request, was previously sent to the ground and no answer has been received for 4 min.
NO INTERSECTION FOUND	I/W	The system could not find any common waypoint nor intersection point through the airway.
NON UNIQUE ROUTE IDENT	I/W	The flight crew has tried to enter on the new route page a company route IDENT that is identical to an existing company route IDENT (pilot-defined or in the database).
NOT ALLOWED	I/W	Data entry is not allowed in the selected field, or a selection action is not allowed.
NOT ALLOWED IN NAV	I/W	An attempt to modify the TO waypoint is made while in NAV mode.
NOT IN DATA BASE	I/W	The pilot is trying to enter or call up a company route IDENT, a FROM/TO pair, a place defined by place-bearing-distance (PBD) or place-bearing/place-bearing (PBX) or an airport NAVAID, waypoint runway, or NAVAID frequency (including pilot-defined elements) that is not in the current database.
NOT XMITTED TO ACARS (ACARS msg)	II/W	A pilot request or a crew report was sent but the communication was not established or not acknowledged.
ONLY SPD ENTRY ALLOWED	I/W	The pilot is trying to enter a Mach number for a preselected speed value on the CLIMB page.
OPP FMGC IN PROCESS	II/W	The offside FMGC is unhealthy, and the FM system mode is SINGLE. The message indicates that the MCDU on which the message is displayed is being driven by the FMGC on the other side.
PAGE UPDATE IN PROCESS	I/W	The pilot presses a key on the flight plan page while predictions are being updated.
PERF DATA UPLINK (ACARS msg)	II/W	Performance data are received from ground.
PLEASE WAIT	I/W	Resynchronization between both FMGCs is in progress.
PROCEDURE RNP IS XX.XX	II/A	Displayed when the RNP value, manually-entered on the PROG page, is larger than the RNP value defined in the navigation database for the active leg or route.
PRINTER NOT AVAILABLE (ACARS msg)	II/W	A printer communication error has been detected while printing a report. The printing is terminated.

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MESSAGE	TYPE/COLOR	CONDITIONS
REVISIONS NOT STORED	II/W	This message, displayed when a pilot-defined route or company route (active or secondary flight plan) is stored, indicates that the following elements are not retained: - Pilot-entered holds - Offsets - Modifications to terminal area procedures - Pilot-entered constraints - Pseudo waypoints - Step at optimum.
RTA DELETED	II/W	A time constraint is automatically deleted: - In case of engine-out - When entering the holding pattern - In case of go-around - At phase transition from descent or approach to climb or cruise - When a time constraint is inserted in the same flight plan at a different waypoint - When the alternate flight plan is activated - When a DIR TO/ABEAM is performed, only if the time constrained waypoint is projected as an ABEAM waypoint - The time constrained waypoint is cleared or sequenced (regardless of active lateral mode) - Valid clock data is lost - The time constraint belongs to the active flight plan and the secondary flight plan is activated - The time constraint belongs to the secondary flight plan and COPY ACTIVE is performed.
RTA EXISTS	I/W	Displayed if the pilot tries to clear an estimated takeoff time defined by the system.
RTE DATALINK IN PROG (ACARS msg)	I/W	A flight plan modification is performed after a F-PLN INIT request has been sent. This message is displayed until the uplink is entirely received.
RWY/LS MISMATCH	II/A	- During climb, cruise, (ILS or MLS) descent approach, or go-around, the LS frequency entered on the RAD NAV page does not match the LS associated with the destination runway. - During preflight or takeoff, the LS frequency entered on the RAD NAV page does not match the LS associated with the takeoff runway.
SEC RTE UPLINK (ACARS msg)	II/W	A flight plan is stored in the secondary flight plan.
SELECT DESIRED SYSTEM	I/W	The MCDU displays its MENU page.

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MESSAGE	TYPE/COLOR	CONDITIONS
SELECT TRUE (also displayed on the ND)	II/A	The MAG/TRUE switch is set to MAG, while the IRS send true HDG/TRK.
SENSOR IS INVALID	I/W	- The pilot has selected FF or FQ, or FF + FQ, or FQ + FF on the FUEL PRED page and the sole sensor or both of the selected sensors are invalid, or - The flight crew has entered fuel on board only, and the FF sensor is invalid.
SET GREEN DOT SPEED ("SET GREEN DOT" displayed on PFD)	II/W (W)	This message appears when the following conditions are all met: - Engine-out condition - Aircraft in selected speed mode - FCU-selected speed equal to or greater than green-dot speed +10 kt, and ALT* or ALT not active, or FCU-selected speed equal to or less than green-dot speed -10 kt.
SET HOLD SPEED (also displayed on PFD)	II/W (W)	This instruction appears when the aircraft is in selected speed, the pilot has inserted a hold in the flight plan, the aircraft is 30 s or less from the point where it must start decelerating towards hold speed, and the selected speed differs from the hold speed by more than 5 kt.
SET MANAGED SPEED ("SET MANAGED SPD"is displayed on PFD)	II/W (W)	The target speed is selected for the current phase, but there is no preselected speed for the next flight phase. When this is so, this message is displayed at transitions from climb to cruise, and from climb or cruise to descent. The message is always displayed at the transition to descent from climb or cruise if selected speed is active. It is not displayed if managed speed is active.
SETTING SPD/RTA	II/W	Displayed when the system recomputes its managed speed target to satisfy the RTA constraints.
SPECIF NDB UNAVAIL	II/A	The NDB to be autotuned (specified for a NDB approach) is not available.
SPECIF VOR-D UNAVAIL (also displayed on ND)	II/A	- The VOR, VOR-DME, or VORTAC to be autotuned (specified for an RNAV or VOR approach) has previously been deselected by the flight crew, or - The bearing, the frequency, or the IDENT of the VOR (or VORDME or VORTAC) to be autotuned is invalid.
SPD ERROR AT WPT 01	II/W	In lateral managed flight, the system predicts that the aircraft will miss a speed constraint by more than 10 kt. When the prediction changes to bring the miss within 5 kt, the message is cleared.
SPD LIM EXCEEDED	II/A	The aircraft is more that 150 ft below the speed limit altitude and more than 10 kt over the speed limit.
STEP ABOVE MAX FL	II/W	The pilot has entered a step altitude that is above the predicted maximum altitude.

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MESSAGE	TYPE/COLOR	CONDITIONS
STEP DELETED	II/W	A step has been automatically deleted.
STORED ROUTES FULL	I/W	The system already contains five pilot-defined routes. (Only five are allowed.)
TAKEOFF DATA UPLINK (ACARS msg)	II/W	A takeoff data message is received.
TEMPORARY F-PLN EXISTS	I/W	The flight crew has selected any key (except ERASE or INSERT) or attempted a flight planning operation on the secondary flight plan while the system is displaying a temporary flight plan.
TIME ERROR AT WPT 01	II/W	While the aircraft is in lateral managed flight the FMGC predicts that it will miss a time constraint (*Refer to DSC-22_20-30-20-25 Required Time of Arrival (RTA) - Entering a Required Time of Arrival*).
TIME MARKER LIST FULL	I/W	The system already contains four time markers. (Only four are allowed).
TIME TO EXIT	II/A	The aircraft must leave holding immediately to satisfy fuel reserve requirements. (Extra fuel is zero).
TOO STEEP PATH AHEAD	II/A	The system displays this message in cruise phase if the aircraft is within 150 nm of its destination or in descent or approach phase and in NAV mode and the descent profile contains a segment that is too steep.
TUNE BBB FFF.FF	II/A	The system cannot autotune the VOR for approach or position because of a manual VOR selection.
UNKNOWN PROGRAM PIN	II/W	The system has been unable to initialize because of an incompatible or undefined aircraft pin program combination (A/C type, engine type, VMO/MMO parity) in the FMGC software.
UPLINK INSERT IN PROG (ACARS msg)	II/W	Displayed when an uplink message is currently inserted in the FMGS.
USING COST INDEX-NNN	I/W	The system contains a flight plan, and the flight crew tries to enter a zero fuel weight or a gross weight into it before defining a Cost Index (CI). The FMGC defaults to the cost index from the last flight.
WAIT FOR SYSTEM RESPONSE	I/W	During the time between a subsystem selection and the display of the subsystem page, the MCDU MENU page remains displayed with this message.
WIND DATA UPLINK (ACARS msg)	II/W	Uplink wind message has been received.
WIND UPLINK EXISTS (ACARS msg)	I/W	A flight plan modification (active or secondary) is attempted when uplink winds are not inserted yet.
WIND UPLINK PENDING (ACARS msg)	II/A	A temporary flight plan exists or a DIR TO page is displayed and a wind uplink is received and stored.
XXXX IS DESELECTED	I/W	The flight crew attempts to enter a deselected NAVAID, via the SELECTED NAVAID page, that has already been deselected.

MCDU MESSAGE LIST

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

1

Messages displayed on the MCDU are of two types and displayed in two colors.

Type I : A direct result of a pilot action;

Type II : Information about a situation, or a call for pilot action;

Type II messages are stored in a first-in/first-out message queue (5 messages max)

They are suppressed, if correct data is entered or when they no longer apply

The flight crew can clear all messages by pressing the CLEAR key on the MCDU console.

Amber (A) : Important

White (W) : Less important

MESSAGE	TYPE/COLOR	CONDITIONS
A/C POSITION INVALID	II/A	The aircraft position has become invalid. If the message has been cleared and the flight crew attempts to call up the HOLD at PPOS or DIR TOpage while the aircraft position is still invalid, then the message is displayed again.
ACT RTE UPLINK (ACARS msg)	II/W	A flight plan is stored in the active flight plan.
ALIGN IRS	II/A	Appears when the IRS are ready for alignment, but the INIT A page is not displayed on either side of the flight deck. The ALIGN IRS message requires that one of the flight crew call up the IRS INIT page, to align the IRS.
AREA RNP IS XX-XX	II/A	Displayed when the RNP value, manually-entered on the PROG page, is larger than the default RNP value associated to the current flight area and when there is no RNP value defined in the navigation database for the active leg or route.
AWY/WPT MISMATCH	I/W	The pilot entered VIA on the AIRWAYS page does not contain the revised point. If you enter a second airway IDENT, it must contain the first airway ending point.
BLOCK IGNORES RTA	II/W	A time constraint existing at initiation of flight planning, or an entry of a time constraint made after initiation of flight planning, are ignored by the fuel planning function.
CABIN RATE EXCEEDED	II/W	This message appears when the aircraft gets within 200 nm of the destination and the computed rate of descent makes it impossible for the cabin to be repressurized at the maximum rate.
CHECK ALTN WIND (ACARS msg)	II/W	The uplinked alternate cruise flight level differs from the defaulted alternate cruise flight level.

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MESSAGE	TYPE/COLOR	CONDITIONS
CHECK APPR SELECTION *EFIS PFD (FMA)	II/W	Displayed when a NON ILS approach is part of the F-PLN and an ILS is manually tuned on RAD NAV page. This message reminds the flight crew that available guidance modes for the approach are APP NAV/FINAL. Displayed when in cruise at less than 100 nm from the top of descent or in descent or approach phase.
CHECK CO RTE (ACARS msg)	II/W	The uplinked company route identifier differs from the one specified in the request.
CHECK DATA BASE CYCLE	II/W	The current date does not match the effective date of the active database, and someone attempts to enter a FROM/TO or CO RTE.
CHECK IRS 1(2)(3)/FM POSITION	II/A	Each IRS position is compared to the FM position. The difference is greater than a threshold function of time.
CHECK IRS/AIRPORT POS	I/A	The distance between ADIRS alignment position and the NAV Database Airport Reference Point is at least 5 nm
CHECK DEST DATA (ACARS msg)	II/A	The aircraft is at 180 nm from destination and the destination QNH, TEMP or WIND displayed on the PERF APPR page received by ACARS uplink has to be checked. If a modification of these parameters is performed creating a conflict with previous data, the message is triggered again.
CHECK FLT NBR (ACARS msg)	II/A	The uplinked flight number differs from the flight number specified in the request.
CHECK MIN DEST FOB	II/W	This message appears when the flight crew has manually entered the MIN DEST FOB value, and MIN DEST FOB <ALTN + FINAL, being FINAL an ALTN valid data.
CHECK NORTH REF * EFIS ND	II/A	The MAG/TRUE sw does not correspond to the airport MAG/TRUE bearing reference (as stored in the FMGS navigation database), either at the departure airport (during preflight), or at the destination airport (when entering the ARRIVAL area).
CHECK QFE	II/A	This appears at the transition from QNH to QFE reference, when the QFE altitude differs by more than 100 ft from the predicted altitude, with the QNH set on the MCDU by means of the airport elevation in the NAV database.
CHECK TAKEOFF DATA	II/A	Following a flight crew entry or modification of one of the take-off parameters, there may be an inconsistency between the take-off runway or the TO shift and V1, VR, V2, FLEX TO temperature or derated level. The flight crew activated the secondary F-PLN in PREFLIGHT or DONE phase.
CHECK WEIGHT	II/A	The gross weights (GW) computed by the flight management computer (FMC) and the flight augmentation computer (FAC) disagree by more than 7 t (7.7 US tons).

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MESSAGE	TYPE/COLOR	CONDITIONS
CLK IS TAKEOFF TIME	II/W	This appears when the flight crew has entered an Estimated Takeoff Time (ETT), and the actual time is equal to ETT.
CLOCK/GPS TIME DIFF XX	II/A	Aircraft clock time and GPS time differ by more than XX minutes.
CROSSLOAD ABORTED	II/W	Message displayed on the transmitting MCDU, indicating an error in the transmission process.
CROSSLOAD COMPLETE	II/W	The database crossload from one FMGC to the other was successfully completed.
CRZ FL ABOVE MAX FL	II/W	This appears when the flight crew enters a cruise altitude that is above the computed maximum altitude.
CSTR DEL ABOVE CRZ FL	II/W	This appears when a flight plan altitude constraint has been deleted because the flight crew has inserted a cruise flight level, or step-down altitude that is at or below the flight plan constraint.
CSTR DEL UP TO WPT 01	II/W	This appears when constraints get deleted because the aircraft transitions to a go-around flight phase, before the FMGS sequences the flight plan destination.
DECELERATE Also displayed on PFD	II/W	The aircraft is still in the cruise phase and managed speed, after it reaches the Top of Descent and has not begun the descent.
DELETING OFFSET	II/W	This appears when the system is deleting an offset automatically, which it does under certain specific conditions, such as: - Change of active leg due to lateral revision. - Termination of next leg at destination runway and the current distance to go is less than or equal to the distance required to reach the path, or the next leg is not a CF, FM or TF leg.
DEST/ALTN MISMATCH	I/W	The pilot attempts to enter an alternate CO RTE (which starts at an origin that is not the primary flight plan destination).
DEST EFOB BELOW MIN	II/A	The EFOB at destination calculated by the FMS is less than the MIN DEST FOB value specified on the FUEL PRED page, for more than 2 min. The message is triggered in flight, except during Takeoff and Climb phases.
DIR TO IN PROCESS	I/W	The flight crew calls up the vertical or lateral revision page on one MCDU while the direct to page is displayed on the other MCDU.
ENTER DEST DATA	II/A	The flight crew has not entered wind, QNH, or temperature for the destination, and the aircraft is 180 nm out.
ENTRY OUT OF RANGE	I/W	The flight crew attempts to enter data that is out of the range specified for the selected field.
FLT NBR UPLINK (ACARS msg)	II/W	A flight number has been added to the uplink flight plan without previous request.
F-PLN ELEMENT RETAINED	I/W	The flight crew attempts to delete stored NAVAIDs, waypoints or runways that are contained in any flight plan or that are being tuned.

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MESSAGE	TYPE/COLOR	CONDITIONS
F-PLN FULL	II/W	There is not enough memory in the flight plan allotment for the computer to accept more flight plan data.
FMS 1/FMS 2 A/C STS DIFF	II/W	This message always precedes a transition to independent mode, and appears at power-up if the system detects a difference in one of the following: - NAV database serial number - Performance database - FM operational program - Aircraft and airline program pins
FMS 1/FMS 2 GW DIFF	II/W	Onside and offside aircraft weight differ by 2 t or more.
FMS 1/FMS 2 PGM PIN DIFF	II/W	Onside and offside program pins are different.
FMS 1/FMS 2 POS DIFF	II/A	Onside and offside positions differ by 0.5 nm or more (5 nm when GPS is not installed).
FMS 1/FMS 2 SPD TGT DIFF	II/W	Onside and offside target speeds displayed on the PFD differ by 5 kt or more.
FORMAT ERROR	I/W	A data entry does not meet the specified entry format for a given field.
GPS PRIMARY LOST (also displayed on ND)	II/A	Displayed when GPS PRIMARY mode is lost.
GPS PRIMARY	II/W	Displayed when the FMS is transitioning to GPS PRIMARY
GPS IS DESELECTED	II/A	This message appears when GPS has been manually deselected and the aircraft is 80 nm before the top of descent or in approach phase.
INDEPENDENT OPERATION	II/A	The FMGCs operate independently of each other.
INITIALIZE WEIGHT/CG	II/A	The zero-fuel weight or block fuel (FOB) is undefined after engine start.
INVALID FLT NBR UPLINK (ACARS msg)	II/W	The uplink message contains a valid flight plan but no flight number.
INVALID PERF UPLINK (ACARS msg)	II/W	Performance uplink message has been rejected.
INVALID RTE UPLINK (ACARS msg)	II/W	An error was detected into the uplink message and it is rejected.
INVALID TAKEOFF UPLINK (ACARS msg)	II/W	The current uplink takeoff data message is rejected.
INVALID WIND UPLINK (ACARS msg)	II/W	The current uplink wind message is rejected.
LAT DISCONT AHEAD	II/A	The next leg is a discontinuity and the aircraft is 30 s from flying the leg.
LIST OF 10 IN USE	I/W	The flight crew has tried to enter more than ten stored runways into the database, and all of the first ten are included in a flight plan or a pilot-stored route.

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MESSAGE	TYPE/COLOR	CONDITIONS
LIST OF 20 IN USE	I/W	The flight crew has tried to create a PBD, LAT/LONG, or PBX, or store a pilot-defined waypoint or NAVAID when 20 are already in use (in a flight plan or pilot-stored routes).
MACH SEGMENT DELETED	II/W	A constant Mach segment of the active flight plan has been automatically deleted. This occurs when the secondary flight plan or the alternate is activated, or engine out is detected or when the flight phase changes from CRZ to another one.
MCDU OVERHEATED	II/A	This message is displayed for 15 s in case of MCDU overheating.
MORE DRAG (EFIS PFD)	II/W	DES mode is engaged, idle is selected and the aircraft must decelerate in order to recover the path, or to respect an altitude constraint, a speed limit or a speed constraint.
NAV ACCUR DOWNGRAD (also displayed on ND)	II/A	NAV accuracy has been downgraded from HIGH to LOW. (See FMGS principles for an explanation).
NAV ACCUR UPGRAD (*EFIS ND)	II/W	NAV accuracy has been upgraded from LOW to HIGH.
NEW ACC ALT-HHHH	II/W	The acceleration altitude has been changed.
NEW CRZ ALT-HHHHH	II/W	The cruise altitude has been changed.
NEW THR RED ALT-HHHH	II/W	The thrust reduction altitude has been changed.
NO ANSWER TO REQUEST (ACARS msg)	I/W	A crew request, was previously sent to the ground and no answer has been received for 4 min.
NO INTERSECTION FOUND	I/W	The system could not find any common waypoint nor intersection point through the airway.
NON UNIQUE ROUTE IDENT	I/W	The flight crew has tried to enter on the new route page a company route IDENT that is identical to an existing company route IDENT (pilot-defined or in the database).
NOT ALLOWED	I/W	Data entry is not allowed in the selected field, or a selection action is not allowed.
NOT ALLOWED IN NAV	I/W	An attempt to modify the TO waypoint is made while in NAV mode.
NO NAV INTERCEPT	II/A	It is triggered, when NAV mode is armed and, no INTERCEPT waypoint exists before the TO waypoint.
NOT IN DATA BASE	I/W	The pilot is trying to enter or call up a company route IDENT, a FROM/TO pair, a place defined by place-bearing-distance (PBD) or place-bearing/place-bearing (PBX) or an airport NAVAID, waypoint runway, or NAVAID frequency (including pilot-defined elements) that is not in the current database.
NOT XMITTED TO ACARS (ACARS msg)	II/W	A pilot request or a crew report was sent but the communication was not established or not acknowledged.
ONLY SPD ENTRY ALLOWED	I/W	The pilot is trying to enter a Mach number for a preselected speed value on the CLIMB page.

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MESSAGE	TYPE/COLOR	CONDITIONS
OPP FMGC IN PROCESS	II/W	The offside FMGC is unhealthy, and the FM system mode is SINGLE. The message indicates that the MCDU on which the message is displayed is being driven by the FMGC on the other side.
PAGE UPDATE IN PROCESS	I/W	The pilot presses a key on the flight plan page while predictions are being updated.
PERF DATA UPLINK (ACARS msg)	II/W	Performance data are received from ground.
PLACE/D IN TRANSITION	I/W	If a place/distance waypoint is defined within a pre-planned “fixed turn radius” transition, the entry is rejected and the “PLACE/D IN TRANSITION” scratchpad message is displayed.
PLEASE WAIT	I/W	Resynchronization between both FMGCs is in progress.
PROCEDURE RNP IS XX.XX	II/A	Displayed when the RNP value, manually-entered on the PROG page, is larger than the RNP value defined in the navigation database for the active leg or route.
PRINTER NOT AVAILABLE (ACARS msg)	II/W	A printer communication error has been detected while printing a report. The printing is terminated.
RADIONAV IS DESELECTED	II/A	Radio navaids have been manually deselected and the aircraft is 80 nm before the top of descent or in approach phase.
REF/GPS POS DIFF	I/A	This message is displayed when there is a discrepancy between the reference position entered by the pilot and the GPS position.
REF/LAST IRS POS DIFF	I/A	This message is displayed when there is a discrepancy between the reference position entered by the pilot and the last stored IRS position.
REVISIONS NOT STORED	II/W	This message, displayed when a pilot-defined route or company route (active or secondary flight plan) is stored, indicates that the following elements are not retained: - Pilot-entered holds - Offsets - Modifications to terminal area procedures - Pilot-entered constraints - Pseudo waypoints - Step at optimum.

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MESSAGE	TYPE/COLOR	CONDITIONS
RTA DELETED	II/W	A time constraint is automatically deleted: - In case of engine-out - When entering the holding pattern - In case of go-around - At phase transition from descent or approach to climb or cruise - When a time constraint is inserted in the same flight plan at a different waypoint - When the alternate flight plan is activated - When a DIR TO/ABEAM is performed, only if the time constrained waypoint is projected as an ABEAM waypoint - The time constrained waypoint is cleared or sequenced (regardless of active lateral mode) - Valid clock data is lost - The time constraint belongs to the active flight plan and the secondary flight plan is activated - The time constraint belongs to the secondary flight plan and COPY ACTIVE is performed.
RTA EXISTS	I/W	Displayed if the pilot tries to clear an estimated takeoff time defined by the system.
RTE DATALINK IN PROG (ACARS msg)	I/W	A flight plan modification is performed after a F-PLN INIT request has been sent. This message is displayed until the uplink is entirely received.
RWY/LS MISMATCH	II/A	- During climb, cruise, (ILS or MLS) descent approach, or go-around, the LS frequency entered on the RAD NAV page does not match the LS associated with the destination runway. - During preflight or takeoff, the LS frequency entered on the RAD NAV page does not match the LS associated with the takeoff runway.
SEC RTE UPLINK (ACARS msg)	II/W	A flight plan is stored in the secondary flight plan.
SELECT DESIRED SYSTEM	I/W	The MCDU displays its MENU page.
SELECT TRUE (also displayed on the ND)	II/A	The MAG/TRUE sw is set to MAG, while the IRS send true HDG/TRK.
SENSOR IS INVALID	I/W	- The pilot has selected FF or FQ, or FF + FQ, or FQ + FF on the FUEL PRED page and the sole sensor or both of the selected sensors are invalid, or - The flight crew has entered fuel on board only, and the FF sensor is invalid.

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MESSAGE	TYPE/COLOR	CONDITIONS
SET GREEN DOT SPEED ("SET GREEN DOT" displayed on PFD)	II/W (W)	This message appears when the following conditions are all met: - Engine-out condition - Aircraft in selected speed mode - FCU-selected speed equal to or greater than green-dot speed +10 kt, and ALT* or ALT not active, or FCU-selected speed equal to or less than green-dot speed -10 kt.
SET HOLD SPEED (also displayed on PFD)	II/W (W)	This instruction appears when the aircraft is in selected speed, the pilot has inserted a hold in the flight plan, the aircraft is 30 s or less from the point where it must start decelerating towards hold speed, and the selected speed differs from the hold speed by more than 5 kt.
SET MANAGED SPEED ("SET MANAGED SPD"is displayed on PFD)	II/W (W)	The target speed is selected for the current phase, but there is no preselected speed for the next flight phase. When this is so, this message is displayed at transitions from climb to cruise, and from climb or cruise to descent. The message is always displayed at the transition to descent from climb or cruise if selected speed is active. It is not displayed if managed speed is active.
SETTING SPD/RTA	II/W	Displayed when the system recomputes its managed speed target to satisfy the RTA constraints.
SPECIF NDB UNAVAIL	II/A	The NDB to be autotuned (specified for a NDB approach) is not available.
SPECIF VOR-D UNAVAIL (also displayed on ND)	II/A	- The VOR, VOR-DME, or VORTAC to be autotuned (specified for an RNAV or VOR approach) has previously been deselected by the flight crew, or - The bearing, the frequency, or the IDENT of the VOR (or VORDME or VORTAC) to be autotuned is invalid.
SPD ERROR AT WPT 01	II/W	In lateral managed flight, the system predicts that the aircraft will miss a speed constraint by more than 10 kt. When the prediction changes to bring the miss within 5 kt, the message is cleared.
SPD LIM EXCEEDED	II/A	The aircraft is more that 150 ft below the speed limit altitude and more than 10 kt over green dot or the speed limit (which ever is smaller).
STEP ABOVE MAX FL	II/W	The pilot has entered a step altitude that is above the predicted maximum altitude.
STEP AHEAD	II/W	Indicates that the aircraft is within 20 nm of the active step point.
STEP DELETED	II/W	A step has been automatically deleted.
STORED ROUTES FULL	I/W	The system already contains five pilot-defined routes. (Only five are allowed.)
TAKEOFF DATA UPLINK (ACARS msg)	II/W	A takeoff data message is received.

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MESSAGE	TYPE/COLOR	CONDITIONS
TEMPORARY F-PLN EXISTS	I/W	The flight crew has selected any key (except ERASE or INSERT) or attempted a flight planning operation on the secondary flight plan while the system is displaying a temporary flight plan.
TIME ERROR AT WPT 01	II/W	While the aircraft is in lateral managed flight the FMGC predicts that it will miss a time constraint (*Refer to DSC-22_20-30-20-25 Required Time of Arrival (RTA) - Entering a Required Time of Arrival*).
TIME MARKER LIST FULL	I/W	The system already contains four time markers. (Only four are allowed).
TIME TO EXIT	II/A	The aircraft must leave holding immediately to satisfy fuel reserve requirements. (Extra fuel is zero).
TO SPEED TOO LOW	II/A	This message appears if the inserted V1, VR, V2 speeds do not satisfy the existing regulatory conditions regarding VMC and VS1G speeds.
TOO STEEP PATH AHEAD	II/A	The system displays this message in cruise phase if the aircraft is within 150 nm of its destination or in descent or approach phase and in NAV mode and the descent profile contains a segment that is too steep.
TUNE BBB FFF.FF	II/A	The system cannot autotune the VOR for approach or position because of a manual VOR selection.
TURN AREA EXCEEDANCE	II/A	This message is displayed 1.5 min before entry of the PI leg, when in NAV mode, if the PI lateral path exceed the protection envelope defined in the Navigation database.
UNKNOWN PROGRAM PIN	II/W	The system has been unable to initialize because of an incompatible or undefined aircraft pin program combination (A/C type, engine type, VMO/MMO parity) in the FMGC software.
UPLINK INSERT IN PROG (ACARS msg)	II/W	Displayed when an uplink message is currently inserted in the FMGS.
USING COST INDEX-NNN	I/W	This message is displayed when the system contains a flight plan, and the flight crew tries to enter a zero fuel weight or a gross weight into it before defining a Cost Index (CI). (In this case, the FMS defaults to the Cost Index from the last flight). It is also displayed when the flight crew inserts the ALTN F-PLN (in this case, the FMS defaults the cost index to 0).
V1/VR/V2 DISAGREE	II/A	This message is displayed when the entered V1, VR and V2 speeds do not satisfy the condition V1 ≤VR ≤V2.
WAIT FOR SYSTEM RESPONSE	I/W	During the time between a subsystem selection and the display of the subsystem page, the MCDU MENU page remains displayed with this message.
WIND DATA UPLINK (ACARS msg)	II/W	Uplink wind message has been received.
WIND UPLINK EXISTS (ACARS msg)	I/W	A flight plan modification (active or secondary) is attempted when uplink winds are not inserted yet.

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MESSAGE	TYPE/COLOR	CONDITIONS
WIND UPLINK PENDING (ACARS msg)	II/A	A temporary flight plan exists or a DIR TO page is displayed and a wind uplink is received and stored.
XXXX IS DESELECTED	I/W	The flight crew attempts to enter a deselected NAVAID, via the SELECTED NAVAID page, that has already been deselected.

MCDU DATA FORMAT LIST

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The following chart lists all the data the pilot may enter on the MCDU.
It also shows the acceptable format for the various data items, the acceptable range, the units of entry, and the MCDU pages on which the data can be entered.

The following codes are used to indicate various data formats:

A : letters
N : numbers
X : letters and numbers

DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
ACCEL ALT	See ALT		ft (MSL)	TAKEOFF (ACT/SEC (1)) GO AROUND (ACT/SEC (1))
ALT	NNNN or NNNNN (leading zeros must be included)	Max ALT = 39 000 Entry is rounded to the nearest 10 ft	ft (MSL)	PERF CLB PERF DES
ALT CSTR	See ALT	See ALT	ft (MSL)	VERT REV F-PLN A SEC F-PLN A
AIRWAYS (VIA)	XXXX	If not in data base "NOT IN DATA BASE" is displayed	N/A	LAT REV AIRWAYS ◁✻
ARPT	AAAA 1 character minimum. 4 maximum.	If AAAA is not in the database airport file, the New Runway page is displayed		INIT A (ACT/SEC (1)) LAT REV ALTN F-PLN A-B (ACT/SEC (1)) WAYPOINT DIR TO
BLOCK FUEL	NN.N leading zeros may be omitted.	0-14 without center tank 0-21 with center tank or 0-30.8/0.46	Thousands of Kg or thousands of Lb	INIT B (ACT/SEC (1))
CABIN RATE	- NNN (- may be omitted)	100 - 999	ft/min	DES FORECAST or CRUISE PERF. PAGE ◁✻
CG	NN.N	8.0 - 45.0	% MAC	INIT B. (ACT/SEC (1)) FUEL PRED
CHANNEL ◁✻	NNN	500 - 699		NEW NAVAID RAD NAV

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
CLASS (NAVAID)	AAAAAA (refer to RANGE for exact inputs allowed)	VOR DME VORDME VORTAC LOC, ILS NDB ILSDME MLS ◁ TACAN ◁	N/A	NEW NAVAID
CO RTE	XXXXXXX 7 or 10 characters (pin program)	If not in the NAVdatabase, a message will be displayed	N/A	INIT A ROUTE SELECTION NEW ROUTE ALTERNATE
COST INDEX	NNN may be entered as 1-3 digits; leading zeros lay be omitted	0 to 999	Kg/Min or 100 lb/Hr	INIT A (ACT/SEC(1)) PERF CLB (ACT/SECSee) PERF CRZ (ACT/SEC(1)) PERF DES (ALT/SEC(1))
CRS	See INB CRD	See INB CRD	degrees	RADIO NAV NEW NAVAID NEW RUNWAY
CRZ FL	Must be entered as FLIGHT LEVEL	Maximum FL (See FLIGHT LEVEL)	Hundred of ft	INIT A (ACT/SEC (1)) PROG
CRZ TEMP	See TEMP		See TEMP	INIT A (ACT/SEC(1)) FUEL PREDICTION
CRZ WIND	See WIND DIR/MAG	See WIND DIR/MAG	See WIND DIR/MAG	INIT A (ACT/SEC (1)) FUEL PREDICTION
DH	NNN	0 - 700 No is accepted if an ILS APPR is selected	ft	PERF APPR (ACT/SEC See)
DIST	NN.N leading and trailing 0's may be omitted.	0 - 99.9 or 0 - 999 (or 9999 ◁)	NM NM	HOLD ALTN
DRT TO ◁	"D"NN	Eight possible values		PERF TAKEOFF

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
EFF WIND ◁X	±NNN "+" may be entered as "T" or "TL" "-" may be entered as "H" or "HD" Leading zeros may be omitted If no sign is input, "+" is taken	0 - 500	kts	CLOSEST AIRPORT EQUI-TIME INIT A SEC INT A
ELV	±NNNN if no sign, + assumed Leading 0's may be omitted	Entry displayed to nearest 10 ft - 400 to 20 470 ft (RWY) (or - 1000 to 20 470 ft ◁X) -2 000 to 20 470 (NAVAID)	ft (MSL)	NEW RUNWAY NEW NAVAID
ETT/RTA ◁X	HH:MM:SS	00:00:00 to 23:59:59	Hour HH Min MM Sec SS	RTA
FF/FQ Sensors	One or both may be entered, Both - /FF + FQ or - / FQ + FF Fuel flow - /FF Fuel Quantity - / FQ		N/A	FUEL PREDICTION
FIG OF MERIT	N	0 - 3	N/A	NEW NAVAID
FINAL/TIME	Only one may be entered at a time. NN.N or (NNN.N ◁X) for FINAL NNNN for TIME	FINAL 0 - 10.0 (or 0 - 100 ◁X) or 0 - 22.0 0 - 90 TIME	Thousand of kg or Thousand of lb minutes	FUEL PRED INIT B
FLAPS		0, 1, 2, or 3		TAKEOFF
FLEX TO TEMP	1. If Derated TO option not implemented: same as TEMP 2. If Derated TO option is implemented: F NN		NN in degrees centigrade	TAKEOFF

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
FLIGHT LEVEL	FLNNN or NNN Leading zeros on NNN may be omitted	Max FL = 390 (or Max FL = 410 ◁✠)	Hundreds of ft (MSL)	F-PLN A-B, PROG VERT REV INIT A (ACT, SEC(1)) PERF CLB PERF DES STEP PRED STEP ALTS ◁✠
FLIGHT NUMBER	XXXXXXXX The 8 alphanumeric are not mandatory	N/A	N/A	INIT A F-PLN A-B
FOB	NN.N (leading zeros may be omitted)	See BLOCK	Thousands of kg or Thousands of Lb	FUEL PREDICTION
FREQ	NNN.NN ILS/VOR NNN.N NDB	108.00 - 117.95 190.0 - 1 750.0	MHz KHz	PROG. NEW NAVAID RADIO NAV
FROM/TO	AAAA /AAAA	AAAA must be in data base or message will be displayed	N/A	INIT A (ACT/SEC (1))
GW	NN.N Leading and trailing zeros may be omitted	35 - 99.9 or 77.2 - 218	Thousands of kg or Thousands of Lb	FUEL PREDICTION
IDLE FACTOR ◁✠	±N.N Leading and trailing zeros may be omitted	-9.9. +9.9	%	A/C STATUS
INB CRS	NNN Leading zeros may be omitted. An entry of 360 is displayed as 0.	000 - 359	Degrees	HOLD
LAT	DDMM.MB or BDDMM.M DD - degrees, MM.M - minutes, B - direction. Leading zeros may be omitted but the direction (B) is necessary. Latitude is displayed as DDMM.MB	B: N or S 0 ≤ DD ≤ 90 0 ≤ MM.M ≤ 59.9	Degree minutes tenths of minutes	INIT A (ACT/SEC (1))

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
LAT/LONG	LAT/LONG See LAT and See LONG except both must be entered with "/" in between	See LAT and See LONG	See LAT and See LONG	F-PLN A-B (ACT/SEC (1)) PROG NEW WAYPOINT NEW NAVAID DIR TO LAT REV NEW RUNWAY
LENGTH	NNNN Leading zeros may be omitted	1 000 - 8 000 m 3 282 - 9 999 ft	Meters or feet	NEW RUNWAY
LONG	DDDMM.MB or BDDDMM.M DDD - degrees MM.M - minutes B - direction. Leading zeros may be omitted but the direction (B) is necessary	B: E or W 0 ≤ DDD ≤ 180 0 ≤ MM.M ≤ 59	Degree minutes tenths of minutes	INIT A
MACH	.NN The decimal point is necessary. Trailing zeros are not necessary	MAX = .82 MIN = .15	Mach Number	F-PLN A (ACT/SEC (1)) PERF CLB PERF CRZ PERF DES
MACH/SPD	MACH and SPD must be entered with "/" between (See MACH and See SPD formats)	See MACH and See SPD	See MACH and See SPD	PERF DES (ACT/SEC (1))
MDA	See ALT	LDG elevation to LDG elevation +5 000	ft (MSL)	PERF APPR (ACT/SEC (1))
MDH	±NNNNN	0 - 5 000	ft (AGL)	PERF APPR (ACT/SEC (1))
NAVAID	XXXX	Any alphanumeric	N/A	PROG NEW NAVAID NAVAID F-PLN A-B (ACT/SEC (1)) LAT REV DIR TO RADIO NAV SELECTED NAVAIDS

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
OFST	NNB or BNN NN offset distance B direction	B: L or R 1 <NN < 50	NM	LAT REV
PERF FACTOR	NN.N leading or trailing zeros may be omitted (± N.N)	-10.0 to +10.0 (or -9.9 - +9.9 ◁✠)	N/A	A/C STATUS
PLACE/BRG/DIST	PLACE can be any data base ARPT, NAVAID or WAYPOINT - BRG must be a 3 digit entry without decimal digit. An entry of BRG = 360 is displayed as 0.	PLACE - If not in data base, a message "NOT IN DATA BASE" is displayed BRG - 000 - 360	N/A degrees	LAT REV(ACT/SEC (1)) NEW WAYPOINT PROG DIR TO F-PLN A-B (ACT/SEC See) STEP ALTS ◁✠
	DIST is NNN.N where leading zeros may be omitted ; all 3 parameters must be entered with "/" between	DIST - 0 - 999.9	NM	
PLACE-BRG/ PLACE-BRG	See PLACE/BRG/DIST A couple PLACE-BRG is entered with a dash in the middle. 2 couples have to be entered with "/" between	See PLACE/BRG/DIST	See PLACE/BRG/DIST	See PLACE/BRG/DIST
PLACE/DIST ◁✠	PLACE: See PLACE/BRG/DIST DIST: See PLACE/BRG/DIST	PLACE: See PLACE/BRG/DIST DIST: 0-999-9	N/A NM	F-PLN A and B SEC F-PLN A and B LAT REV NEW WAYPOINT DIR TO STEP ALTS
QNH	NNNN (leading zero may be omitted).	950 - 1 050 (or 745 - 1050 ◁✠)	Hecto-Pascals (hPa)	PERF APPR (ACT/SEC (1))
	NN.NN (leading and trailing zeros may be omitted).	28.06 - 31.01 (or 22.00 - 31.00 ◁✠)	In.Hg	
RADIAL IN ◁✠	NNN(T) 3 digits entry	000 - 360	Degrees	DIR TO
RADIAL OUT ◁✠	NNN(T) 3 digits entry	000 - 360	Degrees	DIR TO FIX INFO 1 and 2

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
RTE RSV	may be entered as fuel or percentage of trip fuel	Fuel 0 - (0.0) 0 - 21.7 % : 0 - 15	thousands of kg thousands of lb	INIT B (ACT/SEC (1)) FUEL PRED
RWY	AAAANND Where AAAA is same as ARPT (See ARPT). NN is runway number (2 digits) must be entered D is L or R to be included only when there is more than one runway with the same number at ARPT.			RUNWAY NEW RUNWAY F-PLN A-B
SAT/ALT ⋖	TEMP/ALT	See TEMP and See ALT	N/A	CRUISE WIND
SET HDG ⋖	NNN/N (leading and trailing zeros may be omitted) will always be displayed as NNN/N	000.0 - 360.0	Degrees	IRS MONITOR
SLOPE ⋖	NN.N	00.0 -90.0	Degrees	NEW NAVAID
SPD	NNN (must be 3 numerics)	MAX = 350 kt MIN = 100 kt	kt (CAS)	SEC F.PLN A PERF CLB PERF CRZ (ACT, SEC(1)) PERF DES
SPD CSTR	See SPD	See SPD	kt (CAS)	F-PLN A (ACT/SEC (1)) VERT REV (ACT/SEC (1))
SPD LIM	SSS/NNNNN SSS is a speed NNNNN is an ALT or FLIGHT LEVEL (See ALT and See FLIGHT LEVEL)	SSS: See SPD	kt/ft (MSL)	VERT REV (ACT/SEC3 (1))
SPD/MACH	See MACH/SPD	See MACH and See SPD	See MACH and See SPD	PERF DES (ACT/SEC (1))

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
STATION DEC	NND Where NN is the declination and D is the direction. Leading zeros may be omitted. D is not required for an entry of zero declination.	NN: 01 - 99 D: E or W	Degrees	NEW NAVAID
STEP ALT ◁	SNNN or NNNS (where NNN is in Flight Level) or SNNNNN or NNNNNS (where NNNNN is in ALT) Leading zeros may be omitted	See FLIGHT LEVEL or See ALT	See FLIGHT LEVEL or See ALT	F-PLN A
TAXI	N.N Leading or trailing zeros may be omitted	0 - 9.9	Thousands of kg	INIT B (ACT/SEC (1))
TEMP	±NN If no sign, + assumed	±99	Degrees celsius	INIT A (ACT/SEC (1)) FUEL PRED PERF APPR
THR RED ALT	See ALT	400 ft AGL mini	ft (MSL)	PERF TAKE OFF
THS	AAN.N or N.NAA where AA is UP or DN	max UP 7.0 max DN 5.0 increment .1	degrees	PERF TAKEOFF
TRANS ALT	See ALT			PERF GO AROUND
TIME	N.N	0 - 9.9	Minutes	HOLD
TIME MARK. ◁	HHMM	HH: 0 - 23 MM: 0 - 59	Hours Minutes	F-PLN A and B
T.O. SHIFT	NNNN	1-Length of origin runway	m or ft	PERF TAKEOFF
TRIP WIND	See EFF WIND		kts	INIT A SET INIT A
TROPO	See ALT	See ALT (or 60 000 ◁)	ft	INIT A FUEL PREDICTION SEC FUEL PREDICTION

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
UTC CSTR	HH MM Where HH are hours and MM are minutes. Leading zeros may be omitted 1 or 2 digit entry is interpretated as minutes	HH : 0 - 23 MM : 0 - 59	Hours and minutes	VERT REV
V1	See SPD		kt (CAS)	PERF TAKEOFF (ACT/SEC (1))
V2	See SPD		kt (CAS)	PERF TAKEOFF (ACT/SEC (1))
VR	See SPD		kt (CAS)	PERF TAKEOFF (ACT/SEC (1))
WIND	See WIND DIR/VELOCITY	See WIND DIR/VELOCITY	See WIND DIR/VELOCITY	F-PLN B (ACT/SEC (1)) FUEL PREDICTION
WAYPOINT	XXXXX - may be from . 1-5 (1-7 ◁✠) characters for waypoint. Acceptable as waypoint IDENT : ARPT NAVAID WAYPOINT LAT/LONG, PLACE BRG/ PLACE BRG and PLACE/BRG/ DIST PLACE / DIST ◁✠ may be entered to define a waypoint			WAYPOINT NEW WAYPOINT F-PLN A and B (ACT/SEC(1)) LAT REV PROG DIR TO FIX INFO ◁✠ 1 AND 2 EQUI-TIME POINT ◁✠ STEP ALTS ◁✠ PREDICTIVE GPS ◁✠
WIND DIR/WIND MAG	NNN/NNN Both must be entered; leading zeros may be omitted.	WIND DIRECTION 0 - 360	Degrees	INIT A PERF APPR (ACT/SEC (1)) STEP PRED
	An entry of WIND DIR = 360 is displayed as 0.	WIND MAG 0 - 200 (or 0 - 500 ◁✠)	Kt	WIND F-PLN B VERT REV

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
WIND DIRECTION/ MAG/ALT	NNN/NNN/FL NNN or NNN/NNN/NN NNN	Direction and Velocity as above Minimum ALT 1 000	FL in hundred of ft, ALT in ft	DES FORECAST WIND PAGES ◁✻
ZFW	NN.N OR NNN.N Leading and trailing zeros may be omitted	35.0 - 80.0 or 77.1 - 176.0	Thousands of kg or thousands of Lb	INIT B (ACT/SEC (1))

(1) *ACT/SEC = Active or Secondary*

MCDU DATA FORMAT LIST

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

The following chart lists all the data the pilot may enter on the MCDU.
It also shows the acceptable format for the various data items, the acceptable range, the units of entry, and the MCDU pages on which the data can be entered.

The following codes are used to indicate various data formats:

A : letters
N : numbers
X : letters and numbers

DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
ACCEL ALT	See ALT		ft (MSL)	TAKEOFF (ACT/SEC (1)) GO AROUND (ACT/SEC (1))
ALT	NNNN or NNNNN (leading zeros must be included)	Max alt = 39 000 Entry is rounded to the nearest 10 ft	ft (MSL)	PERF CLB PERF DES
ALT CSTR	See ALT	See ALT	ft (MSL)	VERT REV F-PLN A SEC F-PLN A
AIRWAYS (VIA)	XXXX	If not in data base "NOT IN DATA BASE" is displayed	N/A	LAT REV AIRWAYS ◁✻
ARPT	AAAA 1 character minimum. 4 maximum.	If AAAA is not in the database airport file, the New Runway page is displayed		INIT A (ACT/SEC (1)) LAT REV ALTN F-PLN A-B (ACT/SEC (1)) WAYPOINT DIR TO

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
BLOCK FUEL	NN.N leading zeros may be omitted.	0–80/0–175.2	Thousands of Kg or thousands of Lb	INIT B (ACT/SEC (1))
CABIN RATE	- NNN (- may be omitted)	100 - 999	ft/min	DES FORECAST or CRUISE PERF. PAGE ◁✻
CG	NN.N	8.0 - 45.0	% MAC	INIT B. (ACT/SEC (1)) FUEL PRED
CHANNEL ◁✻	NNN	500 - 699		NEW NAVAID RAD NAV
CLASS (NAVAID)	AAAAAA (refer to RANGE for exact inputs allowed)	VOR DME VORDME VORTAC LOC, ILS NDB ILSDME MLS ◁✻ TACAN ◁✻	N/A	NEW NAVAID
CO RTE	XXXXXXX 7 or 10 characters (pin program)	If not in the NAVdatabase, a message will be displayed	N/A	INIT A ROUTE SELECTION NEW ROUTE ALTERNATE
COST INDEX	NNN may be entered as 1-3 digits; leading zeros lay be omitted	0 to 999	Kg/Min or 100 lb/Hr	INIT A (ACT/SEC(1)) PERF CLB (ACT/SEC(1)) PERF CRZ (ACT/SEC(1)) PERF DES (ALT/SEC(1))
CRS	See INB CRS	See INB CRS	degrees	RADIO NAV NEW NAVAID NEW RUNWAY
CRZ FL	Must be entered as FLIGHT LEVEL	Maximum FL (See FLIGHT LEVEL)	Hundred of ft	INIT A (ACT/SEC (1)) PROG
CRZ TEMP	See TEMP		See TEMP	INIT A (ACT/SEC(1)) FUEL PREDICTION
CRZ WIND	See WIND DIR/MAG	See WIND DIR/MAG	See WIND DIR/MAG	INIT A (ACT/SEC (1)) FUEL PREDICTION
DH	NNN	0 - 700 No is accepted if an ILS APPR is selected	ft	PERF APPR (ACT/SEC (1))
DIST	NN.N leading and trailing 0's may be omitted.	0 - 99.9 or 0 - 999 (or 9999 ◁✻)	NM NM	HOLD ALTN

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
DRT TO ◁X	"D"NN	Eight possible values		PERF TAKEOFF
EFF WIND ◁X	±NNN "+" may be entered as "T" or "TL" "-" may be entered as "H" or "HD" Leading zeros may be omitted If no sign is input, "+" is taken	0 - 500	kts	CLOSEST AIRPORT EQUI-TIME INIT A SEC INT A
ELV	±NNNN if no sign, + assumed Leading 0's may be omitted	Entry displayed to nearest 10 ft - 400 to 20 470 ft (RWY) (or -1000 to 20 470 ft ◁X) -2 000 to 20 470 (NAVAID)	ft (MSL)	NEW RUNWAY NEW NAVAID
ETT/RTA ◁X	HH:MM:SS	00:00:00 to 23:59:59	Hour HH Min MM Sec SS	RTA
FF/FQ Sensors	One or both may be entered, Both - /FF + FQ or - / FQ + FF Fuel flow - /FF Fuel Quantity - / FQ		N/A	FUEL PREDICTION
FIG OF MERIT	N	0 - 3	N/A	NEW NAVAID
FINAL/TIME	Only one may be entered at a time. NN.N or (NNN.N ◁X) for FINAL NNNN for TIME	FINAL 0 - 10.0 (or 0 - 100 ◁X) or 0 - 22.0 0 - 90 TIME	Thousand of kg or Thousand of lb minutes	FUEL PRED INIT B
FLAPS		0, 1, 2, or 3		TAKEOFF

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
FLEX TO TEMP	1. If Derated TO option not implemented: same as TEMP 2. If Derated TO option is implemented: F NN		NN in degrees centigrade	TAKEOFF
FLIGHT LEVEL	FLNNN or NNN Leading zeros on NNN may be omitted	Max FL = 390 (or Max FL = 410 ◁※)	Hundreds of ft (MSL)	F-PLN A-B, PROG VERT REV INIT A (ACT, SEC(1)) PERF CLB PERF DES STEP PRED STEP ALTS ◁※
FLIGHT NUMBER	XXXXXXXX The 8 alphanumeric are not mandatory	N/A	N/A	INIT A F-PLN A-B
FOB	NN.N (leading zeros may be omitted)	See BLOCK	Thousands of kg or Thousands of Lb	FUEL PREDICTION
FREQ	NNN.NN ILS/VOR NNN.N NDB	108.00 - 117.95 190.0 - 1 750.0	MHz KHz	PROG NEW NAVAID RADIO NAV
FROM/TO	AAAA /AAAA	AAAA must be in data base or message will be displayed	N/A	INIT A (ACT/SEC (1))
GW	NN.N Leading and trailing zeros may be omitted	35 - 99.9 or 77.2 - 218	Thousands of kg or Thousands of Lb	FUEL PREDICTION
IDLE FACTOR ◁※	±N.N Leading and trailing zeros may be omitted	-9.9. +9.9	%	A/C STATUS
INB CRS	NNN Leading zeros may be omitted. An entry of 360 is displayed as 0.	000 - 359	Degrees	HOLD

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
LAT	DDMM.MB or BDDMM.M DD - degrees, MM.M - minutes, B - direction. Leading zeros may be omitted but the direction (B) is necessary. Latitude is displayed as DDMM.MB	B: N or S 0 ≤ DD ≤ 90 0 ≤ MM.M ≤ 59.9	Degree minutes tenths of minutes	INIT A (ACT/SEC (1))
LAT/LONG	LAT/LONG See LAT and See LONGexcept both must be entered with "/" in between	See LAT and See LONG	See LAT and See LONG	F-PLN A-B (ACT/SEC(1)) PROG NEW WAYPOINT NEW NAVAID DIR TO LAT REV NEW RUNWAY
LENGTH	NNNN Leading zeros may be omitted	1 000 - 8 000 m 3 282 - 9 999 ft	Meters or feet	NEW RUNWAY
LONG	DDDMM.MB or BDDDMM.M DDD - degrees MM.M - minutes B - direction. Leading zeros may be omitted but the direction (B) is necessary	B: E or W 0 ≤ DDD ≤ 180 0 ≤ MM.M ≤ 59	Degree minutes tenths of minutes	INIT A
MACH	.NN The decimal point is necessary. Trailing zeros are not necessary	MAX = .82 MIN = .15	Mach Number	F-PLN A (ACT/SEC (1)) PERF CLB PERF CRZ PERF DES
MACH/SPD	MACH and SPD must be entered with "/" between (See MACH and See SPD formats)	See MACH and See SPD	See MACH and See SPD	PERF DES (ACT/SEC See)
MDA	See ALT	LDG elevation to LDG elevation +5 000	ft (MSL)	PERF APPR (ACT/SEC (1))

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
MDH	±NNNNN	0 - 5 000	ft (AGL)	PERF APPR (ACT/SEC [1])
NAVAID	XXXX	Any alphanumeric	N/A	PROG NEW NAVAID NAVAID F-PLN A-B (ACT/SEC [1]) LAT REV DIR TO RADIO NAV SELECTED NAVAIDS
OFST	NNB or BNN NN offset distance B direction	B: L or R 1 <NN < 50	NM	LAT REV
PERF FACTOR	NN.N leading or trailing zeros may be omitted (± N.N)	-10.0 to +10.0 (or -9.9 - +9.9 ◁✠)	N/A	A/C STATUS
PLACE/BRG/DIST	PLACE can be any data base ARPT, NAVAID or WAYPOINT - BRG must be a 3 digit entry without decimal digit. An entry of BRG = 360 is displayed as 0.	PLACE - If not in data base, a message "NOT IN DATA BASE" is displayed BRG - 000 - 360	N/A degrees	LAT REV (ACT/SEC [1]) NEW WAYPOINT PROG DIR TO F-PLN A-B (ACT/SEC [1]) STEP ALTS ◁✠
	DIST is NNN.N where leading zeros may be omitted ; all 3 parameters must be entered with "/" between	DIST - 0 - 999.9	NM	
PLACE-BRG/ PLACE-BRG	See PLACE/BRG/DIST A couple PLACE-BRG is entered with a dash in the middle. 2 couples have to be entered with "/" between	See PLACE/BRG/DIST	See PLACE/BRG/DIST	See PLACE/BRG/DIST

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
PLACE/DIST ◁	PLACE: See PLACE/BRG/DIST DIST: See PLACE/BRG/DIST	PLACE: See PLACE/BRG/DIST DIST: 0 - 999-9	N/A NM	F-PLN A and B SEC . A and B LAT REV NEW WAYPOINT DIR TO STEP ALTS
QNH	NNNN (leading zero may be omitted).	950 - 1 050 (or 745 - 1050 ◁)	Hecto-Pascals (hPa)	PERF APPR (ACT/SEC (1))
	NN.NN (leading and trailing zeros may be omitted).	28.06 - 31.01 (or 22.00 - 31.00 ◁)	In.Hg	
RADIAL IN ◁	NNN(T) 3 digits entry	000 - 360	Degrees	DIR TO
RADIAL OUT ◁	NNN(T) 3 digits entry	000 - 360	Degrees	DIR TO FIX INFO 1 and 2
RTE RSV	may be entered as fuel or percentage of trip fuel	Fuel 0 - (0.0) 0 - 21.7 % : 0 - 15	thousands of kg thousands of lb	INIT B (ACT/SEC (1)) FUEL PRED
RWY	AAAANND Where AAAA is same as ARPT (See ARPT). NN is runway number (2 digits) must be entered D is L or R to be included only when there is more than one runway with the same number at ARPT.			RUNWAY NEW RUNWAY F-PLN A-B
SAT/ALT ◁	TEMP/ALT	See TEMP and See ALT	N/A	CRUISE WIND
SET HDG ◁	NNN/N (leading and trailing zeros may be omitted) will always be displayed as NNN/N	000.0 - 360.0	Degrees	IRS MONITOR
SLOPE ◁	NN.N	00.0 - 90.0	Degrees	NEW NAVAID
SPD	NNN (must be 3 numerics)	MAX = 350 kt MIN = 100 kt	kt (CAS)	SEC F.PLN A PERF 3CLB PERF CRZ (ACT, SEC) PERF DES

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
SPD CSTR	See SPD	See SPD	kt (CAS)	F-PLN A (ACT/SEC (1)) VERT REV (ACT/SEC (1))
SPD LIM	SSS/NNNNN SSS is a speed NNNNN is an ALT or FLIGHT LEVEL (See ALT and See FLIGHT LEVEL)	SSS: See SPD	kt/ft (MSL)	VERT REV (ACT/SEC (1))
SPD/MACH	See MACH/SPD	See MACH and See SPD	See MACH and See SPD	PERF DES (ACT/SEC (1))
STATION DEC	NND Where NN is the declination and D is the direction. Leading zeros may be omitted. D is not required for an entry of zero declination.	NN: 01 - 99 D: E or W	Degrees	NEW NAVAID
STEP ALT ◁	SNNN or NNNS (where NNN is in Flight Level) or SNNNNN or NNNNNS (where NNNNN is in ALT) Leading zeros may be omitted	See FLIGHT LEVEL or See ALT	See FLIGHT LEVEL or See ALT	F-PLN A
TAXI	N.N Leading or trailing zeros may be omitted	0 - 9.9	Thousands of kg	INIT B (ACT/SEC (1))
TEMP	±NN If no sign, + assumed	±99	Degrees celsius	INIT A (ACT/SEC (1)) FUEL PRED PERF APPR
THR RED ALT	See ALT	400 ft AGL mini	ft (MSL)	PERF TAKE OFF
THS	AAN.N or N.NAA where AA is UP or DN	max UP 7.0 max DN 5.0 increment .1	degrees	PERF TAKEOFF
TRANS ALT	See ALT			PERF GO AROUND
TIME	N.N	0 - 9.9	Minutes	HOLD
TIME MARK. ◁	HHMM	HH : 0 - 23 MM : 0 - 59	Hours Minutes	F-PLN A and B

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
T.O. SHIFT	NNNN	1-Length of origin runway	m or ft	PERF TAKEOFF
TRIP WIND	See EFF WIND		kts	INIT A SET INIT A
TROPO	See ALT	See ALT (or 60 000 ◁✠)	ft	INIT A FUEL PREDICTION SEC FUEL PREDICTION
UTC CSTR	HH MM Where HH are hours and MM are minutes. Leading zeros may be omitted 1 or 2 digit entry is interpretated as minutes	HH : 0 - 23 MM : 0 - 59	Hours and minutes	VERT REV
V1	See SPD		kt (CAS)	PERF TAKEOFF (ACT/SEC (1))
V2	See SPD		kt (CAS)	PERF TAKEOFF (ACT/SEC (1))
VR	See SPD		kt (CAS)	PERF TAKEOFF (ACT/SEC (1))
WIND	See WIND DIR/VELOCITY	See WIND DIR/VELOCITY	See WIND DIR/VELOCITY	F-PLN B (ACT/SEC (1)) FUEL PREDICTION
WAYPOINT	XXXXX - may be from . 1-5 (1-7 ◁✠) characters for waypoint. Acceptable as waypoint IDENT : ARPT NAVAID WAYPOINT LAT/LONG, PLACE BRG/PLACE BRG and PLACE/BRG./ DIST PLACE/DIST ◁✠ may be entered to define a waypoint			WAYPOINT NEW WAYPOINT F-PLN A and B (ACT/SECSee) LAT REV PROG DIR TO FIX INFO ◁✠ 1 AND 2 EQUI-TIME POINT ◁✠ STEP ALTS ◁✠ PREDICTIVE GPS ◁✠

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
WIND DIR/WIND MAG	NNN/NNN Both must be entered ; leading zeros may be omitted. An entry of WIND DIR = 360 is displayed as 0.	WIND DIRECTION 0 - 360	Degrees	INIT A PERF APPR (ACT/SEC [(1)]) STEP PRED
		WIND MAG 0 - 200 (or 0 - 500 ◁✻)	Kt	WIND F-PLN B VERT REV
WIND DIRECTION/ MAG/ALT	NNN/NNN/FL NNN or NNN/NNN/NN NNN	Direction and Velocity as above Minimum ALT 1 000	FL in hundred of ft, ALT in ft	DES FORECAST WIND PAGES ◁✻
ZFW	NN.N OR NNN.N Leading and trailing zeros may be omitted	35.0 - 80.0 or 77.1 - 176.0	Thousands of kg or thousands of Lb	INIT B (ACT/SEC [(1)])

(1) ACT/SEC = Active or Secondary

MCDU DATA FORMAT LIST

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

1

The following chart lists all the data the pilot may enter on the MCDU.
It also shows the acceptable format for the various data items, the acceptable range, the units of entry, and the MCDU pages on which the data can be entered.

The following codes are used to indicate various data formats:

A : letters
N : numbers
X : letters and numbers

DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
ACCEL ALT	See ALT		ft (MSL)	TAKEOFF (ACT/SEC[(2)]) GO AROUND (ACT/SEC [(2)])
ALT	NNNN or NNNNN (leading zeros must be included)	Max ALT = 39 000 Entry is rounded to the nearest 10 ft	ft (MSL)	PERF CLB PERF DES
ALT CSTR	See ALT	See ALT	ft (MSL)	VERT REV F-PLN A SEC F-PLN A

Continued on the following page

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
AIRWAYS (VIA)	XXXX	If not in data base "NOT IN DATA BASE" is displayed	N/A	LAT REV AIRWAYS ◁
ARPT	AAAA 1 character minimum. 4 maximum.	If AAAA is not in the database airport file, the New Runway page is displayed		INIT A (ACT/SEC[2]) LAT REV ALTN F-PLN A-B (ACT/SEC[2]) WAYPOINT DIR TO
BARO	Same as ALT	Ldg elevation to ldg elevation + 5000	ft (MSL)	PERF APPR (ACT/SEC)
BLOCK FUEL	NN.N leading zeros may be omitted.	0-14 /0-175.2	Thousands of Kg or thousands of Lb	INIT B (ACT/SEC [2])
CABIN RATE	- NNN (- may be omitted)	100 - 999	ft/min	DES FORECAST or CRUISE PERF. PAGE ◁
CG	NN.N	8.0 - 45.0	% MAC	INIT B. (ACT/SEC [2]) FUEL PRED
CHANNEL ◁	NNN	500 - 699		NEW NAVAID RAD NAV
CLASS (NAVAID)	AAAAAA (refer to RANGE for exact inputs allowed)	VOR DME VORDME VORTAC LOC, ILS NDB ILSDME MLS ◁ TACAN ◁	N/A	NEW NAVAID
CO RTE	XXXXXXX 7 or 10 characters (pin program)	If not in the NAVdatabase, a message will be displayed	N/A	INIT A ROUTE SELECTION NEW ROUTE ALTERNATE
COST INDEX	NNN may be entered as 1-3 digits; leading zeros lay be omitted	0 to 999	Kg/Min or 100 lb/Hr	INIT A (ACT/SEC[2]) PERF CLB (ACT/SEC[2]) PERF CRZ (ACT/SEC[2]) PERF DES (ALT/SEC[2])
CRS	See INB CRS	See INB CRS	degrees	RADIO NAV NEW NAVAID NEW RUNWAY
CRZ FL	Must be entered as FLIGHT LEVEL	Maximum FL (See FLIGHT LEVEL)	Hundred of ft	INIT A (ACT/SEC [2]) PROG

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
CRZ TEMP	See TEMP		See TEMP	INIT A (ACT/SEC(2)) FUEL PREDICTION
CRZ WIND	See WIND DIR/MAG	See WIND DIR/MAG	See WIND DIR/MAG	INIT A (ACT/SEC (2)) FUEL PREDICTION
DIST	NN.N leading and trailing 0's may be omitted.	0 - 99.9 or 0 - 999 (or 9999 ◁⋇)	NM NM	HOLD ALTN
DRT TO ◁⋇	"D"NN	Eight possible values		PERF TAKEOFF
EFF WIND ◁⋇	±NNN "+" may be entered as "T" or "TL" "-" may be entered as "H" or "HD" Leading zeros may be omitted If no sign is input, "+" is taken	0 - 500	kts	CLOSEST AIRPORT EQUI-TIME INIT A SEC INT A
ELV	±NNNN if no sign, + assumed Leading 0's may be omitted	Entry displayed to nearest 10 ft - 400 to 20 470 ft (RWY) (or - 1000 to 20 470 ft ◁⋇) -2 000 to 20 470 (NAVAID)	ft (MSL)	NEW RUNWAY NEW NAVAID
ETT/RTA ◁⋇	HH:MM:SS	00:00:00 to 23:59:59	Hour HH Min MM Sec SS	RTA
FF/FQ Sensors	One or both may be entered, Both - /FF + FQ or - / FQ + FF Fuel flow - /FF Fuel Quantity - / FQ		N/A	FUEL PREDICTION
FIG OF MERIT	N	0 - 3	N/A	NEW NAVAID

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
FINAL/TIME	Only one may be entered at a time. NN.N or (NNN.N ◁) for FINAL NNNN for TIME	FINAL 0 - 10.0 (or 0 - 100 ◁) or 0 - 22.0 0 - 90 TIME	Thousand of kg or Thousand of lb minutes	FUEL PRED INIT B
FLAPS		0, 1, 2, or 3		TAKEOFF
FLEX TO TEMP	1. If Derated TO option not implemented: same as TEMP 2. If Derated TO option is implemented: F NN		NN in degrees centigrade	TAKEOFF
FLIGHT LEVEL	FLNNN or NNN Leading zeros on NNN may be omitted	Max FL = 390 (or Max FL = 410 ◁)	Hundreds of ft (MSL)	F-PLN A-B, PROG VERT REV INIT A (ACT, SEC(2)) PERF CLB PERF DES STEP PRED STEP ALTS ◁
FLIGHT NUMBER	XXXXXXXX The 8 alphanumeric are not mandatory	N/A	N/A	INIT A F-PLN A-B
FOB	NN.N (leading zeros may be omitted)	See BLOCK	Thousands of kg or Thousands of Lb	FUEL PREDICTION
FREQ	NNN.NN ILS/VOR NNN.N NDB	108.00 - 117.95 190.0 - 1 750.0	MHz KHz	PROG. NEW NAVAID RADIO NAV
FROM/TO	AAAA /AAAA	AAAA must be in data base or message will be displayed	N/A	INIT A (ACT/SEC (2))
GW	NN.N Leading and trailing zeros may be omitted	35 - 99.9 or 77.2 - 218	Thousands of kg or Thousands of Lb	FUEL PREDICTION
IDLE FACTOR ◁	±N.N Leading and trailing zeros may be omitted	-9.9. +9.9	%	A/C STATUS

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
INB CRS	NNN Leading zeros may be omitted. An entry of 360 is displayed as 0.	000 - 359	Degrees	HOLD
LAT	DDMM.MB or BDDMM.M DD - degrees, MM.M - minutes, B - direction. Leading zeros may be omitted but the direction (B) is necessary. Latitude is displayed as DDMM.MB	B: N or S 0 ≤ DD ≤ 90 0 ≤ MM.M ≤ 59.9	Degree minutes tenths of minutes	INIT A (ACT/SEC (2))
LAT/LONG	LAT/LONG See LAT and See LONG except both must be entered with "/" in between	See LAT and See LONG	See LAT and See LONG	F-PLN A-B (ACT/SEC (2)) PROG NEW WAYPOINT NEW NAVAID DIR TO LAT REV NEW RUNWAY
LENGTH	NNNN Leading zeros may be omitted	1 000 - 8 000 m 3 282 - 9 999 ft	Meters or feet	NEW RUNWAY
LONG	DDDMM.MB or BDDDMM.M DDD - degrees MM.M - minutes B - direction. Leading zeros may be omitted but the direction (B) is necessary	B: E or W 0 ≤ DDD ≤ 180 0 ≤ MM.M ≤ 59	Degree minutes tenths of minutes	INIT A
MACH	.NN The decimal point is necessary. Trailing zeros are not necessary	MAX = .82 MIN = .15	Mach Number	F-PLN A (ACT/SEC (2)) PERF CLB PERF CRZ PERF DES

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
MACH/SPD	MACH and SPD must be entered with "/" between (See MACH and See SPD formats)	See MACH and See SPD	See MACH and See SPD	PERF DES (ACT/SEC (2))
NAVAID	XXXX	Any alphanumeric	N/A	PROG NEW NAVAID NAVAID F-PLN A-B (ACT/SEC (2)) LAT REV DIR TO RADIO NAV SELECTED NAVAIDS
OFST	NNB or BNN NN offset distance B direction	B: L or R 1 <NN < 50	NM	LAT REV
PERF FACTOR	NN.N leading or trailing zeros may be omitted (± N.N)	-10.0 to +10.0 (or -9.9 - +9.9 ◁✠)	N/A	A/C STATUS
PLACE/BRG/DIST	PLACE can be any data base ARPT, NAVAID or WAYPOINT - BRG must be a 3 digit entry without decimal digit. An entry of BRG = 360 is displayed as 0.	PLACE - If not in data base, a message "NOT IN DATA BASE" is displayed BRG - 000 - 360	N/A degrees	LAT REV(ACT/SEC (2)) NEW WAYPOINT PROG DIR TO F-PLN A-B (ACT/SEC (2)) STEP ALTS ◁✠
	DIST is NNN.N where leading zeros may be omitted ; all 3 parameters must be entered with "/" between	DIST - 0 - 999.9	NM	
PLACE-BRG/ PLACE-BRG	See PLACE/BRG/DIST A couple PLACE-BRG is entered with a dash in the middle. 2 couples have to be entered with "/" between	See PLACE/BRG/DIST	See PLACE/BRG/DIST	See PLACE/BRG/DIST

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
PLACE/DIST ◁	PLACE: See PLACE/BRG/DIST DIST:See PLACE/BRG/DIST	PLACE: See PLACE/BRG/DIST DIST 0-999-9	N/A NM	F-PLN A and B SEC F-PLN A and B LAT REV NEW WAYPOINT DIR TO STEP ALTS
QNH	NNNN (leading zero may be omitted).	950 - 1 050 (or 745 - 1050 ◁)	Hecto-Pascals (hPa)	PERF APPR (ACT/SEC [2])
	NN.NN (leading and trailing zeros may be omitted).	28.06 - 31.01 (or 22.00 - 31.00 ◁)	In.Hg	
RADIAL ◁	NNN(T) 3 digits entry	000 - 360	Degrees	FIX INFO 1 to 4
RADIAL IN ◁	NNN(T) 3 digits entry	000 - 360	Degrees	DIR TO
RADIAL OUT ◁	NNN(T) 3 digits entry	000 - 360	Degrees	DIR TO FIX INFO 1 to 4
RADIO	NNN	0–700 No is accepted if an ILS/ GLS ◁ ; APPR is selected	ft	PERF APPR (ACT/SEC)
RADIUS ◁	DNNN 3 digits entry D is the identifiant of the circle radius	000 - 256	NM	FIX INFO 1 to 4
REF FIX ◁	See waypoint			FIX INFO 1 to 4
RTE RSV	may be entered as fuel or percentage of trip fuel	Fuel 0 - (0.0) 0 - 21.7 % : 0 - 15	thousands of kg thousands of lb	INIT B (ACT/SEC [2]) FUEL PRED
RWY	AAAANND Where AAAA is See ARPT. NN is runway number (2 digits) must be entered D is L or R to be included only when there is more than one runway with the same number at ARPT.			RUNWAY NEW RUNWAY F-PLN A-B
SAT/ALT ◁	TEMP/ALT	See TEMP and See ALT	N/A	CRUISE WIND

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
SET HDG ◁	NNN/N (leading and trailing zeros may be omitted) will always be displayed as NNN/N	000.0 - 360.0	Degrees	IRS MONITOR
SLOPE ◁	NN.N	00.0 -90.0	Degrees	NEW NAVAID
SPD	NNN (leading zero may be omitted)	MAX = 350 kt MIN = 90 kt	kt (CAS)	SEC F.PLN A PERF CLB PERF CRZ (ACT, SEC(2)) PERF DES
SPD CSTR	See SPD	See SPD	kt (CAS)	F-PLN A (ACT/SEC (2)) VERT REV (ACT/SEC (2))
SPD LIM	SSS/NNNNN SSS is a speed NNNNN is an ALT or FLIGHT LEVEL (See ALT and See FLIGHT LEVEL)	SSS: See SPD	kt/ft (MSL)	VERT REV (ACT/SEC3 (2))
SPD/MACH	See MACH/SPD	See MACH and See SPD	See MACH and See SPD	PERF DES (ACT/SEC (2))
STATION DEC	NND Where NN is the declination and D is the direction. Leading zeros may be omitted. D is not required for an entry of zero declination.	NN: 01 - 99 D: E or W	Degrees	NEW NAVAID
STEP ALT ◁	SNNN or NNNS (where NNN is in Flight Level) or SNNNNN or NNNNNS (where NNNNN is in ALT) Leading zeros may be omitted	See FLIGHT LEVEL or See ALT	See FLIGHT LEVEL or See ALT	F-PLN A
TAXI	N.N Leading or trailing zeros may be omitted	0 - 9.9	Thousands of kg	INIT B (ACT/SEC (2))

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
TEMP	±NN If no sign, + assumed	±99	Degrees celsius	INIT A (ACT/SEC (2)) FUEL PRED PERF APPR
THR RED ALT	See ALT	400 ft AGL mini	ft (MSL)	PERF TAKE OFF
THS	AAN.N or N.NAA where AA is UP or DN	max UP 7.0 max DN 5.0 increment .1	degrees	PERF TAKEOFF
TRANS ALT	See ALT			PERF GO AROUND
TIME	N.N	0 - 9.9	Minutes	HOLD
TIME MARK. ⋖	HHMM	HH: 0 - 23 MM: 0 - 59	Hours Minutes	F-PLN A and B
T.O. SHIFT	NNNN	1-Length of origin runway	m or ft	PERF TAKEOFF
TRIP WIND	See EFF WIND		kts	INIT A SET INIT A
TROPO	See ALT	See ALT (or 60 000 ⋖)	ft	INIT A FUEL PREDICTION SEC FUEL PREDICTION
UTC CSTR	HH MM Where HH are hours and MM are minutes. Leading zeros may be omitted 1 or 2 digit entry is interpretated as minutes	HH: 0 - 23 MM: 0 - 59	Hours and minutes	VERT REV
V1	See SPD		kt (CAS)	PERF TAKEOFF (ACT/SEC (2))
V2	See SPD		kt (CAS)	PERF TAKEOFF (ACT/SEC (2))
VR	See SPD		kt (CAS)	PERF TAKEOFF (ACT/SEC (2))
WIND	See WIND DIR /VELOCITY	See WIND DIR/VELOCITY	See WIND DIR/VELOCITY	F-PLN B (ACT/SEC (2)) FUEL PREDICTION

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DATA NAME	FORMAT	RANGE (X is input)	UNITS	DISPLAY PAGE
WAYPOINT	XXXXX - may be from . 1-5 (1-7 ◁✠) characters for waypoint. Acceptable as waypoint IDENT: ARPT NAVAID WAYPOINT LAT/LONG, PLACE BRG/ PLACE BRG and PLACE/BRG/ DIST PLACE / DIST ◁✠ may be entered to define a waypoint			WAYPOINT NEW WAYPOINT F-PLN A and B (ACT/SEC (2)) LAT REV PROG DIR TO FIX INFO ◁✠ 1 AND 2 EQUI-TIME POINT ◁✠ STEP ALTS ◁✠ PREDICTIVE GPS ◁✠
WIND DIR/WIND MAG	NNN/NNN Both must be entered ; leading zeros may be omitted. An entry of WIND DIR = 360 is displayed as 0.	WIND DIRECTION 0 - 360	Degrees	INIT A PERF APPR (ACT/SEC (2)) STEP PRED
		WIND MAG 0 - 200 (or 0 - 500 ◁✠)	Kt	WIND F-PLN B VERT REV
WIND DIRECTION/ MAG/ALT	NNN/NNN/FL NNN or NNN/NNN/NN NNN	Direction and Velocity as above Minimum ALT 1 000	FL in hundred of ft, ALT in ft	DES FORECAST WIND PAGES ◁✠
ZFW	NN.N OR NNN.N Leading and trailing zeros may be omitted	MIN ZFW See –Max ZFW See	Thousands of kg or thousands of Lb	INIT B (ACT/SEC (2))

(1) *As defined in the Performance Data Base.*

(2) *ACT/SEC = Active or Secondary*

GENERAL

Applicable to: ALL

The baro reference selector of the EIS (Electronic Instrument System) allows the pilot to use the standard barometric reference (STD), sea level atmospheric pressure (QNH), or atmospheric pressure at airfield elevation (QFE option) for the barometer setting.
The selected value is displayed in the baro reference display window of the EFIS control panel and on the Primary Flight Display (PFD) below the altitude scale.
The barometer setting is used as a reference for the altimeter of the PFD and for the PFD target altitude. In flight, it affects the predicted altitudes on the MCDU and the descent path computation.

MCDU ALTITUDE PREDICTIONS

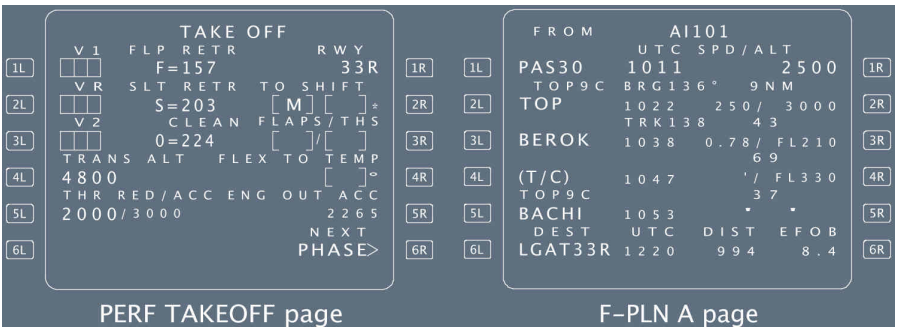
Applicable to: ALL

GENERAL

The FMGS predicts at each waypoint of the flight plan an altitude that is a function of all data in the lateral and vertical flight plans.

ON THE GROUND

The altitude predicted at each waypoint is displayed as altitude in feet above mean sea level (AMSL) when it is below the transition altitude and as flight level when it is above the transition altitude. The altitude constraints are also displayed, and they follow the same rule (feet or flight level).
The predicted altitude is equal to the airport elevation plus the height you must attain in order to reach the waypoint in the applicable mode (climb or descent).



IN FLIGHT

The predicted altitude is equal to the aircraft altitude (as a function of the barometer setting), plus or minus the height you must attain to reach the waypoint in the applicable mode (climb or descent).

- In climb:
  Altitude predictions and constraints are displayed as altitude in feet above mean sea level (AMSL) at, or below, the transition altitude, and as the flight level above it.
  For example : If the transition altitude is 5 000 ft and you insert an altitude constraint as 8 000 ft, the MCDU F-PLN A page displays it as FL 80
- In descent:
  If “STD”is selected on the EIS control panel, altitude predictions and constraints above the transition level are displayed as flight levels, and those below the transition level are displayed as altitude AMSL.
  If sea level standard pressure (QNH), or field elevation pressure (QFE option), is selected on the EIS control panel, altitude predictions and constraints are displayed as altitudes AMSL, regardless of the transition altitude.
  For example: If the transition level is FL 50 and you insert an altitude constraint of 8 000 ft into the MCDU, the MCDU F-PLNS A page will display it as FL 80, if “STD”is selected, and as 8 000 ft, if “QNH”(or “QFE”option) F-PLN A page is selected.

TARGET ALTITUDE ON PFD

Applicable to: ALL

The PFD target altitude may either be:

- The altitude selected on the FCU, or
- A flight management altitude constraint, if the climb mode or descent mode is engaged and the system predicts a level-off at a constraint that comes before reaching the FCU altitude.

The PFD target altitude depends on the barometer setting:

- If “STD”is selected, the target is a flight level
- If “QNH”or “QFE”is selected, the target is an altitude or height.

The aircraft will level off accordingly.

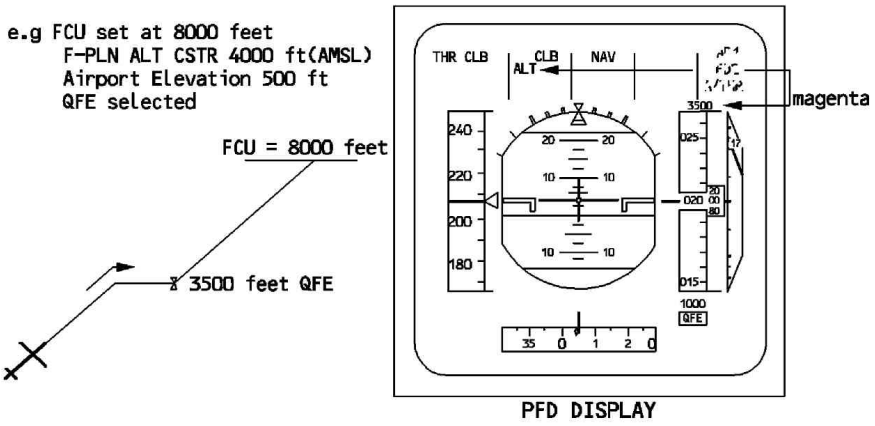
Note: - *If the pilot changes the barometer setting during ALT* or ALT CST*, the aircraft may overshoot the target altitude, because the current value has been changed. However, the ALT* and ALT CST* modes allow the aircraft to regain the FCU altitude. As a general rule, avoid changing the barometer setting when in ALT* or ALT CST**

- *In aircraft equipped to use field elevation pressure (QFE option), switching from STD to QFE (or vice versa) in ALT CST* green changes the target value and may revert the vertical mode into V/S mode.*

NOTE FOR AIRCRAFT WITH QFE (FIELD ELEVATION PRESSURE) PIN PROGRAM

If you select "QFE"on the EFIS control panel:

- The MCDU predictions follow the basic rules (altitudes are AMSL below the transition level, flight levels above it)
- The altitude constraints on the MCDU follow the basic rules
- The target altitude on the PFD is QFE related:
  - If the target altitude has been selected by the FCU, the aircraft will level off there.
  - If the target altitude is an altitude constraint, the PFD automatically shows that constraint as corrected by the airport elevation.



PFD DISPLAY

PROCEDURES

Applicable to: ALL

a. The altitude constraints in departure and arrival procedures should be defined in the navigation database or by the pilot on the MCDU:
   - in terms of altitude AMSL below the transition altitude
   - in terms of flight level above the transition altitude

   If a departure procedure defines an altitude constraint as an AMSL altitude above the transition altitude, you must convert it to STD, because the system and guidance will treat it as a flight level whenever you select the standard barometer setting.

b. In climb you should switch from QNH (or QFE) to STD on both EFIS control panels simultaneously when you reach the transition altitude.
   All MCDU altitude predictions and altitude constraints and all PFD altitude targets will be displayed as flight levels.

c. In descent, when ATC clears you to an altitude below the transition altitude, you can select QNH (or QFE) on both EFIS control panels simultaneously.
   All MCDU altitude predictions and contraints and PFD targets are now altitude AMSL.

CLEARING THE SCRATCHPAD OF DATA OR MESSAGES

Applicable to: ALL

Press the “CLR” key with a single brief touch to erase the last alphanumeric character inserted in the scratchpad.

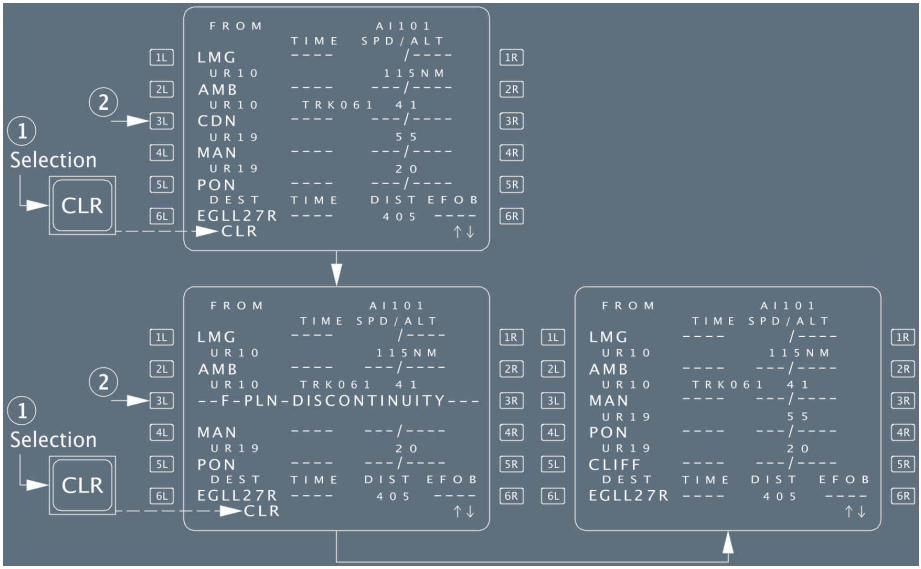
Press the key for more than three seconds to erase all the data inserted in the scratchpad. If the scratchpad is empty, it displays “CLR”.

CLEARING DATA FIELDS

Applicable to: ALL

Clear a data field by pressing the “CLR” key, the scratchpad displays CLR, then select the prompt for the field you want to clear (3L for example).

- You cannot clear all data fields:
  - If the field contains data that has a default value or a value computed by the FMGC, the data reverts to this value.
  - Any attempt to clear the defaulted value has no effect.
- Clearing a constraint on the F-PLN page deletes both the speed constraint and the altitude constraint associated with the waypoint
- If you clear a data field that is a waypoint in the flight plan (primary or secondary), you delete this waypoint from the flight plan and create a discontinuity. The discontinuity can also be cleared in a similar way.


FROM
AI101
TIME SPD/ALT
LMG ---- /----
UR10 115NM
AMB ---- ---/----
UR10 TRK061 41
CDN ---- ---/----
UR19 55
MAN ---- ---/----
UR19 20
PON ---- ---/----
DEST TIME DIST EFOB
EGLL27R ---- 405 ----
CLR
1L 2L 3L 4L 5L 6L
1R 2R 3R 4R 5R 6R
1 Selection
2
CLR
--F-PLN-DISCONTINUITY---
CLIFF ---- ---/----

GENERAL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The FMGS will assist the pilot if it becomes necessary to divert to an alternate airport.

GENERAL

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

Various features are provided to the crew in order to execute a diversion:

- The EQUITIME POINT
- The CLOSEST AIRPORTS pages
- The SECONDARY F-PLN
- The ENABLE ALTN function
- The NEW DEST revision

DIVERSION TO PREPLANNED ALTERNATE AIRPORT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This would probably occur at the end of the cruise phase, during descent or go-around. The pilot can use this method for diverting if the primary flight plan includes an alternate flight plan from destination to a suitable alternate airport.

When decided to divert to the alternate airport from a given waypoint, simply execute an “ENABLE ALTN” (enable alternate) revision:

SELECT “LAT REV” at a given waypoint
PRESS the “ENABLE ALTN” key
INSERT the temporary flight plan (TMPY F-PLN).
ADJUST the resulting active flight plan.

(Refer to DSC-22_20-30-10-10 Alternate Function)

DIVERSION TO ANY ADEQUATE AIRPORT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

May occur if any unexpected event requires a diversion.
In this case use either a secondary flight plan or a lateral revision for a new destination.

EN ROUTE DIVERSION WITH SEVERAL AIRPORTS AVAILABLE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

SELECT the CLOSEST AIRPORTS page.



SELECT the EFOB/WIND prompt.
INSERT the effective wind at selected airport.
CHECK the predictions and CHOOSE the adequate diversion airport.
PREPARE the diversion flight plan on the SEC F-PLN.

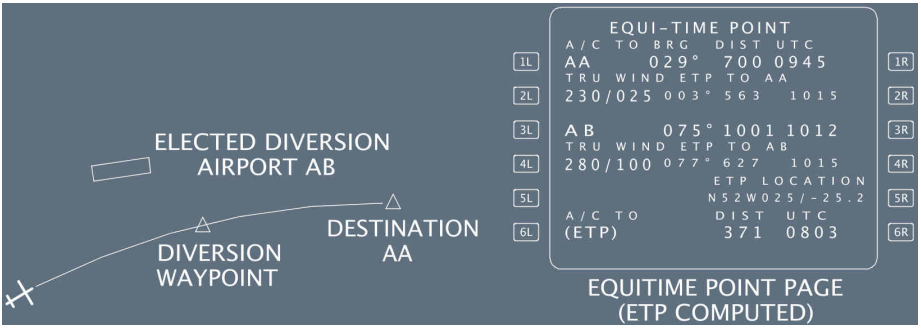
Note: Fuel/time predictions on the CLOSEST AIRPORTS page assume managed speed profile.

EN ROUTE DIVERSION OVER OCEANIC OR DESERTIC AREA

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The diversion airports are usually determined before departure or using the CLOSEST AIRPORTS data.

SELECT the EQUI-TIME POINT page.



ENTER the airport idents in 1L and 3L fields.
ENTER the associated winds in 2L and 4L fields.
CHECK the ETP position and time.
ENTER a predicted time at ETP as time marker.
PREPARE a diversion flight plan on the secondary flight plan.

DIVERSION PREPARATION ON THE SECONDARY FLIGHT PLAN

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The following procedure shall be applied for all diversion cases, once the diversion airport has been selected, as well as the "most probable diversion point of the F-PLN":

PRESS the SEC F-PLN key
PRESS the COPY ACTIVE prompt
SELECT a lateral revision at diversion waypoint
ENTER the ident of the diversion airport in the NEW DEST field.

Then finalize the flight plan between the diversion point and the diversion airport. When the diversion airport is no longer applicable or ETP is sequenced, repeat the same procedure for the next diversion airport.

MISCELLANEOUS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

In some cases, the diversion airport may be simply chosen using the airports displayed on ND when AIRPORT is selected on the EIS control panel.

During oceanic or desertic area flights, the flight crew may use the PROG page, as follows:

ENTER the ident of the diversion airport in the 4R field of MCDU 1

ENTER the next diversion airport in the 4R field of MCDU 2

Then, the FMS continuously calculated the BRG/DIST to the selected diversion airports.

UPDATE the PROG pages when sequencing the ETP.

EXECUTION OF THE DIVERSION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

When the crew decides to divert:

PRESS the SEC F-PLN key.
SELECT the ACTIVATE SEC prompt.
SELECT DIR TO required point.



DIVERSION TO THE ALTERNATE AIRPORT

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The primary F-PLN includes an alternate flight plan from destination to the preferred alternate airport. All fuel prediction and management (EXTRA fuel) take the alternate flight plan into consideration. If the crew decides to divert at the end of the cruise, or beyond the last ETP, or in the descent or go-around phases, this will most probably be to the alternate airport.

When the crew decides to divert:

SELECT a lateral revision at suitable waypoint
SELECT ENABLE ALTN prompt
CHECK the temporary flight plan and INSERT
SELECT DIR TO required waypoint

Note: - *In most cases, the LAT REV shall be selected at the TO WPT. This will facilitate the subsequent selection of the DIR TO waypoint.*
- *The ALTN flight plan shall be finalized, whenever the landing runway is known by the crew (before approach briefing).*
In most cases, this will ensure that the most probable flight plan is displayed on the MCDU once ENABLE ALTN is selected.

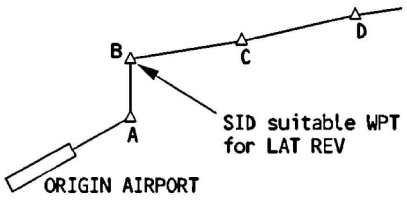
USING THE SECONDARY FLIGHT PLAN FUNCTION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

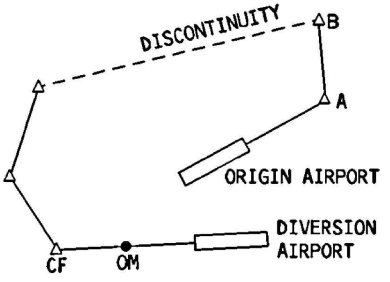
Use the SEC F-PLN function if a secondary flight plan for diversion has been prepared:

WHILE THE AIRCRAFT IS ON THE GROUND,

you have prepared the lateral path you would expect to use in case of an early in flight turn back (major failure after takeoff or during initial climbout), or the lateral path you would expect to use to land at a nearby diversion airport (weather at origin airport requires a takeoff alternate).



INITIAL F-PLN

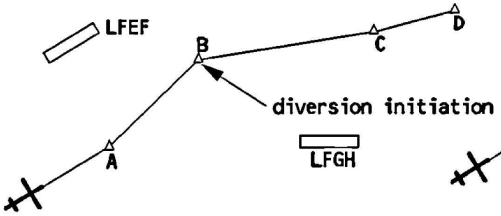


SEC F-PLN for in flight turn back

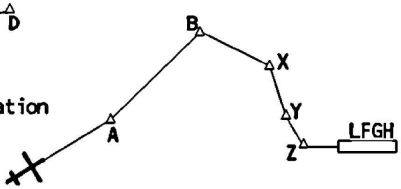
SELECT the “SEC F-PLN” key on the MCDU.
DEPRESS the “COPY ACTIVE” key.
SELECT “LAT REV” at a waypoint with a suitable SID.
ENTER the ident of the diversion airport as the new destination.
ENTER the expected approach and route.
DEPRESS the PERF prompt on SEC INDEX page.
SELECT the PERF APP page of the secondary F-PLN.
ENTER the QNH and wind.
SELECT the landing configuration.

ONCE THE AIRCRAFT IS IN THE CRUISE PHASE,

consider the adequate diversion airports as the aircraft proceeds along the route of the active flight plan: use the "EFIS AIRPORT" feature of the navigation display for this.
Enter a diversion airfield as the destination for the secondary flight plan and adjust the routing (changing it as necessary as cruise phase progresses).



chosen diversion airport



SEC F-PLN for diversion to LFGH

SELECT the "SEC F-PLN" function key on MCDU.
PRESS the "COPY ACTIVE" key.
SELECT "AIRPORT" on the EFIS control panel.

Choose an adequate diversion airport and diversion initial waypoint.

SELECT "LAT REV" at the chosen waypoint.
ENTER the new destination.
MODIFY/COMPLETE the lateral flight plan.

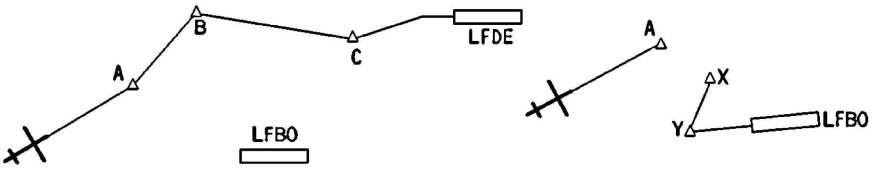
For both of these cases, initiate the diversion as follows:

SELECT the "SEC F-PLN" key on MCDU.
DEPRESS the "ACTIVE SEC" key.
USE the DIR TO function to go to the waypoint of the new active flight plan.

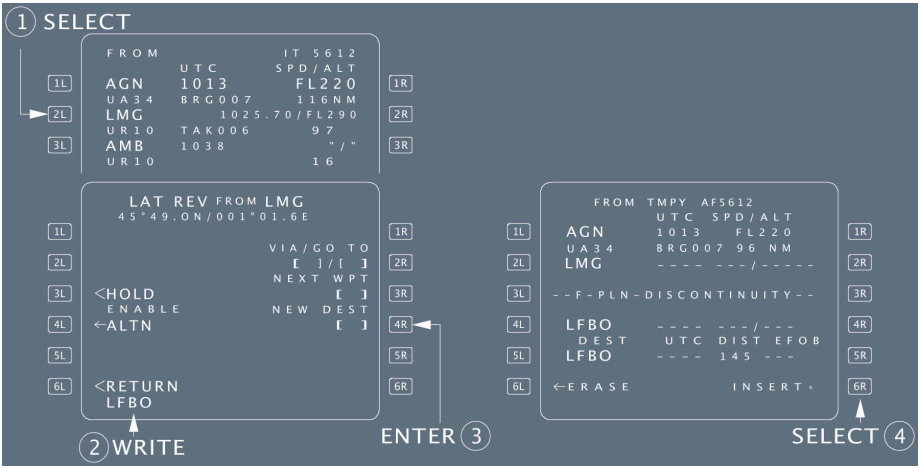
USING NEW DESTINATION FUNCTION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

If the pilot has not prepared a diversion in the secondary flight plan, the "NEW DEST" function allows to make the required change on the active flight plan.
Because the crew will probably have to initiate the diversion quickly, the revision waypoint will probably be the "TO" waypoint.
You will have to adjust the resulting active flight plan in order to have proper routing to the destination and have the applicable performance data entered.



SELECT “LAT REV” at the “TO” waypoint.
ENTER the ident for the new destination.
INSERT the temporary flight plan.
COMPLETE the lateral flight plan to the diversion
ENTER performance data as applicable.
When you initiate the diversion, use “DIR TO” the appropriate waypoint.



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GENERAL

Applicable to: ALL

When the FMGS detects an engine-out condition, the following occurs:

FLIGHT MANAGEMENT PART

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

- CLIMB mode, if active, reverts to OPEN CLIMB mode
- The managed target speeds is immediately set to a value that depends upon the flight phase
- All preselected speeds entered in the MCDU are deleted
- Step climb (or step descent), if entered, is deleted
- Predictions are lost (except in descent and approach phases). When they are lost, the prediction field shows dashes
- Predictions on the secondary flight plan are lost, if it is a copy of the active flight plan
- The PROG page shows the engine-out maximum recommended (EO MAX REC) altitude
- The system automatically calls up the current performance page, which has the EO CLR (engine-out clear) prompt displayed in the 1R field (except during takeoff, before the diversion point is reached).
  If the crew presses the EO CLR, the 2 engine predictions and performance will be restored. Reverting back to one engine-out performance is not possible, unless the system detects a new EO condition. Therefore, the pilot should not press the EO CLR key, if an actual engine-out is detected
- It is not permitted to use the autopilot to perform non precision approaches in engine-out in the following modes: FINAL APP, NAV V/S, NAV/FPA. Only FD use is authorized.

FLIGHT MANAGEMENT PART

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTG, B-HTH, B-HTI

- The managed target speeds is immediately set to a value that depends upon the flight phase
- All preselected speeds entered in the MCDU are deleted
- Step climb (or step descent), if entered, is deleted
- The time constraint is deleted
- The PROG page shows the engine-out maximum recommended (EO MAX REC) altitude

- The system automatically calls up the current performance page, which has the EO CLR (engine-out clear) prompt displayed in the 1R field (except during takeoff, before the diversion point is reached).
  If the crew presses the EO CLR, the 2 engine predictions and performance will be restored. Reverting back to one engine-out performance is not possible, unless the system detects a new EO condition. Therefore, the pilot should not press the EO CLR key, if an actual engine-out is detected
- It is not permitted to use the autopilot to perform non precision approaches in engine-out in the following modes: FINAL APP, NAV V/S, NAV/FPA. Only FD use is authorized.

FLIGHT MANAGEMENT PART

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

- The managed target speeds is immediately set to a value that depends upon the flight phase
- All preselected speeds entered in the MCDU are deleted
- Step climb (or step descent), if entered, is deleted
- The time constraint is deleted
- The PROG page shows the engine-out maximum recommended (EO MAX REC) altitude
- The system automatically calls up the current performance page, which has the EO CLR (engine-out clear) prompt displayed in the 1R field (except during takeoff, before the diversion point is reached).
  If the crew presses the EO CLR, the 2 engine predictions and performance will be restored. Reverting back to one engine-out performance is not possible, unless the system detects a new EO condition. Therefore, the pilot should not press the EO CLR key, if an actual engine-out is detected

FLIGHT GUIDANCE PART

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

- All selected modes remain available (the “HDG/TRK”, “V/S”, and “OPEN” modes, for example)
- In the speed reference system (SRS) mode, the takeoff speed target is V2, or the current speed if it is higher. The magenta triangle indicates V2 in all cases
- The system limits autopilot (AP) and flight director (FD) bank angles during takeoff and approach phases as follows:
  - 15 ° when the aircraft speed is below the maneuvering speeds (F, S, or Green Dot speed) -10 kt
  - Then linear increase to 25 ° up to maneuvering speeds (F, S, or Green Dot speed) -3 kt
  - 25 ° above maneuvering speeds (F, S, or Green Dot speed) -3 kt.

Note: The engine-out bank angle limits apply, when the FG part of the FMGS has detected an engine-out. It cannot be cleared by the crew through the MCDU EO CLEAR prompt.

FLIGHT GUIDANCE PART

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

- All selected modes remain available (the “HDG/TRK”, “V/S”, and “OPEN” modes, for example)
- In the speed reference system (SRS) mode, the takeoff speed target is V2, or the current speed if it is higher but no more than V2 +15. The magenta triangle indicates V2 in all cases. The GO Around speed target is VAPP, or the current speed if higher, limited to VLS +15 kt
- The system limits autopilot (AP) and flight director (FD) bank angles during takeoff and approach phases as follows:
  - 15 ° when the aircraft speed is below the maneuvering speeds (F, S, or Green Dot speed) -10 kt
  - Then linear increase to 25 ° up to maneuvering speeds (F, S, or Green Dot speed) -3 kt
  - 25 ° above maneuvering speeds (F, S, or Green Dot speed) -3 kt.

Note: The engine-out bank angle limits apply, when the FG part of the FMGS has detected an engine-out. It cannot be cleared by the crew through the MCDU EO CLEAR prompt.

AUTOTHRUST

Applicable to: ALL

The system extends the active range of the active engine from idle to maximum continuous thrust (MCT instead of CL thrust).
The Flight Mode Annunciator requests maximum continuous thrust on the live engine at a time that depends on when the engine-out occurs.

ENGINE-OUT CONDITIONS

Applicable to: ALL

The FMGS considers the aircraft to be in an engine-out condition, when one of the following conditions is present and the aircraft has commenced takeoff or is in flight:

- One engine master switch off, or
- N2 below idle, or
- One thrust lever angle is below 5 ° with the other above 22 °, or
- The FADEC shows an engine fault.

ENGINE-OUT SID

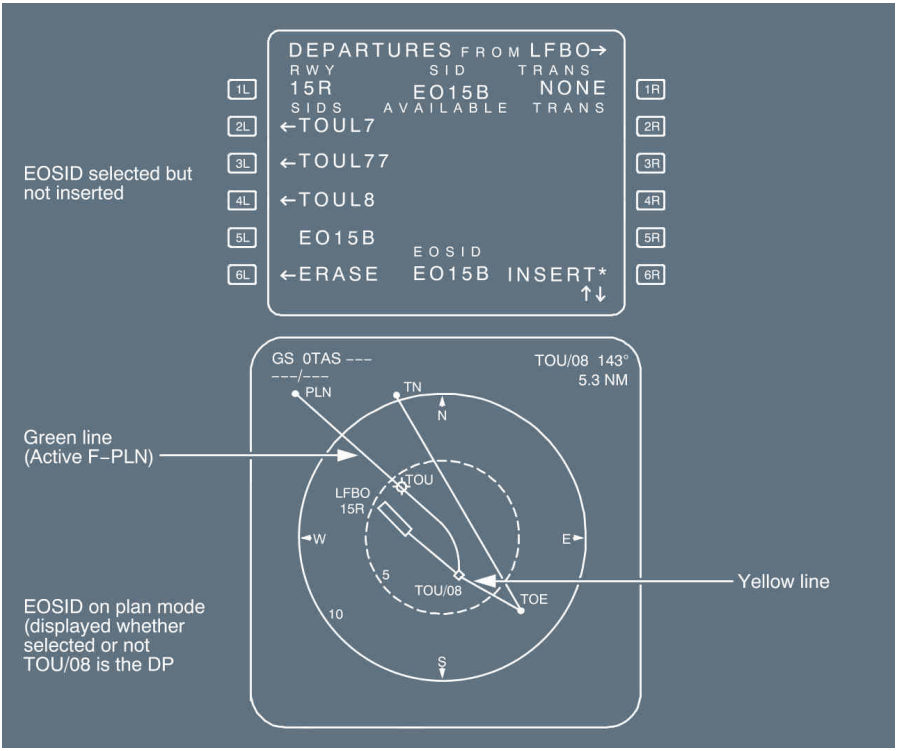
Applicable to: ALL

1 GENERAL

An engine-out standard instrument departure (EOSID), when defined in the database, is always for a specific runway. It is indicated on the bottom line of the SID page for that runway, and you can select it manually.

The pilot can review the SID either by selecting the PLAN mode on the navigation display (solid yellow line), or by selecting it on the SID page. In the latter case, the navigation display shows the SID as a temporary flight plan.

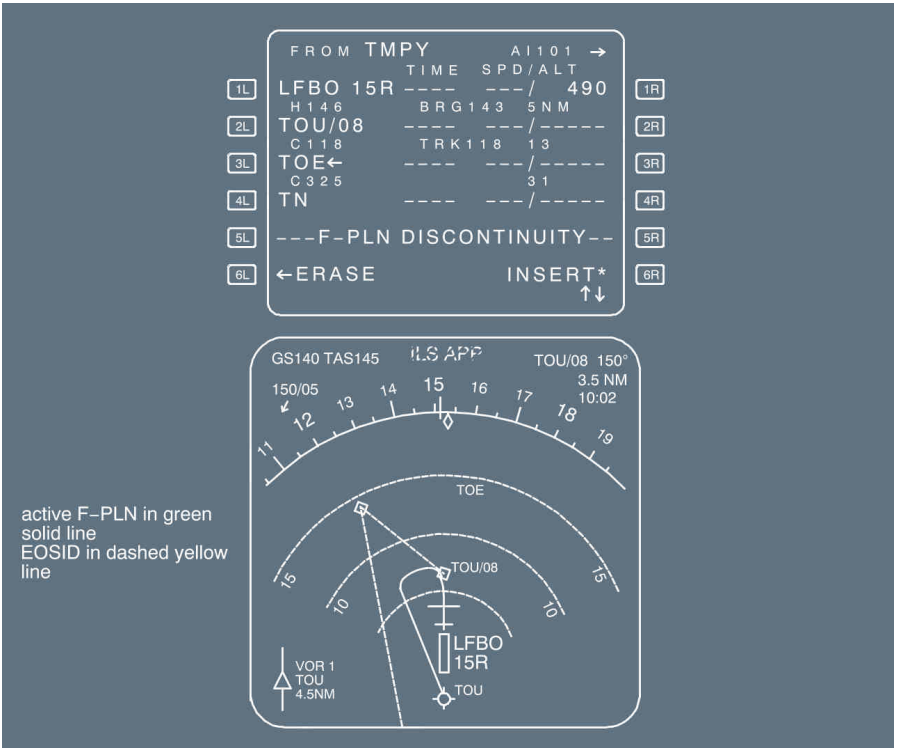
The last point, if any, that is common to both the SID and engine-out SID is called the diversion point (DP).



2 **WHEN AN ENGINE-OUT CONDITION OCCURS BEFORE THE DIVERSION POINT**

The MCDU automatically shows the engine-out SID as a temporary flight plan on the F-PLN page and on the ND. The EOSID can be inserted or erased.

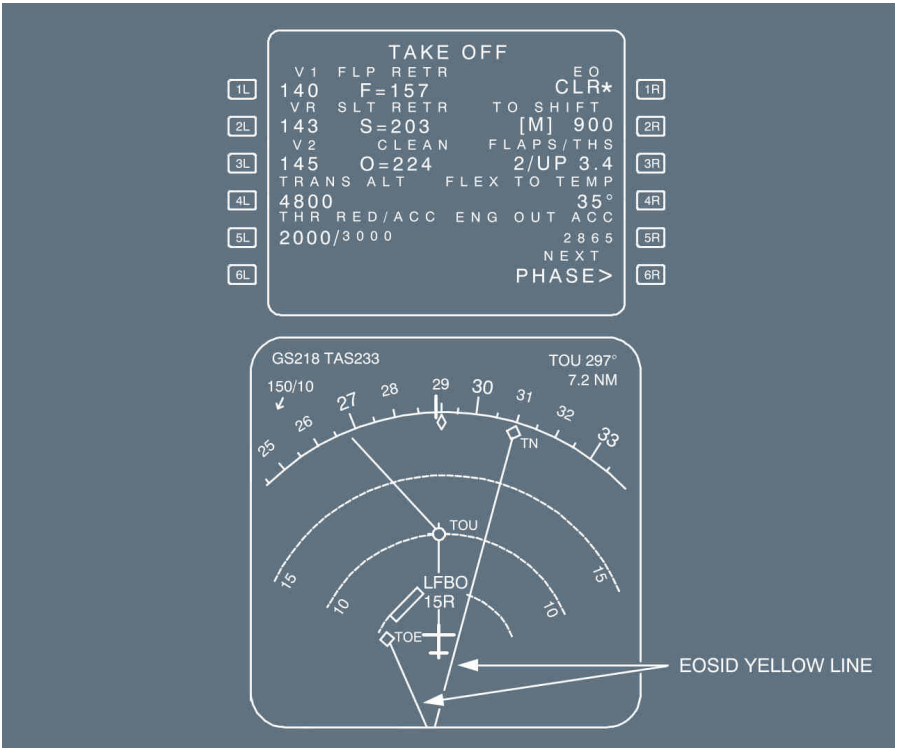
Note: *The EOSID Diversion Point is the waypoint at which the EOSID diverges from the active SID.*
If there is no common leg between the SID and the EOSID in the navigation database, the diversion point is by default the runway threshold. Therefore the SID and EOSID common leg(s) before the flight paths separation must be the same type and nature.



WHEN AN ENGINE-OUT CONDITION OCCURS AFTER THE DIVERSION POINT

REMAIN on the SID path

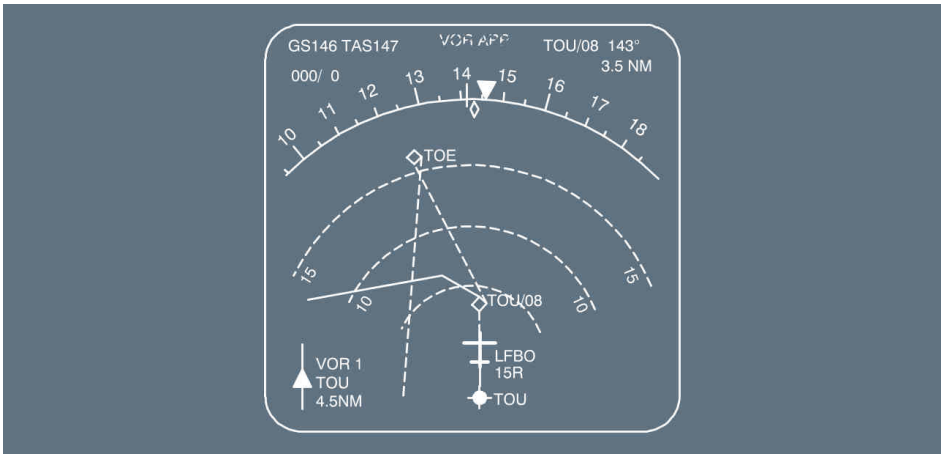
Note: *The navigation display shows the engine-out SID as a yellow line for your information. Directing the aircraft to the EOSID should not be performed unless it allows obstacle clearance and the flight crew considers it is the best strategy for a particular case.*



3 **BELOW THRUST-REDUCTION (THR RED) ALTITUDE**

- The managed target speed changes to V2
- The PROG page displays the engine-out maximum recommended altitude

- The PERF TO page comes up on the display automatically with the “EO CLR” prompt in the 1R field
- The MCDU and the navigation display show the engine-out SID as a temporary flight plan, or the navigation display shows it for information only, depending upon the diversion point location.



PROCEDURE

- **When the aircraft reaches the engine-out acceleration altitude**

  PUSH in the V/S knob to level off.

  CLEAN up your configuration as the speed increases toward target speed.

  When the aircraft is clean and has reached Green Dot speed, “LVR MCT” flashes on the FMA,

  PULL out the altitude selector knob to resume the climb.

  The OP CLB. mode engages.

  MOVE the thrust lever for the live engine to “MCT” detent.

ABOVE THRUST REDUCTION (THR RED) ALTITUDE

- The managed target speed changes to V2
- “LVR MCT” flashes amber on the flight mode annunciator
- The PROG page displays the engine-out maximum recommended altitude
- The PERF TO page displays the “EO CLR*” prompt in the 1R field
- The navigation display shows the EO SID.

PROCEDURE

MOVE the thrust lever of the active engine to the MCT detent.

- **When the aircraft reaches the engine-out acceleration altitude:**
  PUSH the V/S knob, in order to level off.
  CLEAN UP configuration as the speed increases.
- **When the aircraft reaches Green Dot speed:**
  PULL the ALT knob to resume the climb.

  Note: *If necessary, move the thrust lever of the active engine to the TOGA detent. The Flight Mode Annunciator will display "LVR MCT", flashing in white, when the aircraft reaches Green Dot speed.*

ENGINE-OUT IN CLB PHASE (ABOVE ACCELERATION ALTITUDE)

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

ENGINE OUT OCCURS WHILE AIRCRAFT IS ACTUALLY CLIMBING

- The managed target speed changes to Green Dot speed
- "LVR MCT" flashes white on the Flight Mode Annunciator
- The climb mode reverts to open climb (OP CLB) and the aircraft slowly decelerates down to Green Dot speed
- The MCDU shows the PERF CLB page with an "EO CLR*" (clear engine-out) prompt
- The PROG page shows the engine-out maximum recommended altitude (EO MAX REC ALT).

PROCEDURE

MOVE the thrust lever of the active engine to the MCT detent.
SET the altitude on the Flight Control Unit to an altitude below the engine-out maximum recovery altitude, as cleared by ATC.
INITIATE a diversion, when cleared to do so.

Note: *If ALT* engages as the aircraft is emerging from SRS mode and an engine-out occurs more or less simultaneously, the aircraft may lose airspeed as it tries to capture altitude.*
There is no mode reversion when ALT is engaged.*
Low-speed protection remains available as a function of the alpha floor.

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

ENGINE-OUT OCCURS WHILE AIRCRAFT IS ACTUALLY CLIMBING

- The managed target speed changes to Green Dot speed
- "LVR MCT" flashes white on the Flight Mode Annunciator
- The climb mode reverts to open climb (OP CLB) and the aircraft slowly decelerates down to Green Dot speed
- The MCDU shows the PERF CLB page with an "EO CLR*" (clear engine-out) prompt
- The PROG page shows the engine-out maximum recommended altitude (EO MAX REC ALT).

PROCEDURE

MOVE the thrust lever of the active engine to the MCT detent.
SET the altitude on the Flight Control Unit to an altitude below the engine-out maximum recovery altitude, as cleared by ATC.
INITIATE a diversion, when cleared to do so.

Applicable to: ALL

ENGINE-OUT OCCURS WHILE THE AIRCRAFT IS FLYING IN ALT MODE AT AN ALTITUDE SET ON THE FLIGHT CONTROL UNIT

- The target speed is set to engine-out cruise speed (EO CRZ SPD), computed at the altitude set on the Flight Control Unit, but limited by the limit speed (SPD LIM), if there is one.

Other consequences and procedures are similar to previous engine out climb.

ENGINE-OUT IN CRUISE PHASE

Applicable to: ALL

- The system sets the managed target speed to the higher of engine-out cruise Mach number or speed, or current speed.
- "LVR MCT" (or MCT) flashes on the Flight Mode Annunciator.
- The PERF CRZ page appears with the "EO CLR*" (clear engine-out) prompt.
- The PROG page displays the engine-out maximum recommended altitude (EO MAX REC ALT).

PROCEDURE

Perform engine out abnormal procedure.
Refer to PER-OEI-GEN-05 INTRODUCTION "SINGLE ENGINE OPERATIONS"

- *For standard strategy,Refer to PER-OEI-GEN-10 PROCEDURE*
- *For obstacle strategy,Refer to PER-OEI-GEN-15 PROCEDURE*
- *For fixed strategy, Refer to PER-OEI-GEN-20 PROCEDURE*

Initiate a diversion if necessary.

Note: *The engine-out descent strategy requires disconnection of the autothrust, and descent in OPEN DES mode.*
Disconnecting the autothrust prevents an automatic setting of THR IDLE; therefore, the autopilot will fly the target speed in OP DES mode, with a thrust manually selected by the crew.
When reaching the FCU-selected altitude, or whenever normal descent is resumed to a lower altitude, reengage the autothrust.

ENGINE-OUT IN DESCENT PHASE

Applicable to: ALL

- The managed target speed remains unchanged (ECON DES Mach number or speed, with any speed limitations).
- "LVR MCT" (or MCT) flashes on the Flight Mode Annunciator.
- The PERF DES page appears, showing the "EO CLR*" prompt.
- The PROG page displays the engine-out maximum recommended altitude (EO MAX REC ALT).
- The descent mode (if engaged) reverts to V/S, if the aircraft is above the EO REC MAX. If not, the descent mode is maintained.

PROCEDURE

MOVE the thrust lever for the live engine to the MCT detent.
If necessary, SELECT a suitable flight mode for descent.
DISCONNECT the autothrust and ADJUST thrust if necessary.

ENGINE-OUT IN APPROACH PHASE

Applicable to: ALL

- The aircraft maintains approach speed (VAPP).
- "LVR MCT"(or MCT) flashes on the Flight Mode Annunciator.
- The PERF APPR page appears, showing the "EO CLR*" prompt.
- The progress page displays the engine-out maximum recommended altitude (EO MAX REC ALT).

PROCEDURE

MOVE the thrust lever for the live engine to the MCT detent.

CAUTION	Below maneuvering speed (F, S, Green Dot) – 10 kt, the autopilot or flight director (AP/FD) cannot order a bank angle greater than 15 °. Above maneuvering speed – 10 kt, this limit linerarly increases until it reaches 25 ° at maneuvering speed – 3 kt. The limit is then 25 ° for all speeds above maneuvering speed – 3 kt.

ENGINE-OUT IN GO-AROUND PHASE

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

The results and procedures for takeoff phase apply, however, the displays do not show the engine-out SID.

Note: *If ALT* engages out of SRS mode and an engine out occurs simultaneously, an airspeed loss may be encountered during the altitude capture.*

ENGINE-OUT IN GO-AROUND PHASE

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

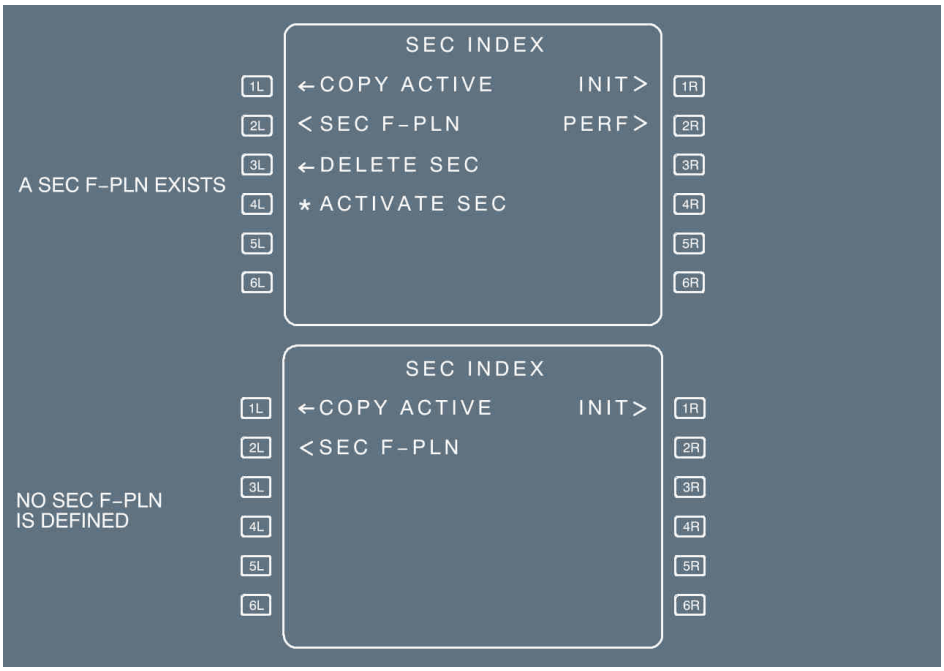
The results and procedures for takeoff phase apply, except that the displays do not show the engine-out SID.

SECONDARY FLIGHT PLAN

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

1 The secondary flight plan (SEC F-PLN) is an alternative flight plan which can be activated when required.
It may include all the vertical elements except history wind data.

The flight crew can:
- Create a secondary flight plan independently from the active flight plan (a secondary flight plan can be created while a temporary flight plan exists)
- Copy it from the active flight plan
- Delete it completely
- Activate it, when the “ACTIVATE SEC”prompt is displayed: The secondary flight plan becomes the active flight plan.



- The screen displays the “ACTIVATE SEC”prompt in flight if:
  - HDG (or TRK) mode is engaged, or
  - NAV mode is engaged, and the active leg of the primary and secondary flight plans is the same.
- The screen displays the "INIT”prompt if the secondary flight plan is not a copy of the active flight plan.

The FMS sequences the secondary flight plan the same way as the active flight plan, when it is a copy of the active flight plan.
The navigation display shows the secondary flight plan in white. In PLAN mode, the flight crew can use the slew keys to review the secondary flight plan (as for the primary flight plan).

PREDICTIONS

The FMGS computes predictions using the same performance methods and performance factor as for the active flight plan. However, it predicts pseudo waypoints only for the MCDU, not for the Navigation Display (ND).

- **When the flight crew initializes the secondary flight plan with the SEC INIT function:**
  The FMGS computes the secondary flight plan predictions as if the aircraft were on ground before engine start. The FMGS computes these predictions one time and does not update them to indicate the progress of the flight (aircraft position, fuel consumption, etc.).
- **When the flight crew initializes the secondary flight plan with the COPY ACTIVE function:**
  - The FMGS computes the secondary flight plan predictions as for the active flight plan. However:
    - The FMGS stops the update and the display of the predictions if the first leg of the active flight plan is no longer the same as the active leg (i.e. if both flight plans diverge).

      Note: *This does not apply to the preflight phase, when the FMGS computes the predictions if the departure airports are the same, even if the takeoff runways are different.*

  - In the SEC F-PLN, the computed distance between the "TO" waypoint, and the following waypoints may be erroneous when:
    - The SEC F-PLN is created using the COPY ACTIVE function
    - Lateral modifications are performed in either the active, or the SEC F-PLN
    - The "TO" waypoint and/or the following waypoints differ between the ACTIVE, and the SEC F-PLN.

    Note: *1. As a result, in the SEC F-PLN, fuel and time predictions are also erroneous because they are computed using the erroneous distance.*
    2. If the SEC F-PLN is activated, the resulting ACTIVE F-PLN is not affected: distances and fuel/time computations in the active F-PLN are correct.

- **The flight crew may use the secondary flight plan in the following cases:**
  - At takeoff when an alternate takeoff runway is probable
  - On ground to initialize the FMGS again if the flight that the flight crew initially prepared is replaced by another flight (*Refer to PRO-NOR-SRP-01-05 INTRODUCTION*)
  - In flight to prepare a diversion
  - In flight when an alternate landing runway is probable
  - To prepare the next flight.

SECONDARY FLIGHT PLAN

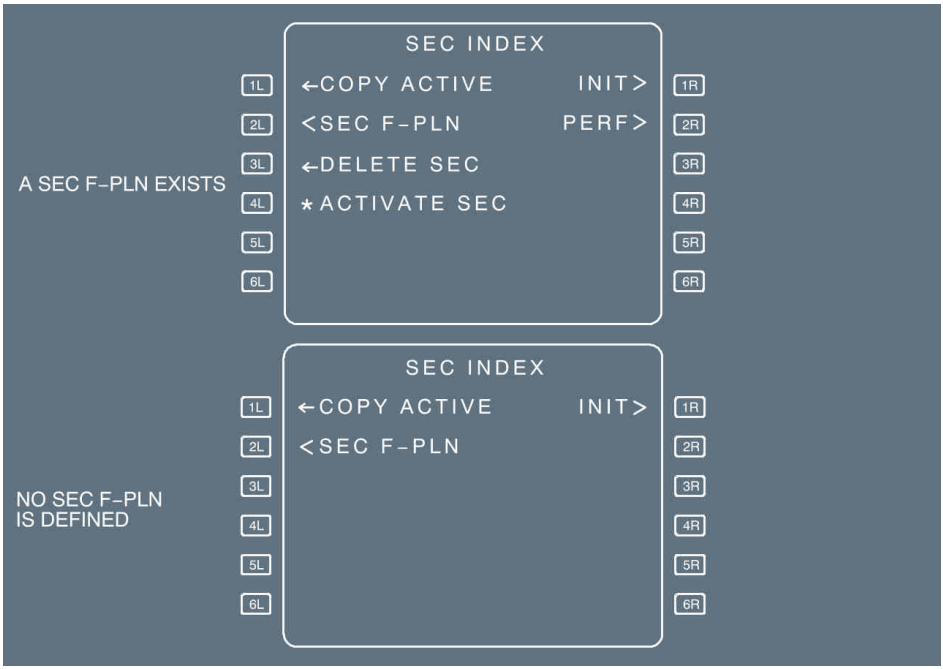
Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

2

The secondary flight plan (SEC F-PLN) is an alternative flight plan which can be activated when required.

It may include all the vertical elements except history wind data.

The flight crew can:
- Create a secondary flight independently from the active flight plan (a secondary flight plan can be created while a temporary flight plan exists).
- Copy it from the active flight plan.
- Delete it completely.
- Activate it, when the “ACTIVATE SEC” prompt is displayed: The secondary flight plan becomes the active flight plan.



- The screen displays the “ACTIVATE SEC”prompt in flight if:
  - HDG (or TRK) mode is engaged, or
  - NAV mode is engaged, and the active leg of the primary and secondary flight plans is the same.

  The FMS sequences the secondary flight plan the same way as the active flight plan, when it is a copy of the active flight plan.

The navigation display shows the secondary flight plan in white. In PLAN mode, the crew can use the slew keys to review the secondary flight plan (as for the primary flight plan).

PREDICTIONS

The FMGS computes predictions using the same performance methods and performance factor it uses for the active flight plan. However, it predicts pseudo waypoints only for the MCDU not for the Navigation Display (ND).

- **When the flight crew initializes the secondary flight plan with the SEC INIT function:**
  The FMGS computes the secondary flight plan predictions as if the aircraft were on ground before engine start. The FMGS computes these predictions one time and does not update them to indicate the progress of the flight (aircraft position, fuel consumption, etc.).
- **When the flight crew initializes the secondary flight plan with the COPY ACTIVE function:**

  The FMGS computes the secondary flight plan predictions as for the active flight plan. However:
  - The FMGS stops the update of the predictions if the first leg of the active flight plan is no longer the same as the active leg (i.e. if both flight plans diverge). The flight phase is the same as the flight phase at the time of the divergence.

    Note: *This does not apply to the preflight phase, when the FMGS computes the predictions if the departure airports are the same, even if the takeoff runways are different.*

- **The flight crew may use the secondary flight plan in the following cases:**
  - At takeoff when an alternate takeoff runway is probable
  - On ground to initialize the FMGS again if the flight that the flight crew initially prepared is replaced by another flight (*Refer to PRO-NOR-SRP-01-05 INTRODUCTION*)
  - In flight to prepare a diversion
  - In flight when an alternate landing runway is probable
  - To prepare the next flight.

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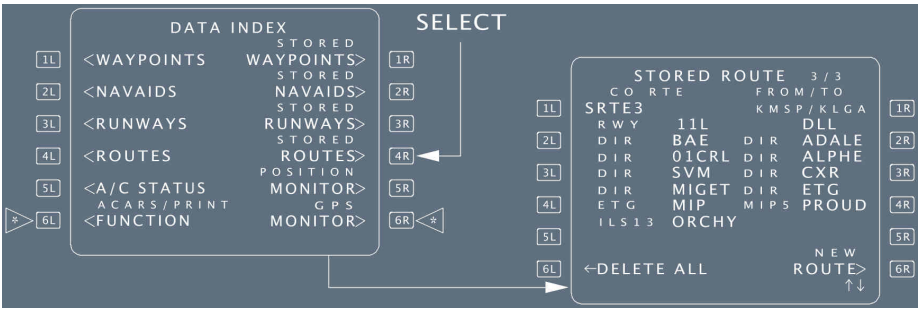
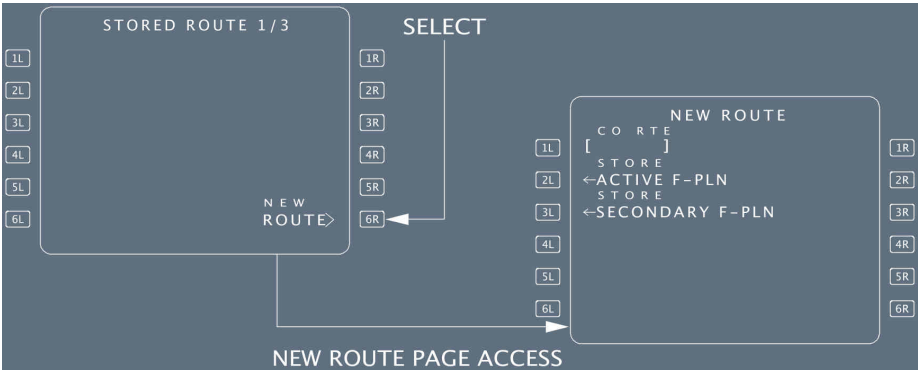
STORED ROUTE FUNCTION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The stored route function allows the pilot to store or review as many as three different routes defined in an active or secondary flight plan.
This also allows you to store a company route that is not yet in the database but is expected to be flown several times (a charter route, for example).
Access the STORED ROUTES page from the DATA INDEX page.

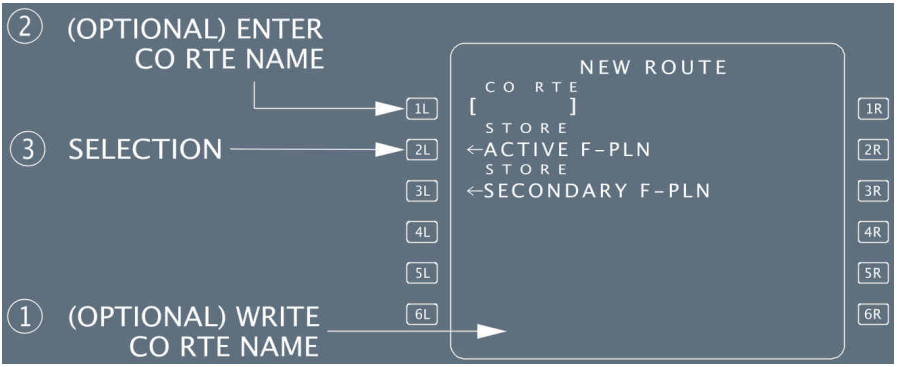


A stored route can be reviewed by using the slew key.
In order to store a new route, first define the route through the active flight plan (on the ground only) or the secondary flight plan (on the ground or in flight) then proceed as described below.



HOW TO STORE THE ACTIVE FLIGHT PLAN (DURING PREFLIGHT ONLY)

SELECT the DATA key on MCDU
PRESS the “STORED ROUTES” key
PRESS the “NEW ROUTE” key
ENTER the name of the company route (optional).
PRESS the “STORE ACTIVE F-PLN” key



HOW TO STORE THE SECONDARY FLIGHT PLAN

SELECT the DATA key on MCDU
PRESS the “STORED ROUTES” key
PRESS the “NEW ROUTE” key
ENTER the company route name (optional)
PRESS the “STORE SECONDARY F-PLN” key

Note: *1. In either case, you may only store a company route if the active or secondary flight plan is complete from origin to destination.*

2. If you do not enter a name, the FMGS automatically names the stored route as "SRTE 1 (or 2 ...)" when it is stored.

3. The system does not retain several elements of the flight plans, when they are stored:

- *Pilot-entered holds*
- *Offsets*
- *Pilot-entered constraints*
- *Modifications to a terminal procedure*
- *Pseudo waypoints*

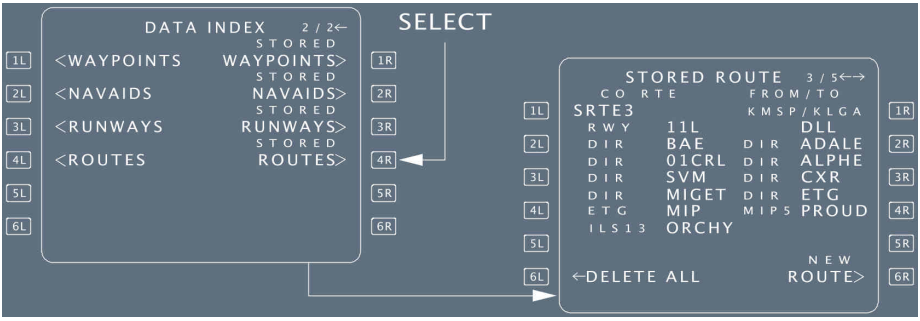
When this happens, it displays "REVISIONS NOT STORED".

4. If five routes are already stored the system will reject a new entry and display "STORED ROUTES FULL" on the MCDU. Delete one stored route by clearing the CO RTE name before inserting a new one.

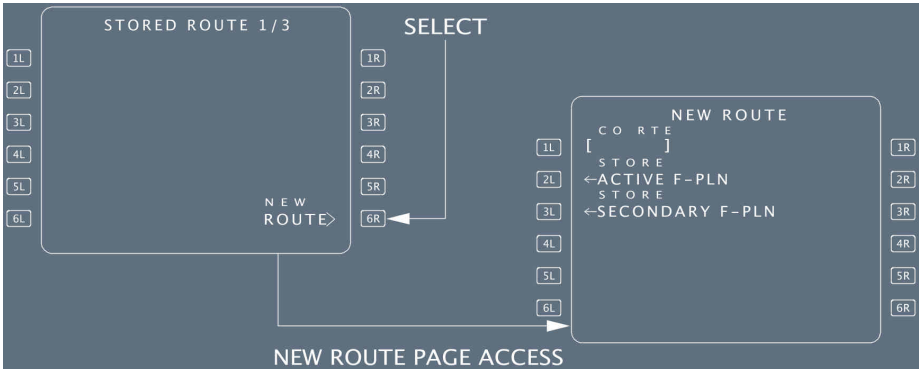
STORED ROUTE FUNCTION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The stored route function allows the pilot to store or review as many as five different routes defined in an active or secondary flight plan.
This also allows the pilot to store a company route that is not yet in the database, but is expected to be flown several times (a charter route, for example).
Access the STORED ROUTES page from the DATA INDEX page.

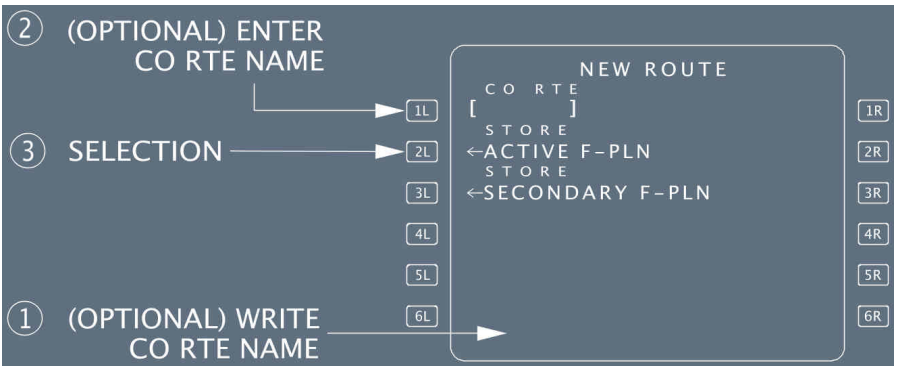


A stored route can be reviewed by using the slew key.
In order to store a new route, first define the route through the active flight plan (on the ground only) or the secondary flight plan (on the ground or in flight) then proceed as described below.



HOW TO STORE THE ACTIVE FLIGHT PLAN (DURING PREFLIGHT ONLY)

SELECT the DATA key on MCDU
PRESS the "STORED ROUTES" key
PRESS the "NEW ROUTE" key
ENTER the name of the company route (optional).
PRESS the "STORE ACTIVE F-PLN" key



HOW TO STORE THE SECONDARY FLIGHT PLAN

SELECT the DATA key on MCDU
PRESS the "STORED ROUTES" key
PRESS the "NEW ROUTE" key
ENTER the company route name (optional)
PRESS the "STORE SECONDARY F-PLN" key

Note:

1. *In either case, you may only store a company route if the active or secondary flight plan is complete from origin to destination.*
2. *If you do not enter a name, the FMGS automatically names the stored route as "SRTE 1 (or 2 ...)" when it is stored.*
3. *The system does not retain several elements of the flight plans, when they are stored:*
   - *Pilot-entered holds*
   - *Offsets*
   - *Pilot-entered constraints*
   - *Modifications to a terminal procedure*
   - *Pseudo waypoints*

   When this happens, it displays "REVISIONS NOT STORED".
4. *If five routes are already stored the system will reject a new entry and display "STORED ROUTES FULL" on the MCDU. Delete one stored route by clearing the CO RTE name before inserting a new one.*

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GENERAL

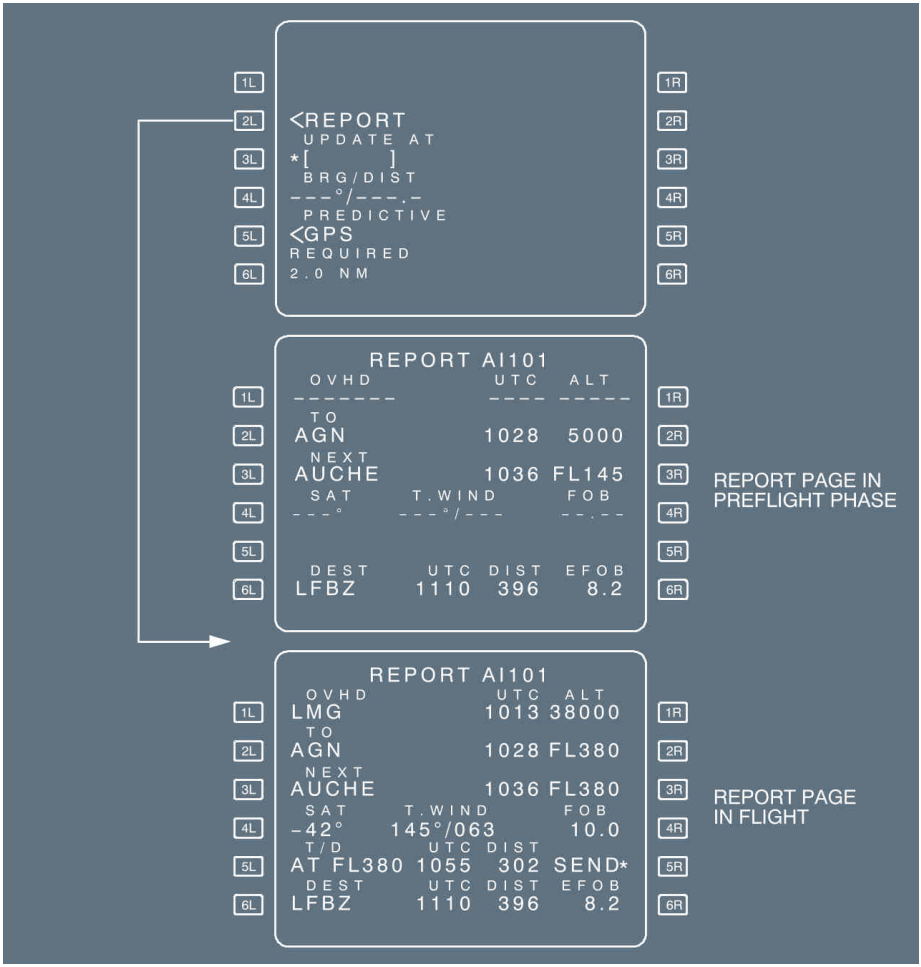
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The REPORT page allows the crew to achieve the position reporting.

REPORT PAGE ACCESS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

1 The report page is accessed from the PROG PAGE.



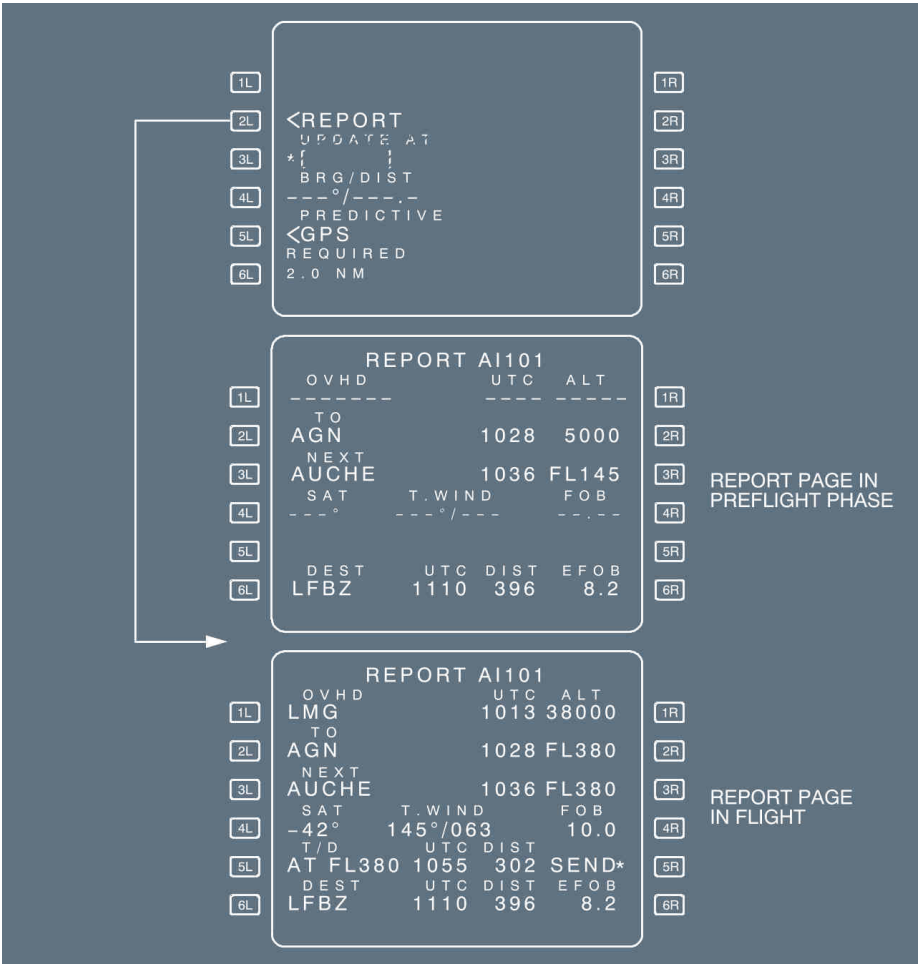
Note: *In case a DIR TO with ABEAM WPTs is achieved, or in case a FIX INFO with ABEAM or RADIAL intersection is inserted in the F-PLN, the TO WPT (provided on the REPORT page) will be the ABEAM WPT or the RADIAL intersect waypoint, if any, as on the F-PLN page.*

REPORT PAGE ACCES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

2

The report page is accessed from the PROG PAGE.



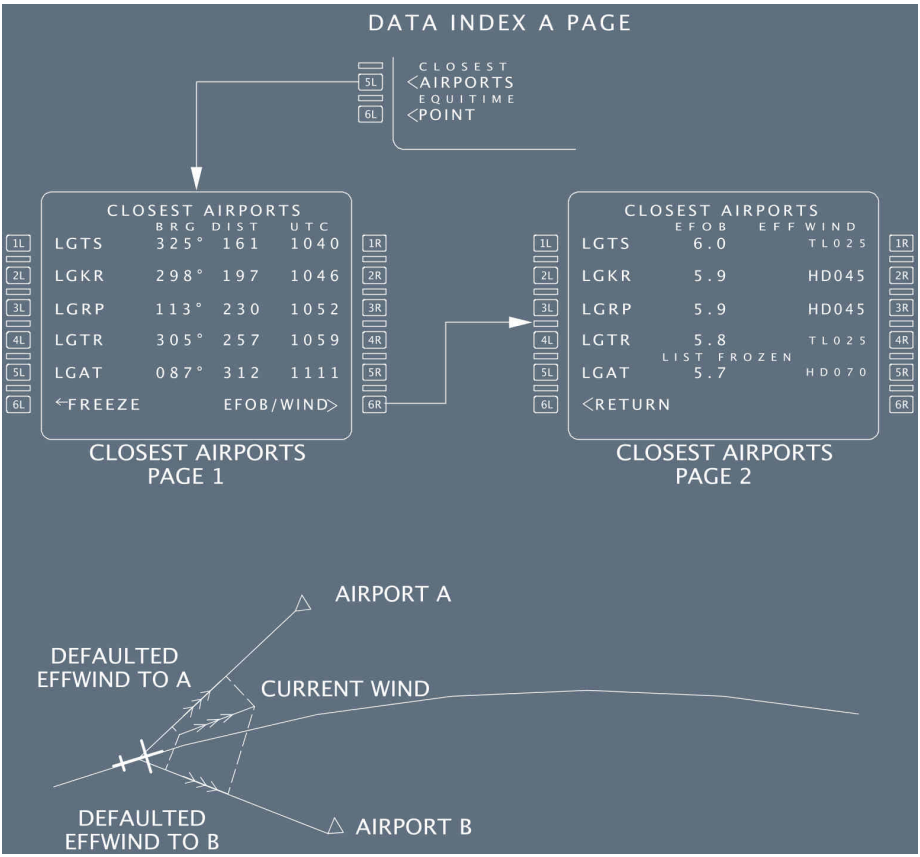
Note: *In case a DIR TO with ABEAM WPTs is achieved, or in case a FIX INFO with ABEAM or RADIAL/CIRCLE intersection is inserted in the F-PLN, the TO WPT (provided on the REPORT page) will be the ABEAM WPT or the RADIAL/CIRCLE intersect waypoint, if any, as on the F-PLN page.*

CLOSEST AIRPORTS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The CLOSEST AIRPORTS page displays the four closest airports, from the position of the aircraft, found in the navigation database (*Refer to DSC-22_20-50-10-25 Closest Airports Pages*for the page description), and the 5th airport, as selected by the crew.

For each airport, the FM computes:
- The BRG/DIST/ESTIMATED UTC from the position of the aircraft to the corresponding airport.
- The EFOB at the airport, assuming an EFFECTIVE WIND (defaulted or entered by the pilot).



Note: *When the CLOSEST AIRPORTS page 2 is selected, the list of airports is automatically frozen, as indicated on the page.*

The FUEL/TIME predictions to the closest airports use simplified assumptions:
- Managed speed profile in cruise, with the effective wind from the CLOSEST AIRPORTS page 2. In case of EO, Engine Out condition is considered.
- Continuous descent from CRZ FL down to the airport elevation.

Note: *In case SELECTED SPD is used, the CLOSEST AIRPORTS page still provides good use to choose the applicable closest airport for diversion purposes. However, when SELECTED SPD is significantly different from MANAGED SPD, the predictions in terms of time and fuel must be disregarded since they are misleading.*
The predictions may then be checked on the SEC F-PLN.

GENERAL

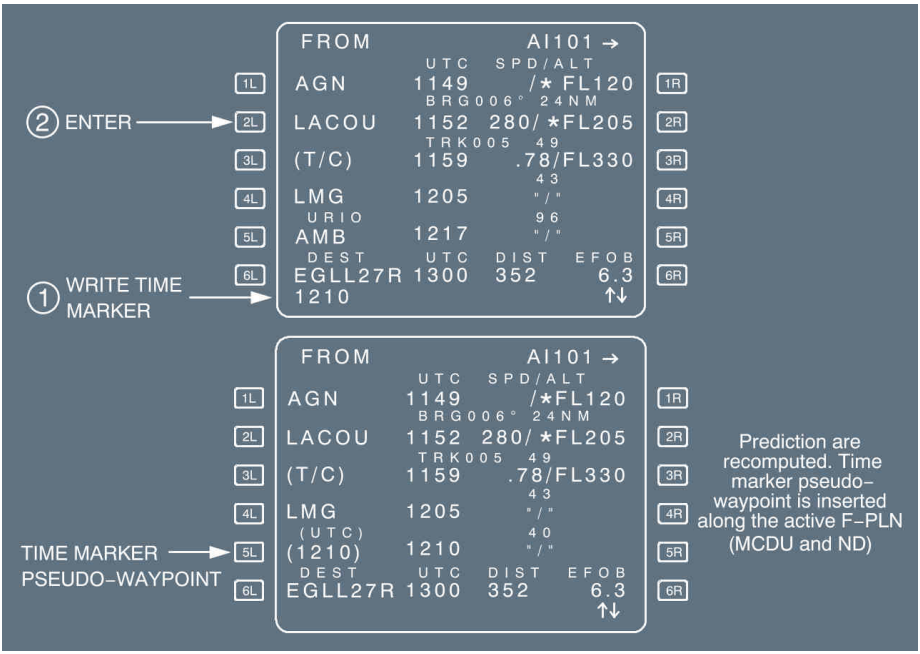
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The crew can enter a time marker in the F-PLN A or B page. Once entered, the FMGS displays a pseudo waypoint along the flight plan on the MCDU and on the Navigation Display. This pseudo waypoint shows the predicted location of the aircraft at the entered time.

HOW TO INSERT A TIME MARKER

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

1 WRITE the time marker in the scratchpad. The entry format is HHMM.
SELECT any left key of the F-PLN A or B page, to insert the time marker in the active flight plan.
The time marker is inserted in the flight plan according to time criteria, irrespective of the key chosen for entry.



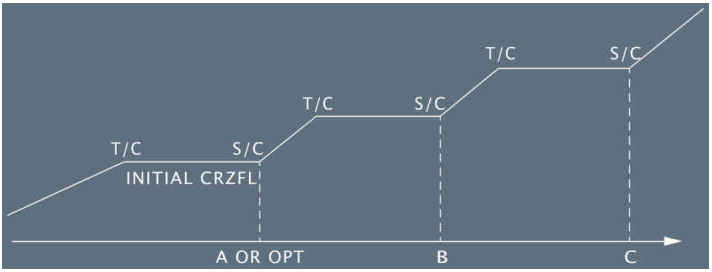
Up to four time markers may exist at a time. An attempt to enter a fifth time marker will cause the "TIME MARKER LIST FULL" message to appear on the scratchpad.
The FMGS updates the time marker position with the predictions.

When the current clock time equals or exceeds the time marker entry, the FMGS sequences the time marker (even in preflight).

STEP CLIMB/STEP DESCENT

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

The STEP ALTS function enables to define the successive cruise Flight Levels. The optimum position to initiate a climb, from the initial (or current) cruise Flight Level to the next one, can also be determined.



PRINCIPLE

GEOGRAPHIC STEPS

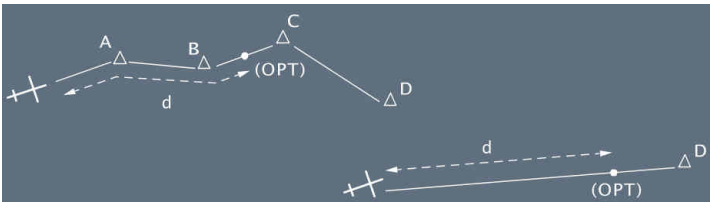
Up to four geographic steps may be defined on the STEP ALTS page. These steps are initiated at the geographical position, along the F-PLN.

Rules

- The minimum step size is 1 000 ft.
- A Step Climb (S/C) cannot follow a Step Descent (S/D).
- A STEP is automatically cleared, if:
  - The S/C (S/D) is sequenced without any level change done by the crew.
  - The crew achieves a LAT REV, which deletes the associated waypoint from the F-PLN
  - By EO condition.
- A STEP is manually cleared:
  - On the STEP ALTS page, by CLEARING the corresponding field.
  - On the F-PLN page, by CLEARING the (S/C) or (S/D) pseudo-waypoints.
- A STEP entry is IGNORED, if the remaining CRZ distance is less than about 50 nm.
- Once the steps are inserted in the F-PLN, they are displayed:
  - On the MCDU, as (S/C), (S/D), (T/C), (T/D) pseudo waypoints.
  - On the ND, by associated , , , white symbols.

OPTIMUM STEP

Once geographic steps are inserted or an altitude is entered, the FM proposes an OPTIMUM STEP start of climb position for the first step climb altitude ahead: Fuel/time savings are displayed, if above 100 kg/min. If no savings are found, no optimum step is proposed.
The OPT STEP is not automatically inserted. The crew must insert it, if appropriate. Once inserted, the OPT STEP point (OPT) becomes a fixed geographical point.
If some F-PLN parameters are subsequently changed (e.g. winds, new waypoints), an update of the optimum position relative to the previous one may be proposed. If savings exist, this new optimum may be inserted to replace the previous optimum step point.
Once an OPT STEP is inserted in the F-PLN, and the crew achieves a lateral F-PLN revision, the FM keeps the (OPT) along the new F-PLN, at the same distance from the aircraft's position, as previously determined.



Rules

- The OPT STEP is only computed by the FM, if data required for the prediction computation are inserted : F-PLN, CRZ FL, CI, GW, CG at least.
- The search of the OPT STEP begins 20 nm beyond (T/C) before Cruise, or ahead of the aircraft's position.
- The search of the OPT STEP ends 20 nm before the next STEP POINT, or 300 nm before the (T/D).
- Only one OPT STEP is computed at a time.

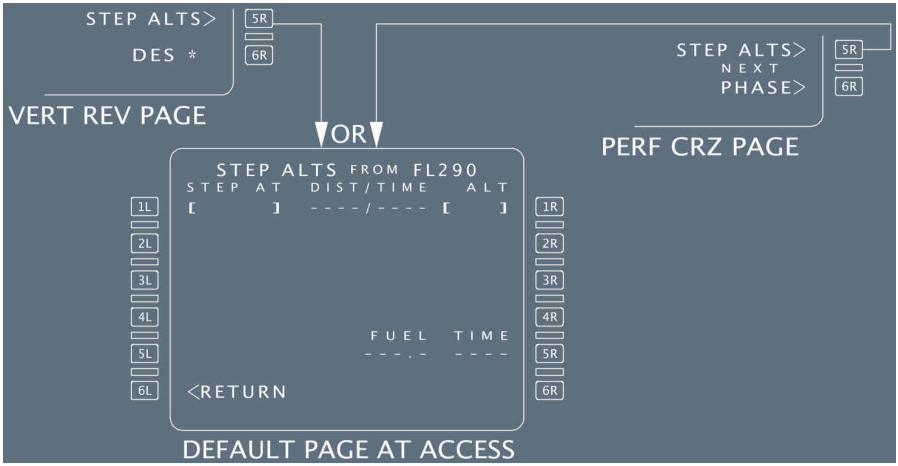
Guidance

When reaching the step point, the steps must be initiated by the crew by selecting the new CRZ FL, and pressing the FCU ALT selector knob. If sequenced without any crew action, the step is automatically deleted.

If the crew initiates the step:
- The CRZ FL is automatically reassigned to its new value.
- The guidance is THR CLB/CLB for a step climb.
  THR IDLE/DES with V/S = -1 000 ft/min for a step descent.

STEP ENTRY

The STEP ALTS page is either accessed from the : - The VERT REV page, or
- PERF CRZ page.

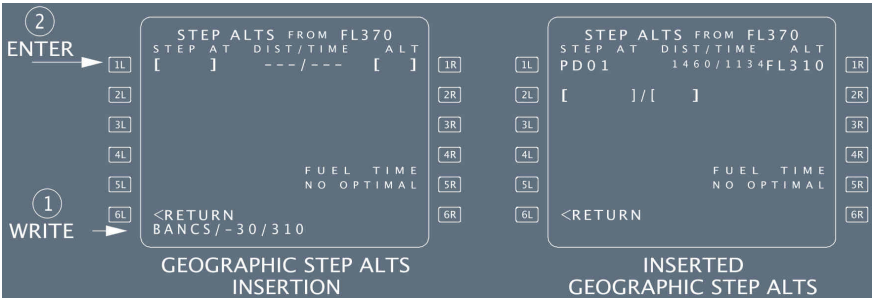


FOR GEOGRAPHIC STEP :

PRESS the PERF key, or PRESS the F-PLN key and SELECT VERT REV at a cruise waypoint.
SELECT the STEP ALTS prompt.
WRITE the POSITION/NEW CRZ FL in the scratchpad, and ENTER it in [1L] to [4L].

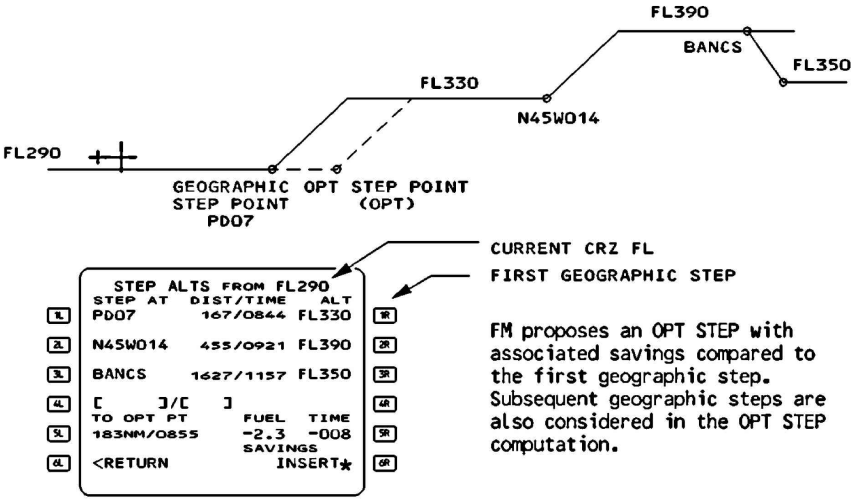
Note:
- *The position may be a waypoint ident, PBD, PD.*
- *The crew may enter LMG/–20/350. The FMS will compute the geographic step 20 nm before LMG to FL 350.*
- *To modify an inserted STEP :*
  - *To modify the CRZ FL only, enter it in the right key.*
  - *To modify the position only, enter it in the left key.*
  - *To modify both, modify the position first, and then the CRZ FL (it is not possible to modify both in a single entry).*

CHECK the PREDICTIONS.



FOR OPTIMAL STEP

Once all geographical steps are inserted, and the predictions are available, the STEP ALTS page displays the FUEL/TIME savings for the first step climb. If no significant savings are predicted, the NO OPTIMAL message is displayed.

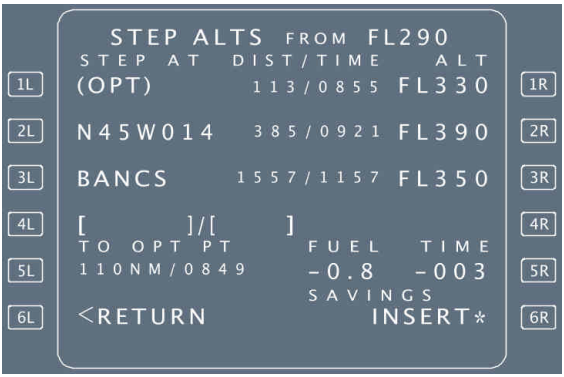


To INSERT the proposed OPT STEP :

SELECT the INSERT prompt.



The computed (OPT) step replaces the initially inserted step position, and is then considered at a fixed geographic position. Savings are no longer displayed, and the UPDATE prompt replaces the INSERT prompt. This prompt allows the crew to update the (OPT) step position, considering possible F-PLN or inserted wind changes.
If pressed, a new OPT point is proposed, with the associated SAVINGS and INSERT prompt, or NO OPTIMAL.
UPDATE prompt has been pressed, the new OPT STEP point gives additional savings :



THERE ARE ONLY 2 CRZ FLS IN THE F-PLN :

The crew may obtain the optimal position for the STEP as follows :

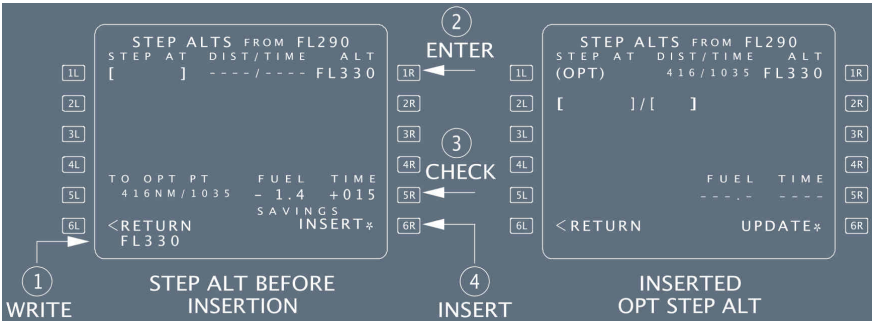
INSERT the initial cruise FL on the INIT A page.
ENSURE that the ZFW and BLOCK fuel are inserted on the INIT B page.
WRITE the new CRZ FL in the STEP ALTS page, and INSERT it in the [1R] field.

Distance and time to optimum point and fuel/time saving are displayed.

CHECK the fuel and time savings and prediction on the [5L] and [5R] fields.

Savings are computed by comparing the entered step altitude, and the origin altitude of the step.

INSERT, if suitable.



Note: No OPT STEP can be computed in the SEC F-PLN.

MESSAGES

Messages may be displayed in the DIST/TIME field :

- "ABOVE MAX", if the inserted step altitude exceeds the MAX MAX ALT.
  The "STEP ABOVE MAX FL"scratchpad message is associated to the "ABOVE MAX" message.
- "IGNORED" displayed in the following cases :
  - Step climb is located prior to the top of climb, or after the top of descent.
  - Step end is at less than 50 nm from the top of descent. An optimum step point, < 200 nm from top of descent, cannot be inserted.
- "STEP NOW", when the distance to the step point is less than 20 nm.

The following message may be displayed in the scratchpad :

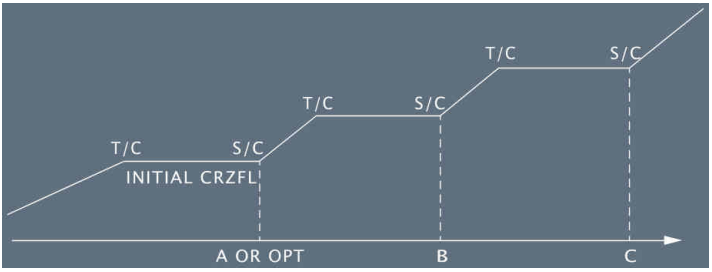
- A "NOT ALLOWED" message is displayed in the scratchpad, if :
  - Four steps already exist in the F-PLN, and an additional step is entered.
  - A step is entered at the FROM waypoint, or at a pseudo-waypoint.
  - Two consecutive steps are entered at the same waypoint (e.g. st ep climb after step descent).

STEP CLIMB/STEP DESCENT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

1

The STEP ALTS function enables to define the successive cruise Flight Levels. The optimum position to initiate a climb, from the initial (or current) cruise Flight Level to the next one, can also be determined.



PRINCIPLE

GEOGRAPHIC STEPS

Up to four geographic steps may be defined on the STEP ALTS page. These steps are initiated at the geographical position, along the F-PLN.

Rules

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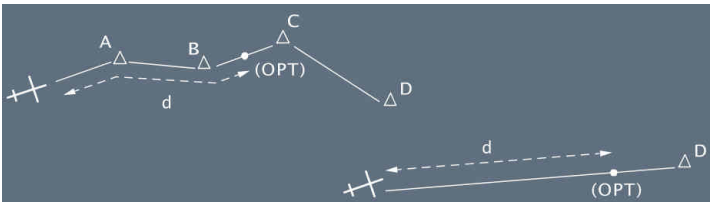
- A STEP is automatically cleared, if:
  - The S/C (S/D) is sequenced without any level change done by the crew.
  - The crew achieves a LAT REV, which deletes the associated waypoint from the F-PLN
  - By EO condition.
- A STEP is manually cleared:
  - On the STEP ALTS page, by CLEARING the corresponding field.
  - On the F-PLN page, by CLEARING the (S/C) or (S/D) pseudo-waypoints.
- A STEP entry is IGNORED, if the remaining CRZ distance is less than about 50 nm.
- Once the steps are inserted in the F-PLN, they are displayed:
  - On the MCDU, as (S/C), (S/D), (T/C), (T/D) pseudo waypoints.
  - On the ND, by associated , , , white symbols.

OPTIMUM STEP

Once geographic steps are inserted or an altitude is entered, the FM proposes an OPTIMUM STEP start of climb position for the first step climb altitude ahead: Fuel/time savings are displayed, if above 100 kg/min. If no savings are found, no optimum step is proposed.
The OPT STEP is not automatically inserted. The crew must insert it, if appropriate. Once inserted, the OPT STEP point (OPT) becomes a fixed geographical point.
If some F-PLN parameters are subsequently changed (e.g. winds, new waypoints), an update of the optimum position relative to the previous one may be proposed. If savings exist, this new optimum may be inserted to replace the previous optimum step point.
Once an OPT STEP is inserted in the F-PLN, and the crew achieves a lateral F-PLN revision, the FM keeps the (OPT) along the new F-PLN, at the same distance from the aircraft's position, as previously determined.



Rules

- The OPT STEP is only computed by the FM, if data required for the prediction computation are inserted : F-PLN, CRZ FL, CI, GW, CG at least.
- The search of the OPT STEP begins 20 nm beyond (T/C) before Cruise, or ahead of the aircraft's position.
- The search of the OPT STEP ends 20 nm before the next STEP POINT, or 300 nm before the (T/D).
- Only one OPT STEP is computed at a time.

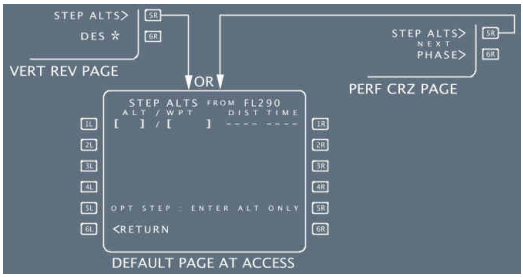
Guidance

When reaching the step point, the steps must be initiated by the crew by selecting the new CRZ FL, and pressing the FCU ALT selector knob. If sequenced without any crew action, the step is automatically deleted.

If the crew initiates the step:
- The CRZ FL is automatically reassigned to its new value.
- The guidance is THR CLB/CLB for a step climb.
  THR IDLE/DES with V/S = -1 000 ft/min for a step descent.

STEP ENTRY

The STEP ALTS page is either accessed from the : - The VERT REV page, or
- PERF CRZ page.

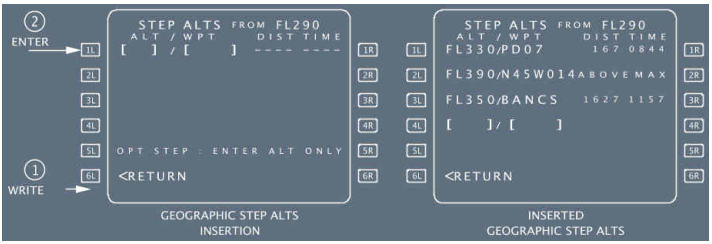


FOR GEOGRAPHIC STEP:

PRESS the F-PLN or PERF key.
SELECT vertical revision at a cruise waypoint.
SELECT the STEP ALTS prompt.
WRITE the ALT/WPT in the scratchpad, and ENTER it in [1L] to [4L].

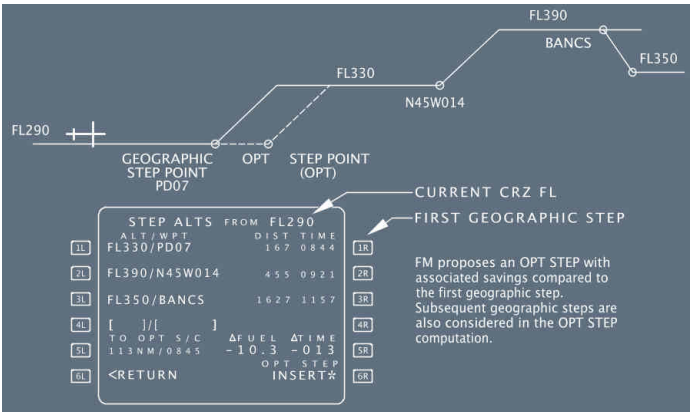
Note:
- *The position may be a waypoint ident, PBD, PD.*
- *The pilot may enter FL 350/LMG/–20. The FM will compute the geographic step 20 nm before LMG to FL 350.*
- *To modify an inserted STEP:*
  - *To modify the CRZ FL only, enter it in the left key, as "FLXXX".*
  - *To modify the position only, enter it in the left key, as "/XXX".*
  - *To modify both, modify the position first, and then the CRZ FL (it is not possible to modify both in a single entry).*

CHECK the PREDICTIONS.



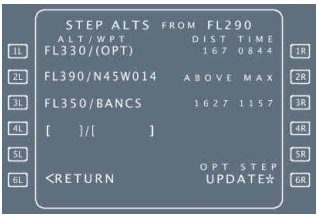
FOR OPTIMAL STEP

Once all geographical steps are inserted, and the predictions are available, the STEP ALTS page displays the FUEL/TIME savings for the first step climb. If no significant savings are predicted, the NO OPTIMAL message is displayed.



To INSERT the proposed OPT STEP displayed in [5L]:

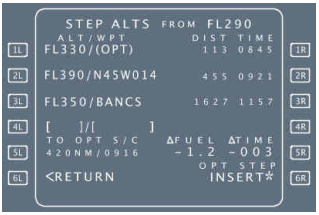
SELECT the INSERT* prompt in [6R].



The computed (OPT) step replaces the initially inserted step position, and is then considered at a fixed geographic position. Savings are no longer displayed, and the UPDATE* prompt replaces the INSERT* prompt. This prompt allows the crew to update the (OPT) step position, considering possible F-PLN or inserted wind changes.

If pressed, a new OPT point is proposed, with the associated SAVINGS and INSERT prompt, or NO OPTIMAL.

UPDATE prompt has been pressed, the new OPT STEP point gives additional savings:



THERE ARE ONLY 2 CRZ FLS IN THE F-PLN:

The pilot may obtain the OPT position of the STEP point, as follows:

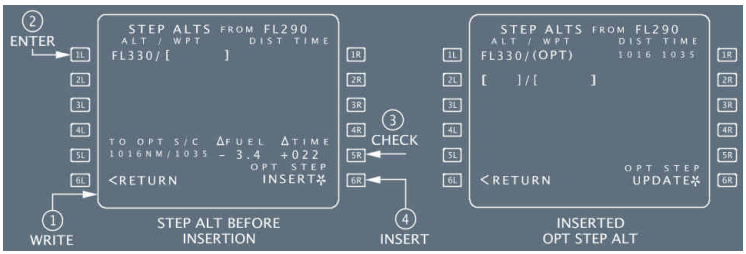
INSERT the initial cruise FL on the INIT A page.
ENSURE that the ZFW, ZFWCG and BLOCK fuel are inserted on the INIT B page.
WRITE the new CRZ FL in the STEP ALTS page, in the [1L] field.

Distance and time to optimum point and fuel/time saving are displayed.

CHECK the fuel and time savings and prediction on the [5R] field.

Savings are computed by comparing the entered step altitude, and the origin altitude of the step.

INSERT, if suitable.



Note: *No OPT STEP is available in the SEC F-PLN.*

MESSAGES

Messages may be displayed in the DIST/TIME field:

- "ABOVE MAX", if the inserted step altitude exceeds the REC MAX ALT.
  The "STEP ABOVE MAX FL"scratchpad message is associated to the "ABOVE MAX" message.
- "IGNORED"

  This message is displayed in the following cases:
  - Step climb is located prior to the top of climb, or after the top of descent.
  - Step end is at less than 50 nm from the top of descent. An optimum step point, < 200 nm from top of descent, cannot be inserted
- "STEP AHEAD", when the distance to the step point is less than 20 nm . A "STEP AHEAD" scratchpad message is also displayed.
  The following message may be displayed in the scratchpad:
- "NOT ALLOWED", if:
  - Four steps already exist in the F-PLN, and an additionnal entry is attempted.
  - Any attempt to enter a step at the FROM waypoint, or at a pseudo waypoint is done.
  - Two consecutive steps are entered at the same waypoint (e.g. step climb after step descent).

GENERAL

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

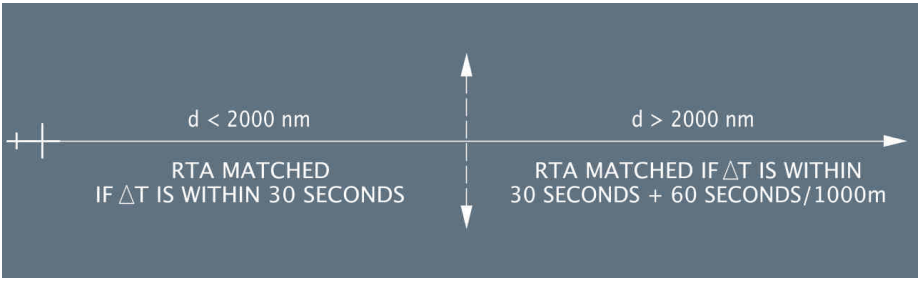
A time constraint (RTA) may be assigned at any waypoint of the F-PLN, downpath of the origin and the FROM waypoint. It can be an "AT", "AT OR BEFORE", or "AT OR AFTER" constraint.
The FMS computes a new managed speed profile from the aircraft position to the constrained waypoint, in order to match the 30 s difference (ΔT) between the time predicted at the constrained waypoint and the RTA. This modified managed speed profile can be checked using the speed prediction, displayed for each waypoint of the F-PLN page.
The RTA function uses a speed range between Green Dot speed and VMO - 10 (or MMO - 0.02).
When the constrained waypoint is sequenced, the ECON SPD/MACH is resumed unless the constrained waypoint is located in a descent segment.

Note: *The FM does not compute a new managed speed profile when a RTA is entered in the descent profile while the aircraft is in cruise within 40 nm from the top of descent.*

The time constraint is inserted on the RTA page. A time constraint may be inserted at any waypoint of the primary or secondary flight plan.
If an engine-out condition is detected, the time constraint is automatically deleted and RTA DELETED message on scratchpad.
If the aircraft enters a holding pattern, the downpath time constraint is deleted.
Once inserted in the F-PLN, the RTA is displayed in magenta on the F-PLN page, as long as no predictions are available.

Once the predictions are available, the time constraint is replaced by the new predicted time at the associated waypoint, and highlighted by a star: (*)
- The (*) is magenta, if the time constraint is matched with the 30 s criteria.
- The (*) is amber, if the time constraint is missed.

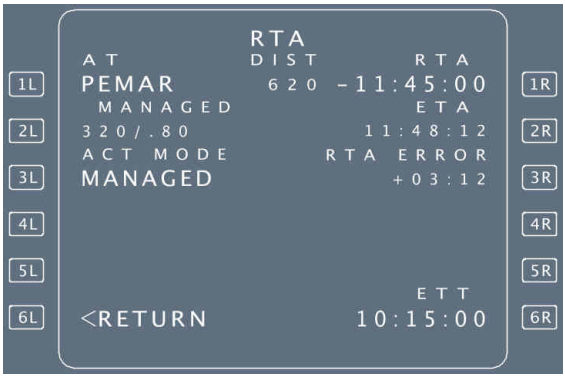
Time constraint matching criteria:



Note: *ΔT is the time difference between the time predicted at the constrained waypoint and the RTA.*

TIME CSTR ENTRY

PRESS the F-PLN key.
SELECT vertical revision at the revised waypoint.
SELECT the RTA key.
ENTER a waypoint at which a time constraint is to be defined.
WRITE the time constraint (+/–HHMMSS) into the scratchpad and ENTER
The display automatically reverts to the F-PLN A page.



Note: - *The TIME CSTR can be directly cleared on the F-PLN A page, using the CLR key.*
- *The time constraint is automatically deleted in the following cases:*
  - *Engine out, or*
  - *When entering a holding pattern, or*
  - *In case of Go-Around, or*
  - *A time constraint is entered at another waypoint, while another time constraint already exists.*

A scratchpad "RTA DELETED"message is displayed.

ESTIMATED TAKEOFF TIME (ETT)

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The Estimated Takeoff Time (ETT) may be entered by the pilot during the preflight phase at the origin airport. This time is used as the initialization time for predictions.
The entry is accepted in the preflight phase, if the ETT is greater than the clock time.

PROCEDURE

PRESS the F-PLN key
SELECT a vertical revision at origin

SELECT the RTA page
WRITE the ETT into the scratchpad, and ENTER in the ETT field.
The display automatically reverts to the F-PLN A page.

Note:
- *If the current time exceeds the ETT entry, the CLK IS TAKE OFF TIME message is displayed ; the ETT is replaced by the clock time.*
- *At takeoff, the takeoff time is automatically updated using the actual clock time.*
- *An ETT entry is automatically deleted, if the origin airport is modified, or if the clock is inoperative.*
- *If a time constraint is entered at a waypoint in the F-PLN, the takeoff time required to match the constraint is automatically computed by the FM. This result is displayed in magenta as ETT at the origin.*

USE OF TIME/ETT CONSTRAINT

During preflight :
- If an ETT has been entered, time predictions are based on the entered value (or clock time, if greater).
- If both an ETT and a time constraint have been entered, time predictions are based on the entered ETT value (or clock time, if greater). The managed speed profile is computed to match the time constraint, as closely as possible, using a pseudo cost index value. (Not displayed).
- If only a time constraint has been entered:
  - Optimum speeds are computed to determine the ETT, so as to satisfy the time constraint.
  - If necessary, flight time (based on optimum speeds) plus clock time (current) is greater than the time constraint ; optimum speeds are modified to match the time constraint as closely as possible.

After Takeoff : The predictions are based on the current time.
Speeds are adjusted to satisfy the time constraint.

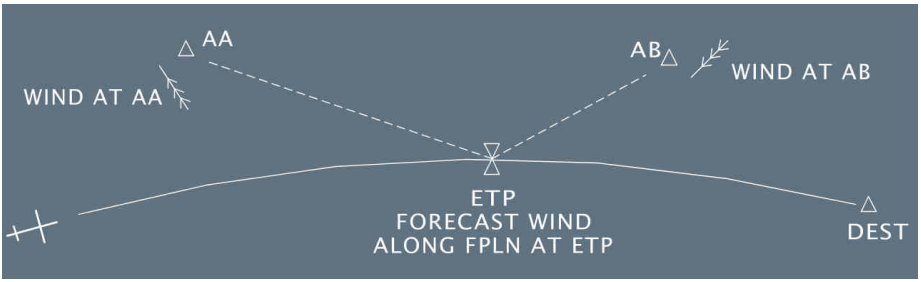
Intentionally left blank

EQUITIME POINT

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The equitime point page displays the ETP, computed along the F-PLN route between two referenced positions (airports, waypoints or navaids), defined by the pilot (*Refer to DSC-22_20-50-10-25 Equi - Time Point Page*for the page description).
When first accessing the page, the FMS proposes origin and destination airfields, as defaulted positions.
The pilot may overwrite these two positions and insert the wind in their vicinity at the applicable CRZ FL.
The FMS then computes the resulting ETP, using the managed or selected speed, and blending the forecasted winds along the F-PLN route with the inserted winds.

The FMS provides:
- TIME and DIST from the aircraft position (or origin on ground) to the ETP
- The BRG/DIST from the ETP to the defined positions
- TIME overhead each position, assuming the aircraft flies from the present position to the defined position via the ETP
- (ETP) pseudo waypoint is displayed on the ND along the F-PLN
- ETP location in relation to the subsequent waypoint.



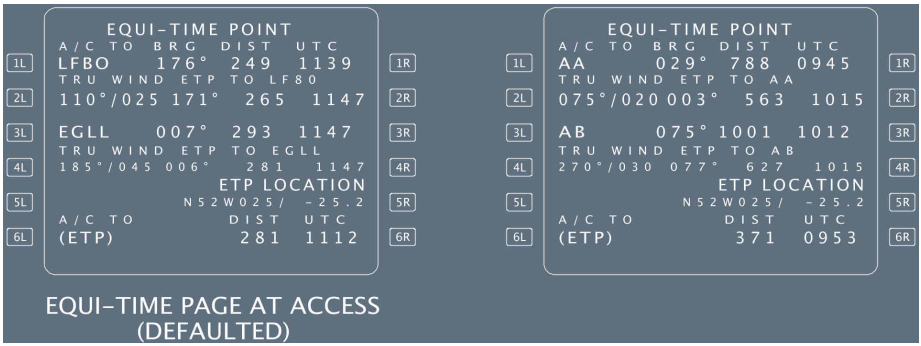
EQUITIME POINT ENTRY

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

PRESS the DATA key.
SELECT the EQUI-TIME POINT prompt.
The EQUI-TIME POINT page is displayed. The origin and destination airports are used by default.
ENTER the REF POINT 1 in the [1L] field.
ENTER the associated wind in the [2L] field.
The wind to be inserted is the wind in the vicinity of the reference point at the CRZ FL.

ENTER the REF POINT 2 in the [3L] field.
ENTER the associated wind in the [4L] field.

The system displays the ETP location with regards to the next waypoint of the active flight plan following the ETP in the [5R] field, and the A/C TO (ETP) predictions in the [6R] field.



Note: - *The ETP pseudo-waypoint is not displayed on the MCDU F-PLN page. In order to easily locate it, or when closing the applicable ETP, the TIME MARKER may be used; this allows the crew to visualize it in advance on the F-PLN page or, to prepare the next applicable ETP on the Equi-time Point page*
- *The ETP is computed using speed according to the current mode (managed or selected).*

GENERAL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The MCDU NAV B/UP allows to link a MCDU to its associated IRS in order to allow the flight crew to monitor the navigation and to be provided with some basic flight planning functions in case of FM 1 + 2 failure.

CAUTION	The MCDU NAV B/UP is to be used only in case of FM 1 + 2 failure. It can be selected temporarily in case of FM1 or 2 only failure, in order to ensure that the function is available on the failed side. When in MCDU NAV B/UP on both sides, one FG at least must be available to engage AP and A/THR.

The MCDU NAV B/UP function provides:
- Aircraft position using onside IRS or IRS 3
- Aircraft position using GPIRS ⋘ position
- F-PLN as memorized in the MCDU
- F-PLN display on ND
- F-PLN automatic sequencing
- Limited lateral revisions
- Mag (True) bearing depending on the pilot selection, from aircraft position to the TO WPT and associated distance
- True track between waypoints
- Time estimates computed with current GS from onside IRS
- Total time and distance to destination

The following features are not provided:
- No DATA BASE available:
  - No autotuning, NAVAIDS must be selected on RMP
  - No radio position
  - No EFIS CTL PANEL options
  - No LDG ELEV (must be manually selected on overhead panel).
- No performance data:
  - No CLB/DES/APP NAV/FINAL modes
  - No SPEED MANAGED
  - No automatic SPD/MACH change over.
- Most of predictions are lost:
  - No EFOB
  - No XTRA
  - No ETA at DEST.
- No multiple lateral F-PLN

- No AF/FD managed modes
- No crosstalk between MCDUs: F-PLN revisions have to be achieved on both MCDUs.

BACK UP NAV SELECTION

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

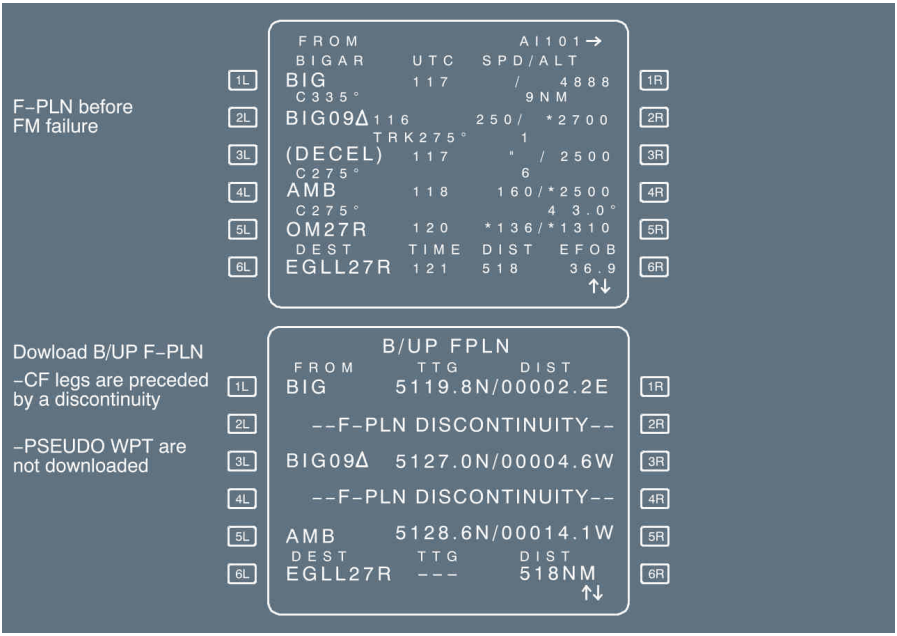
FM F-PLN DOWNLOAD IN MCDU

While BACK UP NAV is not active, the FM downloads permanently a condensed form of the F-PLN in the MCDU.

Downloaded information include:
- Waypoint position
- Waypoint identifier
- Leg type
- Discontinuity
- Overfly
- Turn direction.

Heading legs, course to fix legs, ..., computed INTCPT positions, pseudo waypoints, ..., cannot be downloaded.
They are replaced by discontinuities.
Maximum of 150 waypoints are downloaded.

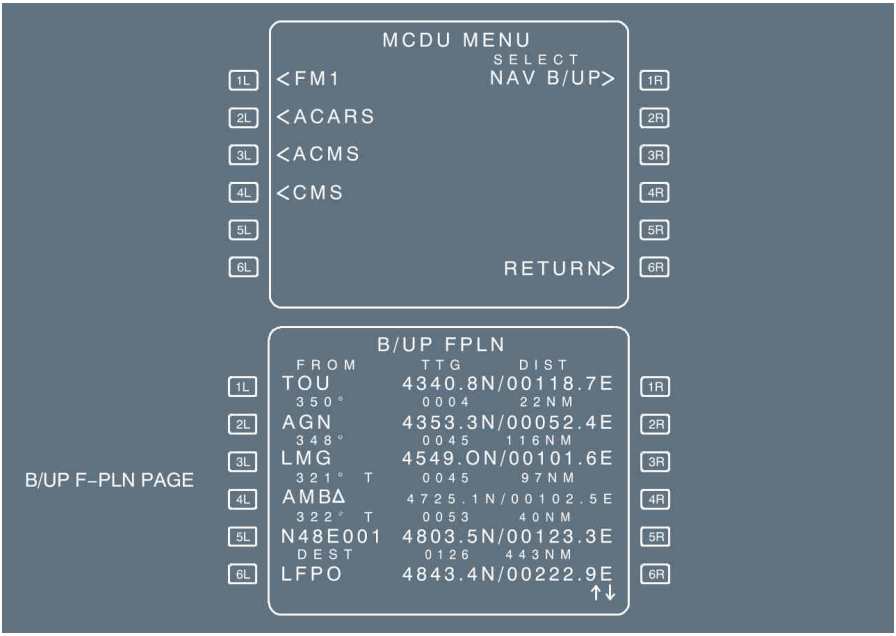
1 **EXAMPLE OF DOWNLOADED F-PLN**

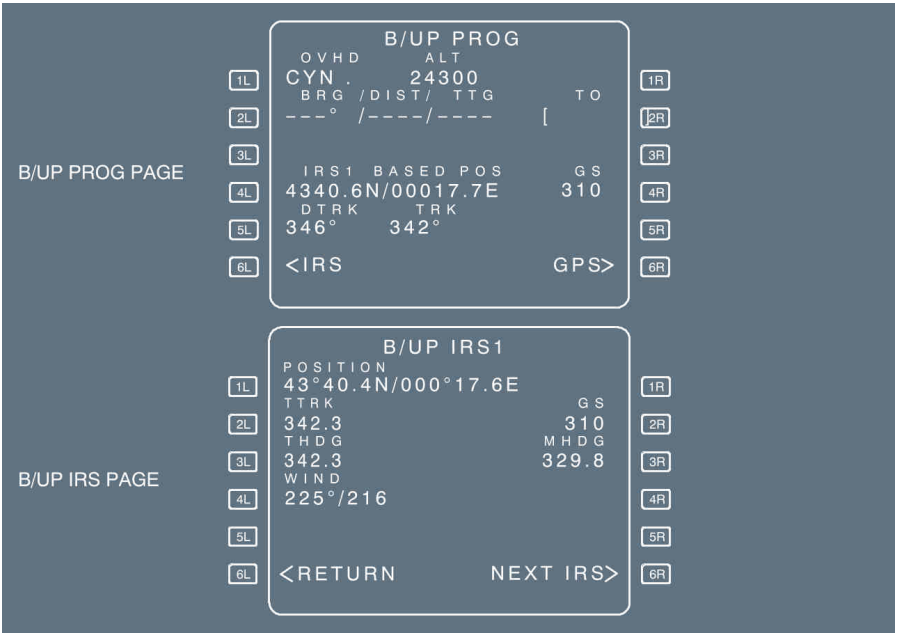


In that procedure, all the legs are coded as CF (Course to Fix) legs. This explains all the discontinuities resulting in the B/UP F-PLN.
These discontinuities may be cleared.
When the second FM fails

REENGAGE and SELECT the required AP and A/THR modes (if disconnected).
SELECT the NAV B/UP prompt on both MCDU.
SELECT NAV on both RMP

Tune the required navaids


MCDU MENU
SELECT
1L <FM1
NAV B/UP> 1R
2L <ACARS 2R
3L <ACMS 3R
4L <CMS 4R
5L 5R
6L RETURN> 6R
B/UP FPLN
FROM TTG DIST
1L TOU 4340.8N/00118.7E 1R
350° 0004 22NM
2L AGN 4353.3N/00052.4E 2R
348° 0045 116NM
3L LMG 4549.ON/00101.6E 3R
321° T 0045 97NM
4L AMBΔ 4725.1N/00102.5E 4R
322° T 0053 40NM
5L N48E001 4803.5N/00123.3E 5R
DEST 0126 443NM
6L LFPO 4843.4N/00222.9E 6R
↑↓
B/UP F-PLN PAGE



- Only MCDU MENU
  - F-PLN key
  - PROG key
  - DIR key
- B/UP F-PLN page
  - B/UP PROG page
  - B/UP IRS 1, 2, 3 pages are available when BACK UP NAV is selected.
- B/U GPS (if GPS ◁⋈ is installed).

BACK UP NAV OPERATION

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

AP AND A/THR

One FG at least must be available to allow the engagement of AP/FD and A/THR. All FM managed modes are lost as well as managed speed.

As a consequence:
- LAT F-PLN is flown in HDG/TRK modes
- VERT F-PLN is flown in OPEN/V/S/FPA modes
- SPD TARGET is manually SELECTED on the FCU
- SPD/MACH crossover is manually SELECTED on the FCU.

It is recommended to use the TRK/FPA modes:

SELECT the required TRK on FCU at waypoint sequencing (as no AP/FD coupling exists in NAV B/UP). F-PLN sequencing is automatic.
MONITOR the track of the next leg prior reaching the TO waypoint (track between TO and next waypoints is true track).
ADJUST the track to follow the F-PLN with X-TRK = 0
USE OP DES or FPA to descend as suitable.

FPA allows easy altitudes predictions:
DNM = △(FL)/FPA°

NAVIGATION MONITORING

The navigation accuracy check must be achieved periodically using the same principle as with FM navigation:

COMPARE computed data with raw data
SELECT ON RMP the applicable navaid
PRESS the [PROG] key

B/UP PROG page is displayed

WRITE in the scratchpad then ENTER the navaid LAT/LONG
SELECT associated navaid needle on the EFIS control panel.
COMPARE computed BRG/DIST with RAW DATA on ND

- *If the crosscheck is POSITIVE the ND may be used in ROSE NAV/MAP modes with raw data*
- *If the crosscheck is NEGATIVE the ND must be used in ROSE VOR/ROSE ILS modes.*

Note: B/UP IRS ◁ and B/UP GPS ◁ pages may also be used to check the position.

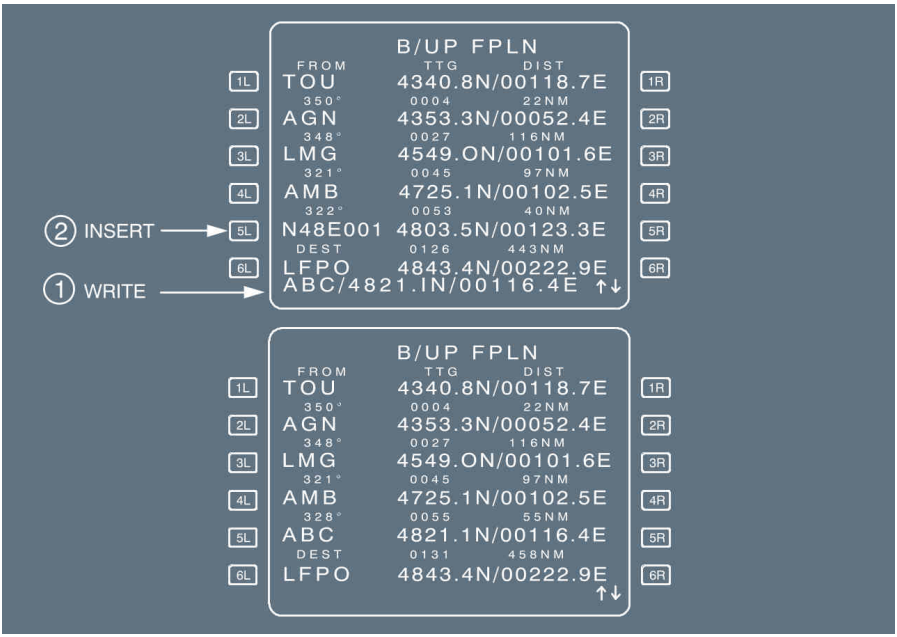
FLIGHT PLANNING

The following revisions may be achieved:
- WPT insertion/deletion
- OVERFLY insertion/deletion
- DIR TO a waypoint
- CLR waypoints/discontinuities.

Waypoint identifiers are either published waypoint identifiers if present in the MCDU active F-PLN, or coded LAT/LONG identifiers resulting from flight crew entries.
All flight planning functions are directly applied on active F-PLN without LAT REV page.

2 WAYPOINT INSERTION

Waypoint insertion into the F-PLN is performed via the B/UP F-PLN page by selecting the line key adjacent to the desired point of insertion, whenever a pre-existing waypoint identifier or valid IDENT/LAT/LONG or LAT/LONG entry is displayed in the scratchpad.
Any waypoint entry which causes the number of legs in the route to exceed the maximum allowed results in the "F-PLN FULL"message.



Note: - *If the inserted waypoint is entered only with LAT/LONG, its identifier would be : N48E001*
- *If the flight crew writes a waypoint IDENT/LAT/LONG with an IDENT already used in the F-PLN, a message "NOT ALLOWED" is displayed.*

WAYPOINT DELETION

Waypoint and discontinuity may be deleted from the B/UP F-PLN page by using the CLR key.

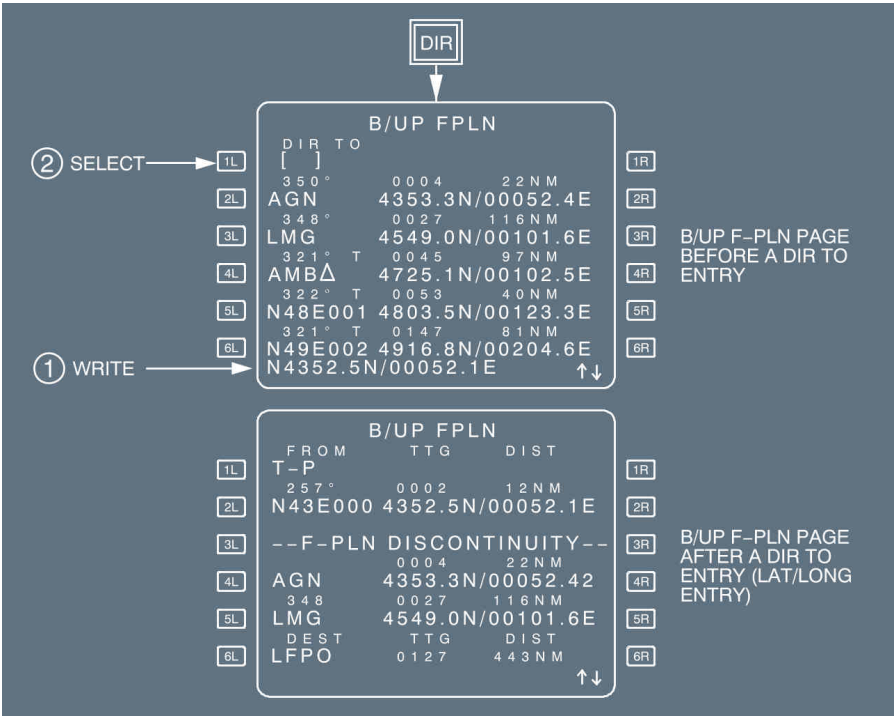
OVERFLY INSERTION/DELETION

Same as for the FM F-PLN.

3 **DIRECT TO A WAYPOINT**

The DIR TO function operates as for the normal F-PLN, except that RADIAL INTERCEPT and ABEAM functions are not available.

PRESS the DIR key.
WRITE LAT/LONG (or IDENT/LAT/LONG) on the scratchpad then INSERT in [1L].
SELECT the correct track on the FCU in order for the aircraft to turn toward the new TO waypoint.



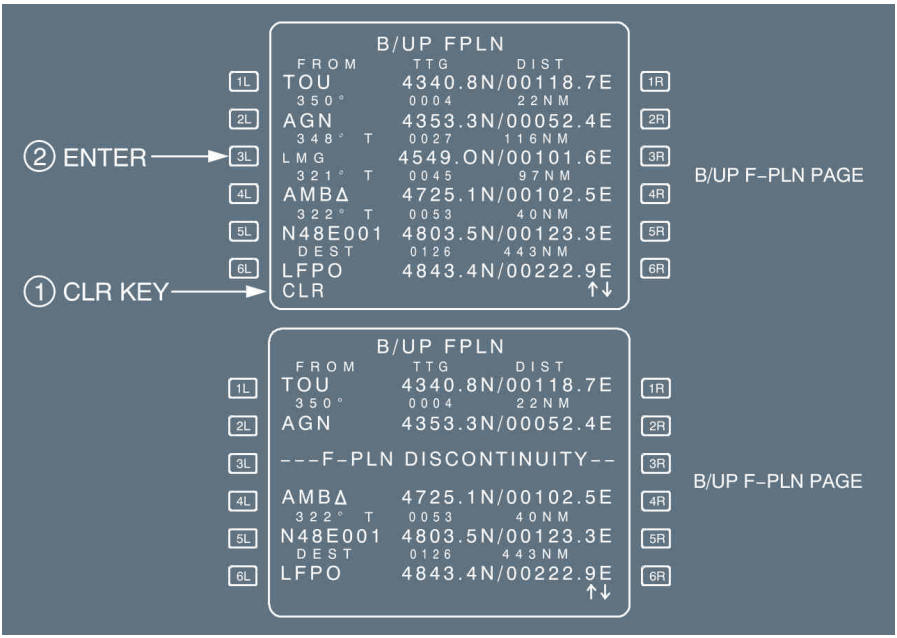
In this example, the entered DIR TO waypoint is a LAT/LONG waypoint.
Due to the fact that this new waypoint is not identical to any waypoint in the F-PLN, a direct leg to that waypoint is created and followed by a discontinuity.
When the DIR TO function is completed, the B/UP F-PLN page is displayed with the DIR TO waypoint as the TO waypoint and the T-P waypoint as the FROM waypoint.

If a DIR TO function is achieved for a waypoint that belongs to the B/UP F/PLN, no F-PLN discontinuity is created.

Note: - *In case of a DIR TO waypoint associated with an OVERFLY condition, the OVERFLY is kept.*

4 **CLR WAYPOINT/DISCONTINUITY**

CLR as for normal operation.



APPROACHES

- ND display selection rule
  As per normal operation, it depends upon the result of NAV ACCY CROSS CHECK.
  Furthermore it depends also whether the F-PLN is complete, including the approach.

F-PLN	NAV ACCY CHECK	ND	
		PF	PNF

Continued on the following page

Continued from the previous page

<table>
<tr><td rowspan="2">Complete with appropriate approach</td><td>Positive</td><td colspan="2">ARC or ROSE NAV
Ref navaid Raw data</td></tr>
<tr><td>Negative</td><td>ROSE VOR/ILS</td><td>ARC or ROSE NAV or
ROSE VOR/ILS
Ref Navaid Raw Data</td></tr>
<tr><td>Incomplete</td><td>Positive or Negative</td><td colspan="2">ROSE VOR/ILS</td></tr>
</table>

END OF DESCENT

ADJUST manually the landing elevation on the overhead panel.
SET the MDA on the standby altimeter.

NON ILS APPROACHES

SELECT on RMP the approach reference navaids.

The autopilot and flight director available modes are TRK-FPA and HDG/VS
The autothrust available speed target is selected speed.

ILS APPROACHES

Only CAT 1 approaches may be flown since the DH indication is not available.

CHECK the ILS frequency and course on the RMP.
PUSH the LS pb on the EIS control panel.

The autopilot and flight director available modes are APP (LOC –G/S –LAND)
The autothrottle available speed target is selected speed

CHECK VAPP in the QRH.

FLIGHT PLAN INITIALIZATION THROUGH ACARS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

REQUEST FOR ACTIVE FLIGHT PLAN INITIALIZATION BEFORE ENGINE START

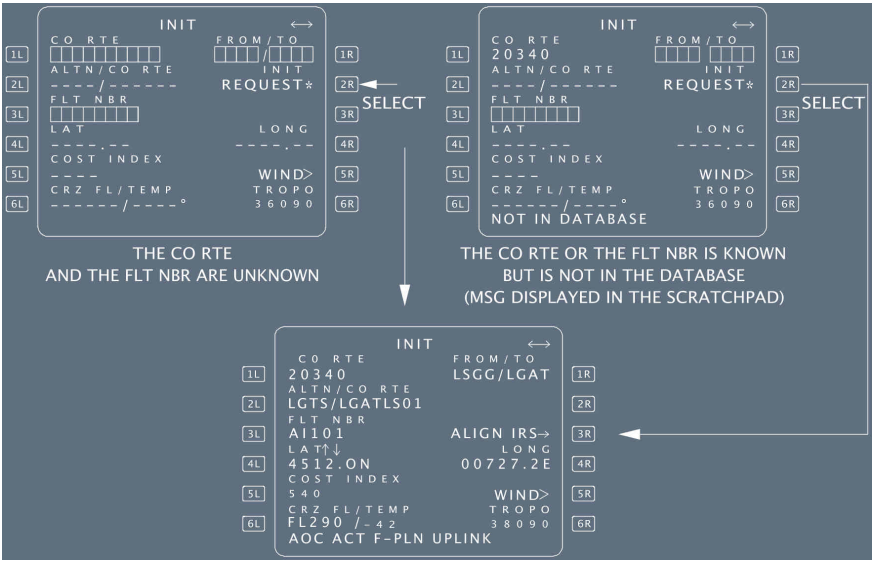
Before engine start, the crew may request a route for the active flight plan. When the route is received, “AOC ACT F-PLN UPLINK” message is displayed on the MCDU indicating that the flight plan has been received and automatically inserted.
After engine start, it is not possible to initialize directly the active flight plan since the received flight plan is automatically routed into the secondary, and the MDCU displays “AOC SEC F-PLN UPLINK”.

PROCEDURE

PRESS the INIT REQUEST * prompt.

The star (*) disappears, all data fields are dashed except:
- *CO RTE, FLT NBR if previously displayed and*
- *Ddefault values.*

The star is not displayed when the FMGS cannot communicate with the ACARS. No request can be sent.
When an active flight plan exists, INIT REQUEST prompt is removed from the active INIT page and no request can be sent for the active flight plan. If a flight plan is entered manually after the request, the uplink message is routed to the secondary.

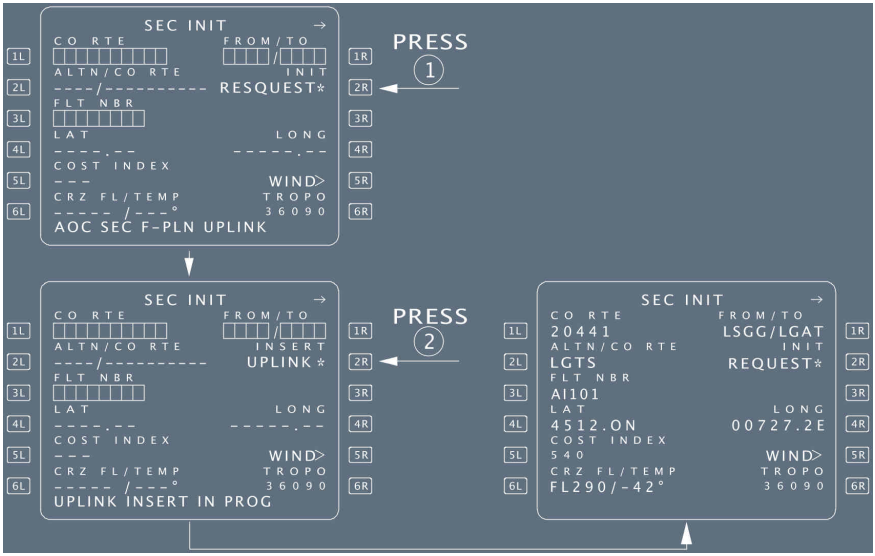


REQUEST FOR SECONDARY FLIGHT PLAN

A request for a secondary flight plan can be initiated anytime. Any flight plan received after engine start is automatically routed into the secondary flight plan.
When the flight plan is received, a message “AOC SEC F-PLN UPLINK” is displayed on the MCDU scratchpad.
Before engine start, and if the SEC F-PLN is empty, any uplinked flight plan is automatically inserted into the secondary flight plan, and no flight crew action is required.
After engine start, or if the SEC F-PLN is not empty, the flight crew must manually insert the uplinked flight plan via INSERT UPLINK prompt.

PROCEDURE TO INSERT OR REJECT A SECONDARY FLIGHT PLAN

When the uplink message is received, the INIT REQUEST prompt of the INIT A page is replaced by INSERT UPLINK (2R field). Pressing the 2R key will insert the flight plan into the secondary. Clearing the prompt will reject it.
If a temporary flight plan or a DIR TO is in progress, the uplink insertion is not accepted until the temporary flight plan or the DIR TO is completed.



FLIGHT PLAN INITIALIZATION THROUGH ACARS

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

1

REQUEST FOR ACTIVE FLIGHT PLAN INITIALIZATION BEFORE ENGINE START

Before engine start, the crew may request a route for the active flight plan. When the route is received, "AOC ACT F-PLN UPLINK" message is displayed on the MCDU indicating that the flight plan has been received and automatically inserted.
After engine start, it is not possible to initialize directly the active flight plan since the received flight plan is automatically routed into the secondary, and the MDCU displays "AOC SEC F-PLN UPLINK".

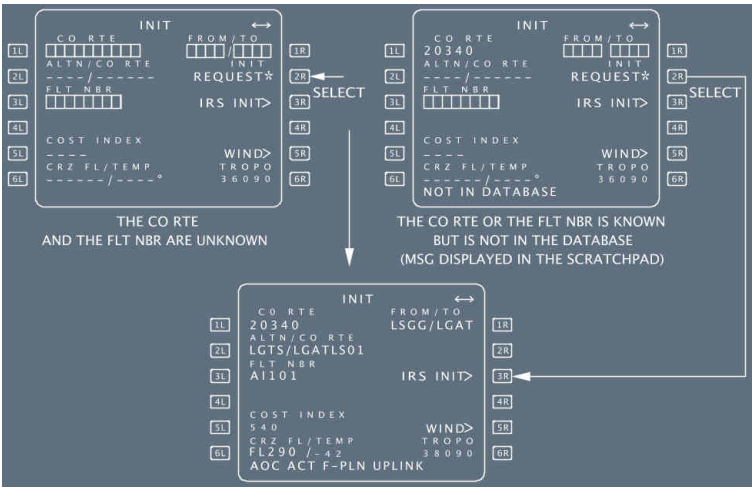
PROCEDURE

PRESS the INIT REQUEST * prompt.

The star (*) disappears, all data fields are dashed except:
- *CO RTE, FLT NBR if previously displayed and*
- *Ddefault values.*

The star is not displayed when the FMGS cannot communicate with the ACARS. No request can be sent.

When an active flight plan exists, INIT REQUEST prompt is removed from the active INIT page and no request can be sent for the active flight plan. If a flight plan is entered manually after the request, the uplink message is routed to the secondary.



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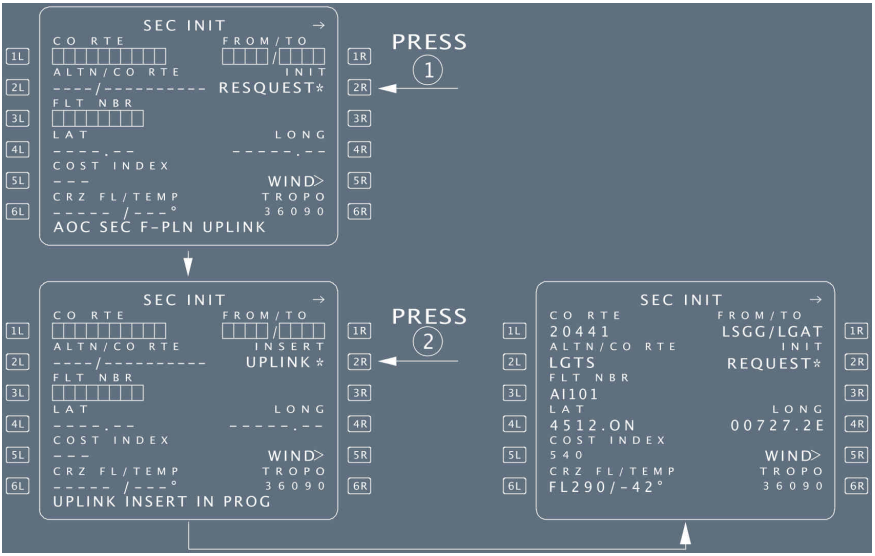
A request for a secondary flight plan can be initiated anytime. Any flight plan received after engine start is automatically routed into the secondary flight plan.
When the flight plan is received, a message “AOC SEC F-PLN UPLINK” is displayed on the MCDU scratchpad.
Before engine start, and if the SEC F-PLN is empty, any uplinked flight plan is automatically inserted into the secondary flight plan, and no flight crew action is required.
After engine start, or if the SEC F-PLN is not empty, the flight crew must manually insert the uplinked flight plan via INSERT UPLINK prompt.

PROCEDURE TO INSERT OR REJECT A SECONDARY FLIGHT PLAN

When the uplink message is received, the INIT REQUEST prompt of the INIT A page is replaced by INSERT UPLINK (2R field). Pressing the 2R key will insert the flight plan into the secondary. Clearing the prompt will reject it.
If a temporary flight plan or a DIR TO is in progress, the uplink insertion is not accepted until the temporary flight plan or the DIR TO is completed.



TAKEOFF DATA

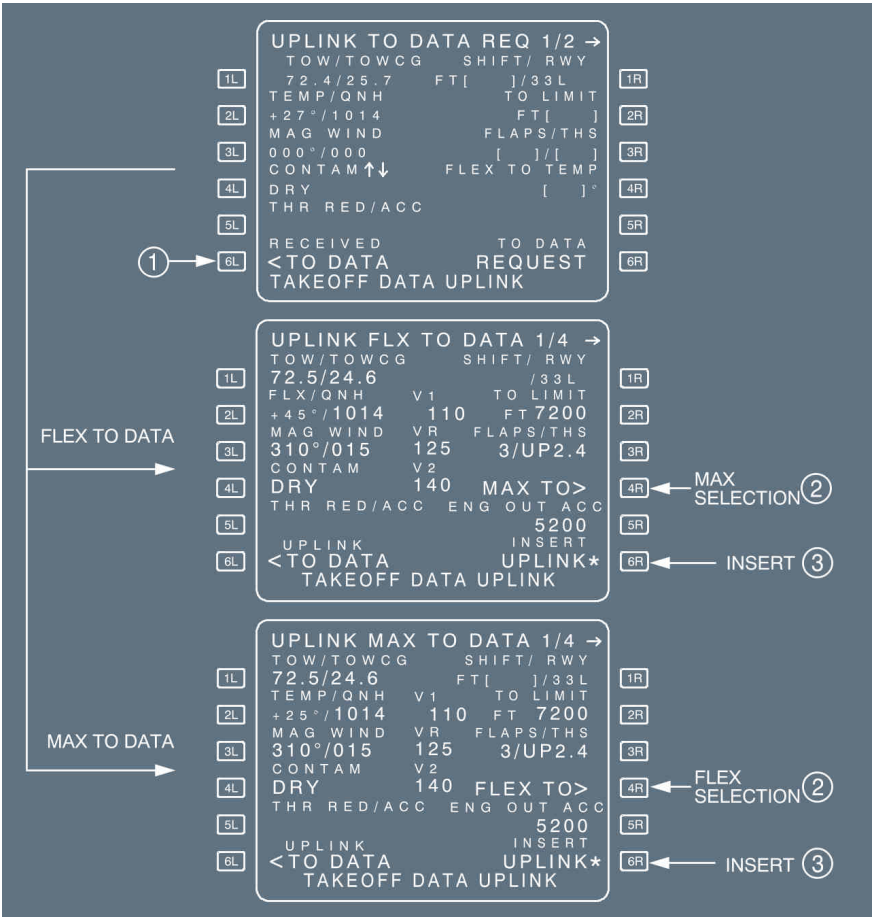
Applicable to: ALL

GENERAL

The takeoff data may be requested in preflight or done phase for the active flight plan only. It is always associated with the active flight plan message.

2 **PROCEDURE TO INSERT UPLINK TAKEOFF DATA**

PRESS the 6L key “RECEIVED TO DATA” when the message TAKEOFF DATA UPLINK is displayed.



This displays the uplink data on 2 different pages: *UPLINK MAX TO DATA*
UPLINK FLX TO DATA

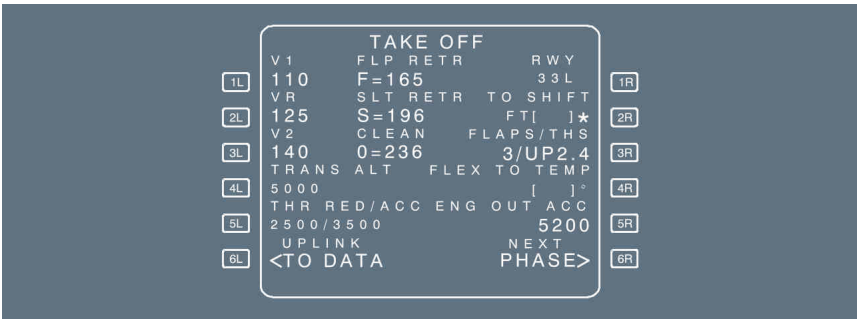
SELECT the data corresponding to the thrust to be used (MAX or FLEX) by pressing [4R].
SELECT the active runway data by slewing the pages (1/4... 4/4).

PRESS the [6R] key “INSERT UPLINK”.

UPLINK MAX TO DATA and UPLINK FLX TO DATA pages are not modifiable.

- **If the takeoff data displayed on this page are not relevant to the active runway entered in the flight plan** , the INSERT UPLINK prompt is not displayed.

- **When the takeoff data have been inserted** , the PERF TO page is amended of the new data.



WIND DATA

Applicable to: ALL

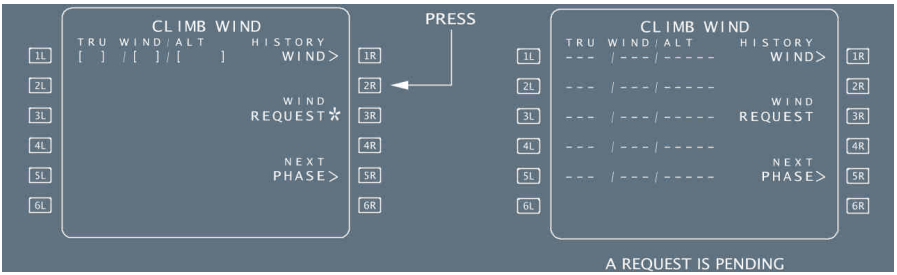
REQUEST FOR WIND DATA

To send a wind request, press the “WIND REQUEST” selection key of any wind pages. This request is automatically sent to the ground for one or more flight phases and for the selected flight plan (primary or secondary). The content of the wind request message is not dependent on the selected wind page (CLIMB, CRUISE or DESCENT) but on the flight phase in progress.

- For active flight plan or secondary flight plan that is a “COPY ACTIVE”, a wind request sent by the crew:
  - during preflight or takeoff phase, initiates a demand for climb, cruise, descent and alternate winds.
  - during climb and cruise phase, initiates a demand for cruise, descent and alternate winds.
  - during descent/approach and go around, no wind request is possible.
- For secondary flight plan that is not a “COPY ACTIVE” there is no restriction linked to flight phase.

Before engine start, and if data has not been entered in any WIND page for the flight plan, the uplinked wind data is automatically inserted into the flight plan, and no flight crew action is required.

If the uplinked wind message is received after engine start, or if data has been entered in any WIND page of the flight plan, the flight crew must manually insert the uplinked wind data via the INSERT UPLINK prompt.



When the amber star following the "WIND REQUEST" is not displayed, the FM is not able to communicate with the ACARS and the pilot cannot send any request.

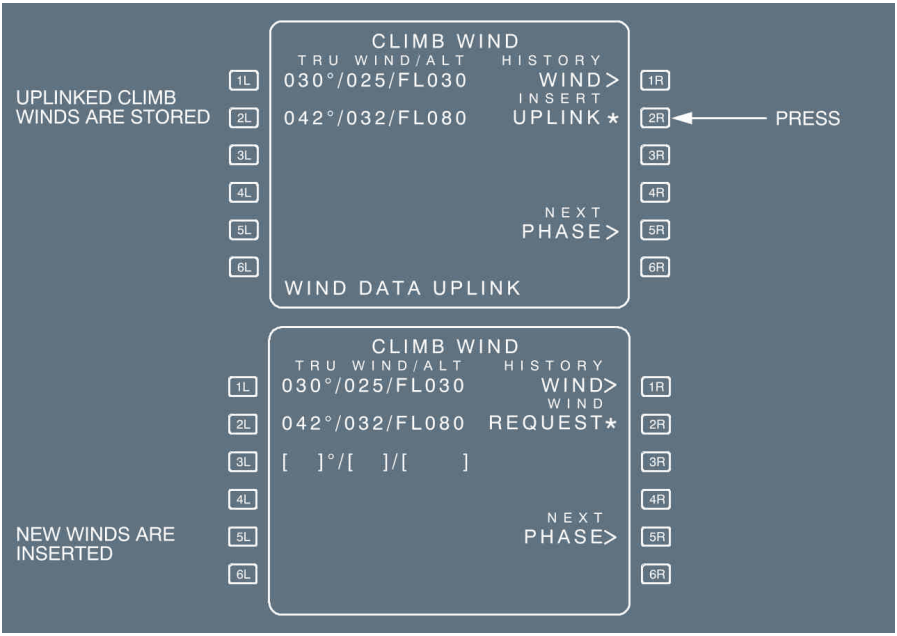
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

3 PROCEDURE TO INSERT WIND DATA

When the uplink message is received, the 2R field is modified, the amber "WIND REQUEST" is replaced by the blue "INSERT UPLINK*". This prompt, when pressed, enables the flight crew to insert the uplink wind data, phase by phase.

To access, review, insert or delete the uplink wind data of other phases, the crew uses "NEXT PHASE" or "PREV PHASE" key.

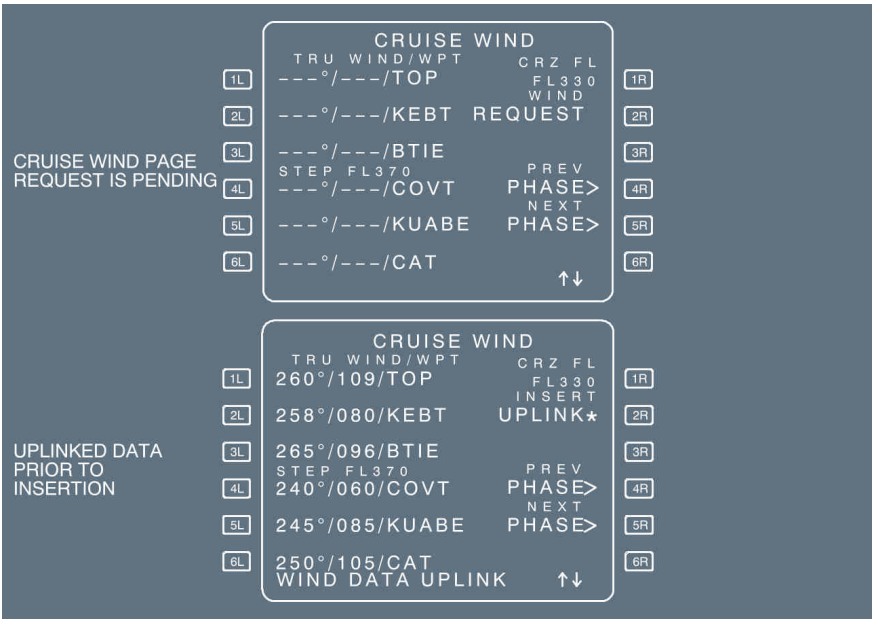
If the crew is not satisfied with the uplink winds, the flight crew will delete the winds, phase by phase clearing the "INSERT UPLINK" prompt. This will delete all the uplinked winds of the selected flight phase.



CLIMB WIND PAGE

When a request is pending, the history WIND page cannot be accessed.
When the climb phase is active, the crew cannot request neither modify the climb winds of the active flight plan or secondary flight plan if it is a copy active.

CRUISE WIND PAGE



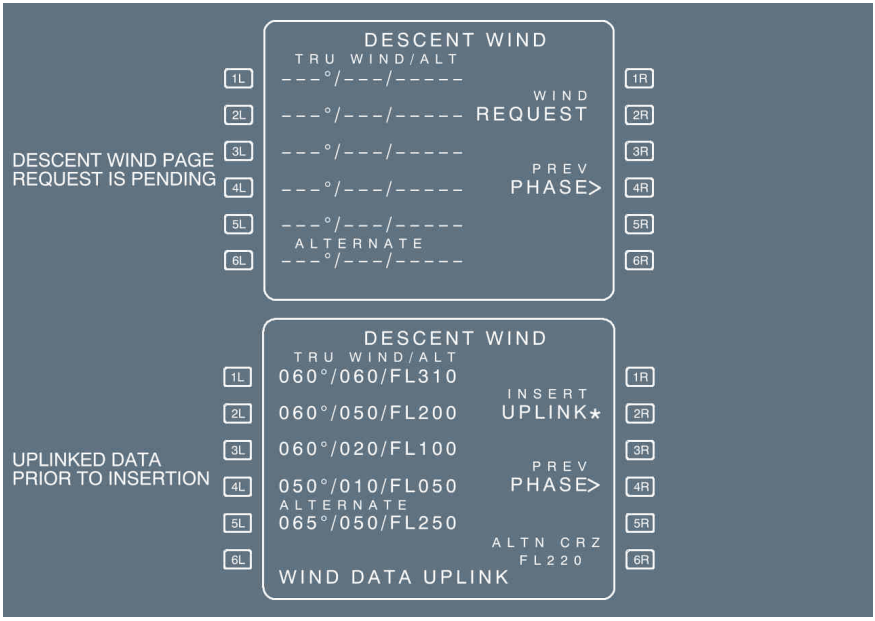
A wind request sent during cruise phase will apply for downpath waypoints of the cruise, descent, approach and alternate phases.

- If the uplink message contains more data and waypoints than the flight plan, the winds at extra waypoints are not considered and automatically discarded. This is transparent to the pilot
- Clearing the INSERT UPLINK* prompt deletes all uplink wind data of the cruise phase. Cruise page reverts to the previous data.

Note: *During cruise, whenever uplink wind data is received and not inserted or cancelled on the CRUISE WIND page, access to the DIR TO function is not possible. The "WIND UPLINK EXISTS" message is displayed on the MCDU scratchpad. Insert or cancel the uplinked wind message first and then access the DIR TO function.*

DESCENT WIND PAGE

The procedures to insert, review or delete descent winds during preflight, climb or cruise phase are described in the above wind general procedure.



If the alternate wind is not available, dashes are displayed in the field.

In descent, approach or go around phases, the pilot cannot request or modify the descent winds of the active flight plan or secondary flight plan if it is a “COPY ACTIVE”.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

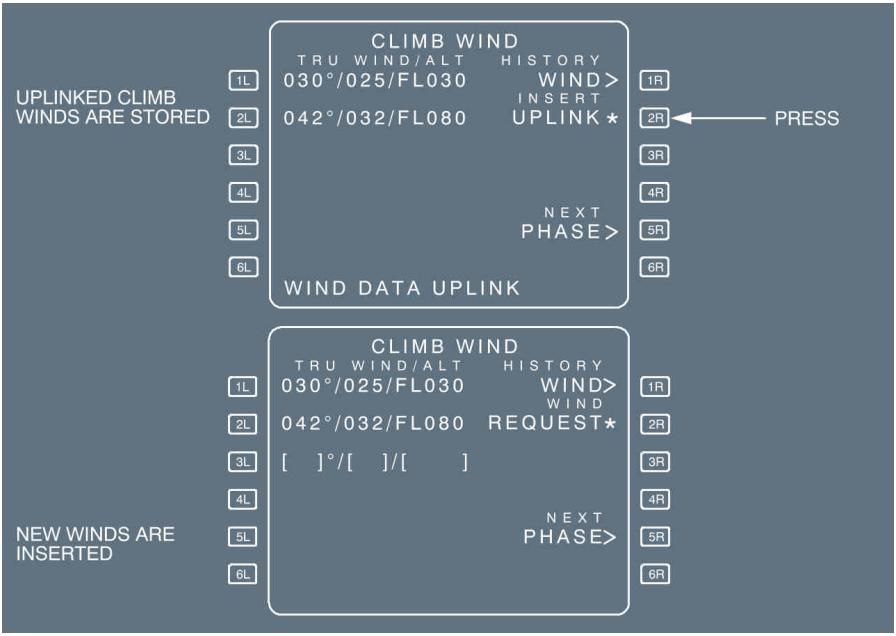
4

PROCEDURE TO INSERT WIND DATA

When the uplink message is received, the 2R field is modified, the amber “WIND REQUEST” is replaced by the blue “INSERT UPLINK*”. This prompt, when pressed, enables the flight crew to insert the uplink wind data, phase by phase.

To access, review, insert or delete the uplink wind data of other phases, the crew uses “NEXT PHASE” or “PREV PHASE” key.

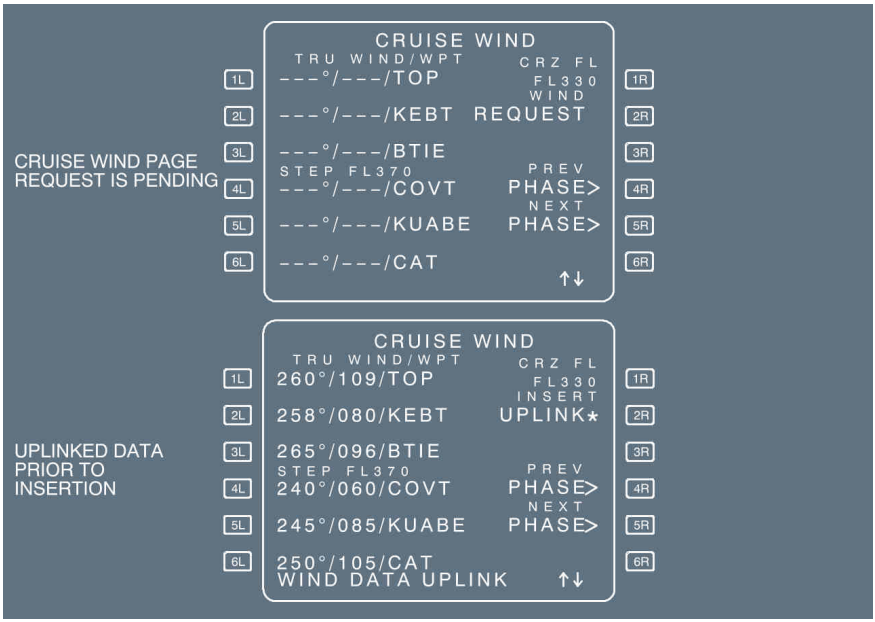
If the crew is not satisfied with the uplink winds, the flight crew will delete the winds, phase by phase clearing the “INSERT UPLINK” prompt. This will delete all the uplinked winds of the selected flight phase.



CLIMB WIND PAGE

When a request is pending, the history WIND page cannot be accessed.
When the climb phase is active, the crew cannot request neither modify the climb winds of the active flight plan or secondary flight plan if it is a copy active.

CRUISE WIND PAGE



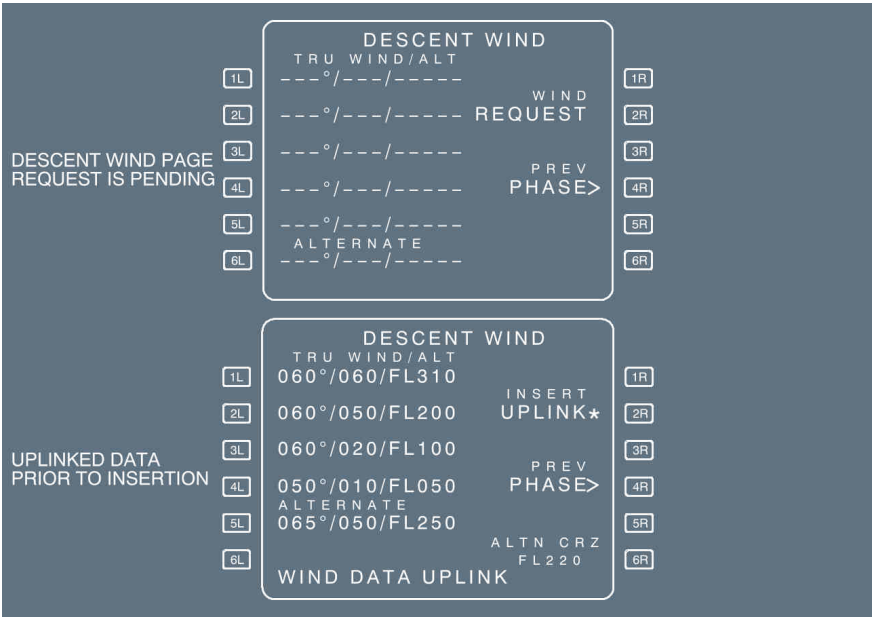
A wind request sent during cruise phase will apply for downpath waypoints of the cruise, descent, approach and alternate phases.

- If the uplink message contains more data and waypoints than the flight plan, the winds at extra waypoints are not considered and automatically discarded. This is transparent to the pilot
- Clearing the INSERT UPLINK* prompt deletes all uplink wind data of the cruise phase. Cruise page reverts to the previous data.

Note: *During cruise, whenever uplink wind data is received and not inserted or cancelled on the CRUISE WIND page, access to the DIR TO function is not possible. The "WIND UPLINK EXISTS" message is displayed on the MCDU scratchpad. Insert or cancel the uplinked wind message first and then access the DIR TO function.*

DESCENT WIND PAGE

The procedures to insert, review or delete descent winds during preflight, climb or cruise phase are described in the above wind general procedure.



If the alternate wind is not available, dashes are displayed in the field.
In descent, approach or go around phases, the pilot cannot request or modify the descent winds of the active flight plan or secondary flight plan if it is a “COPY ACTIVE”.

PRINT FUNCTION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

The PRINT function allows various reports to be printed either automatically (when linked to ACARS ◁ or ATSU ◁) or manually.

The manual PRINT function allows printing of FM-generated flight reports and additional data:

F-PLN	INITialization data
T.O.	Data
WIND	Data
PREFLIGHT	REPORT
IN FLIGHT	REPORT
POSTFLIGHT	REPORT

A detailed description of the PRINT FUNCTION pages is provided in *Refer to DSC-22_20-50-10-20 Print Function Pages - General*.
The print function is available if ACARS ◁ or ATSU ◁ are available or not.
The various flight reports contain most of the prediction information required by the flight crew to monitor the progress of the flight. The resulting documents can therefore be used as realistic master documents, based on the latest data provided by the flight crew to the computer, in terms of ATC clearances and weather information.

PRINT FUNCTION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

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The manual PRINT function allows printing of FM-generated flight reports and additional data:

F-PLN	INITialization data
T.O.	Data
WIND	Data
PREFLIGHT	REPORT
IN FLIGHT	REPORT
POSTFLIGHT	REPORT

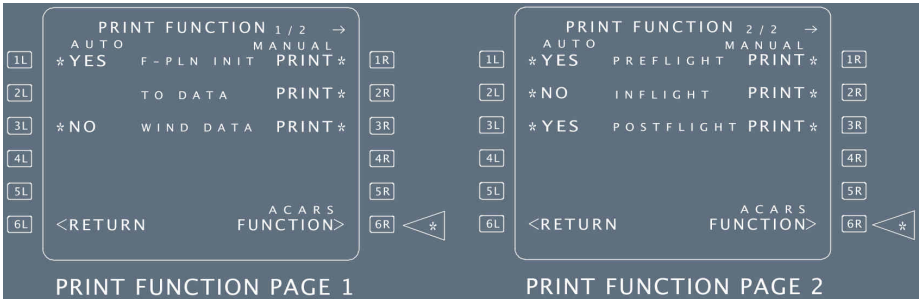
A detailed description of the PRINT FUNCTION pages is provided in *Refer to DSC-22_20-50-10-25 Print Function Pages*.
The print function is available if ACARS ◁ or ATSU ◁ are available or not.
The various flight reports contain most of the prediction information required by the flight crew to monitor the progress of the flight. The resulting documents can therefore be used as realistic master

documents, based on the latest data provided by the flight crew to the computer, in terms of ATC clearances and weather information.

PRINT FUNCTION ACCESS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

The PRINT FUNCTION page is accessed:
- From the DATA INDEX A PAGE, or
- From the AOC FUNCTION page (if ACARS).

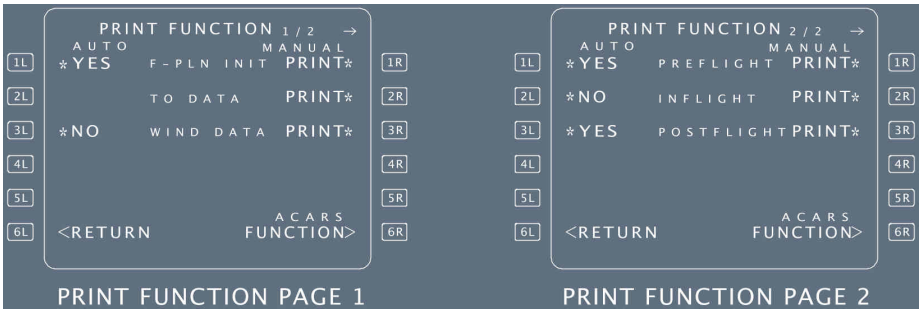


Note: For an automatic printing, "time" is the time of the reception of the message. For a manual printing, "time" is the time of the print request.

PRINT FUNCTION ACCESS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The PRINT FUNCTION page is accessed:
- From the DATA INDEX A PAGE, or
- From the AOC FUNCTION page (if ACARS).



Note: For an automatic printing, "time" is the time of the reception of the message. For a manual printing, "time" is the time of the print request.

ON GROUND BEFORE ENGINE START

Applicable to: ALL 320, B-HTG, B-HTH, B-HTI

When the overall F-PLN data (lateral, vertical including winds, steps, constraints) and the ZFW and ZFWCG values have been inserted:

SELECT the FUEL PLANNING prompt [3R],

- **If the computed BLOCK fuel does not correspond to the actual block fuel required for the flight:**

  ENTER the actual block required for the flight in the [2R] field,

  PRINT the PREFLIGHT report.

  The flight crew may then use the PREFLIGHT report to monitor the progress of the flight.

  Note: Before printing the PREFLIGHT report, the flight crew must check that the F-PLN is complete (all F-PLN discontinuities must be cleared) and that all the F-PLN elements (including winds, steps, constraints, alternate airport) have been inserted, in order to obtain an accurate PREFLIGHT report.

EXAMPLE (FM PREFLIGHT REPORT)

Applicable to: ALL 320, B-HTG, B-HTH, B-HTI

FM PREFLIGHT REPORT

DATE : 24 OCT 06
TIME : 07 : 24

A/C TYPE	: A320-200	DATABASE	: AB49402001
ENG TYPE	: CFM56-5B4	CYCLE	: 29 SEP-26 OCT
FLT NUMBER	: AIB 105	FROM/TO	: EINN/LFBO
CO RTE	:	ALTN	: LFBP
ALTN CO RTE	:		
PERF FACTOR	: +1.5	COST INDEX	: 100
IDLE FACTOR	: +0.0		

CRUISE FL/STEP START WPT
CRZ FL 1 : FL410

FLIGHT PLAN DATA

	DIST	TIME	CRZ FL		
DEST-LFBO	: 714	01:32	FL410		
ALTN-LFBP	: 80	01:52	FL220		
DEP RWY	: 24		ARV PRC	:	
DEP PRC	:		APR PRC	:	
			ARV RWY	:	

WPT	TIME	SPD/ALT	FOB	T. WIND	TAS	SAT	CRS	DIST
PREDICTED VALUES								
EINN24	00:00	133/-95	13.6	TL/040	-	+11	183	0
1520	00:00	159/1574	13.2	TL/040	163	+12	240	2
SHA	00:02	190/FL70	13.0	TL/040	211	+01	059	3
CRK	00:10	295/FL300	11.4	TL/040	459	-44	173	55
TIVLI	00:16	.82/FL400	11.2	TL/040	467	-57	140	50
LND	00:27	.84/FL410	11.0	TL/040	482	-57	140	99
NAKID	00:33	.84/FL410	10.9	TL/040	482	-57	130	46
LIZAD	00:34	.84/FL410	9.2	TL/040	482	-57	129	14
BALOT	00:38	.84/FL410	8.7	TL/040	482	-57	130	37
BERAT	00:41	.84/FL410	8.2	TL/040	482	-57	129	23
DIN	00:46	.84/FL410	7.6	TL/040	482	-57	128	47
NTS	00:56	.84/FL410	7.3	TL/040	482	-57	173	88
MINEL	01:02	.84/FL410	7.1	TL/040	482	-57	153	46
VENAR	01:05	.84/FL410	6.6	TL/040	482	-57	152	25
CGC	01:08	.84/FL410	6.1	TL/040	482	-57	153	34
VELIN	01:14	320/FL280	5.9	TL/040	482	-41	158	45
AGN	01:25	250/FL60	5.2	TL/040	274	+02	157	72
LFBO	01:32	128/550	5.2	TL/040	129	+14	001	27

FUEL PREDICTIONS

TAXI :	0.2	ZFWCG	: 25.0 %
TRIP (DEST) :	8.4	ZFW	: 51.2
RSV :	1.3	TOW	: 66.5
ALTN :	0.6	LW	: 55.9
FINAL :	1.8	CG	: —.-
EXTRA :	0.8		
BLOCK :	15.5		

MISC PERF DATA

TROPOPAUSE :	36090
CLB TRANS :	5000
CRZ TEMP :	-60

IN FLIGHT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

Once the aircraft has reached the CRZ FL once, all the latest ATC clearances have been inserted in the FM, when all the WINDS/STEPS have been properly updated:

ACCESS the PRINT FUNCTION page
PRINT the INFLIGHT REPORT

The inflight report provides the list of all the overflown F-PLN waypoints (HISTORY VALUES) with their associated data (Time, ALT, Fuel, ...), and the predictions to all the downpath waypoints (PREDICTED VALUES).
This new document replaces the PREFLIGHT report, since it carries all the latest expected F-PLN changes. It is the new applicable master document used to monitor the progress of the flight.
The inflight report will be printed after each important F-PLN modification.

IN FLIGHT

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

Once the aircraft has reached the CRZ FL once, all the latest ATC clearances have been inserted in the FM, when all the WINDS/STEPS have been properly updated:

ACCESS the PRINT FUNCTION page
PRINT the INFLIGHT REPORT

The inflight report provides the list of all the overflown F-PLN waypoints (HISTORY VALUES) with their associated data (Time, ALT, Fuel, ...), and the predictions to all the downpath waypoints (PREDICTED VALUES).
This new document replaces the PREFLIGHT report, since it carries all the latest expected F-PLN changes. It is the new applicable master document used to monitor the progress of the flight.
The inflight report will be printed after each important F-PLN modification.

Note: If the selected Fuel Unit option is pounds, the HISTORY FOB values may be incorrectly printed in tons on the INFLIGHT REPORT. The CURRENT and PREDICTED FOB values, however, are correctly printed in pounds.

EXAMPLE (FM INFLIGHT REPORT)

Applicable to: ALL 320, B-HTG, B-HTH, B-HTI

FM INFLIGHT REPORT

DATE : 24 OCT 06
TIME : 09 : 24

A/C TYPE	: A320-200	DATABASE	: AB49402001
ENG TYPE	: CFM56-5B4	CYCLE	: 29 SEP-26 OCT
FLT NUMBER	: AIB 105	FROM/TO	: LFBO/EINN
CO RTE	:	ALTN	: EIDW
ALTN CO RTE	:		
PERF FACTOR	: +1.5	COST INDEX	: 90
IDLE FACTOR	: +0.0		

CRUISE FL/STEP START WPT
CRZ FL 1 : FL390

FLIGHT PLAN DATA

	DIST	TIME	CRZ FL		
DEST-EINN	: 730	10:24	FL390		
ALTN-EIDW	: 106	10:50	FL220		
DEP RWY	: 14R		ARV PRC	:	
DEP PRC	: LMG3A		APR PRC	:	
			ARV RWY	:	

WPT	TIME	SPD/ALT	FOB	T. WIND	TAS	SAT	CRS	DIST
HISTORY VALUES								
LFB014R	08:29	126/536	13.6	HD/070	-	+12	142	0
1000	08:30	141/982	13.2	056°/003	141	+10	143	2
CURRENT POSITION : N43-37.9/E001-22.0								
	08:32	252FL63	13.6	HD/070	297	-11	350	10
PREDICTED VALUES								
OSKAM	08:34	320/FL130	10.4	HD/070	387	-11	350	14
LMG	08:52	.84/FL390	10.2	HD/070	482	-57	359	119
VERAC	08:59	.84/FL390	10.0	HD/070	482	-57	310	48
MAIXE	09:01	.84/FL390	9.9	HD/070	482	-57	310	18
NTS	09:11	.84/FL390	8.2	HD/070	482	-57	310	70
DIN	09:24	.84/FL390	7.7	HD/070	482	-57	352	88
BERAT	09:31	.84/FL390	7.2	HD/070	482	-57	309	47
BALOT	09:34	.84/FL390	6.6	HD/070	482	-57	309	23
LIZAD	09:40	.84/FL390	6.3	HD/070	482	-57	310	37
NAKID	09:42	.84/FL390	6.1	HD/070	482	-57	309	14
LND	09:48	.84/FL390	5.6	HD/070	482	-57	309	46
TIVLI	10:03	.84/FL390	5.1	HD/070	482	-57	322	99
CRK	10:10	320/FL170	4.9	HD/070	407	-19	319	50
SHA	10:23	128/900	4.2	HD/070	130	+13	353	55
EINN	10:24	128/100	4.2	HD/070	128	+15	001	2

FUEL INFORMATION AT 08:32

WEIGHT	CG	FOB	RSV/RSV%	FINAL	EXTRA
65.0	37.3%	13.6	0.4/5.0%	3.1	2.8

Note: In case of a major failure such as an engine out, a new print will be done when time permits.

REACHING THE GATE AFTER LANDING

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

The POSTFLIGHT REPORT gives a complete list of all the overflown waypoints during the flight (HISTORY VALUES).

Furthermore it provides:
- FUEL/TIME summary
- IRS Drift and G/S

When at the gate, after engine shutdown:
- ACCESS the PRINT FUNCTION page
- PRINT the POSTFLIGHT REPORT

REACHING THE GATE AFTER LANDING

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The POSTFLIGHT REPORT gives a complete list of all the overflown waypoints during the flight (HISTORY VALUES).

Furthermore it provides:
- FUEL/TIME summary
- IRS Drift and G/S

When at the gate, after engine shutdown:
- ACCESS the PRINT FUNCTION page
- PRINT the POSTFLIGHT REPORT

Note: *If the selected Fuel Unit option is pounds, the HISTORY FOB values may be incorrectly printed in tons on the POSTFLIGHT REPORT.*

EXAMPLE (FM POSTFLIGHT REPORT)

Applicable to: ALL 320, B-HTG, B-HTH, B-HTI

FM POSTFLIGHT REPORT

DATE : 24 OCT 06
TIME : 12 : 05

A/C TYPE	: A320-200	DATABASE	: AB49402001
ENG TYPE	: CFM56-5B4	CYCLE	: 29 SEP-26 OCT
FLT NUMBER	: AIB 105	FROM/TO	: EINN/LFBO
CO RTE	:	ALTN	: LFBP
ALTN CO RTE	:		
PERF FACTOR	: +1.5	COST INDEX	: 90
IDLE FACTOR	: +0.0		

FLIGHT PLAN DATA

	DIST	TIME	CRZ FL	
DEST-LFBO	: —	11:52	FL—	
ALTN/——	: —	—:—	FL—	
DEP RWY	: 06		ARV PRC	: AGN2T
DEP PRC	:		APR PRC	: VOR32L
			ARV RWY	: 32L

WPT	TIME	SPD/ALT	FOB	T. WIND	TAS	SAT	CRS	DIST
HISTORY VALUES								
EINN06	10:17	134/44	17.0	043/005	-	+11	053	0
1550	10:18	163/1536	16.9	235'/019	165	+08	050	2
SHA	10:18	161/1691	16.9	236'/019	163	+08	049	0
ABCRK	10:27	305/FL280	15.1	295'/049	459	-41	149	53
TIVLI	10:33	.80/FL330	14.8	298'/057	448	-64	143	46
LND	10:44	.84/FL330	14.1	320'/034	477	-61	129	111
ABLIZAD	10:51	.84/FL330	13.6	326'/034	474	-61	141	47
ABBERAT	10:58	.84/FL330	12.4	313'/029	480	-59	141	21
ABOIN	11:03	.84/FL330	12.2	326'/030	479	-60	142	44
ABNTS	11:13	.84/FL330	12.0	330'/034	481	-60	142	126
ABVENAR	11:21	.84/FL330	10.2	335'/028	479	-60	143	24
CGC	11:25	.84/FL330	9.7	339'/031	476	-61	150	33
VELIN	11:31	.84/FL330	9.2	352'/028	476	-60	154	45
AGN	11:40	312/FL220	8.6	050'/024	429	-26	149	72
SOTAK	11:40	321/FL190	8.3	052'/025	425	-20	141	5
D191K	11:44	253/FL90	8.1	347'/015	288	+00	137	24
D165R	11:46	253/4360	7.6	309'/014	265	+04	103	11
CD32L	11:49	175/2967	6.9	293'/009	180	+05	322	5
FD32L	11:50	253/FL1609	6.2	308'007	132	+08	323	4
LFB032L	11:52	132/674	6.2	326'/006	131	+11	321	3

FUEL AND TIME SUMMARY

START UP		SHUT DOWN	
FUEL : 17.0		FUEL	: 4.2
WEIGHT : 75.8		WEIGHT	: 65.0
TIME : 10.09		TIME	: 12:01
TO TIME : —.-		LDG TIME	: 11:52

IRS DATA AT : LFB032L

	IRS 1	IRS2	IRS 3
AVERAGE DRIFT	- 00.3 NM/H	00.4 NM/H	00.3 NM/H
RESIDUAL GND SPD	- 01.0 KTS	03.0 KTS	1.0 KTS

AIRCRAFT SYSTEMS

AUTO FLIGHT - FLIGHT GUIDANCE

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Localization Title	Toc Index	ID	Reason
DSC-22_30-20 General	A	1	Improvement of illustration quality.
DSC-22_30-70-50 Repressurization Segment	F	1	Improvement of illustration quality.
DSC-22_30-70-50 Descent Speed Profile	G	2	Improvement of illustration quality.
DSC-22_30-70-50 Descent Speed Profile	G	3	Improvement of illustration quality.
DSC-22_30-80-30-20 General	A	1	DU revised to improve illustration.
DSC-22_30-80-30-20 General	A	2	DU revised to improve illustration.
DSC-22_30-80-30-20 Engagement Conditions	E	3	Documentation update: Addition of "Engagement Conditions" documentary unit
DSC-22_30-90 A/THR Activation - General	D	1	Improvement of illustration quality.
DSC-22_30-90 A/THR Modes - RETARD Mode	H	2	Correction of the typing error "ARP" to "AP"

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GENERAL

Applicable to: ALL

The Flight Guidance (FG) part of the FMGS controls:
- The Flight Director (FD)
- The Autopilot (AP)
- The Autothrust (A/THR).

MODE REVERSIONS

Applicable to: ALL

There are several types of mode reversions. Each one observes a specific logic that is described in the "Mode Reversions" section. (*Refer to DSC-22_30-75 General*).

GUIDANCE MODES

Applicable to: ALL

Two types of autopilot and flight director modes are available to guide the aircraft:
- Managed modes: When the aircraft is using managed targets, the Flight Management and Guidance System (FMGS) guides it along lateral and vertical flight paths and speed profiles computed by the Flight Management function (FM) from data in the MCDU. FM manages the guidance targets.
- Selected modes: When the flight crew is using selected targets, the FMGS guides the aircraft along lateral and vertical flight paths and speed profiles to meet targets that the flight crew has selected manually on the FCU. The flight crew selects the guidance targets.

GUIDANCE	MANAGED modes	SELECTED modes
LATERAL	NAV, APP NAV LOC*, LOC RWY RWY TRK GA TRK ROLL OUT	HDG-TRK
VERTICAL	SRS (TO and GA) CLB, DES ALT CST, ALT CST* ALT CRZ G/S*, G/S FINAL, FINAL APP FLARE	OP CLB, OP DES V/S, FPA ALT*, ALT EXPEDITE
SPEED	FMGC REFERENCE (ECON, Auto SPD, SPD LIM) EXPEDITE	FCU REFERENCE

MODE SELECTION

Applicable to: ALL

MANAGED MODES

- At takeoff, the managed modes engage automatically when the flight crew sets the thrust levers at the TO or FLX detent.
- During flight, the flight crew can arm or engage the managed modes (if the aircraft meets engagement conditions) by pushing in the appropriate knobs on the Flight Control Unit (FCU).
- The flight crew pushes the DIR TO key on the MCDU to insert a DIR TO leg. It engages or maintains the NAV mode.
- The flight crew pushes the APPR pb on the FCU to arm or engage the localizer and glide slope or “APP NAV-FINAL”, depending upon the approach type insert in the flight plan.
- The LOC pb arms or engages only the localizer mode.

SELECTED MODES

The flight crew can engage the selected modes by pulling out the appropriate FCU selection knobs.

LATERAL MODES

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

MODE	TYPE	GUIDANCE	REMARK
RWY	MANAGED	Mode used at takeoff to guide the aircraft along the runway centerline, using LOC.	Triggered by the thrust levers at FLX or TOGA position.
RWY TRK	MANAGED	Mode used to guide the aircraft along the track the aircraft was following at mode engagement.	
NAV	MANAGED	Mode used to guide the aircraft along the lateral F-PLN. Available above 30 ft after takeoff.	Automatically armed at takeoff, unless HDG/TRK is preset. In that case, RWY TRK engages after takeoff.
HDG-TRK	SELECTED	Mode used to guide the aircraft on a heading or a track selected by the flight crew. The target value is displayed in the FCU window.	*Note:* *HDG/TRK is called "basic mode" because it is a backup mode for certain situations:* - *F-PLN discontinuity entry* - *AP engagement with no FD* - *Loss of F-PLN.*

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MODE	TYPE	GUIDANCE	REMARK
LOC* LOC APP NAV	MANAGED	Mode used to guide the aircraft on the lateral approach path (LOC or F-PLN approach path).	Selected by pressing APPR pb on the FCU ; the mode that engages depends upon the selected approach in the F-PLN. *Note: For LOC only approach, do not select the FCU's APPR pb, but rather the LOC pb.*
LAND	MANAGED	Common mode engaged below 400 ft RA during an automatic ILS approach.	Engaged only if LOC mode and G/S mode are already engaged.
GA TRK	MANAGED	Mode used to guide the aircraft along the track the aircraft was following at mode engagement.	Triggered by the thrust levers at TOGA with Slats/Flaps in at least CONF 1.
ROLL OUT	MANAGED	Mode used to guide the aircraft on the runway, following an automatic landing.	FD rollout symbol is displayed on the PFD at touchdown.

LATERAL MODES

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

MODE	TYPE	GUIDANCE	REMARK
RWY	MANAGED	Mode used at takeoff to guide the aircraft along the runway centerline, using LOC.	Triggered by the thrust levers at FLX or TOGA position.
RWY TRK	MANAGED	Mode used to guide the aircraft along the track the aircraft was following at mode engagement.	
NAV	MANAGED	Mode used to guide the aircraft along the lateral F-PLN. Available above 30 ft after takeoff.	Automatically armed at takeoff, unless HDG/TRK is preset. In that case, RWY TRK engages after takeoff.

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MODE	TYPE	GUIDANCE	REMARK
HDG-TRK	SELECTED	Mode used to guide the aircraft on a heading or a track selected by the flight crew. The target value is displayed in the FCU window.	*Note:* *HDG/TRK is called "basic mode" because it is a backup mode for certain situations:* - *F-PLN discontinuity entry* - *AP engagement with no FD* - *Loss of F-PLN* - *MCDU NAV BACK UP.*
LOC* **LOC** **APP NAV**	MANAGED	Mode used to guide the aircraft on the lateral approach path (LOC or F-PLN approach path).	Selected by pressing APPR pb on the FCU ; the mode that engages depends upon the selected approach in the F-PLN. *Note:* *For LOC only approach, do not select the FCU's APPR pb, but rather the LOC pb.*
LAND	MANAGED	Common mode engaged below 400 ft RA during an automatic ILS approach.	Engaged only if LOC mode and G/S mode are already engaged.
GA TRK	MANAGED	Mode used to guide the aircraft along the track the aircraft was following at mode engagement.	Triggered by the thrust levers at TOGA with Slats/Flaps in at least CONF 1.
ROLL OUT	MANAGED	Mode used to guide the aircraft on the runway, following an automatic landing.	FD rollout symbol is displayed on the PFD at touchdown.

VERTICAL MODES

Applicable to: ALL

MODE	TYPE	GUIDANCE	REMARK
SRS	MANAGED	Mode used at takeoff or go-around to maintain SRS speed (V2, V2+10, VAPP...).	Triggered by the thrust levers at FLX or TOGA position. Disengages automatically at ACC ALT or when another VERT mode is engaged.
CLB	MANAGED	Mode used to climb towards FCU selected altitude along VERT F-PLN taking into account ALT CSTR. Available only if NAV mode engaged. The A/THR is in thrust mode (CLB).	The speed target may be either selected or managed. If managed, SPD CSTR, SPD LIM and HOLD SPD are taken into account. ALT mode is always armed ; displayed in magenta if the next level off is predicted at an ALT CSTR, and in blue if the next level off is predicted at the FCU selected altitude.
DES	MANAGED	Mode used to descend towards FCU selected altitude along the computed descent path taking into account ALT CSTR. Available only if NAV mode engaged. The A/THR may be in THRUST or SPD mode.	
OP CLB **OP DES**	SELECTED	Mode used to climb/descent directly to the FCU selected altitude. These modes disregard all ALT CSTR. The A/THR is in THRUST mode (CLB/IDLE).	The speed target may be either selected or managed. ALT mode is systematically armed and blue. Altitude target is blue on PFD.
EXPEDITE ⩤	SELECTED	Mode used to increase the vertical speed by selecting green dot in climb or 0.80/340 kt in descent.	Used to expedite a climb or descent towards a specific level.
ALT CST* **ALT CST**	MANAGED	Mode automatically engaged when reaching an ALT CSTR before the FCU selected altitude.	CLB/DES mode are systematically armed (blue).
ALT* **ALT** **ALT CRZ**	SELECTED	Mode used to maintain a level flight at the FCU selected altitude.	Soft ALT mode engages when FCU selected altitude = CRZ FL. Soft ALT is part of the managed guidance.

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MODE	TYPE	GUIDANCE	REMARK
V/S-FPA	SELECTED	Mode used to guide the aircraft along a vertical speed or a selected flight path angle.	Altitude target is blue on PFD. V/S-FPA is a basic mode. (*Refer to DSC-22_30-10 Lateral Modes*).
G/S* G/S FINAL	MANAGED	Mode used to guide the aircraft along the final approach path (G/S or non ILS)	Selected by depressing the APPR pb on the FCU. The mode engaged depends upon the selected approach in the F-PLN. Linked to APPR common mode (APPR pb).
FLARE	MANAGED	Common mode which provides the alignment to the runway center line on the yaw axis and the flare on the pitch axis.	Engages below 50 ft RA as a function of the current vertical speed.

INTERACTION BETWEEN AP/FD AND A/THR MODES

Applicable to: ALL

The AP and FD pitch modes can control a target SPD/MACH or a vertical trajectory, and the A/THR mode can control a fixed thrust or a target SPD/MACH. However, the AP/FD and the A/THR cannot both control a target SPD/MACH simultaneously.

Therefore the AP/FD pitch modes and A/THR mode are coordinated as follows:
- If an AP/FD pitch mode controls a vertical trajectory, the A/THR mode controls the target SPD/MACH.
- If an AP/FD pitch mode controls a target SPD or MACH, the A/THR mode controls the thrust.
- If no AP/FD pitch mode is engaged, the A/THR mode reverts to controlling the SPD/MACH mode.

In other words, the selection of an AP/FD pitch mode determines which mode the A/THR controls.

AP/FD pitch modes	A/THR modes
V/S - FPA DES (geometric path) ALT*, ALT ALT CRZ*, ALT CRZ ALT CST*, ALT CST G/S*, G/S FINAL, FINAL APP	SPEED/MACH MODE
AP/FD OFF	

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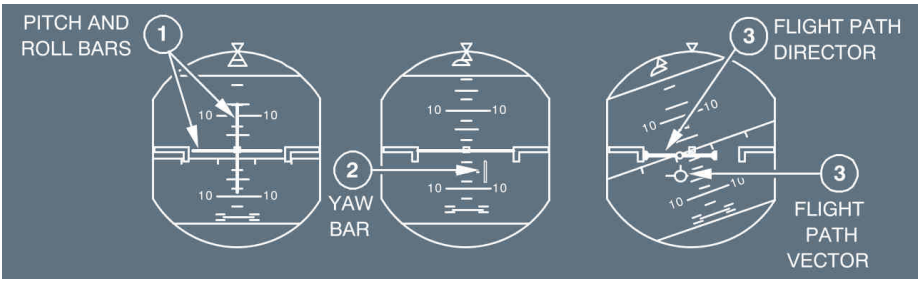
AP/FD pitch modes	A/THR modes
CLB/DES (idle path) OP CLB/OP DES EXP CLB/EXP DES ◁ SRS	THR (CLB, IDLE) MODE
FLARE	RETARD (IDLE)

GENERAL

Applicable to: ALL

1 The Flight Director (FD) displays guidance commands from the Flight Management and Guidance Computer (FMGC) on the Primary Flight Display (PFD).
The flight crew may manually fly the aircraft, following FMGC guidance commands, or crosscheck the FMGC orders when the autopilot is engaged.
In normal operations, FD1 displays FMGC1 orders on the PFD1 and FD2 displays FMGC2 orders on the PFD2.
The FDs use their respective onside FMGCs.

On the PFD:
1. The FD pitch and roll crossbars show pitch and roll demands.
2. Below 30 ft during landing and takeoff, when a localizer is available, the vertical bar is replaced by a yaw bar that gives lateral orders.
3. The Flight Path Director (FPD) symbol relates to the Flight Path Vector (FPV).



The HDG V/S – TRK FPA pb on the FCU enables the flight crew to select either type of reference and display.
The FD pb on the Electronic Flight Instrument System (EFIS) control panel allows the FD bars to be displayed or removed.

FD BARS (HDG V/S SELECTED ON THE FCU)

- The pitch bar is displayed if a vertical mode is engaged. It gives pitch orders for the vertical guidance
- The roll bar is displayed if a lateral mode is engaged. It gives roll orders for lateral guidance.

FLIGHT PATH DIRECTOR (TRK FPA SELECTED ON THE FCU)

The display is an alternate way of transmitting flight director commands.

- The Flight Path Vector (FPV) symbol illustrates the track and flight path angle actually being flown
- The Flight Path Director (FPD) symbol shows the flight crew how to intercept the required vertical and lateral flight trajectory. When the flight crew superimposes the FPV and the FPD symbols, the aircraft is flying the required trajectory.

YAW BAR

The yaw bar is displayed in RWY mode on takeoff and in FLARE and ROLL OUT modes at landing.

FLIGHT DIRECTOR (FD) ENGAGEMENT

Applicable to: ALL

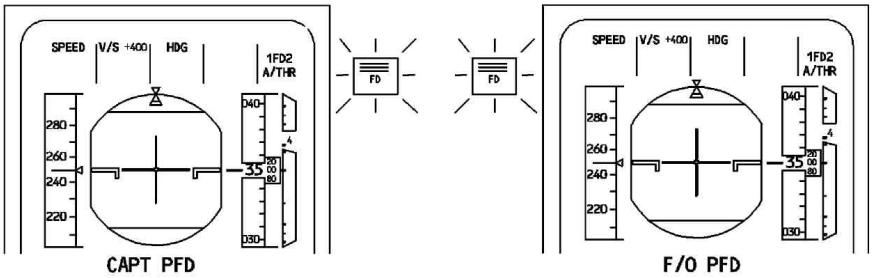
The FDs are engaged automatically when the FMGC powers up.

GROUND ENGAGEMENT

- The "1FD2" symbol appears on both PFDs
- No FD bars appear on the PFDs. (The PFD displays FD orders when a mode is active on the corresponding axis)
- The FCU windows display dashes.

MANUAL FLIGHT ENGAGEMENT

The two FDs engage in the HDG V/S or TRK FPA modes (basic modes).



AUTOMATIC FLIGHT ENGAGEMENT

FD bars are automatically restored in SRS/GA TRK modes at go-around engagement. If FPV/FPD was previously selected, it reverts to FD bars.

FLIGHT DIRECTOR (FD) DISENGAGEMENT

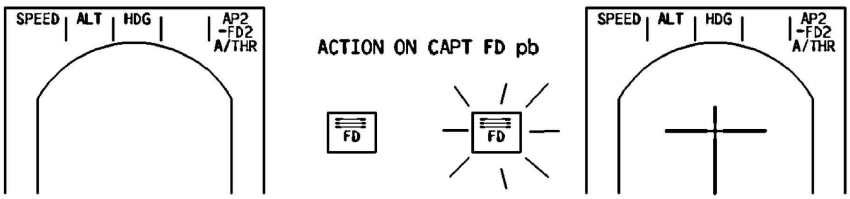
Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

The flight crew may disengage one or two FDs manually, or FDs may disengage automatically if there is a failure.

MANUAL DISENGAGEMENT

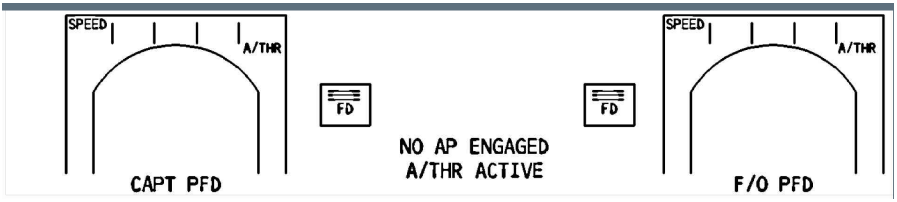
One FD OFF:

- The FD bars no longer appear on the associated PFD.
- The corresponding FD is disengaged.



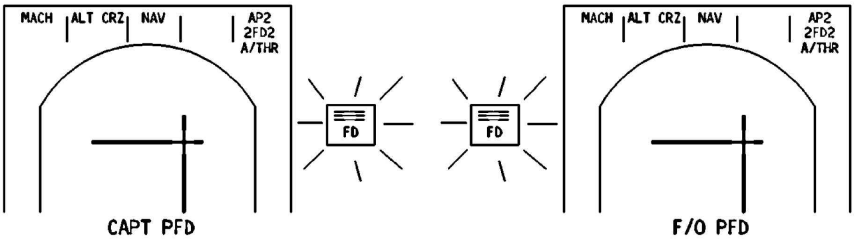
Both FDs OFF:

- The FD bars disappear from both PFDs.
- If no AP was engaged, lateral and vertical modes disengage. The A/THR, if active, automatically reverts to (or remains in) SPEED/MACH mode.
- If one AP was engaged when FDs are switched OFF, this AP remains engaged in the active modes but the FDs are no longer displayed.



AUTOMATIC DISENGAGEMENT

If one FD fails or one FMGC is not valid, both PFDs display the remaining FD.



FLIGHT DIRECTOR (FD) DISENGAGEMENT

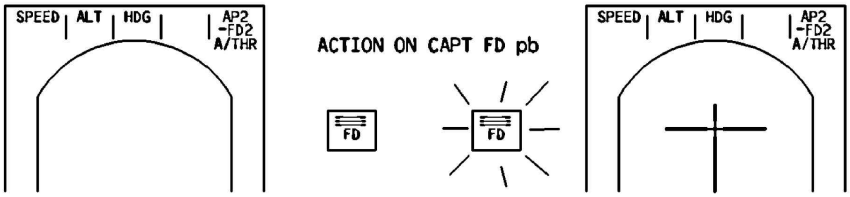
Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

The flight crew may disengage one or two FDs manually, or FDs may disengage automatically if there is a failure.

MANUAL DISENGAGEMENT

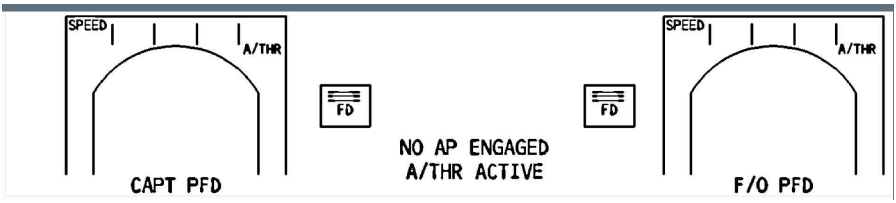
One FD OFF:

- The FD bars no longer appear on the associated PFD.
- The corresponding FD is disengaged.



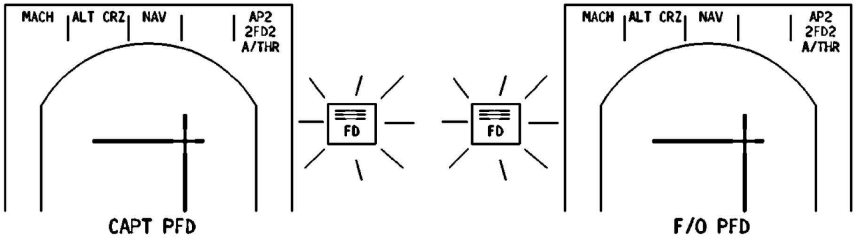
Both FDs OFF:

- The FD bars disappear from both PFDs.
- If no AP was engaged, lateral and vertical modes disengage. The A/THR, if active, automatically reverts to (or remains in) SPEED/MACH mode.
- If one AP was engaged when FDs are switched OFF, this AP remains engaged in the active modes but the FDs are no longer displayed.



AUTOMATIC DISENGAGEMENT

If one FD fails or one FMGC is not valid, both PFDs display the remaining FD.



AUTOMATIC DISENGAGEMENT DUE TO SPEED PROTECTION

When APs are not engaged and the flight crew does not follow the FD bars to maintain the commanded trajectory in climb with CLB or OP CLB (or EXP CLB ◁) engaged or in descent with DES or OP DES (or EXP DES ◁) engaged, the FDs will disengage at the activation of the automatic speed mode protection.

Refer to DSC-22_30-75 Reversion with Global Speed Protection - Automatic Speed Mode Protection in Climb.

AUTOMATIC FD REMOVAL

Applicable to: ALL

- The FD pitch bar is removed when no vertical mode is engaged or when ROLL OUT mode is engaged.
- The FD roll bar is removed when no lateral mode is engaged or when the RWY or ROLL OUT mode is engaged.
- Both FDs are removed when the aircraft pitch exceeds 25 ° up or 13 ° down, or bank angle exceeds 45 °.

Note: *If AP/FDs are OFF, and FD2 then FD1 are engaged within 180 ms (one computation cycle), a flip flop of master FMGC may occur.*
As a result, no vertical mode engages, the FMA 1st column, 1st line (A/THR mode) is blank or displays dashes.
Engaging V/S mode manually reselects the correct FMGC and restores the display.

FD WARNINGS

Applicable to: ALL

FD bar WARNINGS	CONDITIONS
Pitch FD bar (or FPV) flashes 10 s and then remains steady	- If the ALT* mode is lost further to FCU altitude reference change of more than 250 ft. - When in APPR mode (G/S*, G/S, LAND, FINAL), FD reverts to V/S mode (flight crew action or loss of vertical approach mode). - One AP or one FD is engaged while both AP/FD were previously OFF.
Pitch FD bar (or FPV) flashes permanently	Transmission of the GLIDE data is interrupted when in G/S, G/S* or LAND modes above 100 ft RA.
Roll FD bar (or FPV) flashes 10 s and then remains steady	- When in APPR mode (LOC*, LOC, LAND, APP NAV), FD reverts to HDG mode (flight crew action or loss of lateral approach mode). - One AP or one FD is engaged while both AP/FD were previously OFF.
Roll FD bar (or FPV) flashes permanently	Transmission of the LOC data is interrupted when in LOC, LOC* or LAND modes above 15 ft RA.

GENERAL

Applicable to: ALL

The AP:
- Stabilizes the aircraft around its center of gravity
- Acquires and tracks a flight path
- Flies the aircraft to an automatic landing or go-around.

The AP commands the:
- Position of the flight control surfaces for pitch, roll and yaw
- Nose wheel position.

AP ENGAGEMENT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The flight crew can engage AP1 or AP2 by pressing the corresponding pushbutton on the FCU if the aircraft has been airborne for at least 5 s.
When one AP is engaged, the corresponding FCU pushbutton comes on and AP1 (or 2) is displayed on the FMAs.

- One AP can be engaged on ground if the engines are not running. It disengages when one engine is started.
- Two APs may be engaged at a time (AP1 active, AP2 in standby), when the localizer/glide-slope or roll out or go-around mode is armed or engaged.
  Only one AP can be engaged at a time in all other cases.
- If one AP pb is set to ON with both FDs OFF, the AP engages in HDG V/S or TRK FPA mode, depending upon which mode the flight crew has selected on the FCU.
- If one AP pb is set to ON with at least one FD already ON, the AP engages in the current active FD modes.

AP engagement increases the break out force on the sidestick controllers and on the rudder pedals.
AP engagement is indicated by the lighting of the corresponding FCU pushbutton and by the appearance of AP1 (or 2) on the PFD's FMA.

AP ENGAGEMENT

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTG, B-HTH, B-HTI

The flight crew can engage AP1 or AP2 by pressing the corresponding pushbutton on the FCU if the aircraft has been airborne for at least 5 s.
When one AP is engaged, the corresponding FCU pushbutton comes on and AP1 (or 2) is displayed on the FMAs.

- One AP can be engaged on ground if the engines are not running. It disengages when one engine is started.
- Two APs may be engaged at a time (AP1 active, AP2 in standby), when the localizer/glide-slope or roll out or go-around mode is armed or engaged.
  Only one AP can be engaged at a time in all other cases.
- If one AP pb is set to ON with both FDs OFF, the AP engages in HDG V/S or TRK FPA mode, depending upon which mode the flight crew has selected on the FCU.
- If one AP pb is set to ON with at least one FD already ON, the AP engages in the current active FD modes.
- At takeoff, the AP cannot be engaged below 100 ft.

AP engagement increases the break out force on the sidestick controllers and on the rudder pedals.
AP engagement is indicated by the lighting of the corresponding FCU pushbutton and by the appearance of AP1 (or 2) on the PFD's FMA.

AP ENGAGEMENT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The flight crew can engage AP1 or AP2 by pressing the corresponding pushbutton on the FCU if the aircraft has been airborne for at least 5 s.
When one AP is engaged, the corresponding FCU pushbutton comes on and AP1 (or 2) is displayed on the FMAs.
In BACK–UP NAV, AP can be engaged in selected modes if the FG part is available.

- One AP can be engaged on ground if the engines are not running. It disengages when one engine is started.
- Two APs may be engaged at a time (AP1 active, AP2 in standby), when the localizer/glide-slope or roll out or go-around mode is armed or engaged.
  Only one AP can be engaged at a time in all other cases.
- If one AP pb is set to ON with both FDs OFF, the AP engages in HDG V/S or TRK FPA mode, depending upon which mode the flight crew has selected on the FCU.
- If one AP pb is set to ON with at least one FD already ON, the AP engages in the current active FD modes.
- At takeoff, the AP cannot be engaged below 100 ft.

AP engagement increases the break out force on the sidestick controllers and on the rudder pedals.
AP engagement is indicated by the lighting of the corresponding FCU pushbutton and by the appearance of AP1 (or 2) on the PFD's FMA.

AP DISENGAGEMENT

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

AP1 or 2 disengages when:
- The flight crew presses the takeover pb on the sidestick
- The flight crew presses the corresponding AP pb on the FCU
- The flight crew pushes on the sidestick harder than a certain threshold, or moves on the rudder pedals above a threshold
- The flight crew moves the pitch trim wheel beyond a certain threshold
- The other AP is engaged, except when localizer/glideslope modes are armed or engaged, or when the rollout or go-around mode is engaged
- Both thrust levers are set above the MCT detent and the aircraft is on ground
- In a non-precision approach, with FINAL APP mode engaged, the aircraft reaches:
  - The MDA/MDH -50 ft (if entered), or 400 ft AGL (if no MDA/MDH is entered), or
  - The Missed Approach Point (MAP), depending on which one comes first.
- One of the engagement conditions is lost.

Furthermore, in normal law with all protections available, the AP will disconnect if:
- High speed protection is active
- Angle-of-attack protection is active (α prot +1 ° is reached)
- Bank angle is greater than 45 °
- A rudder pedal deflection is more than 10 ° out of trim.

The standard way for the flight crew to disengage the AP is to press the takeover pb on the sidestick. When the AP is OFF, the associated FCU pushbutton goes off, and AP1 (or AP2) disappears from the PFD's FMA.

AP DISENGAGEMENT

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

AP1 or 2 disengages when:
- The flight crew presses the takeover pb on the sidestick
- The flight crew presses the corresponding AP pb on the FCU
- The flight crew pushes on the sidestick harder than a certain threshold, or moves on the rudder pedals above a threshold
- The flight crew moves the pitch trim wheel beyond a certain threshold
- The other AP is engaged, except when localizer/glideslope modes are armed or engaged, or when the rollout or go-around mode is engaged
- Both thrust levers are set above the MCT detent and the aircraft is on ground

- In a non-precision approach, with FINAL APP mode engaged, the aircraft reaches:
  - The MDA/MDH -50 ft (if entered), or 400 ft AGL (if no MDA/MDH is entered), or
  - The Missed Approach Point (MAP), depending on which one comes first.
- One of the engagement conditions is lost.

Furthermore, in normal law with all protections available, the AP will disconnect if:
- High speed protection is active
- Angle-of-attack protection is active (α prot +1 ° is reached)
- Pitch attitude exceeds 25 ° up, or 13 ° down, or bank angle exceeds 45 °
- A rudder pedal deflection is more than 10 ° out of trim.

The standard way for the flight crew to disengage the AP is to press the takeover pb on the sidestick. When the AP is OFF, the associated FCU pushbutton goes off, and AP1 (or AP2) disappears from the PFD's FMA.

AP DISENGAGEMENT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

AP1 or 2 disengages when:
- The flight crew presses the takeover pb on the sidestick
- The flight crew presses the corresponding AP pb on the FCU
- The flight crew pushes on the sidestick harder than a certain threshold, or moves on the rudder pedals above a threshold
- The flight crew moves the pitch trim wheel beyond a certain threshold
- The other AP is engaged, except when localizer/glideslope modes are armed or engaged, or when the rollout or go-around mode is engaged
- Both thrust levers are set above the MCT detent and the aircraft is on ground
- In a non-precision approach, the aircraft reaches the Missed Approach Point (MAP) with FINAL APP mode engaged.
- One of the engagement conditions is lost.

Furthermore, in normal law with all protections available, the AP will disconnect if:
- High speed protection is active
- Angle-of-attack protection is active (α prot +1 ° is reached)
- Pitch attitude exceeds 25 ° up, or 13 ° down, or bank angle exceeds 45 °
- A rudder pedal deflection is more than 10 ° out of trim.

The standard way for the flight crew to disengage the AP is to press the takeover pb on the sidestick. When the AP is OFF, the associated FCU pushbutton goes off, and AP1 (or AP2) disappears from the PFD's FMA.

AP WARNINGS

Applicable to: ALL

When the AP is disengaged, the system warns the flight crew:

- If the flight crew disengages it with the takeover pb on the sidestick, the warnings are temporary
- If the disengagement results from a failure, from the flight crew pushing the pushbutton on the FCU, or from a force on the sidestick, the visual and audio warnings are continual.

		AP DISENGAGEMENT	
		TAKEOVER pb on SIDESTICK	**BY OTHER MEANS**
CONSEQUENCE	**MASTER WARNING light**	Flashing red during 3 s maximum	Flashing red
	ECAM	AP OFF red message 9 s maximum	AUTO FLT AP OFF red warning
	AUDIO	Cavalry charge 0.5 s minimum 1.5 s maximum	Continuous cavalry charge 1.5 s minimum
	CLR pb on ECAM CONTROL PANEL	Extinguished	Illuminated
ACTION	**MASTER WARNING light**	- Extinguishes Master Warning light - Erases ECAM warning - Stops audio if pressed within 1.5 s	- Extinguishes Master Warning light - Stops audio after 1.5 s
	CLR pb on ECAM CONTROL PANEL	No effect	- Extinguishes CLR pb - Erases ECAM message - Calls status
	TAKEOVER pb	- Extinguishes Master Warning light - Erases ECAM warning - Stops audio if pressed within 1.5 s	- Extinguishes Master Warning light - Stops audio after 1.5 s
ECAM STATUS MESSAGE		NO	YES

AUTOLAND WARNING

Applicable to: ALL

The autoland red warning flashes in LAND mode when the radio altitude goes below 200 ft and:

- The aircraft gets too far off the beam (LOC or GLIDE), or
- Both glide slope transmitters or receivers fail above 100 ft, or
- Both localizer transmitters or receivers fail above 15 ft, or
- The difference between both radio altimeter indications is greater than 15 ft, or
- Both autopilots fail.

GENERAL

Applicable to: ALL

In flight, either the AP/FD pitch control, or autothrust may acquire and hold a target speed or Mach number, depending on the engaged modes.

Speed control is:
- Managed when the target comes from the FMGS
- Selected when the target comes from the SPD/MACH FCU window.

MANAGED SPEED/MACH TARGET

Applicable to: ALL

When the speed target is managed, the SPD/MACH window of the FCU shows dashes, and the corresponding dot is lighted. The PFD speed scale shows the speed target in magenta.

ENGAGEMENT CONDITIONS

The SPD target is managed, whenever AP or FD is engaged, and one of the following occurs:
- The flight crew pushes in the SPD/MACH knob
- EXPEDITE mode is engaged
- V2 is inserted in the MCDU
- The speed reference system (SRS) is engaged (takeoff or go-around mode).

Note: At takeoff, SRS will not engage if V2 is not available.

DISENGAGEMENT CONDITIONS

Managed speed disengages any time the flight crew selects a speed target on the FCU, or if the speed was preselected.

SPEED PROFILE

The form of the managed SPD profile depends on the lateral NAV mode.

- **If NAV mode is engaged, the SPD profile takes into account all the constraints linked to the flight plan.**
  The SPD profile is:
  V2 - SPD LIM - SPD CSTR (if applicable) - ECON CLB SPD/MACH - ECON CRZ MACH - ECON or preset DES MACH/SPD -SPD LIM - SPD CSTR (if applicable) - HOLD SPD (if applicable) - VAPP.
- **If NAV mode is not engaged, the SPD/MACH constraints are not considered.**
  The SPD profile is:
  V2 - SPD LIM - ECON CLB SPD/MACH - ECON CRZ MACH - ECON or preset DES MACH/SPD - SPD LIM - VAPP.

Note:
1. *When both AP/FDs are OFF, A/THR reverts to selected SPEED mode, except when the approach phase is activated on MCDU where both managed and selected SPD are available.*
2. *When expedite mode is engaged, the system disregards SPD LIM and SPD CSTR no matter what lateral mode is engaged.*
3. *The managed speed/Mach target may be set below maneuvering speed but as long as the speed target is managed, the FMGS limits the aircraft to the maneuvering speed of the current slats/flaps configuration (VAPP, F, S, Green Dot).*
4. *If the managed speed/Mach target is set above VMAX (VFE, VMO, MMO), the FMGS automatically limits the speed to VMAX.*
5. *If a SPD/MACH constraint has already been taken into account, it remains applied (until a more restrictive constraint applies).*

MINI GROUND SPEED

In approach phase, the managed speed target is the Mini Ground Speed target computed by the Flight Guidance (FG) part of the FMGS. *Refer to DSC-22_30-90 General* for details.

SELECTED SPEED/MACH TARGET

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

To use a selected speed/Mach target, the flight crew uses the knob on the FCU to set the target speed, which is then displayed in the FCU window. It is also displayed in blue on the PFD speed scale.

Note: *The selected speed/Mach target may be set beyond VLS or VMAX, but when autothrust is active, the guidance limits the speed to VLS or VMAX.*

Selected speed has priority over managed speed. The only automatic change-over from selected to managed speed target may occur at go-around mode engagement.
In flight, if the situation calls for managed speed, both the PFD and the MCDU display a message proposing a manual change to managed speed (for example, SET SPD AUTO, SET HOLD SPD, or SET VFTO ◁ or SET GREEN DOT ◁).

ENGAGEMENT CONDITIONS

The aircraft has a selected speed target under any one of the following conditions:
- The flight crew pulls out the SPD/MACH knob (5 s after lift-off)
- Both AP/FDs are OFF (except in APPR phase)
- The FM speed target is lost (except in SRS, G/S, LAND, and GO AROUND modes)

- The MCDU has a preselected speed for the next phase, and the aircraft transitions into that phase
- The FMGC is powered up in flight.

DISENGAGEMENT CONDITIONS

The selected speed target disengages:
- When the managed SPD engages
- When the aircraft is on ground at engine start.

Note: With engines running, the flight crew can select a speed on the FCU only after takeoff.

SELECTED SPEED/MACH TARGET

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

To use a selected speed/Mach target, the flight crew uses the knob on the FCU to set the target speed, which is then displayed in the FCU window. It is also displayed in blue on the PFD speed scale.

Note: The selected speed/Mach target may be set beyond VLS or VMAX, but when autothrust is active, the guidance limits the speed to VLS or VMAX.

Selected speed has priority over managed speed. The only automatic change-over from selected to managed speed target may occur at go-around mode engagement.
In flight, if the situation calls for managed speed, both the PFD and the MCDU display a message proposing a manual change to managed speed (for example, SET MANAGED SPEED, SET HOLD SPEED, or SET GREEN DOT SPEED).

ENGAGEMENT CONDITIONS

The aircraft has a selected speed target under any one of the following conditions:
- The flight crew pulls out the SPD/MACH knob (5 s after lift-off)
- Both AP/FDs are OFF (except in APPR phase)
- The FM speed target is lost (except in SRS, G/S, LAND, and GO AROUND modes)
- The MCDU has a preselected speed for the next phase, and the aircraft transitions into that phase
- The FMGC is powered up in flight.

DISENGAGEMENT CONDITIONS

The selected speed target disengages:
- When the managed SPD engages
- When the aircraft is on ground at engine start.

Note: With engines running, the flight crew can select a speed on the FCU only after takeoff.

AUTO SPD

Applicable to: ALL

The flight crew may insert the AUTO SPD (speed or Mach) on the PERF DES page to replace the ECON DES SPD.
In this case, the managed speed profile takes into account the selected value. The top of descent and the descent path are computed on AUTO SPD assumption.

SPEED/MACH SWITCHING

Applicable to: ALL

In managed speed, at the crossover altitude, the FMGC automatically changes the managed speed target to the corresponding MACH target. The FCU displays the Mach number corresponding to the speed at the switching altitude.

SPEED/MACH CROSS OVER TABLE.

ALTITUDE							
30500	280						
29500		290					
28500	295		300				
27500		305		310			
26500	300		315		325		
25500		310		325		330	
24500			320		335		350
MACH	0.76	0.77	0.78	0.79	0.80	0.81	0.82

Note: *When the speed is selected, the flight crew has to perform the switching manually by pressing the SPD/MACH pb on the FCU. The FCU then displays the aircraft Mach number.*

When the target speed is managed, the FMGC commands the switchover automatically as a function of the ECON MACH value.

MANAGED SPEED TARGET MEMORIZATION

Applicable to: ALL

A dual FM failure has different consequences when it occurs in different phases of the flight.

The system handles target speed and SPD mode as follows:
- During approach with LOC and G/S engaged and radio altitude < 700 ft, the target speed is set to VAPP as previously memorized, and managed SPD target is maintained.
- At go-around, the target speed becomes the memorized go-around speed, which is the higher of VAPP or the speed when go-around was initiated. Managed SPD target is maintained.
- In all other cases, managed target speed reverts to selected, the value being the speed at the moment of the failure.

SPEED/MACH FCU WINDOW SYNCHRONIZATION

Applicable to: ALL

When the target SPD is managed, the SPD/MACH display of the FCU shows dashes.

However, the window displays the target SPD or MACH in the following situations:
- The flight crew turns the SPD/MACH knob.
  If the flight crew does not pull the knob within 10 s after turning it, the selection reverts to dashes.
- The flight crew manually engages a selected SPD target.
- If the flight crew has manually preselected a speed or Mach number for the next phase on the MCDU PERF page, that preselected SPD/MACH engages when the aircraft enters that phase and the FCU window then displays as the target the preselected speed or Mach.
- If the FMGS is powered up in flight, the synchronized speed/Mach value is the current aircraft speed or Mach number.
- If no V2 is entered at takeoff, the V/S mode engages 5 s after lift-off (no speed reference system). The FCU speed target is the speed at V/S mode engagement. (A/THR becomes active when the thrust levers are set in the active range).

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AP/FD MODES GENERAL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The FMGS has guidance parameters for both AP/FD lateral and vertical modes.

The AP/FD lateral modes are:

RWY, RWY TRK	Runway, Runway track mode
NAV	Nav mode
HDG, TRK	Heading, track mode. Also called basic modes
APP NAV	Approach Nav mode
LOC*, LOC	Loc capture, Loc track mode
LAND	Land mode. Managed submode that includes LOC and G/S modes below 400 ft RA
FINAL APP	Final approach mode. Managed submode that includes APP NAV and FINAL modes during non precision approach
ROLL OUT	Roll out mode (Autoland)
GA TRK	Go-around track mode

The AP/FD vertical modes are:

SRS	SRS mode used for takeoff and go-around
CLB	Climb mode
DES	Descent mode
OP CLB	Open Climb mode
OP DES	Open Descent mode
EXP CLB	Expedite mode in climb
EXP DES	Expedite mode in descent
V/S or FPA	Vertical Speed mode or Flight Path Angle mode. Also called basic modes
ALT*	Altitude capture
ALT	Altitude Hold mode
ALT CST*	Altitude constraint capture
ALT CST	Altitude constraint hold mode
ALT CRZ	Altitude hold of the cruise flight level
G/S*	Glide slope capture
G/S	Glide slope mode
FINAL	Final mode (Non precision approach)
FLARE	Flare mode (Autoland)

AP/FD MODES GENERAL

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The FMGS has guidance parameters for both AP/FD lateral and vertical modes.

The AP/FD lateral modes are:

RWY, RWY TRK	Runway, Runway track mode
NAV	Nav mode
HDG, TRK	Heading, track mode. Also called basic modes
APP NAV	Approach Nav mode
LOC*, LOC	Loc capture, Loc track mode
LAND	Land mode. Managed submode that includes LOC and G/S modes below 400 ft RA
FINAL APP	Final approach mode. Managed submode that includes APP NAV and FINAL modes during non precision approach
ROLL OUT	Roll out mode (Autoland)
GA TRK	Go-around track mode

The AP/FD vertical modes are:

SRS	SRS mode used for takeoff and go-around
CLB	Climb mode
DES	Descent mode
OP CLB	Open Climb mode
OP DES	Open Descent mode
EXP CLB	Expedite mode in climb
EXP DES	Expedite mode in descent
V/S or FPA	Vertical Speed mode or Flight Path Angle mode. Also called basic modes
ALT*	Altitude capture
ALT	Altitude Hold mode
ALT CST*	Altitude constraint capture
ALT CST	Altitude constraint hold mode
ALT CRZ	Altitude hold of the cruise flight level
G/S*	Glide slope capture
G/S	Glide slope mode
FINAL	Final mode (Non precision approach)
FLARE	Flare mode (Autoland)

HEADING OR TRACK: HDG - TRK

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO

These modes guide the aircraft laterally along a heading or track selected by the flight crew. The HDG/TRK window of the FCU displays the target heading or track. The flight crew uses the HDG V/S -TRK FPA pb to select heading or track.

ENGAGEMENT CONDITIONS

HDG or TRK is engaged when one of the following conditions is met:
- The flight crew pulls out the HDG/TRK knob (not sooner than 5 s after lift-off)
- NAV is disengaged, either by the loss of the lateral flight plan or by the flight crew entering a flight plan discontinuity
- FINAL mode (armed or engaged) is lost when the aircraft is in APP NAV mode
- LOC or LOC* mode is lost
- The flight crew engages the AP/FD with no other mode already engaged (basic mode of AP/FD engagement)
- LOC mode is armed when APP NAV FINAL were previously engaged.

DISENGAGEMENT CONDITIONS

The engagement of any other lateral mode disengages HDG or TRK.

SYNCHRONIZING THE HDG/TRK WINDOW OF THE FCU

The lateral window of the FCU displays a heading or a track value when:
- The HDG/TRK mode is engaged. The displayed value is the current HDG/TRK or the manually selected value of the target
- The flight crew turns the HDG/TRK knob. The value in the window first synchronizes with the current HDG/TRK, then displays the manual selection. It remains displayed for 10 s or 45 s depending upon FCU standard, then vanishes if the flight crew does not pull the knob (except in HDG preset)
- A HDG/TRK is preset (*Refer to DSC-22_30-60 HDG/TRK Preset*)
- AP/FD is lost. The value becomes that of the aircraft current heading or track.

Note: *If HDG is switched to TRK (or vice versa), the value displayed in the window switches from heading to track (or vice versa).*

HEADING OR TRACK: HDG - TRK

Applicable to: B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

These modes guide the aircraft laterally along a heading or track selected by the flight crew. The HDG/TRK window of the FCU displays the target heading or track. The flight crew uses the HDG V/S -TRK FPA pb to select heading or track.

ENGAGEMENT CONDITIONS

HDG or TRK is engaged when one of the following conditions is met:
- The flight crew pulls out the HDG/TRK knob (not sooner than 5 s after lift-off)
- NAV is disengaged, either by the loss of the lateral flight plan or by the flight crew entering a flight plan discontinuity
- FINAL mode (armed or engaged) is lost when the FMS profile validity is lost (e.g. overflying the MAP)
- LOC or LOC* mode is lost
- The flight crew engages the AP/FD with no other mode already engaged (basic mode of AP/FD engagement)
- The flight crew presses the LOC pb, when APP NAV or FINAL APP modes are already engaged

HDG engages if the flight crew initiates a go-around below 100 ft and HDG or TRK was already engaged. When the aircraft is at 100 ft or above, HDG or TRK are no longer engaged.

DISENGAGEMENT CONDITIONS

The engagement of any other lateral mode disengages HDG or TRK.

SYNCHRONIZING THE HDG/TRK WINDOW OF THE FCU

The lateral window of the FCU displays a heading or a track value when:
- The HDG/TRK mode is engaged. The displayed value is the current HDG/TRK or the manually selected value of the target
- The flight crew turns the HDG/TRK knob. The value in the window first synchronizes with the current HDG/TRK, then displays the manual selection. It remains displayed for 10 s or 45 s depending upon FCU standard, then vanishes if the flight crew does not pull the knob (except in HDG preset)
- A HDG/TRK is preset (*Refer to DSC-22_30-60 HDG/TRK Preset*)
- AP/FD is lost. The value becomes that of the aircraft current heading or track.

Note: *If HDG is switched to TRK (or vice versa), the value displayed in the window switches from heading to track (or vice versa).*

HDG/TRK PRESET

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO

The system has a HDG/TRK preset function for takeoff and go-around.
If the flight crew chooses not to fly the flight plan after takeoff or go-around, they may preset a HDG or a TRK on the FCU by turning the HDG/TRK knob. The value they set remains displayed in the FCU HDG/TRK window until they pull the knob.

OPERATION AT TAKEOFF

HDG/TRK preset is available before takeoff and up to 30 ft RA. Turning the HDG/TRK knob before 30 ft sets the desired HDG/TRK. As a consequence:
- NAV is disarmed
- At 30 ft, RWY TRK is annunciated until the HDG/TRK knob is pulled.

OPERATION AT GO-AROUND

Whenever the LOC*, LOC, LAND, FINAL APP, or GA modes are engaged, the HDG preset is available. If the flight crew rotates the HDG/TRK knob to set the value, it will remain displayed in the window. Pull out the HDG/TRK knob to activate the mode and turn the aircraft to the preset value.

CANCELLATION

The flight crew can cancel a preset HDG/TRK by:
- Engaging the NAV mode using the DIR TO
- Pushing in the HDG/TRK knob (arming NAV mode)
- Disengaging AP/FD.

HDG/TRK PRESET

Applicable to: B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The system has a HDG/TRK preset function for takeoff and go-around.
If the flight crew chooses not to fly the flight plan after takeoff or go-around, they may preset a HDG or a TRK on the FCU by turning the HDG/TRK knob. The value they set remains displayed in the FCU HDG/TRK window until they pull the knob.

OPERATION AT TAKEOFF

HDG/TRK preset is available before takeoff and up to 30 ft RA. Turning the HDG/TRK knob before 30 ft sets the desired HDG/TRK. As a consequence:
- NAV is disarmed
- At 30 ft, RWY TRK is annunciated until the HDG/TRK knob is pulled.

OPERATION AT GO-AROUND

Whenever the LOC*, LOC, LAND, FINAL APP, or GA modes are engaged, the HDG preset is available. If the flight crew rotates the HDG/TRK knob to set the value, it will remain displayed in the window. Pull out the HDG/TRK knob to activate the mode and turn the aircraft to the preset value.
When overflying the MAP, HDG/TRK will synchronize with the current value. The HDG/TRK preset function is no longer available.

CANCELLATION

The flight crew can cancel a preset HDG/TRK by:
- Engaging the NAV mode using the DIR TO
- Pushing in the HDG/TRK knob (arming NAV mode)
- Disengaging AP/FD.

NAVIGATION (NAV)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO

NAV mode is a managed mode that steers the aircraft laterally along the flight plan defined in the FMGS. It is designed to have a zero cross-track error. The flight crew can arm or engage the NAV mode if the MCDU contains a lateral flight plan.

ARMING CONDITIONS

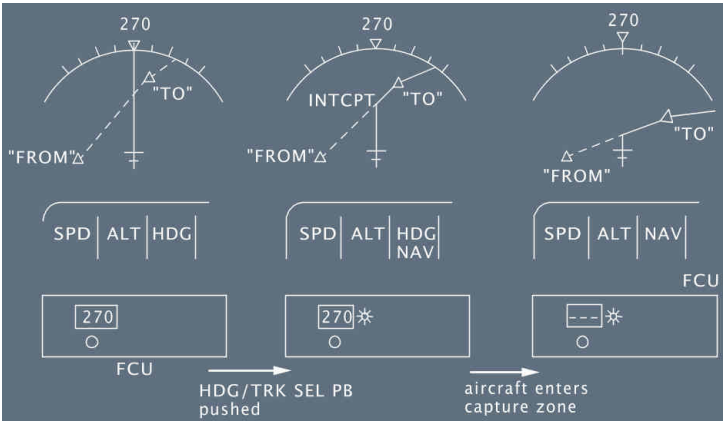
Satisfying one of the following conditions arms NAV:
- The aircraft is on ground with no HDG/TRK preset and no other lateral mode except runway mode
- The flight crew pushes in the HDG/TRK knob, unless the LOC mode is engaged
- The flight crew presses the APPR pb, if a non-ILS approach is selected.

DISARMING CONDITIONS

NAV mode disarms if one of the following occurs:
- The flight crew pulls out the HDG/TRK knob
- The flight crew selects a preset HDG/TRK (TO or GA)
- The flight crew arms the LOC mode by pressing the LOC pb
- The flight crew selects GA mode
- LAND mode has engaged
- The flight crew presses the APPR pb, if an XLS approach is selected.

ENGAGEMENT CONDITIONS

NAV mode engages:
- Automatically at 30 ft RA after takeoff (if armed on the ground)
- When the flight crew orders “DIR TO"(except below 700 ft RA in LOC mode)
- When the flight crew pushes in the HDG/TRK knob when the aircraft is close to (within ~1 nm of) the active flight plan leg
- Automatically in flight when NAV is armed and the aircraft reaches the capture zone for the active flight plan leg.



CAUTION	When NAV is armed, it will automatically engage if: - The aircraft track line intercepts the flight plan before the TO waypoint, and - The intercept waypoint (INTCPT) is displayed on the ND, and - The aircraft reaches the active flight plan leg.

Note: The TO waypoint is displayed in white on NDs and MCDUs.

DISENGAGEMENT CONDITIONS

The NAV mode disengages when:
- Any other lateral mode is engaged
- The flight plan is lost or the aircraft enters a flight plan discontinuity.

INTERACTIONS WITH VERTICAL MODES

When NAV mode is engaged, the vertical managed modes CLB or DES or FINAL take into account altitude and speed constraints linked to waypoints on the lateral flight plan. If NAV mode is disengaged, the vertical managed modes are not available and all downpath altitude and speed constraints are ignored.

NAVIGATION (NAV)

Applicable to: B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

NAV mode is a managed mode that steers the aircraft laterally along the flight plan defined in the FMGS. It is designed to have a zero cross-track error. The flight crew can arm or engage the NAV mode if the MCDU contains a lateral flight plan.

ARMING CONDITIONS

Satisfying one of the following conditions arms NAV:

- The aircraft is on ground with no HDG/TRK preset and no other lateral mode except runway mode
- The flight crew pushes in the HDG/TRK knob, unless the LOC mode is engaged
- The flight crew presses the APPR pb, if a non-ILS approach is selected
- A go-around is initiated, unless HDG/TRK is already preset.

DISARMING CONDITIONS

NAV mode disarms if one of the following occurs:

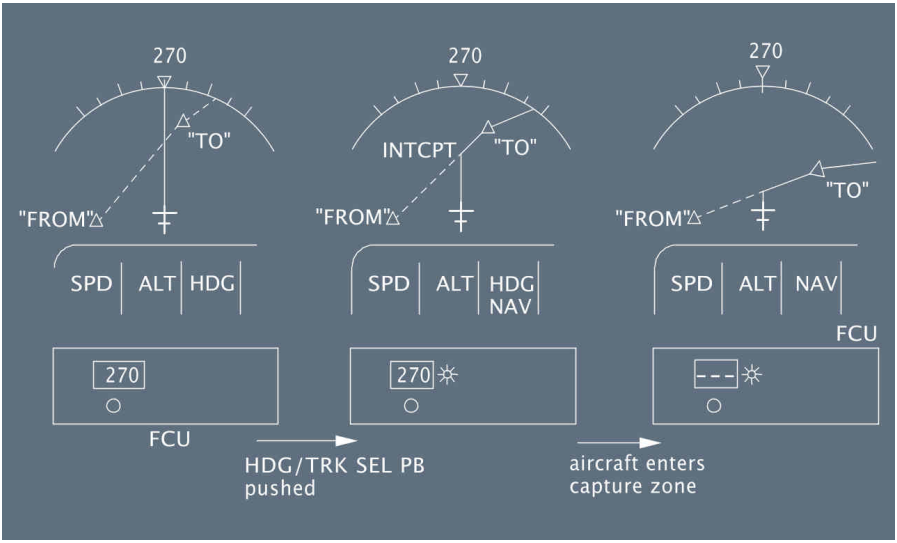
- The flight crew pulls out the HDG/TRK knob
- The flight crew selects a preset HDG/TRK (TO or GA)
- The flight crew arms the LOC mode by pressing the LOC pb
- LAND mode has engaged
- The flight crew presses the APPR pb, if an XLS approach is selected.

ENGAGEMENT CONDITIONS

NAV mode engages:

- Automatically at 30 ft RA after takeoff (if armed on the ground)
- When the flight crew orders “DIR TO"(except below 700 ft RA in LOC mode)
- When the flight crew pushes in the HDG/TRK knob when the aircraft is close to (within ~1 nm of) the active flight plan leg
- Automatically in flight when NAV is armed and the aircraft reaches the capture zone for the active flight plan leg
- Automatically during a go-around, when the aircraft is above 100 ft RA, and within the capture zone for the active flight plan leg, unless a HDG/TRK was preset.

Note: *During a go-around, when the approach was previously flown in NAV, APP NAV or FINAL APP modes, the NAV mode remains engaged, unless a HDG/TRK was preset.*



CAUTION	When NAV is armed, it will automatically engage if: - The aircraft track line intercepts the flight plan before the TO waypoint, and - The intercept waypoint (INTCPT) is displayed on the ND, and - The aircraft reaches the active flight plan leg.

Note: *The TO waypoint is displayed in white on NDs and MCDUs.*

DISENGAGEMENT CONDITIONS

The NAV mode disengages when:
- Any other lateral mode is engaged
- The flight plan is lost or the aircraft enters a flight plan discontinuity.

INTERACTIONS WITH VERTICAL MODES

When NAV mode is engaged, the vertical managed modes CLB or DES or FINAL take into account altitude and speed constraints linked to waypoints on the lateral flight plan. If NAV mode is disengaged, the vertical managed modes are not available and all downpath altitude and speed constraints are ignored.

LOCALIZER MODE THROUGH THE LOC PUSHBUTTON

Applicable to: ALL

This mode captures and tracks a localizer beam independently of the glide path beam. Flight crew use it to fly localizer-only approaches or to initiate an ILS approach when intercepting the glide slope from above.

ARMING CONDITIONS

The flight crew arms the LOC mode by pressing the LOC pb, provided that:
- An ILS is tuned (frequency and runway course)
- The aircraft is above 400 ft RA
- TO or GA mode is not engaged.

DISARMING CONDITIONS

LOC mode is disarmed by:
- Pressing the LOC pb when LOC is armed
- Arming the NAV mode
- Engaging the GA mode.

Note: Engaging NAV mode by selecting DIR TO does not disarm the LOC mode.

ENGAGEMENT CONDITIONS

The LOC mode engages automatically when capture conditions are met.

DISENGAGEMENT CONDITIONS

The LOC mode disengages:
- When another lateral mode is engaged
- When the flight crew presses the LOC pb again (engaging the HDG/TRK mode on the current HDG/TRK).

GENERAL

Applicable to: ALL

Vertical modes guide the aircraft in the vertical plan.

PRINCIPLES

Applicable to: ALL

To leave an FCU selected altitude for another target altitude, the flight crew must turn the Altitude (ALT) knob in order to display the new target altitude and either:

- Pull out the ALT knob to engage the OPEN CLB/DES mode, or
- Push in the ALT knob to engage the CLB/DES mode, or
- Select a target vertical speed (V/S) and pull out the V/S or FPA knob to engage V/S mode, or
- Select EXPEDITE .

This arms ALT mode.

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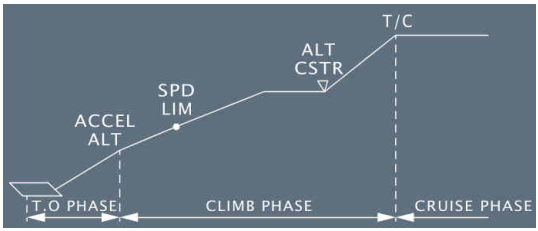
GENERAL

Applicable to: ALL

CLB mode guides the aircraft in a managed climb, at either a managed or a selected target speed, to an FCU selected altitude, taking into account altitude constraints at waypoints.
The system also considers speed constraints if the target speed is managed. The vertical flight path may include several segments:



The flight crew can arm the CLB mode during the takeoff, go-around, climb, and cruise phases and engage it during the climb and cruise phases.

ARMING CONDITIONS

Applicable to: ALL

The CLB mode is armed:
- On ground or when SRS mode is engaged (TO or GA) if the following conditions are met:
  - No other vertical mode is engaged
  - The ACCEL ALT (defined on the PERF TO or GA MCDU pages) is below the FCU selected altitude and the lowest altitude constraint.
- In flight, when the climb or go-around phase is active, and the following conditions are met:
  - The lateral NAV mode is engaged
  - The FCU selected altitude is above the aircraft's present altitude and the aircraft captures or flies an altitude constraint.

DISARMING CONDITIONS

Applicable to: ALL

The CLB mode is disarmed, if one of the following conditions is met:
- Another vertical mode is engaged
- The FCU selected altitude is lower than the present aircraft level
- The FCU selected altitude is set at the altitude constraint while ALT CST* or ALT CST mode is engaged
- The aircraft transitions to DES or APPR phase

- Arming requirements are no longer met
- Vertical flight path validity is lost, or NAV mode is lost while ALT CST* or ALT CST mode is engaged.

ENGAGEMENT CONDITIONS

Applicable to: ALL

The CLB mode can be engaged, if the following conditions are all met:
- The aircraft has been in flight for more than 5 s
- The selected FCU level is above the present aircraft level
- The descent, approach, or go-around phase is not active
- NAV mode is engaged
- Glideslope (G/S) mode is not engaged.

CLB mode automatically engages when the aircraft reaches ACC ALT, or sequences a waypoint with an altitude constraint while the CLB mode is armed.
CLB mode manually engages when the flight crew pushes in the ALT knob, with the CLB mode not armed and the current altitude is not an effective altitude constraint of the flight plan.

Note: *When CLB mode is engaged:*
- *The V/S (FPA) window of the FCU shows dashes*
- *The managed LVL/CH dot on the FCU lights up*
- *The Flight Mode Annunciator displays "CLB"in Column 2.*

DISENGAGEMENT CONDITIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH

The CLB mode disengages, if one of the following conditions is met:
- NAV mode is lost or disengaged (OP CLB engages)
- Another vertical mode engages
- The flight crew selects an altitude on the FCU that is lower than the present aircraft altitude. V/S (FPA) engages on the current V/S (FPA).

DISENGAGEMENT CONDITIONS

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

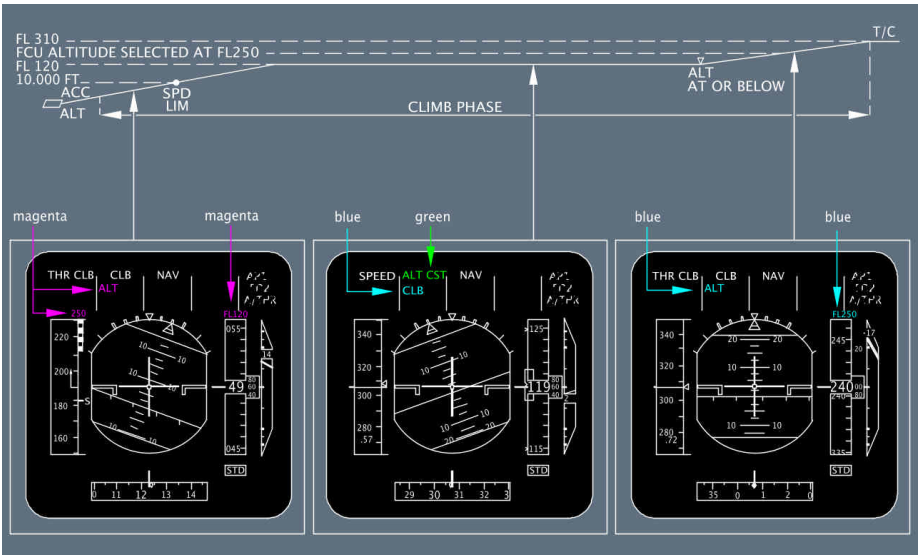
The CLB mode disengages, if one of the following conditions is met:

- NAV mode is lost or disengaged (OP CLB engages). In this case, the reversion to OP CLB is accompanied by a triple click aural warning
- Another vertical mode engages
- The flight crew selects an altitude on the FCU that is lower than the present aircraft altitude. V/S (FPA) engages on the current V/S (FPA).

GUIDANCE

Applicable to: ALL

Climb mode gives the aircraft managed vertical guidance to the FCU selected altitude. It meets altitude constraints at waypoints either with managed speed incorporating speed constraints or with selected speed as target speed. The AP/FD pitch controls the speed or Mach number target and the A/THR is in thrust mode (CLB) corresponding to maximum climb thrust. The flight path may include several segments.



- When CLB mode is engaged, the system arms ALT and displays the applicable target altitude on the ALT scale.
  - If the next predicted level-off is an ALT CSTR, ALT is magenta on the FMA and the ALT CSTR is displayed in magenta on the altitude scale
  - If the next predicted level-off is the FCU altitude, ALT is blue on the FMA and the FCU selected altitude is displayed in blue on the altitude scale.

  Note: *The system takes into account all constraints defined by the database or manually entered by the flight crew. Nevertheless this mode has the following particularity: When the aircraft is in CLB mode and the system predicts that it will miss an altitude constraint, it will not modify the target speed in an attempt to meet it. In this case, the flight crew may select an appropriate speed in order to meet the ALT CSTR.*

- The guidance does not modify the target speed in order to satisfy an altitude constraint. Therefore the constraint may not be met and may be predicted as missed
- When the aircraft levels off at the ALT CSTR, CLB mode arms automatically, then engages when the aircraft passes the constrained waypoint (if the FCU altitude is above the constraint altitude).

GENERAL

Applicable to: ALL

The OPEN CLB mode is a selected mode. It uses the AP/FD pitch mode to maintain a SPD/MACH (selected or managed) while the autothrust (if active) maintains maximum climb thrust.

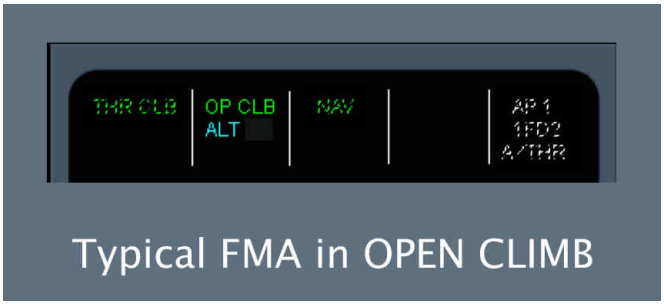
ENGAGEMENT CONDITIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH

The OPEN CLB mode can only be engaged, if all of the following conditions are met:
- The aircraft is in flight for more than 5 s
- The LAND mode is not engaged
- The FCU selected altitude is higher than the aircraft's present altitude.

The OPEN CLB mode is engaged, if one of the following conditions occurs:
- The flight crew pulls out the ALT knob
- The flight crew pulls out the SPD/MACH knob, when TOGA mode or EXPED CLB is engaged
- Acceleration altitude is reached, with CLB armed, and NAV mode not engaged
- Guidance reverts to ensure speed protection
- NAV mode is lost (or disengaged), when previously in CLB mode (*Refer to DSC-22_30-75 General*).

Note: *When OPEN CLB is engaged:*
- *The FMA displays "OP CLB"*
- *The managed LVL/CH dot on the FCU goes out.*



Typical FMA in OPEN CLIMB

ENGAGEMENT CONDITIONS

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

The OPEN CLB mode can only be engaged, if all of the following conditions are met:
- The aircraft is in flight for more than 5 s
- The LAND mode is not engaged
- The FCU selected altitude is higher than the aircraft's present altitude.

The OPEN CLB mode is engaged, if one of the following conditions occurs:
- The flight crew pulls out the ALT knob
- The flight crew pulls out the SPD/MACH knob, when TOGA mode or EXPED CLB is engaged
- Acceleration altitude is reached, with CLB armed, and NAV mode not engaged
- Guidance reverts to ensure speed protection
- NAV mode is lost (or disengaged), when previously in CLB mode. Reversion to OPEN CLB is accompanied by a triple click aural warning (*Refer to DSC-22_30-75 General*).

Note: *When OPEN CLB is engaged:*
- *The FMA displays "OP CLB"*
- *The managed LVL/CH dot on the FCU goes out.*



DISENGAGEMENT CONDITIONS

Applicable to: ALL

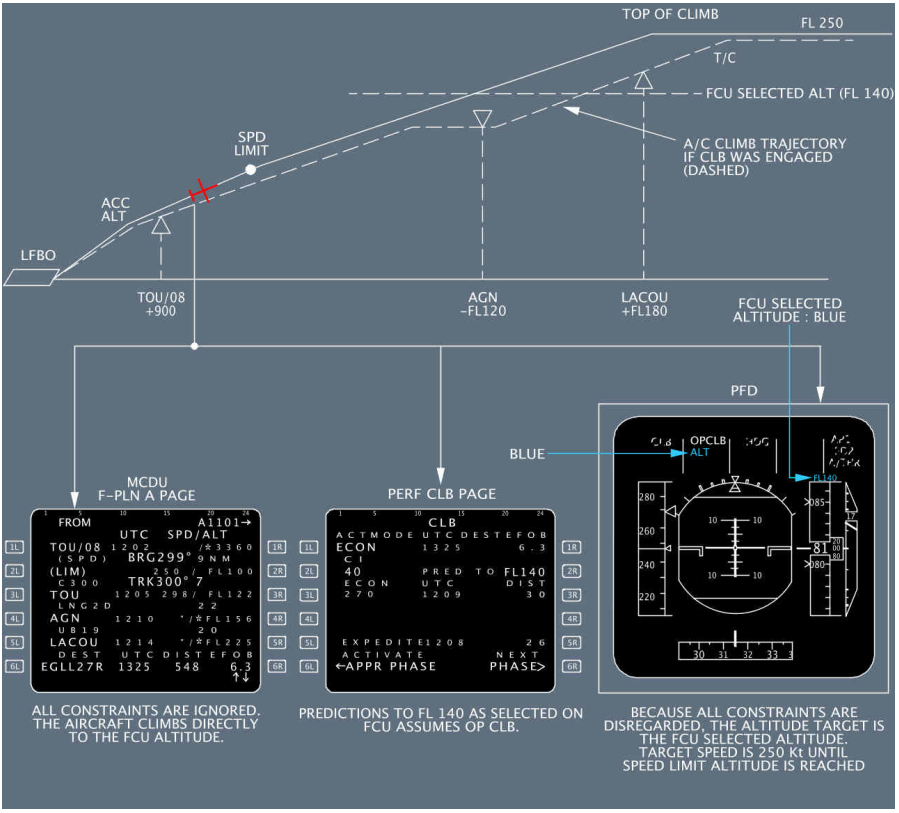
The OPEN CLB mode is disengaged by one of the following conditions:
- Engagement of any other vertical mode
- Reversion to V/S mode (*Refer to DSC-22_30-75 General*)
- Selection of a lower altitude than the current aircraft altitude. V/S (FPA) engages on the current V/S (FPA).

GUIDANCE

Applicable to: ALL

When OPEN CLB is engaged, the target speed/Mach is maintained by adjusting the pitch with the elevator, whereas thrust is maintained either by the A/THR, or manually by the flight crew. Speed target may either be selected or managed.
The OPEN CLB mode disregards all altitude constraints up to the FCU selected altitude.

OPEN CLB MODES, MANAGED SPEED



Note: *If the change is less than 1 200 ft in OPEN CLB mode, the aircraft responds with a rate of climb of 1 000 ft/min.*

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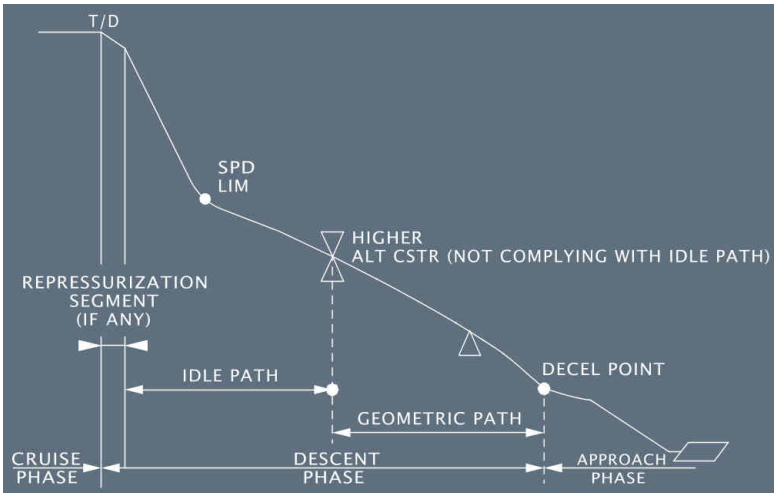
GENERAL

Applicable to: ALL

The DES mode guides the aircraft along the descent path computed by the FMGS. The system computes this flight path backwards from the deceleration point up to the top of descent (T/D), with respect to the speed and altitude constraints at the deceleration point, the guidance begins the deceleration to VAPP, to be reached at 1 000 ft above touchdown on the final descent path.
Internally, the computer divides the descent path into various segments, depending on the relative positions of the constraints. It starts at top of descent (T/D) by setting up an “idle” segment that takes the aircraft down to the first constraint, and follows this with “geometric” segments between constraints.
The descent profile takes into account wind data and data from the lateral and vertical flight plans, and it is based upon the managed descent speed profile. It does not take holding patterns into consideration.

The descent profile has several segments:

- A repressurization segment. When necessary, this produces a repressurization rate for the cabin during descent. It is a function of the destination airport altitude and the selected cabin rate (defaulted to - 350 ft/min but this can be modified)
- Idle path segment. The AP/FD controls the speed and the autothrust stays at idle thrust. The guidance computes this profile from the top of descent or the end of the repressurization segment to the first vertical constraint that cannot be flown at idle thrust
- Geometric path segments. The AP/FD controls the vertical path, and autothrust controls the speed. These segments take the aircraft from the first constraint to the deceleration point.



The descent mode is a managed mode that may be engaged during cruise. It can be armed or engaged in descent and approach phases (except if the FCU selected altitude is higher than the present aircraft altitude).

ARMING CONDITIONS

Applicable to: ALL

The DES mode is armed when an ALT CSTR is captured and all the following conditions are met:
- FCU selected altitude is lower than present altitude
- NAV, LOC* or LOC mode is engaged
- Takeoff or go-around phase is not active
- Flight profile is available.

DISARMING CONDITIONS

Applicable to: ALL

The DES mode is disarmed if one of the following conditions is met:
- Engagement of another vertical mode
- FCU selected altitude is set above the aircraft current altitude
- Loss of NAV, LOC*, or LOC mode
- Switching to the go-around phase
- Loss of vertical flight path validity
- Setting the FCU selected altitude at an altitude constraint while ALT CST* was engaged. (ALT* engages and DES mode disarms).

ENGAGEMENT CONDITIONS

Applicable to: ALL

The DES mode can be engaged, when the following conditions are met:
- The FCU selected altitude is lower than present altitude
- NAV, LOC*, or LOC mode is engaged
- Takeoff, climb, or go-around phase is not active
- Vertical flight path is valid
- TO, G/S, LAND, FINAL or GA mode is not engaged, and:
  - The aircraft sequences a waypoint with an ALT CSTR, and DES mode is armed. The DES mode engages automatically, or
  - The flight crew presses the ALT knob, while ALT CST* or ALT CST is not engaged, or
  - The flight crew presses the ALT knob, while ALT* or ALT is engaged, but the current altitude is not an effective altitude constraint of the F-PLN.

Note: *When DES mode is engaged:*
- *The V/S - FPA window of the FCU shows dashes*
- *The managed LVL/CH dot on the FCU lights up.*

DISENGAGEMENT CONDITIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH

The DES mode is disengaged, if one of the following conditions is met:
- The NAV mode is lost or disengaged and the V/S or FPA mode engages
- Another vertical mode engages
- The flight crew selects an altitude on the FCU that is higher than the aircraft present altitude and the V/S (FPA) engages on current V/S (FPA)
- NAV mode is lost due to a discontinuity in the descent profile. AP/FD reverts to basic mode.

Refer to DSC-22_30-75 General.

DISENGAGEMENT CONDITIONS

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

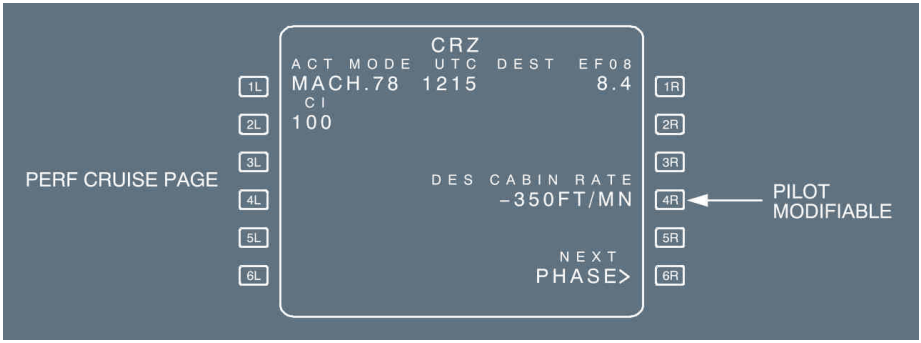
The DES mode is disengaged, if one of the following conditions is met:
- The NAV mode is lost or disengaged and the V/S or FPA mode engages. A triple click aural warning will sound
- Another vertical mode engages
- The flight crew selects an altitude on the FCU that is higher than the aircraft present altitude and the V/S (FPA) engages on current V/S (FPA). Same triple click logic, as for the OP DES case
- NAV mode is lost due to a discontinuity in the descent profile. AP/FD reverts to basic mode, and a triple click aural warning sounds. The vertical mode is boxed in white for 10 s.

Refer to DSC-22_30-75 General.

REPRESSURIZATION SEGMENT

Applicable to: ALL

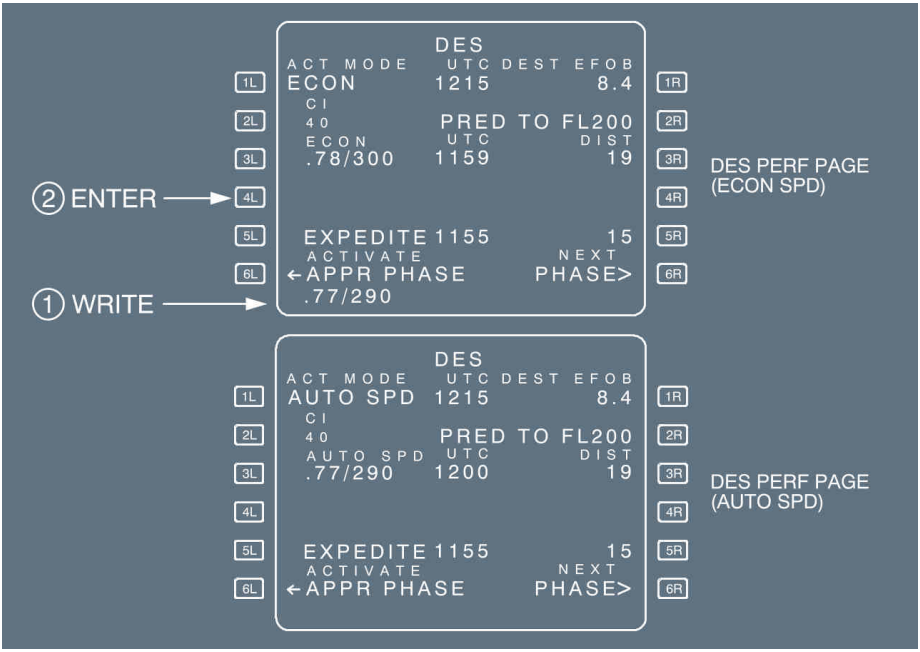
1 The top of descent (T/D) may be updated if the flight crew modifies the cabin rate of descent (default rate is - 350 ft/min).
If the flight crew enters a lower cabin rate, the system computes a repressurization segment that takes into account the additional time needed for repressurization.



DESCENT SPEED PROFILE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

2 The descent speed profile is usually the ECON SPD profile, amended by any speed constraints and speed limit contained in the flight plan.
Before the descent phase is active, if flight crew does not intend to fly the ECON speed/Mach profile, a different speed or Mach can be entered to amend the speed profile.
This selected speed/Mach is called AUTO SPD. It is obtained by entering a Mach number and/or a speed in the ECON field of the PERF DES MCDU page (3L key).



If the flight crew reverts to the SELECTED speed/MACH mode during descent, the profile is not modified and the aircraft flies the same profile at the FCU selected speed/MACH value.

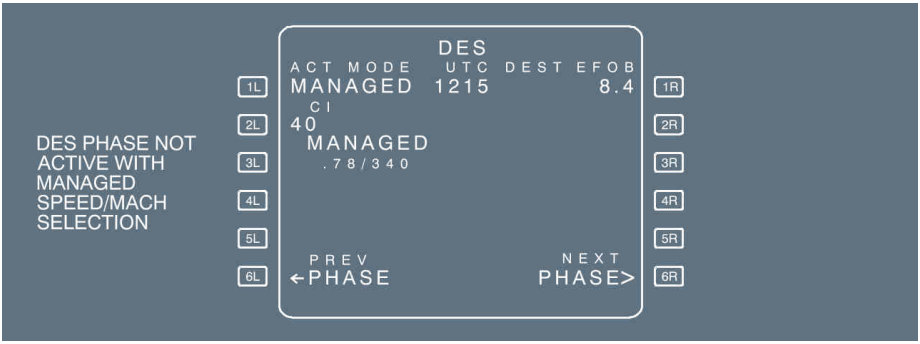
Basic managed SPD/MACH profile in DES mode is:
- ECON MACH, or AUTO MACH
- ECON SPD, or AUTO SPD
- SPD CSTR (if any)
- SPD LIMIT
- Green Dot/S/F/VAPP
- VAPP TARGET.

DESCENT SPEED PROFILE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

3 The descent speed profile is usually the ECON SPD profile, amended by any speed constraints and speed limit contained in the flight plan.
Before the descent phase is active, if flight crew does not intend to fly the ECON speed/Mach profile, a different speed or Mach can be entered to amend the speed profile.

It is obtained by entering a Mach number and/or a speed in the MANAGED field of the PERF DES MCDU page (3L key).



If the flight crew reverts to the SELECTED speed/MACH mode during descent, the profile is not modified and the aircraft flies the same profile at the FCU selected speed/MACH value.

Basic managed SPD/MACH profile in DES mode is:
- ECON MACH, or SELECTED Mach
- ECON SPD, or SELECTED Speed
- SPD CSTR (if any)
- SPD LIMIT
- Green Dot/S/F/VAPP
- VAPP TARGET.

GUIDANCE IN DES MODE

Applicable to: ALL

DESCENT INITIATION

The aircraft will not start its descent automatically when reaching the top of descent (T/D). In order to initiate the descent, the flight crew sets the clearance altitude by turning the ALT knob then pushes the ALT knob.

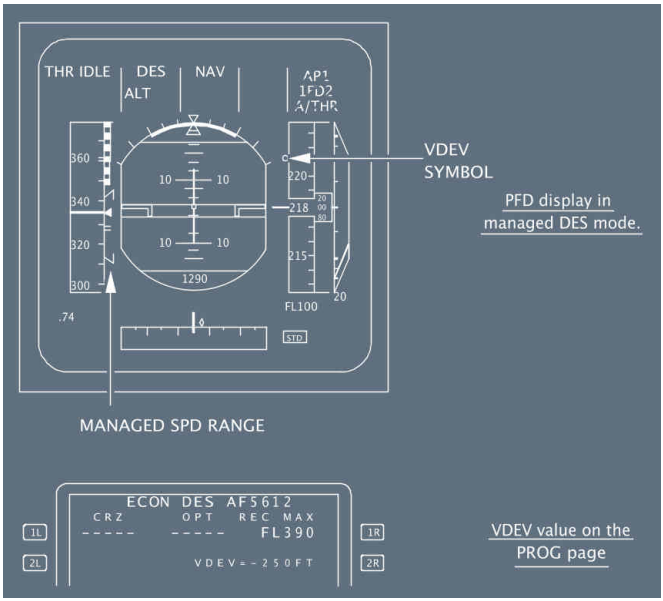
The aircraft will descend immediately:
- If the top of descent is not reached, the aircraft descends at a constant V/S converging on the descent path
- If the aircraft is at or beyond the T/D, it descends at idle thrust.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

DURING THE DESCENT

The flight crew will see a vertical deviation symbol (VDEV) along the ALT scale on the PFD and a VDEV value on the PROG page, so that the aircraft's vertical position can be monitored versus the calculated descent profile.

The aircraft may deviate from the DES profile while DES mode is engaged if:
- Unexpected wind conditions are encountered
- Anti-icing is turned on
- The lateral flight plan is changed.



When the speed is managed, a target speed range displayed on the PFD defines acceptable speed variations around the nominal descent speed target.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

DURING THE DESCENT

The flight crew will see a vertical deviation symbol (VDEV) along the ALT scale on the PFD and a VDEV value on the PROG page, so that the aircraft's vertical position can be monitored versus the calculated descent profile.

The aircraft may deviate from the DES profile while DES mode is engaged if:
- Unexpected wind conditions are encountered
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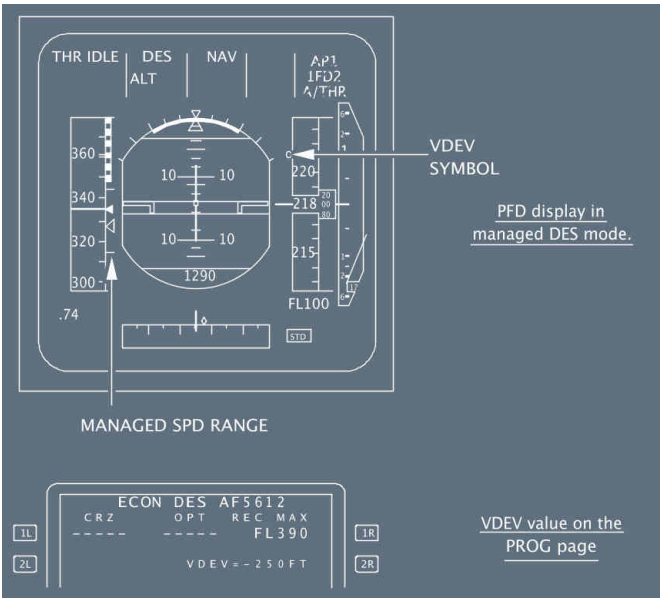
- The lateral flight plan is changed.



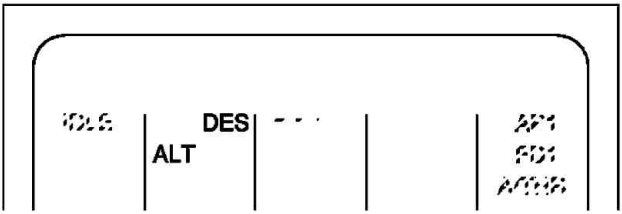
When the speed is managed, a target speed range displayed on the PFD defines acceptable speed variations around the nominal descent speed target.

Applicable to: ALL

FMA DISPLAY

When DES mode is engaged, the system arms ALT and displays the applicable target altitude on the PFD altitude scale.

- If the next predicted level-off is an altitude constraint, ALT is magenta on the FMA second line and the PFD displays the altitude constraint magenta above the altitude scale.
  When the aircraft flies at the altitude constraint (ALT CSTR), the system arms DES blue.
  When the aircraft meets the constraint, DES engages again automatically.
- If the next predicted level-off is the FCU altitude, ALT is blue on the FMA and the PFD displays the FCU selected altitude in blue.

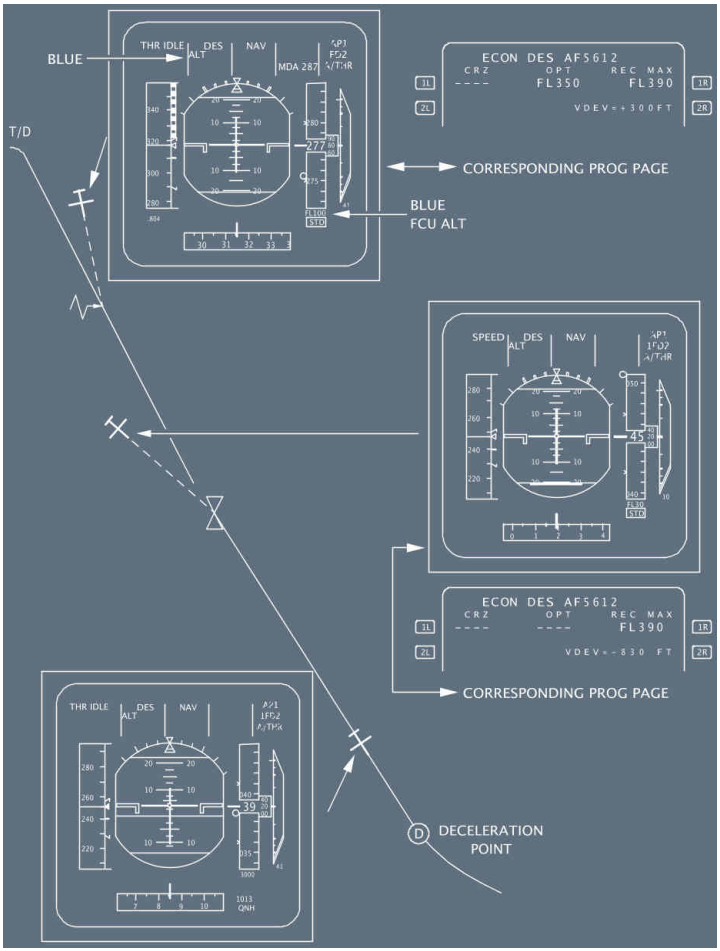


Typical FMA in DES

DES MODE PROFILE

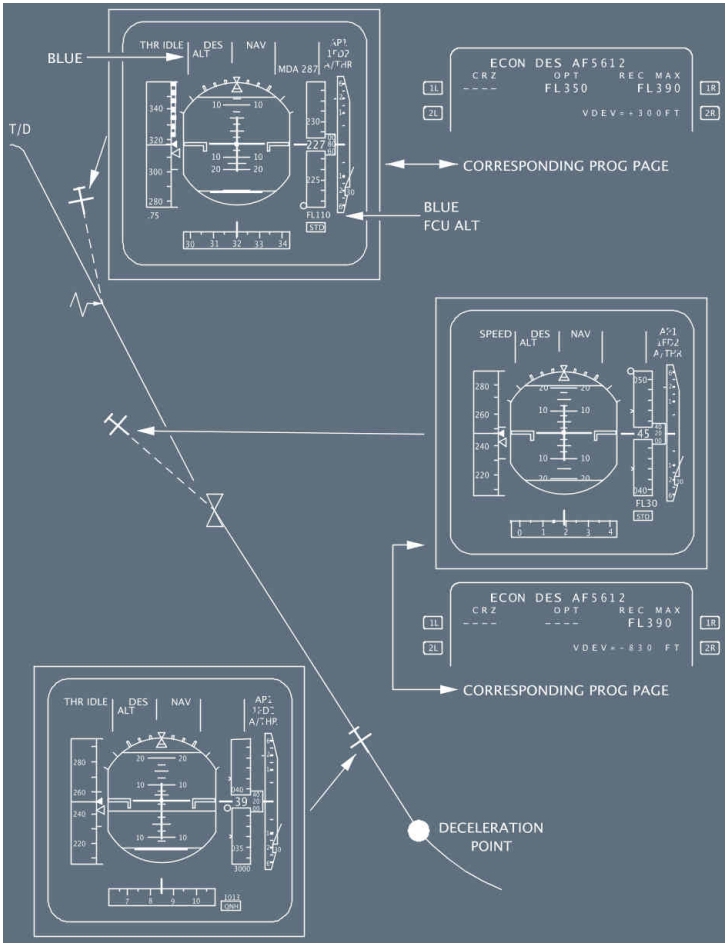
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

GENERAL



Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

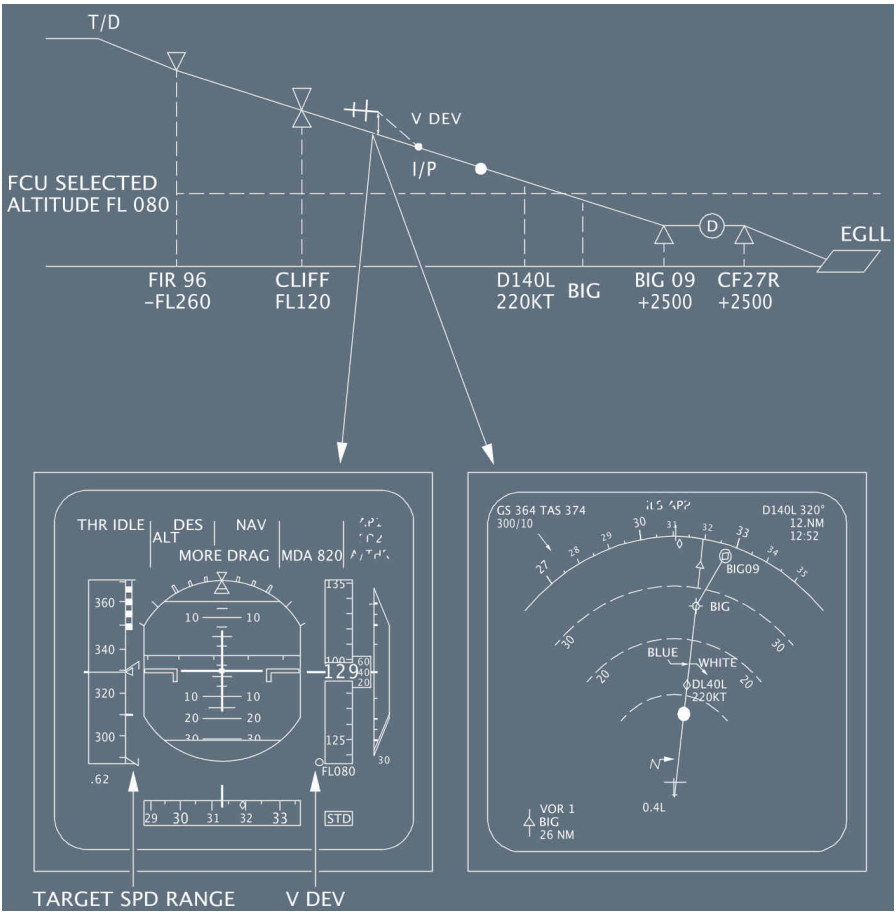
GENERAL



Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

INTERCEPT POINT

Associated with the VDEV displayed on PFD, the ND shows an intercept point ( ) on the flight plan. It indicates the position where the system predicts that the aircraft will intercept the descent profile.



Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

INTERCEPT POINT

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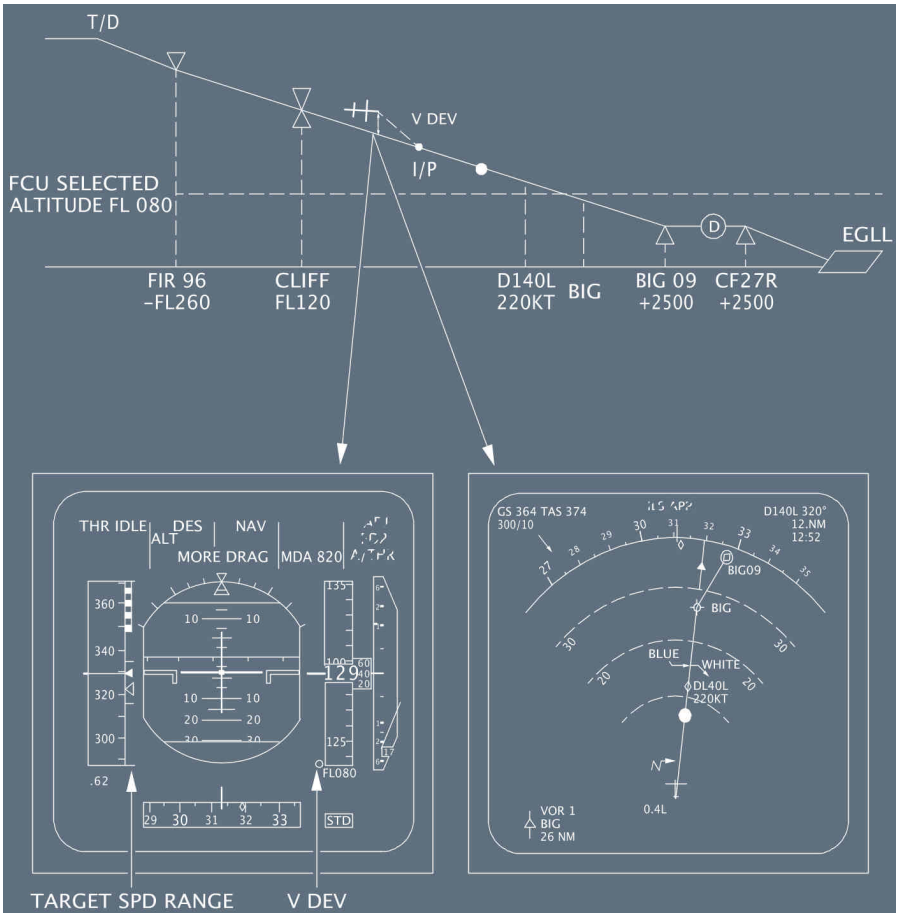


Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

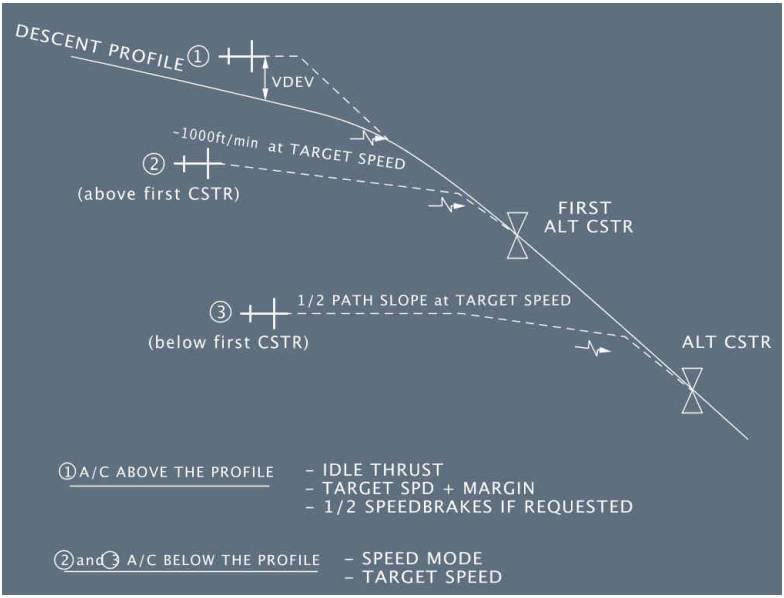
AIRCRAFT ABOVE THE DESCENT PROFILE

If the aircraft is above the descent profile, the speed will increase toward the upper limit of the managed speed range. If the speed reaches the upper limit, the aircraft will maintain the speed but will deviate from the profile (autothrust at idle).

The navigation display presents a pseudo waypoint (intercept point) along the flight plan that assumes the aircraft will return to the profile using:
- Idle thrust
- 1/2 speedbrake extension
- ECON speed plus a margin (until intercepting the profile).

If necessary, the message “AIRBRAKES” (old FMGC standard) or “MORE DRAG” comes up on the PFD and the MCDU, and remains there as long as more drag (speedbrakes) is still required. The flight crew should respond to this message by deploying half speedbrakes.
Whenever the intercept point is predicted to be close to a constrained waypoint, the PFD and MCDU display an “AIRBRAKES” or “MORE DRAG” message depending upon the FMGS standard.

Note: *With DES mode engaged, the speedbrakes extension will not necessarily increase the descent rate. It increases only if the aircraft is above path.*



Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

AIRCRAFT ABOVE THE DESCENT PROFILE

If the aircraft is above the descent profile, the speed will increase toward the upper limit of the managed speed range. If the speed reaches the upper limit, the aircraft will maintain the speed but will deviate from the profile (autothrust at idle).

The navigation display presents a pseudo waypoint (intercept point) along the flight plan that assumes the aircraft will return to the profile using:

- Idle thrust
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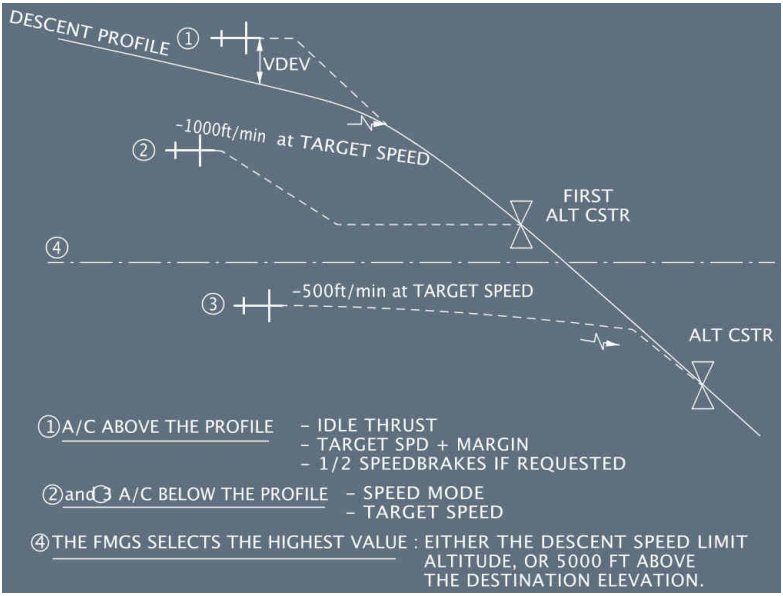
Note: *With DES mode engaged, the speedbrakes extension will not necessarily increase the descent rate. It increases only if the aircraft is above path.*



Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

AIRCRAFT BELOW THE DESCENT PROFILE

If the aircraft is below the descent profile, its speed will be maintained at target speed until it reaches the descent profile. The lower margin becomes effective when the aircraft is on the descent profile but has to loose speed in order to stay on it.
The intercept point on the navigation display is based on the following assumptions:

- **If the aircraft is flying an idle segment:**
  The FMGS maintains V/S = -1 000 ft/min and target speed, until it reaches the constraint altitude or intercepts the profile.
- **If the aircraft is flying a geometric segment:**
  The FMGS maintains a constant flight path angle (half of the theoretical FPA of the profile) until it intercepts either the altitude constraint or the profile.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

AIRCRAFT BELOW THE DESCENT PROFILE

If the aircraft is below the descent profile, its speed will be maintained at target speed until it reaches the descent profile. The lower margin becomes effective when the aircraft is on the descent profile but has to loose speed in order to stay on it.
The intercept point on the navigation display is based on the following assumptions:

- **If the aircraft is flying at an altitude that is higher than both the descent speed limit altitude and the destination elevation +5 000 ft:**
  The FMGS maintains the V/S at -1 000 ft/min and the target speed, until the aircraft reaches the altitude constraint, or intercepts the descent profile.
- **If the aircraft is flying at an altitude that is lower than either the descent speed limit altitude, or the destination elevation +5 000 ft:**
  The FMGS maintains the V/S at - 500 ft/min and the target speed, until the aircraft reaches the altitude constraint or intercepts the descent profile.

Applicable to: ALL

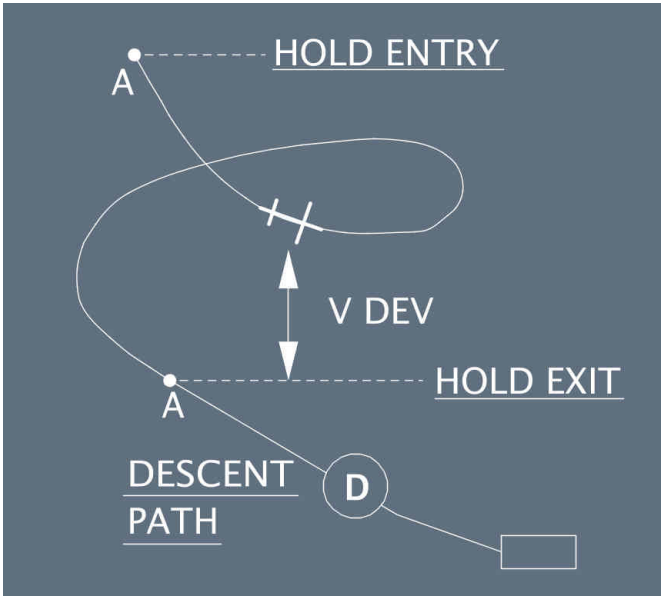
LEVELING OFF AT A CONSTRAINT

If the aircraft levels off at an ALT CSTR, the DES mode arms and remains armed until the aircraft passes the constraint, then reengages (if the FCU altitude is set below the altitude of the constraint).
If the FCU selected altitude is that of a constraint, the flight crew may continue the descent below that altitude by turning the ALT knob and pushing it in. This arms the DES mode, which reengages when the aircraft passes the constraint waypoint.

Applicable to: ALL

GUIDANCE IN A HOLD

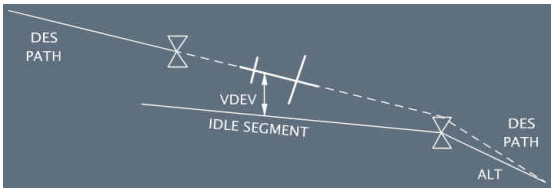
Just before the aircraft enters a holding pattern, the speed target becomes the holding speed.
In the holding pattern, the DES mode commands V/S = -1 000 ft/min while A/THR maintains the holding speed. The aircraft will level off at the next altitude constraint if it is reached during the hold.
The current vertical deviation VDEV is based on the altitude at which the aircraft is supposed to cross the exit fix in order to be properly positioned on the descent profile.
Until the flight crew exits the hold, the FMGS in DES mode will maintain V/S = -1 000 ft/min considering downpath vertical constraint. This means that the aircraft will not descent below the next altitude constraint, neither the FCU selected altitude. If the aircraft reaches the next altitude constraint it will level off and ALT CST mode will engage.



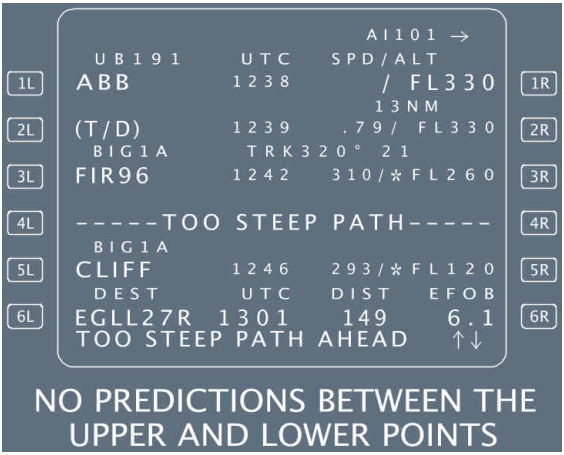
Applicable to: ALL

TOO STEEP PATH

A descent segment is called “too steep path” when FM predicts that the descent segment between two constraint waypoints is impossible to fly at the planned descent speed with half speedbrakes extended.



When this occurs, the MCDU displays no predictions between the upper and the lower points of the too steep path. Relevant message “TOO STEEP PATH” is displayed on MCDU.



When the aircraft reaches the beginning of the too steep path segment, the FM recomputes the VDEV using an idle segment from the end of the too steep path segment.

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GENERAL

Applicable to: ALL

The OPEN DES mode is a selected mode. It maintains a SPD/MACH (selected or managed) with the AP/FD pitch mode while autothrust (if active) maintains IDLE thrust.
It is not to be used for final approach.

ENGAGEMENT CONDITIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

The OPEN DES mode can be engaged only if the following conditions are met:
- The aircraft has been in flight for more than 5 s
- LAND mode is not engaged
- The FCU selected altitude is lower than present altitude.

The OPEN DES mode is engaged by one of the following:
- Pulling out the ALT knob
- Selecting a manual speed when EXP mode ◁ is engaged
- A reversion activates to prevent the speed from decreasing below VLS. (*Refer to DSC-22_30-75 General* for a description of the conditions that cause a reversion).

Note: *When OP DES is engaged:*
- *The FMA displays "OP DES"*
- *The managed LVL/CH dot on the FCU goes out*
- *The system arms the ALT mode.*

ENGAGEMENT CONDITIONS

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

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Note: *When OP DES is engaged:*
- *The FMA displays "OP DES"*
- *The managed LVL/CH dot on the FCU goes out*
- *The system arms the ALT mode.*

DISENGAGEMENT CONDITIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

The OPEN DES mode is disengaged by one of the following conditions:
- Manual engagement of another vertical mode
- Reversion to V/S mode (*Refer to DSC-22_30-75 General*)
- Selection of an altitude higher than present altitude. V/S (FPA) engages on current V/S (FPA).

DISENGAGEMENT CONDITIONS

Applicable to: B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTG, B-HTH

The OPEN DES mode is disengaged by one of the following conditions:
- Manual engagement of another vertical mode
- Selection of an altitude higher than present altitude. V/S (FPA) engages on current V/S (FPA).

DISENGAGEMENT CONDITIONS

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

The OPEN DES mode is disengaged by one of the following conditions:
- Manual engagement of another vertical mode
- Selection of an altitude higher than present altitude. V/S (FPA) engages on current V/S (FPA). The vertical mode is boxed white. If within 5 s after the reversion to V/S, the flight crew does not confirm the altitude target change by another expected action, a triple click aural warning sounds, and the V/S (FPA) is boxed white and flashes for 10 s.

GUIDANCE

Applicable to: ALL

When OPEN DES is engaged, pitch control maintains the target speed/Mach number, and autothrust maintains idle thrust (or the flight crew maintains it manually). The speed target may be either selected or managed.
The OPEN DES mode disregards all altitude constraints.



Typical FMA in OPEN DES

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GENERAL

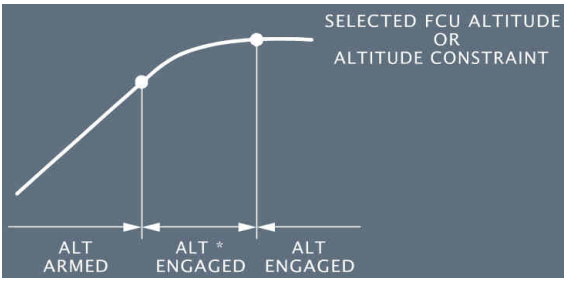
Applicable to: ALL

ALT* mode guides the aircraft to acquire the FCU selected altitude.
ALT CST* guides the aircraft to acquire an altitude constraint provided by Flight Management. Once the aircraft has reached the altitude, the altitude mode (ALT or ALT CST) engages.

ENGAGEMENT CONDITIONS

Applicable to: ALL

The mode engages when the aircraft reaches the altitude capture zone, defined by the aircraft vertical speed (among other parameters).

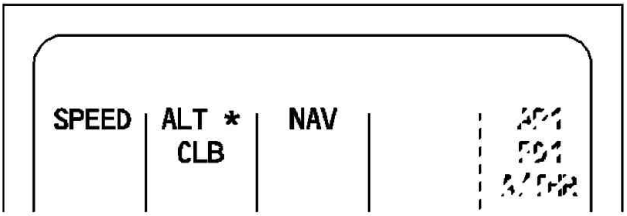


Note: *ALT* and ALT CST* cannot be engaged below 400 ft, if either the takeoff or the go-around mode is engaged.*

DISENGAGEMENT CONDITIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH

The mode is disengaged by one of the following conditions:
- Engagement of V/S mode on current vertical speed by turning the FCU ALT knob by more than 250 ft.
- Engagement of another vertical mode provided the FCU altitude has been changed by more than 250 ft.



Typical FMA in ALT *

DISENGAGEMENT CONDITIONS

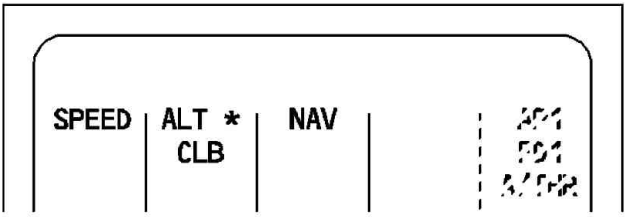
Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

The mode is disengaged by one of the following conditions:

- Engagement of V/S mode on current vertical speed by turning the FCU ALT knob by more than 250 ft.

  If within 5 s after reversion to V/S (FPA) the flight crew does not confirm the altitude target change by:
  - Pulling the ALT knob, or
  - Setting a new V/S (FPA) target, or
  - Pushing the V/S or FPA knob on the FCU,

  then, a triple click aural warning sounds, and the V/S (FPA) is boxed white for additional 10 s.
- Engagement of another vertical mode provided the FCU altitude has been changed by more than 250 ft.



Typical FMA in ALT *

GUIDANCE

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

The ALT* and ALT CST* modes have internal V/S guidance that is a direct function of the difference between present altitude and the altitude target. This V/S internal guidance has priority over the target speed. Therefore if a thrust reduction occurs in ALT* (Engine out), the vertical speed order will not be modified and a speed variation will occur. The ALT* and ALT CST* modes do not have a mode reversion that results from speed variation.
The system switches automatically to ALT (altitude hold) when the altitude deviation becomes less than 20 ft.

Note:
- *If the baro setting is changed during ALT* mode, this may lead to an FCU target overshoot due to the change of the current value of the altitude. However ALT* mode will allow the FCU altitude to be regained.*
- *For aircraft equipped with QFE option, a switching from STD to QFE (or vice versa) in ALT CST* mode, will change the target value and a reversion to V/S may occur if the target value is modified of 250 ft or more.*

GUIDANCE

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

The ALT* and ALT CST* mode have internal V/S guidance that is a direct function of the difference between present altitude and the altitude target.
The system switches automatically to ALT (altitude hold) when the altitude deviation becomes less than 20 ft.
ALT* and ALT CST* modes have internal protections that decreases the vertical speed when VLS or VMAX is reached (VLS or VMAX becomes the priority target).

Note:
- *If the baro setting is changed during ALT* mode, this may lead to an FCU target overshoot due to the change of the current value of the altitude. However ALT* mode will allow the FCU altitude to be regained.*
- *For aircraft equipped with QFE option, a switching from STD to QFE (or vice versa) in ALT CST* mode, will change the target value and a reversion to V/S may occur if the target value is modified of 250 ft or more.*

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GENERAL

Applicable to: ALL

The ALT mode maintains a target altitude. This target altitude is either the FCU selected altitude or an altitude constraint delivered by Flight Management.

ARMING CONDITIONS

Applicable to: ALL

The ALT mode arms automatically whenever the aircraft climbs or descends toward the target altitude.

Note: *The ALT mode arms only if the difference between the current altitude and the FCU selected altitude is at least 250 ft.*

When ALT is armed, the FMA displays the ALT message on its second line:
- Blue when the target altitude is the FCU selected altitude
- Magenta if the target altitude is an altitude constraint.

ENGAGEMENT CONDITIONS

Applicable to: ALL

The ALT mode is engaged automatically when the difference between present altitude and the target altitude becomes less than 20 ft with ALT* engaged.

Note: *The ALT mode is displayed on the FMA when the V/S knob is pushed in or is pulled out with V/S-FPA target set to zero but V/S mode is still active. In other words, if V/S knob is dialled up or down, the aircraft will climb or descend without any pulling action.*

DISENGAGEMENT CONDITIONS

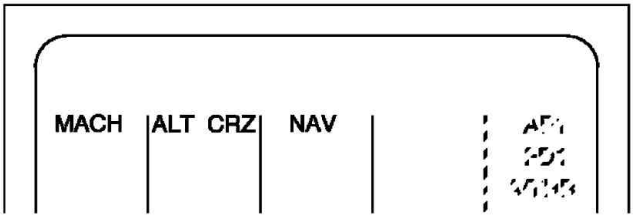
Applicable to: ALL

The ALT mode disengages when any other vertical mode engages.

GUIDANCE

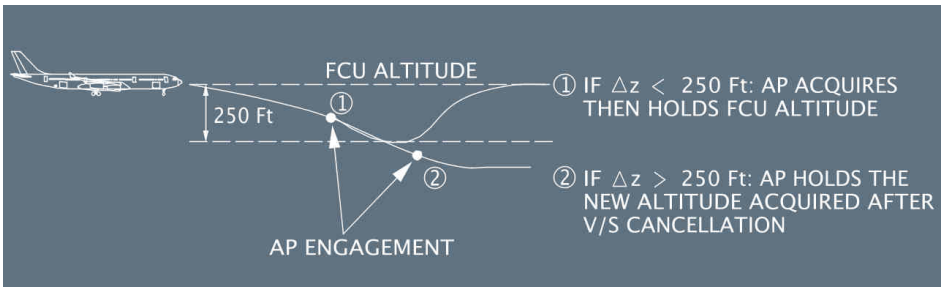
Applicable to: ALL

- The altitude that ALT mode holds is the altitude it memorized when engaged. It is not affected by a change of reference in the ALT window or by a change in the barometric correction.
- When ALT is engaged, the FMA displays ALT in green (FCU altitude hold) or ALT CST in green if it is an altitude constraint.



typical FMA in ALT MODE

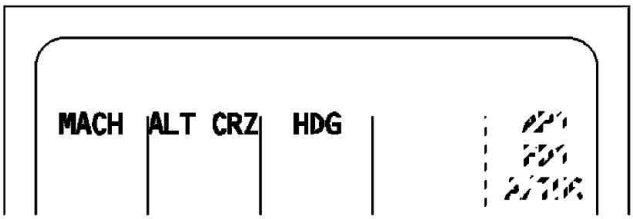
- If the AP is engaged while FD is already engaged in ALT mode at the FCU selected altitude, the autopilot:
  - Acquires and holds the FCU altitude if present altitude is within 250 ft of it, or
  - Commands a level-off if present altitude is more than 250 ft from the FCU altitude.



SOFT ALTITUDE MODE (CRUISE)

Applicable to: ALL

The soft altitude mode engages when the aircraft reaches the FCU altitude set as the cruise flight level (entered in the F-PLN or on PROG page).
The soft altitude mode corrects minor deviations from the Mach target by allowing a ±50 ft variation from the CRZ FL. This feature improves fuel efficiency and passenger comfort and minimizes the changes in thrust.



FMA in SOFT ALT HOLD MODE

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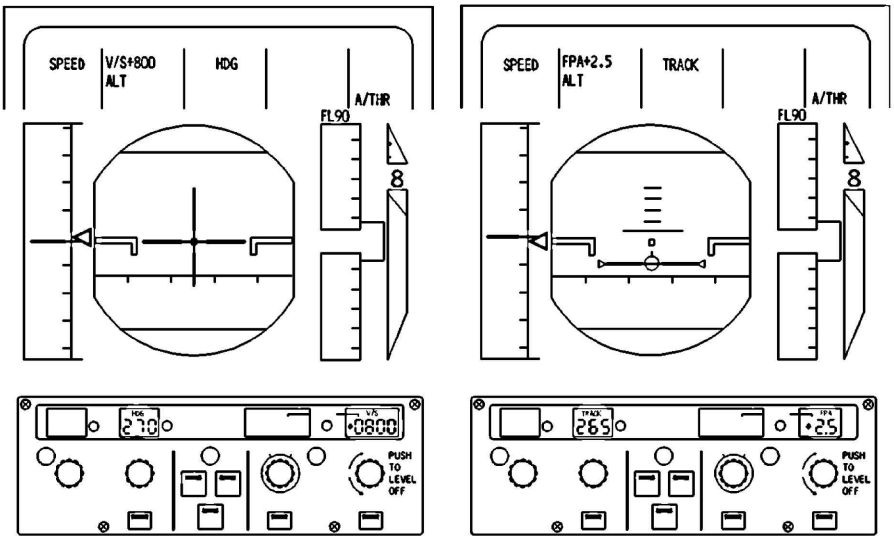
GENERAL

Applicable to: ALL

The V/S - FPA mode is a selected mode. It acquires and holds the vertical speed or the flight path angle displayed in the V/S - FPA window of the FCU.
The HDG V/S -TRK FPA pb on the FCU allows the flight crew to select either type of reference to be used for guidance and for display on the PFD.



ENGAGEMENT CONDITIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

The flight crew can engage the mode manually as follows:
- Pull out the V/S or FPA knob (at least 5 s after lift-off) or push it in for an immediate level off (V/S=0)
- Engage the AP and/or FD if AP and FD are not engaged (basic mode of AP/FD engagement)
- Select a different altitude (more than 250 ft from present altitude) when in ALT* mode
- Select a higher altitude than present altitude when in DES, OP DES modes or EXP DES ◁ mode
- Select a lower altitude than present altitude when in CLB, OP CLB modes or EXP CLB ◁ mode.

The mode engages automatically:
- 5 s after lift-off, if no other vertical mode is engaged
- Upon loss of G/S* or G/S mode
- Upon loss of FINAL mode
- Upon loss of LOC* or LOC mode
- Upon loss of NAV mode when DES mode is engaged
- Upon loss of vertical flight path in DES mode
- Upon automatic reversion (*Refer to DSC-22_30-75 General*).

ENGAGEMENT CONDITIONS

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

The flight crew can engage the mode manually as follows:
- Pull out the V/S or FPA knob (at least 5 s after lift-off) or push it in for an immediate level off (V/S=0)
- Engage the AP and/or FD if AP and FD are not engaged (basic mode of AP/FD engagement)
- Select a different altitude (more than 250 ft from present altitude) when in ALT* mode
- Select a higher altitude than present altitude when in DES, OP DES modes or EXP DES ⋘ mode
- Select a lower altitude than present altitude when in CLB, OP CLB modes or EXP CLB ⋘ mode.

The mode engages automatically:
- 5 s after lift-off, if no other vertical mode is engaged
- Upon loss of G/S* or G/S mode
- Upon loss of FINAL mode
- Upon loss of LOC* or LOC mode
- Upon loss of NAV mode when DES mode is engaged
- Upon loss of vertical flight path in DES mode.

DISENGAGEMENT CONDITIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

The flight crew can disengage the V/S mode manually by:
- Pulling or pushing the Altitude knob, or
- Pushing the EXPED pb ⋘ , or
- Initiating a go-around.

It disengages automatically:
- When the aircraft reaches the FCU altitude, or
- Upon G/S* engagement, or
- On mode reversion from V/S or FPA (associated with SPEED mode) to OPEN mode (associated with THRUST mode). (*Refer to DSC-22_30-75 General*).

DISENGAGEMENT CONDITIONS

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

The flight crew can disengage the V/S mode manually by:
- Pulling or pushing the Altitude knob, or
- Pushing the EXPED pb ⋘ , or
- Initiating a go-around.

It disengages automatically:
- When the aircraft reaches the FCU altitude, or
- Upon G/S* engagement.

GUIDANCE

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

The FMGC pitch mode guides the aircraft to the target V/S or FPA. The corresponding A/THR mode is SPEED or MACH. The FMA displays V/S (FPA).
The V/S (FPA) guidance has priority over the speed guidance. If the selected target V/S or FPA is too high (relative to the current thrust condition and speed), the FMGC will steer the aircraft to the target V/S or FPA, but the aircraft will also accelerate or decelerate.
When the speed reaches its authorized limit, V/S or FPA mode reverts to OPEN mode to regain the target speed. (*Refer to DSC-22_30-75 General*).

Note: *If the flight crew sets V/S = 0 or pushes the V/S or FPA knob to level off, it automatically sets V/S or FPA target to zero and the aircraft levels off and maintains its altitude.*

GUIDANCE

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

The FMGC pitch mode guides the aircraft to the target V/S or FPA. The corresponding A/THR mode is SPEED or MACH. The FMA displays V/S (FPA).
The V/S (FPA) guidance has priority over the speed guidance. If the selected target V/S or FPA is too high (relative to the current thrust condition and speed), the FMGC will steer the aircraft to the target V/S or FPA, but the aircraft will also accelerate or decelerate.

When the speed reaches its authorized limit, V/S or FPA automatically decreases to maintain the minimum (or maximum) speed limit.

Note: *If the flight crew sets V/S = 0 or pushes the V/S or FPA knob to level off, it automatically sets V/S or FPA target to zero and the aircraft levels off and maintains its altitude.*

GENERAL

Applicable to: B-HSQ, B-HSR

Expedite mode is an OPEN mode used in climb or descent to reach the desired altitude with the maximum vertical gradient.

ENGAGEMENT CONDITIONS

Applicable to: B-HSQ, B-HSR

The flight crew can engage EXPEDITE if:
- The aircraft has been in flight for more than 5 s
- Managed speed is available.

The flight crew engages EXPEDITE manually by pushing the EXPED pb on the FCU:
- If the FCU selected altitude is higher than present altitude, EXP CLB mode engages
- If the FCU selected altitude is lower than present altitude, EXP DES mode engages.

DISENGAGEMENT CONDITIONS

Applicable to: B-HSQ, B-HSR

The flight crew can disengage EXPEDITE manually by:
- Pulling out the V/S or FPA knob to engage the V/S or FPA mode
- Pulling out the ALT knob to engage OP CLB or OP DES
- Pulling out the SPD/MACH knob to activate the selected speed target and engage OP CLB or OP DES. A white box appears around the longitudinal mode and flashes for 10 s. A triple click sounds
- Pushing in the ALT knob to engage the CLB or DES mode, provided that the engagement conditions are met
- Selecting a higher altitude than present altitude when in EXP DES. If this action is not followed by another expected flight crew action within 5 s, a triple click sounds. A steady white box appears around the longitudinal mode, then flashes for 10 s after the triple click
- Selecting a lower altitude than present altitude when in EXP CLB. If this action is not followed by another expected flight crew action within 5 s, a triple click sounds. A steady white box appears around the longitudinal mode, then flashes for 10 s after the triple click
- Activating a reversion to V/S to protect the aircraft from exceeding VLS or VMAX. A white box appears around the longitudinal mode and flashes for 10 s. A triple click sounds.

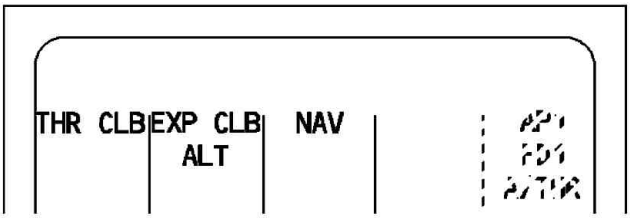
  Note: In FD mode only, it the flight crew does not follow the FD orders, a reversion to V/S occurs when reaching VMAX + 4 in EXP CLB or VLS - 2 in EXP DES (VLS - 17 with speedbrakes). Refer to DSC-22_30-75 General.

EXPEDITE disengages automatically with ALT* engagement.

GUIDANCE

Applicable to: B-HSQ, B-HSR

When the aircraft is in EXP CLB, the target speed is Green Dot, which is maintained with pitch control. Autothrust, if active, sets the thrust at CLB THRUST automatically.
When the aircraft is in EXP DES, the target speed is 340 kt or M 0.8 which is maintained with pitch control. Autothrust, if active, sets the thrust at IDLE automatically.
When EXPEDITE is engaged, the system disregards SPD CSTR, ALT CSTR, and SPD LIM.



FMA in EXP CLB

GENERAL

Applicable to: ALL

There are several types of mode reversions. Each one observes a specific logic that can be described as follows.

INTERACTION BETWEEN LATERAL MODES, VERTICAL MODES, AND MANAGED SPEED PROFILE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

- **When NAV mode is engaged:**

  The FMGS guides the aircraft along the flight plan and considers the constraints attached to the F-PLN waypoints. As a result:
  - Managed CLB and DES modes are available
  - The managed speed profile includes: V2 - SPD CSTR (if applicable) - SPD LIM - ECON CLB SPD/MACH - ECON CRZ MACH - ECON DES (AUTO SPD) - SPD/MACH - SPD CSTR - SPD LIM - HOLD SPD - VAPP/GS MIN.

  It is valid for all vertical modes, except EXPEDITE ◁✻ .

- **When NAV mode is not engaged:**

  The FMGS considers that the flight plan is not followed, and ignores all speed and altitude constraints linked to the F-PLN waypoints. As a result:
  - The managed vertical CLB and DES modes are not available
  - The managed SPD profile disregards the speed constraints and includes: V2 - SPD LIM - ECON CLB - ECON CRZ - ECON DES (AUTO SPD) - SPD LIM - VAPP/GS MIN target.

As a consequence, when NAV mode disengages (manual or automatic):
- CLB mode, when engaged, reverts to OPEN CLB
- DES mode, when engaged, reverts to V/S mode on current value
- Speed and altitude constraints are disregarded (but speed limit is retained).

INTERACTION BETWEEN LATERAL MODES, VERTICAL MODES, AND MANAGED SPEED PROFILE

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH

- **When NAV mode is engaged:**

  The FMGS guides the aircraft along the flight plan and considers the constraints attached to the F-PLN waypoints. As a result:
  - Managed CLB and DES modes are available
  - The managed speed profile includes: V2 - SPD CSTR (if applicable) - SPD LIM - ECON CLB SPD/MACH - ECON CRZ MACH - ECON DES (MANAGED SPD) - SPD/MACH - SPD CSTR - SPD LIM - HOLD SPD - VAPP/GS MIN.

  It is valid for all vertical modes, except EXPEDITE ⋘ .

- **When NAV mode is not engaged:**

  The FMGS considers that the flight plan is not followed, and ignores all speed and altitude constraints linked to the F-PLN waypoints. As a result:
  - The managed vertical CLB and DES modes are not available
  - The managed SPD profile disregards the speed constraints and includes: V2 - SPD LIM - ECON CLB - ECON CRZ - ECON DES (MANAGED SPD) - SPD LIM - VAPP/GS MIN target.

As a consequence, when NAV mode disengages (manual or automatic):
- CLB mode, when engaged, reverts to OPEN CLB
- DES mode, when engaged, reverts to V/S mode on current value
- Speed and altitude constraints are disregarded (but speed limit is retained).

INTERACTION BETWEEN LATERAL MODES, VERTICAL MODES, AND MANAGED SPEED PROFILE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

- **When NAV mode is engaged:**

  The FMGS guides the aircraft along the flight plan and considers the constraints attached to the F-PLN waypoints. As a result:
  - Managed CLB and DES modes are available
  - The managed speed profile includes: V2 - SPD CSTR (if applicable) - SPD LIM - ECON CLB SPD/MACH - ECON CRZ MACH - ECON DES (MANAGED SPD) - SPD/MACH - SPD CSTR - SPD LIM - HOLD SPD - VAPP/GS MIN.

  It is valid for all vertical modes, except EXPEDITE ⋘ .

- **When NAV mode is not engaged:**

  The FMGS considers that the flight plan is not followed, and ignores all speed and altitude constraints linked to the F-PLN waypoints. As a result:
  - The managed vertical CLB and DES modes are not available
  - The managed SPD profile disregards the speed constraints and includes: V2 - SPD LIM - ECON CLB - ECON CRZ - ECON DES (MANAGED SPD) - SPD LIM - VAPP/GS MIN target.

As a consequence, when NAV mode disengages (manual or automatic):

- CLB mode, when engaged, reverts to OPEN CLB. The lateral mode is boxed white for 10 s. The vertical mode is boxed white.

  If within 5 s, the disengagement of the NAV mode is not confirmed by one of the following flight crew actions:
  - FCU altitude change
  - Level-off
  - Selection of the V/S mode

  then, a triple click aural warning sounds. In addition, a white box flashes around the vertical mode for additional 10 s.
- DES mode, when engaged, reverts to V/S mode on current value.

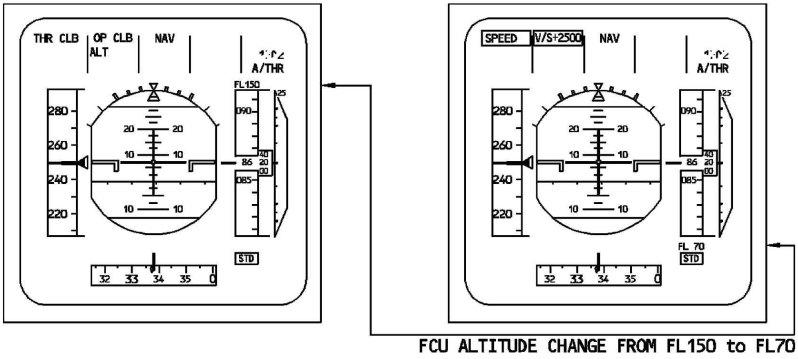
  If within 5 s, the disengagement of the NAV mode is not confirmed by one of the following flight crew actions:
  - FCU altitude change
  - Level-off
  - Selection of the V/S mode

  then, a triple click aural warning sounds. In addition, a white box flashes around the vertical mode for additional 10 s.
- Speed and altitude constraints are disregarded (but speed limit is retained).

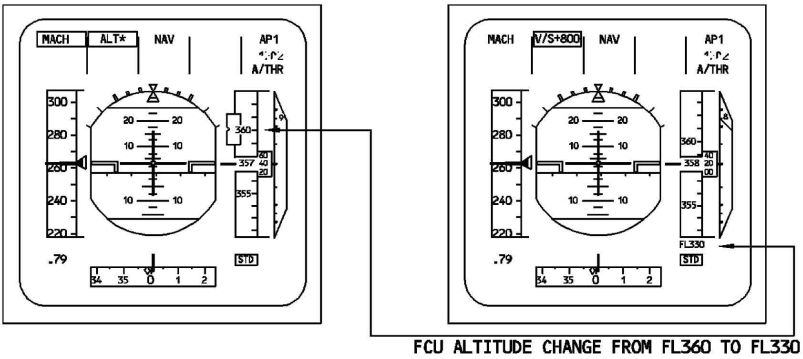
MODE REVERSION DUE TO FCU ALTITUDE CHANGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH

When an OPEN mode is engaged, the aircraft climbs or descends towards the altitude set on the FCU. If the flight crew sets the FCU altitude to a target not compatible with the active open mode, a mode reversion occurs and V/S (or FPA) engages on current V/S (or FPA).
This reversion applies to CLB, OP CLB, DES, OP DES, EXP DES ⋘ , EXP CLB ⋘ .
Example: Reversion from OP CLB to V/S:



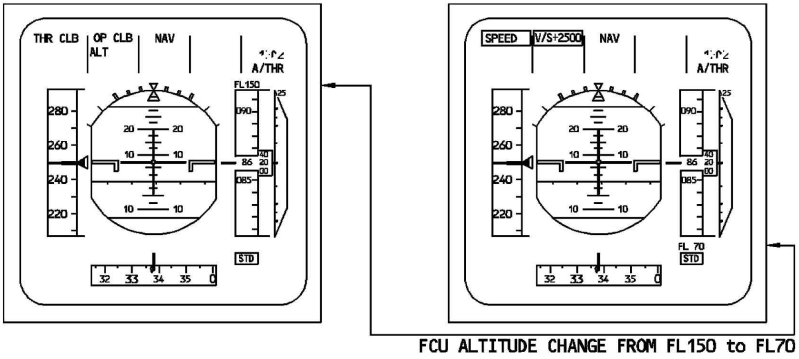
With ALT* engaged, the target altitude is changed by any value greater than 250 ft, V/S (or FPA) engages on currents V/S (or FPA). *Refer to DSC-22_30-75 Mode Reversions (Summary).*



MODE REVERSION DUE TO FCU ALTITUDE CHANGE

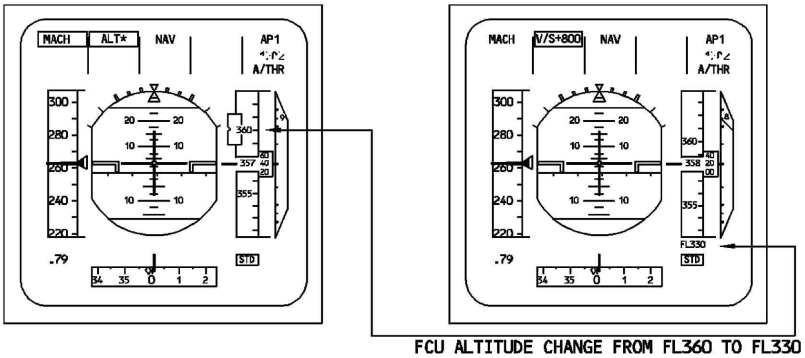
Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

When an OPEN mode is engaged, the aircraft climbs or descends towards the altitude set on the FCU. If the flight crew sets the FCU altitude to a target not compatible with the active open mode, a mode reversion occurs and V/S (or FPA) engages on current V/S (or FPA).
This reversion applies to CLB, OP CLB, DES, OP DES, EXP DES , EXP CLB .
Example: Reversion from OP CLB to V/S:



FCU ALTITUDE CHANGE FROM FL150 to FL70

With ALT* engaged, the target altitude is changed by any value greater than 250 ft, V/S (or FPA) engages on currents V/S (or FPA). *Refer to DSC-22_30-75 Mode Reversions (Summary).*



FCU ALTITUDE CHANGE FROM FL360 TO FL330

If within 5 s after the reversion to V/S (FPA), the flight crew does not confirm the altitude target change by:

- Pulling the ALT knob, or
- Setting a new V/S (or FPA) target, or
- Pushing the V/S or FPA knob on the FCU,

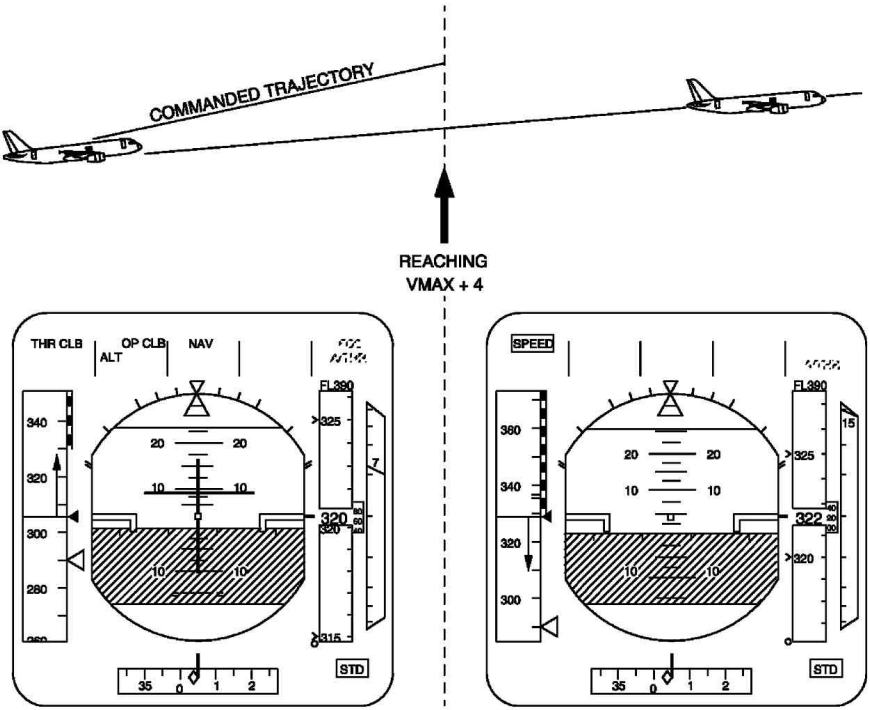
then, a triple click sounds, and the V/S (FPA) is boxed white for additional 10 s.

REVERSION WITH GLOBAL SPEED PROTECTION

Applicable to: B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTG, B-HTH

AUTOMATIC SPEED MODE PROTECTION IN CLIMB

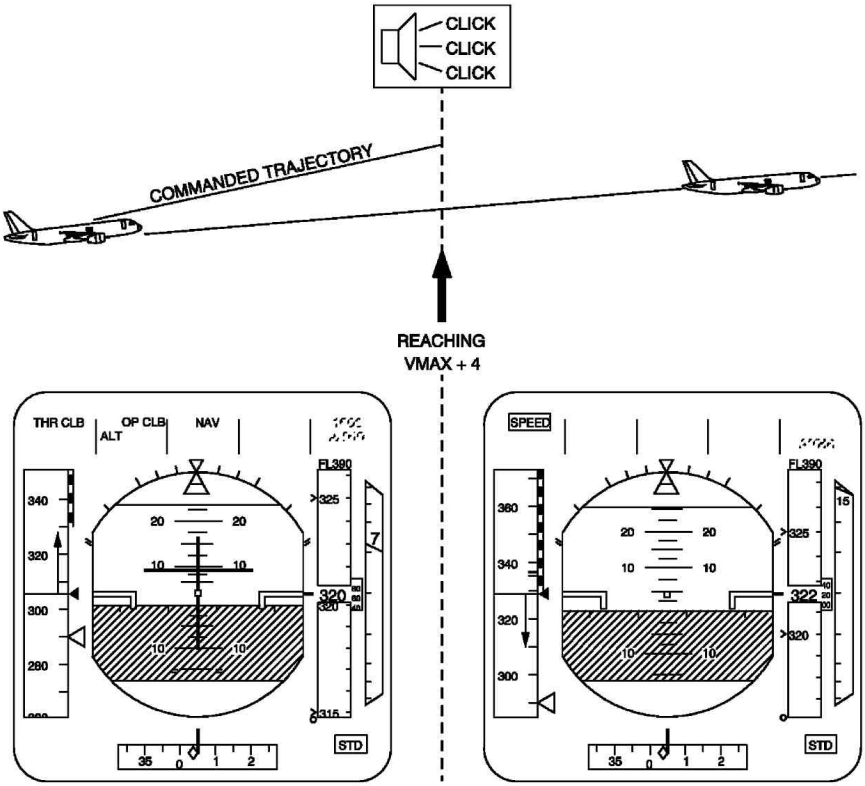
FDs are engaged in an OPEN mode in climb with AP not engaged.
If FDs are engaged in CLIMB or OPEN CLIMB mode or EXP CLB ◁ and the flight crew does not follow the FD bars to maintain the commanded climb (pitch too low and autothrust in maximum climb thrust), the aircraft accelerates.
Both FDs disengage when VMAX+4 is reached (VMAX being VMO, VLE or VFE). If the A/THR is active, it reverts to SPEED mode and reduces the thrust to recover the speed target.



Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

AUTOMATIC SPEED MODE PROTECTION IN CLIMB

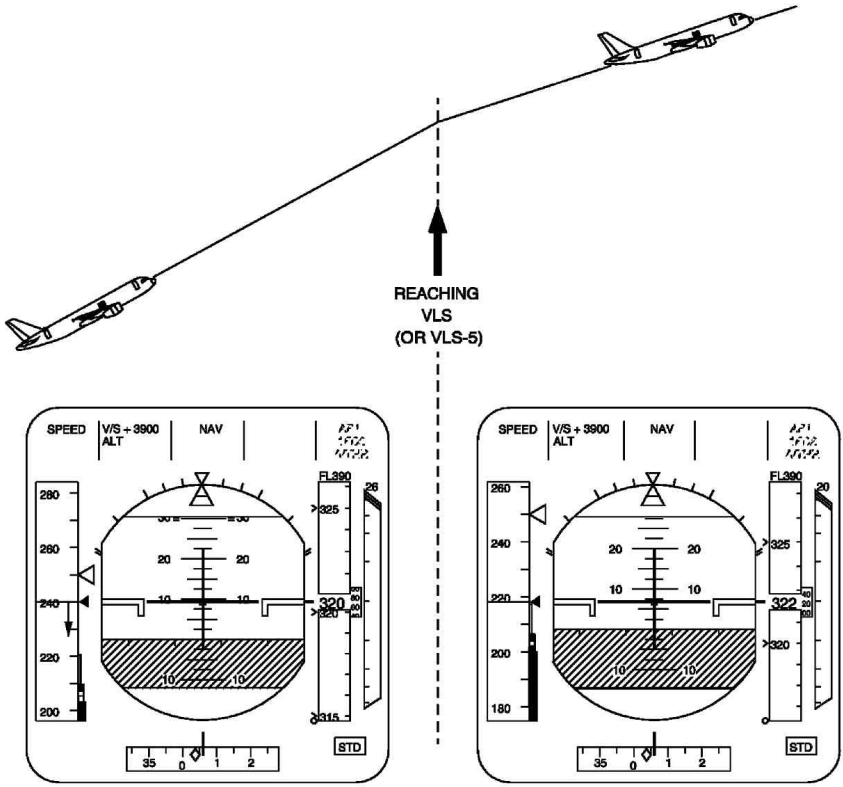
FDs are engaged in an OPEN mode in climb with AP not engaged.
If FDs are engaged in CLIMB or OPEN CLIMB mode or EXP CLB and the flight crew does not follow the FD bars to maintain the commanded climb (pitch too low and autothrust in maximum climb thrust), the aircraft accelerates.
Both FDs disengage when VMAX+4 is reached (VMAX being VMO, VLE or VFE). If the A/THR is active, it reverts to SPEED mode and reduces the thrust to recover the speed target.
A triple click aural warning sounds.



Applicable to: B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTG, B-HTH

AUTOMATIC SPEED PROTECTION IN V/S (OR FPA) MODE IN CLIMB

When climbing with V/S mode engaged: If the selected V/S value is excessive (with regards to thrust and speed), the FMGS maintains the V/S target, but the airspeed decreases. When reaching VLS (or VLS-5, if the speed target is VLS), the AP temporarily abandons the V/S target, and automatically decreases the vertical speed to maintain VLS. The same applies if FPA mode is used with an excessive FPA target.



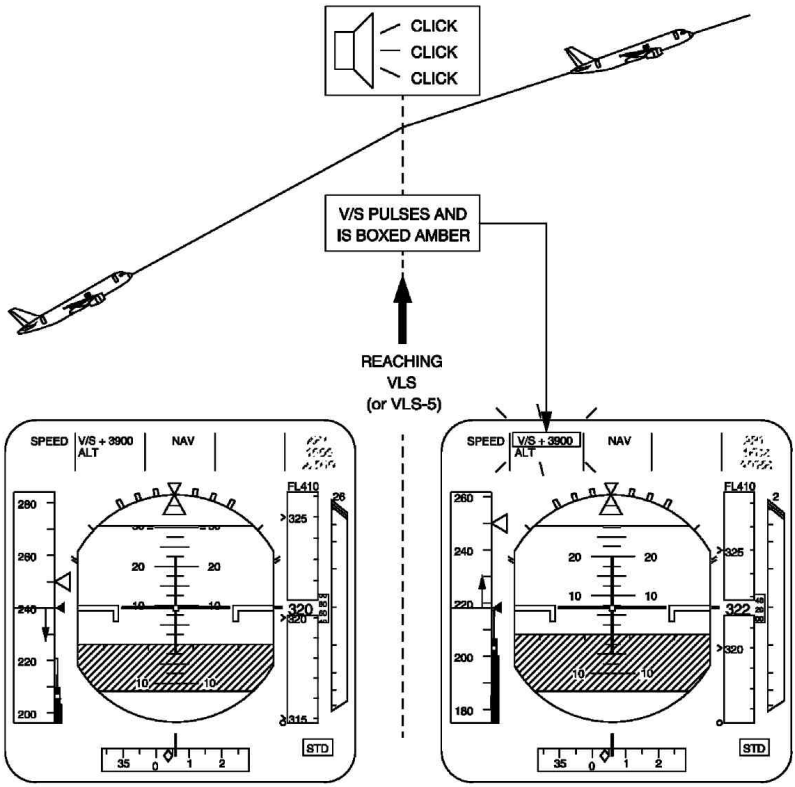
V/S mode remains engaged. The V/S target does not change, but is no longer followed.

Note: When flying with FD bars only (AP OFF), the FMGS adjusts the pitch bar so that VLS is maintained.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

AUTOMATIC SPEED PROTECTION IN V/S (OR FPA) MODE IN CLIMB

When climbing with V/S mode engaged: If the selected V/S value is excessive (with regards to thrust and speed), the FMGS maintains the V/S target, but the airspeed decreases. When reaching VLS (or VLS-5, if the speed target is VLS), the AP temporarily abandons the V/S target, and automatically decreases the vertical speed to maintain VLS. The same applies if FPA mode is used with an excessive FPA target.



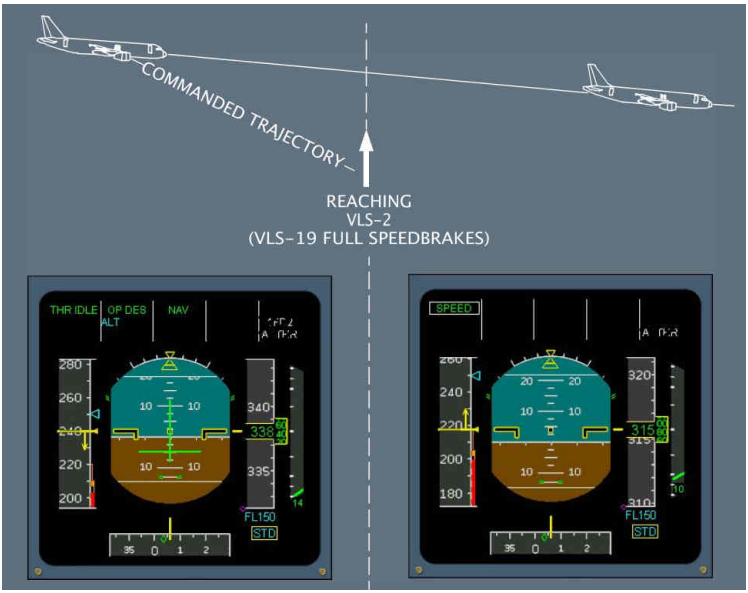
V/S mode remains engaged.
On the FMA, the V/S target is boxed with a flashing amber rectangle, and the V/S value pulses.
Besides, an aural triple click is generated.

Note: When flying with FD bars only (AP OFF), the FMGS adjusts the pitch bar so that VLS is maintained. However, no triple click is generated and the V/S target display on the FMA remains unchanged.

Applicable to: B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTG, B-HTH

AUTOMATIC SPEED MODE PROTECTION IN DESCENT

FDs are engaged in an OPEN mode in descent with the AP not engaged.
If the FDs are engaged in DES, or OP DES mode, or EXP DES and, if the flight crew does not follow the FD bars to maintain the commanded pitch, the aircraft decelerates (insufficient descent rate and idle thrust).
If the airspeed reaches VLS-2, both FDs disengage. (If speedbrakes are extended, the FDs disengage between VLS-2 and VLS-19, depending on the position of the speedbrakes).
The A/THR, if active, reverts to SPEED mode upon FDs disengagement, and increases thrust to recover the speed target.

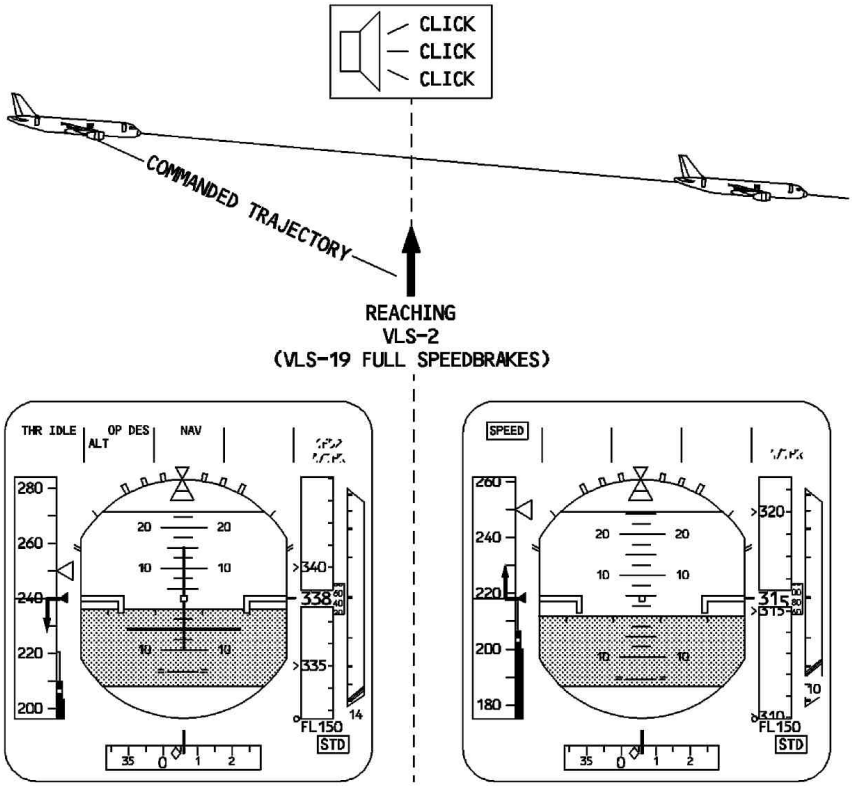


Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

AUTOMATIC SPEED MODE PROTECTION IN DESCENT

FDs are engaged in an OPEN mode in descent with the AP not engaged.

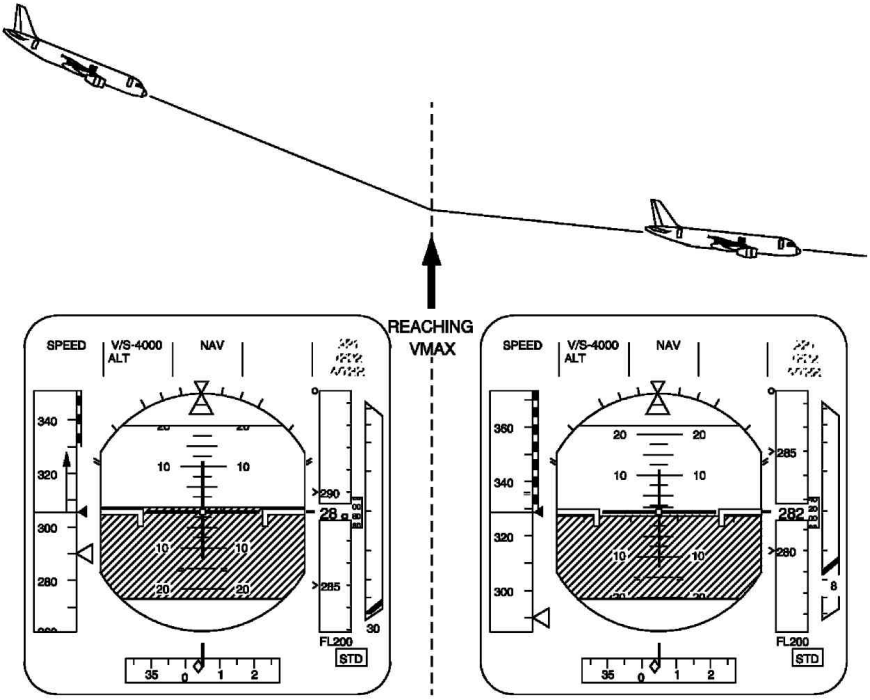
If the FDs are engaged in DES, or OP DES mode, or EXP DES ◁ and, if the flight crew does not follow the FD bars to maintain the commanded pitch, the aircraft decelerates (insufficient descent rate and idle thrust).
If the airspeed reaches VLS-2, both FDs disengage. (If speedbrakes are extended, the FDs disengage between VLS-2 and VLS-19, depending on the position of the speedbrakes).
The A/THR, if active, reverts to SPEED mode upon FDs disengagement, and increases thrust to recover the speed target.
A triple-click aural warning sounds.



Applicable to: B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTG, B-HTH

AUTOMATIC SPEED PROTECTION IN V/S (OR FPA) MODE IN DESCENT

When descending with V/S mode engaged: If the selected V/S value is excessive (with regards to thrust and speed), the FMGS maintains the V/S target, but the airspeed increases. When reaching VMAX (VMO or VLE in clean, or VFE+4 kt), the AP temporarily abandons the V/S target, and automatically decreases the vertical speed to maintain VMAX.
The same applies if FPA mode is used with an excessive FPA target.



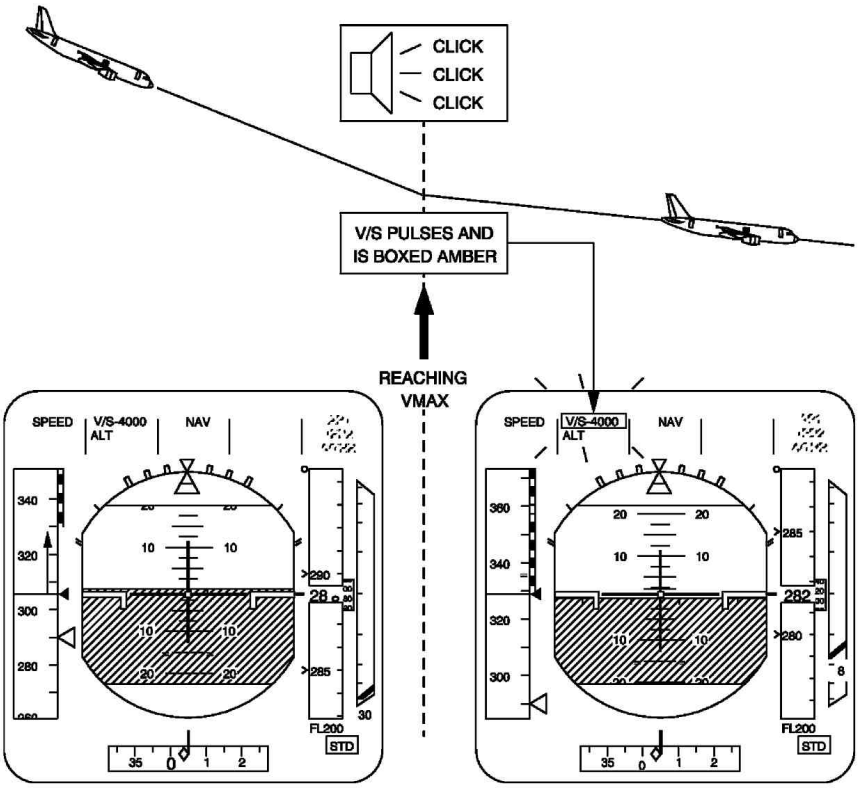
V/S mode remains engaged. The V/S target does not change, but is no longer followed.

Note: *When flying with FD bars only (AP OFF), the FMGS adjusts the pitch bar so that VMAX is maintained.*

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

AUTOMATIC SPEED PROTECTION IN V/S (OR FPA) MODE IN DESCENT

When descending with V/S mode engaged: If the selected V/S value is excessive (with regards to thrust and speed), the FMGS maintains the V/S target, but the airspeed increases. When reaching VMAX (VMO or VLE in clean, or VFE+4 kt), the AP temporarily abandons the V/S target, and automatically decreases the vertical speed to maintain VMAX.
The same applies if FPA mode is used with an excessive FPA target.



V/S mode remains engaged.
On the FMA, the V/S target is boxed with a flashing amber rectangle, and the V/S values pulses.
Besides, an aural triple click is generated.

Note: When flying with FD bars only (AP OFF), the FMGS adjusts the pitch bar so that VMAX is maintained. However, no triple click is generated and the V/S target display on the FMA remains unchanged.

REVERSION WITHOUT GLOBAL SPEED PROTECTION

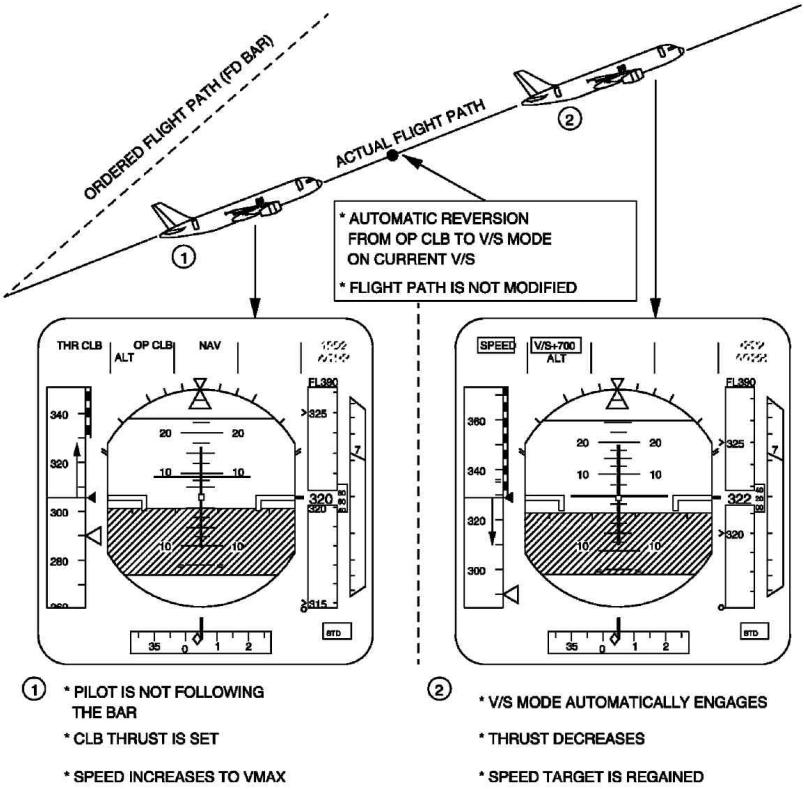
Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

REVERSION FROM OP CLB, CLB OR EXP CLB ⋘ MODE TO V/S (OR FPA) MODE

This reversion is available when FDs only are engaged (no AP).
If FDs are engaged in CLB/OP CLB mode or EXP CLB ⋘ and if the flight crew does not fly the FD bars to maintain the commanded climb (pitch too low), the aircraft will accelerate. This mode reversion, which occurs when the aircraft reaches VMAX+4, attempts to return the aircraft to target speed.

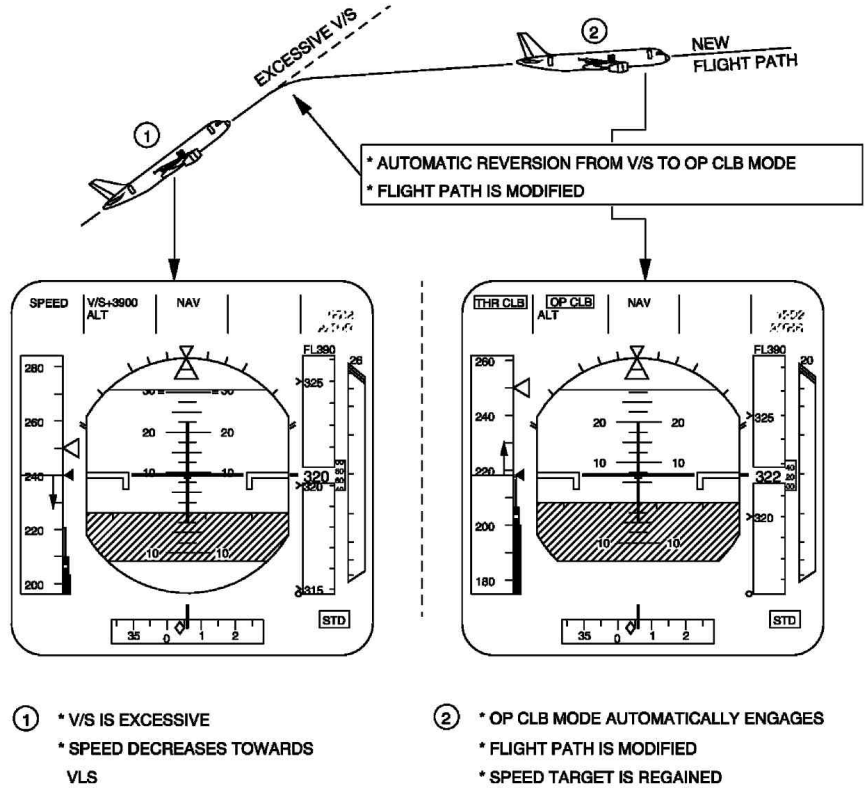
VMAX is the limit speed for the applicable configuration:
- VMO in clean configuration
- VFE with slats/flaps extended
- VLE with landing gear extended.

V/S mode engages on the current V/S value. The A/THR, if active, reverts to SPEED mode, and reduces the thrust to recover the speed target.



REVERSION FROM V/S (OR FPA) MODE TO OP CLB MODE

If the selected target V/S or FPA is too high (relative to the thrust condition and speed), the FMGS will maintain the target V/S or FPA but the aircraft will also decelerate. When the indicated airspeed reaches VLS+5, an automatic reversion to open climb will occur to return the aircraft to target speed (FCU selected altitude above the current aircraft altitude).



① * V/S IS EXCESSIVE
* SPEED DECREASES TOWARDS VLS

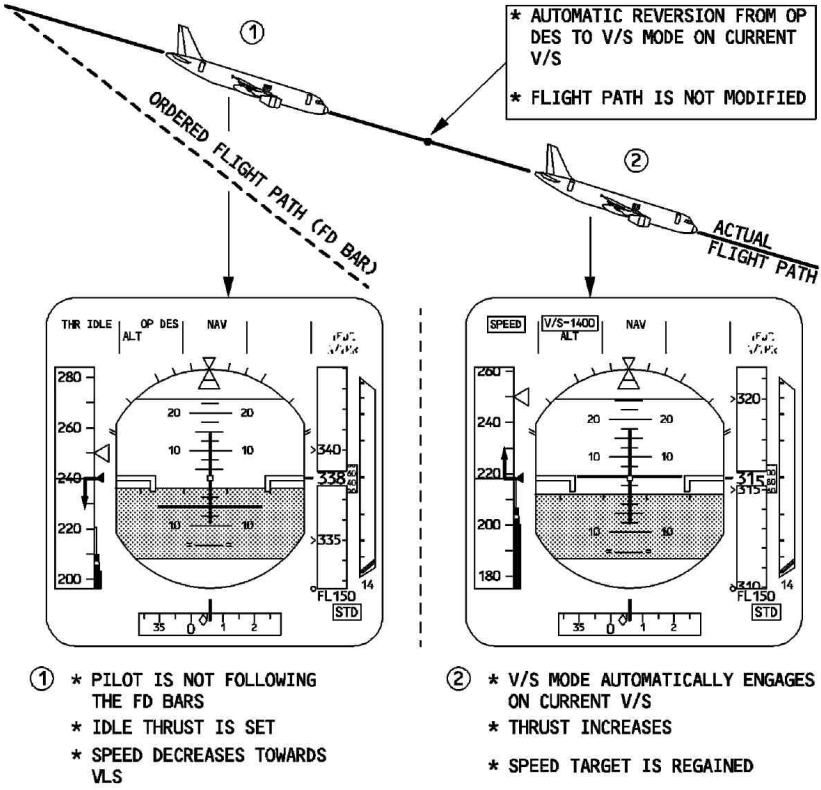
② * OP CLB MODE AUTOMATICALLY ENGAGES
* FLIGHT PATH IS MODIFIED
* SPEED TARGET IS REGAINED

Note: *During a normal approach, if the indicated airspeed is VLS+5 or below and the FCU selected altitude is above the current aircraft altitude, any positive V/S selection will trigger the automatic reversion to OP CLB.*

REVERSION FROM OP DES, DES OR EXP DES ⩤ MODE TO V/S (OR FPA) MODE

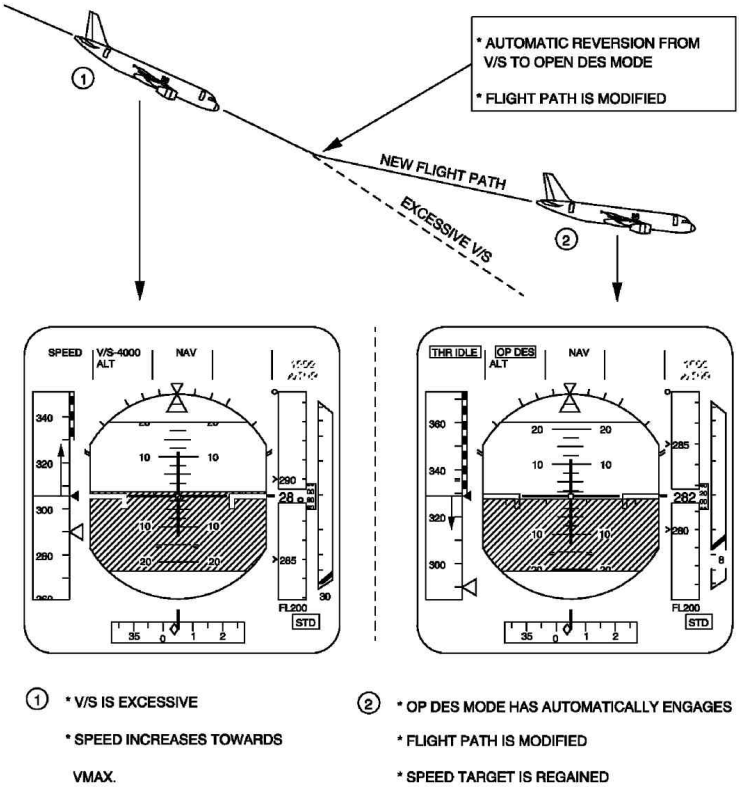
This reversion is available when only the FDs are engaged (no AP).
If the FDs are engaged in DES, or OP DES mode, or EXP DES ⩤ and, if the flight crew does not follow the FD bars to maintain the commanded pitch, the aircraft decelerates (insufficient descent rate and idle thrust).
If the airspeed reaches VLS-2, a reversion to V/S mode occurs. (If speedbrakes are extended, the reversion occurs between VLS-2 and VLS-19, depending on the position of the speedbrakes).

V/S mode engages on the current V/S. The A/THR, if active, reverts to SPEED mode and increases the thrust to recover the speed target.



REVERSION FROM V/S (OR FPA) MODE TO OP DES MODE

If the selected target V/S or FPA is excessive (V/S <0), the FMGS will maintain the target V/S or FPA but the aircraft will also accelerate. When the indicated airspeed reaches VMO-5 (clean configuration) or VMAX+4 (other than clean configuration), an automatic reversion will occur to return the aircraft to target speed. (FCU selected altitude below the current aircraft altitude).



MODE REVERSIONS (SUMMARY)

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

There are 4 different mode reversions:

REVERSION DUE TO A CHANGE OF THE FCU SELECTED ALTITUDE

Vertical Mode Engaged	FCU Altitude Selection Change	Vertical Mode Switches to
CLB - OP CLB EXP CLB	Below aircraft altitude	V/S on current V/S
DES - OP DES EXP DES	Above aircraft altitude	
ALT* ACTIVE	Any change	

REVERSION DUE TO THE LOSS OF NAV MODE (MANUAL OR AUTOMATIC)

CONDITIONS	EVENT	CONSEQUENCE
CLB engaged	Loss of NAV mode	OP CLB engages
DES engaged		V/S engages

REVERSION WHEN FD ORDERS ARE NOT FOLLOWED BY THE FLIGHT CREW (AP NOT ENGAGED)

CONDITIONS	REVERSION OCCURS WHEN	CONSEQUENCE
- FD engaged only (no AP), and - OP DES or EXP DES ◁ or DES engaged	IAS = VLS-2 (if speedbrakes are extended between VLS-2 and VLS-19)	Automatic engagement of SPEED mode on A/THR, and consequently of V/S (FPA) mode on FD to regain the target speed or VLS whichever is greater.
- FD engaged only (no AP), and - OP CLB or EXP CLB ◁ or CLB engaged	IAS = VMAX+4 VMAX = VFE or VLE or VMO/MMO	Automatic engagement of SPEED mode on A/THR, and consequently of V/S (FPA) mode on FD to regain the target speed or VMAX whichever is lower.

REVERSION DUE TO EXCESSIVE V/S

CONDITIONS	REVERSION OCCURS WHEN	CONSEQUENCE
Excessive V/S or FPA selected in climb	IAS = VLS+5	OPEN mode engages to regain the speed target. OP CLB engages when the FCU selected altitude is higher than the current aircraft altitude. OP DES engages when the FCU selected altitude is lower than the current aircraft altitude.
- Excessive V/S or FPA selected in descent, and - Clean configuration	IAS = VMAX-5 (VMAX = VMO/MMO)	
- Excessive V/S or FPA <0 selected in descent, and - Configuration other than clean	IAS = VMAX+4 VMAX = VFE or VLE	

MODE REVERSIONS (SUMMARY)

Applicable to: B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTG, B-HTH

There are only 2 types of vertical mode reversions on aircraft equipped with global speed protection.

REVERSION DUE TO A CHANGE OF THE FCU SELECTED ALTITUDE

Vertical Mode Engaged	FCU Altitude Selection Change	Vertical Mode Switches to
CLB - OP CLB EXP CLB	Below aircraft altitude	V/S on current V/S
DES - OP DES EXP DES	Above aircraft altitude	
ALT* ACTIVE	Any change	

REVERSION DUE TO THE LOSS OF NAV MODE (MANUAL OR AUTOMATIC)

CONDITIONS	EVENT	CONSEQUENCE
CLB engaged	Loss of NAV mode	OP CLB engages
DES engaged		V/S engages

SPEED PROTECTION WHEN FD ORDERS ARE NOT FOLLOWED BY THE FLIGHT CREW (AP NOT ENGAGED)

CONDITIONS	EVENT	CONSEQUENCE
- FD engaged only (no AP), and - OP DES or EXP DES or DES engaged - A/THR active (IDLE thrust)	IAS = VLS-2 (if speedbrakes are extended between VLS-2 and VLS-19)	FD bars disappear. If A/THR active, automatic engagement of SPEED mode on the A/THR. Thrust increases to recover the speed target.
- FD engaged only (no AP), and - OP CLB or EXP CLB or CLB engaged - A/THR active (CLIMB thrust)	IAS = VMAX+4 VMAX = VFE or VLE or VMO/MMO	FD bars disappear. If A/THR active, automatic engagement of SPEED mode on the A/THR. Thrust decreases to recover the speed target.

SPEED PROTECTION DUE TO EXCESSIVE V/S

CONDITIONS	EVENT	CONSEQUENCE
Excessive V/S or FPA selected in climb	IAS = VLS (or VLS-5, if target = VLS)	The selected V/S (or FPA) target is temporarily abandoned to maintain VLS in climb or VMAX in descent.
- Excessive V/S or FPA selected in descent, and - Clean configuration	IAS = VMAX	
- Excessive V/S or FPA <0 selected in descent, and - Configuration other than clean	IAS = VMAX	

MODE REVERSIONS (SUMMARY)

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

There are only 2 types of vertical mode reversions on aircraft equipped with global speed protection.

REVERSION DUE TO A CHANGE OF THE FCU SELECTED ALTITUDE

Vertical Mode Engaged	FCU Altitude Selection Change	Vertical Mode Switches to
CLB - OP CLB EXP CLB ◁✻	Below aircraft altitude	V/S on current V/S
DES - OP DES EXP DES ◁✻	Above aircraft altitude	
ALT* ACTIVE	Any change	

REVERSION DUE TO THE LOSS OF NAV MODE (MANUAL OR AUTOMATIC)

CONDITIONS	EVENT	CONSEQUENCE
CLB engaged	Loss of NAV mode	OP CLB engages
DES engaged		V/S engages

SPEED PROTECTION WHEN FD ORDERS ARE NOT FOLLOWED BY THE FLIGHT CREW (AP NOT ENGAGED)

CONDITIONS	EVENT	CONSEQUENCE
- FD engaged only (no AP), and - OP DES or EXP DES ◁✻ or DES engaged - A/THR active (IDLE thrust)	IAS = VLS-2 (if speedbrakes are extended between VLS-2 and VLS-19)	FD bars disappear. If A/THR active, automatic engagement of SPEED mode on the A/THR. Thrust increases to recover the speed target.
- FD engaged only (no AP), and - OP CLB or EXP CLB ◁✻ or CLB engaged - A/THR active (CLIMB thrust)	IAS = VMAX+4 VMAX = VFE or VLE or VMO/MMO	FD bars disappear. If A/THR active, automatic engagement of SPEED mode on the A/THR. Thrust decreases to recover the speed target.

SPEED PROTECTION DUE TO EXCESSIVE V/S

CONDITIONS	EVENT	CONSEQUENCE
Excessive V/S or FPA selected in climb	IAS = VLS (or VLS-5, if target = VLS)	The selected V/S (or FPA) target is temporarily abandoned to maintain VLS in climb or VMAX in descent.
- Excessive V/S or FPA selected in descent, and - Clean configuration	IAS = VMAX	
- Excessive V/S or FPA <0 selected in descent, and - Configuration other than clean	IAS = VMAX	

ENHANCED MODE REVERSION ALERTNESS

The following sequences, or mode reversions, are highlighted by a triple click:

- V/S selection in ALT*
- SPD selection in SRS
- CLB (or EXP CLB ⋘) to OP CLB, upon lateral flight crew action while climbing toward a constraint
- ALT* to V/S, upon ALT target change
- FD disengagement in OPEN modes
- Alerting FMA display when V/S-(FPA) target is not held
- CLB to OP CLB reversion, upon profile loss
- Automatic FD re-engagement in basic mode
- DES to V/S upon flight plan loss
- FINAL DES to V/S, upon NAV loss
- Reversion to V/S when selected ALT crosses the current altitude
- Automatic FD re-engagement in basic lateral mode
- NAV to HDG, upon NAV loss.

GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO

These modes are called “common” because they are related to both the lateral and the vertical axes.

The AP/FD common modes are:
- On takeoff: Runway/Runway track associated to SRS vertical modes
- In approach: ILS approach (LAND) or non-ILS approach (APP NAV FINAL)
- In go around: Go around track associated to SRS vertical modes.

These modes are engaged simultaneously on both axes.

<table>
<tr><th colspan="2">COMMON MODES</th><th>VERTICAL</th><th>LATERAL</th></tr>
<tr><td colspan="2">TAKEOFF</td><td>SRS</td><td>RWY
RWY TRK</td></tr>
<tr><td rowspan="3">APPROACH
MODES</td><td rowspan="2">ILS
APPROACH</td><td>G/S*
G/S</td><td>LOC*
LOC</td></tr>
<tr><td colspan="2">LAND, FLARE,
ROLL OUT</td></tr>
<tr><td>NON-ILS
APPROACH</td><td>FINAL</td><td>APP NAV</td></tr>
<tr><td colspan="2">GO AROUND
(GA)</td><td>SRS</td><td>GA TRK</td></tr>
</table>

GENERAL

Applicable to: B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

These modes are called “common” because they are related to both the lateral and the vertical axes.

The AP/FD common modes are:
- On takeoff: Runway/Runway track associated to SRS vertical modes
- In approach: ILS approach (LAND) or non-ILS approach (APP NAV FINAL)
- In go around: NAV or Go around track associated to SRS vertical modes.

These modes are engaged simultaneously on both axes.

<table>
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APPROACH</td><td>G/S*
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LOC</td></tr>
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<tr><td>NON-ILS
APPROACH</td><td>FINAL</td><td>APP NAV</td></tr>
<tr><td colspan="2">GO AROUND
(GA)</td><td>SRS</td><td>GA TRK
NAV</td></tr>
</table>

GENERAL

Applicable to: ALL

Takeoff mode combines the SRS (Speed Reference System) vertical mode with the RWY lateral mode. Both are simultaneously engaged, but may be disengaged separately.

Takeoff mode is available:
- During the takeoff run and initial climb for FD bars guidance
- 5 s after lift-off for AP use.

SRS (SPEED REFERENCE SYSTEM)

Applicable to: ALL

GENERAL

The SRS mode controls pitch to steer the aircraft along a path in the vertical plan at a speed defined by the SRS guidance law.

Applicable to: ALL

ENGAGEMENT CONDITIONS

The SRS mode engages automatically when the thrust levers are set to the TOGA or FLX/MCT detent, providing:
- V2 has been inserted in the MCDU PERF TAKEOFF page
- The slats are extended
- The aircraft has been on ground for at least 30 s.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH

DISENGAGEMENT CONDITIONS

The SRS mode disengages:
- Automatically, at the acceleration altitude (ACC ALT), or if ALT* or ALT CST* mode engages (above 400 ft RA)
- If the flight crew engages another vertical mode.

Note: *In Engine Out conditions, the SRS mode does not automatically disengage at EO ACC ALT. Refer to DSC-22_20-60-40 General.*

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

DISENGAGEMENT CONDITIONS

The SRS mode disengages:

- Automatically, at the acceleration altitude (ACC ALT), or if ALT* or ALT CST* mode engages (above 400 ft RA)
- If the flight crew engages another vertical mode
- If the flight crew selects a speed while in SRS mode: SRS reverts to OP CLB mode, and a triple-click aural warning is heard.

Note: *In Engine Out conditions, the SRS mode does not automatically disengage at EO ACC ALT. Refer to DSC-22_20-60-40 General.*

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

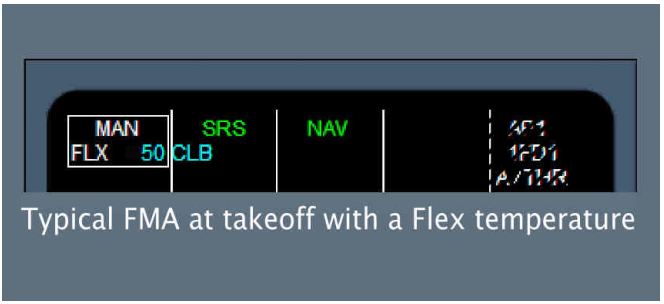
GUIDANCE

In SRS mode, the aircraft maintains a speed target equal to V2+10 kt in normal engine configuration. When the FMGS detects an engine failure, the speed target becomes the highest of V2 or current speed, limited by V2+15 kt.

The SRS guidance law also includes:

- Attitude protection to reduce aircraft nose-up effect during takeoff (18 ° or 22.5 ° maximum in case of windshear)
- Flight path angle protection that ensures a minimum vertical speed of 120 ft/min .

Note: *If during takeoff the flight crew inadvertently sets an altitude on the FCU below the current altitude, the aircraft will remain in SRS mode until the flight crew takes some other action.*



Typical FMA at takeoff with a Flex temperature

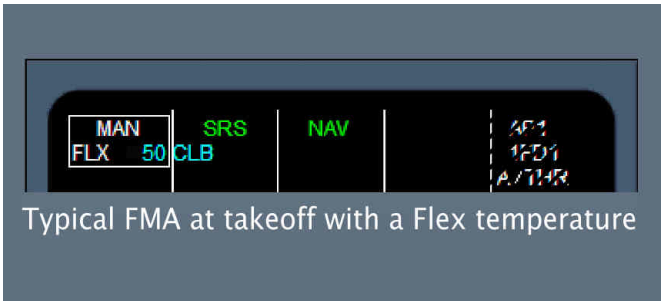
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

GUIDANCE

In SRS mode, the aircraft maintains a speed target equal to V2+10 kt in normal engine configuration. When the FMGS detects an engine failure, the speed target becomes the highest of V2 or current speed, limited by V2+15 kt.

The SRS guidance law also includes:
- Attitude protection to reduce aircraft nose-up effect during takeoff (18 ° or 22.5 ° maximum in case of windshear)
- Flight path angle protection that ensures a minimum vertical speed of 120 ft/min
- A speed protection limiting the target speed to V2+15 kt.

Note: *If during takeoff the flight crew inadvertently sets an altitude on the FCU below the current altitude, the aircraft will remain in SRS mode until the flight crew takes some other action.*



Typical FMA at takeoff with a Flex temperature

RUNWAY (RWY)

Applicable to: ALL

GENERAL

The RUNWAY mode has two submodes:
- RWY mode, which gives lateral guidance orders during takeoff roll and initial climb out (up to 30 ft RA) if a LOC signal is available
- RWY TRK mode, which gives lateral guidance on the track the aircraft was flying at mode engagement (at 30 ft RA).

ENGAGEMENT CONDITIONS

The RWY engagement conditions are:

- The conditions required for SRS mode engagement:
  - V2 is inserted in the MCDU PERF TAKEOFF page
  - Slats are extended
  - The aircraft has been on ground for at least 30 s.
- The aircraft is receiving a LOC signal and LOC deviation is less than 1/2 dot
- The aircraft heading is within 20 ° of the ILS related course
- The ILS course is identical to the runway heading of the origin airport as selected for the active flight plan, if any.

The RWY TRK mode engages automatically at 30 ft (RA) if NAV mode does not engage (NAV not armed prior to takeoff).

DISENGAGEMENT CONDITIONS

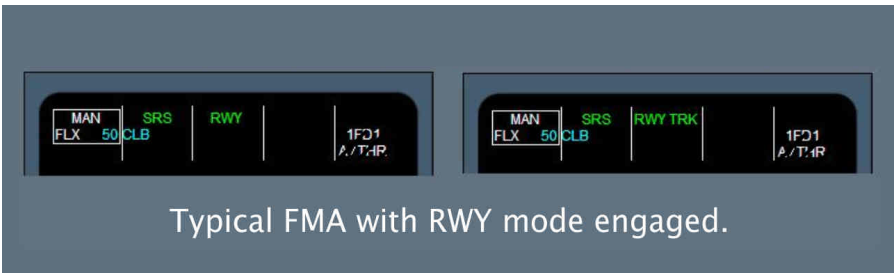
RWY mode disengages if:

- The LOC signal is lost below 30 ft RA or the aircraft heading and the runway heading differ by more than 20 °.
- Another lateral mode is engaged.

Note: If the takeoff runway has no ILS, RWY mode is not available and the PFD does not display the yaw bar nor "RWY"on FMA.

GUIDANCE

The RWY mode uses the LOC signal to guide the aircraft on the runway centerline while the aircraft is on the ground. The PFD displays the FD yaw bar and the FMA displays "RWY".
The RWY TRK mode guides the aircraft on the track the aircraft was flying at mode engagement. The FD displays the conventional guidance bar and the FMA displays “RWY TRK”.



Typical FMA with RWY mode engaged.

General

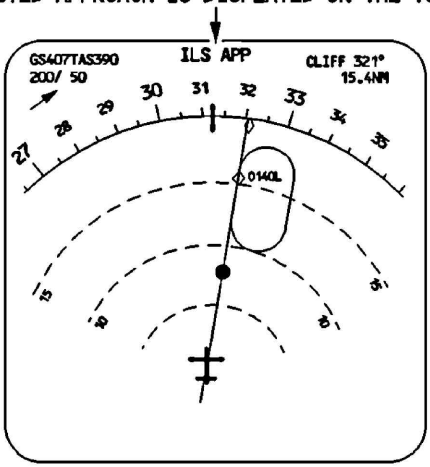
GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

The aircraft can fly different types of approaches:
- Precision approaches: ILS, MLS ◁✻
- Non-precision approaches: VOR/DME, VOR, NDB (if ADF ◁✻), RNAV
- Non-precision approaches using a Localizer only: LOC.

The flight crew uses an ARRIVAL lateral revision to insert these approaches into the flight plan:
- For precision approaches, the flight crew uses the APPR pb on the FCU to arm or engage the LOC and G/S guidance modes
- For non-precision approaches, the flight crew uses the APPR pb on the FCU to arm or engage the APP NAV and FINAL guidance modes, except for LOC approaches, where the flight crew only uses the LOC pb to arm or engage the LOC mode.

THE TYPE OF SELECTED APPROACH IS DISPLAYED ON THE TOP SIDE OF THE ND



GENERAL

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

The aircraft can fly different types of approaches:
- Precision approaches: ILS, MLS
- Non-precision approaches: VOR/DME, VOR, NDB (if ADF), RNAV
- Non-precision approaches using a Localizer only: LOC.

The flight crew uses an ARRIVAL lateral revision to insert these approaches into the flight plan:
- For precision approaches, the flight crew uses the APPR pb on the FCU to arm or engage the LOC and G/S guidance modes
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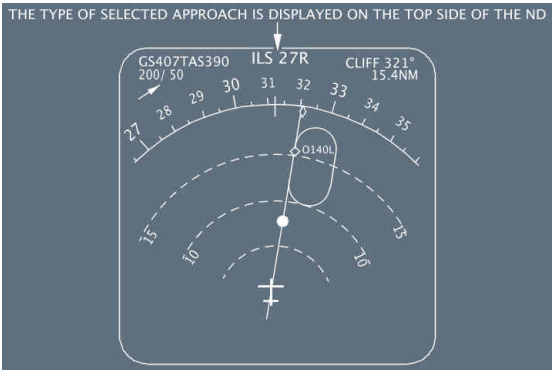


Precision Approach

PRECISION APPROACH MODES

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

GENERAL

The ILS approach mode includes the following modes:

VERTICAL MODE	LATERAL MODE
G/S* (capture) G/S (track)	LOC* (capture) LOC (track)
COMMON MODES: LAND - FLARE - ROLL OUT	

The sequencing of these modes is automatic once the flight crew has pushed the APPR pb and the conditions for engagement are met.

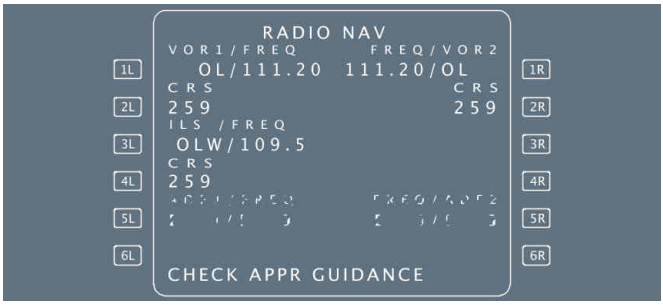
SELECTION

The ILS approach is selected when the APPR pb of the FCU is pressed and:

- An ILS approach or a runway only or no approach is inserted in the Flight Management flight plan (ARRIVAL page), and an ILS frequency is set in on the MCDU, or
- Both radio management panels are set to NAV and each one has the ILS frequency and course set in.

CHECK APPROACH GUIDANCE MESSAGE

If the flight crew inserts a non-ILS approach into the flight plan, and then uses the RAD NAV page to tune an ILS manually, the MCDU displays “CHECK APPR GUIDANCE”. This message is a reminder that the available APPR guidance modes are APP NAV and FINAL.



Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

GENERAL

The ILS approach mode includes the following modes:

VERTICAL MODE	LATERAL MODE
G/S* (capture) G/S (track)	LOC* (capture) LOC (track)
COMMON MODES: LAND - FLARE - ROLL OUT	

The sequencing of these modes is automatic once the flight crew has pushed the APPR pb and the conditions for engagement are met.

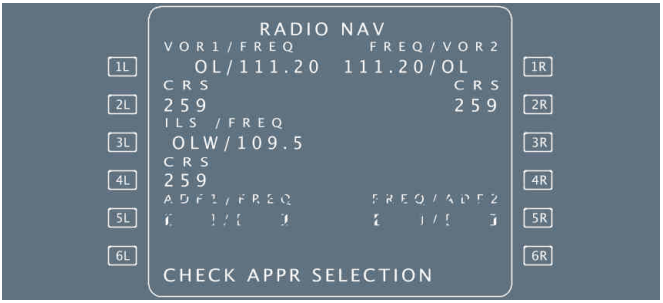
SELECTION

The ILS approach is selected when the APPR pb of the FCU is pressed and:

- An ILS approach or a runway only or no approach is inserted in the Flight Management flight plan (ARRIVAL page), and an ILS frequency is set in on the MCDU, or
- Both radio management panels are set to NAV and each one has the ILS frequency and course set in.

CHECK APPROACH SELECTION MESSAGE

If the flight crew inserts a non-ILS approach into the flight plan, and then uses the RAD NAV page to tune an ILS manually, the MCDU displays “CHECK APPR SELECTION”. This message is a reminder that the available APPR guidance modes are APP NAV and FINAL.



Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

APPR MODE

ARMING CONDITIONS OF LOC AND G/S MODES

The flight crew arms the ILS APPR mode (LOC and G/S in blue on the FMA) by pushing the APPR pb on the FCU, provided that:

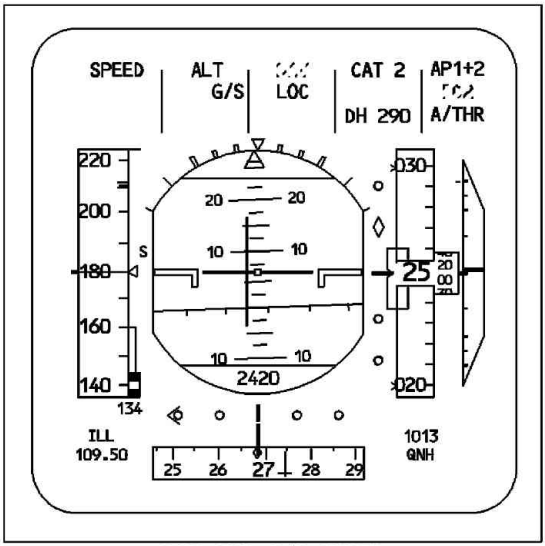
- An ILS approach is selected
- The aircraft is above 400 ft RA
- The ILS and RA are available
- Go-around or takeoff or final mode is not engaged
- ILS frequency and course are identically set on both receivers.

LOC and G/S blue are displayed on the FMA. Both modes will automatically engage when conditions are met.
Second autopilot may be engaged.
Current landing capability is displayed on the FMA.

DISARMING CONDITIONS OF LOC AND G/S MODES

ILS APPR mode is disarmed, if the aircraft is above 400 ft and:

- When the flight crew presses the APPR pb, both the LOC and the G/S modes disarm. The HDG/TRK mode engages if the LOC mode was engaged, and the V/S (FPA) mode engages if the G/S mode was engaged
- When the flight crew presses the LOC pb, only the G/S mode disarms. The V/S (FPA) mode engages, if the G/S mode was engaged
- When the flight crew pulls the HDG/TRK knob
- When the flight crew engages the go-around mode.



LOC AND G/S ARMED

ENGAGEMENT CONDITIONS OF LOC AND G/S MODES

When ILS capture conditions are fulfilled:
- LOC* mode engages, and
- G/S* mode engages. No radio altimeter validity is required with this FMGC standard for G/S engagement. The FMA displays “LOC*”, or “G/S*”, or both, in green.

Nevertheless, the G/S* mode cannot engage, if:
- LOC* mode is not engaged, or
- The aircraft is above the glide path and its trajectory does not cross the ILS G/S beam.

When the aircraft is established on the LOC axis, the LOC mode engages.
When the aircraft is established on the G/S axis, the G/S mode engages.
The FMA displays “LOC”and “G/S”in green. The AP/FD guides the aircraft along the G/S down to 30 ft, and along the LOC during the flare and rollout.

Note: *G/S* or G/S modes may be engaged above the operating range of the radio altimeters (8 000 ft for TRT, and 5 000 ft for Collins and Honeywell radio altimeters). The landing capability displayed on the FMA will reflect the lack of RA validity (CAT 1) until the radio altimeters become active.*
But, if the radio altimeters fail, or if the FMGS receives no radio altimeter data, LOC, G/S, and AP/FDs will disengage and FDs will re-engage on basic modes.

DISENGAGEMENT CONDITIONS OF LOC AND G/S MODES

If the aircraft is above 400 ft, the ILS APPR mode disengages when the flight crew:
- Presses the APPR pb, HDG V/S or TRK FPA engages
- Presses the LOC pb, the LOC mode remains engaged. The system reverts to V/S (FPA), if G/S was engaged
- Pulls out the V/S or FPA knob, the system reverts to basic modes (HDG V/S or TRK FPA engages)
- Pulls out the HDG/TRK knob, HDG V/S or TRK FPA engages
- Engages the go-around mode.

LOC CAPTURE ASSISTANCE FUNCTION

In NAV mode, and when within 20 nm of the destination runway, the aircraft is guided with a track angle of 20 ° from the LOC axis. This helps the aircraft intercept and capture the LOC beam.

When the ILS frequency or the ILS ident entered on the RAD NAV page differs from the ILS of the destination runway entered in the flight plan:
- The aircraft loses the LOC capture assistance function
- The “RWY/ILS MISMATCH” message is displayed on the scratchpad
- The flight crew should select HDG mode to perform the LOC capture.

Note: *There is no glideslope capture assistance. The flight crew shall ensure that the aircraft flight path intercepts the G/S beam.*

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

APPR MODE

ARMING CONDITIONS OF LOC AND G/S MODES

The flight crew arms the ILS APPR mode (LOC and G/S in blue on the FMA) by pushing the APPR pb on the FCU, provided that:
- An ILS approach is selected
- The aircraft is above 400 ft RA
- The ILS and RA are available

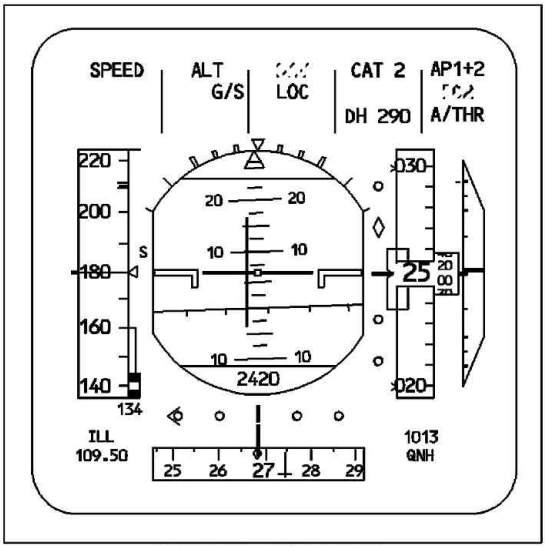
- Go-around or takeoff or final mode is not engaged
- ILS frequency and course are identically set on both receivers.

LOC and G/S blue are displayed on the FMA. Both modes will automatically engage when conditions are met.
Second autopilot may be engaged.
Current landing capability is displayed on the FMA.

DISARMING CONDITIONS OF LOC AND G/S MODES

ILS APPR mode is disarmed, if the aircraft is above 400 ft and:

- When the flight crew presses the APPR pb, both the LOC and the G/S modes disarm. The HDG/TRK mode engages if the LOC mode was engaged, and the V/S (FPA) mode engages if the G/S mode was engaged
- When the flight crew presses the LOC pb, only the G/S mode disarms. The V/S (FPA) mode engages, if the G/S mode was engaged
- When the flight crew pulls the HDG/TRK knob
- When the flight crew engages the go-around mode.



LOC AND G/S ARMED

ENGAGEMENT CONDITIONS OF LOC AND G/S MODES

When ILS capture conditions are fulfilled:
- LOC* mode engages, and
- G/S* mode engages. No radio altimeter validity is required with this FMGC standard for G/S engagement. The FMA displays “LOC*”, or “G/S*”, or both, in green.

Nevertheless, the G/S* mode cannot engage, if:
- LOC* mode is not engaged, or
- The aircraft is above the glide path and its trajectory does not cross the ILS G/S beam.

When the aircraft is established on the LOC axis, the LOC mode engages.
When the aircraft is established on the G/S axis, the G/S mode engages.
The FMA displays “LOC”and “G/S”in green. The AP/FD guides the aircraft along the G/S down to 30 ft, and along the LOC during the flare and rollout.

Note: *G/S* or G/S modes may be engaged above the operating range of the radio altimeters (8 000 ft for TRT, and 5 000 ft for Collins and Honeywell radio altimeters). The landing capability displayed on the FMA will reflect the lack of RA validity (CAT 1) until the radio altimeters become active.*
But, if the radio altimeters fail, or if the FMGS receives no radio altimeter data, LOC, G/S, and AP/FDs will disengage and FDs will re-engage on basic modes.

DISENGAGEMENT CONDITIONS OF LOC AND G/S MODES

If the aircraft is above 400 ft, the ILS APPR mode disengages when the flight crew:
- Presses the APPR pb, HDG V/S or TRK FPA engages
- Presses the LOC pb, the LOC mode remains engaged. The system reverts to V/S (FPA), if G/S was engaged
- Pulls out the HDG/TRK knob, HDG V/S or TRK FPA engages
- Engages the go-around mode
- When the LOC or G/S signal has been lost for 7 s or more above 200 ft RA. AP/FDs disengage and FDs reengage in basic modes (HDG V/S or TRK FPA).

DISENGAGEMENT CONDITIONS OF G/S ONLY

- The flight crew pulls out the V/S or FPA knob. LOC mode remains engaged, but G/S mode disengages and V/S or FPA engages.
- The flight crew pushes or pulls the ALT knob. LOC mode remains engaged, and the mode selected by the flight crew engages, as a function of the FCU selected altitude.

LOC CAPTURE ASSISTANCE FUNCTION

In NAV mode, and when within 20 nm of the destination runway, the aircraft is guided with a track angle of 20 ° from the LOC axis. This helps the aircraft intercept and capture the LOC beam.

When the ILS frequency or the ILS ident entered on the RAD NAV page differs from the ILS of the destination runway entered in the flight plan:
- The aircraft loses the LOC capture assistance function
- The “RWY/ILS MISMATCH” message is displayed on the scratchpad
- The flight crew should select HDG mode to perform the LOC capture.

Note: There is no glideslope capture assistance. The flight crew shall ensure that the aircraft flight path intercepts the G/S beam.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

APPR MODE

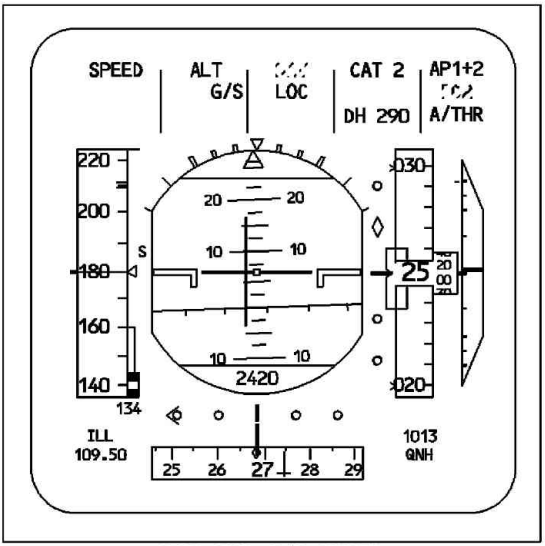
ARMING CONDITIONS OF LOC AND G/S MODES

The flight crew arms the ILS APPR mode (LOC and G/S in blue on the FMA) by pushing the APPR pb on the FCU, provided that:
- An ILS approach is selected
- The aircraft is above 400 ft RA
- The ILS and RA are available
- Go-around or takeoff or final mode is not engaged
- ILS frequency and course are identically set on both receivers.

LOC and G/S blue are displayed on the FMA. Both modes will automatically engage when conditions are met.
Second autopilot may be engaged.
Current landing capability is displayed on the FMA.

DISARMING CONDITIONS OF LOC AND G/S MODES

ILS APPR mode is disarmed, if the aircraft is above 400 ft and:
- When the flight crew presses the APPR pb, both the LOC and the G/S modes disarm. The HDG/TRK mode engages if the LOC mode was engaged, and the V/S (FPA) mode engages if the G/S mode was engaged
- When the flight crew presses the LOC pb, only the G/S mode disarms. The V/S (FPA) mode engages, if the G/S mode was engaged
- When the flight crew pulls the HDG/TRK knob
- When the flight crew engages the go-around mode.



LOC AND G/S ARMED

ENGAGEMENT CONDITIONS OF LOC AND G/S MODES

When ILS capture conditions are fulfilled:

- LOC* mode engages, and
- G/S* mode engages. No radio altimeter validity is required with this FMGC standard for G/S engagement. The FMA displays “LOC*”, or “G/S*”, or both, in green.

Nevertheless, the G/S* mode cannot engage, if:

- LOC* mode is not engaged, or
- The aircraft is above the glide path and its trajectory does not cross the ILS G/S beam.

When the aircraft is established on the LOC axis, the LOC mode engages.
When the aircraft is established on the G/S axis, the G/S mode engages.
The FMA displays “LOC”and “G/S”in green. The AP/FD guides the aircraft along the G/S down to 30 ft, and along the LOC during the flare and rollout.

Note: G/S or G/S modes may be engaged above the operating range of the radio altimeters (8 000 ft for TRT, and 5 000 ft for Collins and Honeywell radio altimeters). The landing capability displayed on the FMA will reflect the lack of RA validity (CAT 1) until the radio altimeters become active.*
But, if the radio altimeters fail, or if the FMGS receives no radio altimeter data, LOC, G/S, and AP/FDs will disengage and FDs will re-engage on basic modes.

DISENGAGEMENT CONDITIONS OF LOC AND G/S MODES

If the aircraft is above 400 ft, the ILS APPR mode disengages when the flight crew:
- Presses the APPR pb, HDG V/S or TRK FPA engages
- Presses the LOC pb, the LOC mode remains engaged. The system reverts to V/S (FPA), if G/S was engaged
- Pulls out the HDG/TRK knob, HDG V/S or TRK FPA engages
- Engages the go-around mode
- When the LOC or G/S signal has been lost for 7 s or more above 200 ft RA. AP/FDs disengage and FDs reengage in basic modes (HDG V/S or TRK FPA).

DISENGAGEMENT CONDITIONS OF G/S ONLY

- The flight crew pulls out the V/S or FPA knob. LOC mode remains engaged, but G/S mode disengages and V/S or FPA engages.
- The flight crew pushes or pulls the ALT knob. LOC mode remains engaged, and the mode selected by the flight crew engages, as a function of the FCU selected altitude.

LOC CAPTURE ASSISTANCE FUNCTION

The LOC capture assistance function enhances the performance of the LOC capture and helps the aircraft to capture the LOC beam without overshoot.

Pre-Capture of the LOC Beam (Enhanced Localizer Capture)

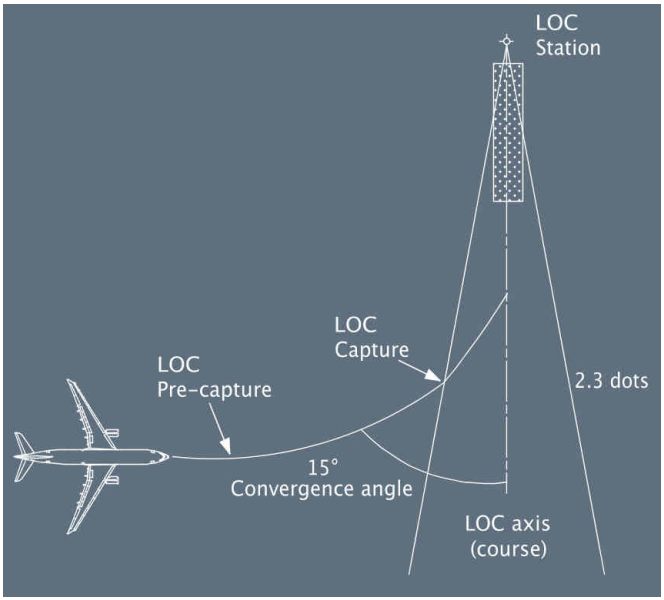
The pre-capture of the LOC beam aims to begin the LOC beam capture sooner.
LOC* mode may engage when LOC mode is armed and when the aircraft reaches the LOC pre-capture zone. The LOC pre-capture zone is a geographical zone around LOC beam where it is possible to guide the aircraft toward the LOC beam, with the help of FMS position data. To ensure the capture of the LOC beam, the aircraft is guided with a 15 ° convergence angle with respect to runway QFU.

The LOC* mode engagement in the pre-capture zone is possible, when :
- The LOC deviation is more than 2.3 dots
- The FMS is in GPS PRIMARY
- The difference between the track and the QFU is between 25 ° and 115 °
- The guidance roll order is such that LOC* will capture the LOC beam without overshoot.

If one of the LOC pre-capture engagement conditions is not respected, in NAV mode and within 20 nm of the destination runway, the aircraft is guided with a track angle of 20 ° from the LOC axis. This helps the aircraft intercept and capture the LOC beam.
When the LOC deviation becomes lower than 2.3 dots, LOC* mode no longer uses the FMS position data for guidance, but the actual LOC beam deviation to complete the capture of the axis.

Capture of the LOC Beam

Current conditions of LOC beam capture in the capture zone remain the same. This means that if approach conditions of the aircraft (interception angle, speed) do not need activation of the capture assistance, the LOC beam capture will occur as usual based on LOC deviation, aircraft track and guidance roll order conditions.



Note: *On the PFD and on the ND, the flight crew will observe movement of the LOC deviation toward the center of the scale, only when the LOC deviation is less than 2 dots. This occurs when the aircraft is in the capture zone.*

When the ILS frequency or the ILS ident entered on the RAD NAV page differs from the ILS of the destination runway entered in the Flight Plan :
- The aircraft loses the LOC capture assistance function
- The "RWY/LS MISMATCH" message is displayed on the scratchpad
- The flight crew should select HDG mode to perform the LOC capture.

Note: *There is no glideslope capture assistance. The flight crew shall ensure that the aircraft flight path intercepts the G/S beam.*

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

LAND MODE

ENGAGEMENT CONDITIONS

LAND mode automatically engages when the LOC and G/S modes are engaged, and the aircraft is below 400 ft RA. The FMA displays "LAND", indicating that LOC and G/S are locked. No action on the FCU will disengage LAND mode. FLARE and ROLL OUT modes will successively engage.

DISENGAGEMENT CONDITIONS

LAND mode disengages:
- Upon engagement of the go-around mode
- If the flight crew presses the APPR pb, when the aircraft has been on ground for at least 10 s with the autopilot disconnected.

Note: *When LAND is not displayed on the FMA, at/or slightly below 400 ft, the landing capability degrades to CAT 1 and the triple click is generated. No autoland is authorized with CAT 1 displayed on the FMA.*

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

LAND MODE

ENGAGEMENT CONDITIONS

LAND mode automatically engages when the LOC and G/S modes are engaged, and the aircraft is below 400 ft RA. The FMA displays "LAND", indicating that LOC and G/S are locked. No action on the FCU will disengage LAND mode. FLARE and ROLL OUT modes will successively engage.

DISENGAGEMENT CONDITIONS

LAND mode disengages:
- Upon engagement of the go-around mode
- If the flight crew presses the APPR pb, when the aircraft has been on ground for at least 10 s with the autopilot disconnected
- When both AP/FDs are disengaged.

Note: *When LAND is not displayed on the FMA, at/or slightly below 400 ft, the landing capability degrades to CAT 1 and the triple click is generated. No autoland is authorized with CAT 1 displayed on the FMA.*

Applicable to: ALL

FLARE MODE

Once the aircraft reaches approximately 40 ft RA (the precise value is a function of V/S):
- The FLARE mode engages
- The FMA displays “FLARE” in green.

At 30 ft RA, the AP/FD aligns the yaw axis with the runway centerline and the aircraft flares on the pitch axis. If the autothrust is active, thrust is automatically reduced to IDLE (*Refer to DSC-22_30-90 A/THR Modes - RETARD Mode*).
When both AP/FDs are disengaged, FLARE mode disengages.
After main landing gear touchdown, the autopilot (if engaged) sends a nose down order.

ALIGN SUB-MODE

ALIGN is a sub-mode of LAND mode that lines up the aircraft’s axis with the ILS course. It is not displayed to the flight crew.

Applicable to: ALL

ROLL OUT MODE

At touchdown, the ROLL OUT mode engages and guides the aircraft along the runway centerline. The FMA displays “ROLL OUT” in green, and the PFD displays the yaw bar and no FD bars.

SPEED CONTROL

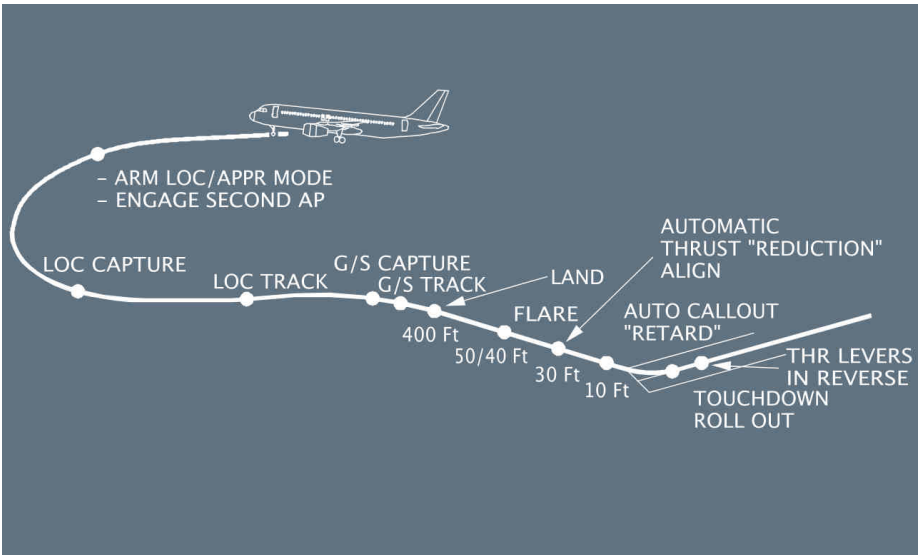
Applicable to: ALL

The autothrust, when active, controls speed. The approach speed target (VAPP) is either managed by the FMGS or selected by the flight crew:

- When managed, the speed target is computed by the FMGS and may be modified by the flight crew through the MCDU. At 700 ft RA, the current speed target value is memorized by the autothrust, to ensure stabilized speed guidance, even if Flight Management fails. Below 700 ft, any new VAPP or WIND entry in the MCDU has no effect on the speed target.
- When selected, the autothrust always targets the speed selected on the FCU.

TYPICAL ILS APPROACH

Applicable to: ALL



AUTOLAND WARNING LIGHT

Applicable to: ALL

The following situations, when occurring below 200 ft RA with the aircraft in LAND mode, trigger the flashing Autoland red warning and a triple click aural warning:

- Both APs OFF below 200 ft RA.
- Excessive deviation in LOC (1/4 dot above 15 ft RA) or GLIDE (1 dot above 100 ft RA). In addition, LOC and GLIDE scales flash on the PFD.
- Loss of LOC signal above 15 ft, or loss of GLIDE signal above 100 ft. The FD bars flash on the PFD. The LAND mode remains engaged.
- The difference between both radio altimeter indications is greater than 15 ft.

LANDING CAPABILITIES

Applicable to: ALL

Each FMGC computes its own automatic landing capability.
The FMA displays “CAT 1”, “CAT 2”, “CAT 3 SINGLE” or “CAT 3 DUAL” messages as soon as the APPR pb is pushed in to arm ILS approach modes.
Refer to PRO-NOR-SRP-01-70 Initial Approach.

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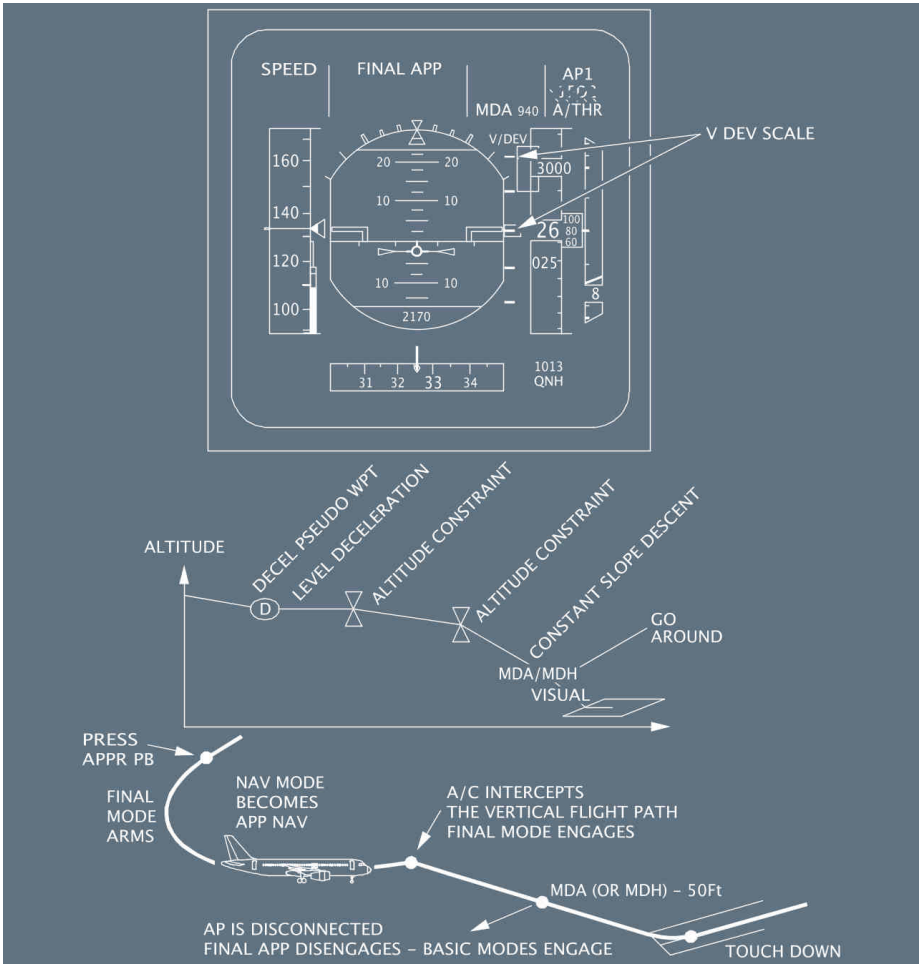
Non Precision Approach

GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

1 This mode guides the aircraft laterally and vertically down to the Minimum Descent Altitude (MDA) or Minimum Descent Height (MDH) along the final descent profile computed by the FMGS.
This mode is used to fly a non-ILS approach (VOR, VOR/DME, NDB (if ADF ⋘), RNAV...) as inserted into the flight plan.



The non-ILS approach includes the following managed modes:

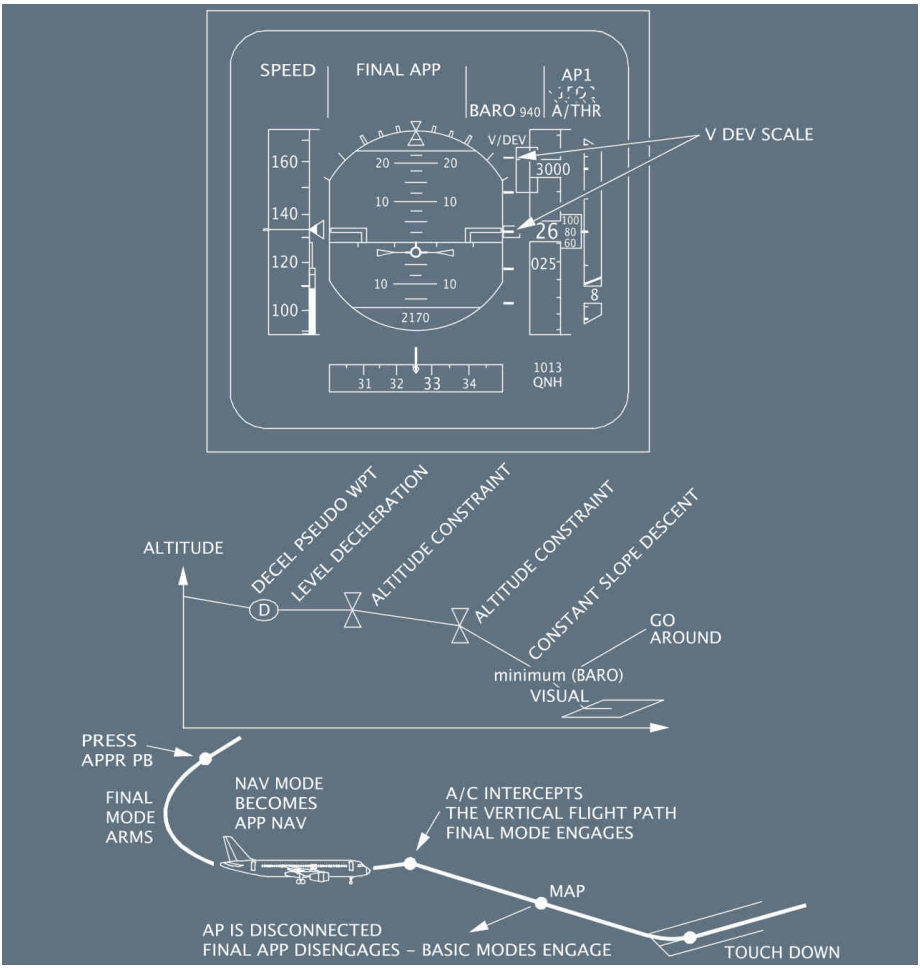
- APP NAV mode for lateral guidance
- FINAL mode for vertical guidance.

GENERAL

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

2 This mode guides the aircraft laterally and vertically down to the minimum along the final descent profile computed by the FMGS.

This mode is used to fly a non-ILS approach (VOR, VOR/DME, NDB (if ADF), RNAV...) as inserted into the flight plan.



The non-ILS approach includes the following managed modes:
- APP NAV mode for lateral guidance
- FINAL mode for vertical guidance.

SELECTION

Applicable to: ALL

A non-ILS approach (VOR, VOR/DME, NDB (if ADF), RNAV) is selected if the active flight plan calls for it (and it has been inserted in that flight plan).

ARMING CONDITIONS

Applicable to: ALL

The flight crew arms the APP NAV and FINAL modes by pressing the APPR pb on the FCU, if all of the following conditions are met:
- The aircraft is above 400 ft AGL
- The flight plan is valid (lateral and vertical profile)
- The active flight plan has selected a non-ILS approach
- GA mode is not engaged.

The FMA displays “FINAL” and “APP NAV”in blue.
If NAV mode was already engaged, APP NAV engages immediately.

DISARMING CONDITIONS

Applicable to: ALL

FINAL and APP NAV modes are disarmed if the flight crew:
- Presses the APPR pb, or
- Presses the LOC pb arming the LOC mode, or
- Engages the GO AROUND mode.

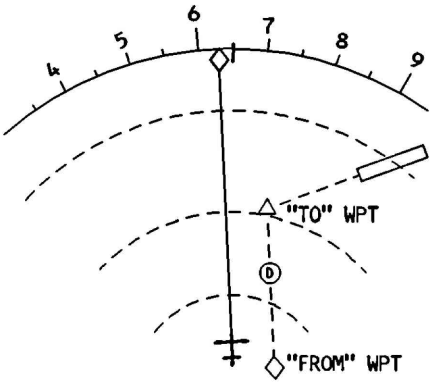
ENGAGEMENT CONDITIONS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

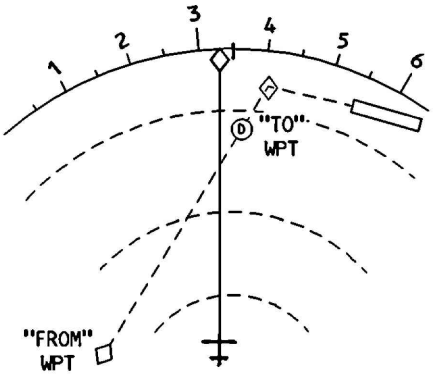
APP NAV and NAV modes engage under the same conditions:
If NAV mode was engaged, APP NAV engages immediately. If HDG/TRK is engaged, APP NAV engages when the intercept conditions are met (aircraft track line must intercept the flight plan active leg).

FINAL mode engages, if:
- APPR phase is active, and the deceleration point has sequenced, and
- APP NAV is engaged, and
- Crosstrack error is less than 1.5 nm, and
- FINAL is armed, and
  - The aircraft intercepts a descending leg of the vertical flight path, or
  - In V/S (FPA) or OPEN DES, the aircraft intercepts a level-off segment of the vertical flight profile, with an FCU selected altitude different from this level-off segment.

The "TO" waypoint is displayed in white on the ND and MCDU:



APP NAV WILL NOT ENGAGE



APP NAV WILL ENGAGE

ENGAGEMENT CONDITIONS

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

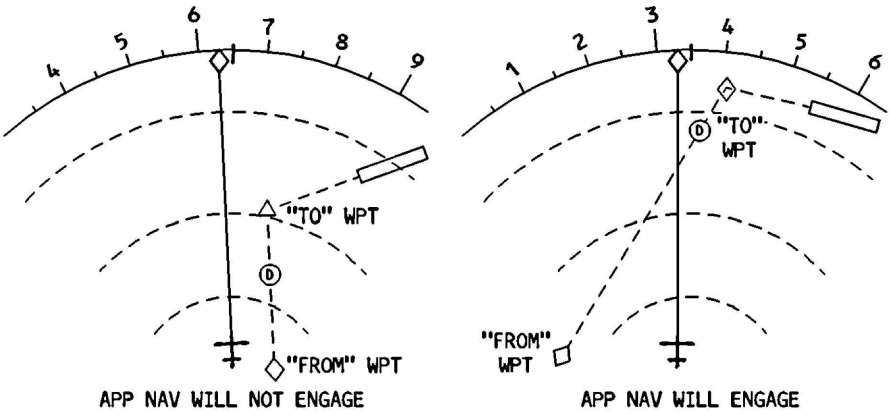
3

APP NAV and NAV modes engage under the same conditions:
If NAV mode was engaged, APP NAV engages immediately. If HDG/TRK is engaged, APP NAV engages when the intercept conditions are met (aircraft track line must intercept the flight plan active leg).

FINAL mode engages, if:
- APPR phase is active, and
- APP NAV is engaged, and

- Crosstrack error is less than 1.5 nm, and
- FINAL is armed, and
  - The aircraft intercepts a descending leg of the vertical flight path, or
  - In V/S (FPA) or OPEN DES, the aircraft intercepts a level-off segment of the vertical flight profile, with an FCU selected altitude different from this level-off segment.

The "TO" waypoint is displayed in white on the ND and MCDU:



DISENGAGEMENT CONDITIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The FINAL and APP NAV modes disengage:

- If the flight crew pushes the APPR pb (HDG-V/S or TRK-FPA modes engage)
- If the flight crew pushes the LOC pb (LOC mode arms if an ILS is selected and HDG-V/S or TRK-FPA modes engage)
- If the flight crew pulls out the HDG/TRK knob, the FMGS reverts to HDG-V/S or TRK-FPA basic modes
- If the flight crew engages V/S or FPA mode, FINAL and APP NAV modes disengage and HDG-V/S or TRK-FPA basic modes engage
- Automatically at MDA (MDH) -50 ft, or 400 ft AGL if no MDA/MDH is entered
- When the GO AROUND mode engages.

DISENGAGEMENT CONDITIONS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

The FINAL and APP NAV modes disengage:
- If the flight crew pushes the APPR pb (HDG-V/S or TRK-FPA modes engage)
- If the flight crew pushes the LOC pb (LOC mode arms if an ILS is selected and HDG-V/S or TRK-FPA modes engage)
- If the flight crew pulls out the HDG/TRK knob, the FMGS reverts to HDG-V/S or TRK-FPA basic modes
- Automatically at MDA (MDH) -50 ft, or 400 ft AGL if no MDA/MDH is entered
- When the GO AROUND mode engages.

Note: *If the flight crew engages V/S or FPA mode, only FINAL mode disengages. APP NAV mode remains engaged.*

DISENGAGEMENT CONDITIONS

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

The FINAL and APP NAV modes disengage:
- If the flight crew pushes the APPR pb (HDG-V/S or TRK-FPA modes engage)
- If the flight crew pushes the LOC pb (LOC mode arms if an ILS is selected and HDG-V/S or TRK-FPA modes engage)
- If the flight crew pulls out the HDG/TRK knob, the FMGS reverts to HDG-V/S or TRK-FPA basic modes
- Automatically at missed Approach Point .
- When the GO AROUND mode engages.

Note: *If the flight crew engages V/S or FPA mode, only FINAL mode disengages. APP NAV mode remains engaged.*

GUIDANCE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

The FINAL mode guides the aircraft on the vertical profile down to the MDA (or MDH if QFE pin program ◁✻).

The FINAL mode does the following:
- Displays a vertical deviation scale (± 200 ft) on the PFD and a VDEV symbol showing deviation from descent path
- Anticipates leaving the altitude selected by the FCU when the aircraft reaches the Continue Descent symbol (blue arrow on the ND)
- Gives precise vertical guidance on the descent and final path with an internal vertical speed limitation to avoid excessive V/S.

If the autopilot is engaged while you are using the APP NAV/ FINAL modes, it disengages automatically at MDA (or MDH) -50 ft.
FD modes revert to HDG-V/S or TRK-FPA basic modes.

GUIDANCE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

The FINAL mode guides the aircraft on the vertical profile down to the minimum.

The FINAL mode does the following:
- Displays a vertical deviation scale (± 200 ft) on the PFD and a VDEV symbol showing deviation from descent path
- Anticipates leaving the altitude selected by the FCU when the aircraft reaches the Continue Descent symbol (blue arrow on the ND)
- Gives precise vertical guidance on the descent and final path with an internal vertical speed limitation to avoid excessive V/S.

If the autopilot is engaged while you are using the APP NAV/ FINAL modes, it disengages automatically at the Missed Approach Point (MAP).
FD modes revert to HDG-V/S or TRK-FPA basic modes.

WARNING

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

If during a non-ILS approach, the GPS PRIMARY function is lost, a triple click aural warning is triggered.

GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO

Go-around mode combines the Speed Reference System (SRS) vertical mode with the GA TRK lateral mode.

GENERAL

Applicable to: B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

When the flight crew performs a go-around, the Speed Reference System (SRS) vertical guidance mode automatically engages.

In addition:
- The NAV mode is automatically engaged or armed, except if HDG/TRK was preset, or
- The GA TRK lateral mode is automatically engaged until the HDG/TRK knob is pulled if the HDG/TRK mode is preset.

Note: Below 100 ft , the HDG mode remains engaged with NAV mode armed if HDG/TRK was already engaged during approach.

ENGAGEMENT CONDITIONS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO

Setting at least one thrust lever to the TOGA detent engages both SRS/GA TRK modes, if:
- The flaps lever is at least in position 1, and
- The aircraft is in flight, or
- The aircraft has been on ground for less than 30 s (AP disengages and can be re-engaged 5 s after lift-off).

FD bars are automatically restored in SRS/GA TRK modes. If FPV/FPD was previously selected, it reverts to FD bars.
The FMA displays “SRS”and “GA TRK”in green.

ENGAGEMENT CONDITIONS

Applicable to: B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

Setting at least one thrust lever to the TOGA detent engages both SRS/NAV modes, if:
- The flaps lever is at least in position 1, and
- The aircraft is in flight, or
- The aircraft has been on ground for less than 30 s (AP disengages and can be re-engaged 5 s after lift-off).

FD bars are automatically restored in SRS/NAV modes. If FPV/FPD was previously selected, it reverts to FD bars.
The FMA displays “SRS”and “NAV”in green.

DISENGAGEMENT CONDITIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH

The SRS mode disengages:
- Automatically, at the Go-around acceleration altitude (GA ACC ALT), or if ALT* mode engages (above 400 ft RA)
- If the flight crew engages another vertical mode
- If the flight crew selects a speed while in SRS mode: SRS reverts to OP CLB mode.

Note: *In Engine Out conditions, the SRS mode does not automatically disengage at EO ACC ALT. Refer to DSC-22_20-60-40 General.*

GA TRK disengages when the flight crew engages another lateral mode, above 100 ft RA.

Note: *In dual AP configuration, disengagement of the Go-around mode on either axis causes AP2 to disconnect.*

DISENGAGEMENT CONDITIONS

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTI

The SRS mode disengages:
- Automatically, at the Go-around acceleration altitude (GA ACC ALT), or if ALT* mode engages (above 400 ft RA)
- If the flight crew engages another vertical mode
- If the flight crew selects a speed while in SRS mode: SRS reverts to OP CLB mode and a triple-click aural warning is heard.

Note: *In Engine Out conditions, the SRS mode does not automatically disengage at EO ACC ALT. Refer to DSC-22_20-60-40 General.*

GA TRK disengages when the flight crew engages another lateral mode, above 100 ft RA.

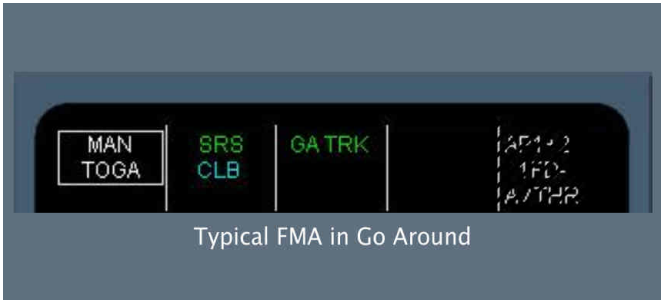
Note: *In dual AP configuration, disengagement of the Go-around mode on either axis causes AP2 to disconnect.*

GUIDANCE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The SRS law maintains the current speed at Go-around engagement, or VAPP, whichever is higher. When the SRS mode disengages, the target speed becomes Green Dot speed.

GA TRK mode guides the aircraft along the current track at Go-around initiation.

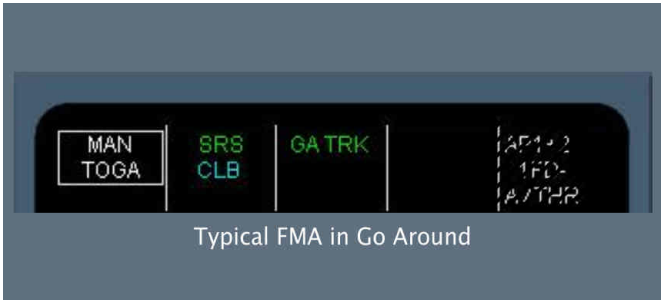


Typical FMA in Go Around

GUIDANCE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

The SRS law maintains the current speed at Go-around engagement, or VAPP, whichever is higher. Nevertheless, the SRS speed target is limited to VLS+25 kt, in a two-engine configuration, and VLS+15 kt, in an engine-out configuration. When the SRS mode disengages, the target speed becomes Green Dot speed.
GA TRK mode guides the aircraft along the current track at Go-around initiation.

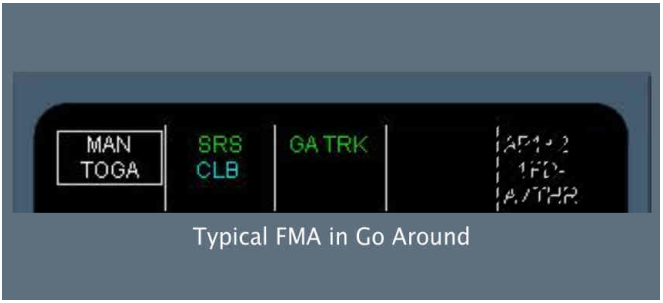


Typical FMA in Go Around

GUIDANCE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

The SRS law maintains the current speed at Go-around engagement, or VAPP, whichever is higher. Nevertheless, the SRS speed target is limited to VLS+25 kt, in a two-engine configuration, and VLS+15 kt, in an engine-out configuration. When the SRS mode disengages, the target speed becomes the smaller of green dot speed or speed constraints.
GA TRK mode guides the aircraft along the current track at Go-around initiation.



Typical FMA in Go Around

GENERAL

Applicable to: ALL

The autothrust (A/THR) is a function of the FMGS, it includes two independent A/THR commands, one per FMGC. Each one is able to control the thrust of both engines simultaneously through two Engine Interface Units and two Electronic Engine Controls (IAE engines) or two Engine Control Units (CFM engines). Only one FMGC controls the active A/THR, it is called the master FMGC.

Thrust is controlled:
- Automatically when the A/THR is active
- Manually by the flight crew.

The autothrust is active when the A/THR pb of the FCU is lighted green and A/THR is displayed white in the FMA 5th column.
The position of the thrust levers determines whether A/THR is armed, active, or disconnected.

The autothrust system, when active:
- Maintains a specific thrust in THRUST mode
- Controls the aircraft speed or Mach in SPEED/MACH mode
- Uses ALPHA FLOOR mode to set maximum thrust when the aircraft angle of attack exceeds a specific threshold.

The autothrust system can operate independently or with the AP/FD:
- When performing alone, A/THR always controls the speed
- If the autothrust system is working with the AP/FD, the A/THR mode and AP/FD pitch modes are linked together. *Refer to DSC-22_30-10 Interaction between AP/FD and A/THR Modes.*

When autothrust is active, the FMGS commands the thrust according to the vertical mode logic, but uses a thrust not greater than the thrust commanded by the position of the thrust lever. For example, when the thrust levers are set at the CL (climb) detent, FG can command thrust between idle and max climb.
The autothrust system, when armed, automatically activates if the thrust levers are moved into the active range sector. Outside of this range, thrust levers control thrust directly.

THRUST LEVERS

Applicable to: ALL

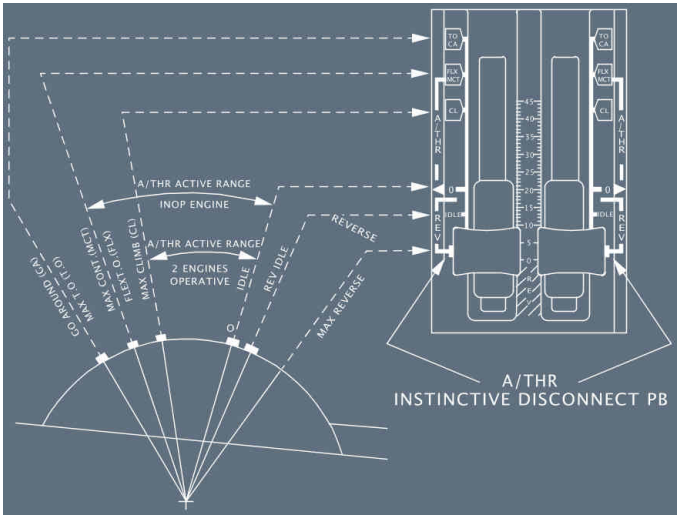
The flight crew uses the thrust levers to do the following:
- Manually select engine thrust
- Arm and activate autothrust (A/THR)
- Engage reverse thrust
- Engage the takeoff and go-around modes.

When autothrust is disconnected, the thrust levers control thrust directly: each lever position corresponds to a given thrust.

Five detents divide each of the thrust lever sectors into four segments. The detents are:

TO GA	:	Max takeoff thrust
FLX MCT	:	Max continuous thrust (or FLX at takeoff)
CL	:	Maximum climb thrust
IDLE	:	Idle thrust for both forward and reverse thrust
MAX REV	:	Maximum reverse thrust

When the thrust levers are at the IDLE position, the flight crew can pull them up to clear the IDLE stop and select reverse thrust. (There is no reverse detent as such).



A/THR ARMING CONDITIONS

Applicable to: ALL

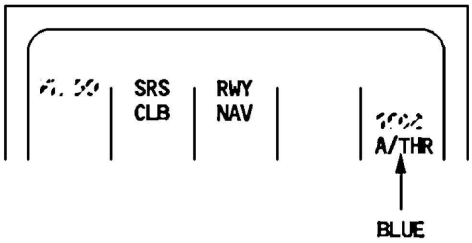
Arming conditions of the A/THR are numerous. The following is a list of the most important ones:

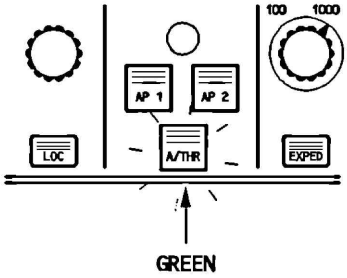
- One FMGC operative
- One FAC operative
- Two ADIRS operative
- Two FADECs operative
- One channel of the FCU operative

- One LGCIU operative
- A/THR is not manually disabled (instinctive disconnect pb has not been pressed for more than 15 s).

The flight crew arms A/THR:
- On ground
  - By pushing the A/THR pb on the FCU when the engines are not running, or
  - By setting the thrust levers at the FLX or TOGA detent when the engines are running.
- In flight
  - By pushing the A/THR pb on the FCU while the thrust levers are out of the active range, or
  - While A/THR is active ("A/THR"white on the FMA), by setting all thrust levers beyond the CL detent or at least one lever above the MCT detent, or
  - By engaging the go around mode.

When the A/THR is armed:
- The FCU's A/THR pb light comes on
- "A/THR"is displayed in blue on the FMA.





Note: *At takeoff, if the thrust levers are set back to idle, the A/THR disengages and cannot be rearmed until the aircraft becomes airborne.*

A/THR ACTIVATION

Applicable to: ALL

1 GENERAL

The A/THR is active when it controls thrust or speed. The position of the thrust lever determines the maximum thrust that the A/THR system can command (except in α-floor condition).

The A/THR being armed, is activated:
- When the flight crew sets both thrust levers between the CL and IDLE detents (two engines operative), or
- When the flight crew sets one thrust lever between the MCT and IDLE detents (one engine inoperative).

The A/THR being disconnected, is activated when the flight crew pushes the A/THR pb on the FCU while the thrust levers are within the active range, including IDLE position.

Note: When the flight crew sets both thrust levers to IDLE position, the A/THR disconnects but, if the flight crew pushes the A/THR pb of the FCU, they will simultaneously arm and activate the autothrust. Due to the thrust levers position, IDLE thrust will be maintained.

When ALPHA FLOOR is activated, regardless of the initial status of A/THR and the position of the thrust levers, the A/THR activates.

When A/THR is active:
- The A/THR pb on the FCU lights up
- The FMA displays A/THR mode in green in the first column and "A/THR"in white in the fifth column.



EFFECTS OF THRUST LEVER MOVEMENT DURING A/THR ACTIVATION

While A/THR is active:

- When both thrust levers are set above the CL detent (both engines operative) or one thrust lever is set above MCT (one engine operative), the A/THR reverts from active to armed.
  "A/THR"turns to blue on the FMA and the thrust levers control thrust directly.
  The FMA displays "MAN THR"in white in its first column.
  The thrust levers provide the flight crew with an immediate increase of thrust when both thrust levers are pushed above the CL detent (two engines) or the active thrust lever above the MCT detent (one engine operative).
- When both thrust levers are set below the CL detent (both engines operative) or one thrust lever is set below MCT (one engine operative), a repeating warning (amber caution, single chime, "A/THR LIMITED" ECAM message) is activated every 5 s until the flight crew moves the lever back into the detent. "LVR CLB"(both engines operative) or "LVR MCT"(one engine operative) flashes white in the first column of the FMA.
  This device reminds the flight crew that the normal operating position of the thrust levers, when A/THR active, is the CL detent (two engines) or the MCT detent (one engine operative).
- When one thrust lever is in the CL detent and the other one out of detent, the "LVR ASYM" amber message comes up until both levers are set in the CL detent (only with both engines operative).

A/THR DISCONNECTION

Applicable to: ALL

GENERAL

When the A/THR is disconnected, it is neither armed nor active.

The A/THR can be disconnected in two ways:

- Standard disconnection:
  - The flight crew pushes the instinctive disconnect pb on the thrust levers, or
  - The flight crew sets both thrust levers to IDLE detent.
- Non-standard disconnection:
  - The flight crew pushes the A/THR pb on the FCU while A/THR is active/armed, or
  - The system loses one of the arming conditions.

CAUTION	If the flight crew pushes and holds one instinctive disconnect pb for more than 15 s, the A/THR system is disconnected for the remainder of the flight. All A/THR functions including ALPHA FLOOR are lost, and they can be recovered only at the next FMGC power-up (on ground).

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

BELOW 100 FT RADIO ALTITUDE

When the radio altitude is below 100 ft and the flight crew sets both thrust levers above CL detent or one above the MCT detent, the autothrust will disconnect. It will rearm automatically when at least one of the thrust levers is set to TOGA.
If the PF sets the thrust levers slightly above CL detent but below TOGA and comes back to CL detent, the A/THR will disconnect and remain disconnected. As a result, the thrust will increase up to CLIMB thrust. The flight crew has to manually set the appropriate thrust for landing (or go-around).

THRUST LOCK FUNCTION

Applicable to: ALL

The Thrust Lock function is activated when the thrust levers are in the CL detent (or the MCT detent with one engine out), and:
- The flight crew pushes the A/THR pb on the FCU, or
- The A/THR disconnects due to a failure.

The thrust is locked at its level prior to disconnection. Moving the thrust levers out of CL or MCT suppresses the thrust lock and gives the flight crew manual control with the thrust levers.

When the Thrust Lock function is active:
- "THR LK" flashes amber on the FMA
- ECAM "ENG THRUST LOCKED" flashes every 5 s
- ECAM displays "THR LEVERS.....MOVE"
- A single chime sounds and the Master Caution light flashes every 5 s.

All warnings cease when the flight crew moves the thrust levers out of the detent.

A/THR DISCONNECTION CAUTION

Applicable to: ALL

		A/THR DISCONNECTION	
		BY INSTINCTIVE DISCONNECT pb OR SETTING TWO LEVERS TO IDLE (if above 50 ft RA)	**BY OTHER MEANS**
CONSEQUENCE	**MASTER CAUTION light**	Illuminated 3 s maximum	Illuminated
	ECAM MESSAGE	A/THR OFF amber message 9 s maximum	Flashing ENG THRUST LOCKED amber caution, AUTO FLT A/THR OFF amber caution, blue "THR LEVERS.....MOVE"
	AUDIO	Single chime	Single chime
	CLR pb on ECAM CONTROL PANEL	Extinguished	Illuminated
ACTION	**MASTER CAUTION light**	- Extinguishes MASTER CAUTION light - Erases ECAM message	Extinguishes MASTER CAUTION light
	CLR pb on ECAM CONTROL PANEL	No effect	- Extinguishes MASTER CAUTION light and CLR pb - Erases ECAM message - Calls status
	INSTINCTIVE DISCONNECT pb	- Extinguishes MASTER CAUTION light - Erases ECAM message	Extinguishes MASTER CAUTION light
ECAM STATUS MESSAGE		NO	YES

The standard disconnection triggers temporary ECAM message and caution light. Single chime sounds.
The non standard disconnection triggers caution light and ECAM message removed only by a flight crew action. Single chime sounds.

A/THR MODES

Applicable to: ALL

GENERAL

Except in takeoff and go-around situations, normal operation of the A/THR system requires the thrust levers to be:

- In the CL detent for the two-engine configuration. If they are not set in the CL detent, “LVR CLB”flashes white on the FMA.
- In MCT detent when in the one-engine-out configuration. If the appropriate lever is not set in the MCT detent, “LVR MCT”flashes white on the FMA.

The A/THR modes are selected automatically in conjunction with the AP/FD modes (except for ALPHA FLOOR):

A/THR in THRUST mode	AP/FD pitch mode maintains the speed: OP CLB - OP DES - CLB - EXP CLB - EXP DES - SRS - FLARE and DES (IDLE path)
A/THR in SPEED/MACH mode	If neither AP nor FD is engaged
	If AP/FD controls a vertical path: V/S - FPA - ALT* - ALT CST* - ALT - ALT CRZ - G/S* - G/S - FINAL and DES (geometric path)
A/THR in RETARD mode	AP/FD engaged in LAND mode during an automatic landing

THRUST MODE

In THRUST mode, autothrust commands a specific thrust level in conjunction with the AP/FD pitch mode. This thrust level is limited by thrust lever position.

FMA Display	Meaning
THR MCT	Single engine thrust in climb. The live engine is at maximum continuous thrust (thrust lever in MCT detent)
THR CLB	Climb thrust in two engine configuration (at least one thrust lever in the CL detent, the other one below CL)
THR LVR	Undetermined thrust (neither CLB nor MCT thrust)
THR IDLE	Minimum thrust (both engines at IDLE thrust)

Note: When the A/THR is armed for takeoff or go-around, the FMA displays “MAN TOGA”(or “MAN FLX”) in white to remind the flight crew that the thrust levers have been positioned properly.

2 **RETARD MODE**

The RETARD mode is only available during automatic landing (AP engaged in LAND mode).

At approximately 40 ft RA, the RETARD mode engages and remains engaged after touchdown. The A/THR commands IDLE thrust during the flare, and the FMA and engine warning display "IDLE". If the autopilot is disengaged during the flare before touchdown, the SPEED mode replaces the RETARD mode, and the flight crew has to manually reduce thrust.

Note: In an automatic landing, the system generates a "RETARD" callout at 10 ft RA, which prompts the flight crew to move the thrust levers to IDLE in order to confirm thrust reduction. In manual landing conditions, the system generates this callout at 20 ft RA, as a reminder.

ALPHA FLOOR

ALPHA FLOOR is a protection that commands TOGA thrust, regardless of the thrust levers' positions. This protection is available from lift-off to 100 ft RA on approach.

ALPHA FLOOR calls up the following indications:
- "A FLOOR" in green, surrounded by a flashing amber box on the FMA, and in amber on the engine warning display, (as long as α-floor conditions are met)
- "TOGA LK" in green, surrounded by a flashing amber box on the FMA, when the aircraft leaves the α-floor conditions. TOGA thrust is frozen.

To cancel ALPHA FLOOR or TOGA LK thrust, the flight crew must disconnect the autothrust.

SPEED/MACH MODE

In SPEED/MACH mode, the A/THR adjusts the thrust in order to acquire and hold a speed or Mach target.

The speed or Mach target may be:
- Selected on the FCU by the flight crew
- Managed by the FMGC.

When in SPEED/MACH mode, the A/THR does not allow speed excursions beyond the following limits, regardless of the target speed or Mach number:
- For a selected speed target, the limits are VLS and VMAX (VMO-MMO, VFE-VLE, whichever applies)
- For a managed speed target, the limits are maneuvering speed (Green Dot, S, F, whichever applies) and maximum speed (340/0.80-VFE-VLE, whichever applies).

The changeover from SPEED to MACH mode is either automatic, performed by the FMGC, or manual, with the flight crew pushing the SPD/MACH pb.
The FMA displays "SPEED" or "MACH".

APPROACH AUTOTHRUST:

Below 3 200 ft RA, with at least CONF 1, the A/THR logic is modified to be more responsive to speed variation. This is referred to as approach autothrust.

SPEED MODE IN APPROACH PHASE

Applicable to: ALL

GENERAL

When the aircraft flies an approach in managed speed, the speed target displayed on the PFD in magenta is variable during the approach.
This managed speed target is computed in the FMGS using the “ground speed mini function”.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

GROUND SPEED MINI FUNCTION PRINCIPLE

The purpose of the "ground speed mini function" is to take advantage of the aircraft inertia when the wind conditions vary during the approach. It does so by providing the flight crew with an adequate indicated speed target. When the aircraft flies this indicated speed target, the energy of the aircraft is maintained above a minimum level ensuring standard aerodynamic margins versus stall.
If the A/THR is active in SPEED mode, it will automatically follow the IAS target, ensuring an efficient thrust management during the approach.
The minimum energy level is the energy level the aircraft will have at touch down if it lands at VAPP speed with the tower reported wind as inserted in the PERF APPR page.
The minimum energy level is represented by the Ground Speed the aircraft will have at touch down. This Ground Speed is called “GROUND SPD MINI”.
During the approach, the FMGS continuously computes the speed target using the wind experienced by the aircraft in order to keep the ground speed at or above the “Ground Speed Mini”.
The lowest speed target is limited to VAPP.
The speed target is displayed on the PFD speed scale in magenta when approach phase and managed speed are active. It is independent of the AP/FD and/or A/THR engagements.
Wind is a key factor in the "ground speed mini function".

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

GROUND SPEED MINI FUNCTION PRINCIPLE

The purpose of the "ground speed mini function" is to take advantage of the aircraft inertia when the wind conditions vary during the approach. It does so by providing the flight crew with an adequate indicated speed target. When the aircraft flies this indicated speed target, the energy of

the aircraft is maintained above a minimum level ensuring standard aerodynamic margins versus stall.
If the A/THR is active in SPEED mode, it will automatically follow the IAS target, ensuring an efficient thrust management during the approach.
The minimum energy level is the energy level the aircraft will have at touch down if it lands at VAPP speed with the tower reported wind as inserted in the PERF APPR page.
The minimum energy level is represented by the Ground Speed the aircraft will have at touch down. This Ground Speed is called “GROUND SPD MINI”.
During the approach, the FMGS continuously computes the speed target using the wind experienced by the aircraft in order to keep the ground speed at or above the “Ground Speed Mini”.
The lowest speed target is limited to VAPP and its upper limit is VFE of next configuration in CONF 1, 2, 3 and VFE-5 in CONF FULL.
The speed target is displayed on the PFD speed scale in magenta when approach phase and managed speed are active. It is independent of the AP/FD and/or A/THR engagements.
Wind is a key factor in the "ground speed mini function".

Applicable to: ALL

TWR WIND

It is the MAG WIND entered in the PERF APPR page. It is the average wind as provided by the ATIS or the tower. Gusts must not be inserted, they are included in the ground speed mini computation.

Applicable to: ALL

TWR HEADWIND COMPONENT

The TWR HEADWIND COMPONENT is the component of the MAG WIND projected on the runway axis (landing runway entered in the flight plan). It is used to compute VAPP and GS mini.

Applicable to: ALL

CURRENT HEADWIND COMPONENT

The actual wind measured by ADIRS is projected on the aircraft axis to define the CURRENT HEADWIND COMPONENT (instantaneous headwind).
The CURRENT HEADWIND COMPONENT is used to compute the variable speed target during final (IAS target).

Applicable to: ALL

VAPP COMPUTATION

VAPP, automatically displayed on the MCDU PERF APPR page, is computed as follows:
- VAPP = VLS+1/3 of the TWR HEADWIND COMPONENT, or
- VAPP = VLS +5 kt, whichever is the highest.

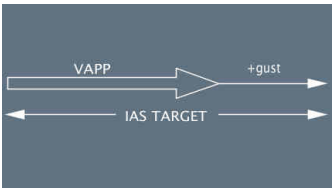
"1/3 of the TWR HEADWIND COMPONENT" has two limits:
- 0 kt as the minimum value (no wind or tailwind)
- +15 kt as the maximum value.

The flight crew can manually modify the VAPP and TWR wind values on the PERF APPR page.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

SPEED TARGET COMPUTATION

The FMGS continuously computes a speed target (IAS target) that is the MCDU VAPP value plus an additional variable gust.

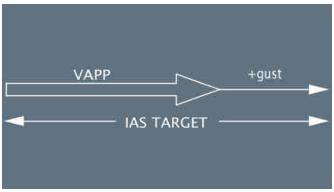


The gust is the instantaneous difference between the CURRENT HEADWIND COMPONENT and the TWR HEADWIND COMPONENT. It is always positive (or equal to zero for no wind or tailwind).
The IAS target is displayed on the PFD as a magenta triangle moving with the gust variation.
VAPP is the IAS target minimum value.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

SPEED TARGET COMPUTATION

The FMGS continuously computes a speed target (IAS target) that is the MCDU VAPP value plus an additional variable gust.



The gust is the instantaneous difference between the CURRENT HEADWIND COMPONENT and the TWR HEADWIND COMPONENT. It is always positive (or equal to zero for no wind or tailwind).
The IAS target is displayed on the PFD as a magenta triangle moving with the gust variation.

The IAS targets have 2 limits:
- VAPP, as the minimum value
- VFE -5 kt in CONF FULL, or VFE of the next configuration in CONF 1, 2 or 3 as the maximum value.

Applicable to: ALL

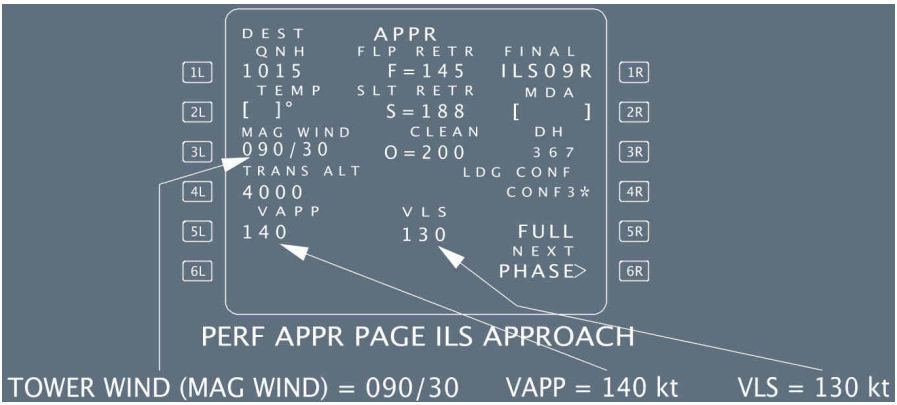
GROUND SPEED MINI (GS MINI) COMPUTATION

Ground speed mini concept has been defined to prevent the aircraft energy from dropping below a minimum level during final approach. The GS mini value is not displayed to the flight crew.

Applicable to: ALL

EXAMPLE

Approach on runway 09, the tower wind direction is on the runway axis.

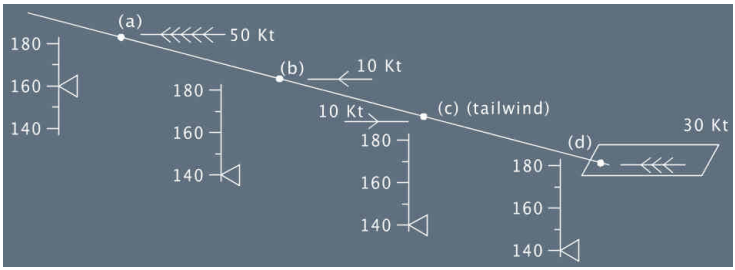


Applicable to: ALL

IAS TARGET VALUES

If we turn the previously explained speed target definition into formulae, we obtain the following result:
IAS TARGET = Max [VAPP, (VAPP + CURRENT HEADWIND - TWR HEADWIND)]

Current Wind in Approach	IAS Target
(a) 090/50	Max [VAPP, (140 +50 -30)] = 160 kt
(b) 090/10	Max [VAPP, (140 +10 -30)] = 140 kt
(c) 270/10	Max [VAPP, (140 +0 -30)] = 140 kt
(d) 090/30	Max [VAPP, (140 +30 -30)] = 140 kt

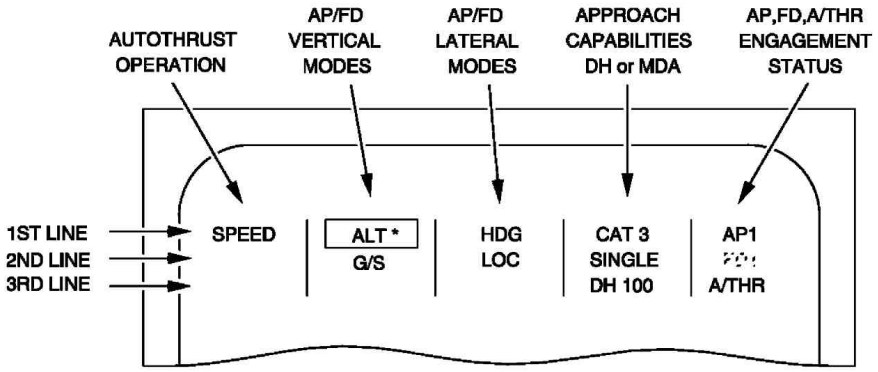


FLIGHT MODE ANNUNCIATOR (FMA)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH

GENERAL

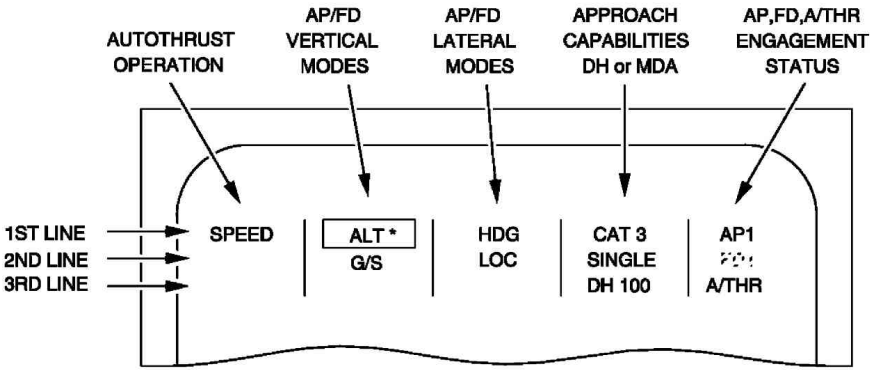
The Flight Mode Annunciator (FMA) which is just above the PFDs, shows the status of the A/THR, the AP/FD vertical and lateral modes, the approach capabilities, and the AP/FD-A/THR engagement status.
After each mode change, the FMA displays a white box around the new annunciation for 10 s.



Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTI

GENERAL

The Flight Mode Annunciator (FMA) which is just above the PFDs, shows the status of the A/THR, the AP/FD vertical and lateral modes, the approach capabilities, and the AP/FD-A/THR engagement status.
A white box is displayed for 10 s around each new annunciation. The white box display time may be increased to 15 s in some mode reversion cases associated with an aural triple click.

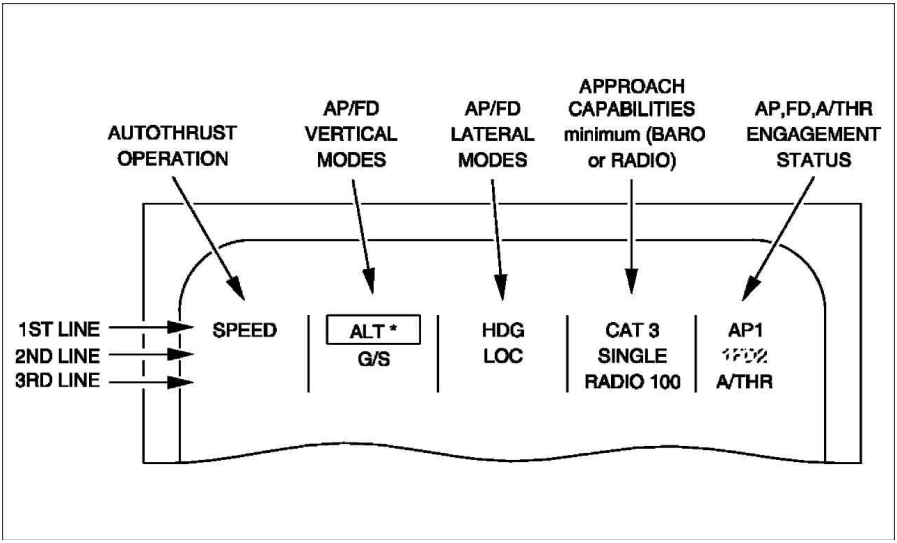


Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

GENERAL

The Flight Mode Annunciator (FMA) which is just above the PFDs, shows the status of the A/THR, the AP/FD vertical and lateral modes, the approach capabilities, and the AP/FD-A/THR engagement status.

A white box is displayed for 10 s around each new annunciation. The white box display time may be increased to 15 s in some mode reversion cases associated with an aural triple click.



Applicable to: ALL

THE THREE LEFT COLUMNS

The first line shows the engaged modes in green.
The second line shows the armed modes in blue or magenta.
Magenta indicates that the modes are armed or engaged because of a constraint.

The third line displays special messages:

- Messages related to flight controls have first priority:
  - "MAN PITCH TRIM ONLY" in red, flashing for 9 s, then steady
  - "USE MAN PITCH TRIM" in amber, pulsing for 9 s, then steady.
- Messages related to the FMGS have second priority.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

THE FOURTH COLUMN

Displays approach capabilities in white.
Displays DH or MDA/MDH in blue.

Note: *The DH or MDA/MDH value on the FMA is not rounded off: The exact value appears on the FMA, and is the same value as the one inserted in the MCDU PERF APPR page.*

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

THE FOURTH COLUMN

Displays approach capabilities in white.
Displays minimum in blue.

Note: The BARO or RADIO value on the FMA is not rounded off: The exact value appears on the FMA, and is the same value as the one inserted in the MCDU PERF APPR page.

Applicable to: ALL

THE FIFTH COLUMN

Displays the engagement status of AP, FD, and A/THR in white.
Displays a box around FD for 10 s in case of automatic FMGC switching.
Displays A/THR in blue when autothrust is armed but not active.

Note: The FMGS synchronizes A/THR mode, AP/FD modes and approach capability to provide identical information on both PFDs.

AUTOTHRUST ANNUNCIATIONS (FMA COLUMN 1)

Applicable to: ALL

FIRST LINE

DISPLAY	COLOR	MEANING
MAN TOGA	White White box	A/THR is armed, at least one thrust lever is in TOGA detent.
MAN FLX XX	White White box Blue numbers	A/THR is armed, at least one thrust lever is in MCT/FLX detent with FLX TO temp set at XX°. The other thrust lever is at or below the MCT/FLX detent.
MAN MCT	White White box	A/THR is armed, at least one thrust lever is in the MCT/FLX detent, the other is at, or below this detent.
MAN THR	White Amber box	A/THR is armed, and the most advanced thrust lever is above CL detent (two engines operative), or one above MCT/FLX (engine-out) and not in a detent.
THR MCT	Green	A/THR is active in thrust mode and the most advanced thrust lever is in the MCT/FLX detent (engine-out).
THR CLB	Green	A/THR is active in thrust mode and the most advanced thrust lever is in the CL detent.
THR IDLE	Green	A/THR is active in thrust mode and commands idle thrust.
THR LVR	Green	A/THR is active in thrust mode with both thrust levers below CL detent, or the live thrust lever (one engine) below MCT.
SPEED or MACH	Green	A/THR is active in SPEED or MACH mode.

Continued on the following page

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DISPLAY	COLOR	MEANING
A. FLOOR	Green Amber box	A/THR is active and commands TOGA thrust while α FLOOR conditions are met.
TOGA LK	Green Amber box	A/THR is active and TOGA thrust is locked (α FLOOR conditions are no longer met).

SECOND LINE

Not used with this standard.

THIRD LINE

DISPLAY	COLOR	MEANING
LVR CLB (flashing)	White	Request to set the thrust levers in CL detent.
LVR MCT (flashing)	White	Request to set the live thrust lever in MCT/FLX detent.
LVR ASYM	Amber	(Two engines only). One thrust lever in CL or MCT/FLX detent and the other one is not in this detent.
THR LK (flashing)	Amber	After A/THR disconnection (action of the flight crew on FCU or failure) resulting in thrust being frozen. Both thrust levers being in CL detent or one in MCT/FLX (engine out) detent.

Note: The amber caution light flashes and a single chime sounds every 5 s, as long as the flight crew takes no appropriate action in the following cases:
- *THR LK*
- *LVR CLB (if the thrust levers are below the CLB detent)*
- *LVR MCT (if the thrust levers are below the FLX/MCT detent).*

AP/FD VERTICAL MODES (FMA COLUMN 2)

Applicable to: B-HSQ, B-HSR

FIRST LINE

DISPLAY	COLOR	MEANING
SRS	Green	Takeoff or go-around mode is engaged.
CLB	Green	Climb mode is engaged. The FMGS target altitude is higher than the actual altitude. ALT CSTR are taken into account.
OP CLB	Green	Open Climb mode is engaged. The FCU selected altitude is higher than the actual altitude. ALT CSTR are disregarded.
EXP CLB	Green	Expedite Climb is engaged. The selected altitude is higher than the actual altitude. Green dot speed is maintained, ALT CSTR are disregarded.

Continued on the following page

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DISPLAY	COLOR	MEANING
ALT* or ALT CST*	Green	ALT CAPTURE is engaged: - ALT* green in case of FCU selected altitude capture - ALT CST* green in case of ALT CSTR capture (vertical profile).
ALT or ALT CST	Green	ALTITUDE HOLD mode is engaged: - ALT is green when the FCU selected altitude is held - ALT CST is green when an ALT CSTR is held (vertical profile).
ALT CRZ	Green	ALT mode is engaged and CRZ FL is held.
DES	Green	Descent mode is engaged. The FMGS target altitude is lower than the actual altitude. ALT CSTR are taken into account.
OP DES	Green	Open Descent mode is engaged. The FCU selected altitude is lower than the actual altitude. ALT CSTR are disregarded.
EXP DES	Green	Expedite Descent is engaged, the selected altitude is lower than the actual altitude. M 0.80 or 340 kt is maintained. ALT CSTR are disregarded.
G/S*	Green	Glide Slope capture mode is engaged.
G/S	Green	Glide Slope mode is engaged.
V/S±XXXX	Green + blue numbers	Vertical speed mode is engaged to acquire and hold the V/S selected on the FCU. ALT CSTR are disregarded. If the aircraft reaches VLS or VMAX and cannot maintain the target, the indication is boxed amber and flashes, and the target pulses.
FPA±XX	Green + blue numbers	Flight Path Angle mode is engaged to acquire and hold the FPA selected on the FCU. ALT CSTR are disregarded. If the aircraft reaches VLS or VMAX and cannot maintain the target, the indication is boxed amber and flashes, and the target pulses.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH

FIRST LINE

DISPLAY	COLOR	MEANING
SRS	Green	Takeoff or go-around mode is engaged.
CLB	Green	Climb mode is engaged. The FMGS target altitude is higher than the actual altitude. ALT CSTR are taken into account.
OP CLB	Green	Open Climb mode is engaged. The FCU selected altitude is higher than the actual altitude. ALT CSTR are disregarded.
ALT* or ALT CST*	Green	ALT CAPTURE is engaged: - ALT* green in case of FCU selected altitude capture - ALT CST* green in case of ALT CSTR capture (vertical profile).

Continued on the following page

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DISPLAY	COLOR	MEANING
ALT or ALT CST	Green	ALTITUDE HOLD mode is engaged: - ALT is green when the FCU selected altitude is held - ALT CST is green when an ALT CSTR is held (vertical profile).
ALT CRZ	Green	ALT mode is engaged and CRZ FL is held.
DES	Green	Descent mode is engaged. The FMGS target altitude is lower than the actual altitude. ALT CSTR are taken into account.
OP DES	Green	Open Descent mode is engaged. The FCU selected altitude is lower than the actual altitude. ALT CSTR are disregarded.
G/S*	Green	Glide Slope capture mode is engaged.
G/S	Green	Glide Slope mode is engaged.
V/S±XXXX	Green + blue numbers	Vertical speed mode is engaged to acquire and hold the V/S selected on the FCU. ALT CSTR are disregarded.
FPA±XX	Green + blue numbers	Flight Path Angle mode is engaged to acquire and hold the FPA selected on the FCU. ALT CSTR are disregarded.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTI

FIRST LINE

DISPLAY	COLOR	MEANING
SRS	Green	Takeoff or go-around mode is engaged.
CLB	Green	Climb mode is engaged. The FMGS target altitude is higher than the actual altitude. ALT CSTR are taken into account.
OP CLB	Green	Open Climb mode is engaged. The FCU selected altitude is higher than the actual altitude. ALT CSTR are disregarded.
ALT* or ALT CST*	Green	ALT CAPTURE is engaged: - ALT* green in case of FCU selected altitude capture - ALT CST* green in case of ALT CSTR capture (vertical profile).
ALT or ALT CST	Green	ALTITUDE HOLD mode is engaged: - ALT is green when the FCU selected altitude is held - ALT CST is green when an ALT CSTR is held (vertical profile).
ALT CRZ	Green	ALT mode is engaged and CRZ FL is held.
DES	Green	Descent mode is engaged. The FMGS target altitude is lower than the actual altitude. ALT CSTR are taken into account.
OP DES	Green	Open Descent mode is engaged. The FCU selected altitude is lower than the actual altitude. ALT CSTR are disregarded.
G/S*	Green	Glide Slope capture mode is engaged.
G/S	Green	Glide Slope mode is engaged.

Continued on the following page

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DISPLAY	COLOR	MEANING
V/S±XXXX	Green + blue numbers	Vertical speed mode is engaged to acquire and hold the V/S selected on the FCU. ALT CSTR are disregarded. If the aircraft reaches VLS or VMAX and cannot maintain the target, the indication is boxed amber and flashes, and the target pulses.
FPA±XX	Green + blue numbers	Flight Path Angle mode is engaged to acquire and hold the FPA selected on the FCU. ALT CSTR are disregarded. If the aircraft reaches VLS or VMAX and cannot maintain the target, the indication is boxed amber and flashes, and the target pulses.

Applicable to: ALL

SECOND LINE

DISPLAY	COLOR	MEANING
CLB	Blue	Climb mode is armed.
ALT	Blue or Magenta	Altitude mode is armed: - Blue when the target altitude is the FCU selected altitude - Magenta when the target altitude is an ALT CSTR.
DES	Blue	Descent mode is armed before the descent phase.
G/S	Blue	Glide Slope mode is armed.
FINAL	Blue	Final descent mode is armed.
ALT G/S	Blue/Blue	ALT and G/S modes are armed.
ALT G/S	Magenta/ Blue	ALT CST and G/S modes are armed.
ALT FINAL	Blue/Blue	ALT and FINAL modes are armed.
ALT FINAL	Magenta/ Blue	ALT CST and FINAL modes are armed.
DES G/S	Blue/Blue	DES and G/S modes are armed.
DES FINAL	Blue/Blue	DES and FINAL modes are armed.

Applicable to: ALL

THIRD LINE

DISPLAY	COLOR	MEANING
SPEED SEL:XXX	Blue	Indicates a preset speed associated with the cruise or climb phase.
MACH SEL:.XX	Blue	Indicates a preset Mach associated with the cruise or climb phase.

Note: These two messages use both the first and second columns (third line).

AP/FD LATERAL MODES (FMA COLUMN 3)

Applicable to: ALL

FIRST LINE

DISPLAY	COLOR	MEANING
RWY	Green	RWY mode is engaged.
RWY TRK	Green	RWY mode is engaged once airborne at or above 30 ft RA.
HDG	Green	HEADING mode is engaged.
TRK	Green	TRACK mode is engaged.
NAV	Green	NAV mode is engaged to guide the aircraft along the FM lateral F-PLN.
LOC*	Green	LOC capture mode is engaged.
LOC	Green	LOC track mode is engaged.
APP NAV	Green	NAV mode is engaged during a non-ILS approach.
GA TRK	Green	GO-AROUND TRACK mode is engaged.

SECOND LINE

DISPLAY	COLOR	MEANING
NAV	Blue	NAV mode is armed.
LOC	Blue	LOC mode is armed.
APP NAV	Blue	NAV mode is armed for a non-ILS approach.

AP/FD COMMON MODES (FMA COLUMNS 2 AND 3)

Applicable to: ALL

DISPLAY	COLOR	MEANING
LAND	Green	Land mode is engaged below 400 ft RA.
FLARE	Green	Flare mode is engaged.
ROLL OUT	Green	Roll out mode is engaged.
FINAL APP	Green	APP NAV and Final modes are engaged during a non-ILS approach.

APPROACH CAPABILITIES (FMA COLUMN 4)

Applicable to: ALL

FIRST LINE

DISPLAY	COLOR	MEANING
CAT 1	White	CAT 1 capability available.
CAT 2	White	CAT 2 capability available.
CAT 3	White	CAT 3 capability available.

Applicable to: ALL

SECOND LINE

DISPLAY	COLOR	MEANING
SINGLE	White	CAT 3 capability available, with FAIL PASSIVE condition.
DUAL	White	CAT 3 capability available, with FAIL OPERATIONAL condition.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

THIRD LINE

DISPLAY	COLOR	MEANING
MDA/MDH XXXX	White Blue	Minimum Descent Altitude or Minimum Descent Height as inserted by the flight crew on the MCDU PERF APPR page.
DH XXX/NO DH	White Blue	Decision Height as inserted by the flight crew on the MCDU PERF APPR page. NO DH: when NO inserted on the MCDU PERF APPR page.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

THIRD LINE

DISPLAY	COLOR	MEANING
BARO XXXX	White Blue	Minimum Descent Altitude or Minimum Descent Height as inserted by the flight crew on the MCDU PERF APPR page.
RADIO XXX/NO DH	White Blue	Decision Height as inserted by the flight crew on the MCDU PERF APPR page. NO DH: when NO inserted on the MCDU PERF APPR page.

AP/FD - A/THR ENGAGEMENT STATUS (FMA COLUMN 5)

Applicable to: ALL

FIRST LINE

DISPLAY	COLOR	MEANING
AP1 + 2	White	Autopilot 1 and 2 are engaged.
AP1	White	Autopilot 1 is engaged.
AP2	White	Autopilot 2 is engaged.

SECOND LINE

DISPLAY	COLOR	MEANING
X FD Y	White	X and Y give the FD engagement status on PFD1 and PFD2. X and Y can be 1, 2, or –: - –: No FD is engaged on the corresponding PFD - 1: FD 1 is engaged on the corresponding PFD - 2: FD 2 is engaged on the corresponding PFD. The normal status (FD 1 and 2 engaged) is 1 FD 2.

THIRD LINE

DISPLAY	COLOR	MEANING
A/THR	White	A/THR is active.
A/THR	Blue	A/THR is armed.

SPECIAL MESSAGES (FMA COLUMNS 2 AND 3)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The third line displays three types of messages:
- It gives first priority to Flight Control messages
- It gives second priority to vertical Flight Management messages
- It gives last priority to EFIS reconfiguration messages.

DISPLAY	COLOR	MEANING
MAN PITCH TRIM ONLY	Red	Displayed in case of loss of L+R elevators.
USE MAN PITCH TRIM	Amber	F/CTL are in direct law.
CHECK APP SEL	White	The aircraft is in cruise at less than 100 nm from the Top of Descent or in descent or in approach and: - A non-ILS approach has been selected - An ILS frequency is tuned on the MCDU RAD NAV page.
SET MANAGED SPD	White	The SPEED target is selected but a preselected SPEED does not exist for the next flight phase.
SET GREEN DOT SPD	White	The aircraft is in Engine Out mode and the SPEED target is selected. This message is displayed if the FCU selected speed is: - ≤Green Dot -10 kt, or - ≥Green Dot +10 kt, except in ALT* and ALT mode.
SET HOLD SPD	White	The aircraft is in selected SPEED control, a Holding pattern is inserted in the F-PLN and the aircraft is 30 s before the deceleration point to the precomputed HOLD SPEED.

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DISPLAY	COLOR	MEANING
DECELERATE	White	This message is displayed if the thrust is not reduced when passing the top of descent and the aircraft is above the descent profile.
MORE DRAG	White	DES mode is engaged, idle is selected, and either: - The aircraft is above the vertical profile and the predicted intercept point of the theoretical profile is at less than 2 nm from the next ALT CSTR, or - In auto speed control and the aircraft enters a speedbrake decelerating segment.
VERT DISCON AHEAD	Amber	DES mode is engaged and: - A TOO STEEP path exists on the next leg - The aircraft is less than 30 s from the TOO STEEP path.

SPECIAL MESSAGES (FMA COLUMNS 2 AND 3)

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI

The third line displays three types of messages:
- It gives first priority to Flight Control messages
- It gives second priority to vertical Flight Management messages
- It gives last priority to EFIS reconfiguration messages.

DISPLAY	COLOR	MEANING
MAN PITCH TRIM ONLY	Red	Displayed in case of loss of L+R elevators.
USE MAN PITCH TRIM	Amber	F/CTL are in direct law.
CHECK APP SEL	White	The aircraft is in cruise at less than 100 nm from the Top of Descent or in descent or in approach and: - A non-ILS approach has been selected - An ILS frequency is tuned on the MCDU RAD NAV page.
SET MANAGED SPD	White	The SPEED target is selected but a preselected SPEED does not exist for the next flight phase.
SET GREEN DOT SPD	White	The aircraft is in Engine Out mode and the SPEED target is selected. This message is displayed if the FCU selected speed is: ≤Green Dot -10 kt, or ≥Green Dot +10 kt, except in ALT* and ALT mode.
SET HOLD SPD	White	The aircraft is in selected SPEED control, a Holding pattern is inserted in the F-PLN and the aircraft is 30 s before the deceleration point to the precomputed HOLD SPEED.

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DISPLAY	COLOR	MEANING
DECELERATE	White	This message is displayed if the thrust is not reduced when passing the top of descent and the aircraft is above the descent profile.
MORE DRAG	White	DES mode is engaged, idle is selected, and either: - The aircraft is above the vertical profile and the predicted intercept point of the theoretical profile is at less than 2 nm from the next ALT CSTR, or - In auto speed control and the aircraft enters a speedbrake decelerating segment.

SPECIAL MESSAGES (FMA COLUMNS 2 AND 3)

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

The third line displays three types of messages:
- It gives first priority to Flight Control messages
- It gives second priority to vertical Flight Management messages
- It gives last priority to EFIS reconfiguration messages.

DISPLAY	COLOR	MEANING
MAN PITCH TRIM ONLY	Red	Displayed in case of loss of L+R elevators.
USE MAN PITCH TRIM	Amber	F/CTL are in direct law.
CHECK APPR SELECTION	White	The aircraft is in cruise at less than 100 nm from the Top of Descent or in descent or in approach and: - A non-ILS approach has been selected - An ILS frequency is tuned on the MCDU RAD NAV page.
SET MANAGED SPEED	White	The SPEED target is selected but a preselected SPEED does not exist for the next flight phase.
SET GREEN DOT SPEED	White	The aircraft is in Engine Out mode and the SPEED target is selected. This message is displayed if the FCU selected speed is: ≤Green Dot -10 kt, or ≥Green Dot +10 kt, except in ALT* and ALT mode.
SET HOLD SPEED	White	The aircraft is in selected SPEED control, a Holding pattern is inserted in the F-PLN and the aircraft is 30 s before the deceleration point to the precomputed HOLD SPEED.

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DISPLAY	COLOR	MEANING
DECELERATE	White	This message is displayed if the thrust is not reduced when passing the top of descent and the aircraft is above the descent profile.
MORE DRAG	White	DES mode is engaged, idle is selected, and either: - The aircraft is above the vertical profile and the predicted intercept point of the theoretical profile is at less than 2 nm from the next ALT CSTR, or - In auto speed control and the aircraft enters a speedbrake decelerating segment.

SPECIAL MESSAGES (FMA COLUMNS 2 AND 3)

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

The third line displays three types of messages:
- It gives first priority to Flight Control messages
- It gives second priority to vertical Flight Management messages
- It gives last priority to EFIS reconfiguration messages.

DISPLAY	COLOR	MEANING
MAN PITCH TRIM ONLY	Red	Displayed in case of loss of L+R elevators.
USE MAN PITCH TRIM	Amber	F/CTL are in direct law.
DISCONNECT AP FOR LDG	Amber	This message is displayed when, during a Non Precision Approach, the AP/FD remains engaged at: - Minimum minus 50 ft, or - 400 ft AGL (if no minimum entered)
CHECK APPR SELECTION	White	The aircraft is in cruise at less than 100 nm from the Top of Descent or in descent or in approach and: - A non-ILS approach has been selected - An ILS frequency is tuned on the MCDU RAD NAV page.
SET MANAGED SPEED	White	The SPEED target is selected but a preselected SPEED does not exist for the next flight phase.
SET GREEN DOT SPEED	White	The aircraft is in Engine Out mode and the SPEED target is selected. This message is displayed if the FCU selected speed is: ≤Green Dot -10 kt, or ≥Green Dot +10 kt, except in ALT* and ALT mode.
SET HOLD SPEED	White	The aircraft is in selected SPEED control, a Holding pattern is inserted in the F-PLN and the aircraft is 30 s before the deceleration point to the precomputed HOLD SPEED.

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DISPLAY	COLOR	MEANING
DECELERATE	White	This message is displayed if the thrust is not reduced when passing the top of descent and the aircraft is above the descent profile.
MORE DRAG	White	DES mode is engaged, idle is selected, and either: - The aircraft is above the vertical profile and the predicted intercept point of the theoretical profile is at less than 2 nm from the next ALT CSTR, or - In auto speed control and the aircraft enters a speedbrake decelerating segment.

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AIRCRAFT SYSTEMS

AUTO FLIGHT - FLIGHT AUGMENTATION

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GENERAL

Applicable to: ALL

The aircraft has two flight augmentation computers (FACs) that perform four main functions:

- Yaw function
  - Yaw damping and turn coordination
  - Rudder trim
  - Rudder travel limitation
- Flight envelope function
  - PFD speed scale management
    - Minimum/maximum speed computation
    - Maneuvering speed computation
  - Alpha-floor protection
- Low-Energy Warning function ◁✻
- Windshear detection function ◁✻

In performing these functions the FAC uses independent channels :
Yaw damper
Rudder trim
Rudder travel limit
Flight envelope

Each FAC interfaces with the elevator aileron computers (ELACs) when the APs are disengaged, or with the FMGS when at least one AP is engaged.
Both FACs engage automatically at power-up.
The pilot can disengage or reset each FAC (in case of failure) by means of a pushbutton on the flight control overhead panel.
When a FAC is disengaged (FAC pushbutton set off) but still valid, the flight envelope function of the FAC remains active.
If both FACs are valid, FAC1 controls the yaw damper, turn coordination, rudder trim, and rudder travel limit, and FAC2 is in standby.
FAC1 keeps the aircraft within the flight envelope through FD1 ; FAC2 performs this function through FD2.
If a failure is detected on any channel of FAC1, FAC2 takes over the corresponding channel.

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YAW DAMPING

Applicable to: ALL

Yaw damping stabilizes the aircraft in yaw and coordinates its turns.
In automatic flight (AP engaged) during takeoff and go around, it assists rudder application after an engine failure (short-term yaw compensation).

Note: *When the AP is engaged, the FMGS sends orders to the FAC to give :*
- *Yaw damping during approach*
- *Yaw control for runway alignment in ROLL OUT mode*

RUDDER TRIM

Applicable to: ALL

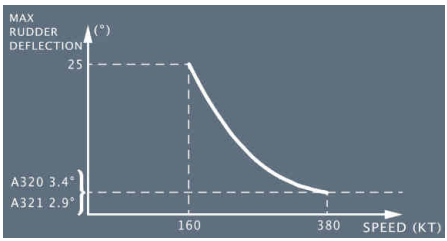
The rudder trim function :
- Executes trim orders, entered by the pilot by using the manual trim knob.
- When AP is engaged
  - executes trim orders from the FMGS.
  - Assists the system in recovering from engine failure (long-term yaw compensation) in all flight guidance modes.
  - If the pilot pushes the rudder more than 10 ° out of trim, it disengages the AP.

Note: *When the AP is engaged, the rudder trim knob is inoperative : the master FMGC sends rudder trim orders to the FAC.*

RUDDER TRAVEL LIMITATION

Applicable to: ALL

This function limits rudder deflection is based on speed in order to avoid high structural loads. It is governed by the following law :



If both FACs lose the rudder travel limitation function, the value of the rudder deflection limit is locked at the time of the second failure.

When the slats are extended, the FACs automatically set the rudder deflection limit at the low-speed setting (maximum authorized deflection).

GENERAL

Applicable to: ALL

As long as one Flight Augmentation Computer (FAC) is valid, it governs the flight envelope function, the rudder position display, and the rudder trim indication regardless of what the flight crew does with the FAC pushbutton.

PFD SPEED SCALE MANAGEMENT

Applicable to: ALL

The FAC controls the speed scale on the PFD (*Refer to DSC-31-40 Attitude Data*).
When both FACs are operative, FAC1 supplies data to PFD1 and FAC2 supplies it to PFD2.

The FAC computes:
- The minimum and maximum speeds:
  - VSW (stall warning)
  - VLS
  - VFE and VFE for the next configuration
  - VLE
  - VMO/MMO
- The maneuvering speeds:
  - Green Dot Speed
  - S speed
  - F speed

  (*Refer to PRO-SUP-10 Characteristic Speeds* for speed definition).

The FAC also computes the speed trend and displays it as an arrow on the PFD speed scale.
The PFD displays these various speeds as appropriate, and they also go to the FMGC to be used as limits for various guidance modes.

Note: *The principle of the speed computation is as follows:*

- *First, the FAC computes VS1G (stall speed). From VS1G it computes the Gross Weight (GW) which is also sent to the Elevator Aileron computers:*
  - *When the aircraft is below 14 500 ft and 250 kt, it computes this from current angle of attack, speed/Mach, altitude, thrust, and CG.*
  - *When the aircraft is above 14 500 ft or 250 kt, it computes this out of the GW, which it has memorized and updated with a fuel consumption model set in the FAC.*
- *Finally the FAC computes the various minimum and maneuvering speeds, Vα prot and Vsw.*
- *The accuracies of the various minimum and maximum speeds are functions of the accuracy with which the FAC computes aircraft gross weight. Normal accuracy for VLS in CONFIG FULL is about ± 3 kt.*

ALPHA-FLOOR PROTECTION

Applicable to: ALL

Alpha-floor protection automatically sets the thrust at TOGA thrust, when the aircraft reaches a very high angle of attack.
The Flight Augmentation Computer (FAC) generates the signal that triggers the alpha-floor mode. This, in turn, sets TOGA thrust on the engines, regardless of the thrust lever positions (*Refer to DSC-22_30-90 A/THR Modes - General*).

The FAC sends this signal when :

- The angle of attack is above a predetermined threshold, that is a function of the configuration.
- In CONF3 and CONF FULL, this threshold decreases as a function of the aircraft deceleration rate (down to – 3 °).

Alpha-floor is available from lift-off until the aircraft reaches 100 ft RA in approach.

Note: - *Alpha-floor is lost, when one of the following combinations of failures occurs :*

SFCC1 and FAC2, or
SFCC2 and FAC1, or
Both FCU channels, or
1 EIU, or
Both FMGCs.

- *Alpha-floor is lost under alternate or direct flight control law.*
- *Alpha-floor is lost when the FADECs are in N1 degraded mode.*
- *Alpha-floor is lost in engine-out, when slats/flaps are extended.*

LOW- ENERGY WARNING

Applicable to: ALL

An aural low-energy “SPEED SPEED SPEED” warning, repeated every 5 s, warns the pilot that the aircraft’s energy level is going below a threshold under which he has to increase thrust, in order to regain a positive flight path angle through pitch control.

It is available in Configuration 2, 3, and FULL. The FAC computes the energy level with the following inputs :

- Aircraft configuration
- Horizontal deceleration rate
- Flight path angle

The warning is inhibited when :

- TOGA is selected, or
- Below 100 ft RA, or
- Above 2 000 ftRA, or
- Alpha-floor, or the ground proximity warning system alert is triggered, or
- In alternate or direct law, or
- If both radio altimeters fail.

During deceleration, the low-energy warning is triggered before alpha floor (unless alpha floor is triggered by stick deflection). The amount of time between the two warnings depends on the deceleration rate.

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WINDSHEAR DETECTION FUNCTION

Applicable to: ALL

The windshear detection function is provided by the Flight Augmentation Computer (FAC) in takeoff and approach phase in the following conditions:

- At takeoff, 3 s after liftoff, up to 1 300 ft RA
- At landing, from 1 300 ft RA to 50 ft RA
- With at least CONF 1 selected.

The warning consists of:

- A visual “WINDSHEAR” red message displayed on both PFDs for a minimum of 15 s.
- An aural synthetic voice announcing “WINDSHEAR”three times.

WINDSHEAR DETECTION PRINCIPLES

Applicable to: ALL

The FACs generate the windshear warning whenever the predicted energy level for the aircraft falls below a predetermined threshold.
In computing this energy level prediction, the FACs use data from different sources. From ADIRS comes data such as vertical speed, air and ground speeds and slope ; from other sources come such derived parameters as total slope, longitudinal wind gradient, and vertical wind.
The FACs express this energy level as an angle of attack and compare it with an angle-of-attack threshold above which windshear conditions are most likely and pilot action is required.

GUIDANCE

Applicable to: ALL

In windshear conditions, flight guidance acts on specially adapted FD pitch orders received from the speed reference system (SRS). The pilot must set go around thrust immediately (which also triggers the FD SRS mode), and follow the pitch order to execute the optimum escape maneuver.

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FAC ENGAGEMENT

Applicable to: ALL

Refer to DSC-27-10-20 Yaw Control - General

RUDDER TRIM OPERATION

Applicable to: ALL

Refer to DSC-27-10-20 Yaw Control - General

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AIRCRAFT SYSTEMS

AUTO FLIGHT - AOC FUNCTIONS

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GENERAL

Applicable to: ALL

The FMS AOC function gives an interface between a ground station and one onboard FMGC, allowing data transmission between these two computers via the ACARS Management Unit or the ATSU.

Two different sets of message can be exchanged:

UPLINK messages from the ground station. They consist in reception of data requested or directly sent to the crew.

DOWNLINK messages from the FMGC (master). They consist in reports or requests sent to the ground station.

The FMGS/ACARS or FMGS/ATSU interface enables the following AOC capabilities.

- F-PLN initialization (flight plan and performance data)
- Takeoff data
- Wind data
- Flight reports
- Broadcast data

Crews can send message using ACARS FUNCTION pages or relevant MCDU pages.
Only one FMGC talks to the ground station. This FMGC is called FMGC “master”.

GENERAL SCRATCHPAD MESSAGES

NOT XMITTED TO ACARS:		A crew request or report was sent to the ground but the communication was not established or not acknowledged.
NO ANSWER TO REQUEST	:	A crew request was previously sent to the ground and no answer (uplink message) was received within 4 min.

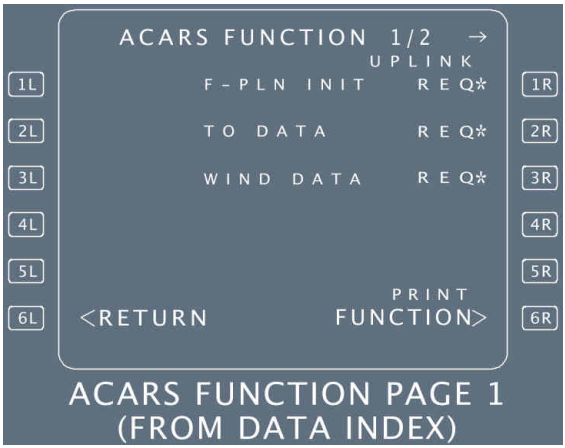
FLIGHT PLAN INITIALIZATION FUNCTION

Applicable to: ALL

This function enables lateral and vertical flight plan data as well as initialization data to be exchanged between the aircraft and a ground station. The aircraft may send flight plan requests for active and secondary flight plan. (downlink messages). The ground station may send flight plan and initialization data (uplink messages) either under aircraft request or automatically without any request.
Each uplink message concerns either the active or secondary flight plan but never both flight plans at the same time. The data sent to the aircraft are checked for flight plan consistency.
A MCDU message comes up when an uplink message is received. “ACT (or SEC) RTE UPLINK”.
If an error prevents the decoding process of the message, “INVALID RTE UPLINK” is displayed on MCDUs.

An uplink message can be routed to the active flight plan if no engine is started and no active flight plan exists. Otherwise, it is routed to the secondary. The crew will insert it into the secondary flight plan or will reject it using the CLR key.

Note: *The flight plan may also be initialized using the ACARS FUNCTION page selected from DATA INDEX page.*



PERFORMANCE DATA

On ground and before engine start, the ground station may also send performance data to the aircraft.
Performance data are always associated with the uplink flight plan. It is either automatically inserted with the active flight plan data, or stored in the secondary with the corresponding flight plan.
This message contains part or all of the following data:
ZFW, ZFWCG, taxi fuel, block fuel, cruise flight level, tropopause altitude, cruise temperature, transition altitude, cost index, performance factor.

Note: *After engine start an uplink performance data message is rejected automatically without any scratchpad message.*

SCRATCHPAD MESSAGES RELATED TO FLIGHT PLAN AND PERFORMANCE

INVALID RTE UPLINK	An error is detected, the uplink message is rejected.
ACT or SEC RTE UPLINK	A F-PLN is stored in the active or secondary flight plan.
FLT NUMBER UPLINK	FLT NBR has been initialized within a F-PLN message without previous request.

CHECK FLT NUMBER	The uplinked FLT NBR differs from the one specified in the request.
CHECK CO RTE	The uplinked CO RTE ident differs from the one specified in the request.
INVALID FLT NBR UPLINK	The uplink contains a valid F-PLN but the FLT NBR is invalid.
PERF DATA UPLINK	Performance data is received
INVALID PERF UPLINK	Performance uplink message has been rejected
RTE DATALINK IN PROG	A flight plan modification is performed after a F-PLN INIT request has been sent; this message is displayed until the uplink is received.
UPLINK INSERT IN PROG	This message is displayed during insertion of a Flight Plan.

TAKEOFF DATA FUNCTION

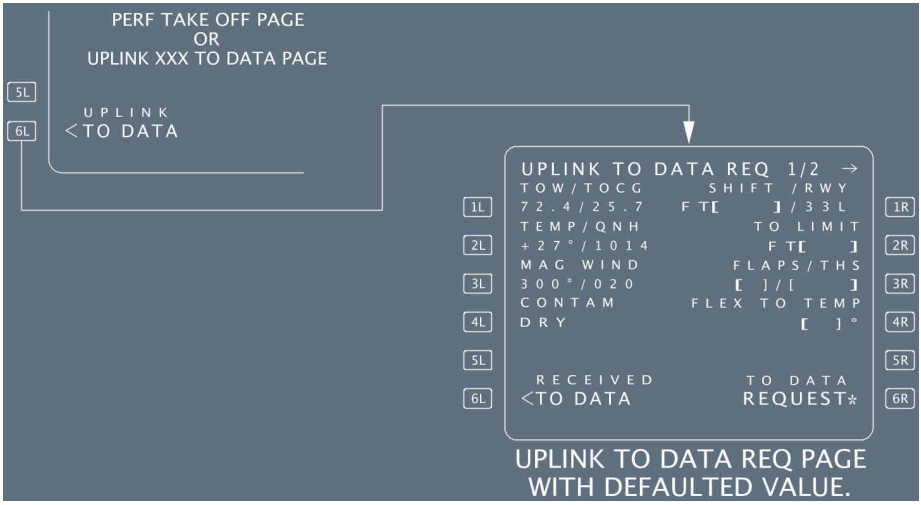
Applicable to: ALL

The takeoff data function is available for the active flight plan only. It is used to request to the ground station, information data for up to 2 runways and to receive this data for up to 4 runways.
The crew sends a request indicating the departure airport, runway idents, CG, GW and weather conditions (such as BARO setting wind, temperature...). In response he receives the takeoff speeds for up to 4 runways but only one set of data may be inserted in the active flight plan for the selected active runway.
Takeoff speeds are computed for max and flex takeoff.

The takeoff data function has required the modification of the standard PERF TAKEOFF page and the addition of 2 news pages:

- UPLINK TO DAT REQ page that enables the crew to specify a request to the ground.
- UPLINK XXX TO DATA page (XXX for MAX or FLEX)

These 2 pages are accessed from the PERF TAKEOFF page in PREFLIGHT and DONE phase only.



SCRATCHPAD MESSAGES RELATED TO TAKEOFF DATA

TAKEOFF DATA UPLINK	:	Takeoff data uplink message is received
INVALID TAKEOFF UPLINK	:	The UPLINK message is rejected

WIND DATA FUNCTION

Applicable to: ALL

This function enables the crew to request and to receive forecasted winds associated to the active or secondary flight plan.

The uplink message (ground station to aircraft) may be received upon crew request or automatically without crew request.

The request is initiated from WIND pages or from ACARS FUNCTION page (*Refer to DSC-22_20-70 Wind Data - Request for Wind Data*).

The uplink wind data when received are directly displayed on the wind pages but not inserted in the flight plan, one set for each flight phase: CLIMB, CRUISE, DESCENT. The alternate wind at alternate cruise flight level is displayed on DESCENT page.

- Winds are associated to altitude for climb an descent phases
- Winds are associated to waypoint for cruise phase and step level. One wind per waypoint.
  - On ground and without entered winds, an uplink message is directly inserted in the flight plan.
  - In flight, winds are temporary stored until the crew inserts it phase per phase.
    Phase of flight is indicated in the WIND title page.
  - Clearing the INSERT UPLINK* prompt using the CLR key deletes the uplink wind data for the selected phase.

When uplink winds are deleted, the wind page reverts to the previous status.
The flight plan B page is modified of the uplink wind only after it is inserted by the crew. AOC uplink winds are then considered as crew manual entries (large font).

SCRATCHPAD MESSAGES RELATED TO WIND DATA

INVALID WIND UPLINK	An error is detected, the uplink is rejected.
WIND DATA UPLINK	Uplinked winds are received.
WIND UPLINK PENDING	A temporary flight plan exists or a DIR TO page is displayed when a wind uplink is received. The message is stored.
WIND UPLINK EXISTS	A F-PLN modification (active or secondary) is attempted when uplink winds are not inserted. This message disappears automatically when the wind uplink is inserted or deleted.
CHECK DEST DATA	The aircraft is at 180 nm from destination, and the destination QNH, TEMP or WIND displayed on the PERF APPR page was received by AOC uplink or, if following insertion of a descent wind uplink, a conflict concerning the above parameters exists.
CHECK ALTN WIND	The uplinked alternate cruise flight level differs from the default alternate cruise flight level.

FLIGHT REPORTS

Applicable to: ALL

Flight reports provide real time information to the ground concerning the aircraft current situation and position.

Several types of flight reports are available:

- The Position report : provides current aircraft position
- the Progress report : provides data relative to the destination

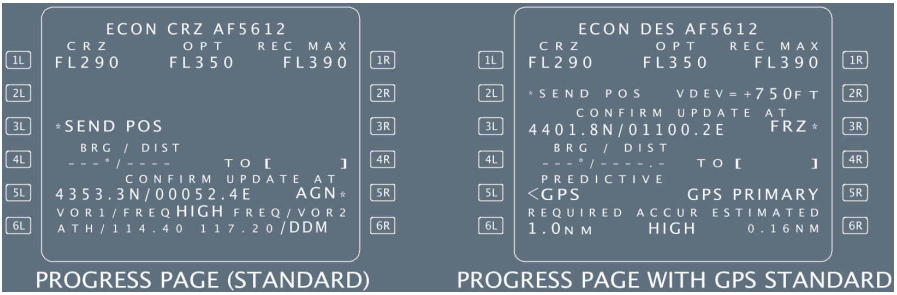
- The Flight-Plan report : provides the active route
- the Performance Data report : provides performance data currently used by FMS.

These reports may be manually initiated via a dedicated prompt or automatically sent in response to a ground request or upon specific conditions.

POSITION REPORT

This report is sent:
- manually via a MCDU prompt or
- following a ground request or
- automatically upon sequencing a designated reporting fix (designated by the ground in a uplink message).

The manual POSITION REPORT downlink prompt is displayed on the PROG page. (SEND POS prompt).



Note: *Position report are initiated from active flight plan only.*

POSITION REPORT CONTENT

- Aircraft position
- Overfly reporting waypoint
- Time of report (UTC)
- Aircraft altitude
- Next reporting waypoint
- ETA at next reporting waypoint
- Reporting waypoint following next report
- SAT
- Current wind
- Remaining fuel

PROGRESS REPORT

A progress report contains data relative to the aircraft arrival time and EFOB at destination for the active F-PLN.

This downlink message is automatically sent following:
- a ground request or
- a change of destination or
- a change of runway or
- a specific event. The possible events that can be selected in the navigation database policy file are :
  - X minutes to Top of Descent
  - Z minutes to Destination
  - ETA changes more than W minutes from the previous report.
    X, Z and W are minutes of time set in the navigation database policy file.

The progress report cannot be manually sent by the crew via a dedicated MCDU prompt.

PROGRESS REPORT CONTENT

- Flight Number
- Arrival Airport Ident
- Destination Runway Ident
- Predicted remaining fuel
- ETA at destination
- Reason for report (specific event, ground request...).

FLIGHT PLAN REPORT

The F-PLN report broadcasts flight plan data to the ground. Only data from the active flight plan can be sent.

This downlink message is sent to the ground:
- automatically following a ground request
- manually by the crew using a prompt displayed on the ACARS FUNCTION page (DSC-22_20 Auto Flight - Flight Management/50 Controls and Indicators/10 MCDU - Page Description/25 FMS2 Honeywell/ACARS Function Page). This prompt may be invalidated through the navigation database policy file.

The Flight Plan report can be downlinked either while on ground or in flight during any flight phase.

FLIGHT PLAN REPORT CONTENT

The report contains the active and alternate flight plan.

PERFORMANCE DATA REPORT

The Performance Data report is a downlink message that allows the transmission of performance data (CG, FUEL, CG...) relative to the active F-PLN.
This message is automatically sent following a ground request. Manual sending is not possible.

PERFORMANCE DATA REPORT CONTENT

Sends to the ground:
- Current GW
- Cruise Altitude
- Current CG
- Fuel on Board
- Block Fuel
- Reserve Fuel
- Cost Index
- Top of Climb Temperature
- Climb Transition Altitude
- Tropopause Altitude
- Taxi Fuel
- ZFW
- ZFWCG

AIRCRAFT SYSTEMS

AUTO FLIGHT - PRINT INTERFACE

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PRINT FUNCTION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

The print function enables several types of data and report to be printed:
- Flight plan initialization data
- Takeoff data
- Wind data
- Preflight report
- In flight report
- Post flight report

The 3 first reports may differ when automatically or manually printed for the following reason:
The automatic process prints the uplink message although the manual process prints the current active data as displayed on the relevant MCDU pages.
The last 3 reports being processed from the same sources are identical in automatic or manual printing.

Note: *AOC is not necessary linked to printing process. The printing function may be activated within the FMGS and selected independently from the AOC.*

- One or several print functions may be deactivated (*Refer to Print Function Pages*).
- If an AOC function is not active, (not selected in the NAV database policy file) the printing process is invalidated for this specific AOC function.

PRINT FUNCTION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The print function enables several types of data and report to be printed :
- Flight plan initialization data
- Takeoff data
- Wind data
- Preflight report
- In flight report
- Post flight report

The 3 first reports may differ when automatically or manually printed for the following reason :
The automatic process prints the uplink message although the manual process prints the current active data as displayed on the relevant MCDU pages.
The last 3 reports being processed from the same sources are identical in automatic or manual printing.

Note: *ACARS is not necessary linked to printing process. The printing function may be activated within the FMGS and selected independently from the ACARS.*

- One or several print functions may be deactivated *Refer to DSC-22_20-50-10-25 Print Function Pages*.
- If an ACARS function is not active, (not selected in the nav database policy file) the printing process is invalidated for this specific ACARS function.

AOC/PRINTER PROGRAMMING OPTIONS ⋖

Applicable to: ALL 320, B-HTG, B-HTH, B-HTI

Option programming for the AOC/PRINTER functions is obtained through the Navigation Data Base policy file or the Airline Modifiable Information (AMI) file.

The list summarizes the possible options:

Data Link (ACARS or AOC) Inhibit	Disables AOC function
F-PLN Data Request Inhibit	Disables uplink and downlink requests of F-PLN initialization data
Performance Data Request Inhibit	Disables uplink and downlink requests of Performance Initialization data
Takeoff Data Request Inhibit	Disables uplink and downlink request of Takeoff Initialization data
Wind Data Request Inhibit	Disables uplink and downlink request of predicted wind data
Flight Number Enable	Flight Number is included within the F-PLN Request or Progress Report downlinks
Position Report Inhibit	Disables a manual Position Report downlink
Progress Report Triggers	Defines the triggers for the automatic downlink of the Progress Report
F-PLN Report Inhibit	Disables the manual downlink of the F-PLN Report
Auto Print of ACARS or AOC uplinks	Selects/Deselects the automatic printing of the F-PLN, INIT, TO and wind data uplinks. If Autoprint is selected, the crew can deselect it manually. If auto printing is deselected, the crew cannot manually reselect it.
Auto Print of Flight Reports	Selects/Deselects the automatic printing of the Preflight, Inflight, Postflight reports. If selected, the crew can deselect it manually. If autoprint is deselected, the crew cannot manually preselected it.

AIRCRAFT SYSTEMS

COMMUNICATIONS

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DSC-23-20-10 Audio Management System	B	2	Improvement of illustration quality.
DSC-23-20-20 Audio Control Panel	A	1	Improvement of illustration quality.
DSC-23-20-20 Audio Control Panel	A	2	Improvement of illustration quality.
DSC-23-20-20 Audio Control Panel	A	3	Improvement of illustration quality.
DSC-23-20-20 SIDE STICK RADIO SELECTOR	B	4	Improvement of illustration quality.
DSC-23-20-20 AUDIO SWITCHING	D	5	Improvement of illustration quality.
DSC-23-20-40 CABIN CALL SYSTEM - CALLS FROM THE COCKPIT	B	1	Improvement of illustration quality.
DSC-23-20-40 CABIN CALL SYSTEM - CALLS FROM THE COCKPIT	B	2	Improvement of illustration quality.
DSC-23-20-40 Cabin Call System - Calls from the Cockpit	B	3	Improvement of illustration quality.
DSC-23-20-40 CABIN CALL SYSTEM - CALLS FROM THE COCKPIT	B	4	Improvement of illustration quality.
DSC-23-20-40 CABIN CALL SYSTEM - CALLS FROM THE CABIN	B	5	Improvement of illustration quality.
DSC-23-20-40 Cabin Call System - Calls from the Cabin	B	6	Improvement of illustration quality.
DSC-23-20-40 Cabin Call System - Calls from the Cabin	B	7	Improvement of illustration quality.
DSC-23-30-20 CONTROLS AND INDICATORS ON OVERHEAD PANEL	A	1	Update of the technical wording
DSC-23-40-40 World Map ACARS Frequencies	A	1	Documentation update: Addition of "World Map ACARS Frequencies" documentary unit

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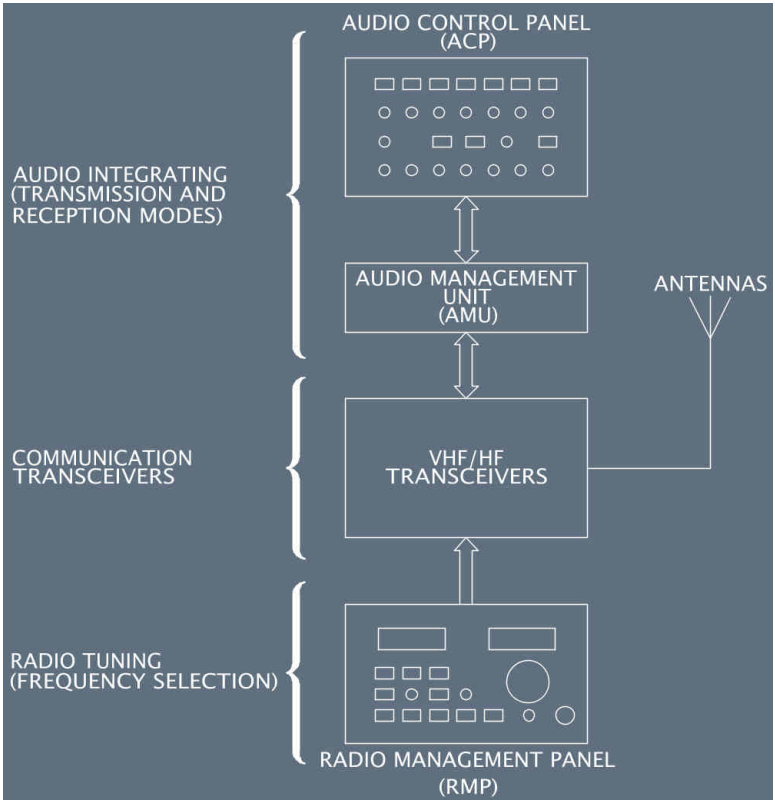
GENERAL

Applicable to: ALL

The communications system comprises the following subsystems :

- VHF/HF transceivers
- Radio tuning systems (Radio Management Panels).
- Audio integrating system (Audio Management Unit, Audio Control Panels).



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GENERAL

Applicable to: ALL

Either of the two Radio Management Panels (RMPs) (third RMP ◁) can be used to tune each transceiver.
To transmit, the flight crew uses the Audio Control Panel (ACP) to select a VHF or HF system. The ACP works through the Audio Management Unit (AMU). Each system is connected to the RMPs, for frequency selection, and to the AMU for connection to the audio integrating and SELCAL (selective calling) systems.

VHF

Applicable to: ALL

Two identical VHF communication systems (third VHF system ◁) are installed.
Each system has a transceiver in the avionics compartment, and an antenna on the fuselage. Only VHF1 functions in EMER ELEC CONFIG. Its range is from 118.0 to 136.975 MHz.
VHF has an alarm which indicates if the microphone ◁ is stuck. If a microphone is in the emission position for more than 30 s, an interrupted tone sounds for 5 s, and the emission is turned off. To reactivate the emission, the crew releases the push-to-talk button and presses it again.

HF ◁

Applicable to: ALL

Two identical HF communication systems are optional. Each has a transceiver in the avionics compartment, and a common tuner and antenna in the vertical stabilizer. Its range is from 2.8 to 24 MHz.

SELCAL (SELECTIVE CALLING)

Applicable to: ALL

Upon receiving a call code corresponding to that of the aircraft, the SELCAL system aurally and visually advises the flight crew that a ground station is calling the aircraft.
The aural warning is inhibited during takeoff and landing.

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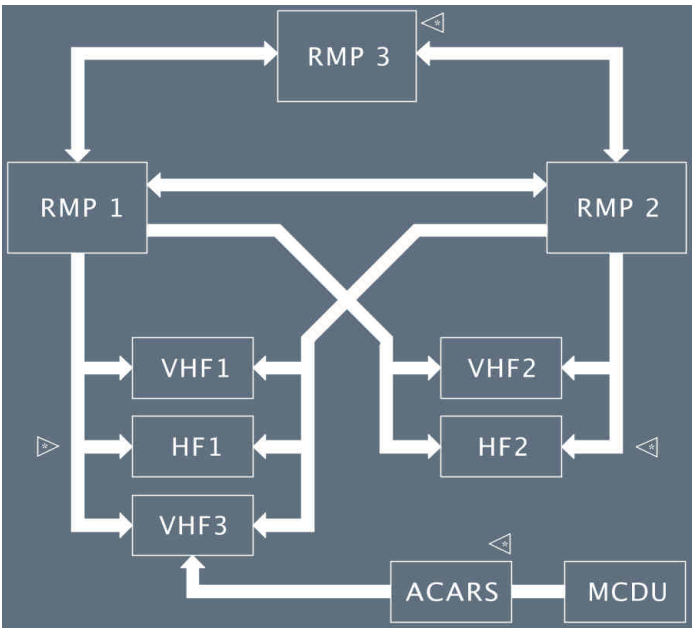
DESCRIPTION

Applicable to: ALL

Identical RMPs Radio Management Panels (RMPs):

- Give the flight crew control of all VHF radio communication systems (HF systems ◁).
- Provide backup to the FMGCs for controlling radio navigation systems (*Refer to DSC-34-30-10 General*).

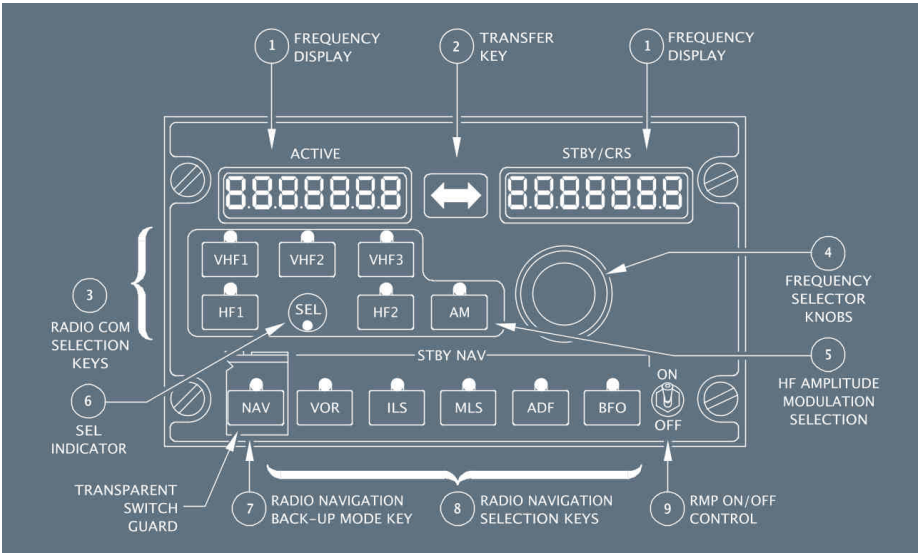
The two RMPs are on the center pedestal (and the third ◁ is on the overhead panel).
Each RMP can control any VHF (HF ◁) transceiver. RMP1 and RMP2 are connected directly to all VHF (HF ◁) transceivers, (whereas RMP3 ◁ is connected to them via RMP1 and RMP2). RMPs are connected together so that each RMP is updated to the selections made on the other RMPs.
Only RMP1 functions in EMER ELEC CONFIG.



If one RMP fails, the remaining one controls all the VHF (HF ◁) transceivers.

RADIO MANAGEMENT PANEL

Applicable to: B-HSQ, B-HSR



(1) Frequency displays

The ACTIVE display window shows the active frequency of the selected radio, which is identified by a green light on the selection key.

The STBY/CRS (standby/course) display window shows a standby frequency that the pilot can activate by pressing the transfer key or change by rotating the tuning knobs. (For a description of the CRS function *Refer to DSC-34-30-30 Radio Management Panel (RMP)*).

(2) Transfer key

Pressing this key moves the active frequency to the standby window and the standby frequency to the active window.

This tunes the selected receiver to the new active frequency.

(3) Radio com selection keys

When the pilot presses one of these keys :

- The ACTIVE window displays the frequency set on that radio.
- The STBY/CRS window displays the selected standby frequency or course.
- The selected key displays a green monitor light.

(4) Frequency selector knobs
The pilot uses these concentric knobs to select the STBY frequency or CRS.
The outer knob controls whole numbers ; the inner knob controls decimal fractions.

(5) AM pushbutton
If the aircraft has HF radios and the flight crew has selected an HF tranceiver, this switch selects the AM mode. (The default mode is the SSB, or single side-band mode).
This key displays a green monitor light when the AM mode is active.

(6) SEL indicator

The SEL indicator on both RMPs comes on amber when a transceiver, normally associated with one RMP, is tuned by another :
- VHF1 (VHF3, HF 1 ⋘), tuned by RMP2.
- VHF2 (HF2 ⋘), tuned by RMP1.

(7) NAV pushbutton (with transparent switchguard)
The pilot presses this key to select navigation receivers and courses through the RMP. It does not affect the selection of communication radios and their frequencies. (*Refer to DSC-34-30-30 Radio Management Panel (RMP)*, for additional information).

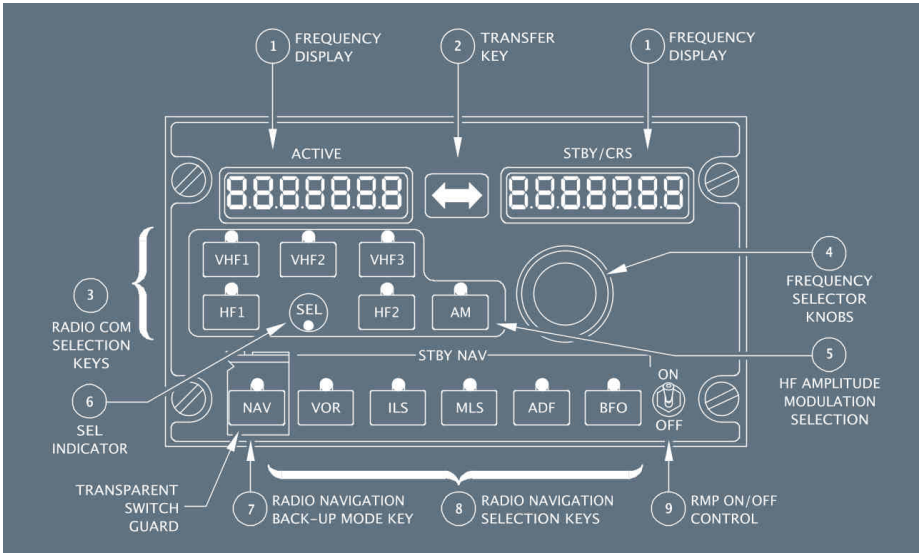
(8) Radio navigation selection keys
The pilot presses one of these keys to select a navigation radio to control through this RMP. This turns on the key's green monitor light.
Refer to DSC-34-30-30 Radio Management Panel (RMP), for additional information.

(9) ON/OFF switch
This switch controls the RMP power supply.

Note: *RMP3 is able to control VHF and HF transceivers through RMP1 and RMP2 even when either of the latter is OFF.*

RADIO MANAGEMENT PANEL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU



(1) Frequency displays

The ACTIVE display window shows the active frequency of the selected radio, which is identified by a green light on the selection key.

The STBY/CRS (standby/course) display window shows a standby frequency that the pilot can activate by pressing the transfer key or change by rotating the tuning knobs. (For a description of the CRS function *Refer to DSC-34-30-30 Radio Management Panel (RMP)*).

(2) Transfer key

Pressing this key moves the active frequency to the standby window and the standby frequency to the active window.

This tunes the selected receiver to the new active frequency.

(3) Radio com selection keys

When the pilot presses one of these keys :

- The ACTIVE window displays the frequency set on that radio.
- The STBY/CRS window displays the selected standby frequency or course.
- The selected key displays a green monitor light.

(4) Frequency selector knobs
The pilot uses these concentric knobs to select the STBY frequency or CRS.
The outer knob controls whole numbers ; the inner knob controls decimal fractions.

(5) AM pushbutton
If the aircraft has HF radios and the flight crew has selected an HF tranceiver, this switch selects the AM mode. (The default mode is the SSB, or single side-band mode).
This key displays a green monitor light when the AM mode is active.

(6) SEL indicator

The SEL indicator on both RMPs comes on amber when a transceiver, normally associated with one RMP, is tuned by another :
- VHF1 tuned by RMP2 or RMP3,
- VHF2 tuned by RMP1 or RMP3.
- VHF3, HF1, HF2 (◁◀) tuned by RMP1 or RMP2.

(7) NAV pushbutton (with transparent switchguard)
The pilot presses this key to select navigation receivers and courses through the RMP. It does not affect the selection of communication radios and their frequencies. (*Refer to DSC-34-30-30 Radio Management Panel (RMP)*, for additional information).

(8) Radio navigation selection keys
The pilot presses one of these keys to select a navigation radio to control through this RMP. This turns on the key's green monitor light.
Refer to DSC-34-30-30 Radio Management Panel (RMP), for additional information.

(9) ON/OFF switch
This switch controls the RMP power supply.

Note: RMP3 is able to control VHF and HF transceivers through RMP1 and RMP2 even when either of the latter is OFF.

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BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
RADIO COMMUNICATIONS	VHF1				X	
	VHF2		DC2			
	VHF3 ◁◁		DC1			
	HF1 ◁◁			SHED		
	HF2 ◁◁	AC2				
	RMP1				X	
	RMP2		DC2			
	RMP3 ◁◁		DC1			
	CAPT ACP				X	
	F/O ACP				X	
	THIRD ACP		DC1			
	FOURTH ACP ◁◁		DC1			
	SELCAL		DC1			
	FLT INTERPHONE				X	
	CAPT LOUDSPEAKER				X	
	F/O LOUDSPEAKER		DC2			
	EXT HORN					HOT 2

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GENERAL

Applicable to: ALL

Intercommunications is divided into two main systems:
- The audio management system.
- The cabin intercommunication data system.

AUDIO MANAGEMENT SYSTEM

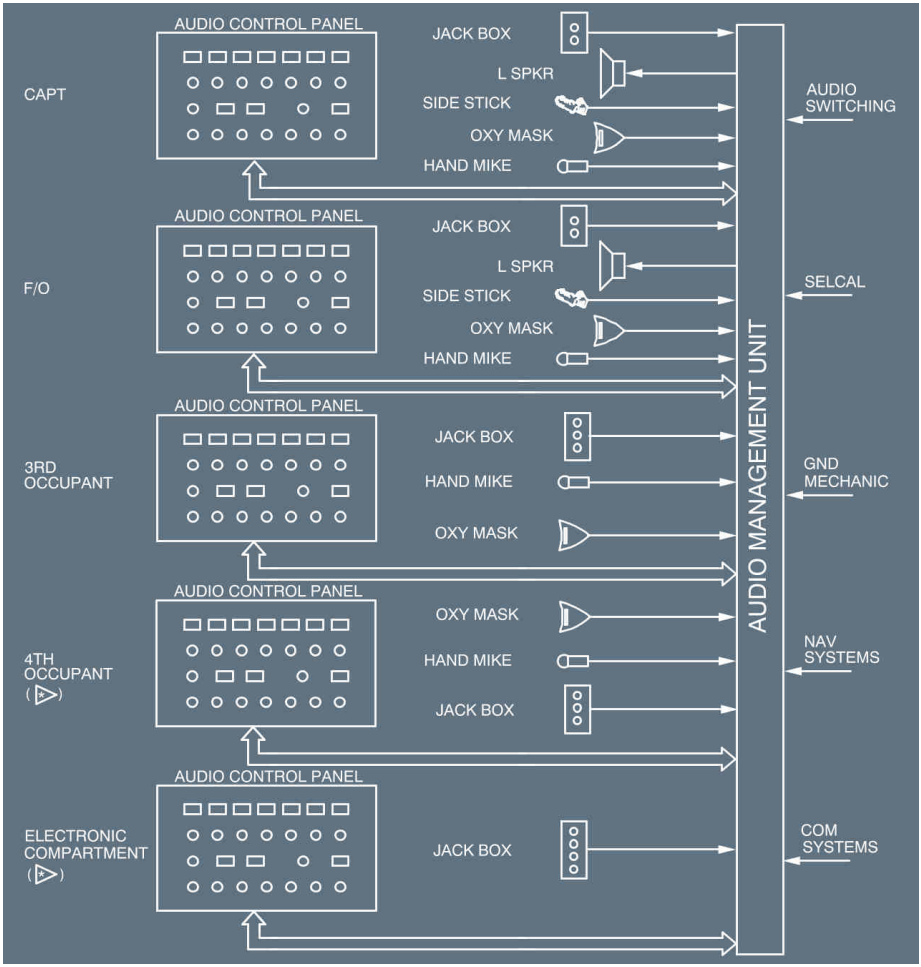
Applicable to: ALL

1

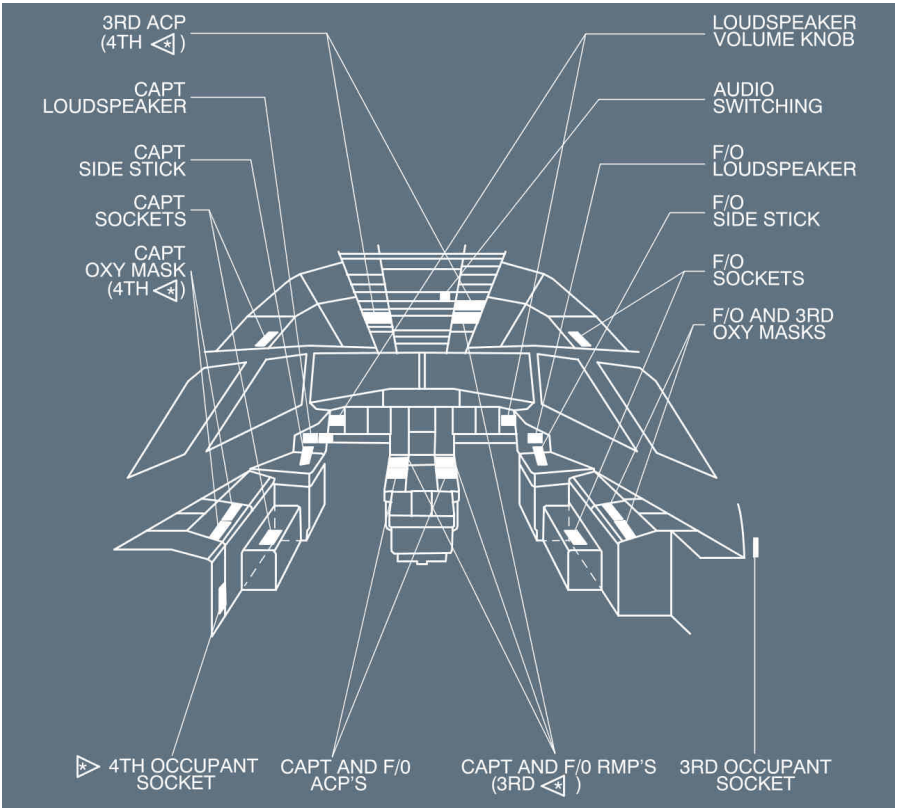
The audio management system allows the flight crew to use :
- All the radio communication and radio navigation facilities installed on the aircraft in transmission and reception mode.
- The interphone systems
- The call systems
- The passenger address system

The audio management system includes :
- An audio management unit (AMU)
- Three audio control panels (ACPs) (fourth and fifth optional)
- Sockets at each station
  - Headset jack and boomset connector (hand microphone connector ◁) for pilot, copilot, and third occupant
  - Headset jack for fourth occupant
- One interphone jack at the ground power receptacle
- Boomsets for the pilot, copilot, and third occupant, and three hand microphones (fourth ◁)
- Three cockpit oxygen mask microphones
- One radio press-to-talk switch on each sidestick
- One SELCAL code selection panel (avionics compartment)
- Two cockpit loudspeakers with separate volume controls
- If installed, a jack panel in the electronic compartment that groups the headset jack, service interphone jack, hand mike connector, and boomset
- An audio switching facility

If audio channel 1 or 2 fails due to a failure either in an ACP or the corresponding AMU, the crew can use the AUDIO SWITCHING selector to select the third audio channel.


AUDIO CONTROL PANEL
CAPT
JACK BOX
L SPKR
SIDE STICK
OXY MASK
HAND MIKE
AUDIO CONTROL PANEL
F/O
JACK BOX
L SPKR
SIDE STICK
OXY MASK
HAND MIKE
AUDIO CONTROL PANEL
3RD OCCUPANT
JACK BOX
HAND MIKE
OXY MASK
AUDIO CONTROL PANEL
4TH OCCUPANT
OXY MASK
HAND MIKE
JACK BOX
AUDIO CONTROL PANEL
ELECTRONIC COMPARTMENT
JACK BOX
AUDIO MANAGEMENT UNIT
AUDIO SWITCHING
SELCAL
GND MECHANIC
NAV SYSTEMS
COM SYSTEMS

2 LOCATION OF COMPONENTS (PILOT'S STATION)



CABIN INTERCOMMUNICATION DATA SYSTEM

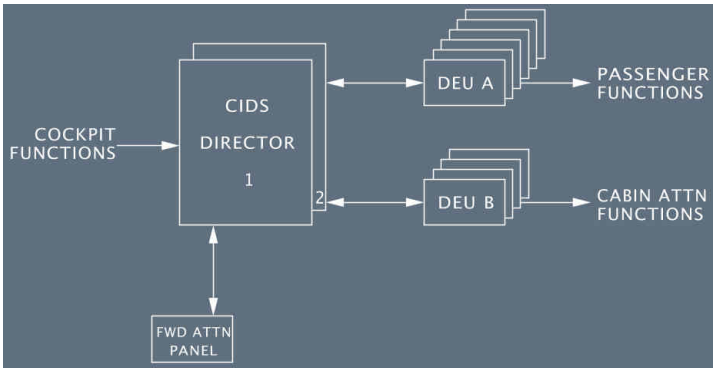
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The Cabin Intercommunication Data System (CIDS) transmits, controls, and processes signals for the following cabin systems:

- Cabin and service interphone
- Passenger address
- Passenger lighted signs
- Reading light
- General cabin illumination
- Emergency evacuation signalling

- Lavatory smoke indication
- Passenger entertainment music and video ◁✻
- Escape slide bottle pressure monitoring ◁✻

The CIDS has the following main components:
- Two CIDS directors connected in parallel, one active, and the other on standby.
- Forward attendant panel for control of the cabin systems.
- Programming and test module that allows the system to be reprogrammed after changes are made in the cabin configuration.



Decoder/Encoder Units (DEUs) linked to the two directors.
- Type A units (for passengers) installed along each side of the passenger cabin.
  The loudspeakers, lighted signs, call buttons, call lights and general illumination ballast units are divided into small groups, each connected to a type A DEU.
- Type B units (for attendants) installed near the exit doors. The Area Call panels, attendant handsets, slide and door pressure sensors, and attendant indicator panels, are connected to type B DEUs.

CABIN INTERCOMMUNICATION DATA SYSTEM

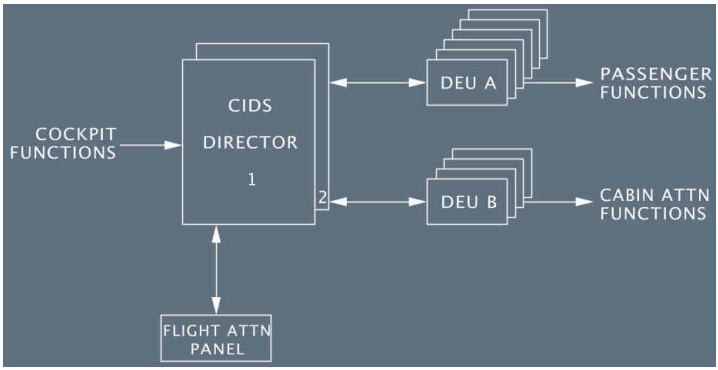
Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The Cabin Intercommunication Data System (CIDS) transmits, controls, and processes signals for the following cabin systems :
- Cabin and service interphone
- Passenger address
- Passenger lighted signs
- Reading lights (LED technology)
- General cabin illumination

- Emergency evacuation signalling
- Lavatory smoke detectors and indicators
- Passenger entertainment music and video
- Escape slide bottle pressure monitoring
- Vacuum system control function
- Cargo and lavatory smoke detection function

The CIDS has the following main components :

- Two CIDS directors connected in parallel ; one active, and the other on standby.
- Flight Attendant Panel (FAP) to monitor and control the cabin systems.
- Attendant Indication Panels (AIP), After Attendant Panels (AAP) and Area Call Panels (ACP)
- Decoder/Encoder Units (DEUs) linked to the two directors.
  - Type A units (for passengers) installed along the cabin.
    The loudspeakers, lighted signs, call buttons, call lights and general illumination ballast units are divided into small groups, each connected to a type A DEU.
  - Type B units (for attendants) installed near the exit doors. The Area Call panels, smoke detectors, attendant handsets, slide and door pressure sensors, and attendant indicator panels, are connected to type B DEUs.



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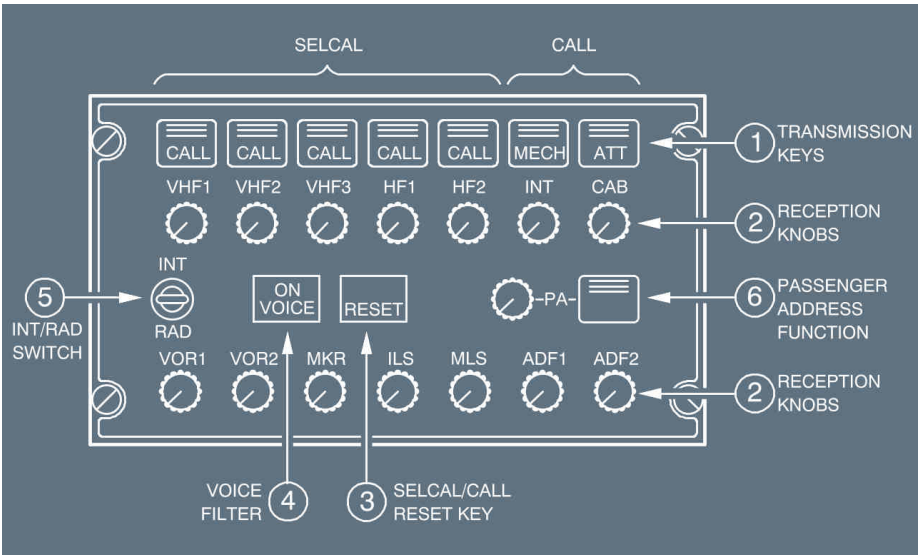
AUDIO CONTROL PANEL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

1



(1) Transmission keys

Pressed : The associated channel is selected for transmission.
The three green lines come on.
The pilot deselects the channel by pressing the pushbutton again, or by selecting another channel.

CALL : The legend flashes amber (and buzzer sounds) when the SELCAL system detects a call.

MECH : The legend flashes amber (and buzzer sounds) for a call from the nose gear bay. The MECH light goes off after 60 s, if it is not reset.

ATT : The legend flashes amber (and buzzer sounds) for a call from a cabin attendant. The ATT light goes off after 60 s, if it is not reset.

(2) Reception knobs

- Pressing and releasing the knob (knob out) selects the associated audio reception channel and the integral white light comes on
- Rotating the knob adjusts the volume

- The INTEG LT knob controls the brightness
- Pressing the knob (knob stays in) disconnects the associated audio reception channel.

Note: To receive DME audio navigation signals that are associated with an ILS or MLS station: The flight crew must not only select the ILS pb (or LS pb) on the FCU, but also the VOR reception channel on the ACP. It is possible that the audio signals of the VOR, the ILS, and the DME (associated with ILS) could all sound at the same time.

(3) SELCAL/CALL RESET key
Pressing this key extinguishes CALL, MECH, and ATT lights.

(4) ON VOICE key
This key allows the flight crew to inhibit the audio navigation signals (VOR, ADF)
Pressing this key filters out IDENT signals and turns on the green ON light.

(5) INT/RAD switch
This switch operates as a press-to-talk switch for boom mike or oxygen mask mike.

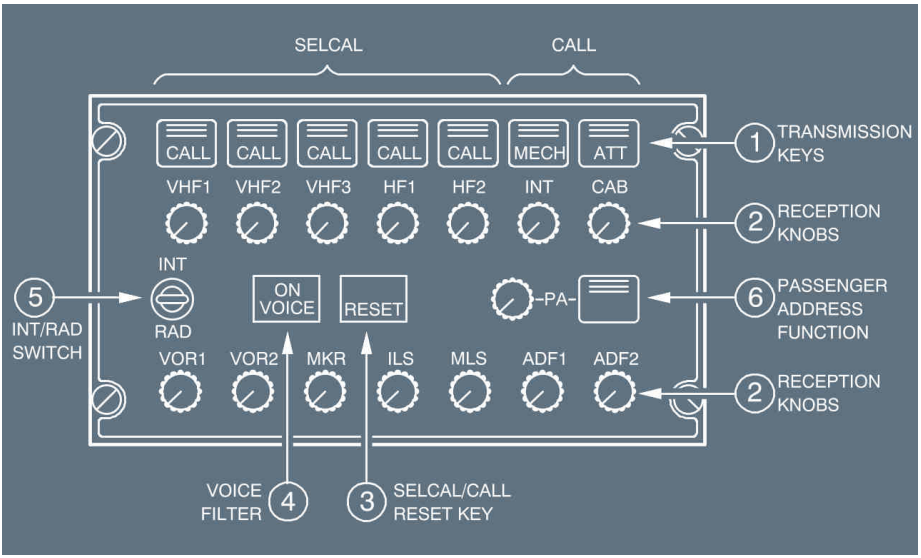
INT	:	Boom and mask mikes transmit on interphone regardless of which transmission key is selected. For reception on interphone, the crew member must have INT selected (INT reception knob out).
Neutral	:	Reception is normal. Boom and mask mikes do not transmit.
RAD (press and hold)	:	Boom and mask mikes transmit on the radio selected on the audio control panel.

(6) Passenger address (PA) function
(*Refer to DSC-23-20-50 Passenger Address*)

AUDIO CONTROL PANEL

Applicable to: B-HSL, B-HSM, B-HSN

2



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The pilot deselects the channel by pressing the pushbutton again, or by selecting another channel.

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MECH : The legend flashes amber (and buzzer sounds) for a call from the nose gear bay. The MECH light goes off after 60 s, if it is not reset.

ATT : The legend flashes amber (and buzzer sounds) for a call from a cabin attendant. The ATT light goes off after 60 s, if it is not reset.

(2) Reception knobs

- Pressing and releasing the knob (knob out) selects the associated audio reception channel and the integral white light comes on.
- Rotating the knob adjusts the volume.

- The INTEG LT knob controls the brightness.
- Pressing the knob (knob stays in) disconnects the associated audio reception channel.

Note: For reception of DME audio navigation signals associated to an ILS or MLS station, the ILS pb (or LS pb on the FCU) must also be selected.

(3) SELCAL/CALL RESET key
Pressing this key extinguishes CALL, MECH, and ATT lights.

(4) ON VOICE key
This key allows the flight crew to inhibit the audio navigation signals (VOR, ADF)
Pressing this key filters out ident signals and turns on the green ON light.

(5) INT/RAD switch
This switch operates as a press-to-talk switch for boom mike or oxygen mask mike.

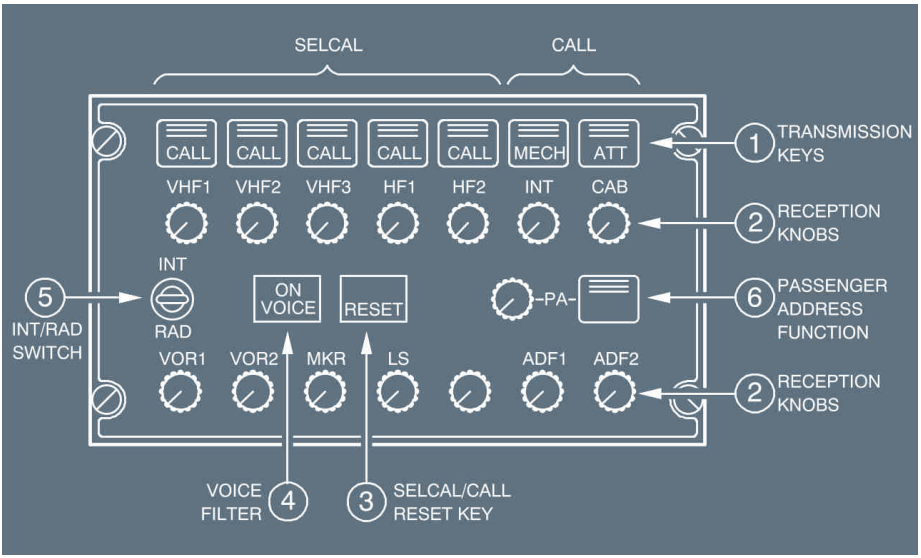
INT	:	Boom and mask mikes transmit on interphone regardless of which transmission key is selected. For reception on interphone, the crew member must have INT selected (INT reception knob out).
Neutral	:	Reception is normal. Boom and mask mikes do not transmit.
RAD (press and hold)	:	Boom and mask mikes transmit on the radio selected on the audio control panel.

(6) Passenger address (PA) function
(*Refer to DSC-23-20-50 Passenger Address*)

AUDIO CONTROL PANEL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

3



(1) Transmission keys

Pressed : The associated channel is selected for transmission.
The three green lines come on.
The pilot deselects the channel by pressing the pushbutton again, or selecting another channel.

CALL : The legend flashes amber (and buzzer sounds) when the SELCAL system detects a call.

MECH : The legend flashes amber (and buzzer sounds) for a call from the nose gear bay. The MECH light goes off after 60 s, if it is not reset.

ATT : The legend flashes amber (and buzzer sounds) for a call from a cabin crew member. The ATT light goes off after 60 s, if it is not reset.

(2) Reception knobs

- Pressing and releasing the knob (knob out) selects the associated audio reception channel and the integral white light comes on.
- Rotating the knob adjusts the volume.

- The ANN LT sw controls the brightness.
- Pressing the knob (knob stays in) disconnects the associated audio reception channel.

Note: *For reception of DME audio navigation signals associated to an ILS or MLS station, the ILS pb (or LS pb on the FCU) must also be selected.*

(3) SELCAL/CALL RESET key
Pressing this key extinguishes CALL, MECH, and ATT lights.

(4) ON VOICE key
This key allows the flight crew to inhibit the audio navigation signals (VOR, ADF)
Pressing this key filters out ident signals and turns on the green ON light.

(5) INT/RAD switch
This switch operates as a press-to-talk switch for boom mike or oxygen mask mike.

INT	:	Boom and mask mikes transmit on interphone regardless of which transmission key is selected. For reception on interphone, the crew member must have INT selected (INT reception knob out).
Neutral	:	Reception is normal. Boom and mask mikes do not transmit.
RAD (press and hold)	:	Boom and mask mikes transmit on the radio selected on the audio control panel.

(5) INT/RAD switch
This switch operates as a press-to-talk switch for boom mike or oxygen mask mike.

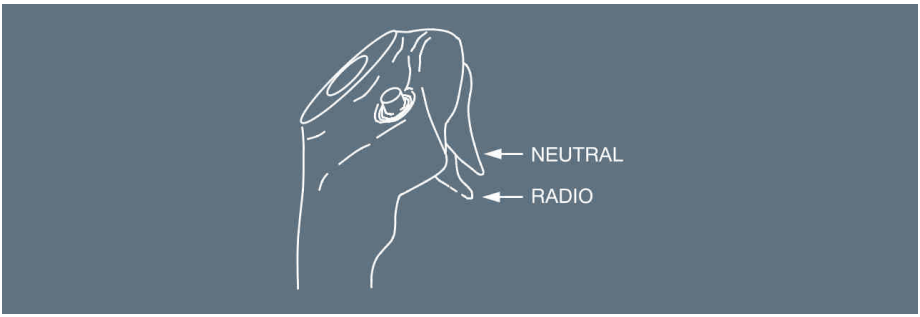
INT	:	Boom and mask mikes transmit on interphone regardless of which transmission key is selected. For reception on interphone, the crew member must have INT selected (INT reception knob out).
Neutral	:	Reception is normal. Boom and mask mikes do not transmit.
RAD (press and hold)	:	Boom and mask mikes transmit on the radio selected on the audio control panel.

(6) Passenger address (PA) function
(*Refer to DSC-23-20-50 Passenger Address*)

SIDE STICK RADIO SELECTOR

Applicable to: ALL

4



This selector has the same function as the INT/RAD switch on the ACP.

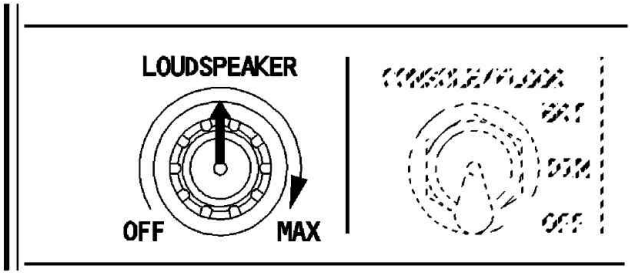
NEUTRAL (spring-loaded) : Boom and mask mikes are dead.
Reception is normal.

RADIO (squeezed) : Boom and mask mikes transmit through the equipment selected by the transmission key on the ACP.

Note: If RADIO is selected on the side stick when the INT/RAD switch is on INT, the radio function has priority over the interphone function.

LOUDSPEAKER VOLUME KNOB

Applicable to: ALL



This knob adjusts the volume of the loudspeaker for radio communication.

OFF : Loudspeaker does not respond to signals from the aircraft's radio equipment.

Clockwise rotation : Loudspeaker broadcasts signals from the aircraft's radio equipment at increasing volume.

Note: This knob does not control the loudness of aural alert and voice messages.

AUDIO SWITCHING

Applicable to: ALL

5



The crew can switch to the third ACP if ACP1 or ACP2 fails.
When the crew does this, it takes away the third occupant's access to the acoustic equipment.
AUDIO 3 XFRD appears in green on the ECAM MEMO display.

NORM : Each crew member uses his dedicated communication equipment.

CAPT 3: The pilot uses his acoustic equipment and the third occupant's ACP.

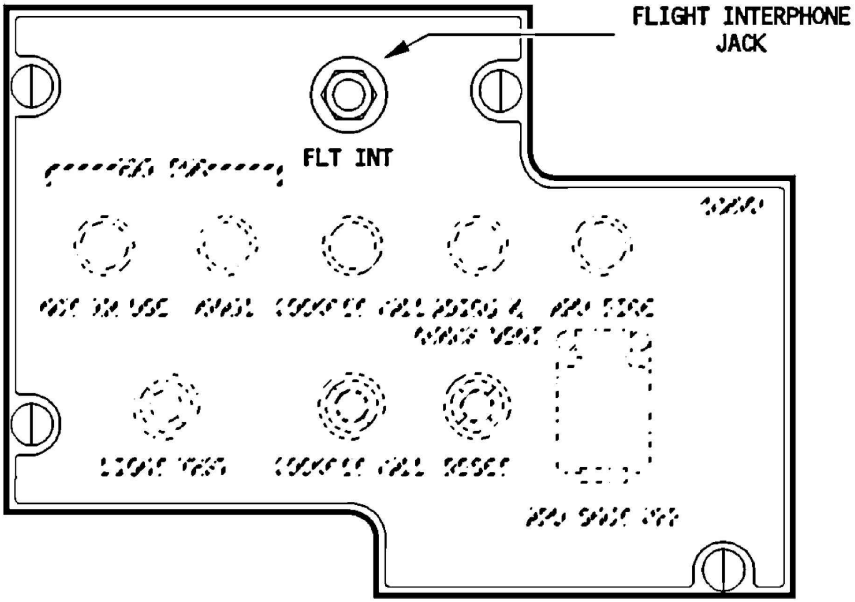
F/O 3 : The copilot uses his acoustic equipment and the third occupant's ACP.

FLIGHT INTERPHONE SYSTEM

Applicable to: ALL

This system allows the flight crew members to communicate among themselves and, through a jack on the external power panel, with the ground mechanic.

EXTERNAL POWER PANEL (FORWARD OF THE NOSE L/G BAY)



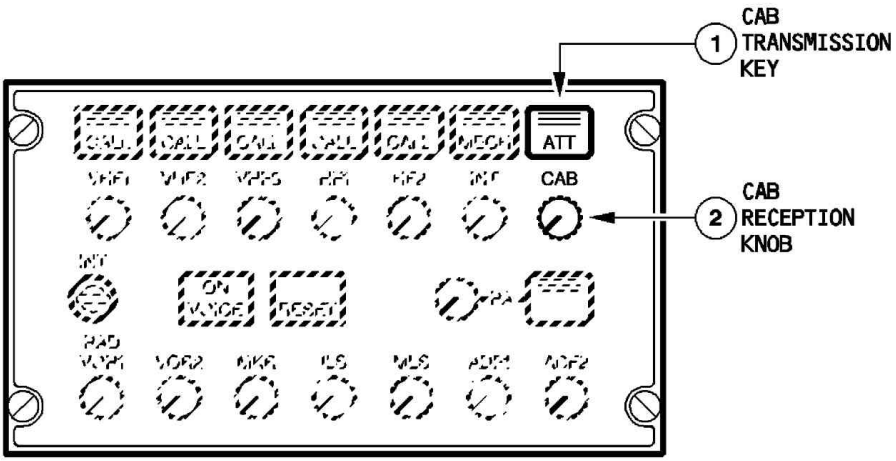
COCKPIT OPERATION FOR GROUND MECHANIC COMMUNICATION

	MECH TRANSMISSION KEY ON ACP	INT RECEPTION KNOB ON ACP	INT/RAD SW ON ACP	PUSH TO TALK ON HANDMIKE
BOOMSET OR OXYGEN MASK	PRESSED	OUT	INT OR RAD	-
HANDMIKE	PRESSED	OUT	-	PRESSED

CABIN INTERPHONE SYSTEM

Applicable to: ALL

The system allows the flight crew to communicate with the flight attendants, and the flight attendants to communicate among themselves.



(1) CAB transmission key

Pressed: Three green lines come on.
Boom, mask, and hand mikes may be used for cabin interphone.

(2) CAB reception knob

Pressed and released (knob out): The integral white light comes on.
The station receives audio signals from the cabin.
Rotating the knob adjusts the volume.

Pressed (knob in): The white light goes out.
The cabin interphone is disconnected.

COCKPIT OPERATION FOR CABIN COMMUNICATION

	CAB TRANSMISSION KEY ON ACP	CAB RECEPTION KNOB ON ACP	INT/RAD SW ON ACP	PUSH TO TALK ON HANDMIKE
BOOMSET OR OXYGEN MASK	PRESSED	OUT	RAD	-
HANDMIKE	PRESSED	OUT	-	PRESSED

SERVICE INTERPHONE SYSTEM

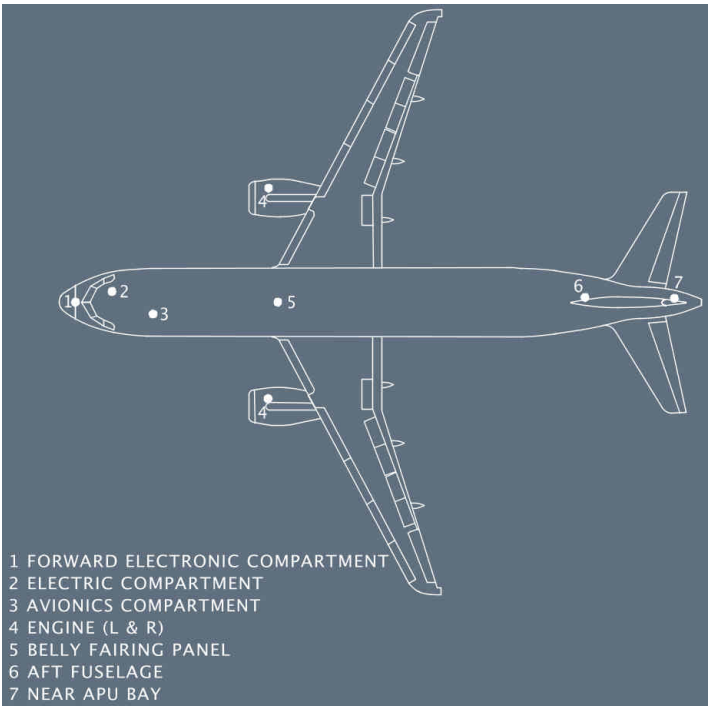
Applicable to: ALL

The system allows for communication between :
- the flight crew and the service interphone jacks
- the flight attendant stations and the service interphone jacks
- the different service interphone jacks.

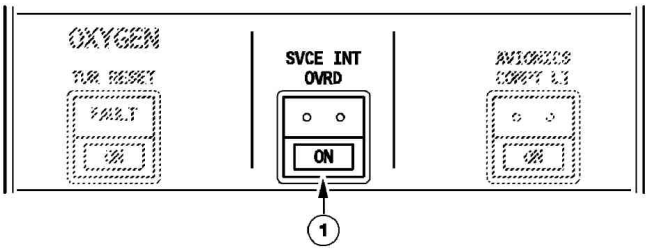
The Service Interphone system has :
- seven interphone jacks
- an OVRD switch located on the overhead panel.

The audio lines from the interphone jacks are connected to both CIDS directors.

LOCATION OF INTERPHONE JACKS



CONTROLS AND INDICATORS AT OVERHEAD PANEL



(1) SVCE INT OVRD pushbutton switch

Auto: Ground personnel can communicate with the flight crew by means of the service interphone jacks 10 s after the aircraft has landed. The landing gear must be compressed.

ON : Communication is possible when the landing gear is not compressed. The ON light is white.

COCKPIT OPERATION

	CAB TRANSMISSION KEY ON ACP	CAB RECEPTION KNOB ON ACP	INT/RAD SW ON ACP	PUSH TO TALK ON HANDMIKE	SVCE INT OVRD PB SW
BOOMSET	PRESSED	OUT	RAD	–	SEE ABOVE CONDITIONS.
HANDMIKE	PRESSED	OUT	–	PRESSED	

Intentionally left blank

GROUND MECHANIC CALL

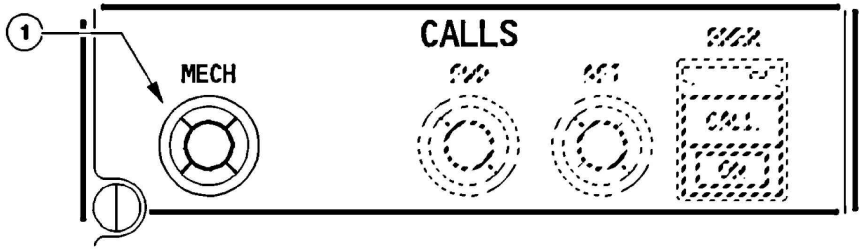
Applicable to: ALL

GENERAL

The system allows the flight crew and ground mechanics to communicate with each other.

Applicable to: ALL 320

CONTROLS AND INDICATORS ON OVERHEAD PANEL



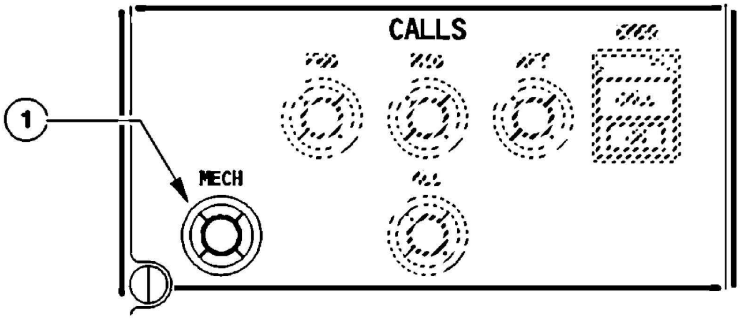
(1) MECH pushbutton

Pressed (and held) : COCKPIT CALL lights up blue on the external power panel in the nose L/G bay.
An external horn sounds.

Released : COCKPIT CALL remains lighted.
The ground mechanic can extinguish it by pressing the RESET button on the external power panel. The external horn stops sounding.

Applicable to: ALL 321

CONTROLS AND INDICATORS ON OVERHEAD PANEL



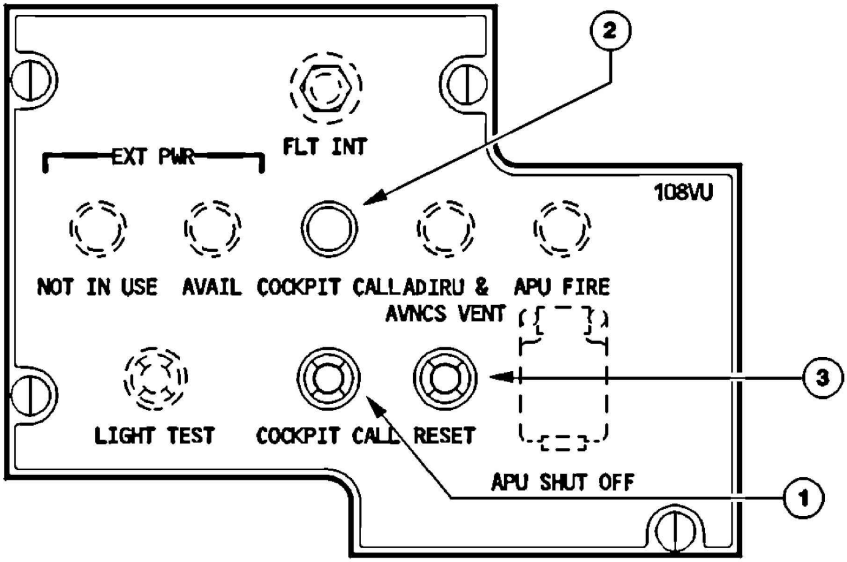
(1) MECH pushbutton

Pressed (and held) : COCKPIT CALL lights up blue on the external power panel in the nose L/G bay.
An external horn sounds.

Released : COCKPIT CALL remains lighted.
The ground mechanic can extinguish it by pressing the RESET button on the external power panel. The external horn stops sounding.

Applicable to: ALL

CONTROLS AND INDICATORS ON THE EXTERNAL POWER PANEL



(1) COCKPIT CALL pushbutton

Pressed : This calls the cockpit.
The MECH lights flash amber on the ACPs and a buzzer sounds.

Released: The MECH lights go out after 60 s if they are not reset on the ACPs.
The buzzer stops.

(2) COCKPIT CALL light

The blue light appears when cockpit calls the ground mechanic. An external horn also sounds.

(3) RESET pushbutton

Pressed The COCKPIT CALL light goes out.

CABIN CALL SYSTEM

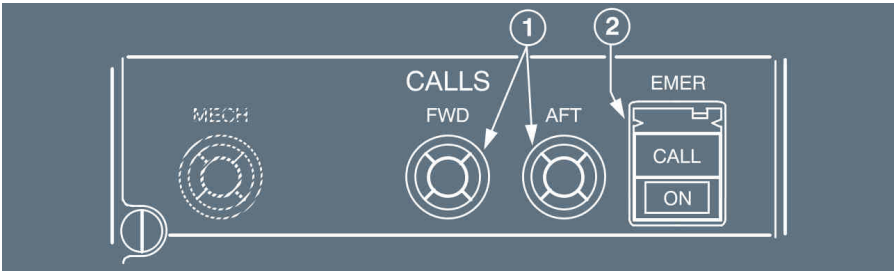
Applicable to: ALL

GENERAL

The cabin call system is for communication between the cockpit and the cabin.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSQ, B-HSR

1 CALLS FROM THE COCKPIT



(1) FWD/AFT pushbutton

When pressed, the following aural and visual alerts will trigger in the cabin :
- Two lights come on in pink on the FWD or AFT area call panel, as applicable.
- On the Attendant Indication Panel (AIP), the “CAPTAIN CALL” message appears and a light comes on in green.
- A high-low chime sounds in the FWD or AFT section of the cabin, as applicable.

(2) EMER pushbutton-switch (guarded)

When pressed, the following aural and visual alerts will trigger in the cabin:
- Two pink lights flash on all area call panels.
- The “EMERGENCY CALL” message appears on all AIPs.
- A high-low chime sounds three times, on all of the loudspeakers.

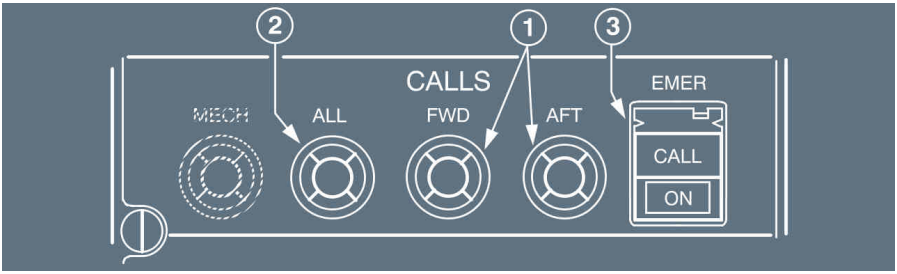
Also, on the cockpit CALLS panel, the ON light flashes in white and the CALL light flashes in amber.

If the cabin handset has an EMER CALL key, the following aural and visual alerts will trigger in the cockpit, when an emergency call is made from the cabin to the cockpit:
- On the EMER pb-sw: The ON light flashes in white, and the CALL light flashes in amber.
- The ATT lights will flash on all Audio Control Panels (ACPs).
- Three buzzers will sound consecutively (for approx. three seconds each).

The cabin call system will reset, when the cabin crewmember hangs up the handset.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

2 CALLS FROM THE COCKPIT



(1) FWD/AFT pushbutton

When pressed, the following aural and visual alerts will trigger in the cabin :
- Two lights come on in pink on the FWD or AFT area call panel, as applicable.
- On the Attendant Indication Panel (AIP), the “CAPTAIN CALL” message appears and a light comes on in green.
- A high-low chime sounds in the FWD or AFT section of the cabin, as applicable.

(2) ALL pushbutton

When pressed, all the stations simultaneously respond, as indicated above.

(3) EMER pushbutton-switch (guarded)

When pressed, the following aural and visual alerts will trigger in the cabin:
- Two pink lights flash on all area call panels.
- The “EMERGENCY CALL” message appears on all AIPs.
- A high-low chime sounds three times, on all of the loudspeakers.

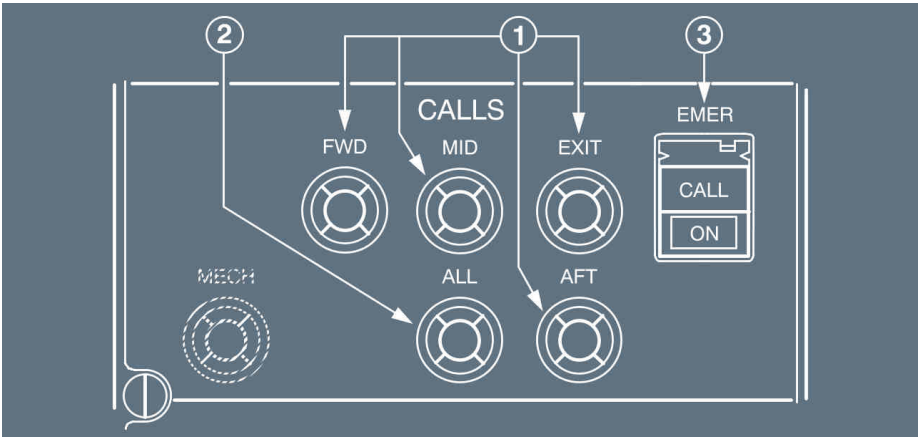
Also, on the cockpit CALLS panel, the ON light flashes in white and the CALL light flashes in amber.

If the cabin handset has an EMER CALL key, the following aural and visual alerts will trigger in the cockpit, when an emergency call is made from the cabin to the cockpit:
- On the EMER pb-sw: The ON light flashes in white, and the CALL light flashes in amber.
- The ATT lights will flash on all Audio Control Panels (ACPs).
- Three buzzers will sound consecutively (for approx. three seconds each).

The cabin call system will reset, when the cabin crewmember hangs up the handset.

Applicable to: B-HTD, B-HTE, B-HTF, B-HTG

3



(1) FWD/MID/EXIT/AFT pushbutton

When pressed, the following aural and visual alerts will trigger in the cabin:
- Two lights come on in pink on the FWD/MID/EXIT/AFT area call panel, as applicable.
- On the Attendant Indication Panel (AIP), the “CAPTAIN CALL” message appears and a light comes on in green.
- A high-low chime sounds in the FWD/MID/EXIT/AFT section of the cabin, as applicable.

(2) ALL pushbutton

When pressed, all the stations simultaneously respond, as indicated above.

(3) EMER pushbutton-switch (guarded)

When pressed, the following aural and visual alerts will trigger in the cabin:
- Two pink lights flash on all area call panels.
- The “EMERGENCY CALL” message appears on all AIPs.
- A high-low chime sounds three times, on all of the loudspeakers.

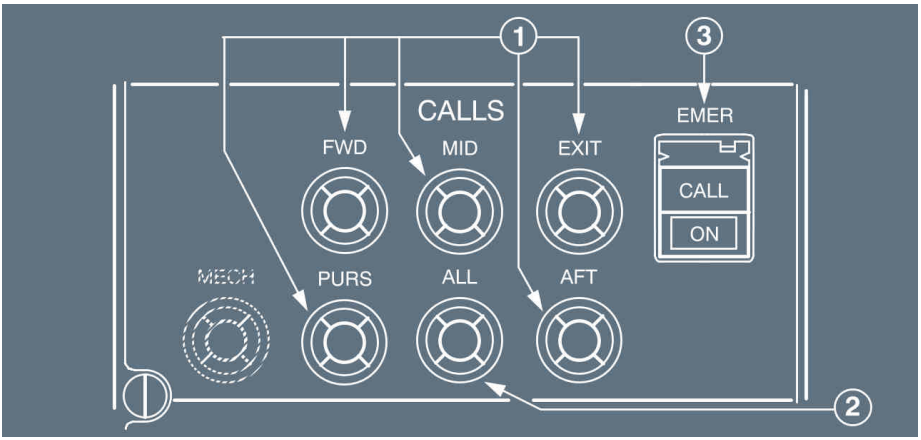
Also, on the cockpit CALLS panel, the ON light flashes in white and the CALL light flashes in amber.

If the cabin handset has an EMER CALL key, the following aural and visual alerts will trigger in the cockpit, when an emergency call is made from the cabin to the cockpit:
- On the EMER pb-sw: The ON light flashes in white, and the CALL light flashes in amber.
- The ATT lights will flash on all Audio Control Panels (ACPs).
- Three buzzers will sound consecutively (for approx. three seconds each).

The cabin call system will reset, when the cabin crewmember hangs up the handset.

Applicable to: B-HTH, B-HTI

4



(1) PURS/FWD/MID/EXIT/AFT pushbutton

When pressed, the following aural and visual alerts will trigger in the cabin :
- Two lights come on in pink on the PURS/FWD/MID/EXIT/AFT area call panel, as applicable.
- On the Attendant Indication Panel (AIP), the “CAPTAIN CALL” message appears and a light comes on in green.
- A high-low chime sounds in the PURS/FWD/MID/EXIT/AFT section of the cabin, as applicable.

(2) ALL pushbutton

When pressed, all the stations simultaneously respond, as indicated above.

(3) EMER pushbutton-switch (guarded)

When pressed, the following aural and visual alerts will trigger in the cabin :
- Two pink lights flash on all area call panels.
- The “EMERGENCY CALL” message appears on all AIPs.
- A high-low chime sounds three times, on all of the loudspeakers.

Also, on the cockpit CALLS panel, the ON light flashes in white and the CALL light flashes in amber.

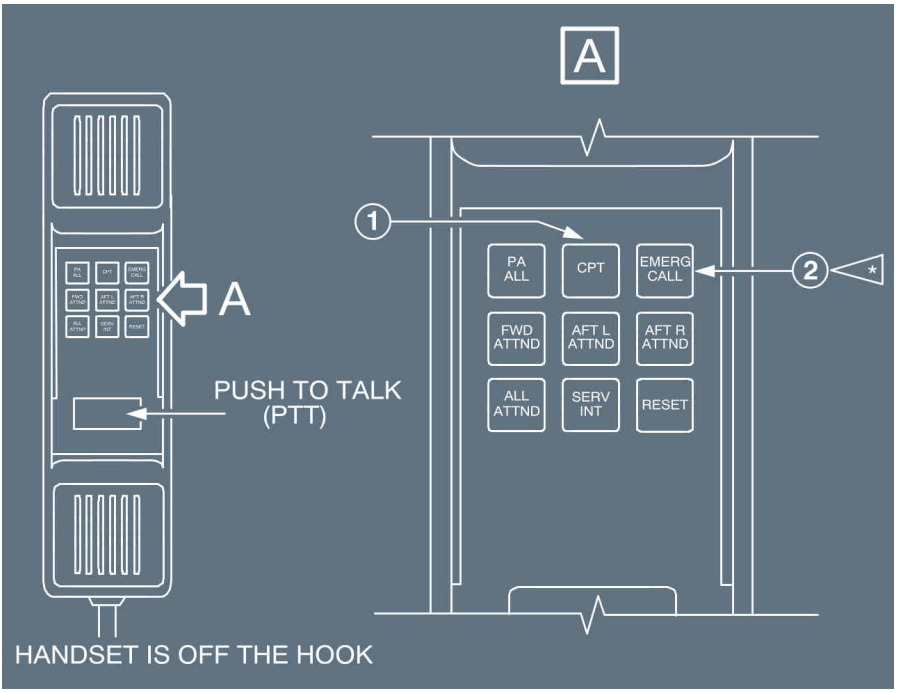
The following aural and visual alerts will trigger in the cockpit, when an emergency call is made from the cabin to the cockpit :

- On the EMER pb-sw : The ON light flashes in white, and the CALL light flashes in amber.
- The ATT lights will flash on all Audio Control Panels (ACPs).
- Three buzzers will sound consecutively (for approx. three seconds each).

The cabin call system will reset, when the cabin crewmember hangs up the handset.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

5 **CALLS FROM THE CABIN**



(1) CPT key

When pressed, the following aural and visual alerts will trigger in the cockpit:

- The ATT lights will flash on all Audio Control Panels (ACPs).
- A buzzer (inhibited during takeoff and landing) will sound.

In the cabin, the “CAPTAIN” message will appear on the Attendant Indication Panel (AIP) for which the CPT key was pressed.

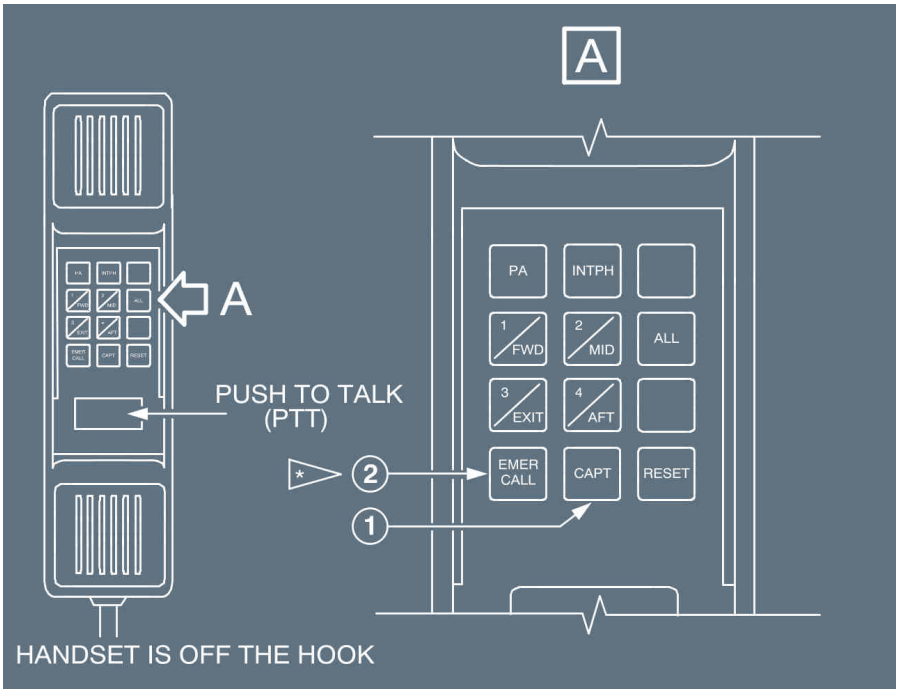
(2) EMER CALL key

When pressed, the following aural and visual alerts will trigger in the cockpit:
- On the EMER pb-sw: The ON light flashes in white, and the CALL light flashes in amber.
- The ATT lights will flash on all ACPs.
- Three buzzers (inhibited during takeoff and landing) will sound consecutively.

In the cabin, the “EMERGENCY CALL” message will appear on all AIPs.

Applicable to: ALL 321, B-HSL, B-HSM, B-HSN

6 CALLS FROM THE CABIN



(1) CAPT key

When pressed, the following aural and visual alerts will trigger in the cockpit:
- The ATT lights will flash on all Audio Control Panels (ACPs).
- A buzzer (inhibited during takeoff and landing) will sound.

In the cabin, the “CAPTAIN” message will appear on the Attendant Indication Panel (AIP) for which the CAPT key was pressed.

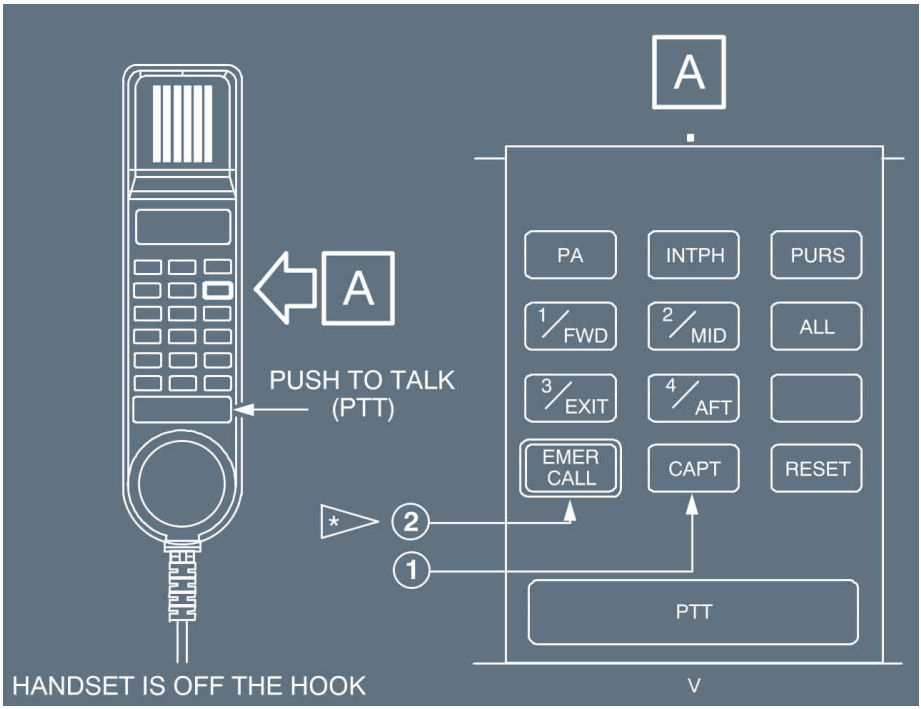
(2) EMER CALL key

When pressed, the following aural and visual alerts will trigger in the cockpit:
- On the EMER pb-sw: The ON light flashes in white, and the CALL light flashes in amber.
- The ATT lights will flash on all ACPs.
- Three buzzers (inhibited during takeoff and landing) will sound consecutively.

In the cabin, the “EMERGENCY CALL” message will appear on all AIPs.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

7



(1) CAPT key

When pressed, the following aural and visual alerts will trigger in the cockpit:
- The ATT lights will flash on all Audio Control Panels (ACPs).
- A buzzer (inhibited during takeoff and landing) will sound.

In the cabin, the “CAPTAIN” message will appear on the Attendant Indication Panel (AIP) for which the CAPT key was pressed.

(2) EMER CALL key

When pressed, the following aural and visual alerts will trigger in the cockpit:
- On the EMER pb-sw: The ON light flashes in white, and the CALL light flashes in amber.
- The ATT lights will flash on all ACPs.
- Three buzzers (inhibited during takeoff and landing) will sound consecutively.

In the cabin, the “EMERGENCY CALL” message will appear on all AIPs.

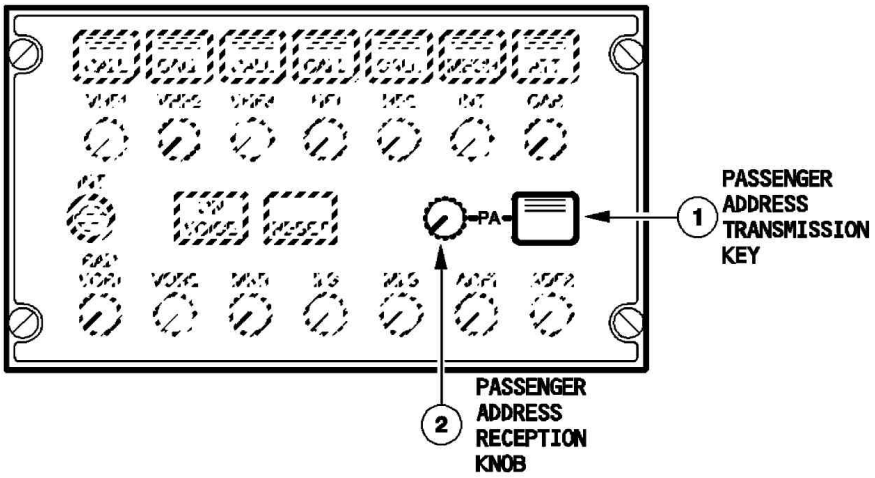
Intentionally left blank

PASSENGER ADDRESS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG

The passenger address allows all crew members to make announcements to passengers in the cabin through loudspeakers. It can be operated from the cockpit (with ACP or handset) or from the cabin (attendant stations).

CONTROLS AND INDICATORS



(1) PA transmission key

Pressed and held : The flight crew may use a boom, mask, or hand mike to make an announcement.
Three green lines come on.

Note: The flight crew may use a cockpit handset to make PA announcements without action on the ACPs.

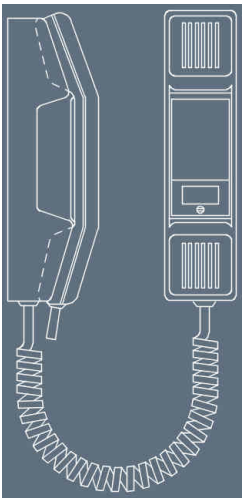
(2) PA reception knob

Pressed and released (knob out) The message goes to the loudspeakers, and the integral white light comes on.
The flight crew can turn the knob to adjust the volume.

Pressed (knob in)	The PA reception to the loudspeakers is disconnected. The white light goes out.

COCKPIT HANDSET

The cockpit handset at the bottom of the pedestal is for PA announcements.



PA FROM COCKPIT

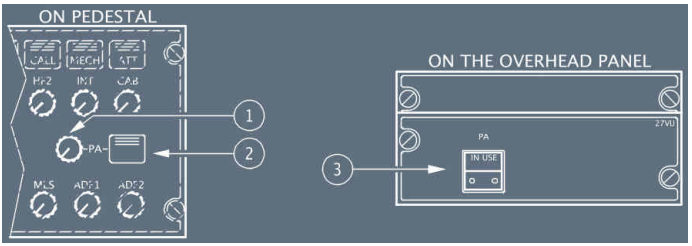
	PA TRANSMISSION KEY ON ACP	PA RECEPTION KNOB ON ACP	PUSH TO TALK ON HANDMIKE	PUSH TO TALK ON HANDSET
BOOMSET OR OXYGEN MASK	PRESSED	OUT		
HANDMIKE	PRESSED	OUT	PRESSED	
HANDSET				PRESSED

PASSENGER ADDRESS

Applicable to: B-HSL, B-HSM, B-HSN, B-HTH, B-HTI

The passenger address allows all crew members to make announcements to passengers in the cabin through loudspeakers. It can be operated from the cockpit (with ACP or handset) or from the cabin (attendant stations).

CONTROLS AND INDICATORS



(1) PA transmission key

Pressed and held : The flight crew may use a boom, mask, or hand mike to make an announcement.
Three green lines come on.

Note: The flight crew may use a cockpit handset to make PA announcements without action on the ACPs.

(2) PA reception knob

Pressed and released (knob out): The message goes to the loudspeakers, and the integral white light comes on.
The flight crew can turn the knob to adjust the volume.

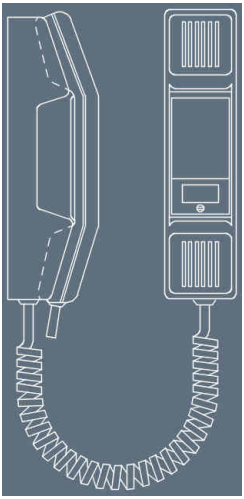
Pressed (knob in): The PA reception to the loudspeakers is disconnected.
The white light goes out.

(3) PA IN USE light

Comes on white when the PA is activated from the cockpit or from the cabin (cabin attendant or prerecorded announcement).

COCKPIT HANDSET

The cockpit handset at the bottom of the pedestal is for PA announcements.



PA FROM COCKPIT

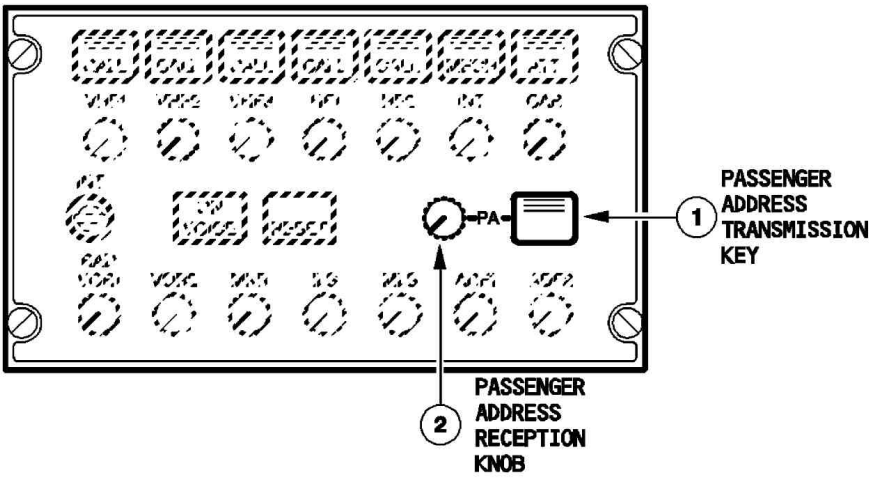
	PA TRANSMISSION KEY ON ACP	PA RECEPTION KNOB ON ACP	PUSH TO TALK ON HANDMIKE	PUSH TO TALK ON HANDSET
BOOMSET OR OXYGEN MASK	PRESSED	OUT		
HANDMIKE	PRESSED	OUT	PRESSED	
HANDSET				PRESSED

PASSENGER ADDRESS

Applicable to: B-HSQ, B-HSR

The passenger address allows all crew members to make announcements to passengers in the cabin through loudspeakers. It can be operated from the cockpit (with ACP or handset) or from the cabin (attendant stations).

CONTROLS AND INDICATORS



(1) PA transmission key

Pressed and held : The flight crew may use a boom, mask, or hand mike to make an announcement.
Three green lines come on.

Note: The flight crew may use a cockpit handset to make PA announcements without action on the ACPs.

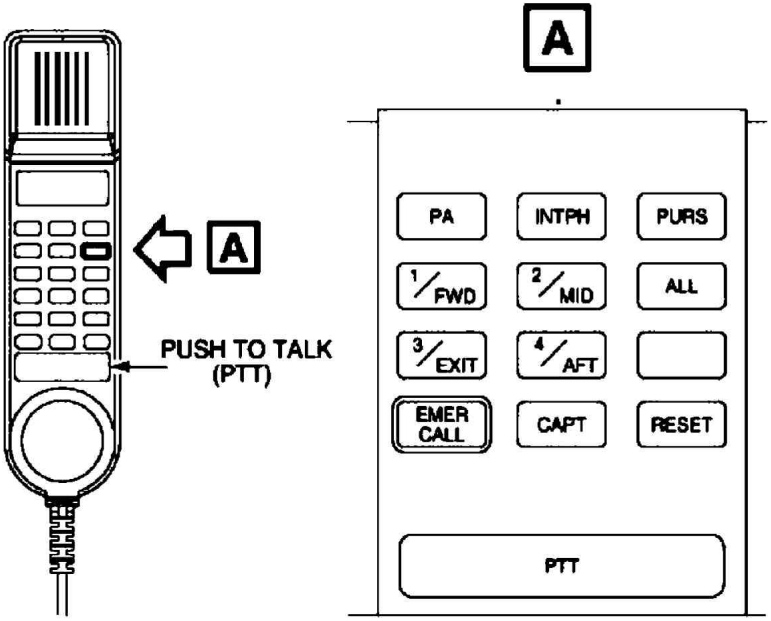
(2) PA reception knob

Pressed and released (knob out): The message goes to the loudspeakers, and the integral white light comes on.
The flight crew can turn the knob to adjust the volume.

Pressed (knob in): The PA reception to the loudspeakers is disconnected.
The white light goes out.

COCKPIT HANDSET

The cockpit handset at the bottom of the pedestal is for PA announcements.



Note: *Due to numerous customizations of the handset and keypad, their functions are not described in detail.*

PA FROM COCKPIT

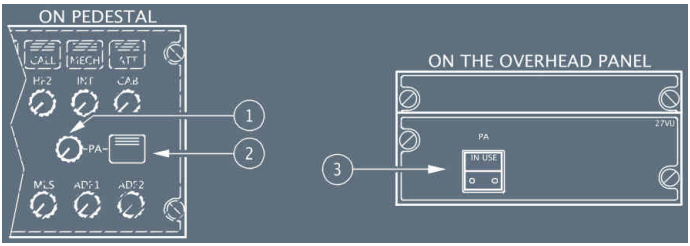
	PA TRANSMISSION KEY ON ACP	PA RECEPTION KNOB ON ACP	PUSH TO TALK ON HANDMIKE	PUSH TO TALK ON HANDSET
BOOMSET OR OXYGEN MASK	PRESSED	OUT		
HANDMIKE	PRESSED	OUT	PRESSED	
HANDSET				PRESSED

PASSENGER ADDRESS

Applicable to: B-HSO, B-HSP, B-HST, B-HSU

The passenger address allows all crew members to make announcements to passengers in the cabin through loudspeakers. It can be operated from the cockpit (with ACP or handset) or from the cabin (attendant stations).

CONTROLS AND INDICATORS



(1) PA transmission key

Pressed and held : The flight crew may use a boom, mask, or hand mike to make an announcement.
Three green lines come on.

Note: The flight crew may use a cockpit handset to make PA announcements without action on the ACPs.

(2) PA reception knob

Pressed and released (knob out) The message goes to the loudspeakers, and the integral white light comes on.
The flight crew can turn the knob to adjust the volume.

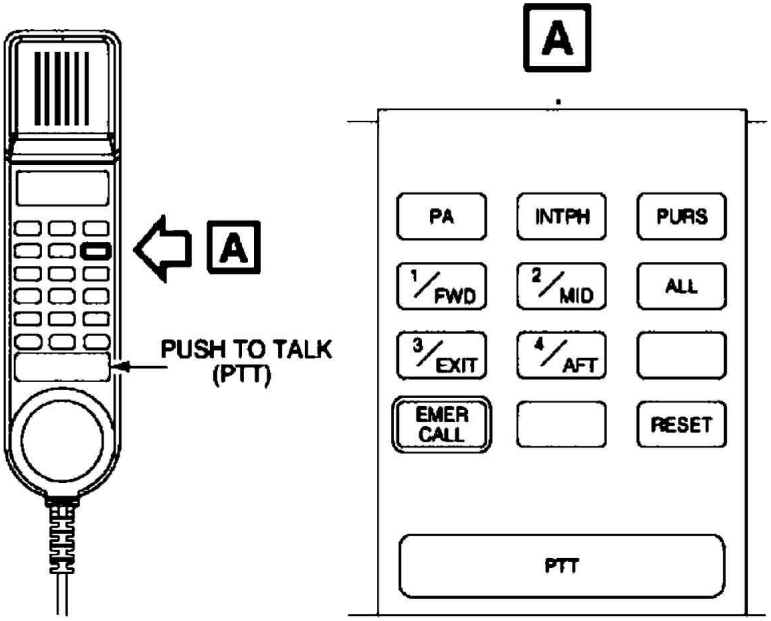
Pressed (knob in) The PA reception to the loudspeakers is disconnected.
The white light goes out.

(3) PA IN USE light

Comes on white when the PA is activated from the cockpit or from the cabin (cabin attendant or prerecorded announcement).

COCKPIT HANDSET

The cockpit handset at the bottom of the pedestal is for PA announcements.



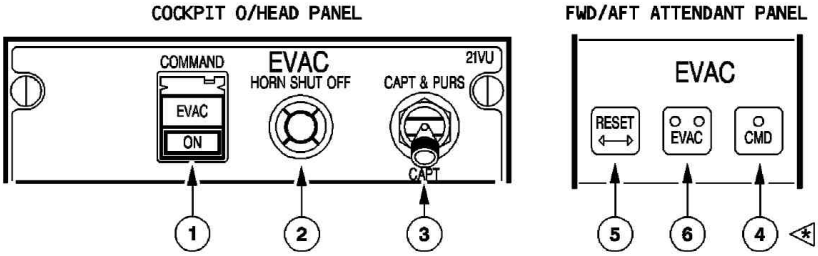
Note: *Due to numerous customizations of the handset and keypad, their functions are not described in detail.*

PA FROM COCKPIT

	PA TRANSMISSION KEY ON ACP	PA RECEPTION KNOB ON ACP	PUSH TO TALK ON HANDMIKE	PUSH TO TALK ON HANDSET
BOOMSET OR OXYGEN MASK	PRESSED	OUT		
HANDMIKE	PRESSED	OUT	PRESSED	
HANDSET				PRESSED

EMER EVAC

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN



(1) COMMAND pb

ON : In the cockpit :
- EVAC light flashes red.
- Horn sounds.

In the cabin :
- EVAC lights flash at FWD and AFT attendant panels.
- Evacuation tone sounds.

OFF: The alert is stopped.

The EVAC light flashes red when the alert is activated.

(2) HORN SHUT OFF pb

Pressing this button silences the cockpit horn.

(3) CAPT and PURS/CAPT sw

CAPT and PURS : The alert may either be activated from the cockpit or the cabin.

CAPT : The alert may only be activated from the cockpit.
If one of the cabin CMD pb is pressed, only the cockpit horn sounds for 3 s.

(4) CMD pb

Pressing this button activates the alert, if the cockpit switch is at the CAPT &PURS position.
Pressing it again stops the alert.

(5) RESET pb

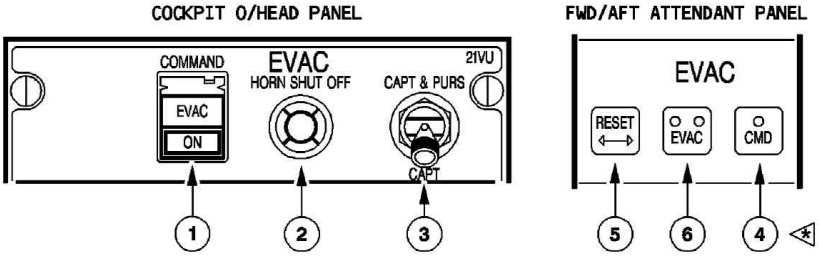
Pressing this button silences the EVAC tone.

(6) EVAC light

This light flashes when the alert is activated.

EMER EVAC

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) COMMAND pb

ON : In the cockpit : - The EVAC light flashes red.
In the cabin : - The EVAC lights flash at FWD and AFT attendant panels.
- The Evacuation tone sounds.

OFF: The alert is stopped.
The EVAC light flashes red when the alert is activated.

(2) HORN SHUT OFF pb
Pressing this button silences the cockpit horn.

(3) CAPT and PURS/CAPT sw

CAPT and PURS : The alert may either be activated from the cockpit or the cabin.

CAPT : The alert may only be activated from the cockpit.
If one of the cabin CMD pb is pressed, only the cockpit horn sounds for 3 s.

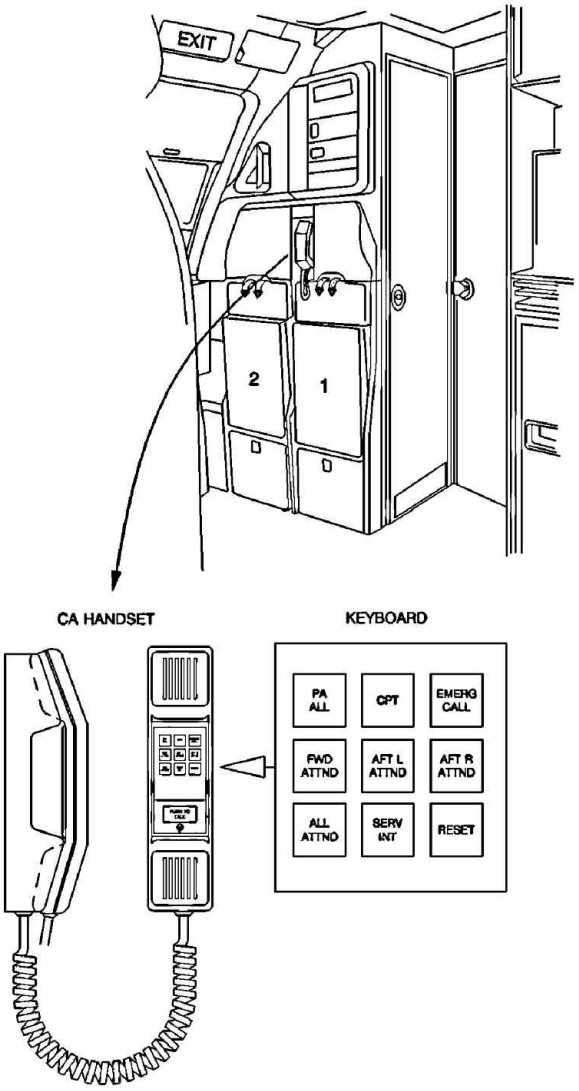
(4) CMD pb
Pressing this button activates the alert, if the cockpit switch is at the CAPT &PURS position.
Pressing it again stops the alert.

(5) RESET pb
Pressing this button silences the EVAC tone.

(6) EVAC light
This light flashes when the alert is activated.

PURSER STATION

Applicable to: ALL


EXIT
2
1
CA HANDSET
KEYBOARD
PA ALL
CPT
EMERG CALL
FWD ATTND
AFT L ATTND
AFT R ATTND
ALL ATTND
SERV INT
RESET

BUS EQUIPMENT LIST

Applicable to: B-HSQ, B-HSR

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
CABIN INTERCOM DATA SYS	CIDS1		GND/FLT		X	
	CIDS2		GND/FLT		X	
	DEU (A/B)		GND/FLT		X	

BUS EQUIPMENT LIST

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
CABIN INTERCOM DATA SYS	CIDS1		GND/FLT		X	HOT2
	CIDS2		GND/FLT		X	HOT2
	DEU (A/B)		GND/FLT		X	

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DESCRIPTION

Applicable to: ALL

The cockpit voice recorder (CVR) records :
- direct conversations between crew members in the cockpit
- all aural warnings sounded in the cockpit
- communications received and transmitted by radio
- intercommunications conversations between crew members
- announcements transmitted over the passenger address system, if PA reception is selected on the third audio control panel.

Only the last 2 h of recording are retained.

The CVR system consists of :
- a remote microphone behind the overhead panel
- a “hot mike” function, which records the crew members voice directly from their microphone, even if the push to talk switch is not activated.
- a crashproof four-track recorder, equipped with an underwater locating beacon, in the aft section of the aircraft
- a control panel on the overhead panel.

It is energized automatically :
- on the ground during the first 5 min after the aircraft electrical network is energized
- on the ground with one engine running
- in flight

On the ground, it is stopped automatically 5 min after the last engine shutdown provided the CVR jack is not used.
On the ground, the crew can energize the CVR manually by pressing the GND CTL pushbutton.

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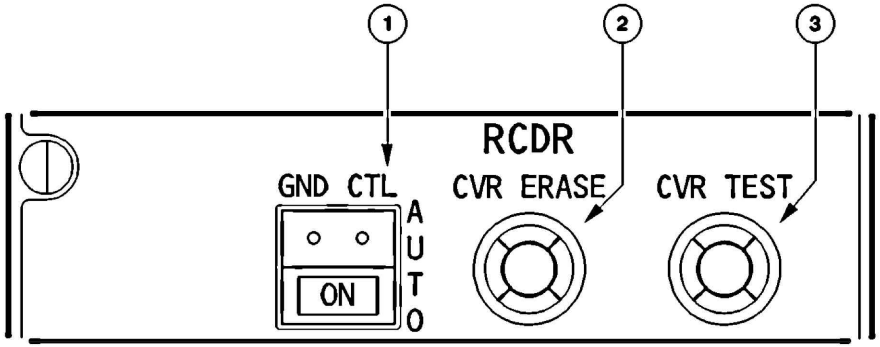
CONTROLS AND INDICATORS ON OVERHEAD PANEL

Applicable to: ALL

1



(1) GND CTL switch (spring-loaded)

ON : The CVR, DFDR, and QAR are on.
The ON light comes on blue.

AUTO : The CVR, DFDR, and QAR are on, according to the logic. (*Refer to DSC-23-30-10 DESCRIPTION*).

(2) CVR ERASE pushbutton

Pressed for 2 s : This completely erases the tape, if :
- The aircraft is on the ground, and
- The parking brake is on.

(3) CVR TEST pushbutton

Pressed and held : This activates the test, if the CVR is on (the GND CTL pushbutton pressed, or during the first 5 min after energization of the aircraft electrical network), and the parking brake is on.
Refer to PRO-NOR-SOP-06 Overhead Panel - RCDR for additional information.

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BUS EQUIPMENT LIST

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
COCKPIT VOICE RECORDER	CVR CTL				SHED	
	CVR			SHED		

BUS EQUIPMENT LIST

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
COCKPIT VOICE RECORDER	CVR CTL				X	
	CVR				X	

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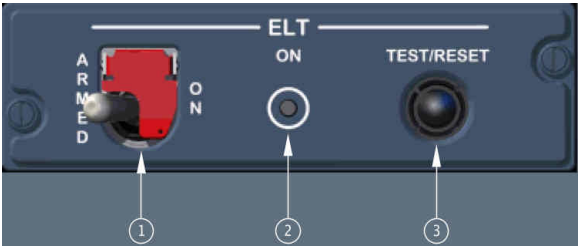
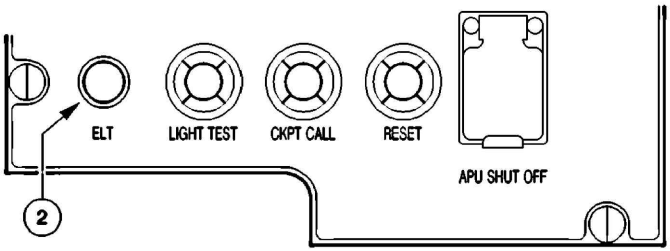
CONTROLS AND INDICATORS

Applicable to: B-HSQ, B-HSR





(1) ELT sw

The guard keeps this switch in the ARMED position.

ON : The Emergency Locator Transmitter (ELT) transmits an emergency signal.

ARMED : In the case of impact, the ELT transmits an emergency signal (on 121.5, 243 and 406.025 MHz).

(2) ON and ELT light

These lights come on amber either when the emergency signal is transmitted, or during ELT autotest.

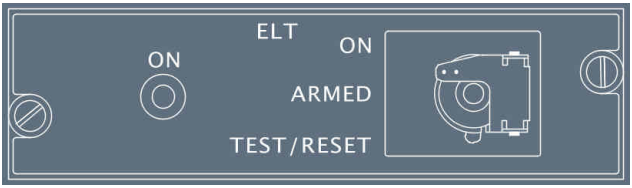
(3) TEST/RESET pb

Pressing this pushbutton starts the ELT auto test.

Note: If the ELT is unduly triggered in ARMED mode (by an external impact, hard landing, etc.), select the TEST/RESET position to reset to reset the ELT and stop signal transmission.

CONTROLS AND INDICATORS

Applicable to: B-HSK, B-HSL, B-HSM, B-HTG, B-HTH, B-HTI



(1) ELT selector

ON : The Emergency Locator Transmitter (ELT) transmits an emergency signal.

ARMED : In case of impact, the ELT transmits an emergency signal (on 121.5, 243 and 406 MHz).

TEST/RESET : Starts the ELT autotest.

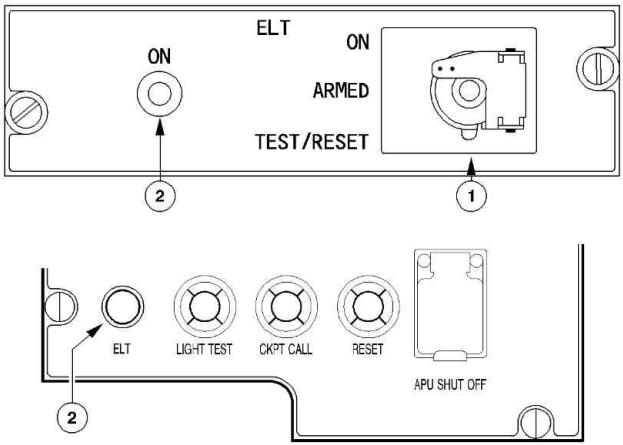
Note: If the ELT is unduly triggered in ARMED mode (by an external impact, hard landing, etc.), select the TEST/RESET position to reset the ELT and stop signal transmission.

(2) ON light

This light comes on either when the emergency signal is transmitted, or during the ELT test.

CONTROLS AND INDICATORS

Applicable to: B-HSN



(1) ELT selector

ON : The Emergency Locator Transmitter (ELT) transmits an emergency signal.

ARMED : In case of impact, the ELT transmits an emergency signal (on 121.5, 243 and 406 MHz).

TEST/RESET : Starts the ELT autotest.

Note: If the ELT is unduly triggered in ARMED mode (by an external impact, hard landing, etc.), select the TEST/RESET position to reset the ELT and stop signal transmission.

(2) ON light and ELT light

These lights come on amber either when the emergency signal is transmitted, or during ELT autotest.

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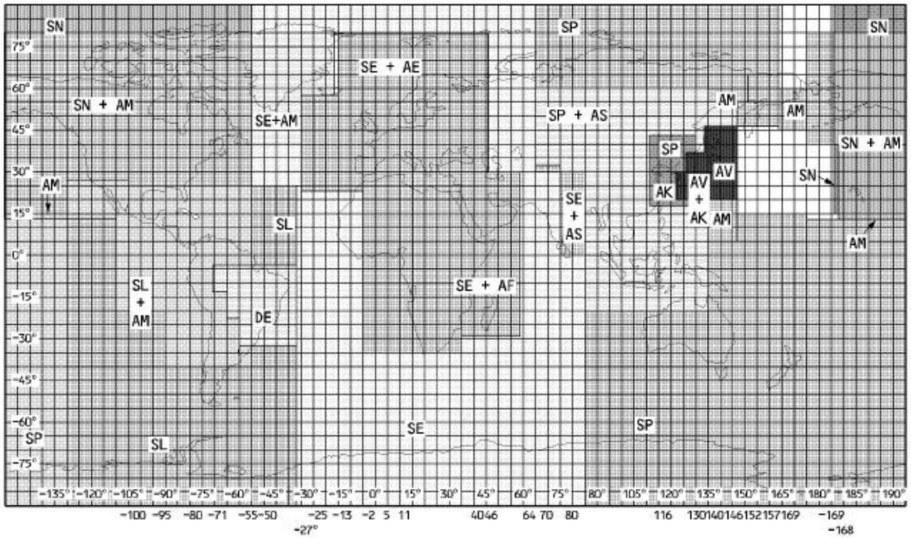
WORLD MAP ACARS FREQUENCIES

Applicable to: ALL

1



SOUTH
ACARS WORLD MAP

The table below defines the world zone abbreviations, indicates their associated Service Provider, MCDU label, and ACARS frequency.

ABBREVIATION	SERVICE PROVIDER	MCDU LABEL	FREQUENCY	Family
SP	SITA PACIFIC	SIT-PAC	131.550 MHz	SITA
SN	SITA NORTH AMERICA	SIT-NAM	136.850 MHz	SITA
SL	SITA LATIN AMERICA	SIT-LAM	131.725 MHz	SITA
SE	SITA EUROPE	SIT-E/A	131.725 MHz	SITA
DE	DEPV BRAZIL	DEPV	131.550 MHz	SITA
AV	AVICOM	AVICOM	131.450 MHz	SITA
AM	ARINC AMERICA	ARI-AM	131.550 MHz	ARINC
AE	ARINC EUROPE	ARI-EUR	136.925 MHz	ARINC
AF	ARINC AFRICA	ARI-AFR	126.900 MHz	ARINC
AK	ARINC KOREA	ARI-KOR	131.725 MHz	ARINC
AS	ARINC ASIA	ARI-ASI	131.450 MHz	ARINC

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BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
ACARS		AC1				

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BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
SATCOM ⋘		AC1				

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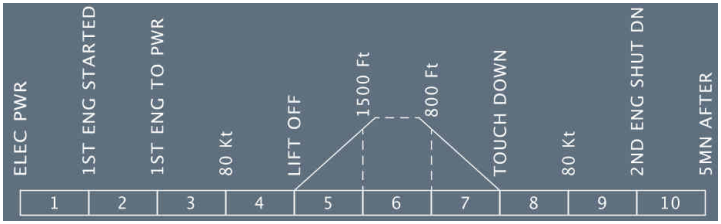
WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
CIDS 1 + 2 FAULT	SINGLE CHIME	MASTER CAUTION	NIL	NIL	3, 4, 5, 7, 8
VHF 1(2)(3) EMITTING **HF1(2) EMITTING** Transmitter emitting more than 60 s					
SATCOM ◁ FAULT	NIL	NIL			
ACARS ◁ FAULT					
HF 1(2) ◁ DATA FAULT					
VHF 3 ◁ DATA FAULT					
SATCOM ◁ DATA FAULT					

MEMO DISPLAY

This display shows “AUDIO 3 XFRD” in green, if the AUDIO SWITCHING selector is not on NORM.

ACARS ◁ , the display shows:
- "ACARS CALL" in green, pulsing, if ACARS has received a message from the ground requesting a voice communication.
- "VHF 3: VOICE" in green, if VHF 3 is operating in voice mode and ACARS communication is interrupted.
- "ACARS MSG"in green, pulsing, if ACARS has received a message from the ground
- ACARS STBY in green, if ACARS communications between the aircraft and the ground are lost.

SATCOM ◁ , the display shows "SATCOM ALERT" in green, when a message with a priority level below 4 is received from the ground.
HF ◁ and ATSU ◁ , the display shows “HF VOICE”, pulsing in green for 10 s and then steady, when all the HF radios are in voice mode.

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AIRCRAFT SYSTEMS

ELECTRICAL

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DSC-24-PLP PRELIMINARY PAGES

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DC GENERATION....B
Circuit Breakers (C/Bs)....C

DSC-24-10-30 Operations

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FAILURE OF ONE TR....C
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EXTERNAL POWER PANEL....C
Forward Cabin....D
ECAM ELEC Page....E

ECAM ELEC PAGE..... F

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Memo Display..... B

Localization Title	Toc Index	ID	Reason
DSC-24-10-10 General	A	1	Improvement of illustration quality.
DSC-24-10-30-20 On Ground	B	1	Improvement of illustration quality.
DSC-24-10-30-20 On Ground	B	2	Improvement of illustration quality
DSC-24-10-30-30 Failure of AC Bus 1	B	1	Improvement of illustration quality.
DSC-24-10-30-30 Failure of AC Bus 1	B	2	Improvement of illustration quality.
DSC-24-10-30-30 Flight with Batteries Only	I	3	Improvement of illustration quality.
DSC-24-10-30-30 On Ground, Batteries Only (Speed < 50 kt)	J	4	Improvement of illustration quality.
DSC-24-10-30-30 Smoke Configuration	K	5	Improvement of illustration quality.
DSC-24-10-30-30 Smoke Configuration	K	6	Improvement of illustration quality.
DSC-24-20 Overhead Panel	A	1	Improvement of illustration quality
DSC-24-20 Overhead Panel	A	2	Improvement of illustration quality
DSC-24-20 Overhead Panel	A	3	Improvement of illustration quality
DSC-24-20 Overhead Panel	A	4	Improvement of illustration quality
DSC-24-20 Overhead Panel	A	5	Improvement of illustration quality
DSC-24-20 Forward Cabin	D	6	Improvement of illustration quality.

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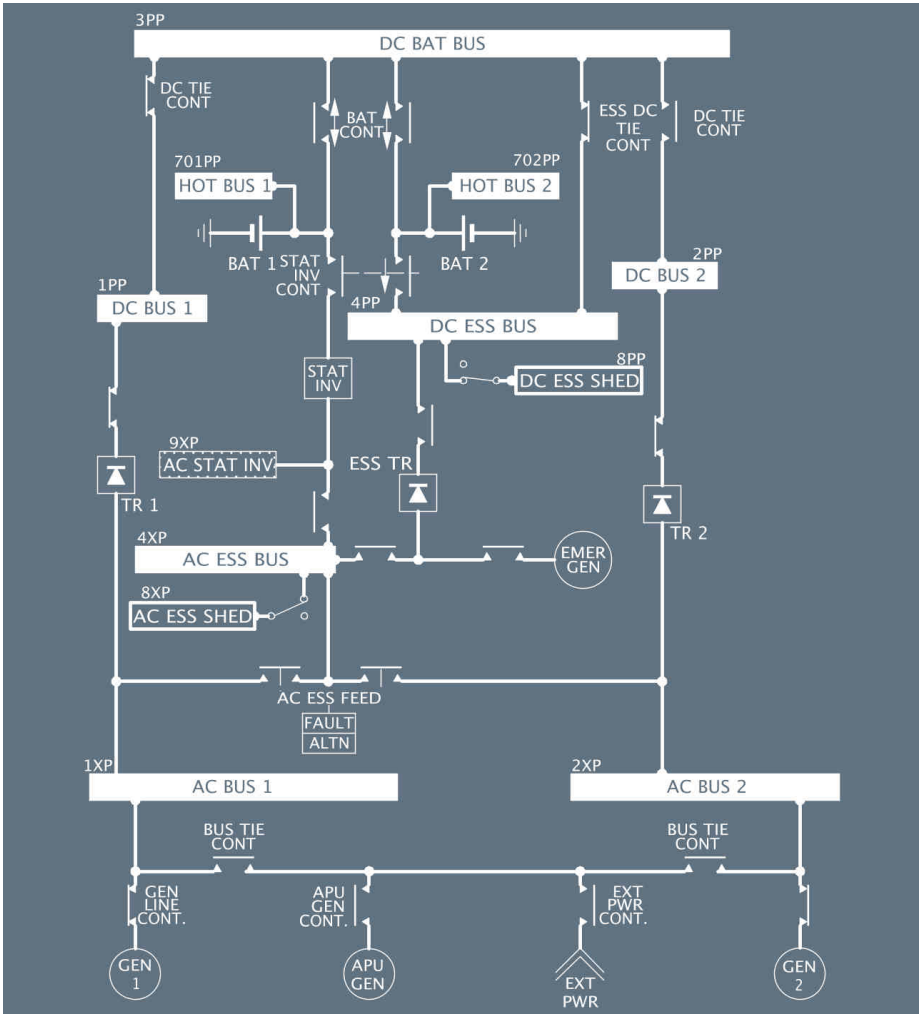
GENERAL

Applicable to: ALL

1 The electrical power system consists of a three-phase 115/200 V 400 Hz constant-frequency AC system and a 28 V DC system.
Electrical transients are acceptable for equipment.
Commercial supply has secondary priority.
In normal configuration, the electrical power system provides AC power.
A part of this AC power is converted into DC power for certain applications.
The electrical power system is constituted of 2 engine generators and 1 APU generator.
Each generator can provide AC power to all electrical bus bars.
In the event that normal AC power is not available, an emergency generator can provide AC power.
In the event that all AC power is not available, the electrical power system can invert DC power from the batteries into AC power.


3PP
DC BAT BUS
DC TIE CONT
BAT CONT
ESS DC TIE CONT
DC TIE CONT
701PP
HOT BUS 1
702PP
HOT BUS 2
BAT 1
STAT INV CONT
BAT 2
2PP
DC BUS 2
1PP
DC BUS 1
4PP
DC ESS BUS
STAT INV
8PP
DC ESS SHED
9XP
AC STAT INV
ESS TR
TR 1
TR 2
4XP
AC ESS BUS
EMER GEN
8XP
AC ESS SHED
AC ESS FEED
FAULT
ALTN
1XP
AC BUS 1
2XP
AC BUS 2
BUS TIE CONT
BUS TIE CONT
GEN LINE CONT.
APU GEN CONT.
EXT PWR CONT.
GEN 1
APU GEN
EXT PWR
GEN 2

AC GENERATORS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM

MAIN GENERATORS

Two three-phase AC generators (GEN 1, GEN 2), one driven by each main engine through an integrated drive, supply aircraft electrical power. Each generator can supply up to 90 KVA of power at 115 and 200 V and 400 Hz.
A third generator (APU GEN), driven directly by the APU and producing the same output as each main engine generator, can replace either or both main engine generators at any time.

Two Generators Control Units (GCU) control the output of their respective generator. The main functions of each GCU are :
- Control the frequency and voltage of the generator output.
- Protect the network by controlling the associated generator line contactor (GLC).

EXTERNAL POWER

A ground power connector near the nosewheel allows ground power to be supplied to all busbars. A Ground Power Control Unit (GPCU) protects the network by controlling the external power contactor.

EMERGENCY GENERATOR

The blue hydraulic circuit drives an emergency generator that automatically supplies emergency AC power to the aircraft electrical system, if all main generators fail. This generator supplies 5 KVA of three-phase 115 and 200 V 400 Hz power.

A Generator Control Unit (GCU) :
- Keeps the emergency generator at a constant speed,
- Controls the generator's output voltage,
- Protects the network by the controlling the emergency generator line contactor, and
- Controls the emergency generator start-up.

STATIC INVERTER

A static inverter transforms DC power from Battery 1 into one KVA of single-phase 115 V 400 Hz AC power, which is then supplied to part of the AC essential bus. When the aircraft speed is above 50 kt, the inverter is automatically activated, if nothing but the batteries are supplying electrical power to the aircraft, regardless of the BAT 1 and BAT 2 pushbutton positions.
When the aircraft speed is below 50 kt, the inverter is activated, if nothing but the batteries are supplying electrical power to the aircraft, and the BAT 1 and BAT 2 pushbuttons are both on at auto.

AC GENERATORS

Applicable to: B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

ENGINE – DRIVEN GENERATORS

Two three-phase AC generators (GEN 1, GEN 2), one driven by each main engine through an integrated drive, supply aircraft electrical power. Each generator can supply up to 90 KVA of power at 115 and 200 V and 400 Hz.

Two Generators Control Units (GCU) control the output of their respective generator. The main functions of each GCU are :
- Control the frequency and voltage of the generator output.
- Protect the network by controlling the associated generator line contactor (GLC).

APU GENERATOR AND EXTERNAL POWER

A third generator (APU GEN), driven directly by the APU and producing the same output as each main engine generator, can replace either or both main engine generators at any time.
A ground power connector near the nosewheel allows ground power to be supplied to all busbars.

A Ground and Auxiliary Power Unit (GAPCU) :
- Controls the frequency and voltage of the APU generator and external power output.
- Protects the network by controlling the external power contactor and the APU Generator Line Contactor.

EMERGENCY GENERATOR

The blue hydraulic circuit drives an emergency generator that automatically supplies emergency AC power to the aircraft electrical system, if all main generators fail. This generator supplies 5 KVA of three-phase 115 and 200 V 400 Hz power.

A Generator Control Unit (GCU) :
- Keeps the emergency generator at a constant speed,
- Controls the generator's output voltage,
- Protects the network by the controlling the emergency generator line contactor, and
- Controls the emergency generator start-up.

STATIC INVERTER

A static inverter transforms DC power from Battery 1 into one KVA of single-phase 115 V 400 Hz AC power, which is then supplied to part of the AC essential bus. When the aircraft speed is above 50 kt, the inverter is automatically activated, if nothing but the batteries are supplying electrical power to the aircraft, regardless of the BAT 1 and BAT 2 pushbutton positions.

When the aircraft speed is below 50 kt, the inverter is activated, if nothing but the batteries are supplying electrical power to the aircraft, and the BAT 1 and BAT 2 pushbuttons are both on at auto.

DC GENERATION

Applicable to: ALL

TRANSFORMER RECTIFIERS (TRS)

Two main transformer rectifiers, TR 1 and TR 2, supply the aircraft's electrical system, with up to 200 A of DC current.
A third (identical) transformer rectifier, the ESS TR, can power the essential DC circuit from the emergency generator, if the engine and APU generators all fail, or if TR 1 or TR 2 fails.
Each TR controls its contactor by internal logic.

BATTERIES

Two main batteries, each with a normal capacity of 23 Ah, are permanently connected to the two hot buses.
Each battery has an associated Battery Charge Limiter (BCL).
The BCL monitors battery charging and controls its battery contactor.

CIRCUIT BREAKERS (C/BS)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

The aircraft has two types of C/Bs:
- Monitored (green): When out for more than 1 min, the C/B TRIPPED warning is triggered on the ECAM.
- Non-monitored (black).

Moreover, there are yellow rings on the C/B's, which must be pulled when flying on batteries only (*Refer to DSC-24-10-30-30 Flight with Batteries Only*). The Wing Tip Brake (WTB) C/Bs have red caps on them to prevent them from being reset.
The C/B TRIPPED warning on the ECAM indicates the location of the affected C/B. The following panels are monitored: OVHD PNL, L(R) ELEC BAY, REAR PNL J-M or N-R or S-V or W-Z.

Note: *The flight crew can clear the ECAM C/B TRIPPED caution by pressing:*
- *The EMER CANC pb: When pressed, this pushbutton clears and inhibits the ECAM C/B TRIPPED caution for the remainder of the flight, or*
- *The CLR pb: When pressed, this pushbutton only clears the ECAM C/B TRIPPED caution. If the C/B remains pulled, any additional tripped circuit breakers on the same panel will not be detected, and the ECAM will not trigger the caution. However, if the C/B is pushed, any additional tripped circuit breakers will be detected, and the ECAM will trigger the caution again.*

CIRCUIT BREAKERS (C/BS)

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The aircraft has two types of C/Bs:
- Monitored (green): When out for more than 1 min, the C/B TRIPPED warning is triggered on the ECAM.
- Non-monitored (black).

The Wing Tip Brake (WTB) C/Bs have red caps on them to prevent them from being reset.
The C/B TRIPPED warning on the ECAM indicates the location of the affected C/B. The following panels are monitored: OVHD PNL, L(R) ELEC BAY, REAR PNL J-M or N-R or S-V or W-Z.

Note: *The flight crew can clear the ECAM C/B TRIPPED caution by pressing:*
- *The EMER CANC pb: When pressed, this pushbutton clears and inhibits the ECAM C/B TRIPPED caution for the remainder of the flight, or*
- *The CLR pb: When pressed, this pushbutton only clears the ECAM C/B TRIPPED caution. If the C/B remains pulled, any additional tripped circuit breakers on the same panel will not be detected, and the ECAM will not trigger the caution. However, if the C/B is pushed, any additional tripped circuit breakers will be detected, and the ECAM will trigger the caution again.*

General

GENERAL

Applicable to: ALL

GEN 1 and 2 when operating have priority over the APU generator and over external power.
External power has priority over the APU generator when the EXT PWR pb switch is ON.
The APU generator or external power can supply the entire network.
One engine generator can supply the entire network.
The generators cannot be connected in parallel.

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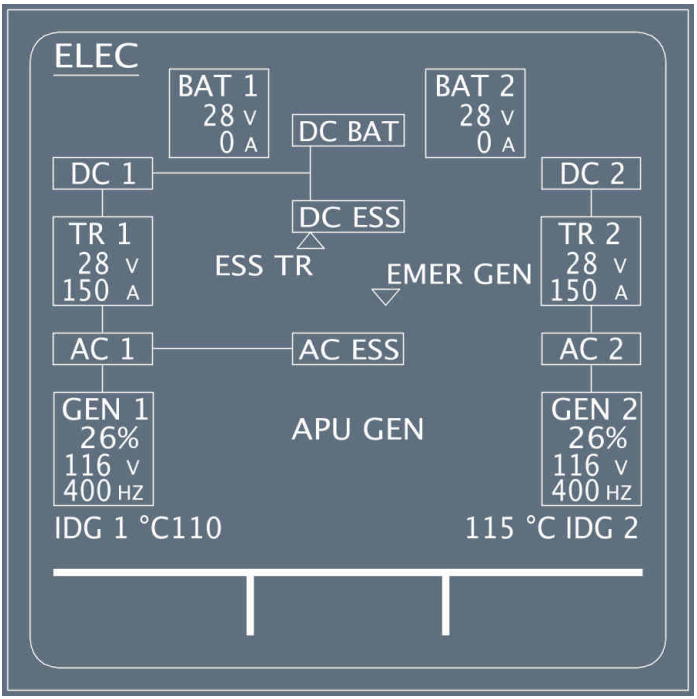
NORMAL CONFIGURATION

IN FLIGHT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

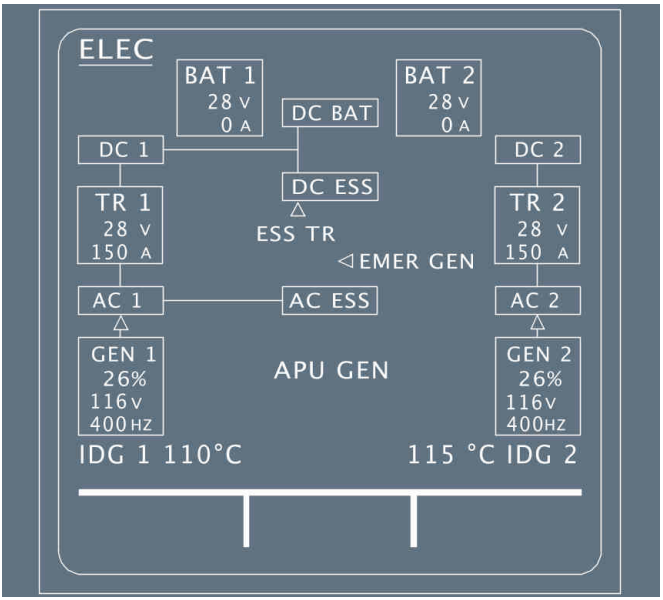
Each engine-driven generator supplies its associated AC BUS (1 and 2) via its generator line contactor (GLC 1 and GLC 2).
AC BUS 1 normally supplies the AC ESS BUS via a contactor.
TR 1 normally supplies DC BUS 1, DC BAT BUS, and DC ESS BUS.
TR 2 normally supplies DC BUS 2.
The two batteries are connected to the DC BAT BUS, if they need charging. When they are fully charged, the battery charge limiter disconnects them.



IN FLIGHT

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

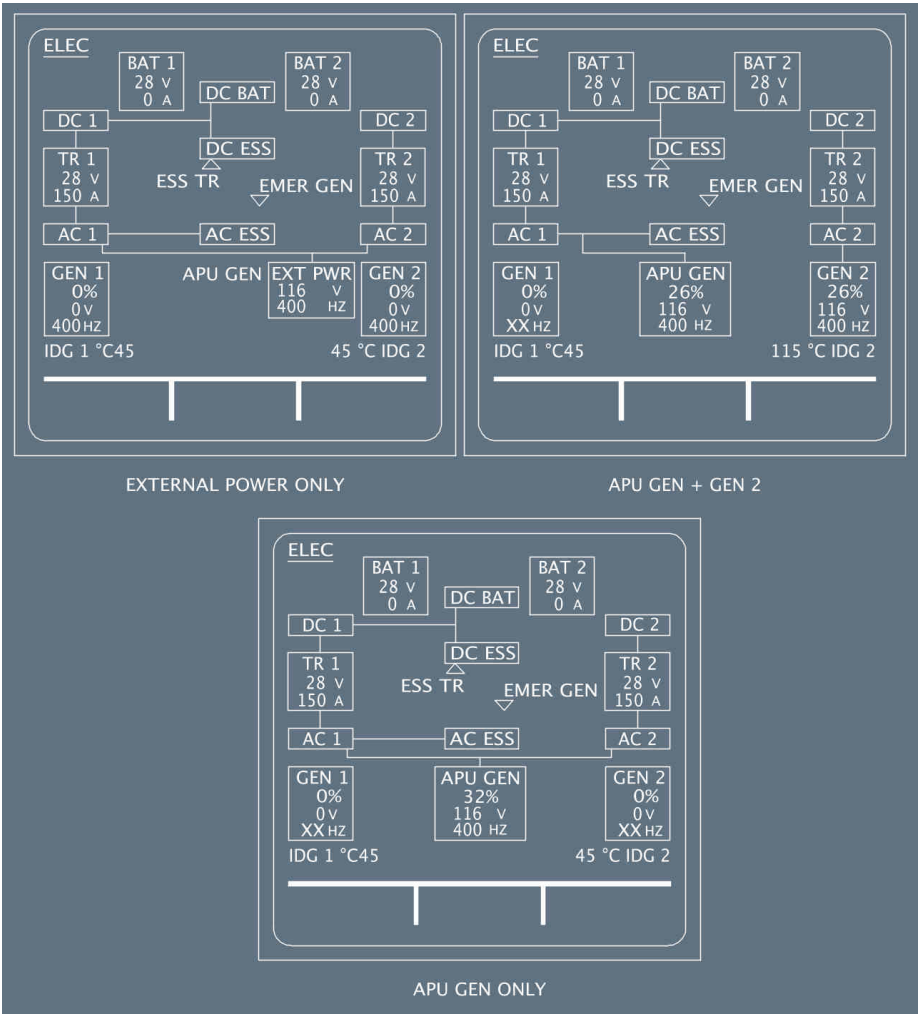
Each engine-driven generator supplies its associated AC BUS (1 and 2) via its generator line contactor (GLC 1 and GLC 2).
AC BUS 1 normally supplies the AC ESS BUS via a contactor.
TR 1 normally supplies DC BUS 1, DC BAT BUS, and DC ESS BUS.
TR 2 normally supplies DC BUS 2.
The two batteries are connected to the DC BAT BUS, if they need charging. When they are fully charged, the battery charge limiter disconnects them.



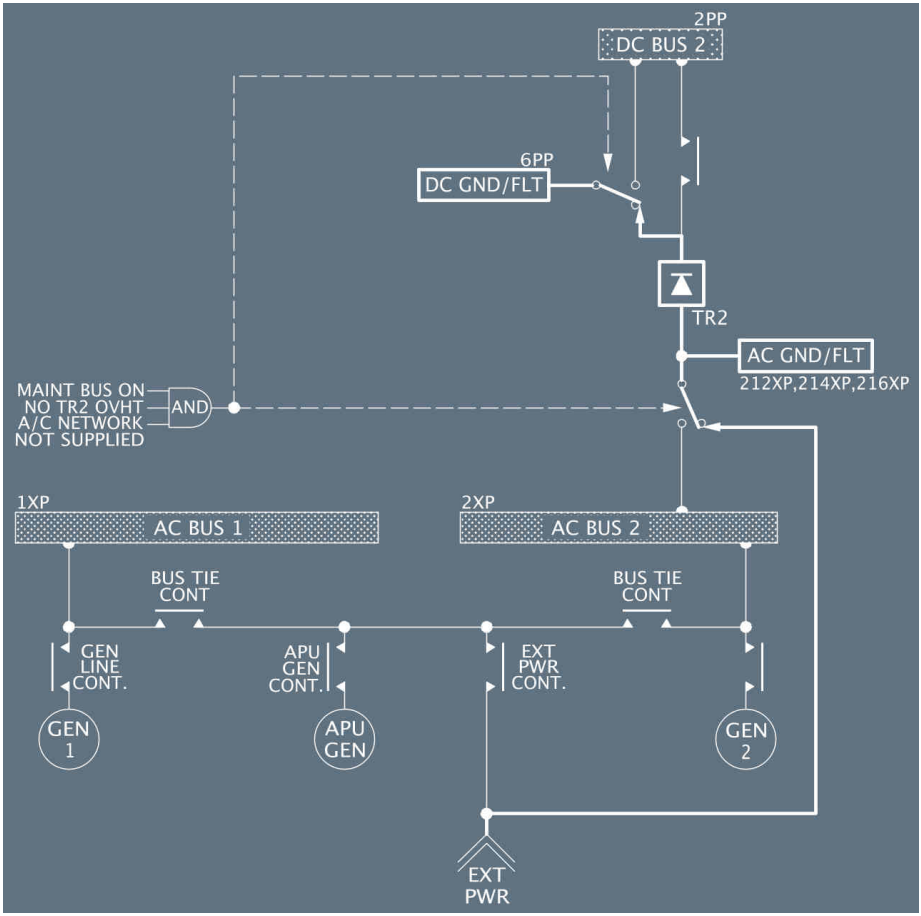
ON GROUND

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

[1] Either the APU generator, or external power, may supply the complete system.



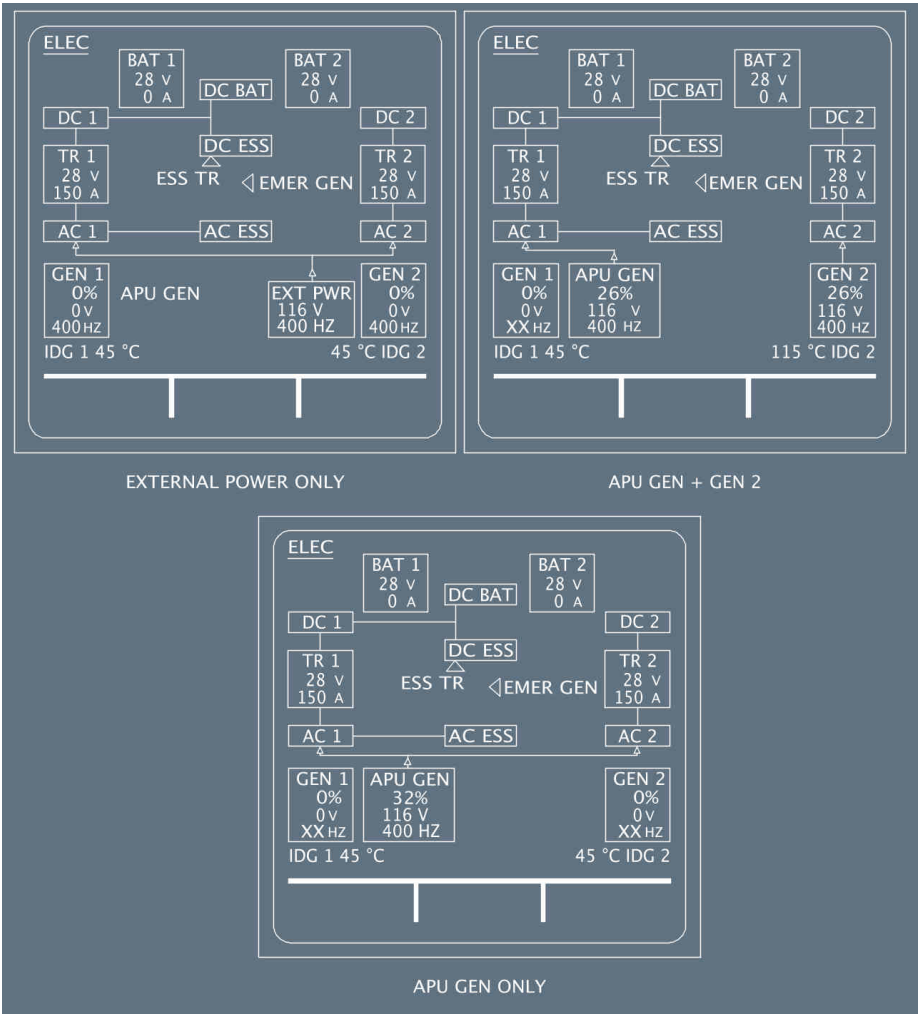
On ground, when only ground services are required, external power can supply the AC and DC GND/FLT BUSES directly without supplying the entire aircraft network.
Personnel select this configuration with the MAINT BUS switch in the forward entrance area.



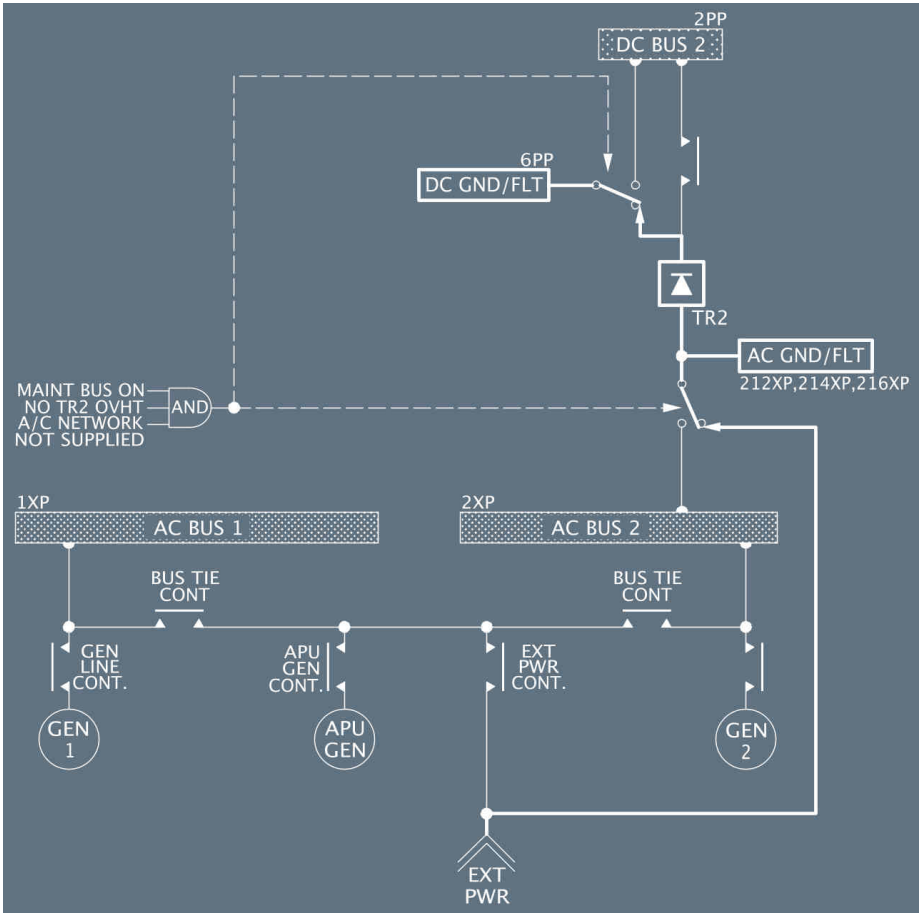
ON GROUND

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

[2] Either the APU generator, or external power, may supply the complete system.



On ground, when only ground services are required, external power can supply the AC and DC GND/FLT BUSES directly without supplying the entire aircraft network.
Personnel select this configuration with the MAINT BUS switch in the forward entrance area.

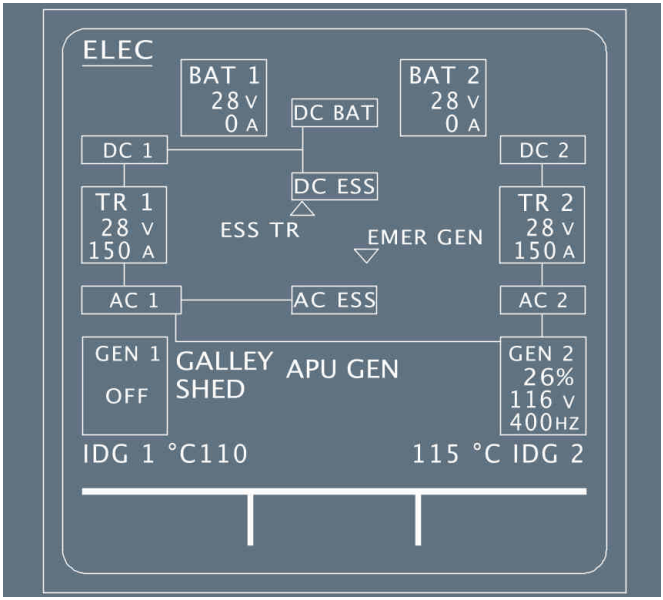

2PP
DC BUS 2
6PP
DC GND/FLT
TR2
AC GND/FLT
212XP,214XP,216XP
MAINT BUS ON
NO TR2 OVHT
A/C NETWORK
NOT SUPPLIED
AND
1XP
AC BUS 1
2XP
AC BUS 2
BUS TIE
CONT
BUS TIE
CONT
GEN
LINE
CONT.
APU
GEN
CONT.
EXT
PWR
CONT.
GEN
1
APU
GEN
GEN
2
EXT
PWR

Abnormal Configurations

FAILURE OF ONE ENGINE GENERATOR

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF

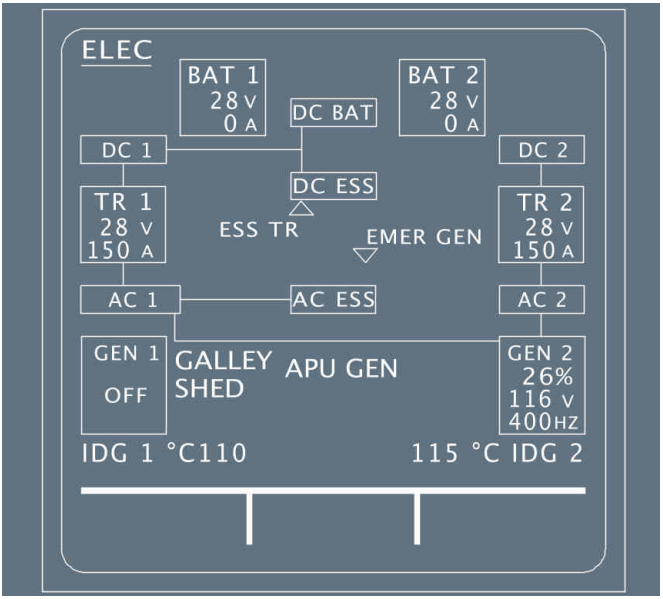
The system automatically replaces the failed generator, with the :
- APU GEN, if available, or
- Other engine generator (automatically shedding part of the galley load).



FAILURE OF ONE ENGINE GENERATOR

Applicable to: B-HTG, B-HTH, B-HTI

The system automatically replaces the failed generator, with the :
- APU GEN, if available, or
- Other engine generator (automatically shedding all of the galley load).

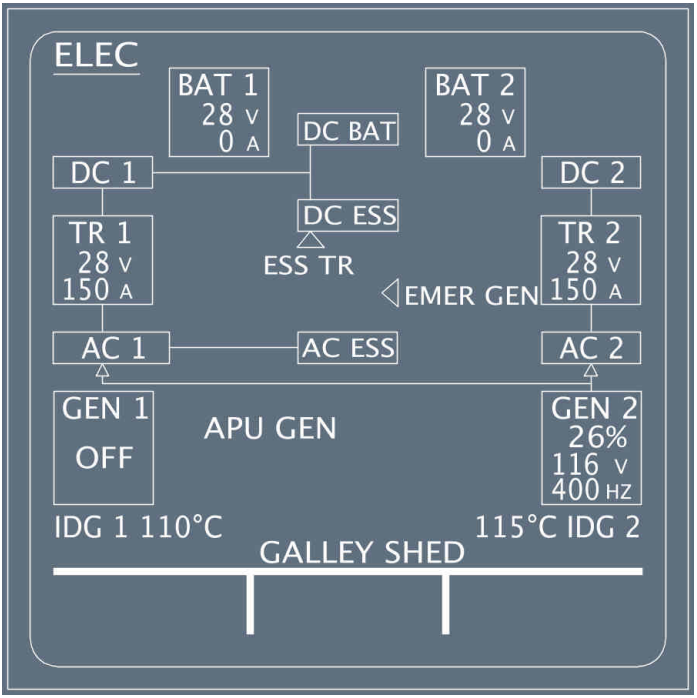


FAILURE OF ONE ENGINE GENERATOR

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The system automatically replaces the failed generator, with the :

- APU GEN, if available, or
- Other engine generator (automatically shedding part of the galley load).

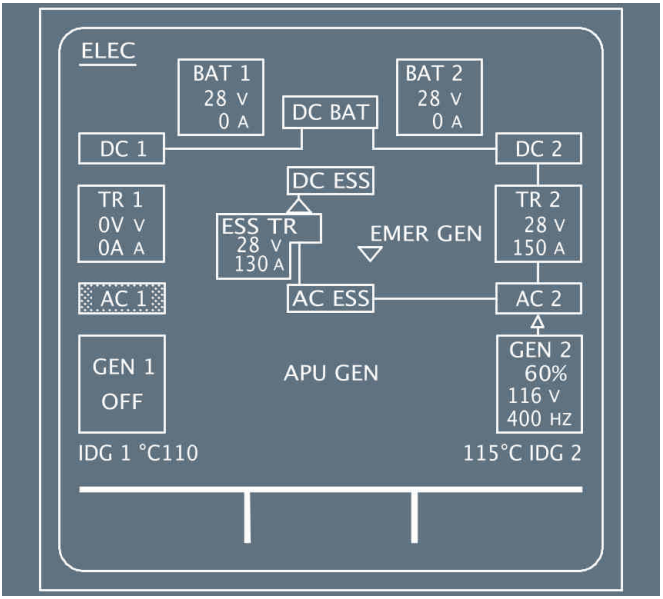


FAILURE OF AC BUS 1

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

1

- AC BUS 2 automatically supplies AC ESS BUS, and DC ESS BUS via the ESS TR
- DC BUS 2 supplies DC BUS 1 and DC BAT BUS automatically after 5 s.

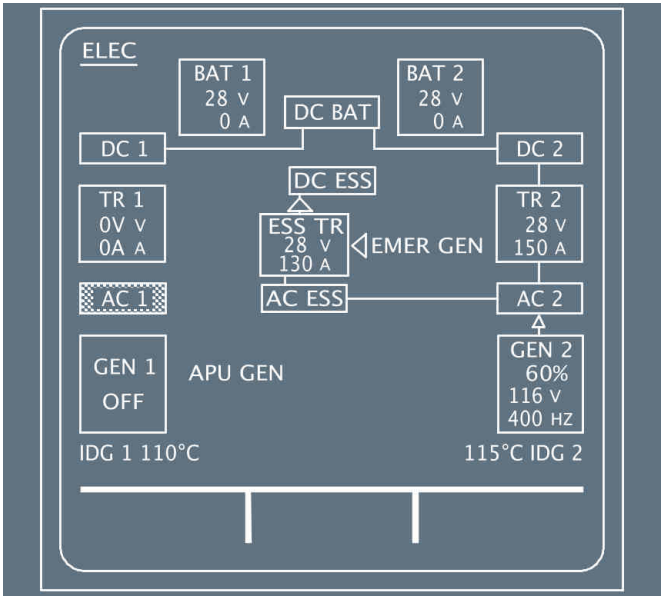


FAILURE OF AC BUS 1

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

2

- AC BUS 2 automatically supplies AC ESS BUS, and DC ESS BUS via the ESS TR
- DC BUS 2 supplies DC BUS 1 and DC BAT BUS automatically after 5 s.



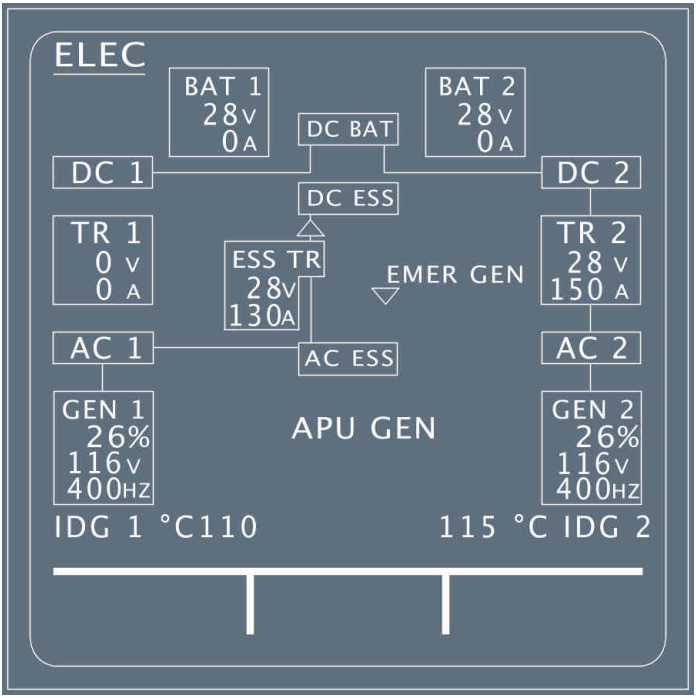
FAILURE OF ONE TR

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

The contactor of each TR opens automatically, in case of :

- Overheat
- Minimum current

The other TR automatically replaces the faulty one.
The ESS TR supplies the DC ESS BUS.



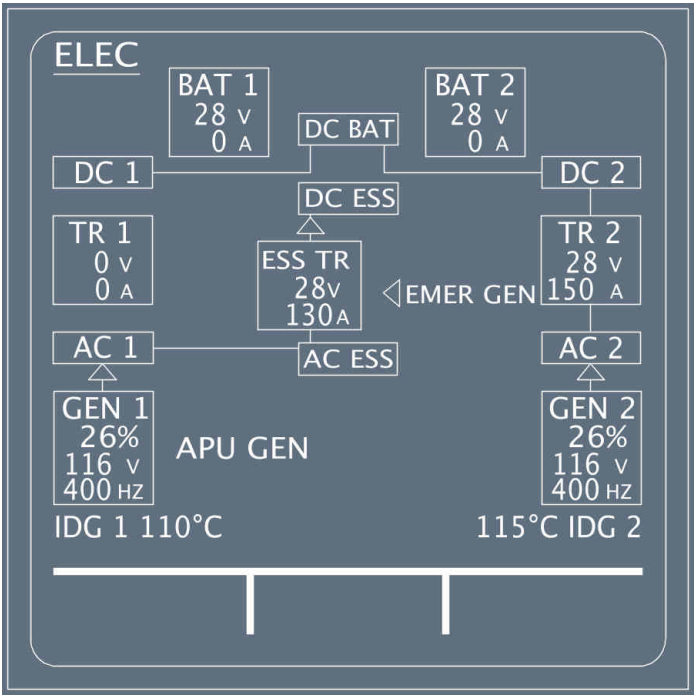
FAILURE OF ONE TR

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The contactor of each TR opens automatically, in case of :

- Overheat
- Minimum current

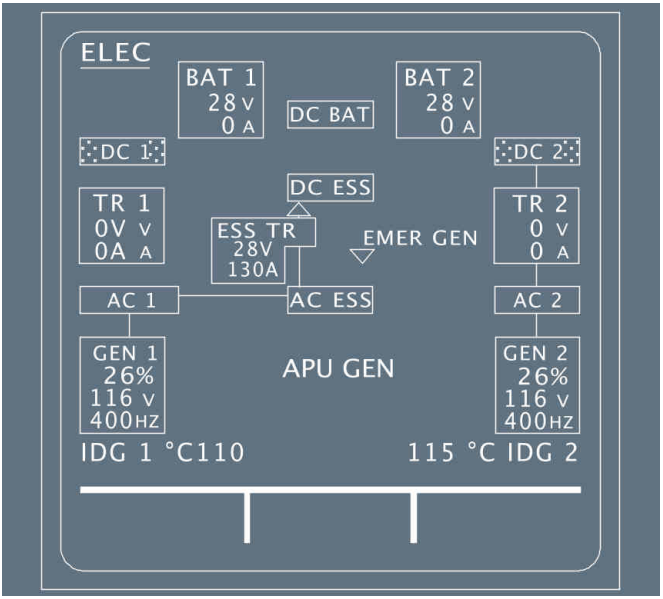
The other TR automatically replaces the faulty one.
The ESS TR supplies the DC ESS BUS.



FAILURE OF TR 1 AND TR 2

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

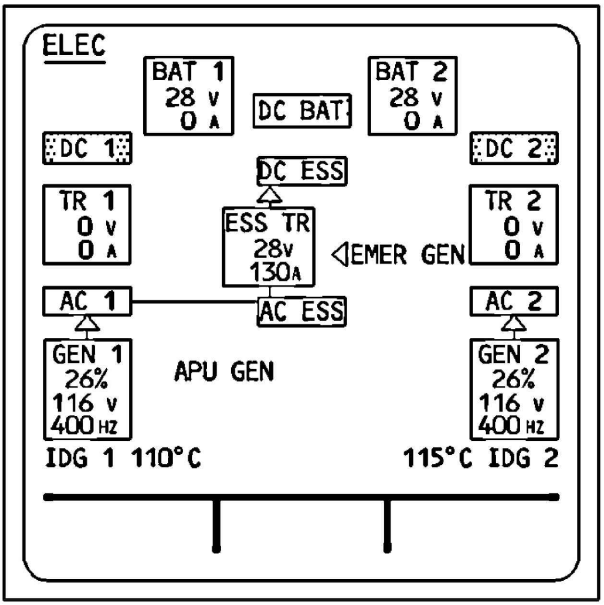
If TR 1 and TR 2 are lost, DC BUS 1, DC BUS 2, and DC BAT BUS are lost. The DC ESS BUS is supplied by the ESS TR.



FAILURE OF TR 1 AND TR 2

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

If TR 1 and TR 2 are lost, DC BUS 1, DC BUS 2, and DC BAT BUS are lost. The DC ESS BUS is supplied by the ESS TR.



EMERGENCY GENERATION AFTER LOSS OF ALL MAIN GENERATORS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

If both AC BUS 1 and AC BUS 2 are lost and the aircraft speed is above 100 kt, the Ram Air Turbine (RAT) extends automatically. This powers the blue hydraulic system, which drives the emergency generator by means of a hydraulic motor. This generator supplies the AC ESS BUS, and the DC ESS BUS via the ESS TR.

When the landing gear is down, the emergency generator is no longer powered, and the emergency generation network is automatically transferred to the batteries and the static inverter, and the system automatically sheds the AC SHED ESS and DC SHED ESS buses.

When the aircraft is on ground :

- Below 100 kt, DC BAT BUS is automatically connected to the batteries.
- Below 50 kt, AC ESS BUS is automatically shed, leading to the loss of all display units.

Note: *1. During RAT extension and emergency generator coupling (about 8 s), the batteries power the emergency generation network.*

2. If only the batteries are powering the emergency generation network, APU start is only available on ground (speed below 100 kt).

EMERGENCY GENERATION AFTER LOSS OF ALL MAIN GENERATORS

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

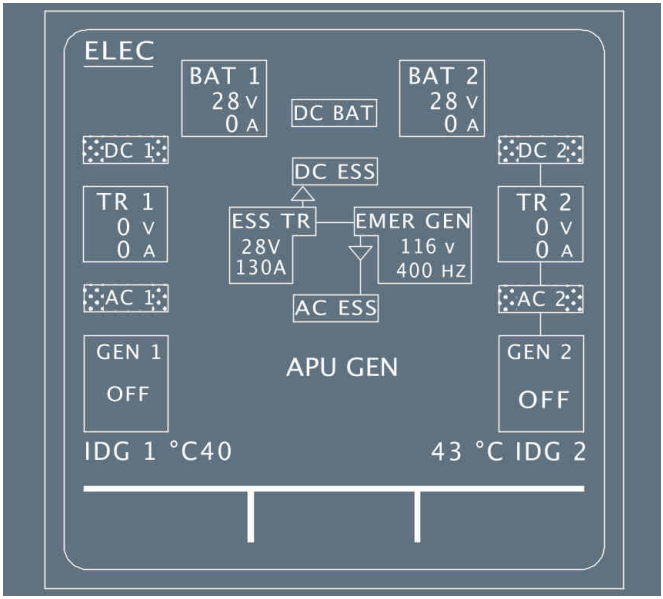
If both AC BUS 1 and AC BUS 2 are lost and the aircraft speed is above 100 kt, the Ram Air Turbine (RAT) extends automatically. This powers the blue hydraulic system, which drives the emergency generator by means of a hydraulic motor. This generator supplies the AC ESS BUS, and the DC ESS BUS via the ESS TR.
If the RAT stalls, or if the aircraft is on the ground with a speed below 100 kt, the emergency generator has nothing to drive it. The emergency generation network automatically transfers to the batteries and static inverter, and the system automatically sheds the AC SHED ESS and DC SHED ESS buses.

When the aircraft is on ground :
- Below 100 kt, DC BAT BUS is automatically connected to the batteries.
- Below 50 kt, AC ESS BUS is automatically shed, leading to the loss of all display units.

Note: *During RAT extension and emergency generator coupling (about 8 s), the batteries power the emergency generation network.*

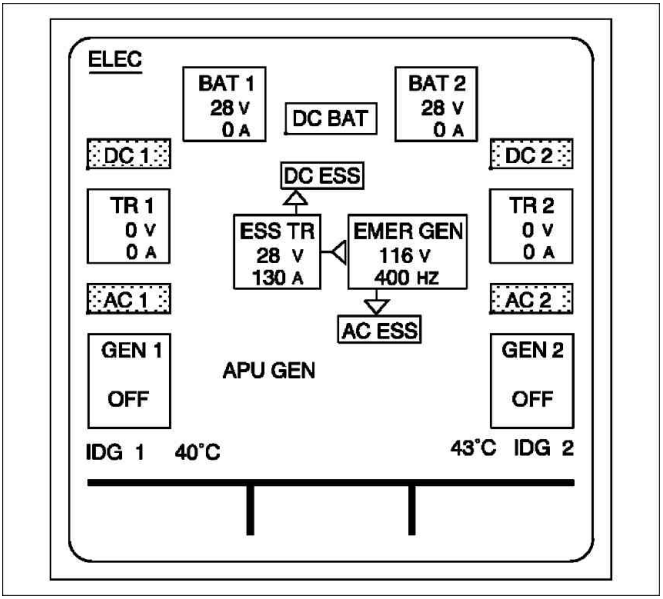
EMER GEN RUNNING

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



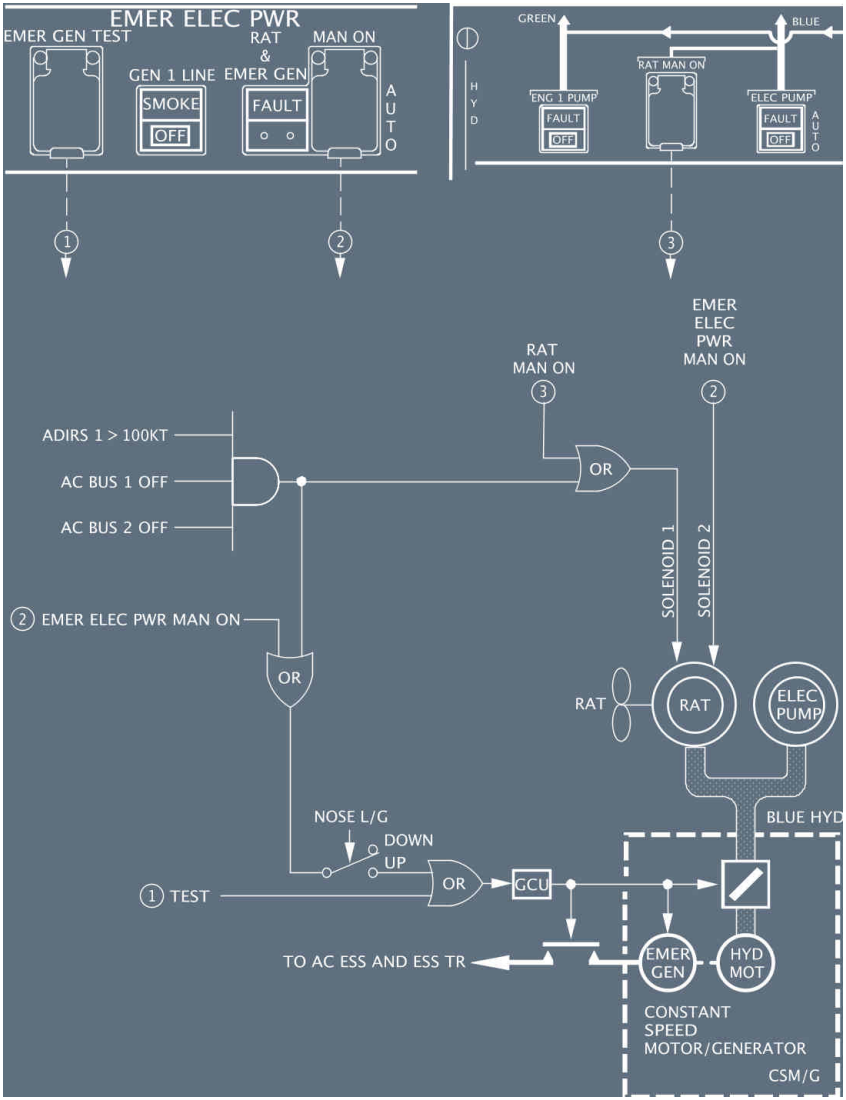
EMER GEN RUNNING

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



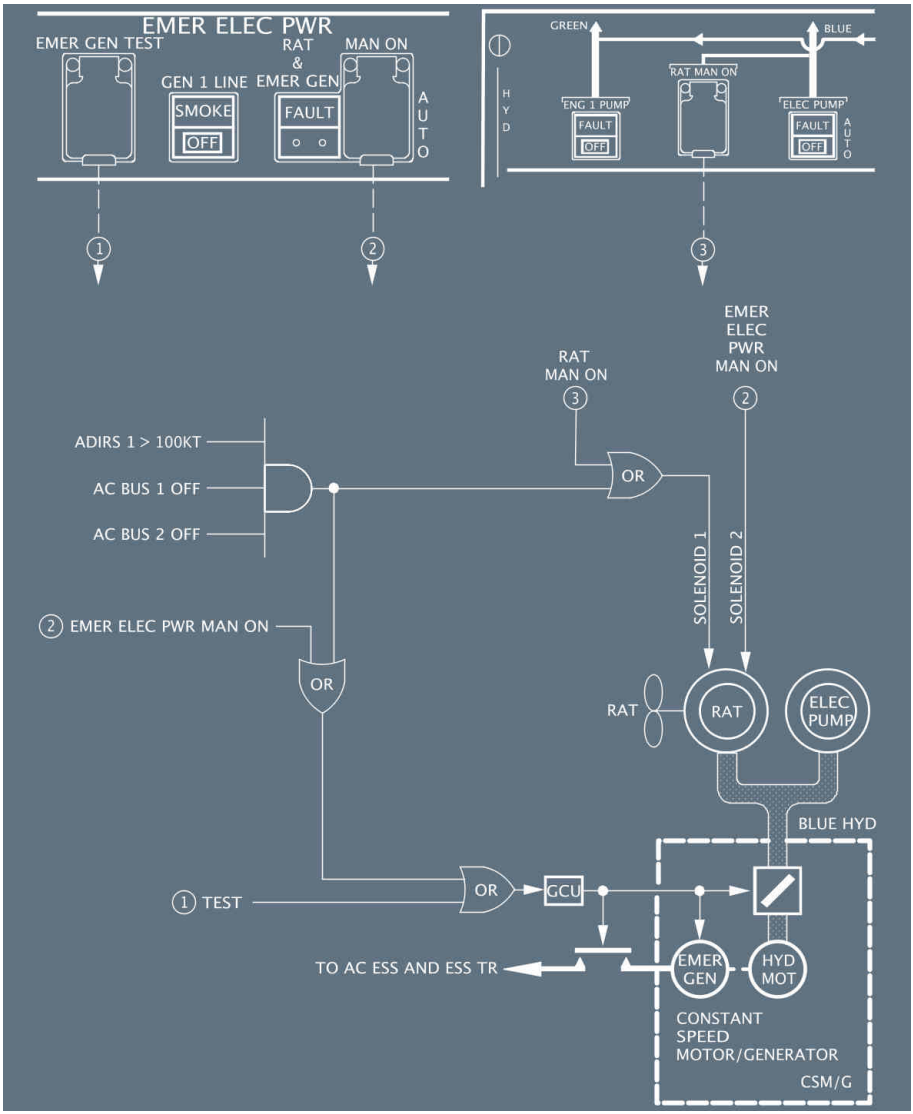
EMER GEN RUNNING (CONT'D)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI



EMER GEN RUNNING (CONT'D)

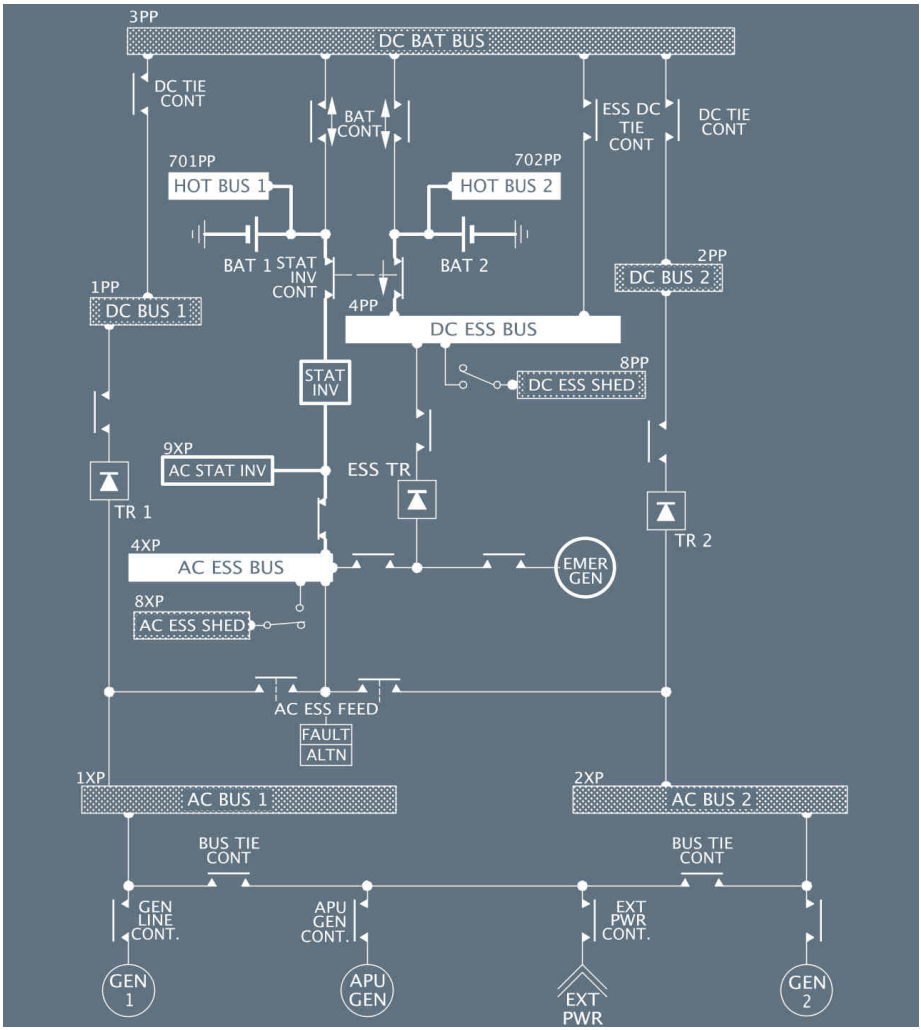
Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU


EMER ELEC PWR
EMER GEN TEST
RAT & MAN ON
GEN 1 LINE
EMER GEN
SMOKE
OFF
FAULT
AUTO
GREEN
BLUE
HYD
RAT MAN ON
ENG 1 PUMP
ELEC PUMP
FAULT
OFF
1
2
3
EMER ELEC PWR MAN ON
RAT MAN ON
ADIRS 1 > 100KT
AC BUS 1 OFF
AC BUS 2 OFF
OR
SOLENOID 1
SOLENOID 2
2 EMER ELEC PWR MAN ON
RAT
ELEC PUMP
BLUE HYD
1 TEST
GCU
TO AC ESS AND ESS TR
EMER GEN
HYD MOT
CONSTANT SPEED MOTOR/GENERATOR
CSM/G

FLIGHT WITH BATTERIES ONLY

Applicable to: ALL

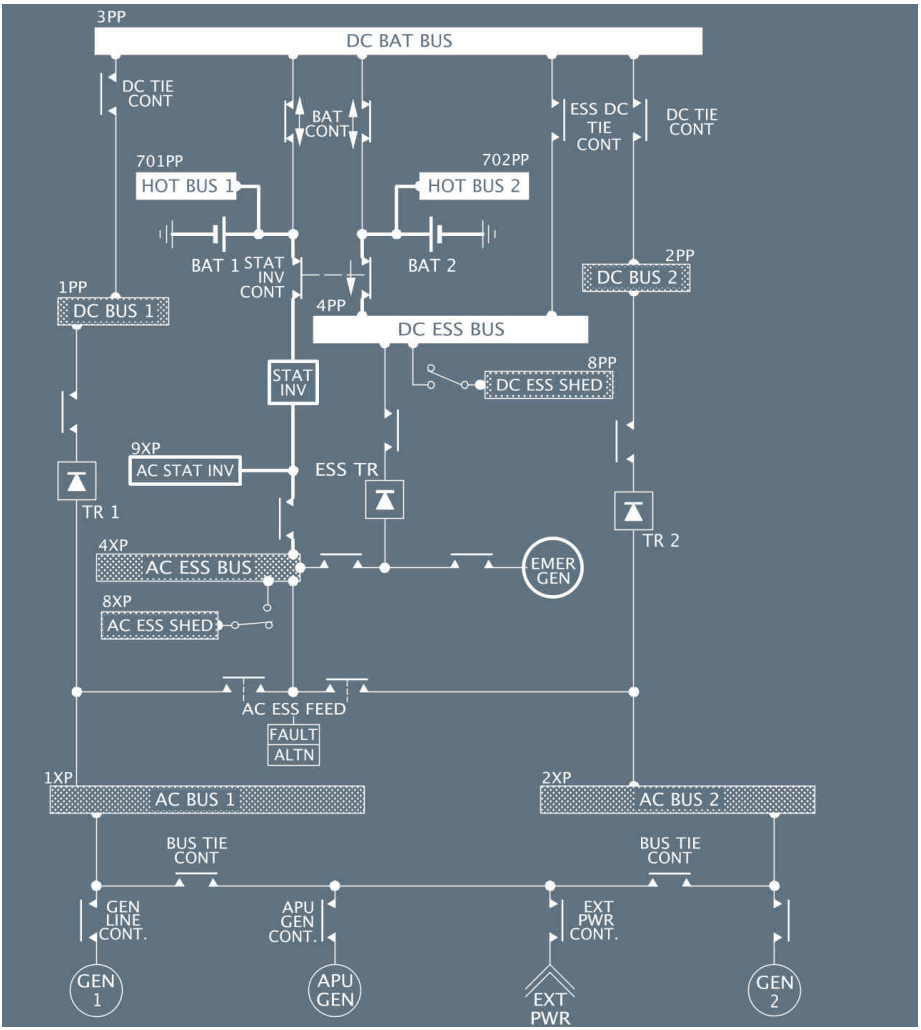
3



ON GROUND, BATTERIES ONLY (SPEED < 50 KT)

Applicable to: ALL

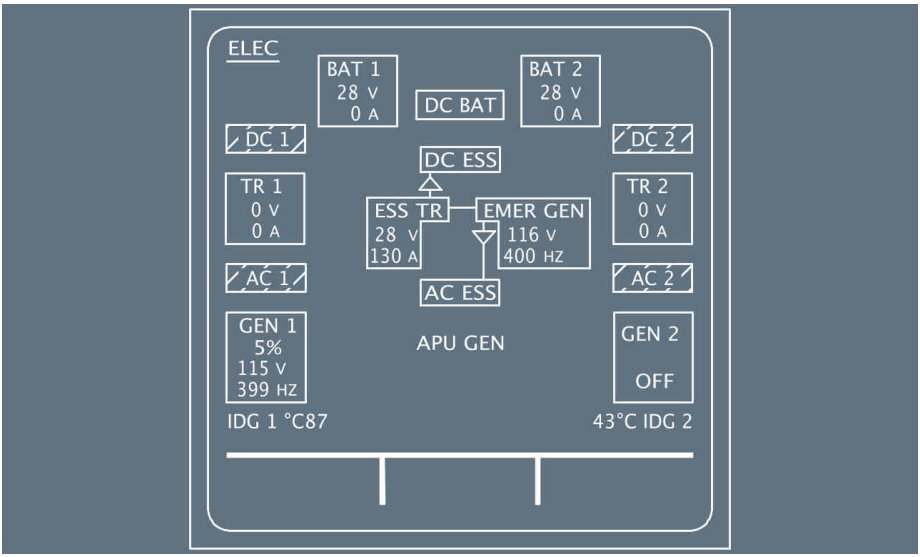
4

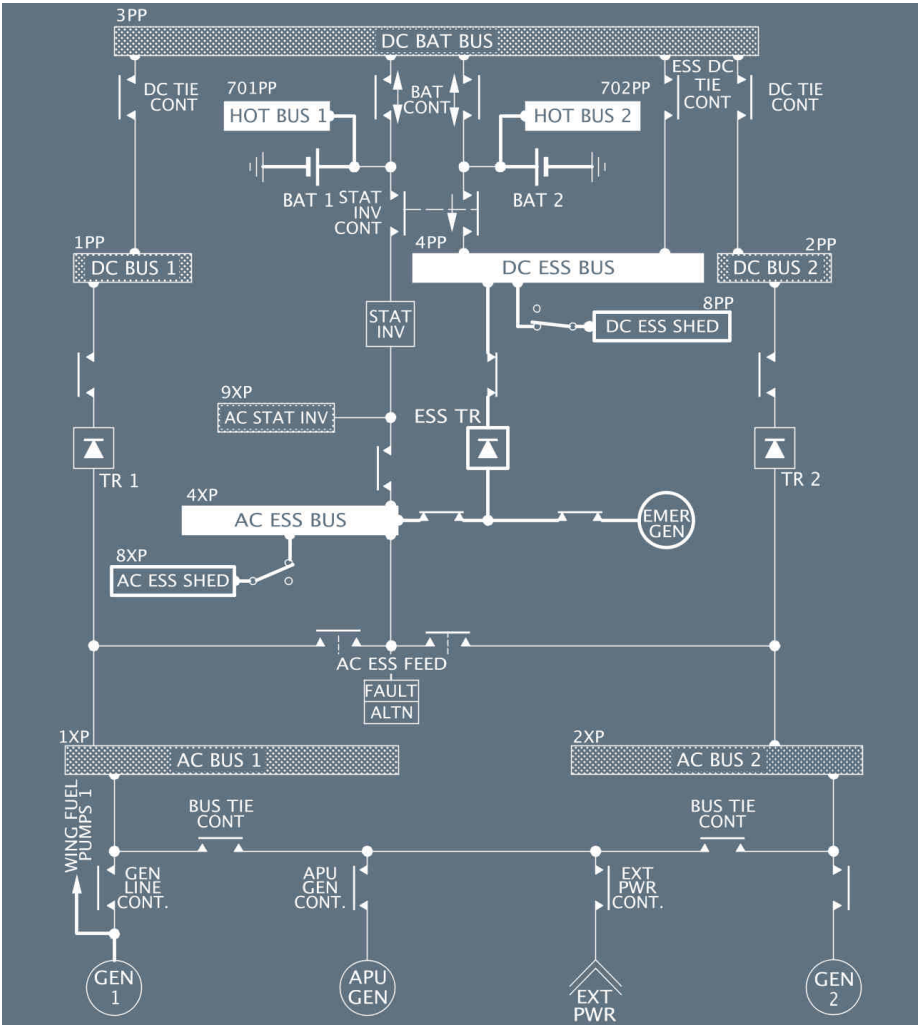


SMOKE CONFIGURATION

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

5 In this configuration the main busbars are shed. The electrical distribution is the same as it is in the emergency electrical configuration (loss of main generators), except the fact that in smoke configuration the fuel pumps are connected upstream of the GEN 1 line connector.
The procedure sheds approximately 75 % of electrical equipment. All equipment that remains powered is supplied via the circuit breakers on the overhead panel (except for equipment that supplied by hot buses).



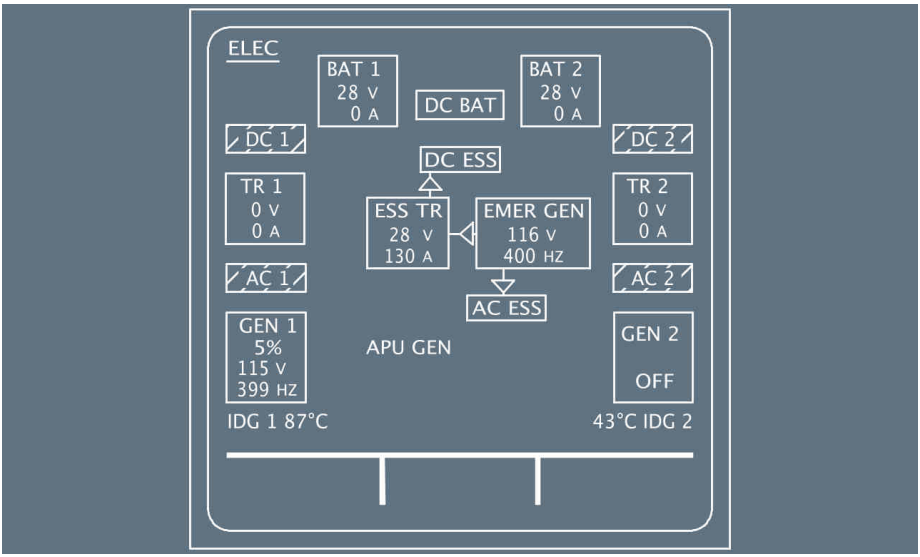


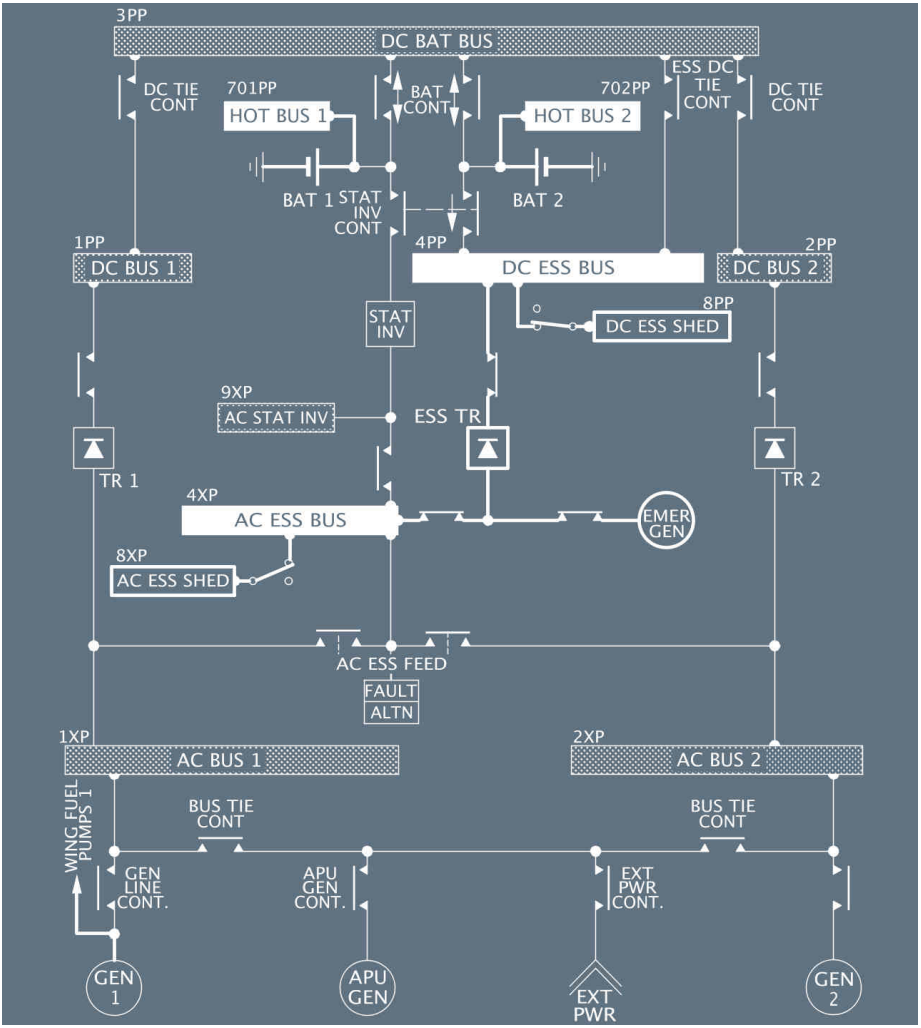
Note: *ECAM ELEC page is identical to that for emergency generator running.*

SMOKE CONFIGURATION

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

6 In this configuration the main busbars are shed. The electrical distribution is the same as it is in the emergency electrical configuration (loss of main generators), except the fact that in smoke configuration the fuel pumps are connected upstream of the GEN 1 line connector.
The procedure sheds approximately 75 % of electrical equipment. All equipment that remains powered is supplied via the circuit breakers on the overhead panel (except for equipment that supplied by hot buses).





Note: *ECAM ELEC page is identical to that for emergency generator running.*

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Distribution Table

DISTRIBUTION TABLE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

	AC BUS 1	AC BUS 2	AC ESS BUS	AC SHED ESS	AC STAT INV	TR1	TR2	ESS TR	DC BUS 1	DC BUS 2	DC BAT BUS	DC ESS BUS	DC SHED ESS	HOT BUS 1	HOT BUS 2
NORM CONF	GEN 1	GEN 2	GEN 1	GEN 1	-	GEN 1	GEN 2	-	TR1 GEN 1	TR2 GEN 2	TR1 GEN 1	TR1 GEN 1	TR1 GEN 1	BAT 1	BAT 2
ONE GEN INOP AVAIL-X- (1, 2 or APU)	GEN X	GEN X	GEN X	GEN X	-	GEN X	GEN X	-	TR1 GEN X	TR2 GEN X	TR1 GEN X	TR1 GEN X	TR1 GEN X	BAT 1	BAT 2
EMER CONF •BEFORE EMER GEN AVAILABILITY (about 8 s)	-	-	ST INV BAT 1	-	ST INV BAT 1	-	-	-	-	-	-	BAT 2	-	BAT 1	BAT 2
•EMER GEN RUNNING	-	-	EMER GEN	EMER GEN	-	-	-	EMER GEN	-	-	-	ESS TR EMER GEN	ESS TR EMER GEN	BAT 1	BAT 2
•AFTER L/G EXT (emer gen not running)	-	-	ST INV BAT 1	-	ST INV BAT 1	-	-	-	-	-	-	BAT 2	-	BAT 1	BAT 2
TR1 FAULT	GEN 1	GEN 2	GEN 1	GEN 1	-	-	GEN 2	GEN 1	TR2 GEN 2	TR2 GEN 2	TR2 GEN 2	ESS TR GEN 1	ESS TR GEN 1	BAT 1	BAT 2
TR2 FAULT	GEN 1	GEN 2	GEN 1	GEN 1	-	GEN 1	-	GEN 1	TR1 GEN 1	TR1 GEN 1	TR1 GEN 1	ESS TR GEN 1	ESS TR GEN 1	BAT 1	BAT 2
TR1 + 2 FAULT	GEN 1	GEN 2	GEN 1	GEN 1	-	-	-	GEN 1	-	-	-	ESS TR -GEN 1	ESS TR -GEN 1	BAT 1	BAT 2

ON GROUND BAT. ONLY	AC BUS 1	AC BUS 2	AC ESS BUS	AC SHED ESS	AC STAT INV	TR1	TR2	ESS TR	DC BUS 1	DC BUS 2	DC BAT BUS	DC ESS BUS	DC SHED ESS	HOT BUS 1	HOT BUS 2
Speed ≥100 kt	-	-	ST INV BAT 1	-	ST INV BAT 1	-	-	-	-	-	-	BAT 2	-	BAT 1	BAT 2
50 kt ≤speed < 100 kt	-	-	ST INV BAT 1	-	ST INV BAT 1	-	-	-	-	-	BAT 1-2	BAT 2	-	BAT 1	BAT 2
Speed < 50 kt	-	-	-	-	ST INV BAT 1	-	-	-	-	-	BAT 1-2	BAT 2	-	BAT 1	BAT 2

DISTRIBUTION TABLE

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

	AC BUS 1	AC BUS 2	AC ESS BUS	AC SHED ESS	AC STAT INV	TR1	TR2	ESS TR	DC BUS 1	DC BUS 2	DC BAT BUS	DC ESS BUS	DC SHED ESS	HOT BUS 1	HOT BUS 2
NORM CONF	GEN 1	GEN 2	GEN 1	GEN 1	-	GEN 1	GEN 2	-	TR1 GEN 1	TR2 GEN 2	TR1 GEN 1	TR1 GEN 1	TR1 GEN 1	BAT 1	BAT 2
ONE GEN INOP AVAIL-X- (1, 2 or APU)	GEN X	GEN X	GEN X	GEN X	-	GEN X	GEN X	-	TR1 GEN X	TR2 GEN X	TR1 GEN X	TR1 GEN X	TR1 GEN X	BAT 1	BAT 2
EMER CONF •BEFORE EMER GEN AVAILABILITY (about 8 s)	-	-	ST INV BAT 1	-	ST INV BAT 1	-	-	-	-	-	-	BAT 2	-	BAT 1	BAT 2
•EMER GEN RUNNING	-	-	EMER GEN	EMER GEN	-	-	-	EMER GEN	-	-	-	ESS TR EMER GEN	ESS TR EMER GEN	BAT 1	BAT 2
TR1 FAULT	GEN 1	GEN 2	GEN 1	GEN 1	-	-	GEN 2	GEN 1	TR2 GEN 2	TR2 GEN 2	TR2 GEN 2	ESS TR GEN 1	ESS TR GEN 1	BAT 1	BAT 2

Continued on the following page

Continued from the previous page

	AC BUS 1	AC BUS 2	AC ESS BUS	AC SHED ESS	AC STAT INV	TR1	TR2	ESS TR	DC BUS 1	DC BUS 2	DC BAT BUS	DC ESS BUS	DC SHED ESS	HOT BUS 1	HOT BUS 2
TR2 FAULT	GEN 1	GEN 2	GEN 1	GEN 1	-	GEN 1	-	GEN 1	TR1 GEN 1	TR1 GEN 1	TR1 GEN 1	ESS TR GEN 1	ESS TR GEN 1	BAT 1	BAT 2
TR1 + 2 FAULT	GEN 1	GEN 2	GEN 1	GEN 1	-	-	-	GEN 1	-	-	-	ESS TR -GEN 1	ESS TR -GEN 1	BAT 1	BAT 2

ON GROUND BAT. ONLY	AC BUS 1	AC BUS 2	AC ESS BUS	AC SHED ESS	AC STAT INV	TR1	TR2	ESS TR	DC BUS 1	DC BUS 2	DC BAT BUS	DC ESS BUS	DC SHED ESS	HOT BUS 1	HOT BUS 2
Speed >100 kt	-	-	EMER GEN	EMER GEN	-	-	-	EMER GEN	-	-	-	ESS TR EMER GEN	ESS TR EMER GEN	BAT 1	BAT 2
rat stall or 50 kt ≤speed ≤ 100 kt	-	-	ST INV BAT 1	-	ST INV BAT 1	-	-	-	-	-	BAT 1-2	BAT 2	-	BAT 1	BAT 2
Speed < 50 kt	-	-	-	-	ST INV BAT 1	-	-	-	-	-	BAT 1-2	BAT 2	-	BAT 1	BAT 2

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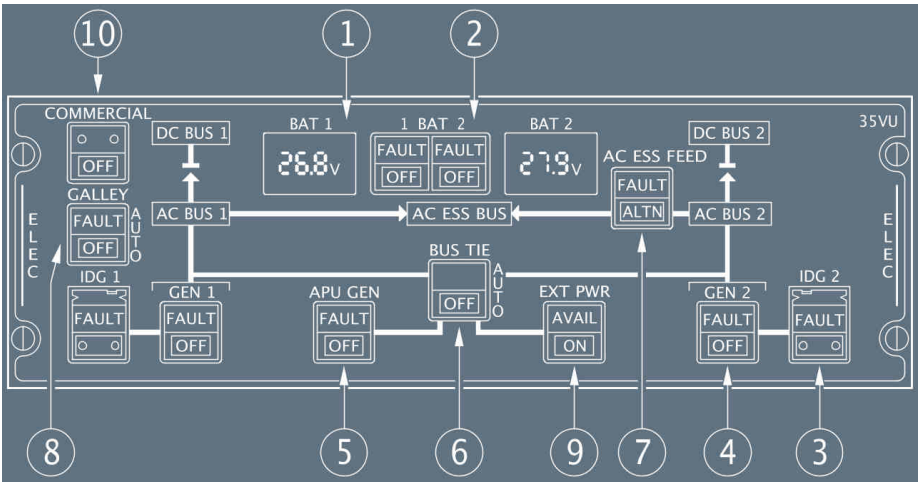
OVERHEAD PANEL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

1



(1) BAT 1(2) ind.
Shows battery voltage in white.

(2) BAT 1(2) pb-sw
Controls the operation of the corresponding battery charge limiter.

Auto : The battery charge limiter controls automatically the connection and the disconnection of the corresponding battery to the DC BAT BUS (3 PP) by closing and opening of the battery line contactor.

- The batteries are connected to the DC BAT BUS in the following cases:
  - APU starting (MASTER SW pb-sw at ON and N < 95 %).

    Note: *The connection is limited to 3 min when the emergency generator is running.*

  - Battery voltage below 26.5 V (battery charge). The charging cycle ends when battery charge current goes below 4 A.
    - On ground, immediately
    - In flight, after a time delay of 30 min.
  - Loss of AC BUS 1 and 2 when below 100 kt (EMER GEN not supplying).
- If AC BUS 1 and 2 are not energized and the EMER GEN is not supplying:
  - Battery 1 supplies the AC STAT INV BUS, and, if speed is greater than 50 kt, the AC ESS BUS.
  - Battery 2 supplies the DC ESS BUS.

    Note: *In normal configuration the batteries are disconnected most of the time.*

    Note: *A battery automatic cut-off logic prevents the batteries from discharging completely when the aircraft is on the ground (parking).*

    Automatic battery contactors open when:
    - *The aircraft is on the ground*
    - *The BAT pb switches are at AUTO*
    - *The main power supply (EXT PWR + GEN) is cut off*
    - *Battery voltage is low.*

    The flight crew can reset the contactors by switching the BAT pb-sw to OFF then to AUTO.

OFF : The battery charge limiter is not operating: the battery line contactor is open. OFF comes on white if the DC BAT BUS is supplied. Hot buses remain supplied.

FAULT light : Comes on amber, accompanied by an ECAM caution, when the charging current for the corresponding battery is outside limits.
In this case the battery contactor opens.

(3) IDG 1(2) (Integrated Drive Generator) pb-sw (guarded)

CAUTION	1. Maintaining the IDG pb-sw during more than 3 s may damage the IDG disconnection mechanism. 2. Disconnect the IDG only when the engine is running or windmilling. If not, the IDG will be damaged when starting the engine.

The IDG switches are normally springloaded out.
Pressing this switch disconnects the IDG from its driveshaft: only maintenance personnel can reconnect it.

FAULT light : Lights up amber, and ECAM caution comes on, if:
- IDG oil outlet overheats (above 185 °C), or
- IDG oil pressure is low (inhibited at low engine speed: N2 below 14 %).

It extinguishes when the IDG is disconnected.

(4) GEN 1(2) pb-sw

ON : The generator field is energized and the line contactor closes if electrical parameters are normal.

OFF : The generator field is de-energized and the line contactors opens.
The fault circuit is reset.

FAULT light : Lights up amber, and an ECAM caution comes on, if:
- The associated generator control unit (GCU) trips it.

Note: If a differential fault trips the protection, reset action has no effect after two attempts.

- Opening of the line contactor (except if the GEN pb-sw is selected OFF).

(5) APU GEN pb-sw

ON : The APU generator field is energized and the line contactor closes if parameters are normal and the EXT PWR line contactor is open.
The bus tie contactor 1(2) closes automatically if GEN 1(2) is not operating.

OFF : The generator field is de-energized and the line contactor opens. The fault circuit is reset.

FAULT light : Same as GEN 1 or 2 FAULT
The APU GEN FAULT light is inhibited when APU speed is too low or if the APU GEN line contactor opens after EXT PWR or ENG GEN takes over.

(6) BUS TIE pb-sw

AUTO : The bus tie contactors (BTCs) automatically open or close to maintain power supply to both AC BUS 1 and 2.
- One contactor is closed, when:
  - One engine generator supplies the associated AC BUS, and
  - The APU generator, or external power supplies the other side.
- Both contactors are closed during single-engine operation, or operation on the APU generator, or external power supply.

OFF : Both bus tie contactors open.

(7) AC ESS FEED pb-sw

NORMAL : The AC ESS BUS is normally supplied by AC BUS 1. It is automatically supplied by AC BUS 2, when AC BUS 1 is lost.

ALTN : Comes on when manually selected. The AC ESS BUS is supplied by AC BUS 2.

FAULT light : The amber light, and ECAM caution come on, when the AC ESS BUS is not electrically-supplied.

Note: In case of a total loss of the main generators, the AC ESS BUS is automatically supplied by the emergency generator, or by the static inverter, if the emergency generator is not available.

(8) GALLEY pb-sw

AUTO : Main galley and secondary galley are supplied.

The main galley is shed automatically when:
- In flight: When only one generator is operating.
- On the ground: When only one engine generator is operating. (All galleys are available when the APU GEN or EXT PWR is supplying power.)

OFF : The main galley and secondary galley are not supplied.

FAULT light : The amber light, and ECAM caution come on, when the load on any generator is more than 100 % of rated output.

(9) EXT PWR pb (momentary action)

AVAIL light comes on green, if:
- External power is plugged in, and
- External power parameters are normal.

Pressed momentarily:
- If the AVAIL light was on:
  - The external power line contactor closes
  - The AVAIL light goes off
  - The ON light comes on blue.
- If the ON light was on:
  - The external power line contactor opens
  - The ON light goes off
  - The AVAIL light comes on.

Note: *1. External power has priority over the APU generator. The engine generators have priority over external power.*
2. The ON light stays on, even when the engine generators supply the aircraft.

(10) COMMERCIAL ◁ pb-sw

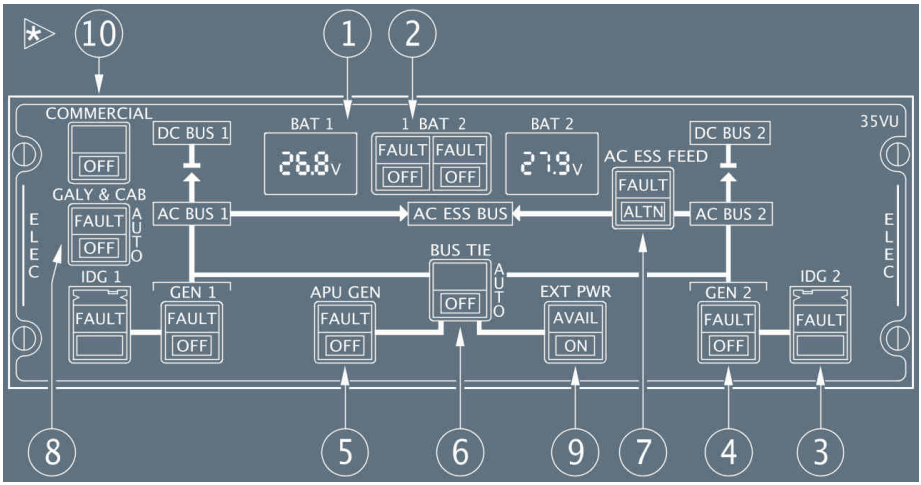
ON : All aircraft commercial electrical loads are supplied:
- Cabin and cargo lights
- Water and toilet system
- Drain mast ice protection
- Galley
- Passenger's entertainment
- Semi-automatic cargo loading ◁

OFF : Switches off all aircraft commercial electrical loads.

OVERHEAD PANEL

Applicable to: B-HSJ, B-HSK

2



(1) BAT 1(2)
Shows battery voltage in white.

(2) BAT 1(2) pb-sw
Controls the operation of the corresponding battery charge limiter.

Auto : The battery charge limiter controls automatically the connection and the disconnection of the corresponding battery to the DC BAT BUS (3 PP) by closing and opening of the battery line contactor.

- The batteries are connected to the DC BAT BUS in the following cases:
  - APU starting (MASTER SW pb-sw at ON and N < 95 %).

    Note: *The connection is limited to 3 min when the emergency generator is running.*

  - Battery voltage below 26.5 V (battery charge). The charging cycle ends when battery charge current goes below 4 A.

    ■ On ground, immediately
    ■ In flight, after a time delay of 30 min.

  - Loss of AC BUS 1 and 2 when below 100 kt (EMER GEN not supplying).
- If AC BUS 1 and 2 are not energized and the EMER GEN is not supplying:
  - Battery 1 supplies the AC STAT INV BUS, and, if speed is greater than 50 kt, the AC ESS BUS.
  - Battery 2 supplies the DC ESS BUS.

    Note: *In normal configuration the batteries are disconnected most of the time.*

    Note: *A battery automatic cut-off logic prevents the batteries from discharging completely when the aircraft is on the ground (parking).*

    Automatic battery contactors open when:
    - *The aircraft is on the ground*
    - *The BAT pb switches are at AUTO*
    - *The main power supply (EXT PWR + GEN) is cut off*
    - *Battery voltage is low.*

    The flight crew can reset the contactors by switching the BAT pb-sw to OFF then to AUTO.

OFF : The battery charge limiter is not operating: the battery line contactor is open. OFF comes on white if the DC BAT BUS is supplied. Hot buses remain supplied.

FAULT light : Comes on amber, accompanied by an ECAM caution, when the charging current for the corresponding battery is outside limits.
In this case the battery contactor opens.

(3) IDG 1(2) (Integrated Drive Generator) pb-sw (guarded)

CAUTION	1. Maintaining the IDG pb-sw during more than 3 s may damage the IDG disconnection mechanism. 2. Disconnect the IDG only when the engine is running or windmilling. If not, the IDG will be damaged when starting the engine.

The IDG switches are normally springloaded out.
Pressing this switch disconnects the IDG from its driveshaft: only maintenance personnel can reconnect it.

FAULT light : Lights up amber, and ECAM caution comes on, if:
- IDG oil outlet overheats (above 185 °C), or
- IDG oil pressure is low (inhibited at low engine speed: N2 below 14 %).

It extinguishes when the IDG is disconnected.

(4) GEN 1(2) pb-sw

ON : The generator field is energized and the line contactor closes if electrical parameters are normal.

OFF : The generator field is de-energized and the line contactors opens.
The fault circuit is reset.

FAULT light : Lights up amber, and an ECAM caution comes on, if:
- The associated generator control unit (GCU) trips it.

Note: If a differential fault trips the protection, reset action has no effect after two attempts.

- Opening of the line contactor (except if the GEN pb-sw is selected OFF).

(5) APU GEN pb-sw

ON : The APU generator field is energized and the line contactor closes if parameters are normal and the EXT PWR line contactor is open.
The bus tie contactor 1(2) closes automatically if GEN 1(2) is not operating.

OFF : The generator field is de-energized and the line contactor opens. The fault circuit is reset.

FAULT light : Same as GEN 1 or 2 FAULT
The APU GEN FAULT light is inhibited when APU speed is too low or if the APU GEN line contactor opens after EXT PWR or ENG GEN takes over.

(6) BUS TIE pb-sw

AUTO : The bus tie contactors (BTCs) automatically open or close to maintain power supply to both AC BUS 1 and 2.
- One contactor is closed, when:
  - One engine generator supplies the associated AC BUS, and
  - The APU generator, or external power supplies the other side.
- Both contactors are closed during single-engine operation, or operation on the APU generator, or external power supply.

OFF : Both bus tie contactors open.

(7) AC ESS FEED pb-sw

NORMAL : The AC ESS BUS is normally supplied by AC BUS 1. It is automatically supplied by AC BUS 2, when AC BUS 1 is lost.

ALTN : Comes on when manually selected. The AC ESS BUS is supplied by AC BUS 2.

FAULT light : The amber light, and ECAM caution come on, when the AC ESS BUS is not electrically-supplied.

Note: In case of a total loss of the main generators, the AC ESS BUS is automatically supplied by the emergency generator, or by the static inverter, if the emergency generator is not available.

(8) GALY & CAB pb-sw

AUTO : Main galley, secondary galley and in-seat power supply ⋘ are supplied.

The main galley and in-seat power supply ⋘ are shed automatically when:
- In flight: When only one generator is operating.
- On ground: When only one engine generator is operating. (All galleys are available when the APU GEN or EXT PWR is supplying power.)

OFF : The main galley, secondary galley and in-seat power supply ⋘ are not supplied.

FAULT light : The amber light, and ECAM caution come on, when the load on any generator is more than 100 % of rated output.

(9) EXT PWR pb (momentary action)

AVAIL light comes on green, if:
- External power is plugged in, and
- External power parameters are normal.

Pressed momentarily:
- If the AVAIL light was on:
  - The external power line contactor closes
  - The AVAIL light goes off
  - The ON light comes on blue.
- If the ON light was on:
  - The external power line contactor opens
  - The ON light goes off
  - The AVAIL light comes on.

Note: *1. External power has priority over the APU generator. The engine generators have priority over external power.*
2. The ON light stays on, even when the engine generators supply the aircraft.

(10) COMMERCIAL ◁❄ pb-sw

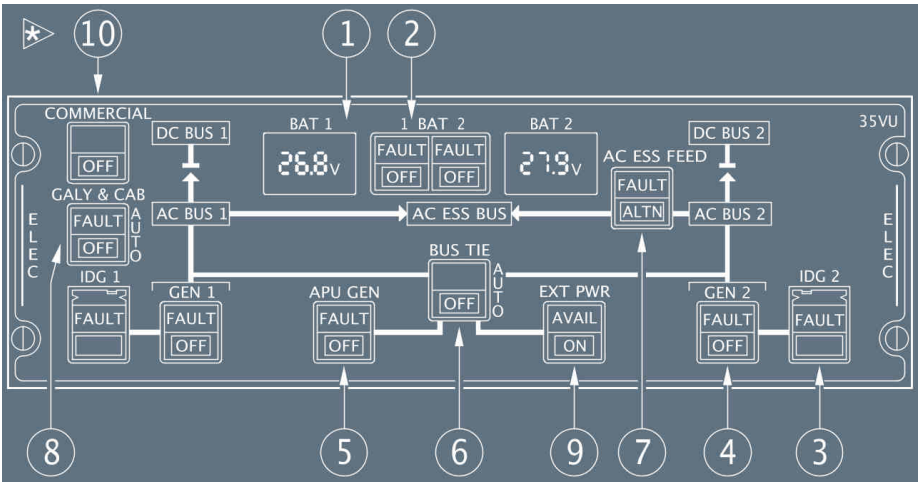
ON : All aircraft commercial electrical loads are supplied:
- Cabin and cargo lights
- Water and toilet system
- Drain mast ice protection
- Galley
- Passenger's entertainment
- Semi-automatic cargo loading ◁❄

OFF : Switches off all aircraft commercial electrical loads.

OVERHEAD PANEL

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

3



(1) BAT 1(2)
Shows battery voltage in white.

(2) BAT 1(2) pb-sw
Controls the operation of the corresponding battery charge limiter.

Auto : The battery charge limiter controls automatically the connection and the disconnection of the corresponding battery to the DC BAT BUS (3 PP) by closing and opening of the battery line contactor.

- The batteries are connected to the DC BAT BUS in the following cases:
  - APU starting (MASTER SW pb-sw at ON and N < 95 %).

    Note: *The connection is limited to 3 min when the emergency generator is running.*

  - Battery voltage below 26.5 V (battery charge). The charging cycle ends when battery charge current goes below 4 A.
    - On ground, immediately
    - In flight, after a time delay of 30 min.
  - Loss of AC BUS 1 and 2 when below 100 kt (EMER GEN not supplying).
- If AC BUS 1 and 2 are not energized and the EMER GEN is not supplying:
  - Battery 1 supplies the AC STAT INV BUS, and, if speed is greater than 50 kt, the AC ESS BUS.
  - Battery 2 supplies the DC ESS BUS.

    Note: *In normal configuration the batteries are disconnected most of the time.*

    Note: *A battery automatic cut-off logic prevents the batteries from discharging completely when the aircraft is on the ground (parking).*

    Automatic battery contactors open when:
    - *The aircraft is on the ground*
    - *The BAT pb switches are at AUTO*
    - *The main power supply (EXT PWR + GEN) is cut off*
    - *Battery voltage is low.*

    The flight crew can reset the contactors by switching the BAT pb-sw to OFF then to AUTO.

OFF : The battery charge limiter is not operating: the battery line contactor is open. OFF comes on white if the DC BAT BUS is supplied. Hot buses remain supplied.

FAULT light : Comes on amber, accompanied by an ECAM caution, when the charging current for the corresponding battery is outside limits.
In this case the battery contactor opens.

(3) IDG 1(2) (Integrated Drive Generator) pb-sw (guarded)

CAUTION	1. Maintaining the IDG pb-sw during more than 3 s may damage the IDG disconnection mechanism. 2. Disconnect the IDG only when the engine is running or windmilling. If not, the IDG will be damaged when starting the engine.

The IDG switches are normally springloaded out.
Pressing this switch disconnects the IDG from its driveshaft: only maintenance personnel can reconnect it.

FAULT light : Lights up amber, and ECAM caution comes on, if:
- IDG oil outlet overheats (above 185 °C), or
- IDG oil pressure is low (inhibited at low engine speed: N2 below 14 %).

It extinguishes when the IDG is disconnected.

(4) GEN 1(2) pb-sw

ON : The generator field is energized and the line contactor closes if electrical parameters are normal.

OFF : The generator field is de-energized and the line contactors opens.
The fault circuit is reset.

FAULT light : Lights up amber, and an ECAM caution comes on, if:
- The associated generator control unit (GCU) trips it.

Note: If a differential fault trips the protection, reset action has no effect after two attempts.

- Opening of the line contactor (except if the GEN pb-sw is selected OFF).

(5) APU GEN pb-sw

ON : The APU generator field is energized and the line contactor closes if parameters are normal and the EXT PWR line contactor is open.
The bus tie contactor 1(2) closes automatically if GEN 1(2) is not operating.

OFF : The generator field is de-energized and the line contactor opens. The fault circuit is reset.

FAULT light : Same as GEN 1 or 2 FAULT
The APU GEN FAULT light is inhibited when APU speed is too low or if the APU GEN line contactor opens after EXT PWR or ENG GEN takes over.

(6) BUS TIE pb

AUTO : The bus tie contactors (BTCs) automatically open or close to maintain power supply to both AC BUS 1 and 2.
- One contactor is closed, when:
  - One engine generator supplies the associated AC BUS, and
  - The APU generator, or external power supplies the other side.
- Both contactors are closed during single-engine operation, or operation on the APU generator, or external power supply.

OFF : Both bus tie contactors open.

(7) AC ESS FEED pb

NORMAL : The AC ESS BUS is normally supplied by AC BUS 1. It is automatically supplied by AC BUS 2, when AC BUS 1 is lost.

ALTN : Comes on when manually selected. The AC ESS BUS is supplied by AC BUS 2.

FAULT light : The amber light, and ECAM caution come on, when the AC ESS BUS is not electrically-supplied.

Note: In case of a total loss of the main generators, the AC ESS BUS is automatically supplied by the emergency generator, or by the static inverter, if the emergency generator is not available.

(8) GALY & CAB pb

AUTO : Main galley, secondary galley, in-seat power supply ⋘ and IFE ⋘ system (prerecorded announcement, telephone system, video/airshow, music…), are supplied.

The main galley, the in-seat power supply ⋘ and the IFE ⋘ system are automatically shed:
- In flight: When only one generator is operating.
- On ground: When only one engine generator is operating. (All galleys are available when the APU GEN or EXT PWR is supplying power.)

OFF : The main galley, secondary galley, in-seat power supply ⋘ and IFE ⋘ system are not supplied.

FAULT light : The amber light, and ECAM caution come on, when the load on any generator is more than 100 % of rated output.

(9) EXT PWR pb (momentary action)

AVAIL light comes on green, if:
- External power is plugged in, and
- External power parameters are normal.

Pressed momentarily:
- If the AVAIL light was on:
  - The external power line contactor closes
  - The AVAIL light goes off
  - The ON light comes on blue.
- If the ON light was on:
  - The external power line contactor opens
  - The ON light goes off
  - The AVAIL light comes on.

Note: 1. External power has priority over the APU generator. The engine generators have priority over external power.
2. The ON light stays on, even when the engine generators supply the aircraft.

(10) COMMERCIAL ◁ pb-sw

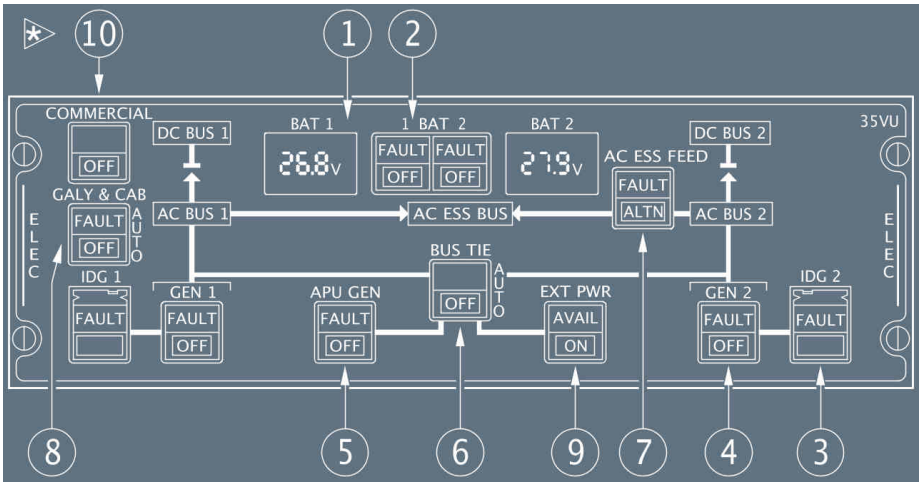
ON : All aircraft commercial electrical loads are supplied:
- Cabin and cargo lights
- Water and toilet system
- Drain mast ice protection
- Galley
- Passenger's entertainment
- Semi-automatic cargo loading ◁

OFF : Switches off all aircraft commercial electrical loads.

OVERHEAD PANEL

Applicable to: B-HTG

4



(1) BAT 1(2) ind.
Shows battery voltage in white.

(2) BAT 1(2) pb-sw
Controls the operation of the corresponding battery charge limiter.

Auto : The battery charge limiter controls automatically the connection and the disconnection of the corresponding battery to the DC BAT BUS (3 PP) by closing and opening of the battery line contactor.

- The batteries are connected to the DC BAT BUS in the following cases:
  - APU starting (MASTER SW pb-sw at ON and N < 95 %).

    Note: *The connection is limited to 3 min when the emergency generator is running.*

  - Battery voltage below 26.5 V (battery charge). The charging cycle ends when battery charge current goes below 4 A.

    ■ On ground, immediately
    ■ In flight, after a time delay of 30 min.

  - Loss of AC BUS 1 and 2 when below 100 kt (EMER GEN not supplying).
- If AC BUS 1 and 2 are not energized and the EMER GEN is not supplying:
  - Battery 1 supplies the AC STAT INV BUS, and, if speed is greater than 50 kt, the AC ESS BUS.
  - Battery 2 supplies the DC ESS BUS.

    Note: *In normal configuration the batteries are disconnected most of the time.*

    Note: *A battery automatic cut-off logic prevents the batteries from discharging completely when the aircraft is on the ground (parking).*

    Automatic battery contactors open when:
    - *The aircraft is on the ground*
    - *The BAT pb switches are at AUTO*
    - *The main power supply (EXT PWR + GEN) is cut off*
    - *Battery voltage is low.*

    The flight crew can reset the contactors by switching the BAT pb-sw to OFF then to AUTO.

OFF : The battery charge limiter is not operating: the battery line contactor is open. OFF comes on white if the DC BAT BUS is supplied. Hot buses remain supplied.

FAULT light : Comes on amber, accompanied by an ECAM caution, when the charging current for the corresponding battery is outside limits.
In this case the battery contactor opens.

(3) IDG 1(2) (Integrated Drive Generator) pb-sw (guarded)

CAUTION	1. Maintaining the IDG pb-sw during more than 3 s may damage the IDG disconnection mechanism. 2. Disconnect the IDG only when the engine is running or windmilling. If not, the IDG will be damaged when starting the engine.

The IDG switches are normally springloaded out.
Pressing this switch disconnects the IDG from its driveshaft : only maintenance personnel can reconnect it.

FAULT light : Lights up amber, and ECAM caution comes on, if:
- IDG oil outlet overheats (above 185 °C), or
- IDG oil pressure is low (inhibited at low engine speed: N2 below 14 %).

It extinguishes when the IDG is disconnected.

(4) GEN 1(2) pb-sw

ON : The generator field is energized and the line contactor closes if electrical parameters are normal.

OFF : The generator field is de-energized and the line contactors opens.
The fault circuit is reset.

FAULT light : Lights up amber, and an ECAM caution comes on, if:
- The associated generator control unit (GCU) trips it.

Note: If a differential fault trips the protection, reset action has no effect after two attempts.

- Opening of the line contactor (except if the GEN pb-sw is selected OFF).

(5) APU GEN pb-sw

ON : The APU generator field is energized and the line contactor closes if parameters are normal and the EXT PWR line contactor is open.
The bus tie contactor 1(2) closes automatically if GEN 1(2) is not operating.

OFF : The generator field is de-energized and the line contactor opens. The fault circuit is reset.

FAULT light : Same as GEN 1 or 2 FAULT
The APU GEN FAULT light is inhibited when APU speed is too low or if the APU GEN line contactor opens after EXT PWR or ENG GEN takes over.

(6) BUS TIE pb

AUTO : The bus tie contactors (BTCs) automatically open or close to maintain power supply to both AC BUS 1 and 2.
- One contactor is closed, when:
  - One engine generator supplies the associated AC BUS, and
  - The APU generator, or external power supplies the other side.
- Both contactors are closed during single-engine operation, or operation on the APU generator, or external power supply.

OFF : Both bus tie contactors open.

(7) AC ESS FEED pb

NORMAL : The AC ESS BUS is normally supplied by AC BUS 1. It is automatically supplied by AC BUS 2, when AC BUS 1 is lost.

ALTN : Comes on when manually selected. The AC ESS BUS is supplied by AC BUS 2.

FAULT light : The amber light, and ECAM caution come on, when the AC ESS BUS is not electrically-supplied.

Note: In case of a total loss of the main generators, the AC ESS BUS is automatically supplied by the emergency generator, or by the static inverter, if the emergency generator is not available.

(8) GALY & CAB pb

AUTO : Main galley, secondary galley, and in-seat power supply are supplied.

All galleys and in-seat power supply are automatically shed, when:
- In flight: only one generator is operating
- On the ground: only one engine generator is operating. (All galleys are available when the APU GEN or EXT PWR is supplying power.)

OFF : The main galley, secondary galley and in-seat power supply are not supplied.

FAULT light : The amber light, and ECAM caution come on, when the load on any generator is more than 100 % of rated output.

(9) EXT PWR pb (momentary action)

AVAIL light comes on green, if:
- External power is plugged in, and
- External power parameters are normal.

Pressed momentarily:

- If the AVAIL light was on:
  - The external power line contactor closes
  - The AVAIL light goes off
  - The ON light comes on blue.
- If the ON light was on:
  - The external power line contactor opens
  - The ON light goes off
  - The AVAIL light comes on.

Note: *1. External power has priority over the APU generator. The engine generators have priority over external power.*
2. The ON light stays on, even when the engine generators supply the aircraft.

(10) COMMERCIAL ◁❄ pb-sw

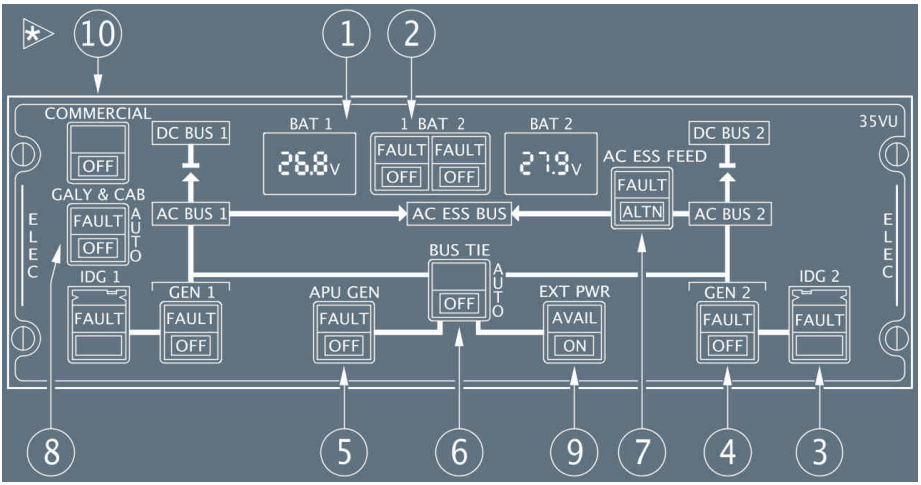
ON : All aircraft commercial electrical loads are supplied:
- Cabin and cargo lights
- Water and toilet system
- Drain mast ice protection
- Galley
- Passenger's entertainment
- Semi-automatic cargo loading ◁❄

OFF : Switches off all aircraft commercial electrical loads.

OVERHEAD PANEL

Applicable to: B-HTH, B-HTI

5



(1) BAT 1 (2).
Shows battery voltage in white.

(2) BAT 1 (2) pb-sw
Controls the operation of the corresponding battery charge limiter.

Auto : The battery charge limiter controls automatically the connection and the disconnection of the corresponding battery to the DC BAT BUS (3 PP) by closing and opening of the battery line contactor.

- The batteries are connected to the DC BAT BUS in the following cases:
  - APU starting (MASTER SW pb-sw at ON and N < 95 %).

    Note: *The connection is limited to 3 min when the emergency generator is running.*

  - Battery voltage below 26.5 V (battery charge). The charging cycle ends when battery charge current goes below 4 A.
    - On ground, immediately
    - In flight, after a time delay of 30 min.
  - Loss of AC BUS 1 and 2 when below 100 kt (EMER GEN not supplying).
- If AC BUS 1 and 2 are not energized and the EMER GEN is not supplying:
  - Battery 1 supplies the AC STAT INV BUS, and, if speed is greater than 50 kt, the AC ESS BUS.
  - Battery 2 supplies the DC ESS BUS.

    Note: *In normal configuration the batteries are disconnected most of the time.*

    Note: *A battery automatic cut-off logic prevents the batteries from discharging completely when the aircraft is on the ground (parking).*

    Automatic battery contactors open when:
    - *The aircraft is on the ground*
    - *The BAT pb switches are at AUTO*
    - *The main power supply (EXT PWR + GEN) is cut off*
    - *Battery voltage is low.*

    The flight crew can reset the contactors by switching the BAT pb-sw to OFF then to AUTO.

OFF : The battery charge limiter is not operating: the battery line contactor is open. OFF comes on white if the DC BAT BUS is supplied. Hot buses remain supplied.

FAULT light : Comes on amber, accompanied by an ECAM caution, when the charging current for the corresponding battery is outside limits.
In this case the battery contactor opens.

(3) IDG 1 (2) (Integrated Drive Generator) pb-sw (guarded)

CAUTION	1. Maintaining the IDG pb-sw during more than 3 s may damage the IDG disconnection mechanism. 2. Disconnect the IDG only when the engine is running or windmilling. If not, the IDG will be damaged when starting the engine.

The IDG switches are normally springloaded out.
Pressing this switch disconnects the IDG from its driveshaft : only maintenance personnel can reconnect it.

FAULT light : Lights up amber, and ECAM caution comes on, if:
- IDG oil outlet overheats (above 185 °C), or
- IDG oil pressure is low (inhibited at low engine speed : N2 below 14 %)

It extinguishes when the IDG is disconnected.

(4) GEN 1 (2) pb-sw

ON : The generator field is energized and the line contactor closes if electrical parameters are normal.

OFF : The generator field is de-energized and the line contactors opens.
The fault circuit is reset.

FAULT light : Lights up amber, and an ECAM caution comes on, if:
- The associated generator control unit (GCU) trips it.

Note: If a differential fault trips the protection, reset action has no effect after two attempts.

- Opening of the line contactor (except if the GEN pb-sw is selected OFF)

(5) APU GEN pb-sw

ON : The APU generator field is energized and the line contactor closes if parameters are normal and the EXT PWR line contactor is open.
The bus tie contactor 1 (2) closes automatically if GEN 1 (2) is not operating.

OFF : The generator field is de-energized and the line contactor opens. The fault circuit is reset.

FAULT light : Same as GEN 1 or 2 FAULT
The APU GEN FAULT light is inhibited when APU speed is too low or if the APU GEN line contactor opens after EXT PWR or ENG GEN takes over.

(6) BUS TIE pb

AUTO : The bus tie contactors (BTCs) automatically open or close to maintain power supply to both AC BUS 1 and 2.
- One contactor is closed, when:
  - One engine generator supplies the associated AC BUS, and
  - The APU generator, or external power supplies the other side.
- Both contactors are closed during single-engine operation, or operation on the APU generator, or external power supply.

OFF : Both bus tie contactors open.

(7) AC ESS FEED pb

NORMAL : The AC ESS BUS is normally supplied by AC BUS 1. It is automatically supplied by AC BUS 2, when AC BUS 1 is lost.

ALTN : Comes on when manually selected. The AC ESS BUS is supplied by AC BUS 2.

FAULT light : The amber light, and ECAM caution come on, when the AC ESS BUS is not electrically-supplied.

Note: In case of a total loss of the main generators, the AC ESS BUS is automatically supplied by the emergency generator, or by the static inverter, if the emergency generator is not available.

(8) GALY & CAB pb

AUTO : Main galley, secondary galley, in-seat power supply ⋖ and IFE ⋖ system (prerecorded announcement, telephone system, video/airshow, music…), are supplied.

The above-mentioned equipment system (if installed) are automatically shed:
- In flight: When only one generator is operating.
- On ground: When only one engine generator is operating. (All galleys are available when the APU GEN or EXT PWR is supplying power.)

OFF : The main galley, secondary galley, in-seat power supply ⋖ and IFE ⋖ system (prerecorded announcement, telephone system, video/airshow, music ....) are not supplied.

FAULT light : The amber light, and ECAM caution come on, when the load on any generator is more than 100 % of rated output.

(9) EXT PWR pb (momentary action)

AVAIL light comes on green, if:
- External power is plugged in, and
- External power parameters are normal.

Pressed momentarily:
- If the AVAIL light was on:
  - The external power line contactor closes
  - The AVAIL light goes off
  - The ON light comes on blue.
- If the ON light was on:
  - The external power line contactor opens
  - The ON light goes off
  - The AVAIL light comes on.

Note: 1. External power has priority over the APU generator. The engine generators have priority over external power.
2. The ON light stays on, even when the engine generators supply the aircraft.

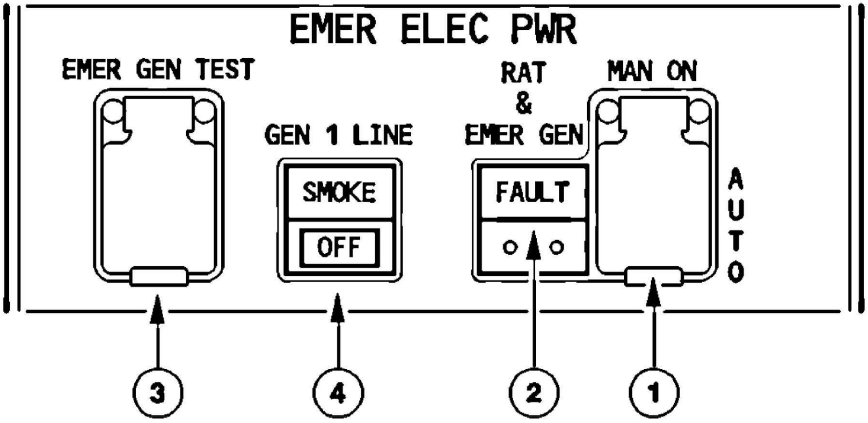
(10) COMMERCIAL ◁ pb

ON : All aircraft commercial electrical loads are supplied:
- Cabin and cargo lights
- Water and toilet system
- Drain mast ice protection
- Galley
- Passenger's entertainment
- Semi-automatic cargo loading ◁

OFF : Switches off all aircraft commercial electrical loads.

OVERHEAD PANEL (CONT'D)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI



(1) MAN ON pb (guarded)

AUTO : When the following conditions are met:
- AC BUS 1 is not electrically supplied.
- AC BUS 2 is not electrically supplied.
- Aircraft speed is greater than 100 kt.

  - The RAT extends.
  - The blue hydraulic system drives the emergency generator.
  - As soon as the emergency generator electrical parameters are within tolerance and the landing gear is retracted, the emergency generator is connected to the aircraft network.

Pressed : This selects manual RAT extension.
Emergency generator coupling occurs 3 s after the RAT supplies the emergency generator.

(2) FAULT light

This light comes on red if the emergency generator is not supplying power when:
- AC BUS 1 and AC BUS 2 are not powered and,
- Nose landing gear is up.

(3) EMER GEN TEST pb (guarded)

Pressed and held:
- If AC NORMAL BUSES are supplied:
  - The EMER GEN is driven hydraulically if the blue electric pump is running.
    The AC ESS BUS and the DC ESS BUS are connected to the emergency generator.
    (The DC ESS SHED and AC ESS SHED buses are not powered.)
  - ECAM displays the ELEC page automatically (only on the ground).
- If only the batteries supply the aircraft:
  - The static inverter powers the AC ESS BUS.

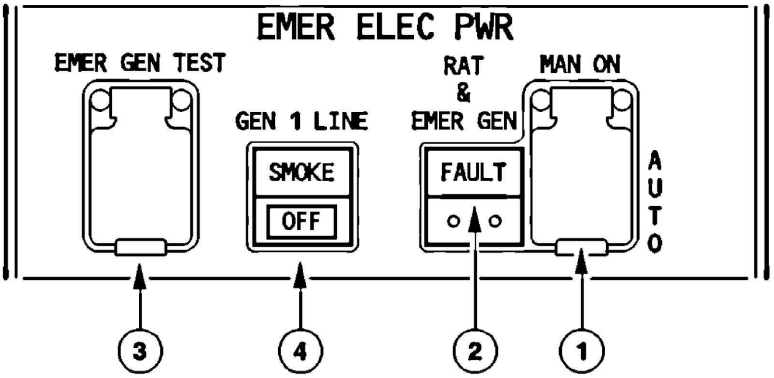
(4) GEN 1 LINE pb-sw

OFF : GEN 1 line contactor opens.
The AC BUS 1 channel is supplied from GEN 2 through bus tie contactors. This is used for smoked drill.

SMOKE : (*Refer to DSC-26-30-20 Overhead Panel*)
lt

OVERHEAD PANEL (CONT'D)

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) MAN ON pb (guarded)

AUTO : When the following conditions are met:
- AC BUS 1 is not electrically supplied.
- AC BUS 2 is not electrically supplied.
- Aircraft speed is greater than 100 kt.

  • The RAT extends.
  • The blue hydraulic system drives the emergency generator.
  • As soon as the emergency generator electrical parameters are within tolerance the emergency generator is connected to the aircraft network.

Pressed : This selects manual RAT extension.
Emergency generator coupling occurs 3 s after the RAT supplies the emergency generator.

(2) FAULT lt

This light comes on red if the emergency generator is not supplying power when AC BUS 1 and AC BUS 2 are not powered.

(3) EMER GEN TEST pb (guarded)

Pressed and held:
- If AC NORMAL BUSES are supplied:
  • The EMER GEN is driven hydraulically if the blue electric pump is running.
  The AC ESS BUS and the DC ESS BUS are connected to the emergency generator.
  (The DC ESS SHED and AC ESS SHED buses are not powered.)
  • ECAM displays the ELEC page automatically (only on the ground).
- If only the batteries supply the aircraft:
  • The static inverter powers the AC ESS BUS.

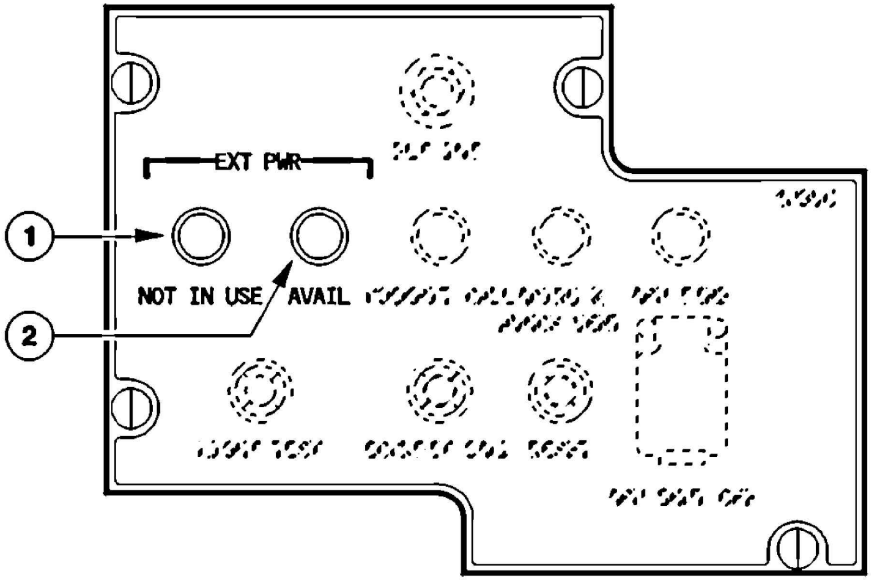
(4) GEN 1 LINE pb sw

OFF : GEN 1 line contactor opens.
The AC BUS 1 channel is supplied from GEN 2 through bus tie contactors. This is used for smoked drill.

SMOKE lt : (*Refer to DSC-26-30-20 Overhead Panel*)

EXTERNAL POWER PANEL

Applicable to: ALL



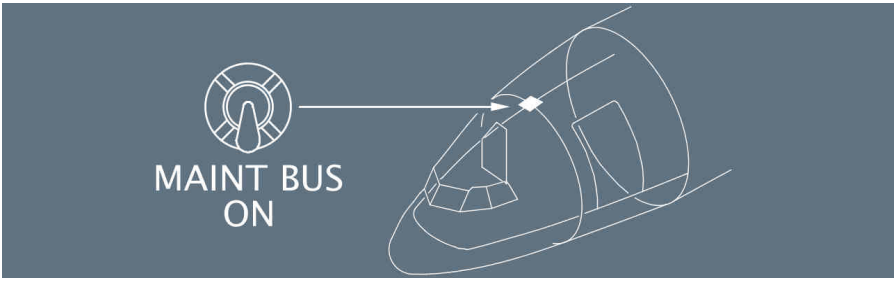
(1) EXT PWR NOT IN USE
This white light comes on to inform ground personnel that the ground power unit is not supplying the aircraft network and can be removed.

(2) EXT PWR AVAIL
This amber light comes on to indicate that external power is available and the voltage is correct.

FORWARD CABIN

Applicable to: ALL

6 **MAINT BUS SW:**



This switch allows personnel to energize electrical circuits for ground servicing without energizing the entire aircraft electrical system.

ON : The switch latches magnetically if external power is connected and normal (AVAIL light on).

The AC and DC GND/FLT buses have power and the following loads can be energized:

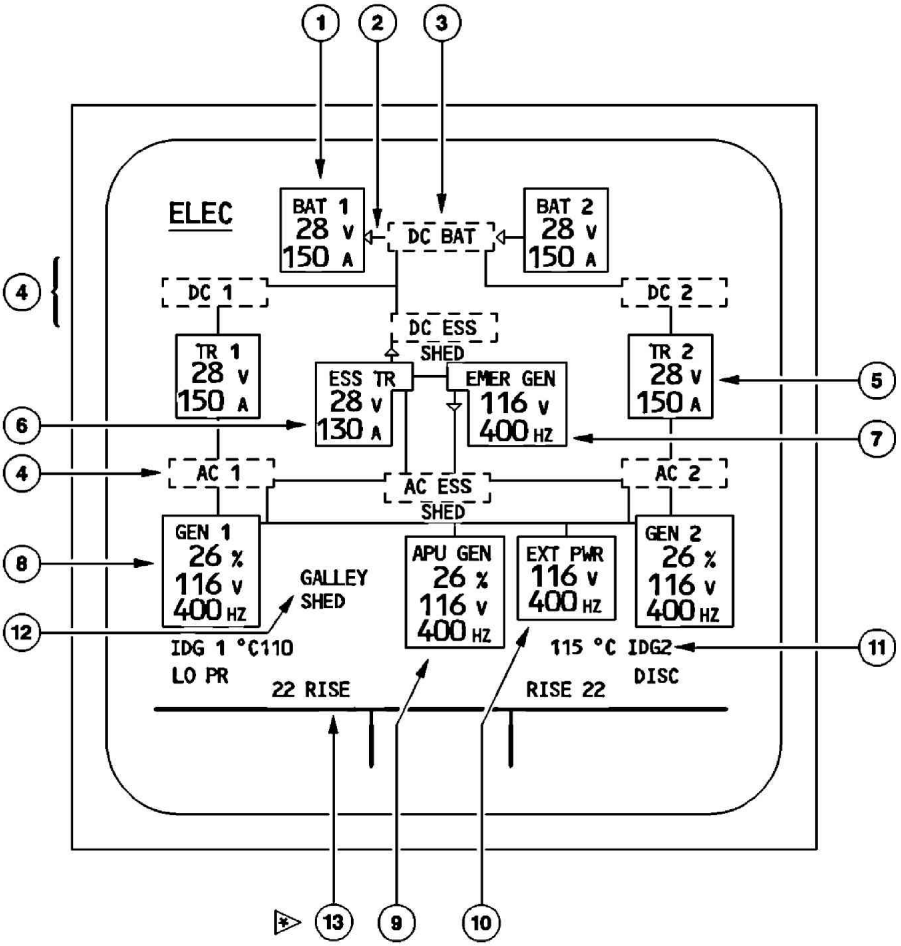
- passenger compartment lighting
- galley lighting
- entrance area lights
- lavatory lighting and service
- vacuum cleaner sockets
- flight compartment service outlets
- hydraulic pump (yellow system)
- flight compartment flood lighting
- fuel quantity indications
- refueling
- cargo hold lighting
- main and nose landing gear compartment lighting
- belly fairing panel service outlets
- ground call
- equipment compartment lights and service outlets
- navigation lights.

The switch trips when the external source is removed.

OFF : The AC and DC GND/FLT buses are connected to AC BUS 2 and DC BUS 2.

ECAM ELEC PAGE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

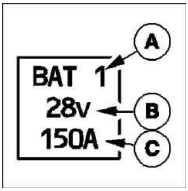


(1) Battery indications

- BAT pb-sw at OFF:
  Legend is in white.



- BAT pb-sw at Auto:



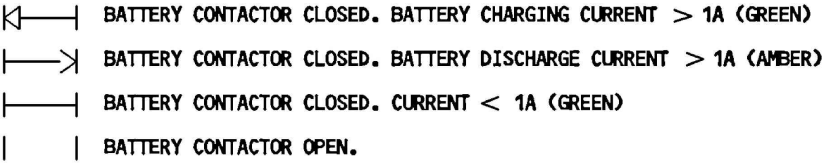
(A)

Legend is normally white, but becomes amber:
- when voltage and current indications change to amber, or
- in case of a BAT FAULT warning.

(B) Battery voltage is normally green, but becomes amber if V > 31 V or V < 25 V.

(C) Battery current is normally green, but becomes amber if discharge current > 5 A.

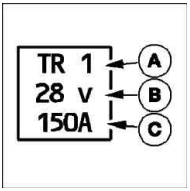
(2) Battery charge/discharge indication



(3) DC BAT indication
It is normally in green. It becomes amber, if DC BAT voltage ≤ 25 V.

(4) Bus indication
It is normally in green. It becomes amber, when the corresponding bus is off.
SHED appears in amber, when AC or DC SHED ESS BUS is off.

(5) TR 1 (2) indication



(A) Normally white, this legend becomes amber when legends B and C do.

(B) The TR voltage is normally in green. It becomes amber, if V > 31 V, or V < 25 V.

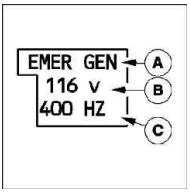
(C) The TR current is normally in green. It becomes amber, when the TR current ≤ 5 A.

(6) ESS TR indication



This legend follows the logic of the above-noted TR 1 (2) legend.
The voltage and current are not displayed, when the essential TR contactor is open.

(7) EMER GEN indication



(A) This legend is normally in white. It becomes amber when either the voltage or frequency legend becomes amber.

(B)

This legend is normally in green. It becomes amber, if:
- V > 120 V or
- V < 110 V.

(C)

This legend is normally in green. It becomes amber, if:
- F > 410 Hz or
- F < 390 Hz .

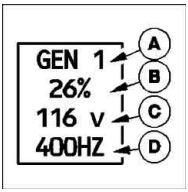
Voltage and frequency indications are not displayed, when the EMER GEN line contactor is open.

(8) GEN 1/2 indications

- GEN pb-sw is OFF:
  GEN is amber.
  OFF indication is white
  1 or 2 indication is white if the associated engine is running, amber if it is not.



- GEN pb-sw is ON.



(A) GEN 1 or GEN 2, normally white, becomes amber if any of the following legends become amber.

(B) The load legend, normally green, becomes amber if load > 100 %.

(C) The voltage legend, normally green, becomes amber if V > 120 V or V < 110 V.

(D) The frequency legend, normally green, becomes amber if F > 410 Hz or F < 390 Hz.

(9) APU GEN indications

- When the APU MASTER sw is OFF this legend is white regardless of the position of the APU GEN pb-sw.



- When the APU MASTER sw is ON, and the APU GEN pb-sw is OFF:
  The APU GEN legend is amber.
  The OFF legend is white.



- When the APU MASTER sw is ON and the APU GEN pb-sw is ON:
  The indications are the same as for GEN 1 (2).

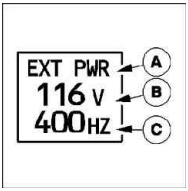


(10) EXT PWR indications

- External power is not available.



- When external power is available:



(A) This legend is normally white, but becomes amber, if either of the following legends turns amber.

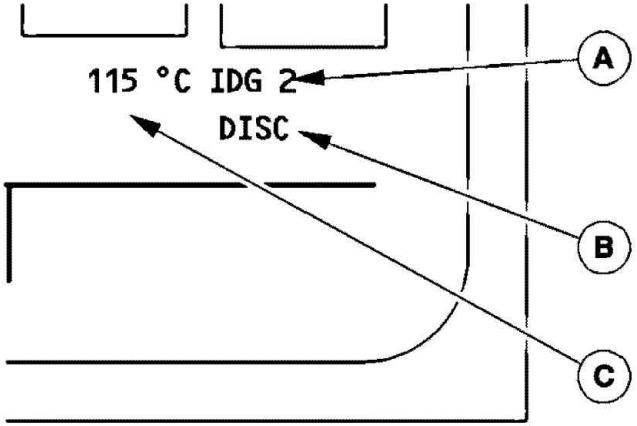
(B) This legend is normally green, but becomes amber, if V > 120 V or if V < 110 V.

(C) This legend is normally green, but becomes amber, if F > 410 Hz or if F < 390 Hz.



- This legend appears during the static inverter test, and when pressing the ELEC pb on the ECAM control panel while ESS BUSES are supplied by the batteries. It is normally green, but becomes amber, if:
  V < 110 V or V> 120 V.
  F < 390 Hz or F > 410 Hz.

(11) IDG indications



(A) IDG1 (2) legend

The IDG legend is normally white, but becomes amber, if:
- Oil outlet temperature > 185 °C.
- Oil pressure gets too low.
- IDG becomes disconnected.

The 1 or 2 is white if the corresponding engine is running, amber if it is not and the FADEC is powered.

(B) DISC/LO PR indication

The DISC legend appears in amber, when the IDG is disconnected.
LO PR appears in amber, when IDG low pressure is detected and the associated engine is running.

(C) Oil outlet temperature

This legend is normally in green, but appears amber, if T > 185 °C.
It flashes, if 147 °C <T < 185 °C (advisory).

(12) GALLEY SHED indication

This legend appears in white when:
- The GALLEY pb-sw is OFF, or
- The main galleys are shed, meaning:
  - In flight, only one generator is operating.
  - On ground, the aircraft is being supplied by one engine generator only.

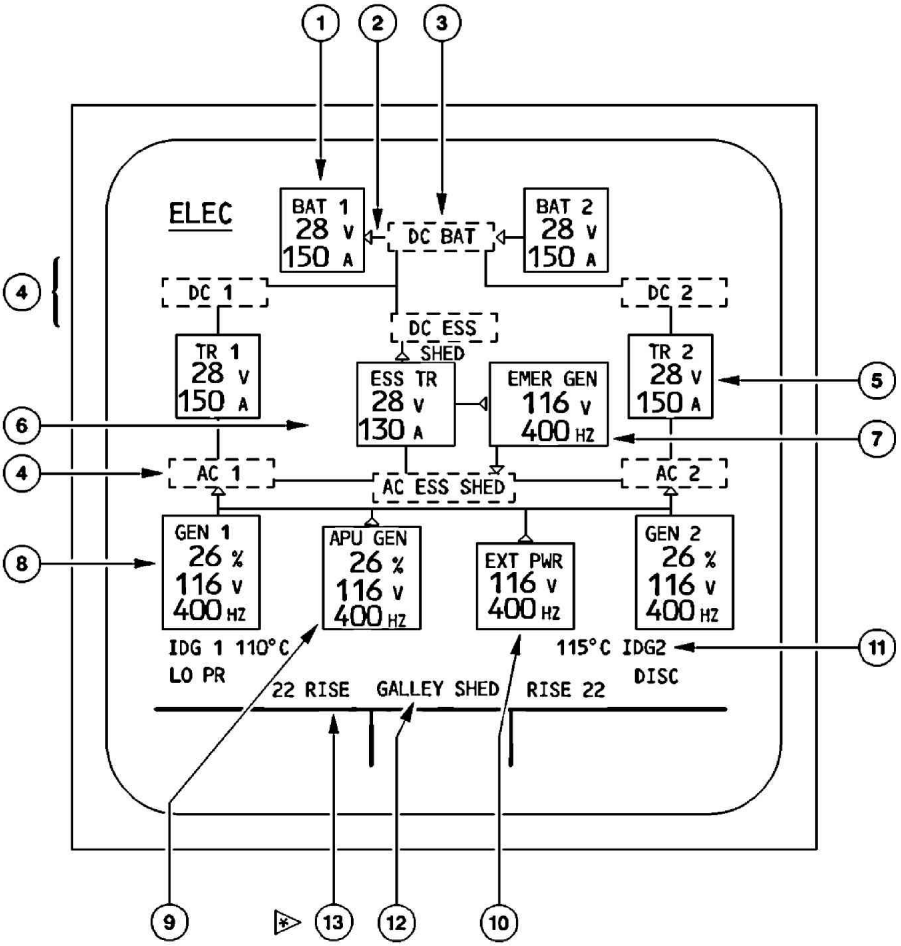
The legend is not displayed, when the aircraft is in its normal configuration.

(13) RISE indication ◁

This number, displayed in green, is the difference between the temperature at the IDG inlet and that at the IDG outlet.

ECAM ELEC PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

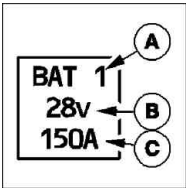


(1) Battery indications

- BAT pb-sw at OFF:
  Legend is in white.



- BAT pb-sw at Auto:



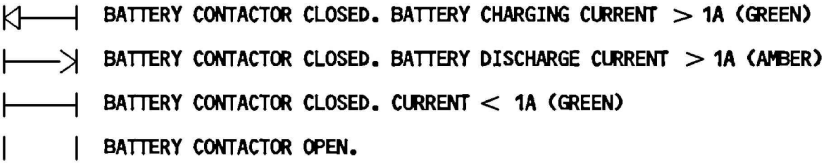
(A)

Legend is normally white, but becomes amber:
- when voltage and current indications change to amber, or
- in case of a BAT FAULT warning.

(B) Battery voltage is normally green, but becomes amber if V > 31 V or V < 25 V.

(C) Battery current is normally green, but becomes amber if discharge current > 5 A.

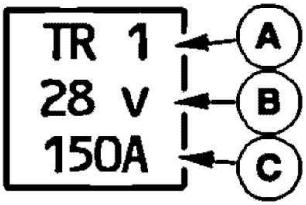
(2) Battery charge/discharge indication



(3) DC BAT indication
It is normally in green. It becomes amber, if DC BAT voltage ≤ 25 V.

(4) Bus indication
It is normally in green. It becomes amber, when the corresponding bus is off.
SHED appears in amber, when AC or DC SHED ESS BUS is off.

(5) TR 1 (2) indication



(A) It is normally in white. It becomes amber when legends B and C do.

(B) The TR voltage is normally in green. It becomes amber, if V > 31 V, or V < 25 V.

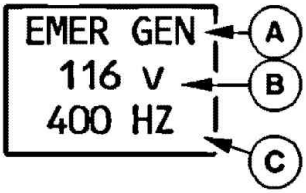
(C) The TR current is normally in green. It becomes amber, when the TR current ≤ 5 A.

(6) ESS TR indication



This legend follows the logic of the above-noted TR 1 (2) legend.
The voltage and current are not displayed, when the essential TR contactor is open.

(7) EMER GEN indication



(A) This legend is normally in white. It becomes amber when either the voltage or frequency legend becomes amber.

(B)

This legend is normally in green. It becomes amber if:
- V > 120 V or
- V < 110 V.

(C)

This legend is normally in green. It becomes amber if:
- F > 410 Hz or
- F < 390 Hz .

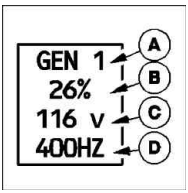
Voltage and frequency indications are not displayed when the EMER GEN line contactor is open.

(8) GEN 1/2 indications

- GEN pb-sw is OFF:
  GEN is amber.
  OFF indication is white
  1 or 2 indication is white if the associated engine is running, amber if it is not.



- GEN pb-sw is ON.



(A) GEN 1 or GEN 2, normally white, becomes amber if any of the following legends become amber.

(B) The load legend, normally green, becomes amber if load > 100 %.

(C) The voltage legend, normally green, becomes amber if V > 120 V or V < 110 V.

(D) The frequency legend, normally green, becomes amber if F > 410 Hz or F < 390 Hz.

(9) APU GEN indications

- When the APU MASTER sw is OFF this legend is white regardless of the position of the APU GEN pb-sw.



- When the APU MASTER sw is ON, and the APU GEN pb-sw is OFF:
  The APU GEN legend is amber.
  The OFF legend is white.



- When the APU MASTER sw is ON and the APU GEN pb-sw is ON:
  The indications are the same as for GEN 1 (2).

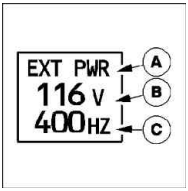


(10) EXT PWR indications

- External power is not available.



- When external power is available:



(A) This legend is normally white, but becomes amber, if either of the following legends turns amber.

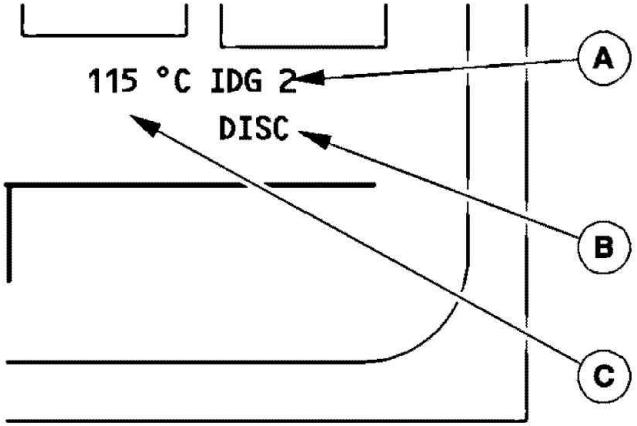
(B) This legend is normally green, but becomes amber, if V > 120 V or if V < 110 V.

(C) This legend is normally green, but becomes amber, if F > 410 Hz or if F < 390 Hz.



- This legend appears during the static inverter test, and when pressing the ELEC pb on the ECAM control panel while ESS BUSES are supplied by the batteries. It is normally green, but becomes amber, if:
  V < 110 V or V> 120 V.
  F < 390 Hz or F > 410 Hz.

(11) IDG indications



(A) IDG1 (2) legend

The IDG legend is normally white, but becomes amber, if:
- Oil outlet temperature > 185 °C.
- Oil pressure gets too low.
- IDG becomes disconnected.

The 1 or 2 is white if the corresponding engine is running, amber if it is not and the FADEC is powered.

(B) DISC/LO PR indication

The DISC legend appears in amber, when the IDG is disconnected.
LO PR appears in amber, when IDG low pressure is detected and the associated engine is running.

(C) Oil outlet temperature

This legend is normally in green, but appears amber, if T > 185 °C.
It flashes, if 147 °C <T < 185 °C (advisory).

(12) GALLEY SHED indication

This legend appears in white when:
- The GALLEY pb-sw is OFF, or
- The main galleys are shed, meaning:
  - In flight, only one generator is operating.
  - On ground, the aircraft is being supplied by one engine generator only.

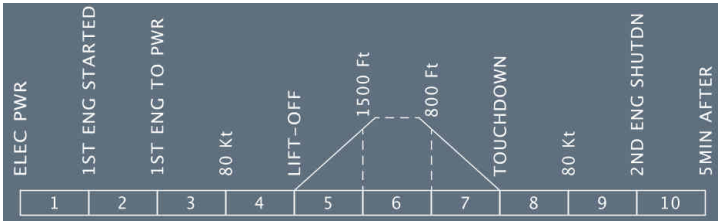
The legend is not displayed, when the aircraft is in its normal configuration.

(13) RISE indication ◁

This number, displayed in green, is the difference between the temperature at the IDG inlet and that at the IDG outlet.

WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNINGS	FLT PHASE INHIB
EMER CONFIG Loss of main generators.	CRC	MASTER WARN	NIL (1)	RAT and EMER GEN FAULT lt	4, 8
ESS BUSES ON BAT DC and AC ESS BUSES are supplied by batteries			ELEC	NIL	1, 2, 3, 4, 8, 9, 10
AC BUS 1 FAULT **AC BUS 2 FAULT** **AC ESS BUS SHED** **DC BUS 1 FAULT** **DC BUS 2 FAULT** **DC BUS 1 + 2 FAULT** **DC ESSBUS FAULT** **DC ESSBUS SHED** Bus(es) is (are) no longer supplied.	SINGLE CHIME	MASTER CAUTION	ELEC		4, 8
AC ESS BUS FAULT Bus is no longer supplied.				AC ESS FEED FAULT lt	
AC ESS BUS ALTN				NIL	3, 4, 5, 6, 7, 8
DC BAT BUS FAULT Bus is no longer supplied.					4, 5, 7, 8
DC EMER CONFIG DC BUS 1 and 2 and DC ESS BUS are not supplied.					4, 8
GEN 1(2) FAULT - Protection trip initiated by associated GCU, or - Opening of line contactor with GEN pb ON.				GEN 1(2) FAULT	1, 4, 5, 7, 8,10
GEN 1(2) OFF. GEN 1(2) pb OFF with no FAULT.				NIL	1, 3, 4, 5, 7, 8, 10
APU GEN FAULT - Protection trip initiated by associated GCU, or - Opening of line contactor with APU GEN pb-sw ON.				APU GEN FAULT lt	4, 5, 7, 8
GEN 1(2) or APU GEN OVERLOAD Load of one generator is above 100 % of rated output				GALLEY FAULT lt	3, 4, 5, 7, 8

Continued on the following page

Continued from the previous page

E/WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNINGS	FLT PHASE INHIB
IDG 1(2) OIL LO PR IDG oil pressure low				IDG 1(2) FAULT lt	1, 4, 5, 7, 8, 10
IDG 1(2) OIL OVHT IDG outlet oil TEMP above 185 °C					
IDG 1(2) DISCONNECTED on ground				IDG OFF lt	3 to 10
BAT 1(2) FAULT Charging current increases at an abnormal rate				BAT 1(2) FAULT lt	3, 4, 5, 7, 8
ESS TR FAULT				NIL	
C/B TRIPPED ON OVHD PNL **C/B TRIPPED ON L (R) ELEC BAY** **C/B TRIPPED REAR PNL J-M or N-R or S-V or W-Z** One C/B tripped in the designated zone.			NIL		3, 4, 5, 7, 8, 9, 10
BAT 1(2) OFF BAT pb OFF without fault.	NIL	NIL	ELEC		1, 3, 4, 5, 7, 8, 9, 10
TRI 1(2) FAULT					3, 4, 5,7, 8
BCL 1(2) FAULT					
STATIC INV FAULT			NIL		
EMER GEN 1 LINE OFF GEN 1 LINE pb-sw in OFF position.					1, 3, 4, 5, 7, 8, 9, 10

(1) The flight crew must call up the ELEC page on the upper ECAM by pressing and holding the ELEC pushbutton on the ECAM control panel.

MEMO DISPLAY

Applicable to: ALL

EMER GEN is displayed in green, when the emergency generator is running.

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AIRCRAFT SYSTEMS

EQUIPMENT

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DSC-25-PLP PRELIMINARY PAGES

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DSC-25-11 Cockpit Door Security System

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Cockpit Door Description....A

DSC-25-11-20 Cockpit Door Locking System (CDLS)

COCKPIT DOOR LOCKING SYSTEM (CDLS)....A

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DSC-25-11-30 Cockpit Door Surveillance System (CDSS)

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BUS EQUIPMENT LIST....A

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DSC-25-40-10 Cockpit

DSC-25-40-10-10 Description

Description....A

Localization Title	Toc Index	ID	Reason
DSC-25-10-20 General	A	1	Improvement of illustration quality.
DSC-25-10-70 Overhead Panel	A	1	Improvement of illustration quality
DSC-25-10-70 Overhead Panel	A	2	Improvement of illustration quality

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GENERAL

Applicable to: ALL

The aircraft and system controls, required for piloting the aircraft, are arranged in such a way that the crew faces forward and all crewmembers can monitor instruments and systems.
The designers concentrated system controls on the overhead panel by making extensive use of pushbuttons, directly installed in the system synoptic.

Note: *This section of the FCOM is designed to provide Operators with a general overview of the most common cockpit system configurations and cockpit panel layouts. Due to the large number of possible configurations and layouts, there may be a slight difference between these illustrations and the exact aircraft configuration.*
For the applicable panel that corresponds to your aircraft configuration, refer to the panel layout illustrations provided in the related FCOM chapter.

PRINCIPLES FOR PUSHBUTTONS WITH INTEGRATED INDICATIONS

Applicable to: ALL

Whenever possible, pushbuttons used for corrective actions, have integrated status and failure indications.

The pushbutton positions, and their illuminated indications, follow the "lights out" principle.

- While corresponding to particular aircraft configurations, indications also have the following color codes :
  - Warnings
    RED : A failure requiring immediate action.
  - Cautions
    AMBER : A failure, of which the flight crew should be aware, but does not call for immediate action.
  - Indications
    GREEN : For normal system operation.
    BLUE : For normal operation of a system used temporarily
    WHITE : - For an abnormal pushbutton position.
    - For a test result or maintenance information.

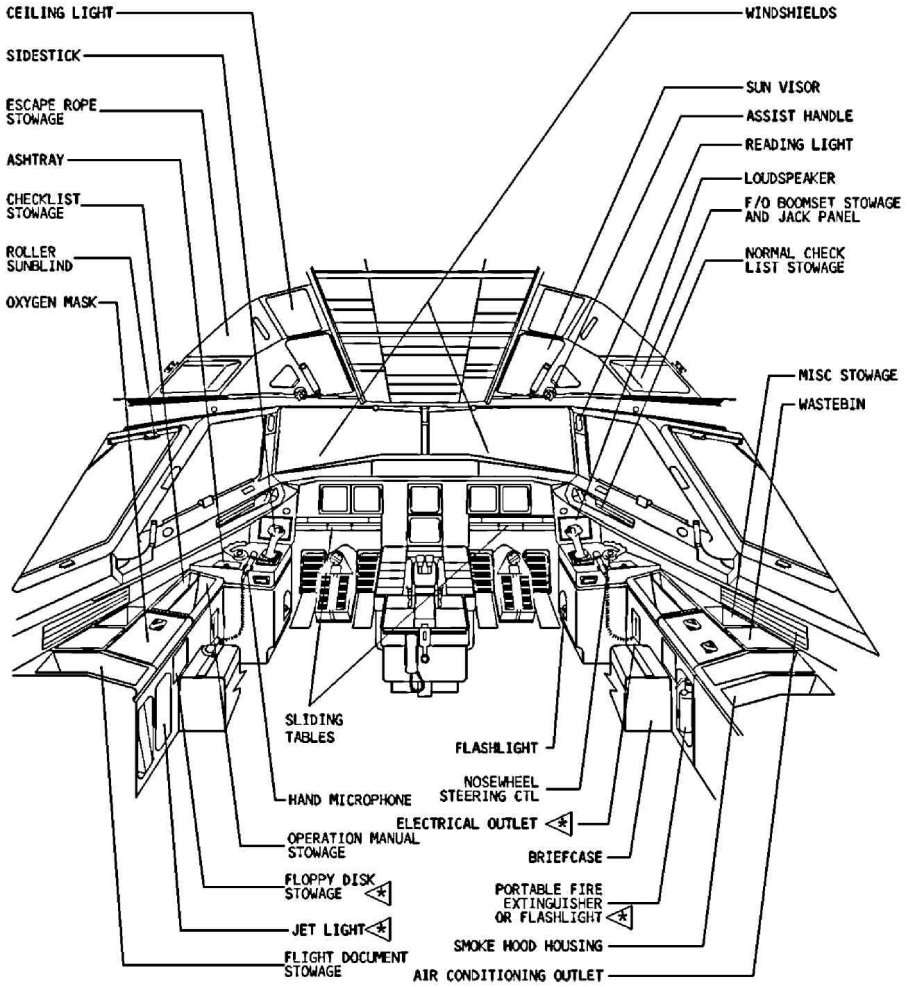
  When the aircraft is in a normal configuration, only green lights can be permanently lit, whereas blue lights can be intermittently.
- Pushbutton positions :

POSITION	BASIC FUNCTION
Pressed In	ON, AUTO, OVRD, OPEN
Released Out	OFF, MAN, ALTN, SHUT

Note: *1. Certain pushbutton lights have two dots, indicating that the corresponding part of the pushbutton is not used.*
2. Certain pushbuttons do not remain pressed in. These are referred to as "Momentary Action" pushbuttons.

GENERAL ARRANGEMENT

Applicable to: ALL



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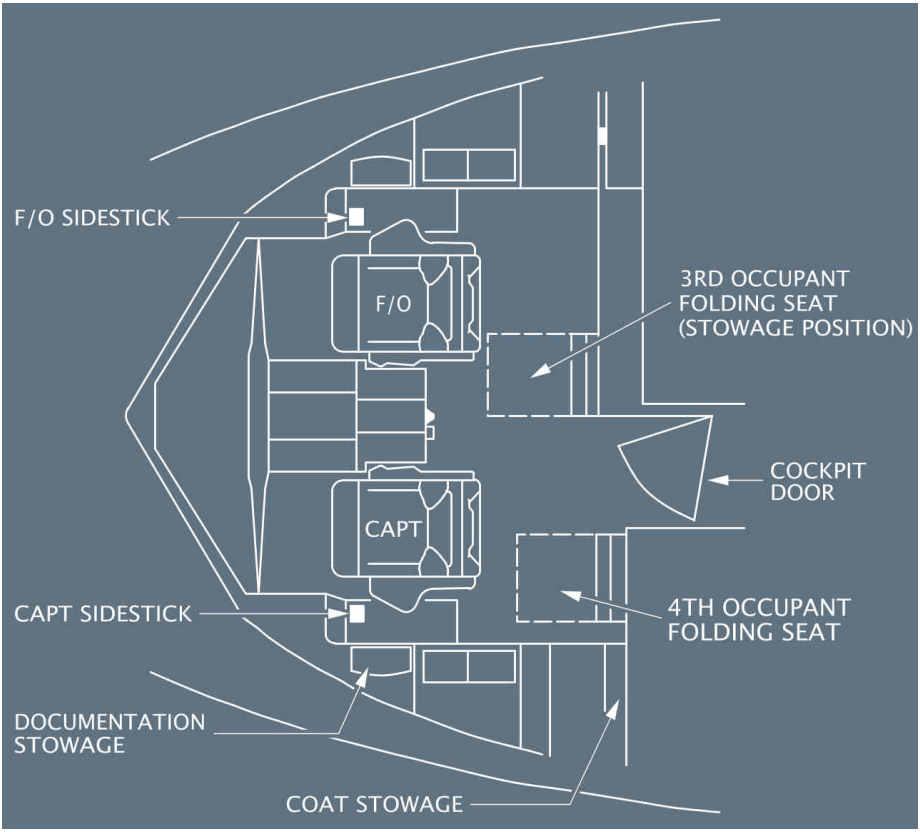
GENERAL

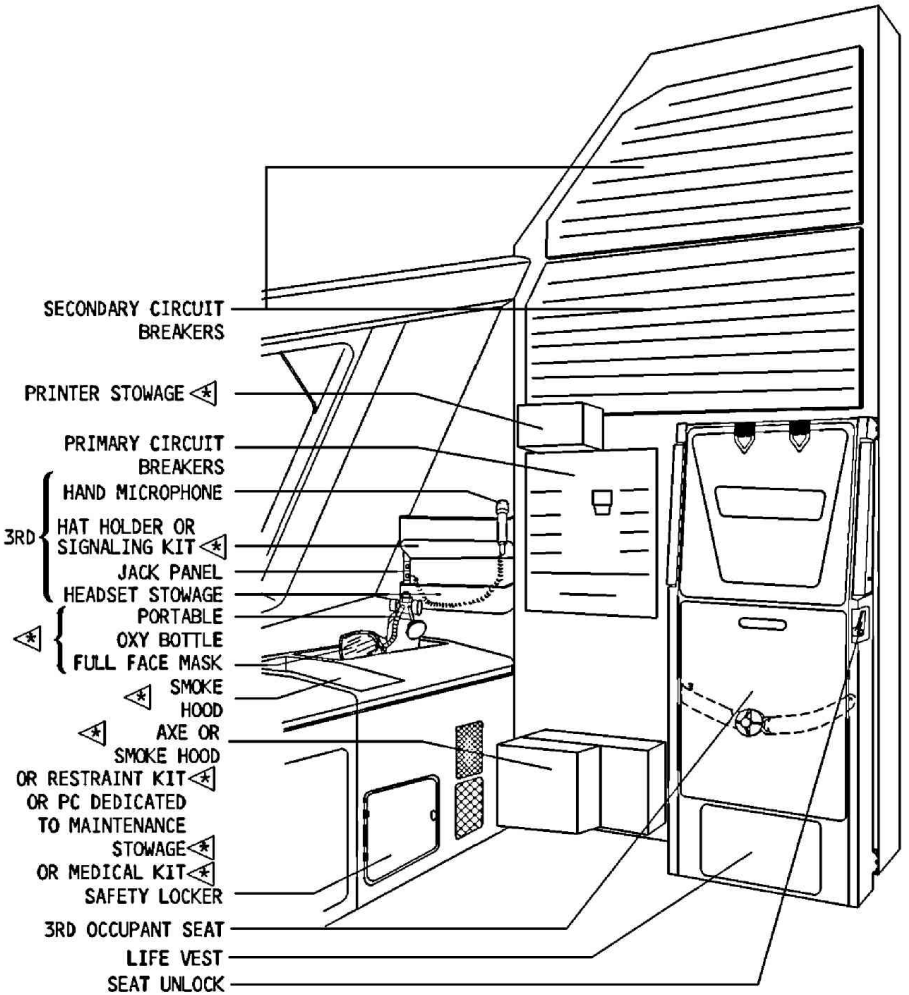
Applicable to: ALL

1 The cockpit can accommodate two crewmembers, plus a third and fourth occupant.
The two pilot seats are mounted on columns.
The third and fourth occupant seats are folding seats.



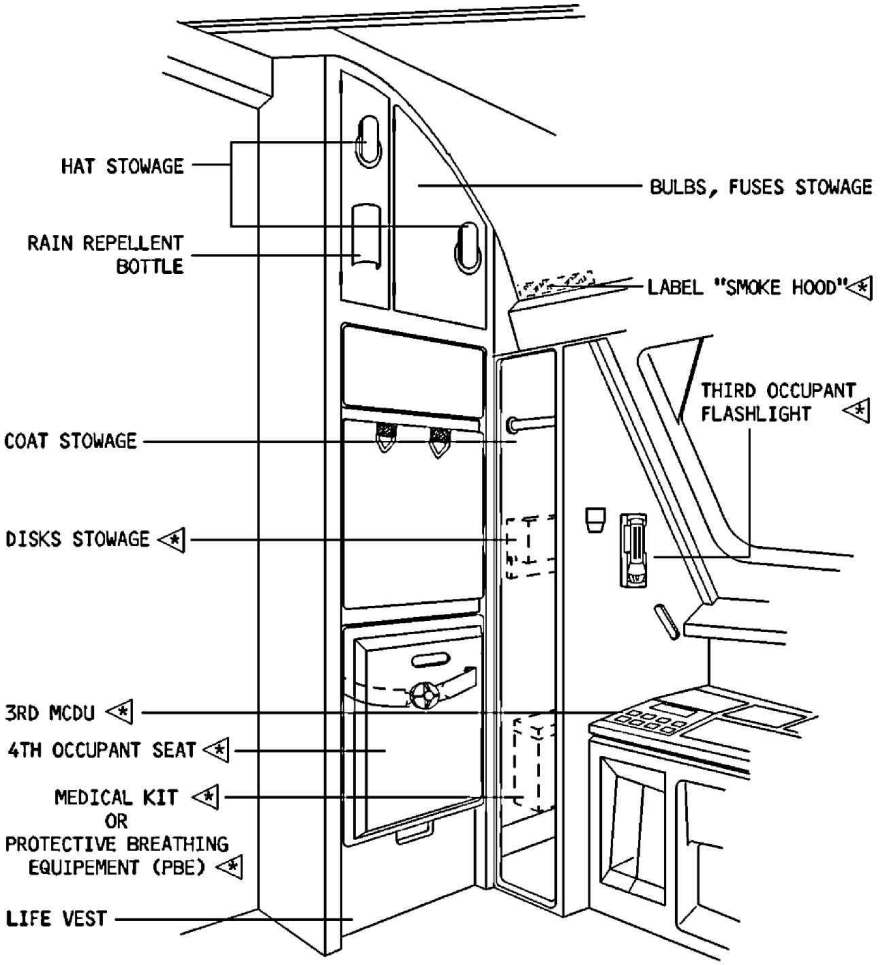
RIGHT REAR CORNER

Applicable to: ALL



LEFT REAR CORNER

Applicable to: ALL



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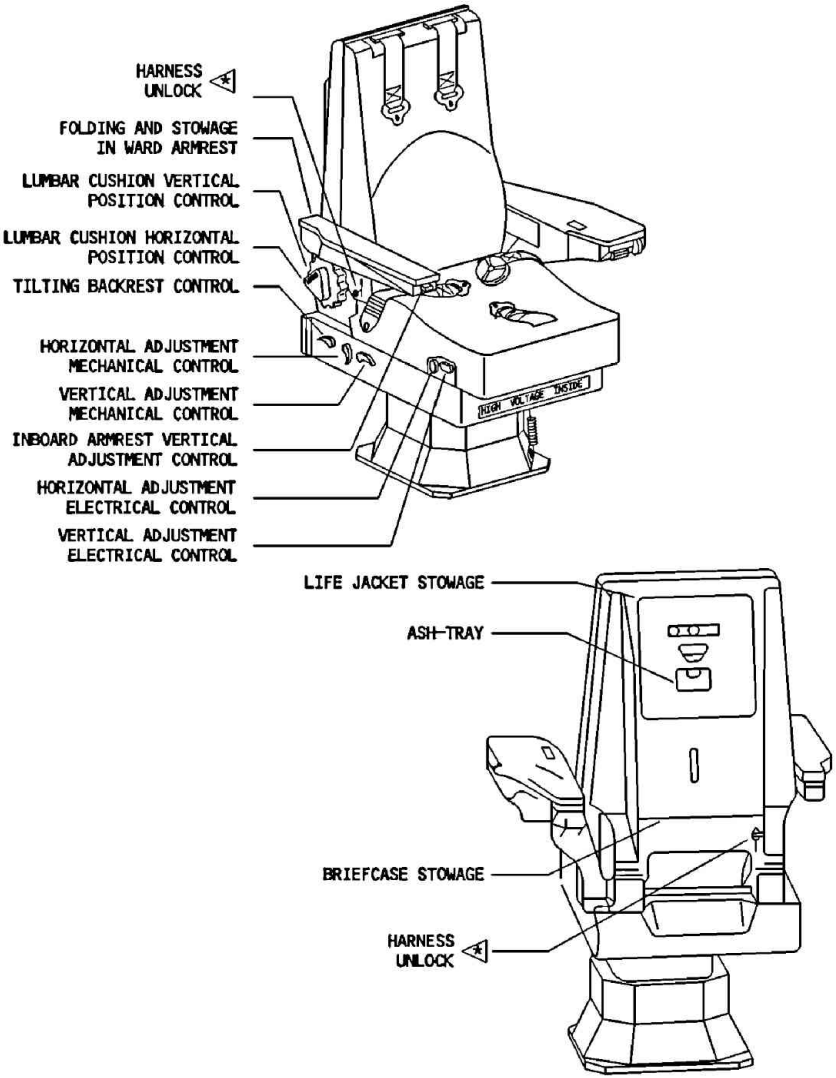
PILOT SEATS

Applicable to: ALL


HARNESS UNLOCK
FOLDING AND STOWAGE IN WARD ARMREST
LUMBAR CUSHION VERTICAL POSITION CONTROL
LUMBAR CUSHION HORIZONTAL POSITION CONTROL
TILTING BACKREST CONTROL
HORIZONTAL ADJUSTMENT MECHANICAL CONTROL
VERTICAL ADJUSTMENT MECHANICAL CONTROL
INBOARD ARMREST VERTICAL ADJUSTMENT CONTROL
HORIZONTAL ADJUSTMENT ELECTRICAL CONTROL
VERTICAL ADJUSTMENT ELECTRICAL CONTROL
LIFE JACKET STOWAGE
ASH-TRAY
BRIEFCASE STOWAGE
HARNESS UNLOCK

PILOT SEAT MECHANICAL ADJUSTMENT

Applicable to: ALL

To adjust a seat mechanically, the occupant must lift the appropriate control handle. This unlocks the seat so that it may be moved. Releasing the control handle returns it to springloaded locked position. On electrically-powered seats ◁ , the mechanical adjustment is a backup : The seat should be adjusted electrically.

PILOT SEAT ELECTRICAL ADJUSTMENT (IF INSTALLED)

Applicable to: ALL

To adjust a seat electrically, the occupant must press the appropriate control switch in the desired direction, and release it when the seat reaches the desired position. The switch then returns to the springloaded neutral position.

To adjust the vertical position of the lumbar cushion, the occupant must :
- Pull the control out to the unlocked position,
- Turn the control to adjust the position of the cushion, and
- Push the control into the locked position.

HEADREST ADJUSTMENT (IF INSTALLED)

Applicable to: ALL

To adjust the headrest in inclination, the occupant presses the inclination control button, and releases it to lock the position.
To control the height of the headrest, the occupant must push it horizontally, adjust the height, and release it to lock the position.

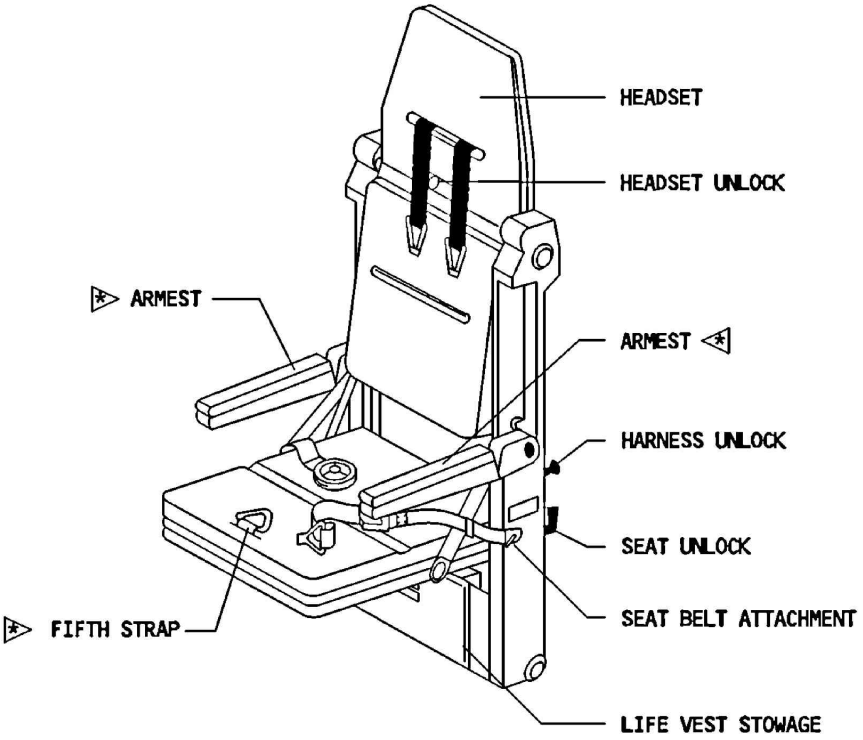
ARMREST ADJUSTMENT

Applicable to: ALL

To adjust the inboard armrest, the occupant must turn the knurled knob, located on the bottom surface of the armrest.

OBSERVER SEAT

Applicable to: ALL



OBSERVER SEAT ADJUSTMENT

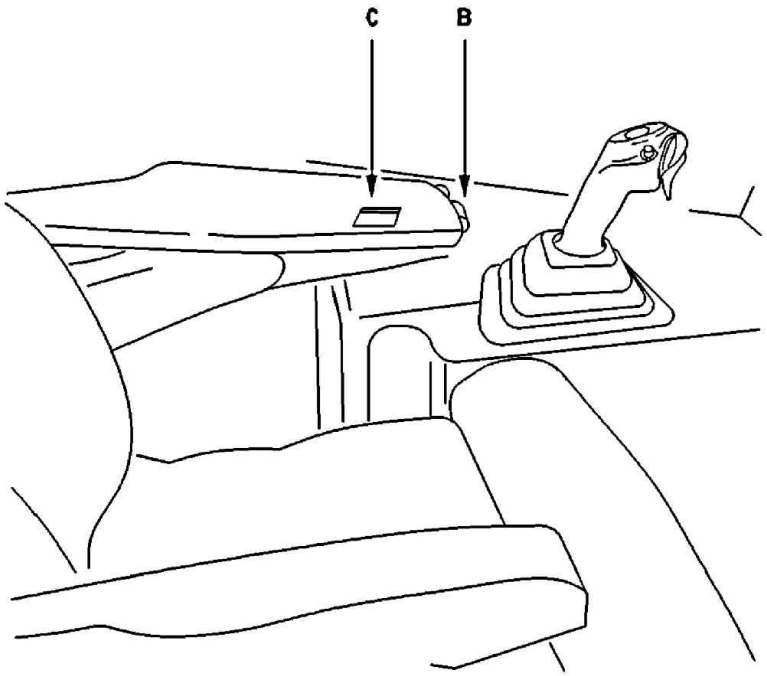
Applicable to: ALL

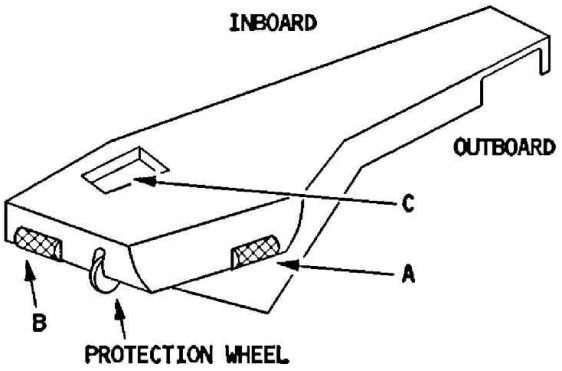
This seat has three positions :

- Normal : Centered on aircraft axis.
- Intermediate : Clear of the cockpit entrance.
- Stowed : Seat vertical and headrest folded back. The seat is usable in this position, and does not impede access to the documents and equipment on the right side of the cockpit.

ARM REST

Applicable to: ALL





The position of the arm rest is adjustable as follows:

A. Height adjustment

B. Pitch adjustment

The armrest also has a memory display (C) that shows pitch and height.

GENERAL

Applicable to: ALL

The cockpit has fixed and sliding windows.

FIXED WINDOWS

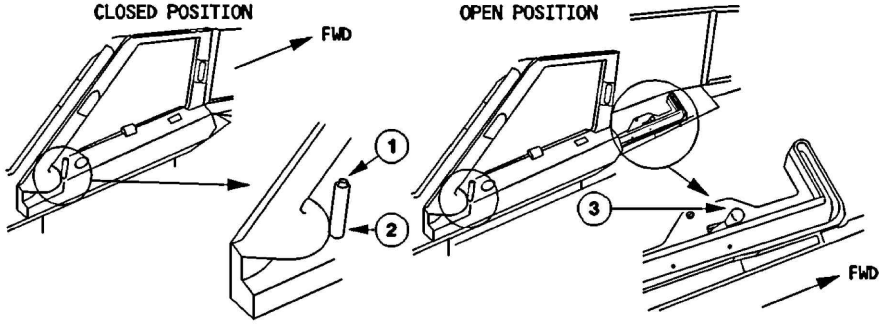
Applicable to: ALL

There are four fixed windows :
- two windshields
- two fixed side windows

SLIDING WINDOWS

Applicable to: ALL

The flight crew can use the sliding windows as emergency exits. Therefore they are not permitted to stow any object so that it protrudes into the window area from the side console. Members of the flight crew can use the control handle to slide each of the windows rearward, and can use a locking pin to lock each window open.



(1) Unlocking button
Flight crew presses this button to unlock the control handle.

(2) Control handle

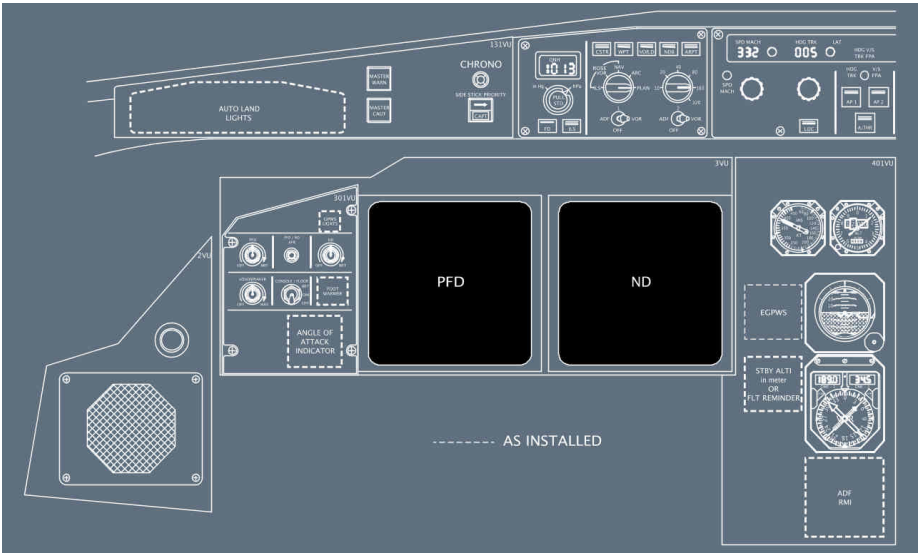
- To open the window, the crew member pulls inward and rearward.
- To close the window, the crew member pushes forward.

(3) Locking pin
This pin locks the window open.
It is near the window's lower guide track and is visible when the window is open.

- Forward
  Between the closed position and the one-third open position, the window is free to move forward and aft.
  When the window is more than one-third open, this pin prevents it from moving forward.
- Aft
  Flight crew must move the locking pin aft in order to close the window. Left sliding window.

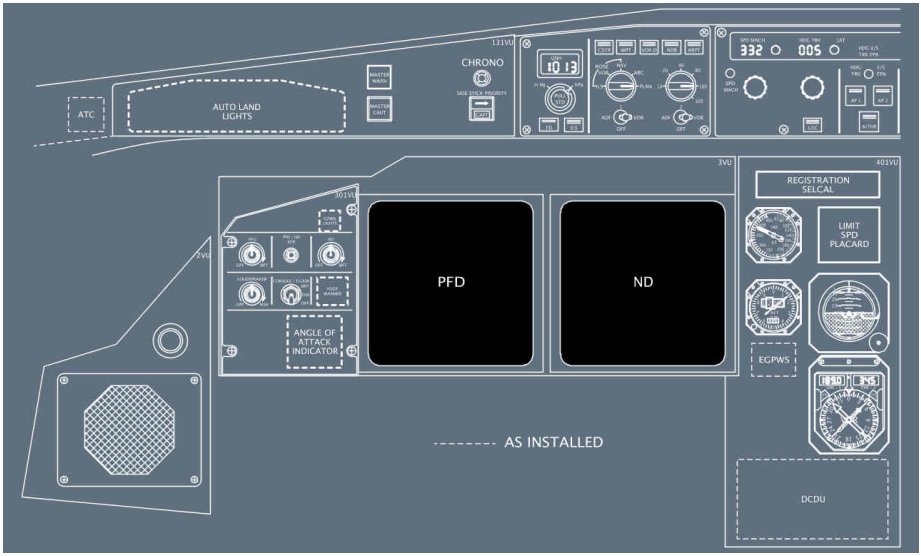
PILOT'S INSTRUMENT PANELS - CAPTAIN SIDE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



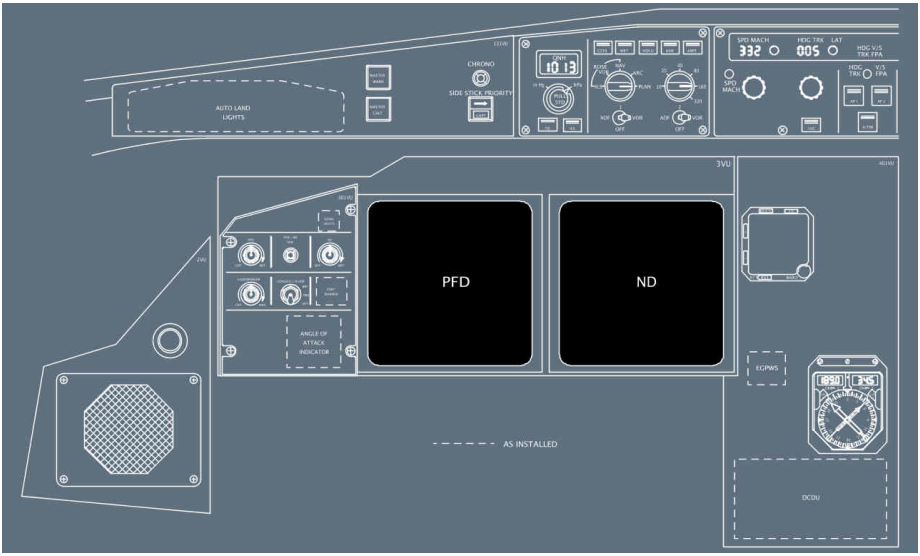
PILOT'S INSTRUMENT PANELS - CAPTAIN SIDE

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI



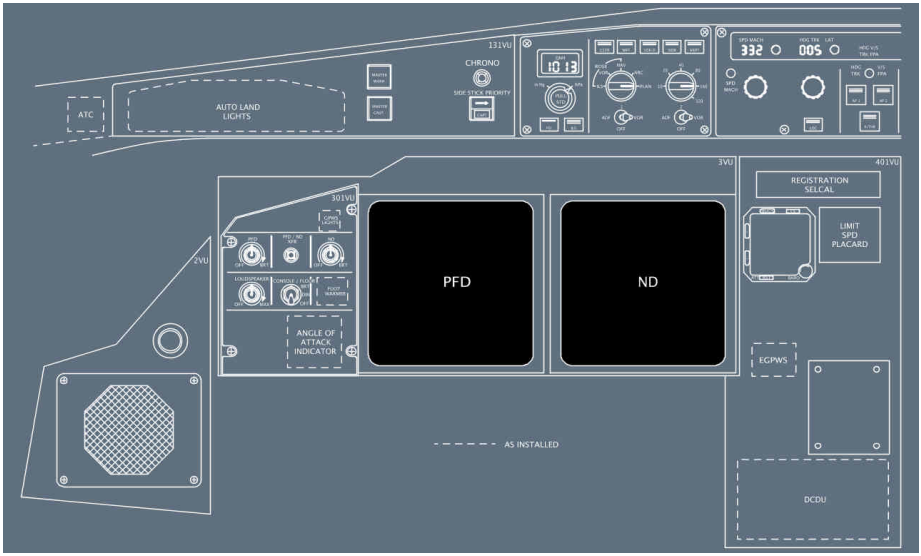
PILOT'S INSTRUMENT PANELS - CAPTAIN SIDE

Applicable to: B-HSL, B-HSM, B-HSN



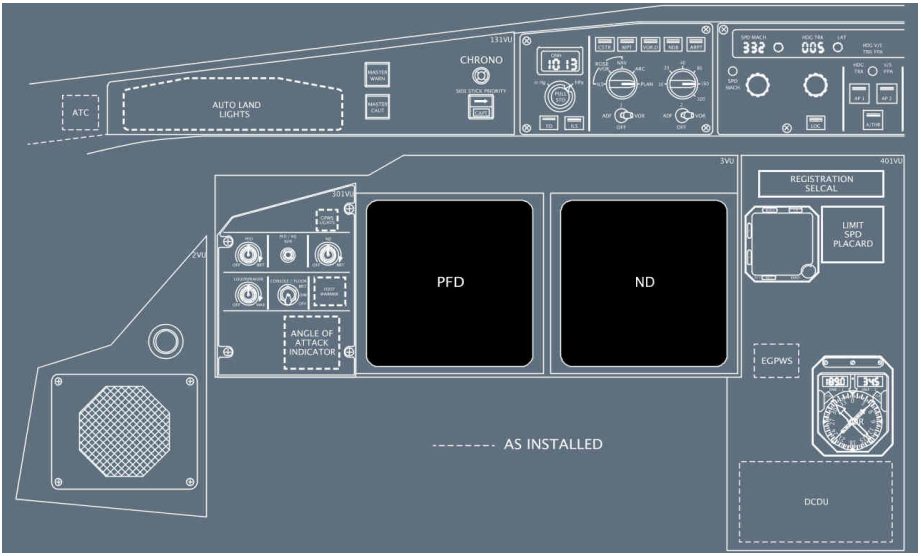
PILOT'S INSTRUMENT PANELS - CAPTAIN SIDE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU



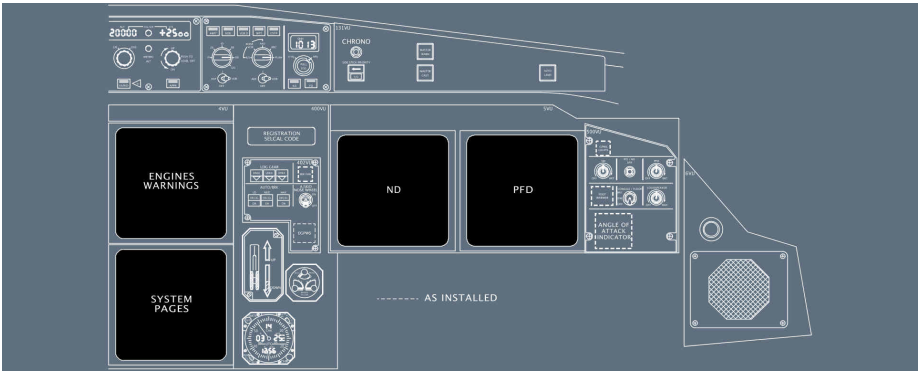
PILOT'S INSTRUMENT PANELS - CAPTAIN SIDE

Applicable to: B-HSO, B-HSP



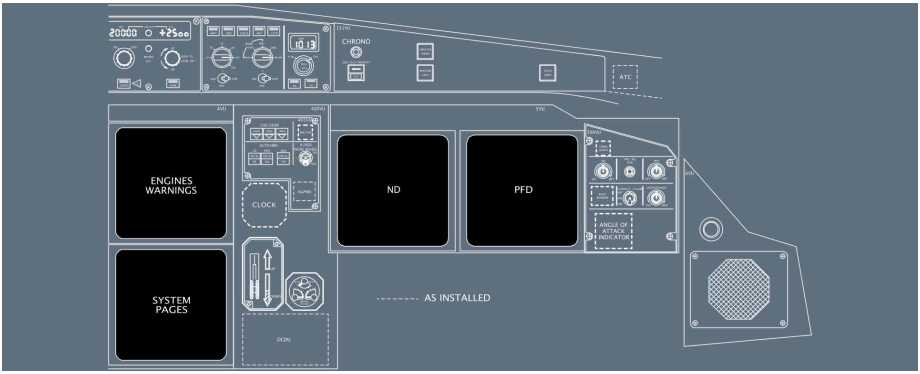
PILOT'S INSTRUMENT PANELS - FIRST OFFICER SIDE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



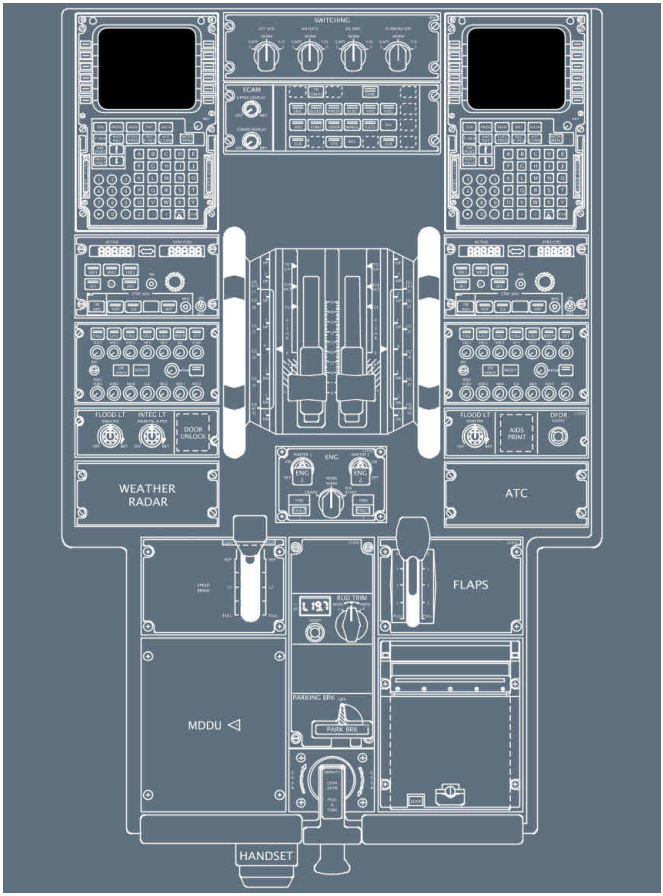
PILOT'S INSTRUMENT PANELS - FIRST OFFICER SIDE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



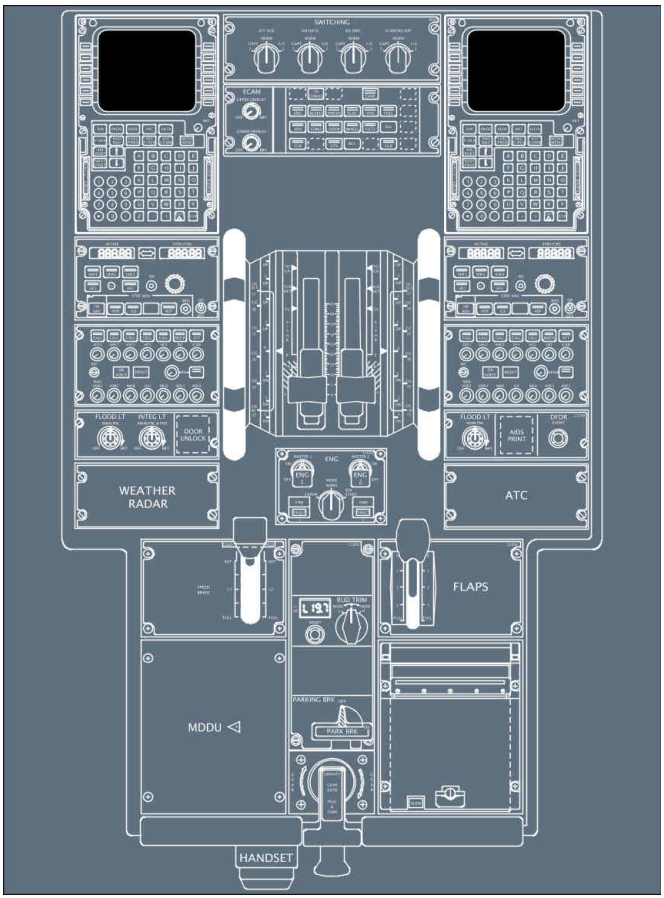
PEDESTAL

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF



PEDESTAL

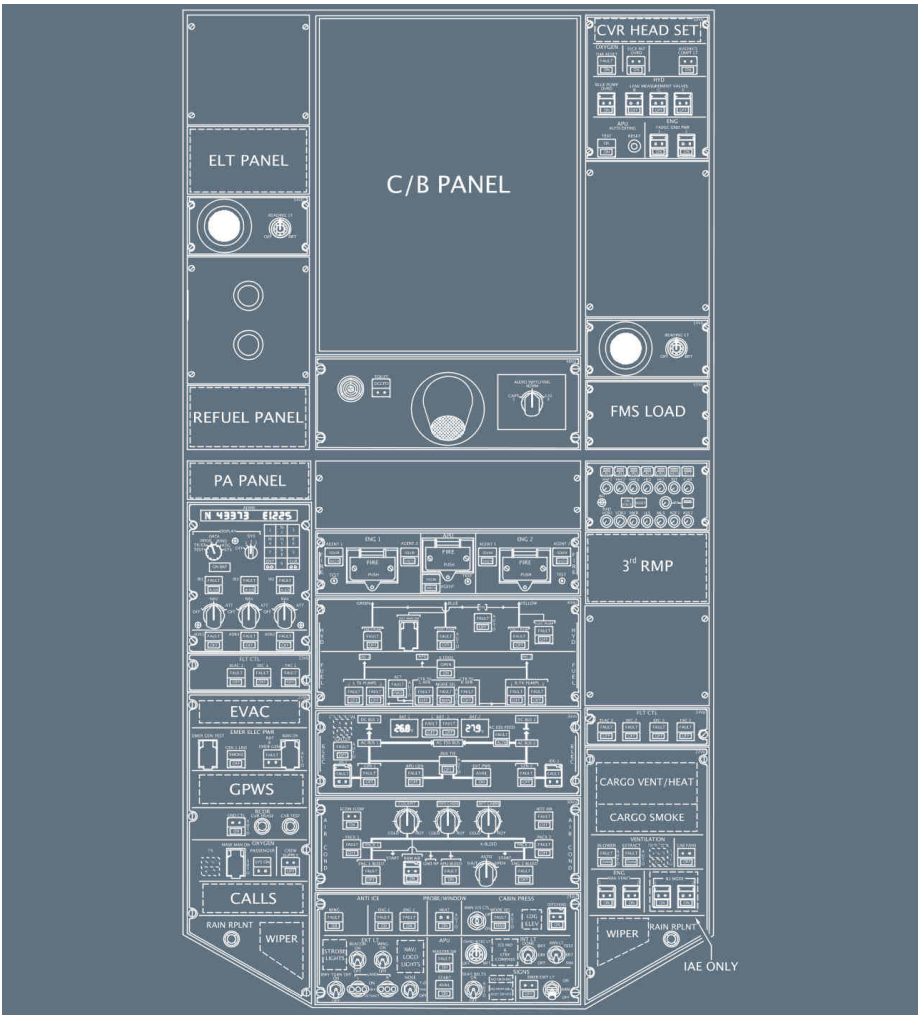
Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI



OVERHEAD PANEL

Applicable to: ALL 321

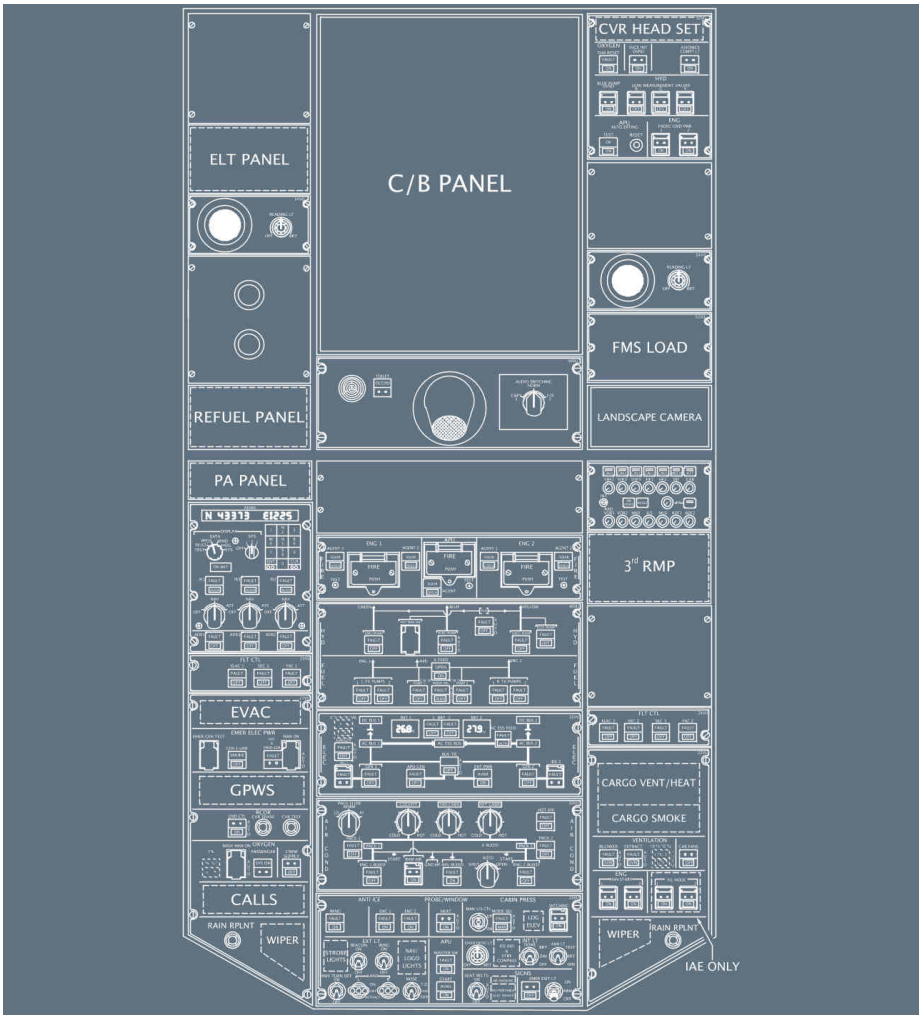
1



OVERHEAD PANEL

Applicable to: ALL 320

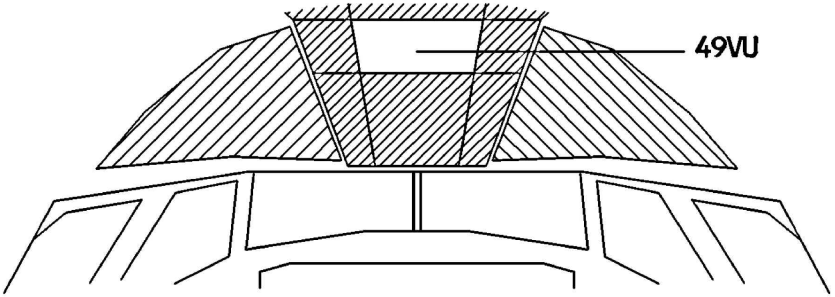
2



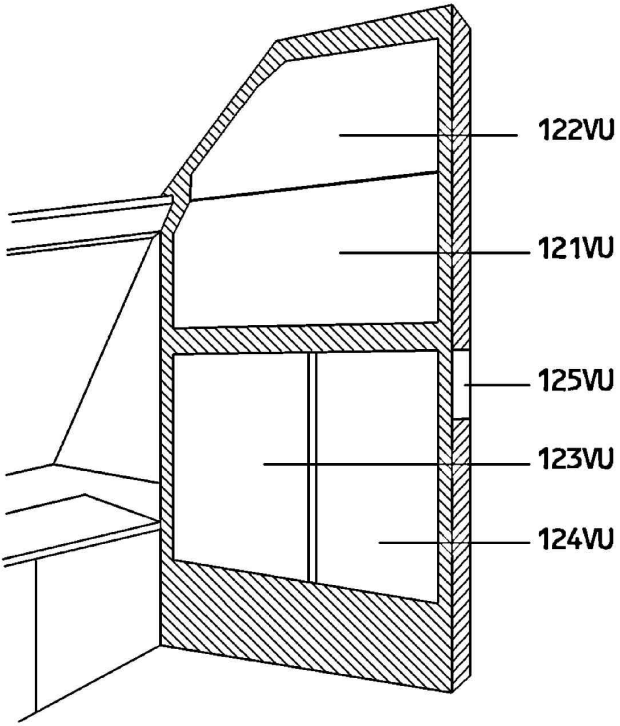
C/B PANELS

Applicable to: ALL

OVERHEAD PANEL



RIGHT REAR PANEL



BUS EQUIPMENT LIST

Applicable to: ALL

	NORM			EMER ELEC		
	AC	DC	DC BAT	AC ESS	DC ESS	HOT
CAPTAIN SEAT motors ◁	AC1					
F/O SEAT motors ◁	AC2					
FOOT WARMERS ◁	AC2					

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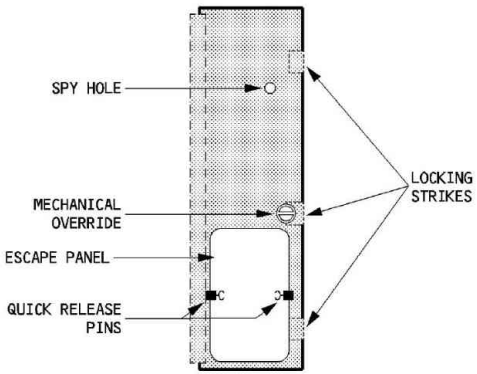
COCKPIT DOOR DESCRIPTION

Applicable to: B-HSQ, B-HSR

A forward-opening hinge door separates the cockpit from the passenger compartment. It has three electric locking strikes, controlled by the flight crew. In normal conditions, when the door is closed, they remain locked. When there is a request to enter the cockpit, the flight crew can authorize entry by unlocking the door, that remains closed until it is pushed open.
When the flight crew does not respond to requests for entry, the door can also be unlocked by the cabin crew, by entering a two to seven-digit code (programmed by the airline) on the keypad, installed on the lateral side of the Forward Attendant Panel (FAP).
The door is bulletproof and fully compliant with rapid decompression requirements.
A mechanical override enables the flight crew to open the door from the cockpit side.



Note: *1. The escape panel enables the flight crew to evacuate the cockpit, in case of an emergency when the door is jammed. This panel can only be removed from the cockpit side by pulling the quick release pins towards the center of the flap and kicking the panel open.*

2. In case of an electrical supply failure, the door is automatically unlocked, but remains closed.

COCKPIT DOOR DESCRIPTION

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

A forward-opening hinge door separates the cockpit from the passenger compartment. It has three electric locking strikes, controlled by the flight crew. In normal conditions, when the door is closed, they remain locked. When there is a request to enter the cockpit, the flight crew can authorize entry by unlocking the door, that remains closed until it is pushed open.

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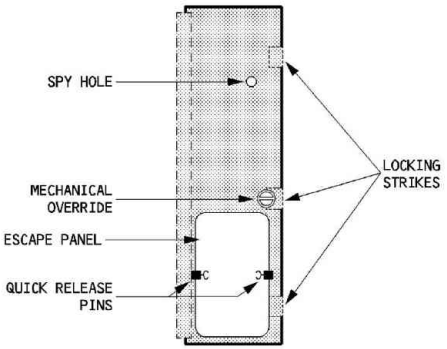
The door is bulletproof and fully compliant with rapid decompression requirements.
A mechanical override enables the flight crew to open the door from the cockpit side.
A deadbolt is installed at the level of the center latch area of the cockpit door. This deadbolt bolts the door from the cockpit side, in the event that more than one locking latch strike fails, or in the case of a total CLS failure.



Note: *1. The escape panel enables the flight crew to evacuate the cockpit, in case of an emergency, when the door is jammed. This panel can only be removed from the cockpit side by pulling the quick release pins towards the center of the flap and kicking the panel open.*

2. In case of an electrical supply failure, the door is automatically unlocked, but remains closed.

COCKPIT DOOR LOCKING SYSTEM (CDLS)

Applicable to: ALL

The Cockpit Door Locking System (CDLS) provides a means of electrically locking and unlocking the cockpit door. This system is mainly composed of :
- A keypad, located in the forward cabin, near the cockpit door,
- A toggle switch, located in the center pedestal's Cockpit Door panel,
- A control unit and its CKPT DOOR CONT normal panel, located on the overhead panel,
- A buzzer.

The keypad enables the cabin crew to request access to the cockpit. There are two different access request types : "Routine" and "Emergency" access request (*Refer to PRO-SUP-25 Cockpit Door Operation - General*).
The toggle switch enables the flight crew to lock or unlock the cockpit door, following an access request, thereby allowing or denying the entry to the cockpit.

The cockpit door control unit is the system controller, in charge of :
- Locking or unlocking the door latches, upon flight crew action.
- Unlocking the door, in case of cockpit decompression (the door then opens towards the cockpit under differential pressure).
- Indicating system failures of electrical latches and pressure sensors.
- Activating the access request buzzer and turning on the keypad LEDs.

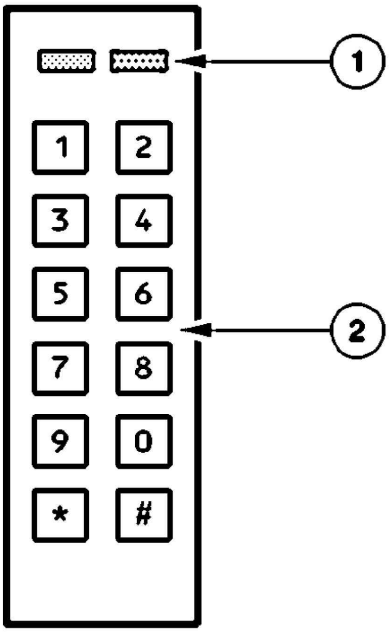
The buzzer sounds in the cockpit for 1 to 9 s to indicate that a routine access request has been made, or sounds continuously if an emergency access procedure has been initiated.

CONTROLS

Applicable to: ALL

KEYPAD

The keypad is used by the cabin crew to request pilots to open the door (*Refer to PRO-SUP-25 Cockpit Door Operation - General*).



(1) Locked/Unlocked Door Indicator

GREEN light ON : The door has been unlocked either by a flight crew action, or automatically (during 5 s) when no flight crew action is performed during the delay following an emergency access request. The door can be pushed open.

GREEN light flashes : An emergency request to enter the cockpit has been made; the buzzer will sound continuously in the cockpit, but no action has yet been taken by the flight crew.

RED light ON : The flight crew has denied access, and the door remains locked.

(2) Digital Keypad

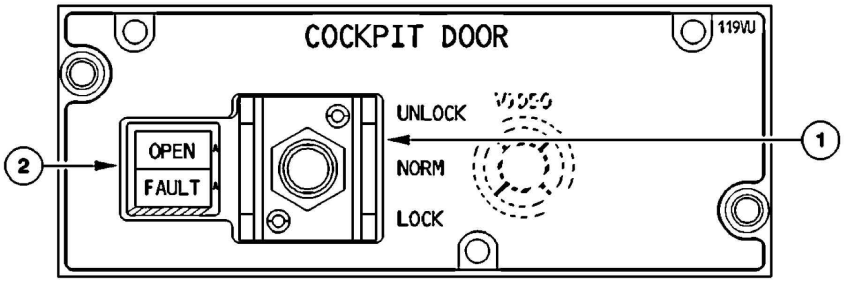
The keypad is used to sound the buzzer in the cockpit for 1 to 9 s (3 s by default), by entering a zero to seven-digit code, as programmed by the airline, followed by the '#' key. It is also used to enter the two to seven-digit emergency code, followed by the '#' key, when the flight crew does not respond.

Note: During the test performed by the cockpit door control unit, the CDLS keypad remains operational, and the CDLS operates as follows:
The control unit will store access codes that are entered, and the LOCKED/UNLOCKED DOOR INDICATOR (RED/GREEN LEDs) of the keypad will remain on, as long as the test is running.

- *If the correct access code is entered on the keypad, the buzzer will not sound, until the test is completed.*
- *If the emergency access code is entered, the door will unlock. The cockpit buzzer and the LOCKED/UNLOCKED DOOR INDICATOR will be inoperative.*

CENTRAL PEDESTAL COCKPIT DOOR PANEL

The secured cockpit door opening is controlled by a toggle switch, located on the central pedestal.



(1) COCKPIT DOOR toggle switch

UNLOCK position : This position is used to enable the cabin crewmember to open the door. The switch must be pulled and maintained in the unlock position until the door is pushed open.

NORM position : All latches are locked, and EMERGENCY access is possible for the cabin crew.

LOCK position : Once the button has been moved to this position, the door is locked ; emergency access, the buzzer, and the keypad are inhibited for a preselected time (5 to 20 min).

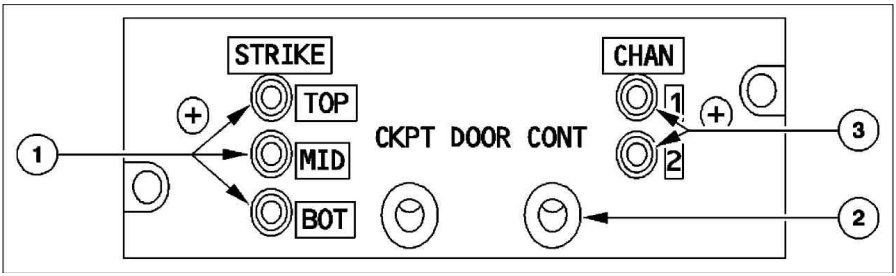
Note: *1. If the LOCK position has not been used by the pilot, for at least 5 to 20 min, the cabin crew is able to request emergency access to open the cockpit door.*
2. The UNLOCK position overrides and resets any previous selection.
3. In case of an electrical supply failure, the cockpit door is automatically unlocked, but remains closed.

(2) COCKPIT DOOR Fault Open indicator

OPEN light ON	:	The door is not closed, or not locked.
OPEN light flashes	:	The cabin crew has started an emergency access procedure. If there is no reaction from the flight crew, the door will unlock at the end of the adjustable time delay (15 to 120 s).
FAULT	:	This light comes on when a system failure has been identified (Example : Latch, pressure sensors, control unit). The inoperative item can be identified by checking the strike and pressure sensor status lights on the CKPT DOOR CONT panel.

OVERHEAD CONTROL PANEL

The Cockpit Door Locking System's control panel is located on the overhead panel.



(1) Strikes' status lights

Off : The corresponding (upper, mid, or lower) locking latch is operative.

On : The corresponding (upper, mid, or lower) locking latch is faulty.

(2) Pressure sensor

Two redundant differential pressure sensors enable rapid pressure variation in the cockpit to be detected, in order to command simultaneous opening of all latches when a defined pressure drop is detected.

(3) Pressure sensor status lights

Off : The corresponding (1 or 2) pressure sensor is operative.

On : The corresponding (1 or 2) pressure sensor is faulty.

Note: *These indicators enable the crew to identify the faulty item, when the Central Pedestal Fault indicator light is ON.*

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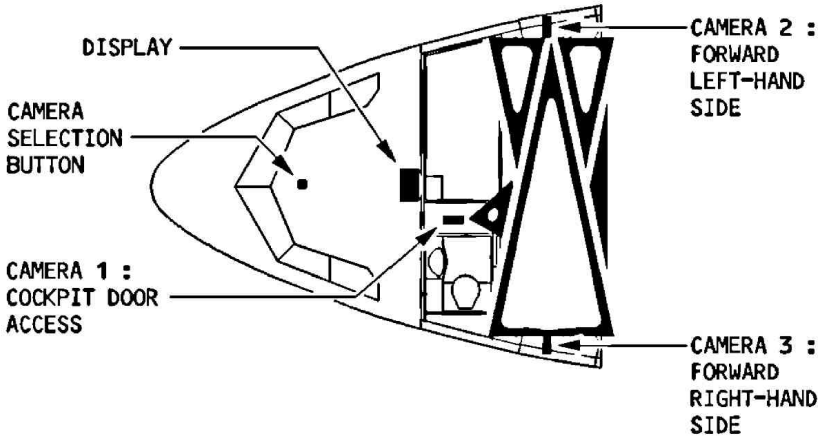
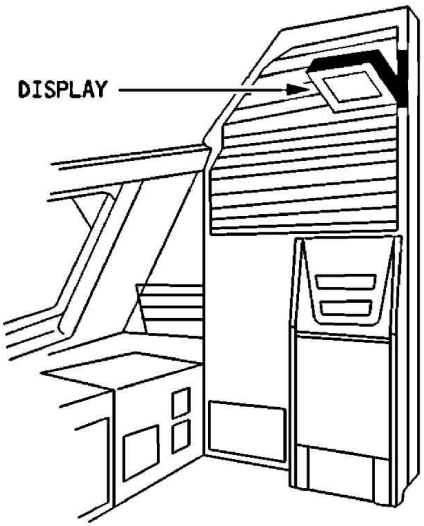
GENERAL

Applicable to: B-HSQ, B-HSR

The Cockpit Door Surveillance system consists of three video cameras, which enable the flight crew to identify persons prior to authorizing their entry into the cockpit. An LCD display, located on the rear panel, shows the various camera views. It has automatic brightness adjustment and is activated by the Cockpit Door Video pb.



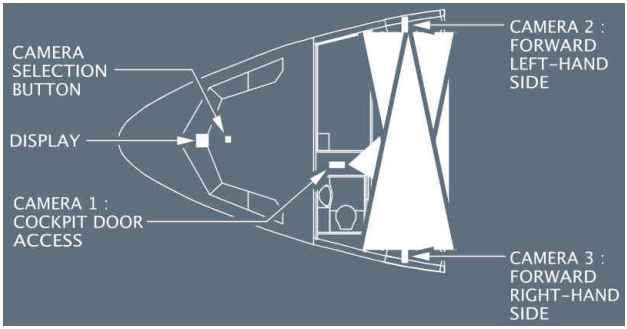


GENERAL

Applicable to: B-HSO, B-HSP, B-HST, B-HSU

The Cockpit Door Surveillance System (CDSS) consists of three video cameras, that enable the flight crew to identify persons prior to authorizing their entry into the cockpit. The lower ECAM display displays the various camera views. A control panel, located on the central pedestal allows the flight

crew members to select the CDSS display on the SD and to swap between the different camera views.

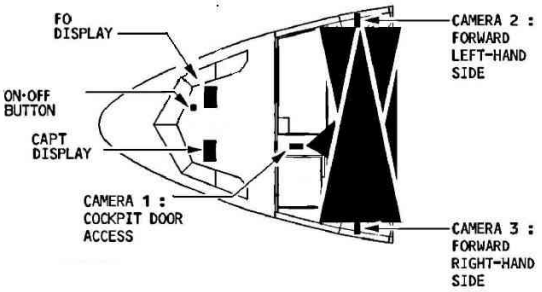


GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The Cockpit Door Surveillance System (CDSS) consists of three video cameras, that enable the flight crew to identify persons prior to authorizing their entry into the cockpit. Two LCD displays, mounted forward of the side sticks, show the various camera views. Viewing camera selection is performed by touching the LCD display to activate a selection menu and then touching the screen icon corresponding to the desired camera. The LCD display is turned on by touching the screen where there is no icon. Display brightness is affected by repeatedly touching the desired brightness control icon.

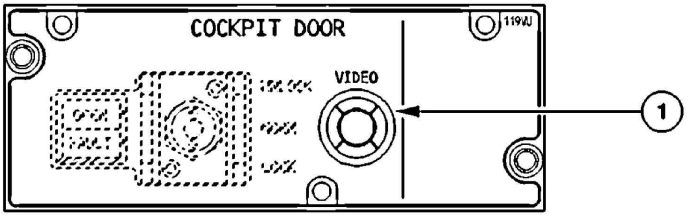
Additionally, there is a Cabin Ready feature which allows the cabin crew to indicate to the cockpit that the cabin has been prepared for takeoff or landing. The Cabin Ready switch, located adjacent to the FAP at door L1, illuminates green when pressed. This sends a signal to the LCD displays, which then annunciate 'CABIN READY'. Touching either monitor cancels the annunciation on the displays and extinguishes the Cabin Ready switch in the cabin.



CONTROLS

Applicable to: B-HSQ, B-HSR

CENTRAL PEDESTAL

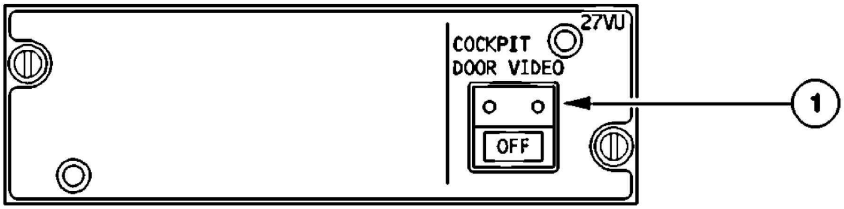


(1) Cockpit Door Video pb
Selects the various camera image displays.

Camera 1 image	:	Displayed by pressing the pushbutton when the screen is on standby, or after Camera 2 and 3 images have been displayed. Automatically displayed, after an entry request is performed on the keypad.
Camera 2 and 3 images	:	Displayed on a split screen, when the pushbutton is pressed after Camera 1's image has been displayed.
Standby	:	If the pushbutton is maintained pressed for at least two seconds, or if no action has been taken for 5 min, the screen goes blank and remains on standby.

Note: An entry request, performed on the keypad within 30 s following an earlier entry request, will not lead to the automatic selection of Camera 1, since the flight crew is given authority to select any desired camera image via the cockpit door video pb. After these 30 s, the system reverts to its normal operation.

OVERHEAD PANEL



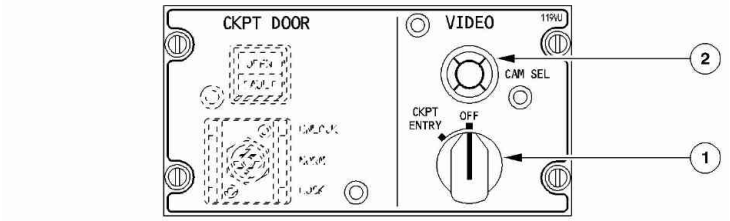
(1) Cockpit Door Video pb

OFF: The Cockpit Door Surveillance System is manually de-energized.

CONTROLS

Applicable to: B-HSO, B-HSP, B-HST, B-HSU

CENTRAL PEDESTAL



(1) Lower ECAM rotary selector

CKPT ENTRY : The lower ECAM displays the camera 1 image.

The camera images are not displayed on the Lower ECAM display in the case of:
- A subsequent automatic system page call following a warning, a caution, or an advisory, or
- A subsequent manual selection of a system page on the ECAM Control Panel (ECP), or
- A SD failure, or
- An E/WD failure.

OFF : The lower ECAM display operates normally.

(2) Lower ECAM CAM SEL

Selects various camera image displays, when the lower ECAM rotary selector is set to the CKPT ENTRY position.

The image from camera 1 appears:
- Automatically, when the lower ECAM rotary selector is set to the CKPT ENTRY position.
- When images from cameras 2 and 3 are displayed, and after the flight crew presses the lower ECAM CAM SEL pb
- Automatically, when images from cameras 2 and 3 are displayed, and after a crew member uses the cabin keypad to make an entry request at least 30 s after a previous entry request.

Images from cameras 2 and 3 are displayed simultaneously on a split screen, when the image from camera 1 is displayed, and after the flight crew presses the lower ECAM CAM SEL pb.

Note: *1. The message "PLEASE WAIT" is displayed during the transition between two video images when the flight crew requests an image change.*
2. The message "VIDEO NOT AVAIL" is displayed when the flight crew requests a video image and no image can be displayed.

OVERHEAD PANEL



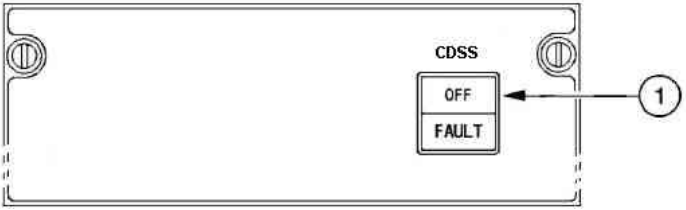
(1) Cockpit Door Video pb

OFF : The Cockpit Door Surveillance System (CDSS) is manually de-energized.

CONTROLS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

OVERHEAD PANEL



(1) Cockpit Door Surveillance System pb-sw

OFF : The Cockpit Door Surveillance System is manually de-energized.

FAULT lt : The amber fault light illuminates if a fault condition exists.

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BUS EQUIPMENT LIST

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSQ, B-HSR

	NORM			EMER ELEC		
	AC	DC	DC BAT	AC ESS	DC ESS	HOT
COCKPIT DOOR LOCKING SYSTEM ⋘		DC2				
COCKPIT DOOR LOCKING SYSTEM BACKUP ⋘		DC1				
COCKPIT DOOR SURVEILLANCE SYSTEM ⋘		DC1				

BUS EQUIPMENT LIST

Applicable to: B-HSO, B-HSP, B-HST, B-HSU

	NORM			EMER ELEC		
	AC	DC	DC BAT	AC ESS	DC ESS	HOT
COCKPIT DOOR LOCKING SYSTEM ⋘		DC2				
COCKPIT DOOR LOCKING SYSTEM BACKUP ⋘		DC1				
COCKPIT DOOR SURVEILLANCE SYSTEM ⋘	AC1					

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BUS EQUIPMENT LIST

Applicable to: ALL

	NORM			EMER ELEC		
	AC	DC	DC BAT	AC ESS	DC ESS	HOT
IN SEAT POWER SUPPLY ◁	AC2					

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Description

DESCRIPTION

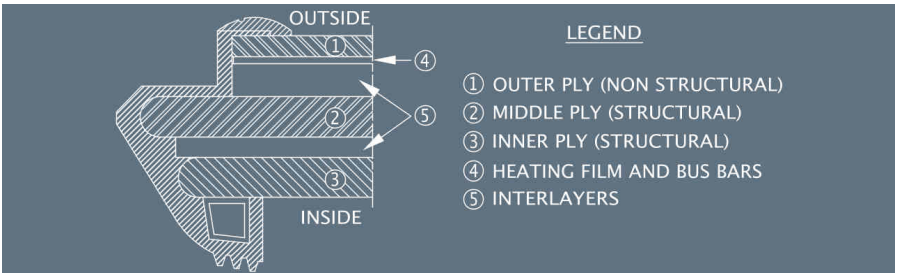
Applicable to: ALL

COCKPIT WINDSHIELD AND WINDOWS DESCRIPTION

All cockpit windows are fail-safe design.
The windows are made of:

- A non structural ply, the Outer ply (1), which is only a protective layer
- Two structural plies, the Middle ply (2) and the Inner ply (3)
  Each structural ply is able to sustain individually the pressurization loads
- A heating film (4) to defog and/or de-ice the windshield/window
- Two interlayers (5).

Typical Structure Of A Cockpit Window (Cut View)



For information on cockpit window damage procedure, description and evaluation method, *Refer to PRO-ABN-80 COCKPIT WINDSHIELD/WINDOW CRACKED* and, *Refer to FCTM/AO-090 COCKPIT WINDSHIELD/WINDOW CRACKED*.

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AIRCRAFT SYSTEMS

FIRE PROTECTION

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DSC-26-PLP PRELIMINARY PAGES

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Fire Extinguishing....A

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Localization Title	Toc Index	ID	Reason
DSC-26-30-10 Description	A	1	Improvement of illustration quality.
DSC-26-50-10 Smoke Detection	A	1	Improvement of illustration quality.
DSC-26-50-10 Smoke Detection	A	2	Improvement of illustration quality.
DSC-26-50-10 Smoke Detection	A	3	Improvement of illustration quality.
DSC-26-50-20 Fire Extinguishing	A	1	Improvement of illustration quality.
DSC-26-50-20 Fire Extinguishing	A	2	Improvement of illustration quality.
DSC-26-50-30 Overhead Panel	A	1	Improvement of illustration quality.
DSC-26-50-30 Overhead Panel	A	2	Improvement of illustration quality.
DSC-26-50-30 Overhead Panel	A	3	Improvement of illustration quality.
DSC-26-50-40 Warnings and Cautions	A	1	Documentation update: Addition of "Warnings and Cautions" documentary unit

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DESCRIPTION

Applicable to: ALL

Aircraft Fire Protection Systems are comprised of :

- Fire and overheat detection and extinguishing systems for the :
  - Engines
  - APU
- Smoke detection and extinguishing systems for the :
  - Cargo compartments
  - Lavatories
- Smoke detection for the :
  - Avionic bay
- Portable fire extinguishers for the :
  - Flight compartment
  - Passenger cabin

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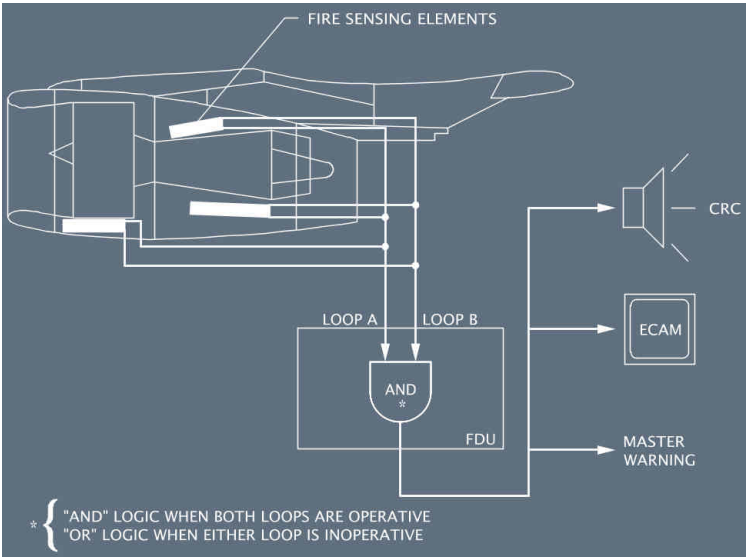
DETECTION

Applicable to: ALL

The engines and the APU each have a fire and overheat detection system consisting of:
- Two identical gas detection loops (A and B) mounted in parallel
- A Fire Detection Unit (FDU).

The gas detection loops consist of:
- Three sensing elements for each engine, one in the pylon nacelle, one in the engine core and one in the engine fan section
- One sensing element in the APU compartment.

When a sensing element is subjected to heat, it sends a signal to the fire detection unit.
As soon as loops A and B detect temperature at a preset level, they trigger the fire warning system.
A fault in one loop (break or loss of electrical supply) does not affect the warning system.
The unaffected loop still protects the aircraft.
If the system detects an APU fire while the aircraft is on the ground, it shuts down the APU automatically and discharges extinguishing agent.



EXTINGUISHING

Applicable to: ALL

Each engine has two extinguisher bottles equipped with electrically operated squibs to discharge their contents. Each squib has a dual electric supply. The flight crew controls the discharge from the ENG FIRE panel in the cockpit.

The APU has one fire extinguisher bottle that has two electrically operated squibs to discharge its agent. The flight crew controls the discharge from the APU FIRE panel in the cockpit. This bottle also discharges automatically if there is an APU fire when the aircraft is on the ground.

FIRE WARNINGS AND LOOP CAUTIONS

Applicable to: ALL

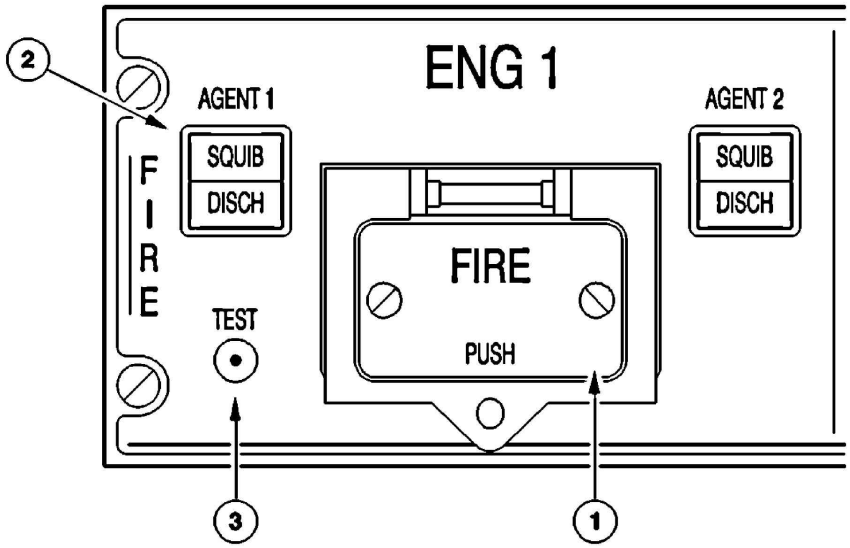
Fire detection units process all the warnings and cautions originating in the sensing elements :

- The fire warning appears in case of :
  - a fire signal from both loop A and B or,
  - a fire signal from one loop when the other is faulty, or
  - breaks in both loops occuring within 5 s of each other (flame effect), or
  - a test performed on the control panel.
- The loop-fault cautions appear if :
  - one loop is faulty or,
  - both loops are faulty or,
  - the fire detection unit fails.

OVERHEAD PANEL

Applicable to: ALL

ENG FIRE PANEL



The aircraft has two identical ENG FIRE panels, which contain the following switches and indicators:

(1) ENG 1 (2) FIRE pb
This pushbutton's normal position is in, and guarded.

The pilot pushes it to release it. It pops out, sending an electrical signal that performs the following for the corresponding engine :
- Silences the aural fire warning
- Arms the fire extinguisher squibs
- Closes the low-pressure fuel valve
- Closes the hydraulic fire shut off valve
- Closes the engine bleed valve
- Closes the pack flow control valve
- Cuts off the FADEC power supply
- Deactivates the IDG

ENG 1 (2) FIRE lt

This red light comes on, regardless of the pushbutton's position, whenever the fire warning for the corresponding engine is activated.

(2) AGENT 1 and AGENT 2 pb

Both of these buttons become active when the flight crew pops the ENG FIRE button for their engine.

A brief push on the button discharges the corresponding fire bottle.

- "SQUIB" lights up white when the flight crew pops the ENG FIRE button for its engine to help the flight crew identify the AGENT pushbutton to be activated.
- "DISCH"lights up amber when its fire extinguisher bottle has lost pressure.

(3) TEST pb

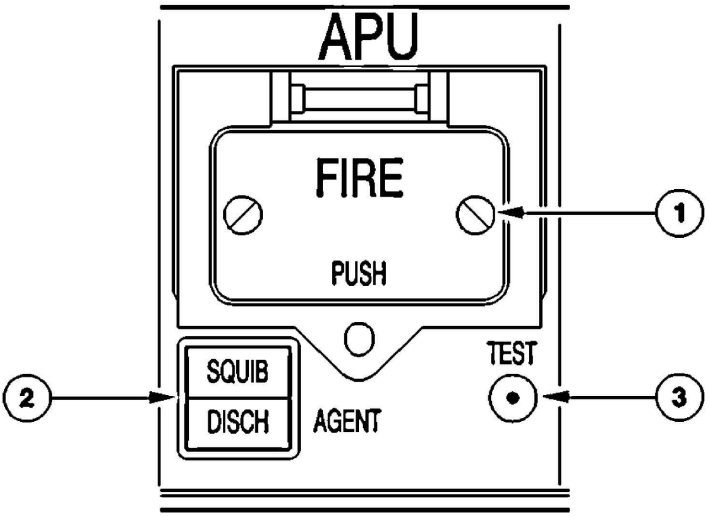
This button permits the flight crew to test the operation of the fire detection and extinguishing system.

When the flight crew presses it :

- A continuous repetitive chime sounds.
- The MASTER WARN lights flash.
- ENG FIRE warning appears on ECAM.
- On the FIRE panel :
  - The ENG FIRE pushbutton lights up red.
  - The SQUIB lights come on white if discharge supplies are available.
  - The DISCH lights come on amber.
- On the ENG panel (pedestal) :
  - The FIRE lights come on red.

APU FIRE PANEL

Applicable to: ALL



(1) APU FIRE pb sw

This pushbutton's normal position is in and guarded.

The pilot pushes it to release it. It pops out, sending an electrical signal that performs the following for the APU :

- shuts down the APU
- silences the aural warning
- arms the squib on the APU fire extinguisher
- closes the low-pressure fuel valve
- shuts off the APU fuel pump
- closes the APU bleed valve and X bleed valve and deactivates the APU generator.

The red APU FIRE light comes on when the APU fire warning is activated, regardless of the position of the pushbutton.

(2) AGENT pb

This pushbutton becomes active when the pilot pops the APU FIRE button.

The flight crew presses it briefly to discharge the fire bottle.
- SQUIB lights up white when the pilot pops the APU FIRE button.
- DISCH lights up amber when the fire extinguisher bottle has lost pressure.

Note: A red disk, which is outside at the rear of the fuselage, signals that the agent is not discharged overboard due to bottle overpressure.

(3) TEST pb

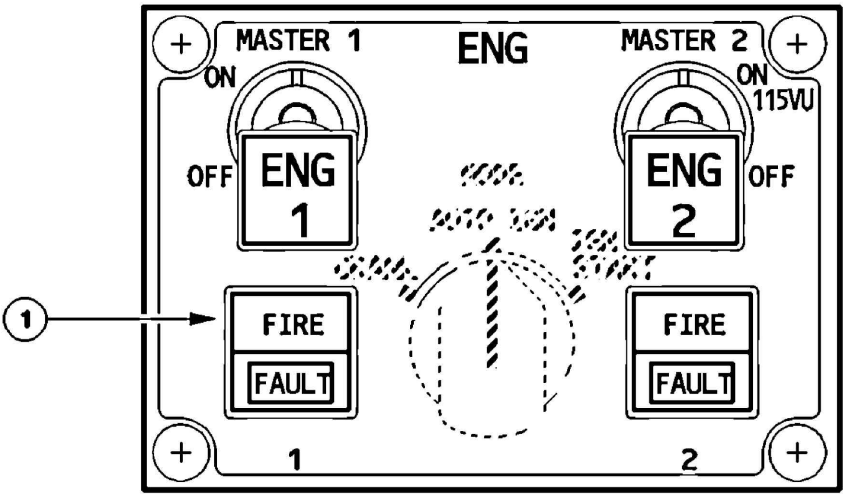
This button permits the flight crew to test the operation of the fire detection and extinguishing system for the APU.

When the flight crew presses it :
- A continuous repetitive chime sounds.
- The MASTER WARN lights flash.
- APU FIRE warning appears on ECAM.
- On the APU FIRE panel :
  - The APU FIRE pushbutton lights up red.
  - The SQUIB light comes on white.
  - The DISCH light comes on amber.

Note: The automatic shutdown of the APU on the ground will not occur while the flight crew is performing this test.

PEDESTAL

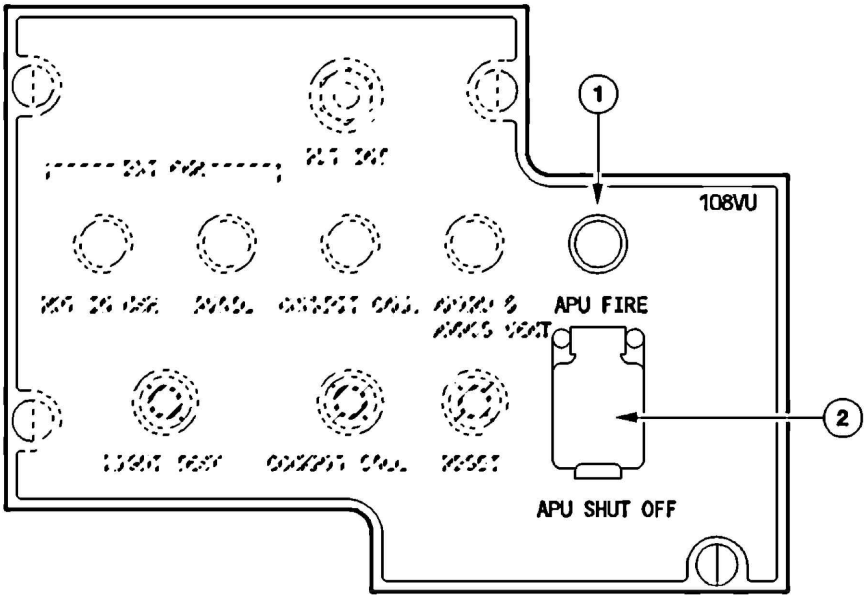
Applicable to: ALL



(1) FIRE lt
This light identifies the engine to be shutdown because of fire.
Light comes on red when an engine fire warning is triggered.

EXTERNAL POWER PANEL

Applicable to: ALL



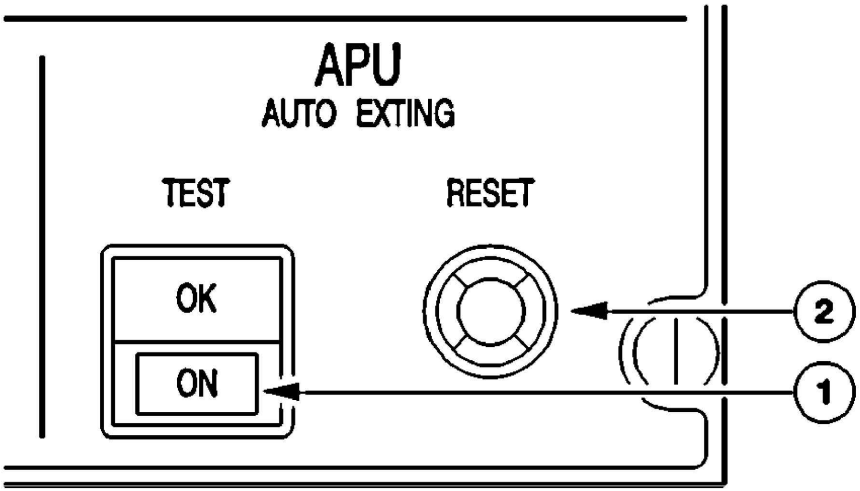
When the aircraft is on the ground, an APU fire causes an additional external warning.

(1) APU FIRE lt
The red APU FIRE light comes on and an external warning horn sounds when the system detects an APU fire.
The APU fire extinguisher discharges automatically 3 s after the appearance of the fire warning.
The light goes out when the fire has been extinguished.

(2) APU SHUT OFF pb
This pushbutton is used for manual APU Emergency shutdown, if an emergency situation is detected on ground by the ground crew. When this pushbutton is pressed, the APU low pressure fuel shutoff valve closes, and the ECB receives a signal that starts the shutdown sequence. The shutdown sequence is the same as the APU automatic shutdown sequence, except that there is no cool down cycle. Pressing this pushbutton also silences the external warning horn.

MAINTENANCE PANEL

Applicable to: ALL



(1) TEST pushbutton-switch
Tests the following APU circuits : Fire warning, auto extinguishing, and shutdown.
The test sequence lasts for 10 s.
During the test sequence, the APU MASTER switch must be ON.
If all circuits are operating correctly, the OK light comes on.

Note: *If the APU was running, it shuts down.*

(2) RESET pushbutton
Resets, the test circuit.

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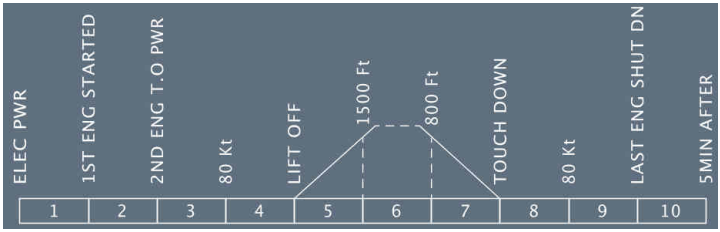
WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ENG 1 (2) FIRE Fire detected by both loops or by one loop, the other one being faulty, or break in both loops occuring within 5 s	CRC	MASTER WARN	ENGINE	FIRE lts on ENG FIRE pb and on ENG panel	NIL
APU FIRE Fire detected by both loops or by one loop, the other one being faulty, or break in both loops occuring within 5 s			APU	FIRE lt on APU FIRE pb	
ENG 1 (2) APU FIRE DET FAULT Both loops inoperative or Fire Detector Unit inoperative	SINGLE CHIME	MASTER CAUT	NIL	NIL	3, 4, 5, 7, 8
ENG 1 (2) APU LOOP A (B) FAULT	NIL	NIL			

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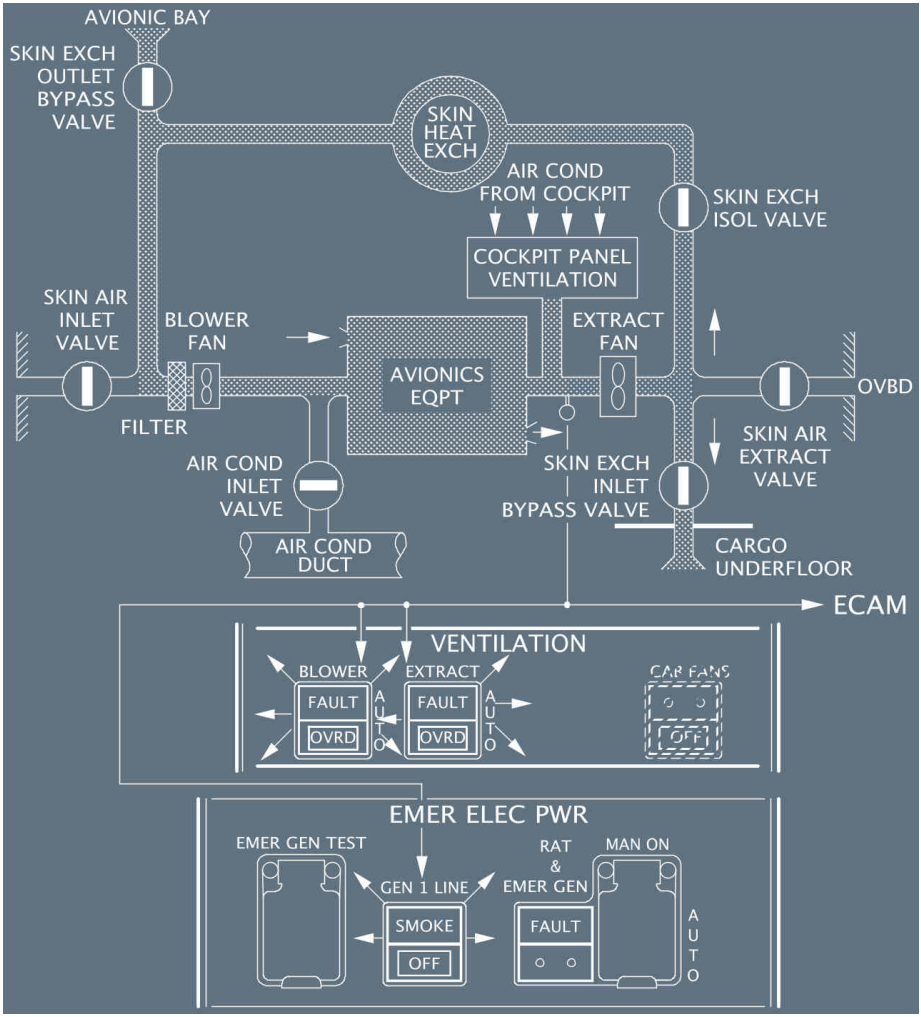
DESCRIPTION

Applicable to: ALL

1 One smoke detector in the air extraction duct of the avionics ventilation system detects smoke in the avionics compartment.
It signals the ECAM to display a warning in the cockpit.

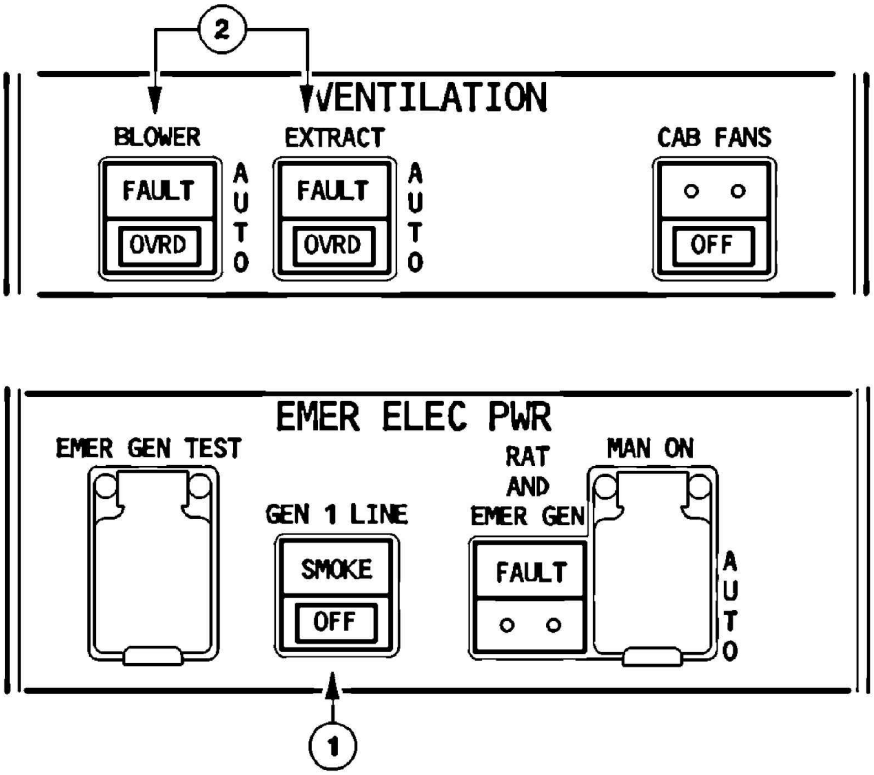
When it detects smoke for more than 5 s:
- A single chime sounds
- The MASTER CAUTION lights, on the glareshield, light up
- The ECAM displays a caution on the E/WD
- The SMOKE light, on the EMER ELEC PWR panel, lights up
- The BLOWER and EXTRACT FAULT, on the VENTILATION panel, light up.

If smoke is detected for more than 5 min, the caution can be cleared; but, it remains latched, and can be recalled. On the ground, a dual FWC reset will unlatch the caution.


AVIONIC BAY
SKIN EXCH OUTLET BYPASS VALVE
SKIN HEAT EXCH
AIR COND FROM COCKPIT
SKIN EXCH ISOL VALVE
COCKPIT PANEL VENTILATION
SKIN AIR INLET VALVE
BLOWER FAN
EXTRACT FAN
AVIONICS EQPT
OVBD
FILTER
SKIN AIR EXTRACT VALVE
AIR COND INLET VALVE
SKIN EXCH INLET BYPASS VALVE
AIR COND DUCT
CARGO UNDERFLOOR
ECAM
VENTILATION
BLOWER
EXTRACT
FAULT
OVRD
AUTO
CAB FANS
OFF
EMER ELEC PWR
EMER GEN TEST
GEN 1 LINE
RAT & EMER GEN
MAN ON
SMOKE
FAULT
OFF
AUTO

OVERHEAD PANEL

Applicable to: ALL



(1) GEN 1 LINE
(*Refer to DSC-24-10-20 AC Generators*)

SMOKE lt : Comes on amber, along with a warning on ECAM, when smoke is detected in the avionics ventilation duct.

(2) BLOWER and EXTRACT pb sw
(*Refer to DSC-21-30-60 Overhead Panel*)

FAULT lts : Both FAULT lights come on amber, along with a warning on ECAM, when smoke is detected in the avionics ventilation duct.

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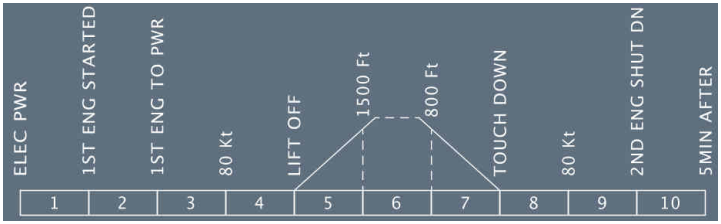
WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
AVNCS SMOKE Smoke detected in ventilation extraction duct	SINGLE CHIME	MASTER CAUT	ELEC	• SMOKE lt on EMER ELEC PWR panel • FAULT lts on BLOWER and EXTRACT pb sw	4, 5, 7, 8

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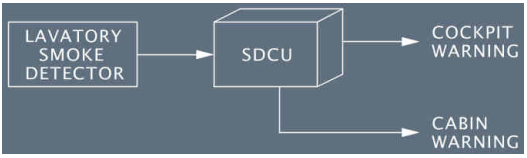
SMOKE DETECTION

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The lavatory smoke detection system consists of :
- One smoke detector in each lavatory.
- A double channel Smoke Detection Control Unit (SDCU).

When a detector finds smoke in a lavatory, it sends a signal to the SDCU, which transmits it to the Flight Warning Computer (FWC), for Warning in the cockpit, and to the CIDS (for warning in the cabin).

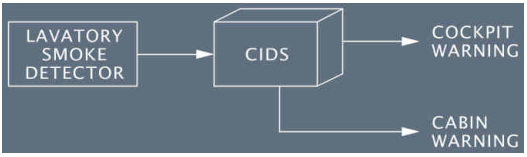


SMOKE DETECTION

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The lavatory smoke detection system consists of :
- One smoke detector in each lavatory.
- A CIDS Decoder Encoder Unit that links the detector to the entire CIDS system.

When a detector finds smoke in a lavatory, it sends a signal to the CIDS, which transmits it to the Flight Warning Computer (FWC), for Warning in the cockpit, and generates an indication in the cabin.



WASTEBIN FIRE EXTINGUISHING

Applicable to: ALL

Each lavatory wastebin has an automatic fire extinguishing system.

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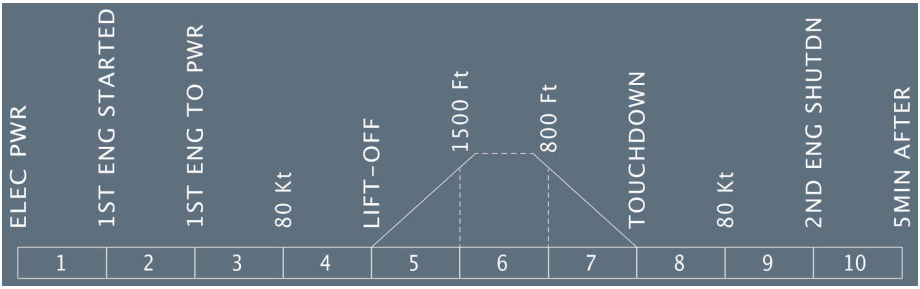
WARNINGS AND CAUTIONS

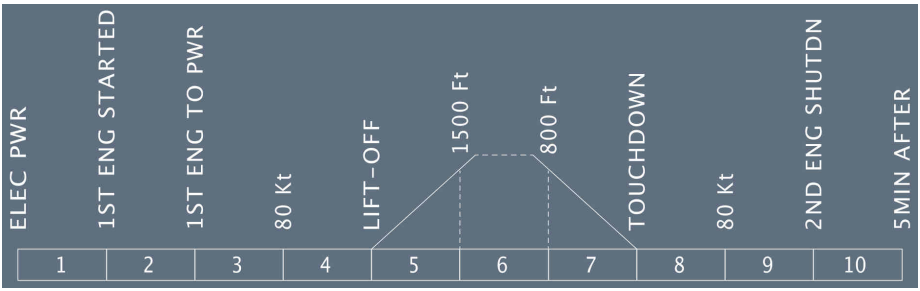
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNINGS	FLT PHASE INHIB
LAVATORY SMOKE Smoke detected in one lavatory.	CRC	MASTER WARN	NIL	NIL	4, 5, 7, 8
LAVATORY DET FAULT Lavatory smoke detection fault, or Lavatory and galley fan faulty.	NIL	NIL			3, 4, 5, 7, 8
DET FAULT Both SDCU channels failed.	SINGLE CHIME	MASTER CAUT			

WARNINGS AND CAUTIONS

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNINGS	FLT PHASE INHIB
LAVATORY SMOKE Smoke detected in one lavatory.	CRC	MASTER WARN	NIL	NIL	4, 5, 7, 8
LAVATORY DET FAULT Lavatory smoke detection fault	NIL	NIL			3, 4, 5, 7, 8
DET FAULT Both CIDS Smoke Detection functions are failed.	SINGLE CHIME	MASTER CAUT			

SMOKE DETECTION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

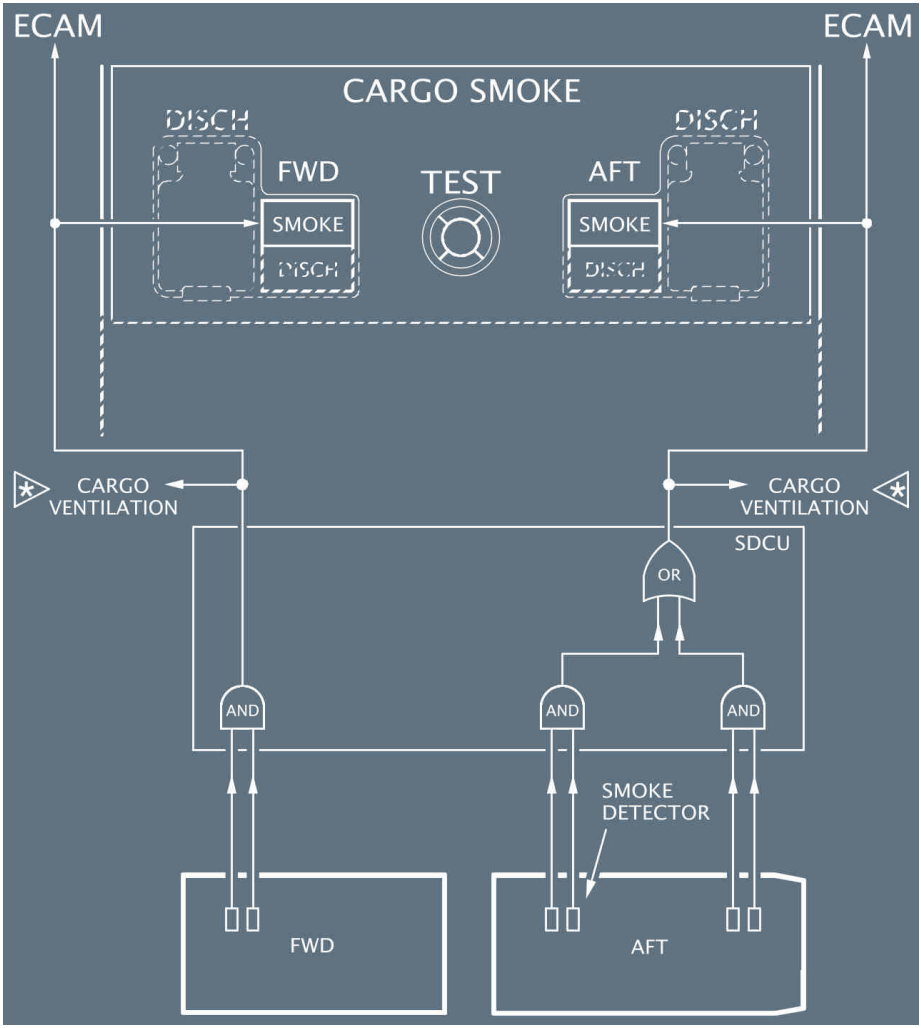
1 The cargo compartments have a smoke detection system.

- Cavities in the cargo compartment ceiling panels each hold two smoke detectors. Each detector is linked to one of the two detection loops (dual loop principle).
- The forward cargo compartment has one cavity.
- The aft cargo compartment has two cavities.
- The Smoke Detection Control Unit (SDCU) receives signals from the detectors and transmits them to the ECAM, which displays a warning in the cockpit. The SDCU has two identical channels.

Smoke in one cavity activates the cargo smoke warning if:

- Both smoke detectors detect it, or
- One smoke detector detects it and the other is inoperative.

Cargo ventilation ◁✻, and the cargo smoke warning is activated in either compartment, the associated isolation valves ◁✻ automatically close and the extraction fan ◁✻ stops.


ECAM
ECAM
CARGO SMOKE
DISCH
DISCH
FWD
TEST
AFT
SMOKE
SMOKE
DISCH
DISCH
CARGO VENTILATION
CARGO VENTILATION
SDCU
OR
AND
AND
AND
SMOKE DETECTOR
FWD
AFT

SMOKE DETECTION

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

2

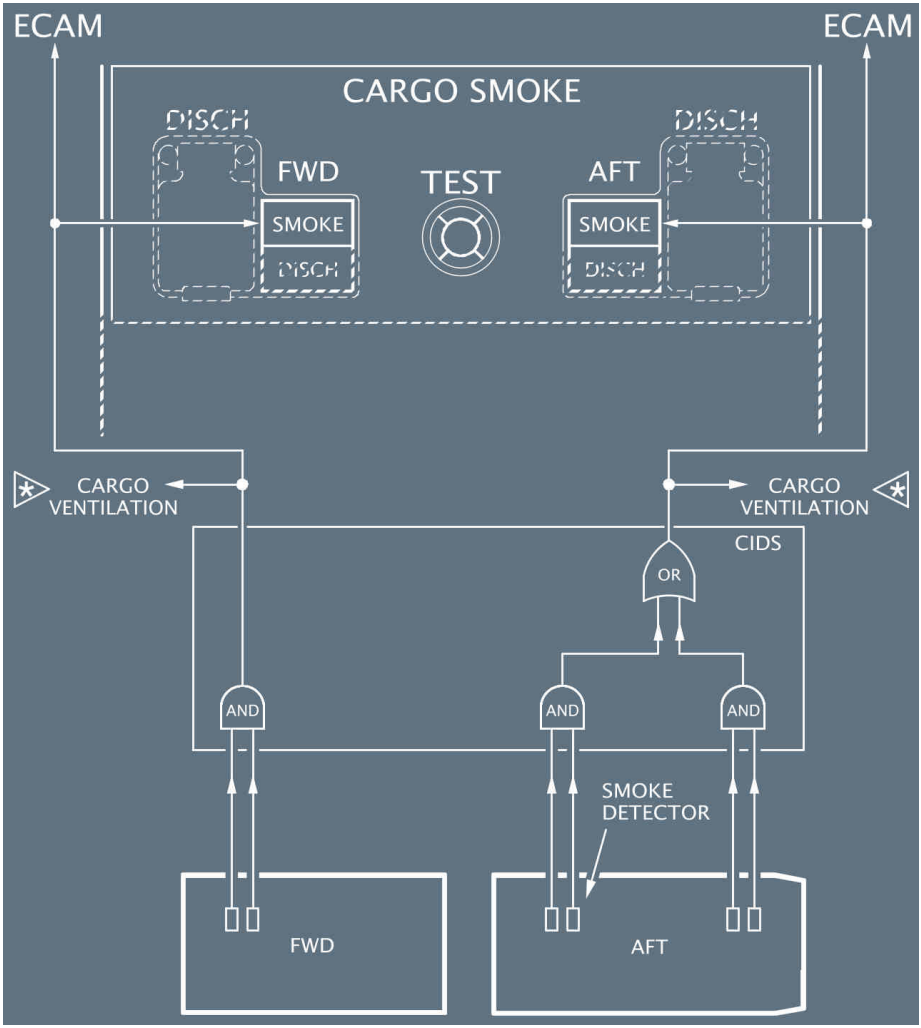
The cargo compartments have a smoke detection system.

- Cavities in the cargo compartment ceiling panels each hold two smoke detectors. Each detector is linked to one of the two detection loops (dual loop principle).
- The forward cargo compartment has one cavity.
- The aft cargo compartment has two cavities.
- The Cabin Intercommunication Data System (CIDS) receives signals from the detectors and transmits them to the ECAM, which displays a warning in the cockpit. The CIDS has two identical channels.

Smoke in one cavity activates the cargo smoke warning if:

- Both smoke detectors detect it, or
- One smoke detector detects it and the other is inoperative.

Cargo ventilation ◁ , and the cargo smoke warning is activated in either compartment, the associated isolation valves ◁ automatically close and the extraction fan ◁ stops.


ECAM
ECAM
CARGO SMOKE
DISCH
DISCH
FWD
TEST
AFT
SMOKE
SMOKE
DISCH
DISCH
CARGO VENTILATION
CARGO VENTILATION
CIDS
OR
AND
AND
AND
SMOKE DETECTOR
FWD
AFT

SMOKE DETECTION

Applicable to: ALL 321

3

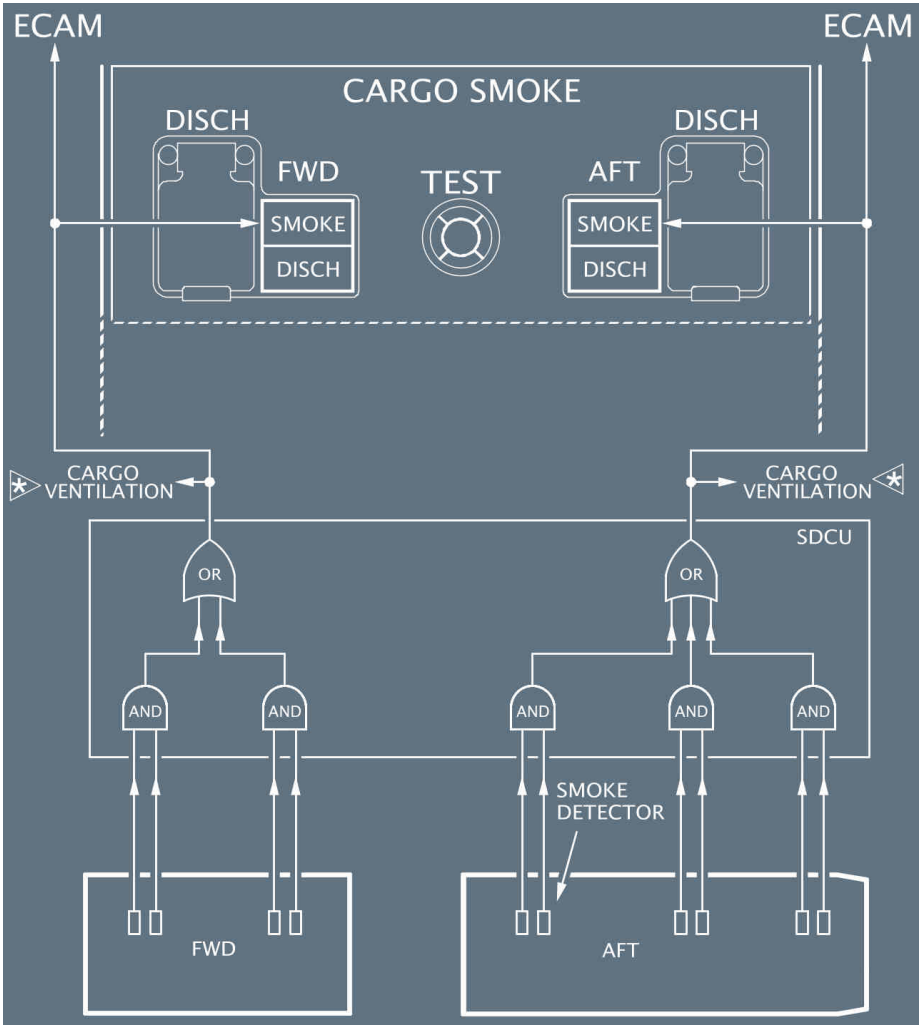
The cargo compartments have a smoke detection system.

- Cavities in the cargo compartment ceiling panels each hold two smoke detectors. Each detector is linked to one of the two detection loops (dual loop principle).
- The forward cargo compartment has two cavities.
- The aft cargo compartment has three cavities.
- The Smoke Detection Control Unit (SDCU) receives signals from the detectors and transmits them to the ECAM, which displays a warning in the cockpit. The SDCU has two identical channels.

Smoke in one cavity activates the cargo smoke warning if:

- Both smoke detectors detect it, or
- One smoke detector detects it and the other is inoperative.

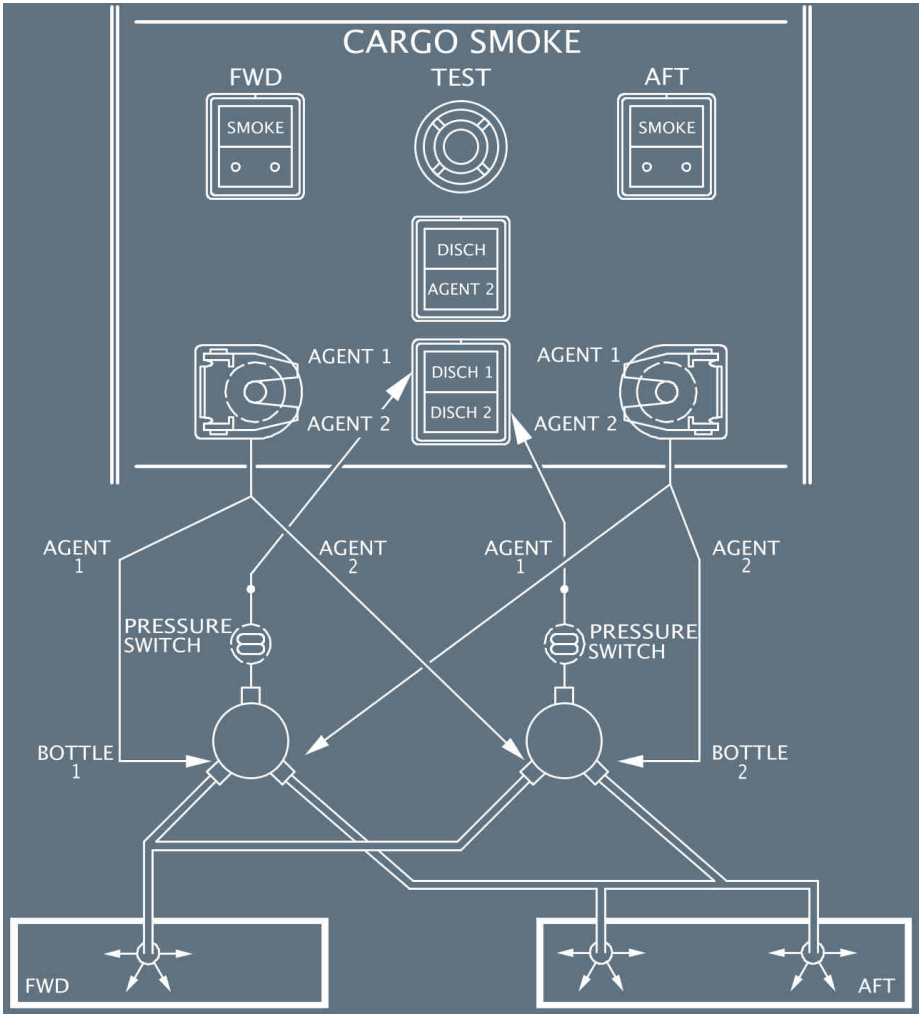
Cargo ventilation ◁✻, and the cargo smoke warning is activated in either compartment, the associated isolation valves ◁✻ automatically close and the extraction fan ◁✻ stops.


ECAM
ECAM
CARGO SMOKE
DISCH
DISCH
FWD
TEST
AFT
SMOKE
DISCH
SMOKE
DISCH
CARGO VENTILATION
CARGO VENTILATION
SDCU
OR
OR
AND
AND
AND
AND
AND
SMOKE DETECTOR
FWD
AFT

FIRE EXTINGUISHING

Applicable to: ALL 320

1 A fire extinguishing system protects the FWD and AFT cargo compartments.
Two fire bottles supply three nozzles (one in the FWD compartment, and two in the AFT compartment). Each bottle has two discharge heads, one for each compartment.
When the FWD (AFT) SMOKE light comes on, the flight crew selects AGENT 1 with the corresponding toggle switch.
This action ignites the corresponding squib on the fire bottle, which then discharges extinguishing agent into that compartment.
60 min after the discharge of the first bottle, the AGENT 2 DISCH light appears. This is to indicate that the flight crew has to discharge AGENT 2 to maintain the required extinguishant concentration.
Bottle 1 is discharged in approximately 60 s, whereas Bottle 2 discharges within approximately 90 min controlled by a flow metering system.
This ensures sufficient agent concentration for 205 min.

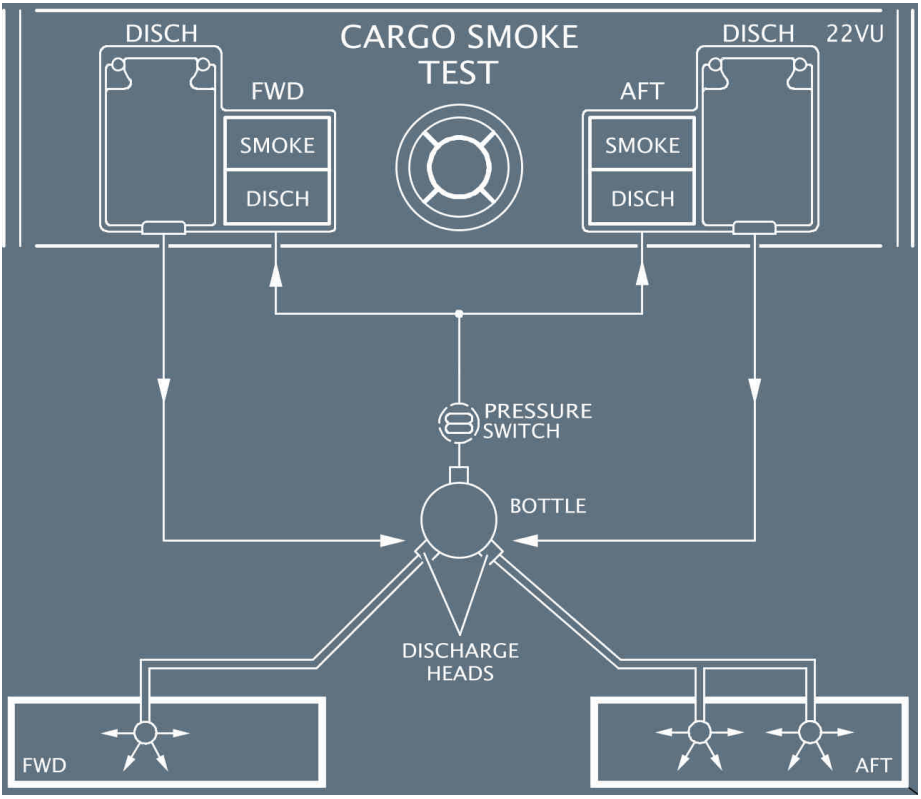


FIRE EXTINGUISHING

Applicable to: ALL 321

2 A fire extinguishing system protects the FWD and AFT cargo compartments.

One fire bottle supplies three nozzles (one in FWD compartment and two in AFT compartment). The bottle has two discharge heads, one for each compartment. When a member of the flight crew presses the DISCH pushbutton for either compartment, the action ignites the corresponding squib on the fire bottle, which then discharges extinguishing agent into that compartment.
When the bottle has discharged, the amber DISCH light comes on.



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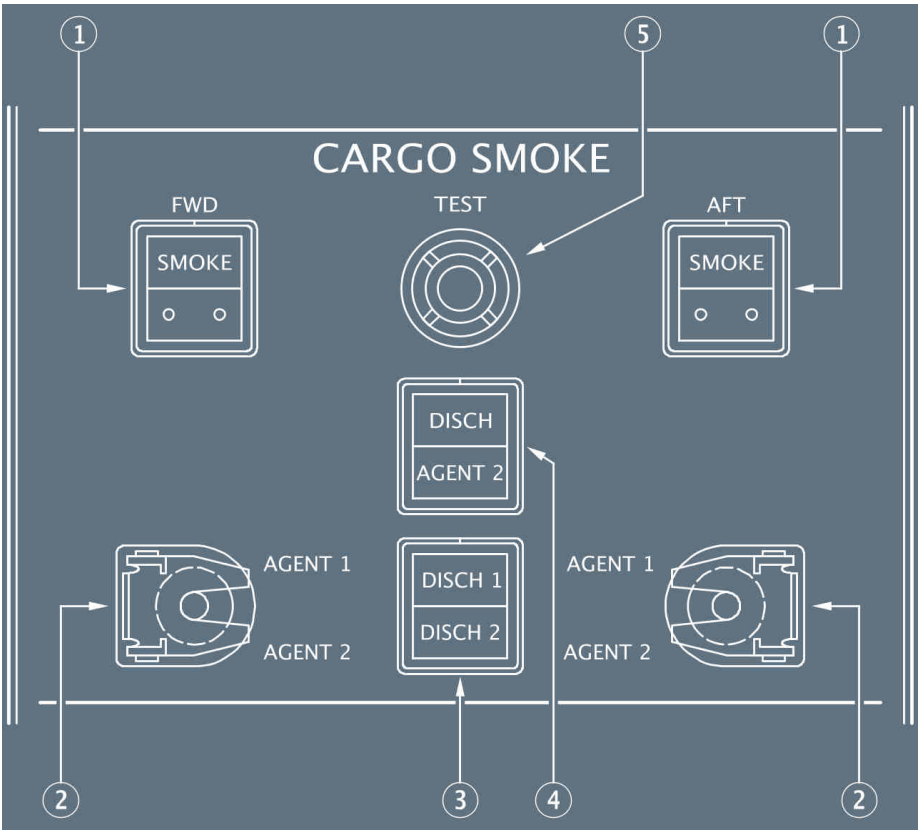
OVERHEAD PANEL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

1



(1) SMOKE light

This red light, and the associated ECAM warning, come on when the system detects smoke in the indicated compartment. This light comes on, if:

- Both channels detect smoke, or
- One channel detects smoke and the SDCU finds that the other channel is faulty.

(2) DISCH toggle switch
The guarded toggle switch permits ignition of the corresponding squib for discharge of extinguishing agent 1(2) in the respective compartment (FWD or AFT).

(3) DISCH light
This amber light comes on when the bottle has discharged. DISCH 1 appears within 60 s after Agent 1 activation, whereas DISCH 2 appears approximately 40 min after Agent 2 activation.

(4) DISCH AGENT 2 light
This light comes on amber, 60 min after the discharge of Agent 1 in either the FWD or AFT cargo compartment. It goes off, when the Agent 2 squib is ignited.

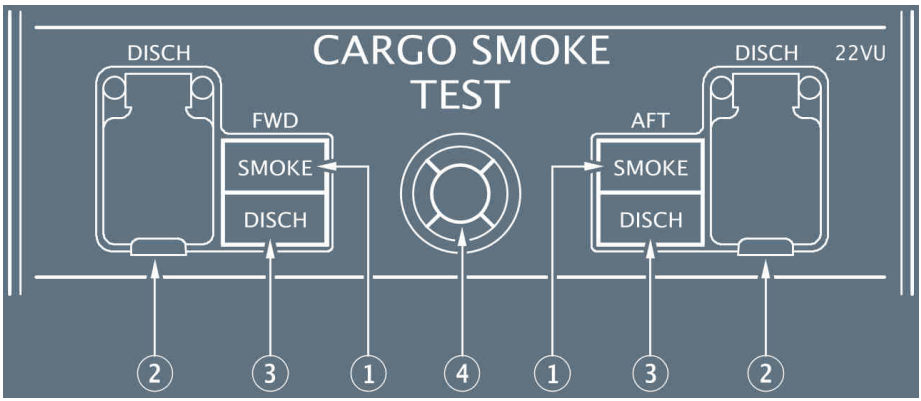
(5) TEST pb

Pressing this button for at least 3 s, and until it is released:
- Tests the smoke detectors in sequence,
- Turns on the red smoke lights twice, and displays the ECAM warning,
- Closes the ventilation system's isolation valves .
- Turns on the amber DISCH light.

OVERHEAD PANEL

Applicable to: ALL 321

2



(1) SMOKE light

This red light, and the associated ECAM warning, come on when the system detects smoke in the indicated compartment. This light comes on, if:
- Both channels detect smoke, or
- One channel detects smoke and the SDCU finds that the other channel is faulty.

(2) DISCH pb

This button ignites the squib to discharge the extinguishing agent in the corresponding compartment (FWD or AFT).

(3) DISCH light

Within 60 s after pressing the discharge pushbutton, this amber light comes on, thereby indicating that the agent bottle has fully discharged.

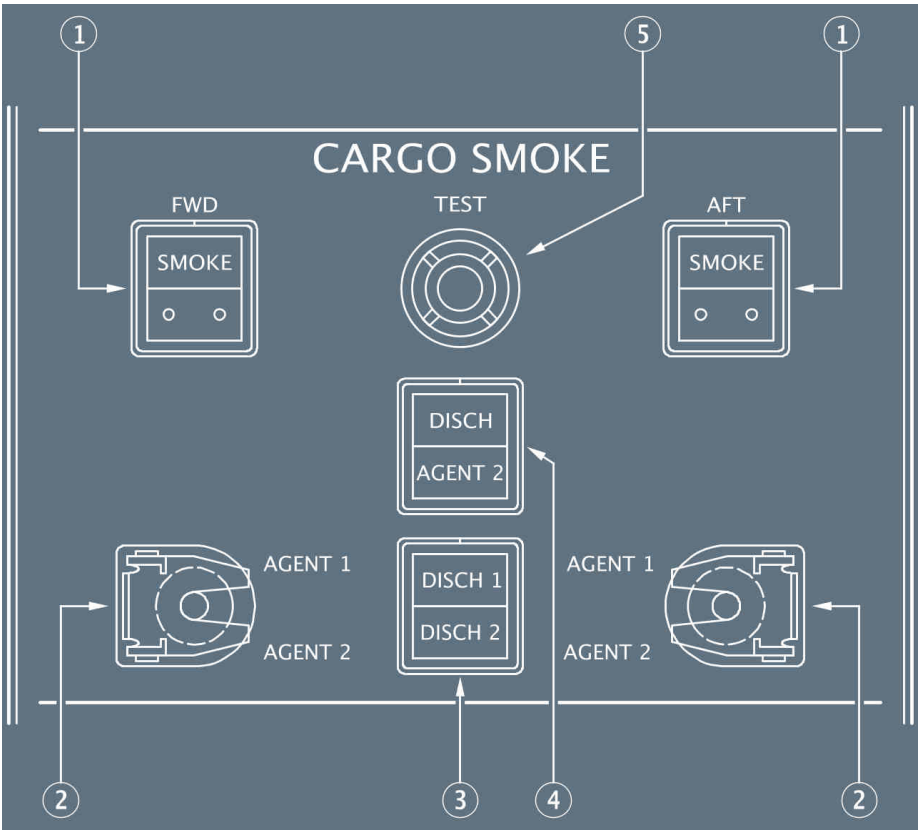
(4) TEST pb

Pressing this button for at least 3 s, and until it is released:
- Tests the smoke detectors in sequence,
- Turns on the red smoke lights twice, and displays the ECAM warning,
- Closes the ventilation system's isolation valves.
- Turns on the amber DISCH light.

OVERHEAD PANEL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

3



(1) SMOKE light

This red light, and the associated ECAM warning, come on when the system detects smoke in the indicated compartment. This light comes on, if:

- Both channels detect smoke, or
- One channel detects smoke and the other channel is faulty.

(2) DISCH toggle switch

The guarded toggle switch permits ignition of the corresponding squib for discharge of extinguishing Agent 1(2) in the respective compartment (FWD or AFT).

(3) DISCH light

This amber light comes on when the bottle has discharged. DISCH 1 appears within 60 s after Agent 1 activation, whereas DISCH 2 appears approximately 40 min after Agent 2 activation.

(4) DISCH AGENT 2 light

This light comes on amber, 60 min after the discharge of Agent 1 in either the FWD or AFT cargo compartment. It goes off, when the Agent 2 squib is ignited.

(5) TEST pb

Pressing this button for at least 3 s, and until it is released:

- Tests the smoke detectors in sequence,
- Turns on the red smoke lights twice, and displays the ECAM warning,
- Closes the ventilation system's isolation valves ◁⊲ .
- Turns on the amber DISCH light.

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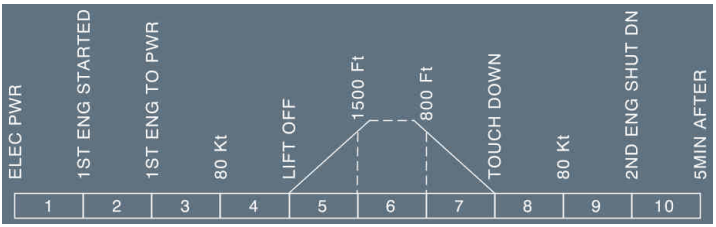
WARNINGS AND CAUTIONS

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

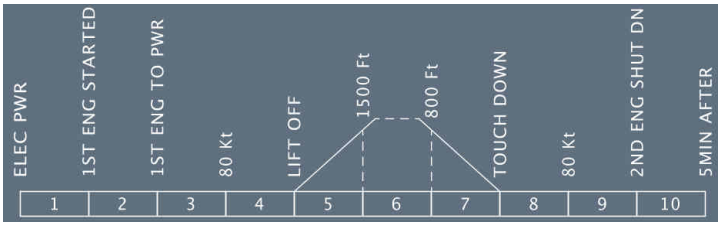
1



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
FWD (AFT) CARGO SMOKE Smoke detected	CRC	MASTER WARN	COND	SMOKE light on CARGO SMOKE panel	4, 5, 7, 8
FWD (AFT) CRG DET FAULT Smoke detection fault	NIL	NIL	NIL	NIL	
DET FAULT Both CIDS Smoke Detection Functions are failed.	SINGLE CHIME	MASTER CAUTION			3, 4, 5, 7, 8
FWD (AFT) CARGO BTL (1)(2) FAULT Forward or aft bottle squib failed or bottle on low pressure.					4, 5, 7, 8

WARNINGS AND CAUTIONS

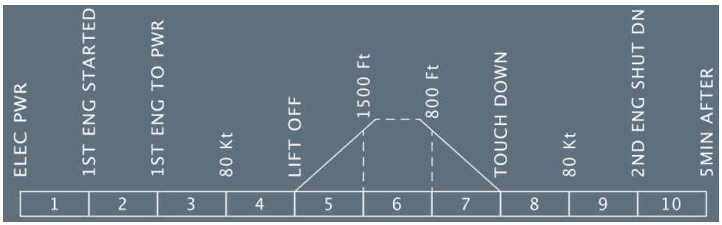
Applicable to: ALL 321



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
FWD (AFT) CARGO SMOKE Smoke detected	CRC	MASTER WARN	COND	SMOKE light on CARGO SMOKE panel	4, 5, 7, 8
FWD (AFT) CRG DET FAULT Smoke detection fault	NIL	NIL	NIL	NIL	3, 4, 5, 7, 8
DET FAULT Both SDCU channels failed	SINGLE CHIME	MASTER CAUTION			
FWD (AFT) BTL SQUIB FAULT Forward or aft bottle squid failed					4, 5, 7, 8

WARNINGS AND CAUTIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
FWD (AFT) CARGO SMOKE Smoke detected	CRC	MASTER WARN	COND	SMOKE light on CARGO SMOKE panel	4, 5, 7, 8
FWD (AFT) CRG DET FAULT Smoke detection fault	NIL	NIL	NIL	NIL	3, 4, 5, 7, 8
DET FAULT Both SDCU channels failed	SINGLE CHIME	MASTER CAUTION			
FWD (AFT) BTL SQUIB FAULT Forward or aft agent 1(2) bottle squib failed					4, 5, 7, 8

ELECTRICAL SUPPLY

Applicable to: ALL 321

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
ENG/APU	FIRE DETECTION	ENG 1 LOOP A				X	
		ENG 1 LOOP B		DC2			
		ENG 2 LOOP A		DC2			
		ENG 2 LOOP B				X	
		APU LOOP A		DC BAT			
		APU LOOP B		DC BAT			
	FIRE EXTINGUISHING	ENG 1/2					
		BTL 1 SQUIB A					HOT 1
		BTL 1 SQUIB B					HOT 2
		BTL 2 SQUIB A		DC 2			
		BTL 2 SQUIB B		DC 2			
		APU					
		BTL SQUIB A					HOT 1
		BTL SQUIB B		DC BAT			
		APU AUTO EXT		DC BAT			
CARGO LAVATORIES		SDCU CH 1				SHED	
		SDCU CH 2		DC 2			
		FWD/AFT CARGO EXTING BOTTLES		DC BAT			

ELECTRICAL SUPPLY

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
ENG/APU	FIRE DETECTION	ENG 1 LOOP A				X	
		ENG 1 LOOP B		DC2			
		ENG 2 LOOP A		DC2			
		ENG 2 LOOP B				X	
		APU LOOP A		DC BAT			
		APU LOOP B		DC BAT			
		AUTO EXT		DC BAT			
	FIRE EXTINGUISHING	ENG 1/2					
		BTL 1 SQUIB A					HOT 1
		BTL 1 SQUIB B					HOT 2
		BTL 2 SQUIB A		DC 2			
		BTL 2 SQUIB B		DC 2			
		APU					
		BTL SQUIB A					HOT 1
		BTL SQUIB B		DC BAT			
		APU AUTO EXT		DC BAT			
CARGO LAVATORIES		SDCU CH 1				SHED	
		SDCU CH 2		DC 2			
		FWD/AFT CARGO EXTING BOTTLES		DC BAT			

ELECTRICAL SUPPLY

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
ENG/APU	FIRE DETECTION	ENG 1 LOOP A				X	
		ENG 1 LOOP B		DC2			
		ENG 2 LOOP A		DC2			
		ENG 2 LOOP B				X	
		APU LOOP A		DC BAT			
		APU LOOP B		DC BAT			
		AUTO EXT		DC BAT			
	FIRE EXTINGUISHING	ENG 1/2					
		BTL 1 SQUIB A					HOT 1
		BTL 1 SQUIB B					HOT 2
		BTL 2 SQUIB A		DC 2			
		BTL 2 SQUIB B		DC 2			
		APU					
		BTL SQUIB A					HOT 1
		BTL SQUIB B		DC BAT			
		APU AUTO EXT		DC BAT			
CARGO LAVATORIES		CIDS CH 1				X	
		CIDS CH 2		DC 2			
		FWD/AFT CARGO EXTING BOTTLES		DC BAT			

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AIRCRAFT SYSTEMS

FLIGHT CONTROLS

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Localization Title	Toc Index	ID	Reason
DSC-27-10-20 General Architecture	A	1	Improvement of illustration quality.
DSC-27-10-20 SPEED BRAKES AND GROUND SPOILERS - SPEED BRAKE CONTROL	D	2	Documentation update: Addition of "SPEED BRAKES AND GROUND SPOILERS - SPEED BRAKE CONTROL" documentary unit
DSC-27-10-20 Speed Brakes and Ground Spoilers - Ground Spoiler Control	D	3	Improvement of illustration quality.
DSC-27-10-20 Speed Brakes and Ground Spoiler - Ground Spoiler Control	D	4	Improvement of illustration quality.
DSC-27-10-20 Speed Brakes and Ground Spoilers - Roll Control - Schematic	D	5	Improvement of illustration quality.
DSC-27-20-10-10 General	A	1	Improvement of illustration quality.
DSC-27-20-10-20 Protections - High Angle of Attack Protection	D	1	Documentation update: Addition of "Protections - High Angle of Attack Protection" documentary unit
DSC-27-20-20 Flight Controls Law Reconfiguration	B	1	Improvement of illustration quality.
DSC-27-20-20 Flight Controls Law Reconfiguration	B	2	Improvement of illustration quality.
DSC-27-20-30 PEDESTAL	A	1	Content enhanced to clarify that after the RUD TRIM reset, an indication of up to 0.3° (L or R) may be observed in the rudder trim position indication.
DSC-27-20-30 Lateral Consoles	B	2	Modify the note "If...., the first action..."by "If...., any action" to avoid misunderstanding
DSC-27-20-30 ECAM F/CTL Page	F	3	Yaw control indication revised to add items (1), (2), (3) description.
DSC-27-20-30 ECAM F/CTL Page	F	4	Yaw control indication revised to indicate that two TLU messages are displayed in amber when the TLU indexes are suppressed.

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GENERAL

Applicable to: ALL

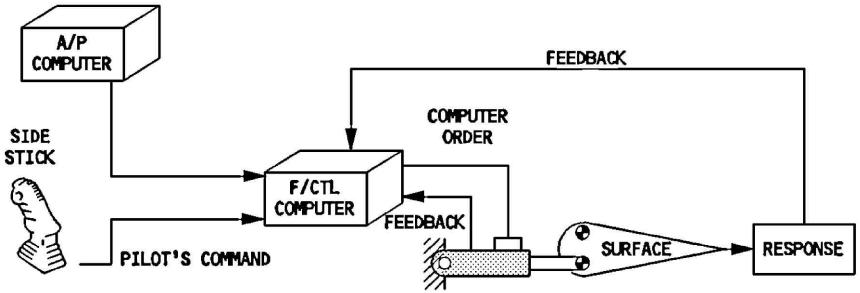
The fly-by-wire system was designed and certified to render the new generation of aircraft even more safe, cost effective, and pleasant to fly.

BASIC PRINCIPLE

Applicable to: ALL

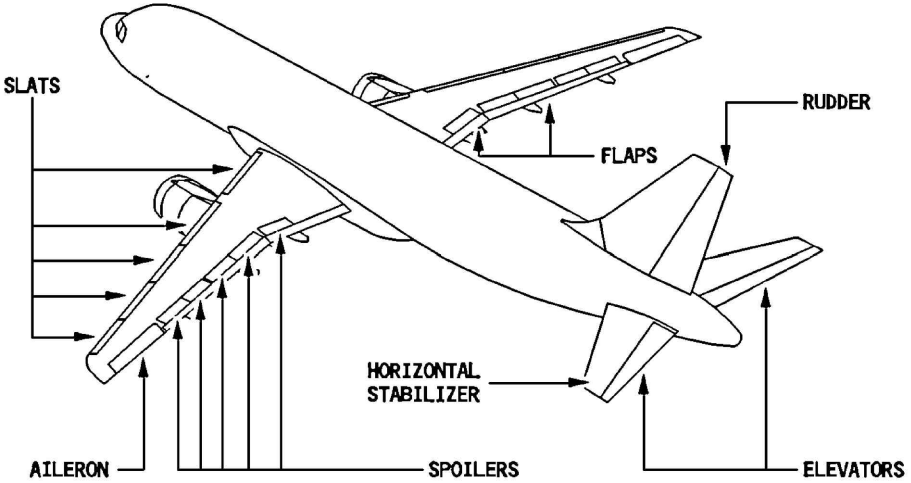
Flight control surfaces are all :
- Electrically-controlled, and
- Hydraulically-activated.

The stabilizer and rudder can also be mechanically-controlled.
Pilots use sidesticks to fly the aircraft in pitch and roll (and in yaw, indirectly, through turn coordination).
Computers interpret pilot input and move the flight control surfaces, as necessary, to follow their orders.
However, when in normal law, regardless of the pilot's input, the computers will prevent excessive maneuvers and exceedance of the safe envelope in pitch and roll axis.
However, as on conventional aircraft, the rudder has no such protection.



CONTROL SURFACES

Applicable to: ALL



The flight controls are electrically or mechanically controlled as follows :

PITCH AXIS

Elevator = Electrical

Stabilizer = Electrical for normal or alternate control. Mechanical for manual trim control

ROLL AXIS

Ailerons = Electrical

Spoilers = Electrical

YAW AXIS

Rudder = Mechanical, however control for yaw damping, turn coordination and trim is electrical.

SPEED BRAKES

Speed brakes = Electrical

Note: All surfaces are hydraulically actuated.

COCKPIT CONTROLS

Applicable to: ALL

- Each pilot has a sidestick controller with which to exercise manual control of pitch and roll. These are on their respective lateral consoles.
  The two sidestick controllers are not coupled mechanically, and they send separate sets of signals to the flight control computers.
- Two pairs of pedals, which are rigidly interconnected, give the pilot mechanical control of the rudder.
- The pilots control speed brakes with a lever on the center pedestal.
- The pilots use mechanically interconnected handwheels on each side of the center pedestal to control the trimmable horizontal stabilizer.
- The pilots use a single switch on the center pedestal to set the rudder trim.
- There is no manual switch for trimming the ailerons.

COMPUTERS

Applicable to: ALL

Seven flight control computers process pilot and autopilot inputs according to normal, alternate, or direct flight control laws.
The computers are :

2 ELACs

(Elevator Aileron Computer)

For : Normal elevator and stabilizer control.
Aileron control.

3 SECs

(Spoilers Elevator Computer)

For : Spoilers control.
Standby elevator and stabilizer control.

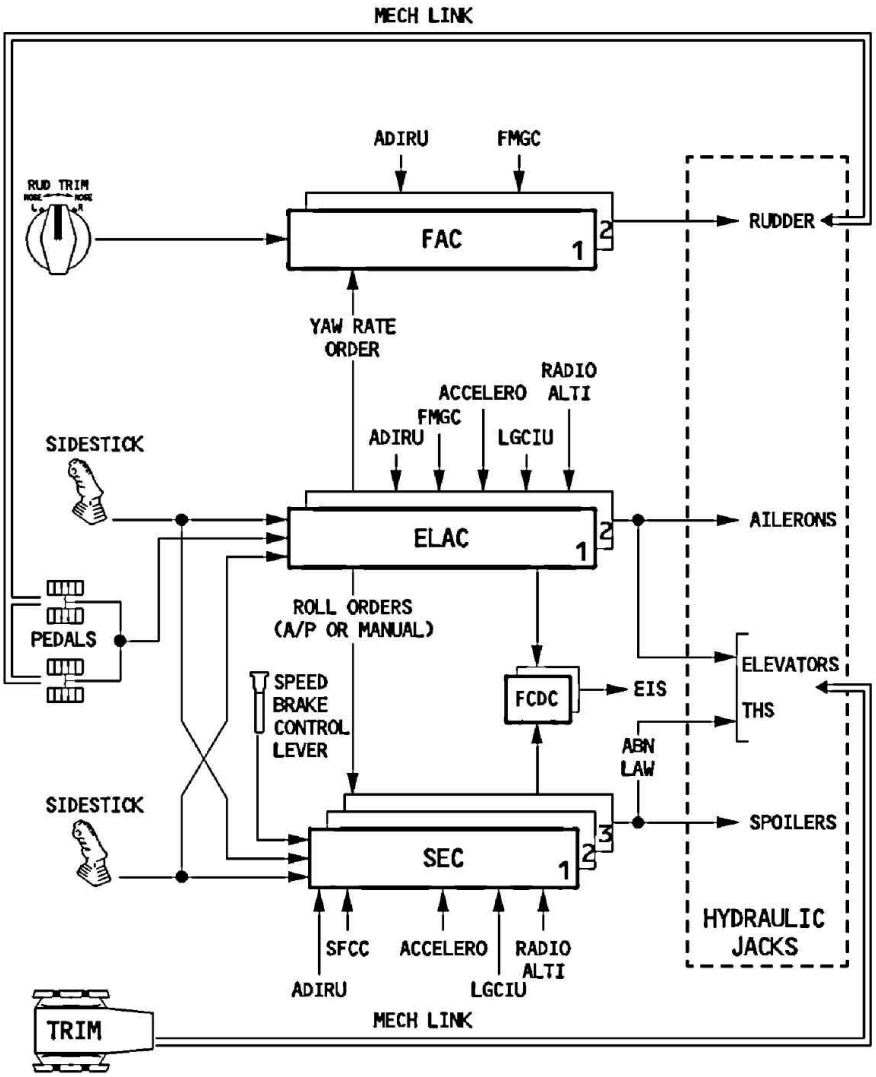
2 FACs

(Flight Augmentation Computer)

For : Electrical rudder control.

IN ADDITION 2 FCDC

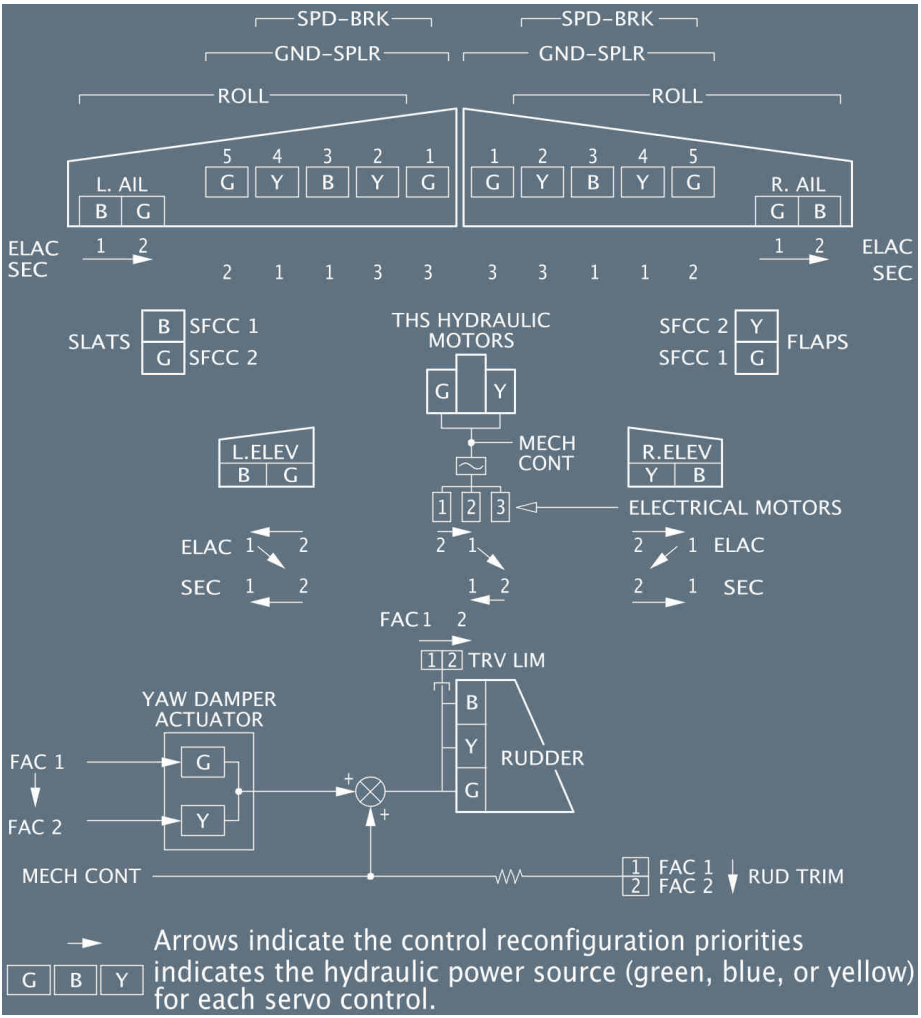
Flight Control Data Concentrators (FCDC) acquire data from the ELACs and SECs and send it to the electronic instrument system (EIS) and the centralized fault display system (CFDS).


MECH LINK
ADIRU
FMGC
RUD TRIM
NOSE
NOSE
FAC
1
2
RUDDER
YAW RATE
ORDER
RADIO
ALTI
ACCELERO
FMGC
ADIRU
LGCIU
SIDESTICK
ELAC
1
2
AILERONS
PEDALS
ROLL ORDERS
(A/P OR MANUAL)
ELEVATORS
SPEED
BRAKE
CONTROL
LEVER
FCDC
EIS
THS
ABN
LAW
SIDESTICK
SEC
1
2
3
SPOILERS
HYDRAULIC
JACKS
SFCC
ACCELERO
RADIO
ALTI
ADIRU
LGCIU
TRIM
MECH LINK

GENERAL ARCHITECTURE

Applicable to: ALL

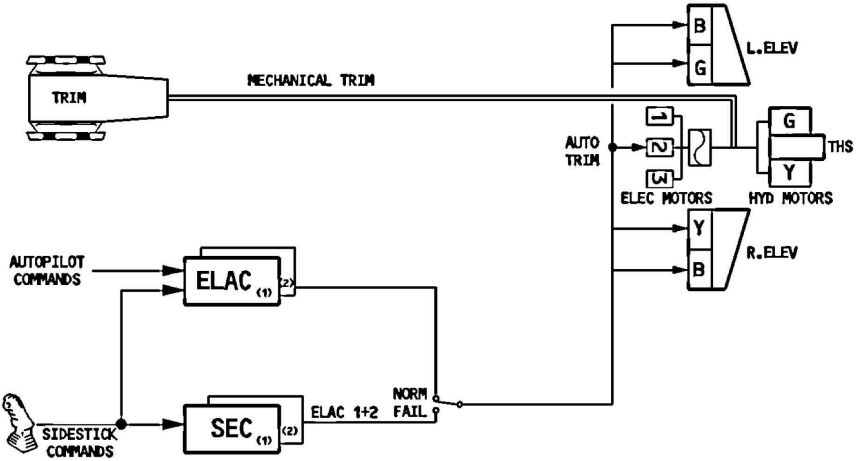
1



PITCH CONTROL

Applicable to: ALL

GENERAL



Two elevators and the Trimmable Horizontal Stabilizer (THS) control the aircraft in pitch. The maximum elevator deflection is 30 ° nose up, and 17 ° nose down. The maximum THS deflection is 13.5 ° nose up, and 4 ° nose down.

ELECTRICAL CONTROL

- In normal operations, ELAC2 controls the elevators and the horizontal stabilizer, and the green and yellow hydraulic jacks drive the left and right elevator surfaces respectively.
  The THS is driven by N° 1 of three electric motors.
- If a failure occurs in ELAC2, or in the associated hydraulic systems, or with the hydraulic jacks, the system shifts pitch control to ELAC1. ELAC1 then controls the elevators via the blue hydraulic jacks and controls the THS via the N° 2 electric motor.
- If neither ELAC1 nor ELAC2 is available, the system shifts pitch control either to SEC1 or to SEC2, (depending on the status of the associated circuits), and to THS motor N° 2 or N° 3.

In case of failure, the actuators are reconfigured, *Refer to DSC-27-10-20 PITCH CONTROL - SCHEMATIC*.

MECHANICAL CONTROL

Mechanical control of the THS is available from the pitch trim wheel at any time, if either the green or yellow hydraulic system is functioning.
Mechanical control from the pitch trim wheel has priority over electrical control.

ACTUATION

ELEVATORS

- Two electrically-controlled hydraulic servojacks drive each elevator.

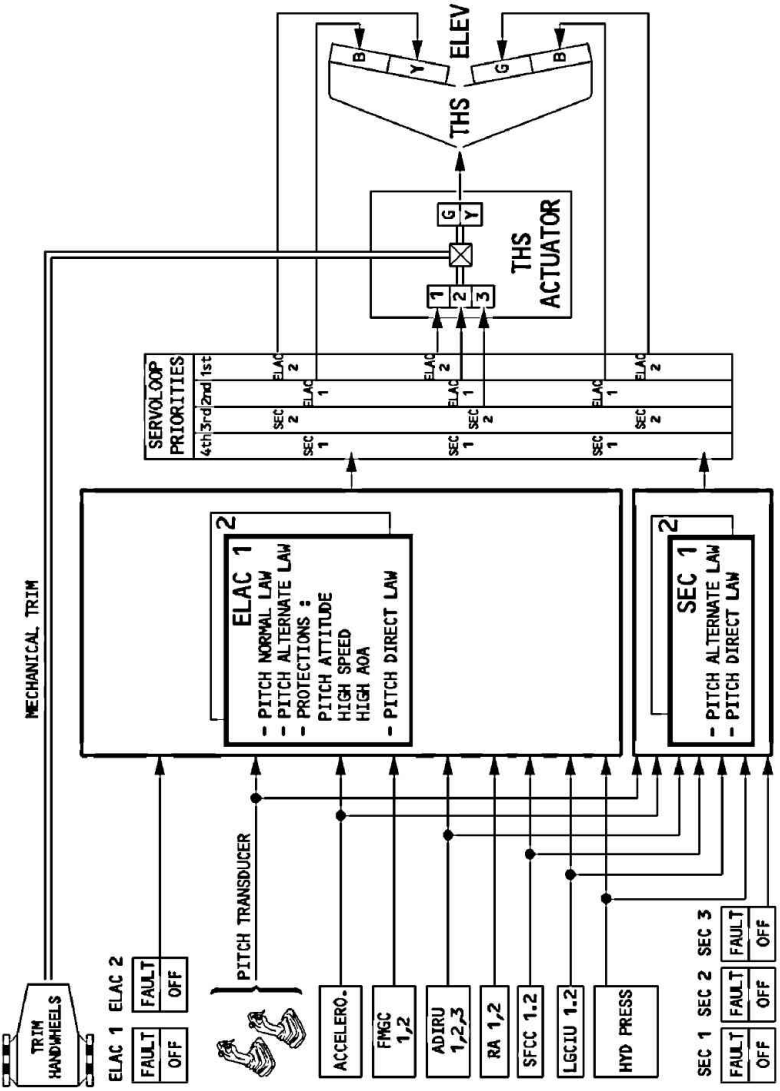
  Each servojack has three control modes :
  - Active : The jack position is electrically-controlled.
  - Damping : The jack follows surface movement.
  - Centering : The jack is hydraulically retained in the neutral position.

- In normal operation :
  - One jack is in active mode.
  - The other jack is in damping mode.
  - Some maneuvers cause the second jack to become active.
- If the active servojack fails, the damped one becomes active, and the failed jack is automatically switched to damping mode.
- If neither jack is being controlled electrically, both are automatically switched to the centering mode.
- If neither jack is being controlled hydraulically, both are automatically switched to damping mode.
- If one elevator fails, the deflection of the remaining elevator is limited in order to avoid putting excessive asymmetric loads on the horizontal tailplane or rear fuselage.

STABILIZER

- A screwjack driven by two hydraulic motors drives the stabilizer.
- The two hydraulic motors are controlled by :
  - One of three electric motors, or
  - The mechanical trim wheel.

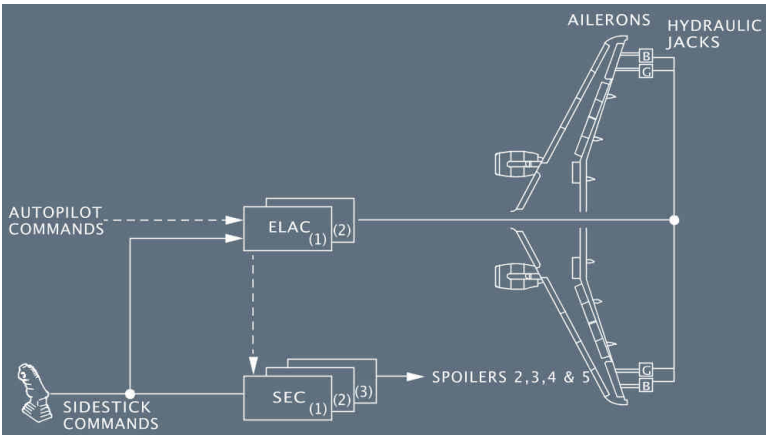
SCHEMATIC


ELEV
THS
B
Y
G
B
THS ACTUATOR
G
Y
1
2
3
SERVOLOOP PRIORITIES
4th
3rd
2nd
1st
ELAC 2
ELAC 1
SEC 2
SEC 1
MECHANICAL TRIM
2
ELAC 1
- PITCH NORMAL LAW
- PITCH ALTERNATE LAW
- PROTECTIONS :
PITCH ATTITUDE
HIGH SPEED
HIGH AOA
- PITCH DIRECT LAW
2
SEC 1
- PITCH ALTERNATE LAW
- PITCH DIRECT LAW
PITCH TRANSDUCER
TRIM HANDWHEELS
ELAC 1
ELAC 2
FAULT
OFF
ACCELERO.
FMGC 1,2
ADIRU 1,2,3
RA 1,2
SFCC 1,2
LGCIU 1,2
HYD PRESS
SEC 1
SEC 2
SEC 3
FAULT
OFF

ROLL CONTROL

Applicable to: ALL 321

GENERAL

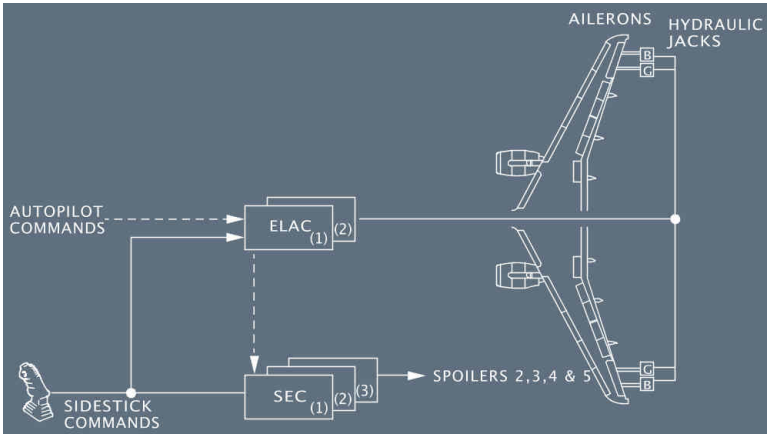


One aileron and four spoilers on each wing control the aircraft about the roll axis.
The maximum deflection of the ailerons is 25 °.
The ailerons extend 5 ° down when the flaps are extended (aileron droop).

The maximum deflection of the spoilers is :
- 35 ° for spoilers 2, 4, and 5
- 7 ° for spoilers 3.

Applicable to: ALL 320

GENERAL



One aileron and four spoilers on each wing control the aircraft about the roll axis.
The maximum deflection of the ailerons is 25 °.
The ailerons extend 5 ° down when the flaps are extended (aileron droop).
The maximum deflection of the spoilers is 35 °.

Applicable to: ALL

ELECTRIC CONTROL

- The ELAC 1 normally controls the ailerons.
  If ELAC1 fails, the system automatically transfers aileron control to ELAC2.
  If both ELACs fail, the ailerons revert to the damping mode.
- SEC3 controls the N° 2 spoilers, SEC1 the N° 3 and 4 spoilers, and SEC2 the N° 5 spoilers.
  If a SEC fails, the spoilers it controls are automatically retracted.

Applicable to: ALL

ACTUATION

AILERONS

Each aileron has two electrically controlled hydraulic servojacks.
One of these servojacks per aileron operates at a time.

Each servojack has two control modes :

Active : Jack position is controlled electrically
Damping : Jack follows surface movement.

The system automatically selects damping mode, if both ELACs fail or in the event of blue and green hydraulic low pressure.

SPOILERS

A servojack positions each spoiler. Each servojack receives hydraulic power from either the green, yellow, or blue hydraulic system, controlled by the SEC1, 2 or 3 (*Refer to DSC-27-10-20 GENERAL ARCHITECTURE* diagram).
The system automatically retracts the spoilers to their zero position, if it detects a fault or loses electrical control.
If the system loses hydraulic pressure, the spoiler retains the deflection it had at the time of the loss, or a lesser deflection if aerodynamic forces push it down.
When a spoiler surface on one wing fails, the symmetric one on the other wing is inhibited.

SPEED BRAKES AND GROUND SPOILERS

Applicable to: B-HTF

2

The pilot controls the speedbrakes with the speedbrake lever.
The speedbrakes are actually spoilers 2, 3 and 4.

Speedbrake extension is inhibited, if :
- SEC1 and SEC3 both have faults.
- An elevator (L or R) has a fault (in this case only spoilers 3 and 4 are inhibited).
- Angle-of-attack protection is active.
- Flaps are in configuration 3 or FULL.

If an inhibition occurs when the speedbrakes are extended, they automatically retract and remain retracted until the inhibition condition disappears and the pilots reset the lever. (The speedbrakes can be extended again, 10 s or more after the lever is reset).
When a speedbrake surface on one wing fails, the symmetric one on the other wing is inhibited.

Note: *1. For maintenance purposes, the speedbrake lever will extend the N° 1 surfaces when the aircraft is stopped on ground, regardless of the slat/flap configuration.*
2. When the aircraft is flying faster than 315 kt or M 0.75 with the autopilot engaged, the speedbrake retraction rate is reduced (Retraction from FULL to in takes about 25 s).

L3 The maximum deflection for the spoilers 2, 3 and 4 is 25 °.
For these surfaces (which perform both roll and speedbrake functions) the roll function has priority. When the sum of a roll order and a simultaneous speedbrake order on one surface is greater than the maximum deflection available in flight, the same surface on the other wing is retracted until the difference between the two surfaces is equal to the roll order.

Applicable to: ALL 320

SPEED BRAKE CONTROL

The pilot controls the speedbrakes with the speed brake lever.
The speedbrakes are actually spoilers 2, 3 and 4.

Speedbrake extension is inhibited, if:
- SEC1 and SEC3 both have faults
- An elevator (L or R) has a fault (in this case only spoilers 3 and 4 are inhibited)
- Angle-of-attack protection is active
- Flaps are in configuration FULL
- Thrust levers above MCT position
- Alpha Floor activation.

If an inhibition occurs when the speedbrakes are extended, they retract automatically and stay retracted until the inhibition condition disappears and the pilots reset the lever. (The speedbrakes can be extended again 10 s or more after the lever is reset).
When a speedbrake surface on one wing fails, the symmetric one on the other wing is inhibited.

Note: *1. For maintenance purposes, the speedbrake lever will extend the N° 1 surfaces when the aircraft is stopped on ground, whatever the slat/flap configuration.*
2. When the aircraft is flying faster than 315 kt or M 0.75 with the autopilot engaged, the speedbrake retraction rate is reduced (Retraction from FULL to in takes about 25 s).

L3 The maximum speedbrake deflection in manual flight is:
40 ° for spoilers 3 and 4
20 ° for spoiler 2.

The maximum speedbrake deflection with the autopilot engaged is:
25 ° for spoilers 3 and 4
12.5 ° for spoiler 2.

The maximum speedbrake deflection with the autopilot engaged is achieved with half speedbrake lever deflection.
For these surfaces (which perform both roll and speedbrake functions) the roll function has priority. When the sum of a roll order and a simultaneous speedbrake order on one surface is greater than the maximum deflection available in flight, the same surface on the other wing is retracted until the difference between the two surfaces is equal to the roll order.

Applicable to: B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

The pilot controls the speedbrakes with the speedbrake lever.
The speedbrakes are actually spoilers 2, 3 and 4.

Speedbrake extension is inhibited, if :
- SEC1 and SEC3 both have faults.
- An elevator (L or R) has a fault (in this case only spoilers 3 and 4 are inhibited).
- Angle-of-attack protection is active.
- Flaps are in configuration 3 or FULL.
- Thrust levers above MCT position.
- Alpha Floor activation.

If an inhibition occurs when the speedbrakes are extended, they automatically retract and remain retracted until the inhibition condition disappears and the pilots reset the lever. (The speedbrakes can be extended again, 10 s or more after the lever is reset).
When a speedbrake surface on one wing fails, the symmetric one on the other wing is inhibited.

Note: *1. For maintenance purposes, the speedbrake lever will extend the N° 1 surfaces when the aircraft is stopped on ground, regardless of the slat/flap configuration.*
2. When the aircraft is flying faster than 315 kt or M 0.75 with the autopilot engaged, the speedbrake retraction rate is reduced (Retraction from FULL to in takes about 25 s).

L3 The maximum deflection for the spoilers 2, 3 and 4 is 25 °.
For these surfaces (which perform both roll and speedbrake functions) the roll function has priority. When the sum of a roll order and a simultaneous speedbrake order on one surface is greater than the maximum deflection available in flight, the same surface on the other wing is retracted until the difference between the two surfaces is equal to the roll order.

Applicable to: ALL 320

3 **GROUND SPOILER CONTROL**

Spoilers 1 to 5 act as ground spoilers.
When a ground spoiler surface on one wing fails, the symmetric ground spoiler surface on the other wing is inhibited.

ARMING

The pilot arms the ground spoilers by pulling the speedbrake control lever up into the armed position.

FULL EXTENSION – REJECTED TAKEOFF PHASE

- **If the ground spoilers are armed and the speed exceeds 72 kt, the ground spoilers will automatically extend as soon as both thrust levers are reset to idle.**
- **If the ground spoilers are not armed and the speed exceeds 72 kt, the ground spoilers will automatically extend as soon as reverse is selected on one engine (the other thrust lever remains at idle).**

FULL EXTENSION - LANDING PHASE

- **If the ground spoilers are armed and all thrust levers are at idle, the ground spoilers will automatically extend as soon as both main landing gears have touched down.**
- **If the ground spoilers are not armed and both main landing gears have touched down, the ground spoilers will automatically extend as soon as reverse is selected on one engine (the other thrust lever remains at idle).**

Note: • *In autoland, the ground spoilers fully extend at half speed one second after both main landing gears touch down.*
• *The spoiler roll function is inhibited when spoilers are used for the ground spoiler function.*

PARTIAL EXTENSION

The ground spoilers partially extend (10 °) when reverse is selected on at least one engine (other engine at idle), and one main landing gear strut is compressed. This partial extension, by decreasing the lift, eases the compression of the second main landing gear strut, and consequently leads to full ground spoiler extension.

RETRACTION

The ground spoilers retract:
- After landing,
- After a rejected takeoff, when the ground spoilers are disarmed.

Note: *If ground spoilers are not armed, they extend at the reverse selection and retract when idle is selected.*

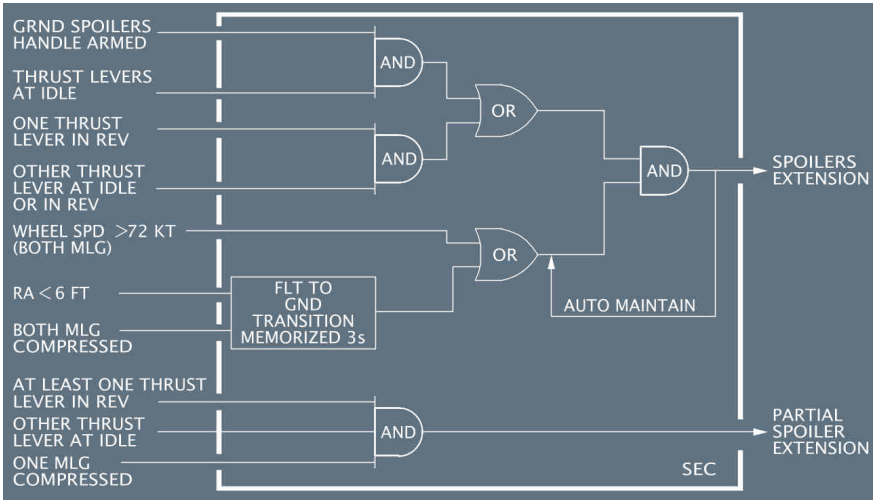
- During a touch and go, when at least one thrust lever is advanced above 20 °.

Note: *After an aircraft bounce, the ground spoilers remain extended with the thrust levers at idle.*

L3 The landing gear touchdown condition is triggered for both main landing gear, either when their wheel speed is greater than 72 kt, or when their landing gear struts are, confirmed to be compressed by the radio altitude (RA <6 ft).

The thrust levers are considered to be at idle when they are:

- Below 3 °,
- Below 15 °, when the RA is below 6 ft.



Applicable to: ALL 321

4 GROUND SPOILER CONTROL

Spoilers 1 to 5 act as ground spoilers.
When a ground spoiler surface on one wing fails, the symmetric ground spoiler surface on the other wing is inhibited.

ARMING

The pilot arms the ground spoilers by pulling the speedbrake control lever up into the armed position.

FULL EXTENSION – REJECTED TAKEOFF PHASE

- **If the ground spoilers are armed and the speed exceeds 72 kt, the ground spoilers will automatically extend as soon as both thrust levers are reset to idle.**
- **If the ground spoilers are not armed and the speed exceeds 72 kt, the ground spoilers will automatically extend as soon as reverse is selected on one engine (the other thrust lever remains at idle).**

FULL EXTENSION - LANDING PHASE

- **If the ground spoilers are armed and all thrust levers are at idle, the ground spoilers will automatically extend as soon as both main landing gears have touched down.**
- **If the ground spoilers are not armed and both main landing gears have touched down, the ground spoilers will automatically extend as soon as reverse is selected on one engine (the other thrust lever remains at idle).**

Note: *The spoiler roll function is inhibited when spoilers are used for the ground spoiler function.*

PARTIAL EXTENSION

The ground spoilers partially extend (10 °) when reverse is selected on at least one engine (other engine at idle), and one main landing gear strut is compressed. This partial extension, by decreasing the lift, eases the compression of the second main landing gear strut, and consequently leads to full ground spoiler extension.

RETRACTION

The ground spoilers retract:

- After landing,
- After a rejected takeoff, when the ground spoilers are disarmed.

Note: *If ground spoilers are not armed, they extend at the reverse selection and retract when idle is selected.*

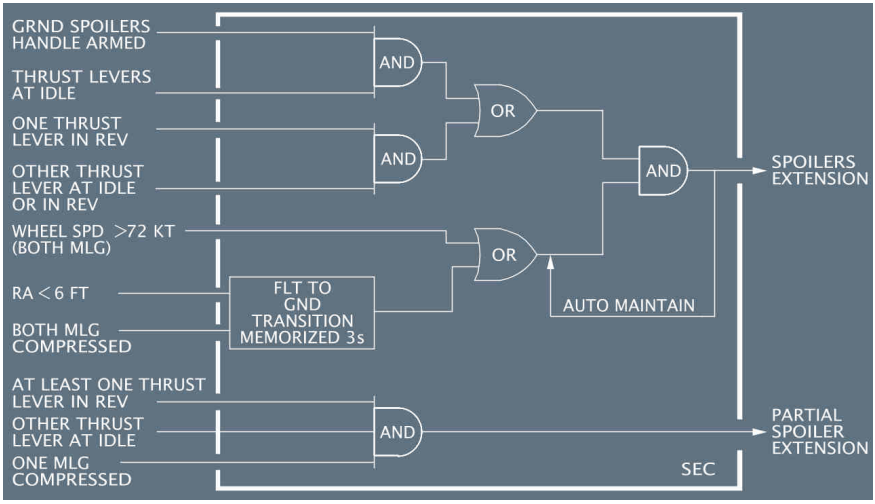
- During a touch and go, when at least one thrust lever is advanced above 20 °.

Note: *After an aircraft bounce, the ground spoilers remain extended with the thrust levers at idle.*

L3 The landing gear touchdown condition is triggered for both main landing gear, either when their wheel speed is greater than 72 kt, or when their landing gear struts are, confirmed to be compressed by the radio altitude (RA <6 ft).

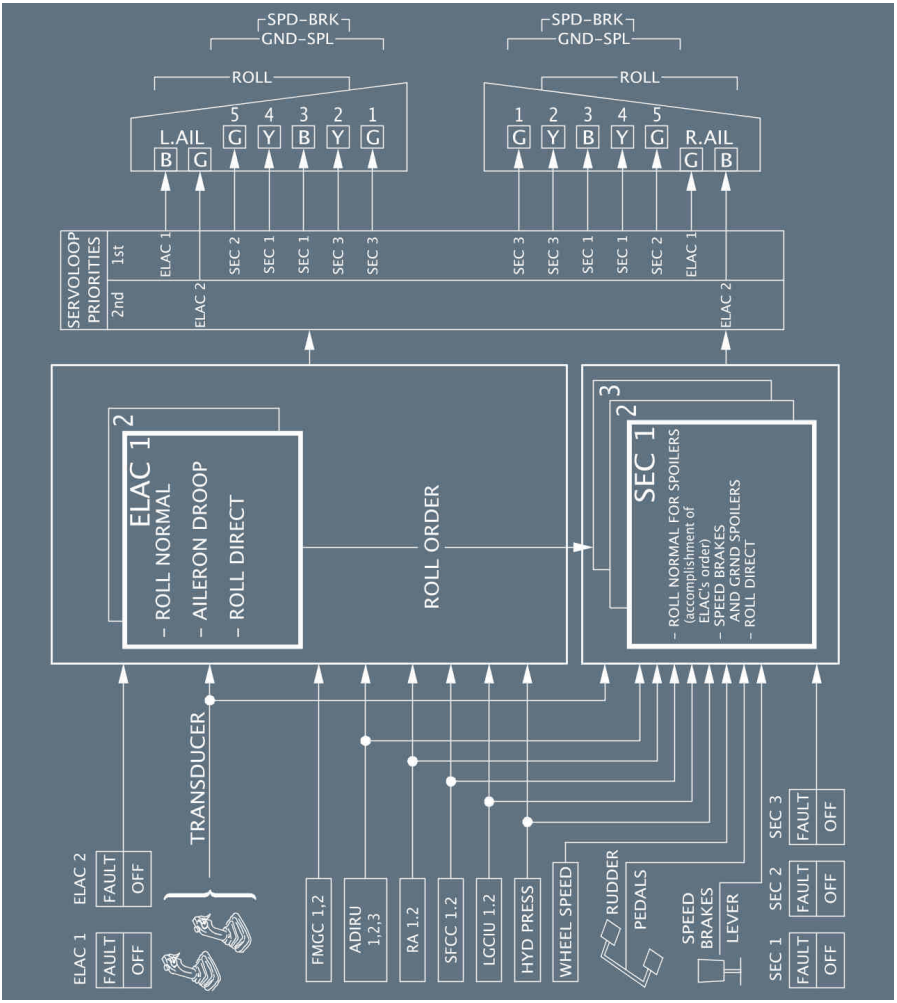
The thrust levers are considered to be at idle when they are:

- Below 3 °,
- Below 15 °, when the RA is below 6 ft.



Applicable to: ALL

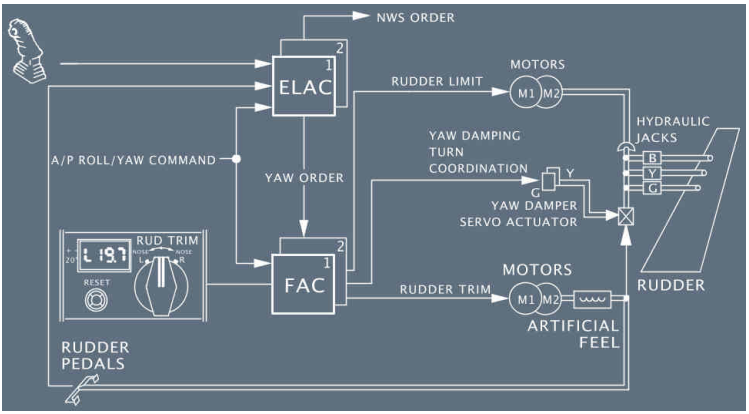
5 ## ROLL CONTROL - SCHEMATIC



YAW CONTROL

Applicable to: ALL

GENERAL



One rudder surface controls yaw.

ELECTRICAL RUDDER CONTROL

The yaw damping and turn coordination functions are automatic.
The ELACs compute yaw orders for coordinating turns and damping yaw oscillations, and transmit them to the FACs.

MECHANICAL RUDDER CONTROL

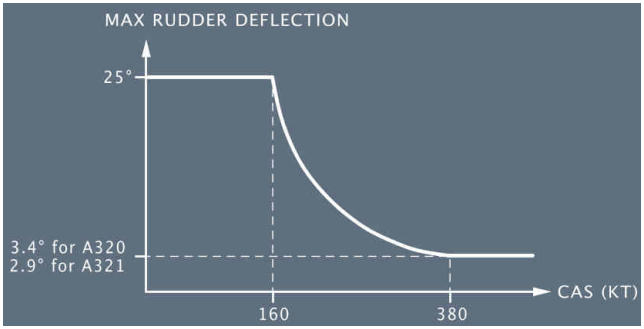
The pilots can use conventional rudder pedals to control the rudder.

RUDDER ACTUATION

Three independent hydraulic servojacks, operating in parallel, actuate the rudder. In automatic operation (yaw damping, turn coordination) a green servo actuator drives all three servojacks. A yellow servo actuator remains synchronized and takes over if there is a failure.
There is no feedback to the rudder pedals from the yaw damping and turn coordination functions.

RUDDER TRAVEL LIMIT

The rudder and pedal deflection limit depends on speed.
Each channel of the limiter is controlled and monitored by its associated FAC. If both FACs fail, maximum deflection is available, when the slats are extended.



RUDDER TRIM

The two electric motors that position the artificial feel unit also trim the rudder. In normal operation, motor N° 1 (controlled by FAC1), drives the trim, and FAC2 with motor N° 2 remains synchronized as a backup.

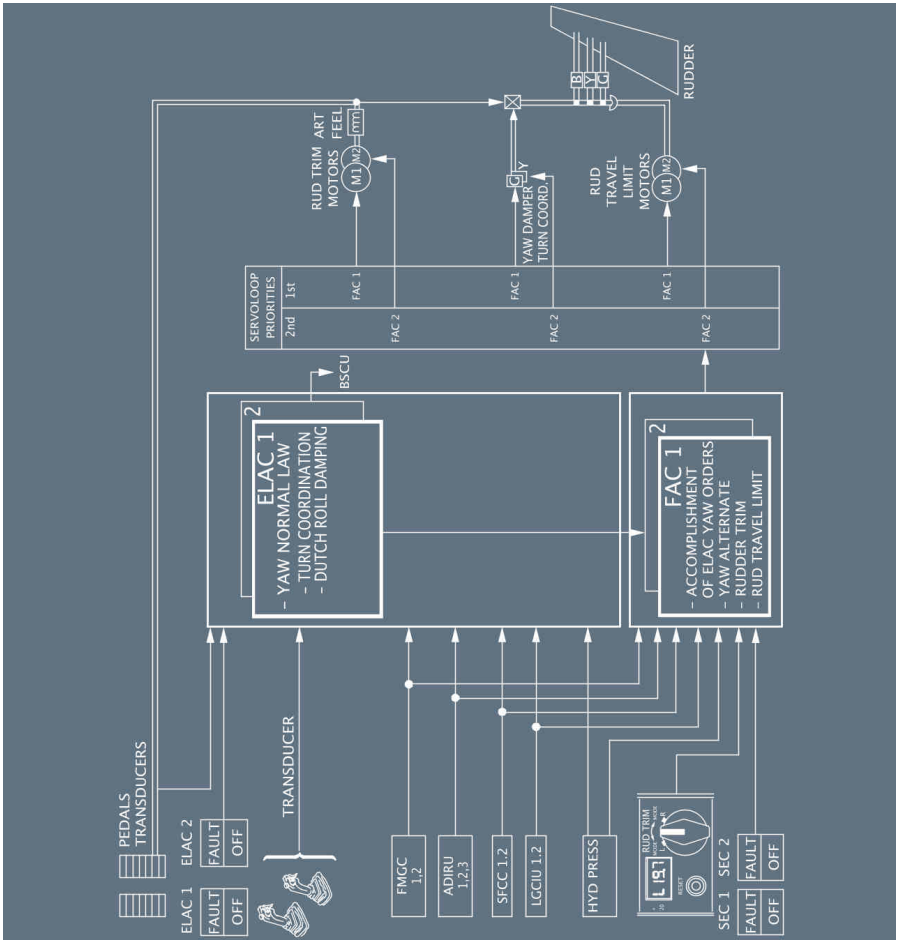
In manual flight, the pilot can apply rudder trim with the rotary RUD TRIM switch on the pedestal.

- Maximum deflection is ± 20 °.
- Rudder trim speed is 1 °/s.
- In addition to limitation by the TLU, if rudder trim is applied, maximum rudder deflection may be reduced in the opposite direction.

The pilot can use a button on the RUD TRIM panel to reset the rudder trim to zero.

Note: With the autopilot engaged, the FMGC computes the rudder trim orders. The rudder trim rotary switch and the rudder trim reset pushbutton are not active.

SCHEMATIC


RUDDER
B
Y
G
RUD TRIM MOTORS
ART FEEL
M1
M2
YAW DAMPER
TURN COORD.
RUD TRAVEL LIMIT MOTORS
SERVOLOOP PRIORITIES
1st
2nd
FAC 1
FAC 2
BSCU
ELAC 1
YAW NORMAL LAW
TURN COORDINATION
DUTCH ROLL DAMPING
FAC 1
ACCOMPLISHMENT OF ELAC YAW ORDERS
YAW ALTERNATE
RUDDER TRIM
RUD TRAVEL LIMIT
PEDALS TRANSDUCERS
ELAC 1
ELAC 2
FAULT
OFF
TRANSDUCER
FMGC 1,2
ADIRU 1,2,3
SFCC 1,2
LGCIU 1,2
HYD PRESS
RUD TRIM
SEC 1
SEC 2

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General

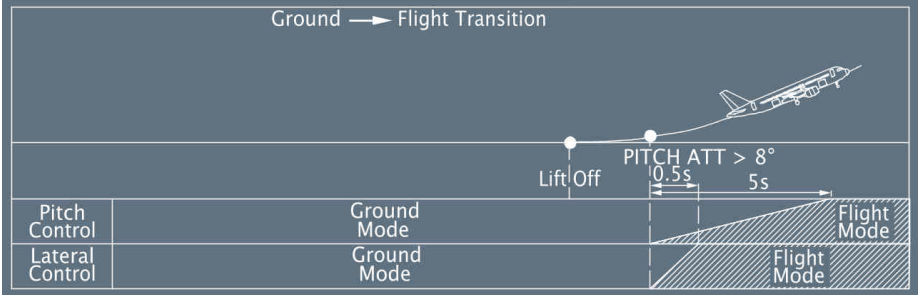
GENERAL

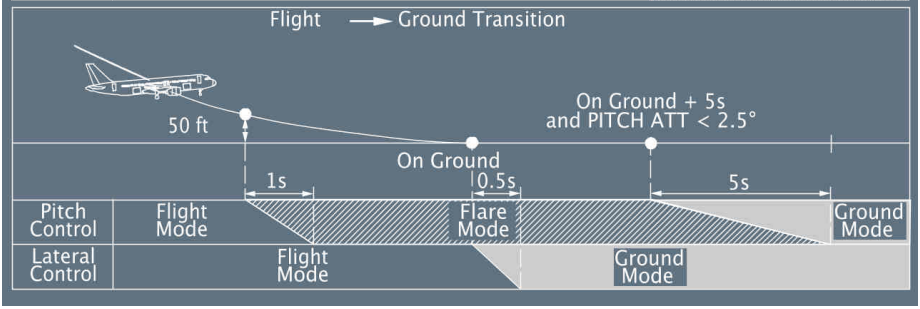
Applicable to: ALL

1 Flight control normal law covers:
- three-axis control
- flight envelope protection
- alleviation of maneuver loads

NORMAL LAW protection	Pitch Control		
	Ground Mode	Flight Mode	Flare Mode
Pitch Attitude		X	
Load Factor		X	
High Speed		X	
High Angle Of Attack		X	X

NORMAL LAW Protection	Lateral Control	
	Ground Mode	Flight Mode
Bank Angle		X





Pitch Control

GROUND MODE

Applicable to: ALL

Ground mode is a direct relationship between sidestick deflection and elevator deflection, without auto trim.
It automatically sets the trimmable horizontal stabilizer (THS) at 0 ° (inside the green band).
After landing, the automatic pitch trim resetting to 0 ° stops as soon as the pitch attitude exceeds 2.5 °. In this case, the THS setting is frozen.
The automatic resetting to 0 ° restarts as soon as the pitch attitude goes below 2.5 °.
A setting that the pilot enters manually to adjust for CG has priority for takeoff.
When the aircraft reaches 75 kt during the takeoff roll, the system reduces the maximum up elevator deflection from 30 ° to 20 °.

FLIGHT MODE

Applicable to: ALL 321

The normal-law flight mode is a load-factor-demand mode with automatic trim and protection throughout the flight envelope.
Following normal law, the sidestick controllers set the elevator and THS to maintain load factor proportional to stick deflection and independent of speed.
With the sidestick at neutral, wings level, the system maintains 1 g in pitch (corrected for pitch attitude), and there is no need for the pilot to trim by changing speed or configuration.
Pitch trim is automatic both in manual mode and when the autopilot is engaged. In normal turns (up to 33 °C of bank) the pilot does not have to make any pitch corrections once the turn is established.
The flight mode is active from takeoff to landing, and follows the logic shown schematically (*Refer to DSC-27-20-10-10 General*).

Automatic pitch trim freezes in the following situations:
- The pilot enters a manual trim order.
- The radio altitude is below 50 ft (100 ft with autopilot engaged).
- The load factor goes below 0.5 g.
- The aircraft is under high-speed or high-Mach protection.

When angle-of-attack protection is active, the THS setting is limited between the setting at the aircraft's entry into this protection and 3.5 ° nose down. (Neither the pilot nor the system can apply additional nose-up trim).
Similarly, when the load factor is higher than 1.25 g or when the aircraft exceeds 33 ° of bank, the THS setting is limited to values between the actual setting and 3.5 ° nose down.

CONTROL WITH AUTOPILOT ENGAGED

- The ELACs and SECs limit what the autopilot can order.
- The pilot has to overcome a restraining force in order to move the sidestick when the autopilot is engaged. If he overcomes this force and does move the sidestick, he disconnects the autopilot.
- The pilot can also disconnect the autopilot by pushing on the rudder pedals (10 ° out of trim), or by moving the pitch trim wheel beyond a certain threshold.
- All protections of normal laws remain effective except pitch attitude protection.

FLIGHT MODE

Applicable to: ALL 320

The normal-law flight mode is a load-factor-demand mode with automatic trim and protection throughout the flight envelope.
Following normal law, the sidestick controllers set the elevator and THS to maintain load factor proportional to stick deflection and independent of speed.
With the sidestick at neutral, wings level, the system maintains 1 g in pitch (corrected for pitch attitude), and there is no need for the pilot to trim by changing speed or configuration.
Pitch trim is automatic both in manual mode and when the autopilot is engaged. In normal turns (up to 33 ° of bank) the pilot does not have to make any pitch corrections once the turn is established.
The flight mode is active from takeoff to landing, and follows the logic shown schematically (*Refer to DSC-27-20-10-10 General*).

Automatic pitch trim freezes in the following situations:
- The pilot enters a manual trim order.
- The radio altitude is below 50 ft (100 ft with autopilot engaged).
- The load factor goes below 0.5 g.

When angle-of-attack protection is active, the THS setting is limited between the setting at the aircraft's entry into this protection and 3.5 ° nose down. (Neither the pilot nor the system can apply additional nose-up trim).
Similarly, when the load factor is higher than 1.25 g or when the aircraft exceeds 33 ° of bank, the THS setting is limited to values between the actual setting and 3.5 ° nose down.
When High Speed or High Mach Protection is active, the THS Setting is limited between the setting at the aircraft's entry into this protection and 11 ° nose-up.

CONTROL WITH AUTOPILOT ENGAGED

- The ELACs and SECs limit what the autopilot can order.
- The pilot has to overcome a restraining force in order to move the sidestick when the autopilot is engaged. If he overcomes this force, he disconnects the autopilot.

- The pilot can also disconnect the autopilot by pushing on the rudder pedals (10 ° out of trim), or by moving the pitch trim wheel beyond a certain threshold.
- All protections of normal laws remain effective except pitch attitude protection.

FLARE MODE

Applicable to: ALL

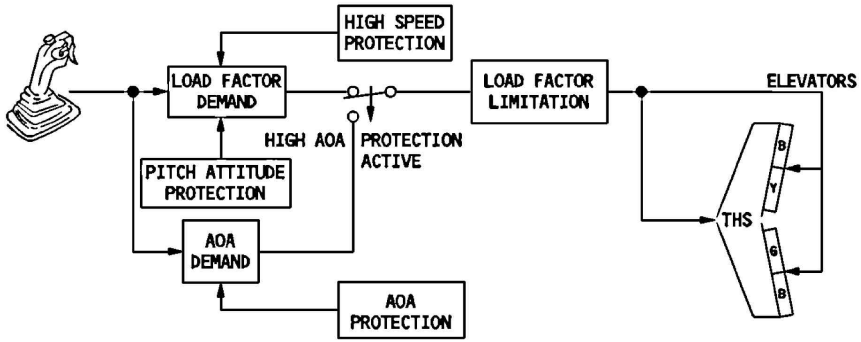
The flight mode changes to flare mode when the aircraft passes 50 ft RA as it descends to land. The system memorizes the attitude at 50 ft, and that attitude becomes the initial reference for pitch attitude control.
As the aircraft descends through 30 ft, the system begins to reduce the pitch attitude, reducing it to 2 ° nose down over a period of 8 s. This means that it takes gentle nose-up action by the pilot to flare the aircraft.

PROTECTIONS

Applicable to: ALL

GENERAL

The normal law protects the aircraft throughout the flight envelope, as follows :
- load factor limitation
- pitch attitude protection
- high-angle-of-attack (AOA) protection
- high-speed protection.



Applicable to: ALL

LOAD FACTOR LIMITATION

The load factor is automatically limited to:
+2.5 g to -1 g for clean configuration.
+2 g to 0 for other configurations.

Applicable to: ALL

PITCH ATTITUDE PROTECTION

Pitch attitude is limited to :
- 30 ° nose up in conf 0 to 3 (progressively reduced to 25 ° at low speed).
- 25 ° nose up in conf FULL (progressively reduced to 20 ° at low speed).
- 15 ° nose down (indicated by green symbols "=" on the PFD's pitch scale).

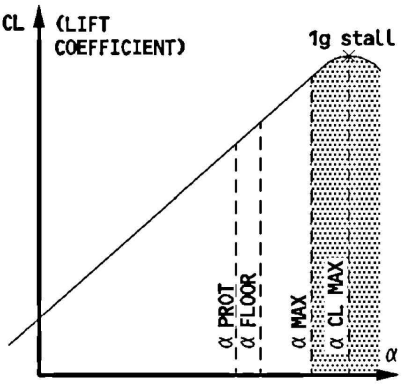
The flight director bars disappear from the PFD when the pitch attitude exceeds 25 ° up or 13 ° down. They return to the display when the pitch angle returns to the region between 22 ° up and 10 ° down.

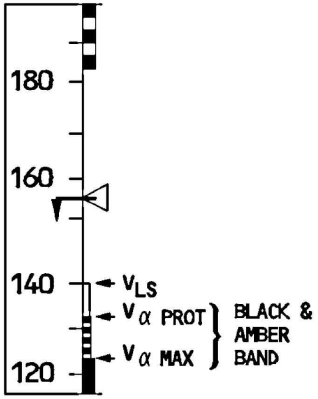
Applicable to: B-HTF

1

HIGH ANGLE OF ATTACK PROTECTION

Under normal law, when the angle-of-attack becomes greater than αprot, the system switches elevator control from normal mode to a protection mode, in which the angle-of-attack is proportional to sidestick deflection. That is, in the αprot range, from α prot to αMAX, the sidestick commands α directly. However, the angle-of-attack will not exceed αMAX, even if the pilot gently pulls the sidestick all the way back. If the pilot releases the sidestick, the angle-of-attack returns to αprot and stays there.
This protection against stall and windshear has priority over all other protections. The autopilot disconnects at α prot + 1 °.





Vα prot, Vα floor, Vα MAX vary according to weight and configuration.

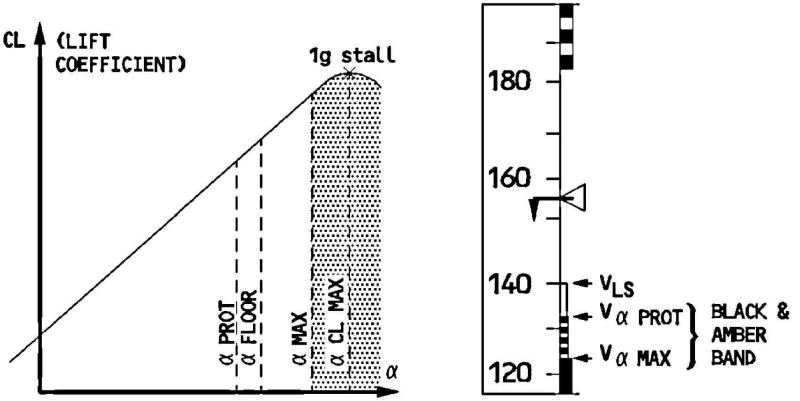
To deactivate the angle of attack protection, the pilot must push the sidestick:
- Greater than 8 ° forward, or,
- Greater than 0.5 °for at least 0.5 s when α < α MAX.

Note: *1. At takeoff αprot is equal to αMAX for 5 s.*
2. αfloor is activated through the A/THR system, when:
- *αis greater than αfloor (9.5 ° in configuration 0; 15 ° in configuration 1, 2; 14 ° in configuration 3; 13 ° in configuration FULL), or*
- *Sidestick deflection is greater than 14 ° nose up, with either the pitch attitude or the angle-of-attack protection active.*
The αfloor function is available from lift-off to 100 ft RA before landing.

Applicable to: ALL 320

HIGH ANGLE OF ATTACK PROTECTION

Under normal law, when the angle-of-attack becomes greater than αprot, the system switches elevator control from normal mode to a protection mode, in which the angle-of-attack is proportional to sidestick deflection. That is, in the αprot range, from α prot to αMAX, the sidestick commands α directly. However, the angle-of-attack will not exceed αMAX, even if the pilot gently pulls the sidestick all the way back. If the pilot releases the sidestick, the angle-of-attack returns to αprot and stays there.
This protection against stall and windshear has priority over all other protections. The autopilot disconnects at α prot + 1 °.



Vα prot, Vα floor, Vα MAX vary according to weight and configuration.

To deactivate the angle of attack protection, the pilot must push the sidestick:
- Greater than 8 ° forward, or,
- Greater than 0.5 °for at least 0.5 s when α < α MAX.

In addition, below 200 ft, the angle of attack protection is also deactivated, when:
- Sidestick deflection is less than half nose-up, and
- Actual α is less than α prot – 2 °.

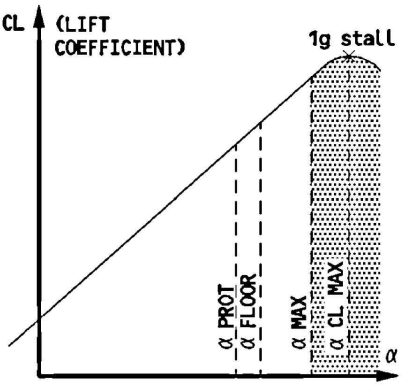
Note: *1. At takeoff α prot is equal to α MAX for 5 s.*
2. αfloor is activated through the A/THR system, when:
- *α is greater than αfloor (9.5 ° in configuration 0; 15 ° in configuration 1, 2; 14 ° in configuration 3; 13 ° in configuration FULL) or*
- *Sidestick deflection is greater than 14 ° nose up, with either the pitch attitude or the angle-of-attack protection active.*
The αfloor function is available from lift-off to 100 ft RA before landing.

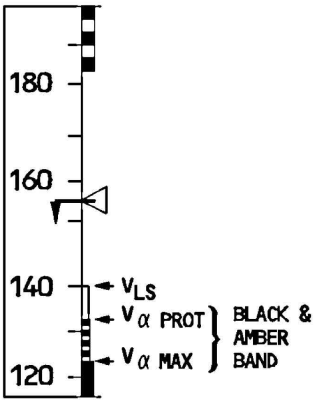
Applicable to: B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

HIGH ANGLE OF ATTACK PROTECTION

Under normal law, when the angle-of-attack becomes greater than αprot, the system switches elevator control from normal mode to a protection mode, in which the angle-of-attack is proportional to sidestick deflection. That is, in the αprot range, from α prot to αMAX, the sidestick commands α directly. However, the angle-of-attack will not exceed αMAX, even if the pilot gently pulls the sidestick all the way back. If the pilot releases the sidestick, the angle-of-attack returns to αprot and stays there.

This protection against stall and windshear has priority over all other protections. The autopilot disconnects at α prot + 1 °.





Vα prot, Vα floor, Vα MAX vary according to weight and configuration.

To deactivate the angle of attack protection, the pilot must push the sidestick:
- Greater than 8 ° forward, or,
- Greater than 0.5 °for at least 0.5 s when α < α MAX.

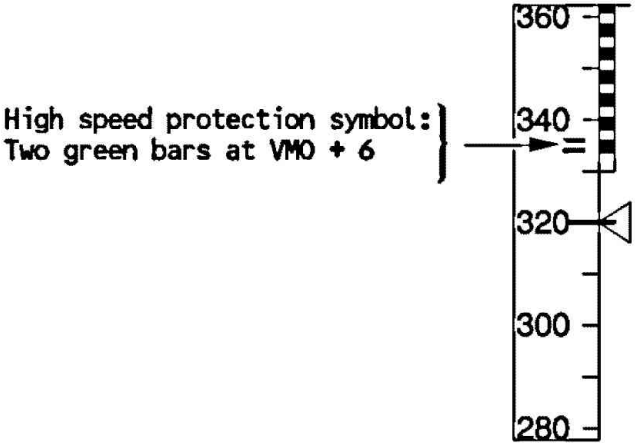
Note: *1. At takeoff α prot is equal to α MAX for 5 s.*
2. αfloor is activated through the A/THR system, when:
- *α is greater than αfloor (9.5 ° in configuration 0; 15 ° in configuration 1, 2; 14 ° in configuration 3; 13 ° in configuration FULL), or*
- *Sidestick deflection is greater than 14 ° nose up, with either the pitch attitude or the angle-of-attack protection active.*
The αfloor function is available from lift-off to 100 ft RA before landing.

Applicable to: ALL 321

HIGH SPEED PROTECTION

The aircraft automatically recovers, following a high speed upset. Depending on the flight conditions (high acceleration, low pitch attitude), High Speed Protection is activated at/or above VMO/MMO.
When it is activated, the pitch trim is frozen. Positive spiral static stability is introduced to 0 ° bank angle (instead of 33 ° in normal law), so that with the sidestick released, the aircraft always returns to a bank angle of 0 °. The bank angle limit is reduced from 67 ° to 40 °.
As the speed increases above VMO/MMO, the sidestick nose-down authority is progressively reduced, and a permanent nose-up order is applied to aid recovery to normal flight conditions.

High Speed Protection is deactivated, when the aircraft speed decreases below VMO/MMO, where the usual normal control laws are recovered.
The autopilot disconnects, when High Speed Protection becomes active.

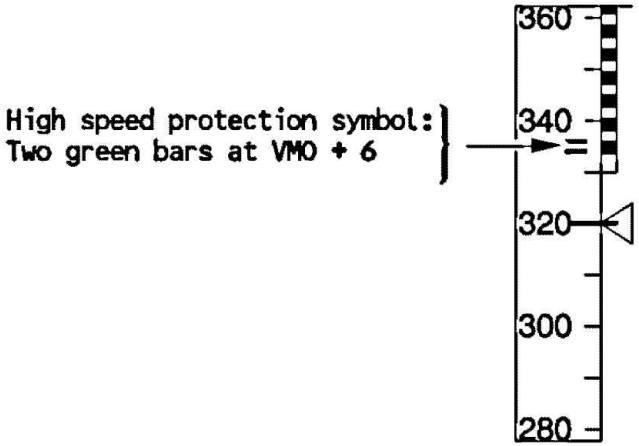


Note: The ECAM displays an "O/SPEED" warning at VMO + 4 kt and MMO + 0.006.

Applicable to: ALL 320

HIGH SPEED PROTECTION

The aircraft automatically recovers, following a high speed upset. Depending on the flight conditions (high acceleration, low pitch attitude), High Speed Protection is activated at/or above VMO/MMO.
When it is activated, the THS setting is limited between the setting at the aircraft's entry into this protection and 11 ° nose-up. Positive spiral static stability is introduced to 0 ° bank angle (instead of 33 ° in normal law), so that with the sidestick released, the aircraft always returns to a bank angle of 0 °. The bank angle limit is reduced from 67 °to 40 °.
As the speed increases above VMO/MMO, the sidestick nose-down authority is progressively reduced, and a permanent nose-up order is applied to aid recovery to normal flight conditions.
High Speed Protection is deactivated, when the aircraft speed decreases below VMO/MMO, where the usual normal control laws are recovered.
The autopilot disconnects, when High Speed Protection becomes active.



Note: *The ECAM displays an "O/SPEED" warning at VMO + 4 kt and MMO + 0.006.*

Applicable to: ALL

LOW ENERGY WARNING (IF INSTALLED)

The low energy warning is computed by the FAC (*Refer to DSC-22_40-10 General*).

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Lateral Control

NORMAL LAW

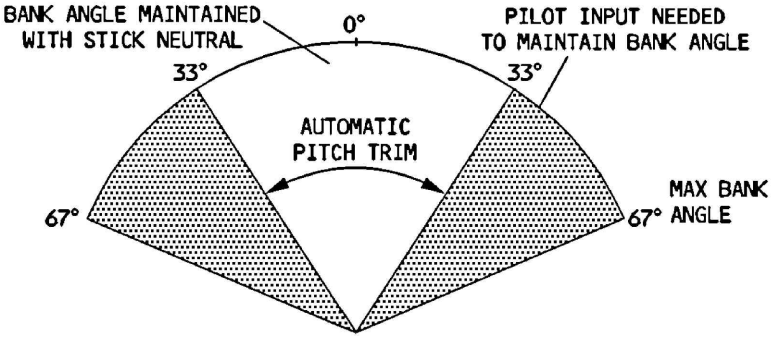
Applicable to: ALL

When the aircraft is on the ground (in “on ground” mode), the sidestick commands the aileron and roll spoiler surface deflection. The amount of control surface deflection that results from a given amount of sidestick deflection depends upon aircraft speed. The pedals control rudder deflection through a direct mechanical linkage. The aircraft smoothly transitions to “in flight” mode shortly after liftoff.
When the aircraft is in the “in flight” mode, normal law combines control of the ailerons, spoilers (except N° 1 spoilers), and rudder (for turn coordination) in the sidestick. While the system thereby gives the pilot control of the roll and heading, it also limits the roll rate and bank angle, coordinates the turns, and damps the dutch roll.
The roll rate requested by the pilot during flight is proportional to the sidestick deflection, with a maximum rate of 15 °/s when the sidestick is at the stop.
When the aircraft is in “flare” mode, the lateral control is the same as in “in flight” mode.
After touchdown, the aircraft smoothly transitions from “in flight” mode to “ground” mode.

BANK ANGLE PROTECTION

Applicable to: ALL

Inside the normal flight envelope, the system maintains positive spiral static stability for bank angles above 33 °. If the pilot releases the sidestick at a bank angle greater than 33 °, the bank angle automatically reduces to 33 °. Up to 33 °, the system holds the roll attitude constant when the sidestick is at neutral. If the pilot holds full lateral sidestick deflection, the bank angle goes to 67 ° (indicated by a pair of green bar lines “=” on the PFD) and no further.
If Angle-of-Attack protection is active, and the pilot maintains full lateral deflection on the sidestick, the bank angle will not go beyond 45 °. If High Speed Protection is active, and the pilot maintains full lateral deflection on the sidestick, the bank angle will not go beyond 40 °. If high speed protection is operative, the system maintains positive spiral static stability from a bank angle of 0 °, so that with the sidestick released, the aircraft always returns to a bank angle of 0 °.
When bank angle protection is active, auto trim is inoperative.
If the bank angle exceeds 45 °, the autopilot disconnects and the FD bars disappear. The FD bars return when the bank angle decreases to less than 40 °.

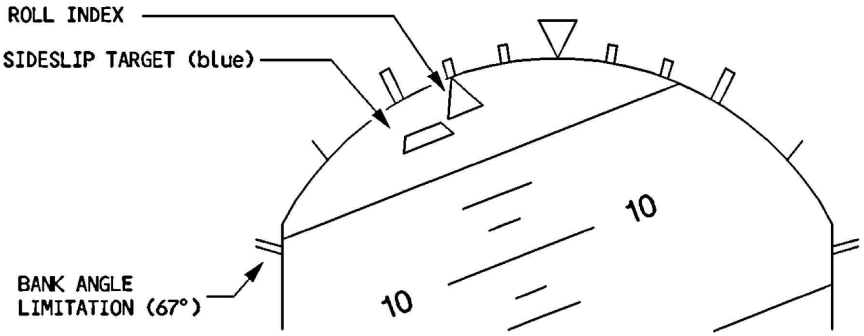

BANK ANGLE MAINTAINED
WITH STICK NEUTRAL
0°
PILOT INPUT NEEDED
TO MAINTAIN BANK ANGLE
33°
33°
AUTOMATIC
PITCH TRIM
67°
MAX BANK
67° ANGLE

Sideslip Target

SIDESLIP TARGET

Applicable to: ALL

If one engine fails, the FAC modifies the sideslip indication slightly to show the pilot how much rudder to use to get the best climb performance (ailerons to neutral and spoilers retracted).
In the case of an engine failure at takeoff, or at go-around, the sideslip index on the PFD changes from yellow to blue (to provide the conditions for the blue display of the sideslip target, *Refer to DSC-31-40 Attitude Data*).



In flight, the lateral normal law commands some rudder surface deflection to minimize the sideslip. The pilot's response is normal and instinctive: zero the slip indication by applying the right amount of rudder to get the best climb performance.

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GENERAL

Applicable to: ALL

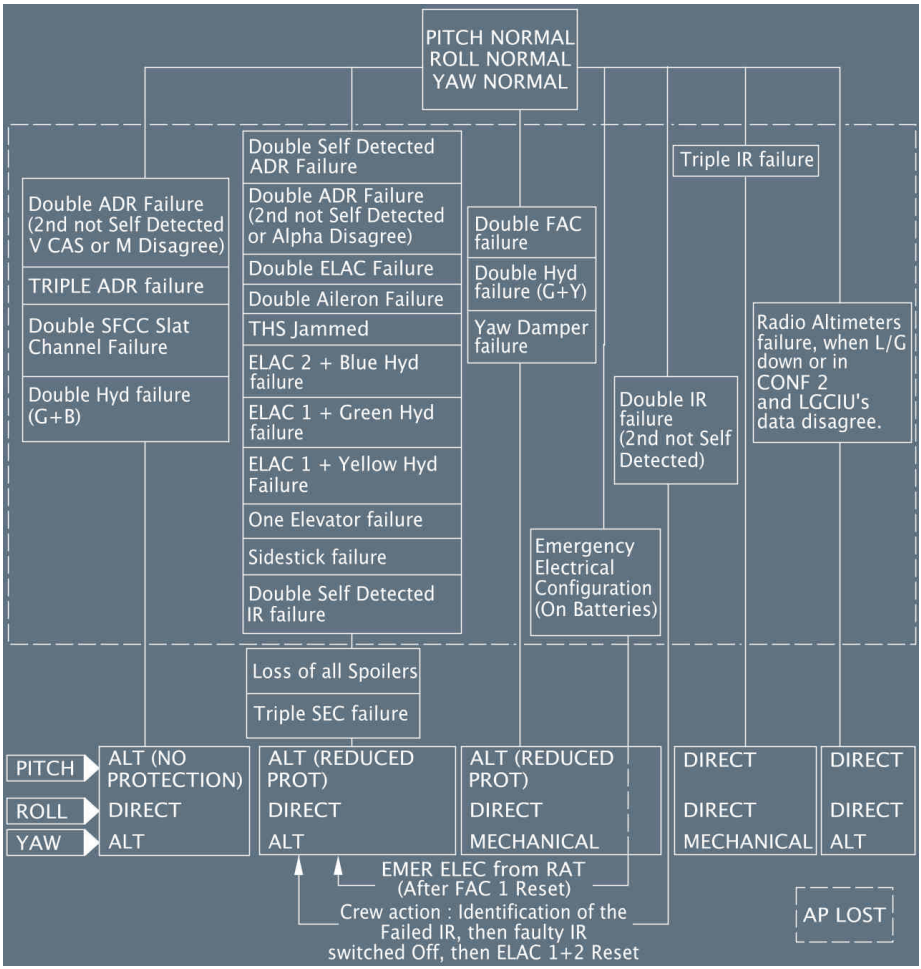
Depending on the failures occuring to the flight control system, or on its peripherals, there are 3 levels of reconfiguration :

- Alternate law
  They are two levels of alternate law : with and without reduced protections.
- Direct law
- Mechanical

FLIGHT CONTROLS LAW RECONFIGURATION

Applicable to: ALL 320

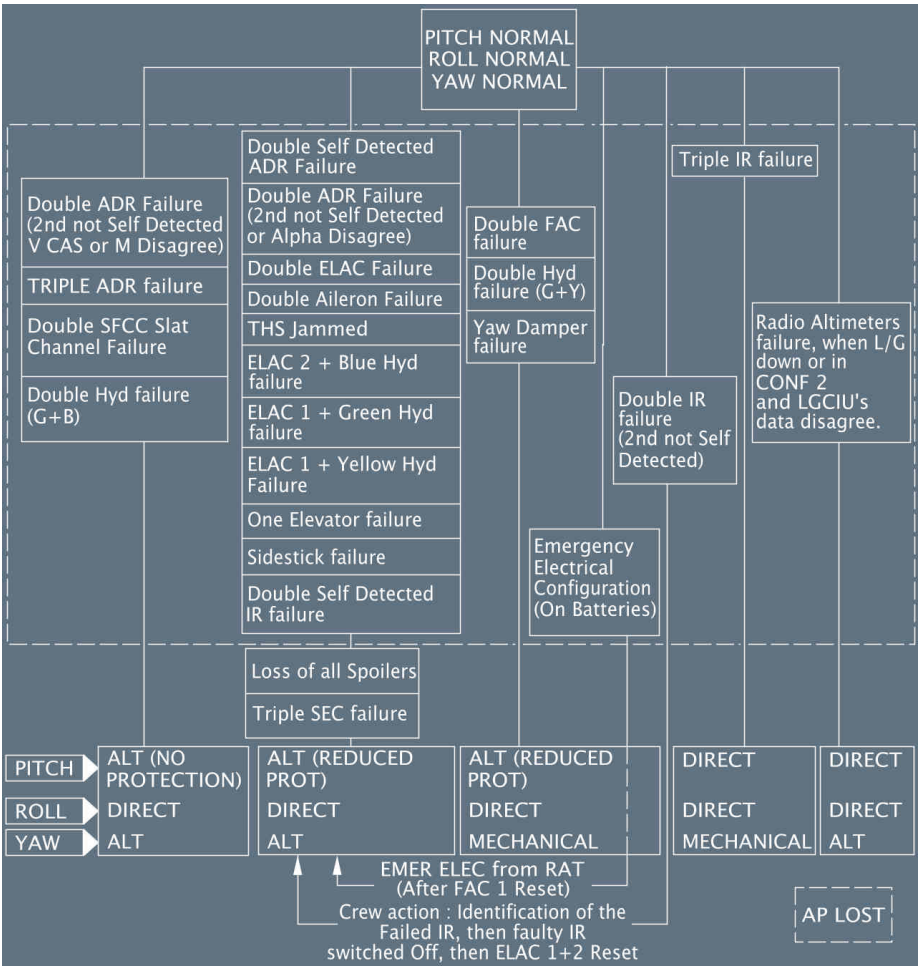
1



FLIGHT CONTROLS LAW RECONFIGURATION

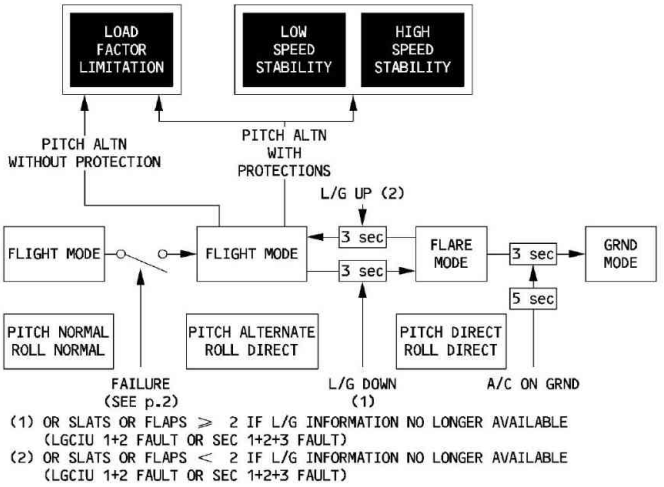
Applicable to: ALL 321

2



ALTERNATE LAW

Applicable to: ALL



PITCH CONTROL

GROUND MODE

Under alternate law the ground mode becomes active on the ground 5 s after touchdown. It is identical to the ground mode of the normal law.

FLIGHT MODE

In flight, the alternate law pitch mode follows a load-factor demand law much as the normal law pitch mode does, but it has less built-in protection (reduced protections).

FLARE MORE

In pitch alternate law the flight mode changes to the flare mode when the pilot selects landing gear down. The flare mode is a direct stick-to-elevator relationship. (*Refer to DSC-27-20-20 Direct Law*).

LATERAL CONTROL

When the aircraft flying in pitch alternate law, lateral control follows the roll direct law associated with yaw alternate or mechanical.

ROLL DIRECT LAW

Refer to DSC-27-20-20 Direct Law.

YAW ALTERNATE LAW

Only the yaw damping function is available. Damper authority is limited to ±5 ° of rudder deflection.

REDUCED PROTECTIONS

LOAD FACTOR LIMITATION

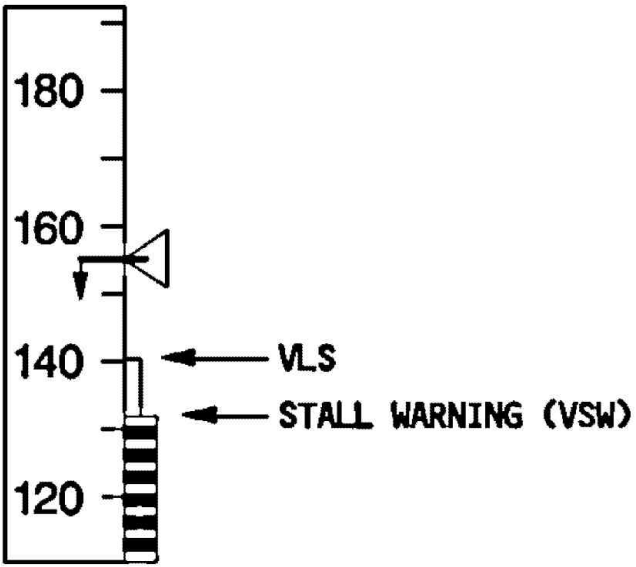
The load factor limitation is similar to that under normal law.

PITCH ATTITUDE PROTECTION

There is no pitch attitude protection. Amber Xs replace the green double bars "=" on the PFD.

LOW SPEED STABILITY

An artificial low speed stability replaces the normal angle-of-attack protection. It is available for all slat/flap configurations, and the low speed stability is active from about 5 kt up to about 10 kt above stall warning speed, depending on the aircraft's gross weight and slats/flaps configuration.
A gentle progressive nose down signal is introduced, which tends to keep the speed from falling below these values.
The system also injects bank-angle compensation, so that operation effectively maintains a constant angle of attack.
In addition, audio stall warnings (crickets + "STALL" synthetic voice message) is activated at an appropriate margin from the stall condition.
The PFD speed scale is modified to show a black/red barber pole below the stall warning.
The α floor protection is inoperative.



HIGH SPEED STABILITY

Above VMO or MMO, a nose up demand is introduced to avoid an excessive increase in speed. The pilot can override this demand.
In addition, the aural overspeed warning (VMO + 4 or MMO + 0.006) remains available.

BANK ANGLE PROTECTION

Not provided.

Note: *The AP will disconnect, if speed exceeds VMO/MMO, or if the bank angle exceeds 45 °.*

ALTERNATE LAW WITHOUT REDUCED PROTECTION

Applicable to: ALL

This is identical to alternate law except that it does not include the low-speed stability or the high-speed stability. It includes only the load factor limitation.

DIRECT LAW

Applicable to: ALL

PITCH CONTROL

The pitch direct law is a direct stick-to-elevator relationship (elevator deflection is proportional to stick deflection).
In all configurations the maximum elevator deflection varies as a function of CG.
It is a compromise between adequate controllability with the CG forward, and not-too-sensitive control with the CG aft.
There is no automatic trim : the pilot must trim manually.
The PFD displays in amber the message “USE MAN PITCH TRIM”.
No protections are operative.
The α floor function is inoperative.
Overspeed and stall warnings are available as for alternate law.

LATERAL CONTROL

When flying in “direct law”, the roll direct law associated with mechanical yaw control governs lateral control.

ROLL DIRECT LAW

The roll direct law is a direct stick-to-surface-position relationship. System gains are set automatically to correspond to slat/flap configuration.
With the aircraft in the clean configuration, the maximum roll rate is about 30 °/s.
With slats extended, it is about 25 °/s.
To limit roll rate, the roll direct law uses only ailerons and spoilers N° 4 and 5.
If spoiler N° 4 has failed, spoiler N° 3 replaces it.
If the ailerons have failed, all roll spoilers become active.

YAW MECHANICAL CONTROL

The pilot controls yaw with the rudder pedals.
The yaw damping and turn coordination functions are lost.

ABNORMAL ATTITUDE LAWS

Applicable to: B-HSI, B-HSM, B-HTF

The system applies an abnormal-attitude law in pitch and roll, if the aircraft exceeds any of these limits in flight:

- Pitch attitude > 50 ° nose up or 30 ° nose down
- Bank angle > 125 °
- Angle of attack > 30 ° or < -10 ° (-15 ° for A319 and A321)

- Speed > 440 kt or < 60 kt
- Mach > 0.91 or < 0.1

The law in pitch is the alternate law with no protection, except load-factor protection, and without auto trim. In roll, it is a full-authority direct law with a yaw mechanical.

When the aircraft has recovered from its abnormal attitude, the flight control laws in effect are:
- In pitch: Alternate law without protection, with autotrim.
- In roll: Full authority direct law, with yaw alternate law.

There is no reversion to direct law, when the pilot extends the landing gear.

ABNORMAL ATTITUDE LAWS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSJ, B-HSK, B-HSL, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

The system applies an abnormal-attitude law in pitch and roll, if the aircraft exceeds any of these limits in flight:
- Pitch attitude > 50 ° nose up or 30 ° nose down
- Bank angle > 125 °
- Angle of attack > 30 ° or < -10 ° for the A320 (-15 °for the A318, A319 and A321)
- Speed > 440 kt or < 70 to 90 kt (depending on the aircraft pitch attitude)
- Mach > 0.91

The law in pitch is the alternate law with no protection, except load-factor protection, and without auto trim. In roll, it is a full-authority direct law with a yaw mechanical.

When the aircraft has recovered from its abnormal attitude, the flight control laws in effect are:
- In pitch: Alternate law without protection, with autotrim.
- In roll: Full authority direct law, with yaw alternate law.

There is no reversion to direct law, when the pilot extends the landing gear.

MECHANICAL BACK-UP

Applicable to: ALL

PITCH

Mechanical backup enables the pilot to control the aircraft during a temporary complete loss of electrical power.
He does this in pitch by manually applying trim to the THS.
The PFDs display “MAN PITCH TRIM ONLY” in red.

LATERAL

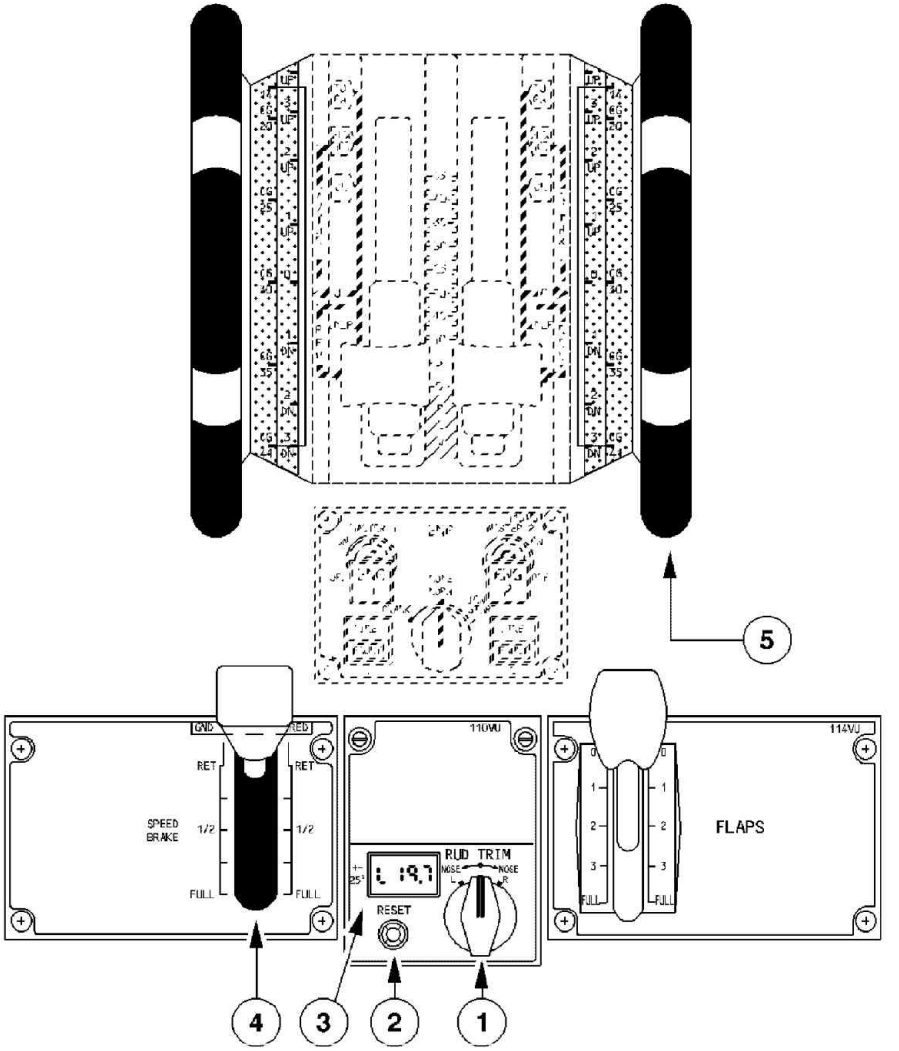
The pilot uses the rudder pedals as the mechanical backup to laterally control the aircraft .

Intentionally left blank

PEDESTAL

Applicable to: ALL

1


5
SPEED BRAKE
RET
1/2
FULL
110VU
RUD TRIM
NOSE
RESET
114VU
FLAPS
4
3
2
1

(1) RUD TRIM Rotary Switch

Controls the rudder trim actuator, which moves the neutral point of the artificial feel by the equivalent of one degree of rudder travel per second.

Note: The rudder trim rotary selector has no effect, when the autopilot is engaged.

(2) RESET Pushbutton

By pushing the RESET pushbutton, the zero trim position is ordered at 1.5 °/s.
After the reset, an indication of up to 0.3° (L or R) may be observed in the rudder trim position indication.

Note: The RESET pb is not active, when the autopilot is engaged.

(3) Position Indicator

Displays the rudder trim direction (L or R) and value (0 to 20 °).

(4) SPEEDBRAKE Lever

The lever controls:

- The position of the speedbrake surfaces.
  To set speedbrake surfaces to a required position, the lever has to be pushed down and set to the required position. A “hardpoint” is provided at “½” SPEEDBRAKE position.
- The manual preselection of the ground spoilers.
  To arm the ground spoilers, the lever must be pulled up when in the RET position.
  When the lever is armed (or reverse thrust is selected), all spoiler's surfaces will automatically extend at landing, or in case of a rejected takeoff.

(5) PITCH TRIM Wheel

Both pitch trim wheels provide mechanical control of the THS and have priority over electrical control. A pilot action on the pitch trim wheel disconnects the autopilot.

Note: Crew action on the pitch trim wheel does not disconnect the ELACs (micro-switches, actuated by the override mechanism, ensure that the computers remain synchronized with the manually-selected position).

The THS is manually-controlled on ground for the THS setting, before takeoff and in flight, when in direct law.

- Before takeoff, the pilot sets the THS to the angular value, determined as a function of the aircraft CG, using the CG scale on the wheel. The relationship between the aircraft CG and the THS setting shown on the trim wheel is only applicable for takeoff. The limits of the THS normal setting range for takeoff are indicated by a green band on the pitch trim wheel.
- In flight, when in direct law, the pilot uses the THS conventionally to fly in trim. In flight, the aircraft pitch trim setting depends on aircraft CG, weight, altitude and speed. Consequently, the relation between the aircraft CG, and the THS setting displayed on the pitch trim wheel, does not apply in flight.

Following nosewheel touchdown, as the pitch attitude becomes less than 2.5 ° for more than 5 s, pitch trim is automatically reset to zero.

Note: *This function is inoperative, when the green or yellow hydraulic system is not pressurized.*

LATERAL CONSOLES

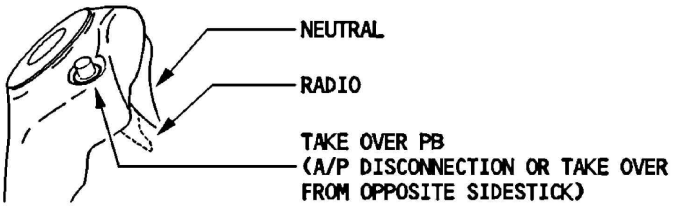
Applicable to: ALL

2 SIDESTICKS

Each pilot has on his lateral console a sidestick he can use to control pitch and roll manually. Each sidestick is springloaded to neutral.
When the autopilot is engaged, a solenoid-operated detent locks both sidesticks in the neutral position. If the pilot applies a force above a given threshold (5 daN in pitch, 3.5 daN in roll) the stick becomes free and the autopilot disengages.

The hand grip has two switches:

- Autopilot disconnect and sidestick takeover pushbutton.
- Push-to-talk button.



Sidestick priority logic

- When only one pilot operates the sidestick, it sends his control signals to the computers.
- When the pilots move both side stick simultaneously in the same or opposite direction and neither takes priority, the system adds the signals of both pilots algebraically. The total is limited to the signal that would result from the maximum deflection of a single sidestick.

Note: *In the event of simultaneous input on both sidesticks (2 ° deflection off the neutral position in any direction) the two green SIDE STICK PRIORITY lights on the glareshield come on and "DUAL INPUT" voice message is activated.*

A pilot can deactivate the other stick and take full control by pressing and keeping pressed his priority takeover pushbutton.
For latching the priority condition, it is recommended to press the takeover push button for more than 40 s.
This allows the pilot to release his takeover push button without losing priority.
However, a pilot can at any time reactivate a deactivated stick by momentarily pressing the takeover push button on either stick.
If both pilots press their takeover pushbuttons, the pilot that presses last gets priority.

Note: *If an autopilot is engaged, any action on a takeover pushbutton disengages it.*

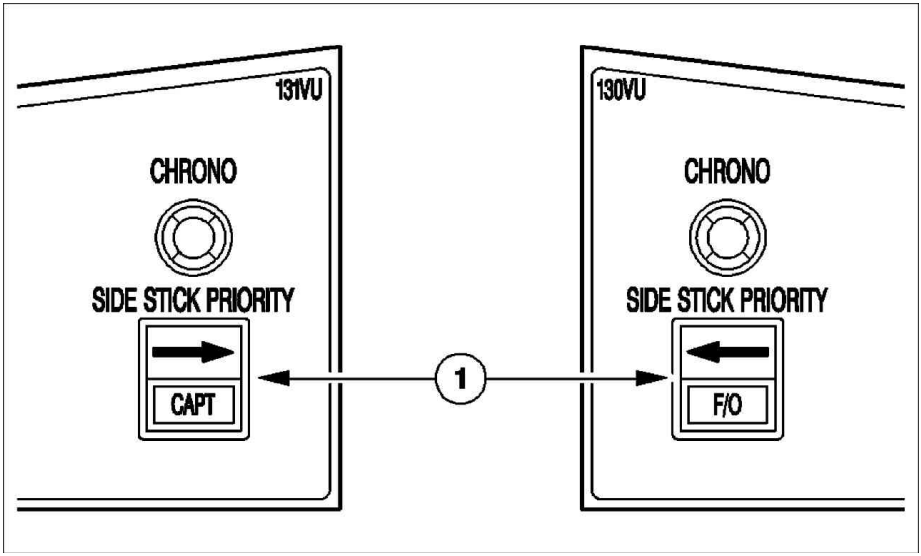
In a priority situation

- A red light comes on in front of the pilot whose stick is deactivated.
- A green light comes on in front of the pilot who has taken control, if the other stick is not in the neutral position (to indicate a potential and unwanted control demand).

Note: *If the aircraft is on the ground and commencing its takeoff run and one stick is deactivated, this triggers the takeoff "CONFIG" warning.*

GLARESHIELD

Applicable to: ALL



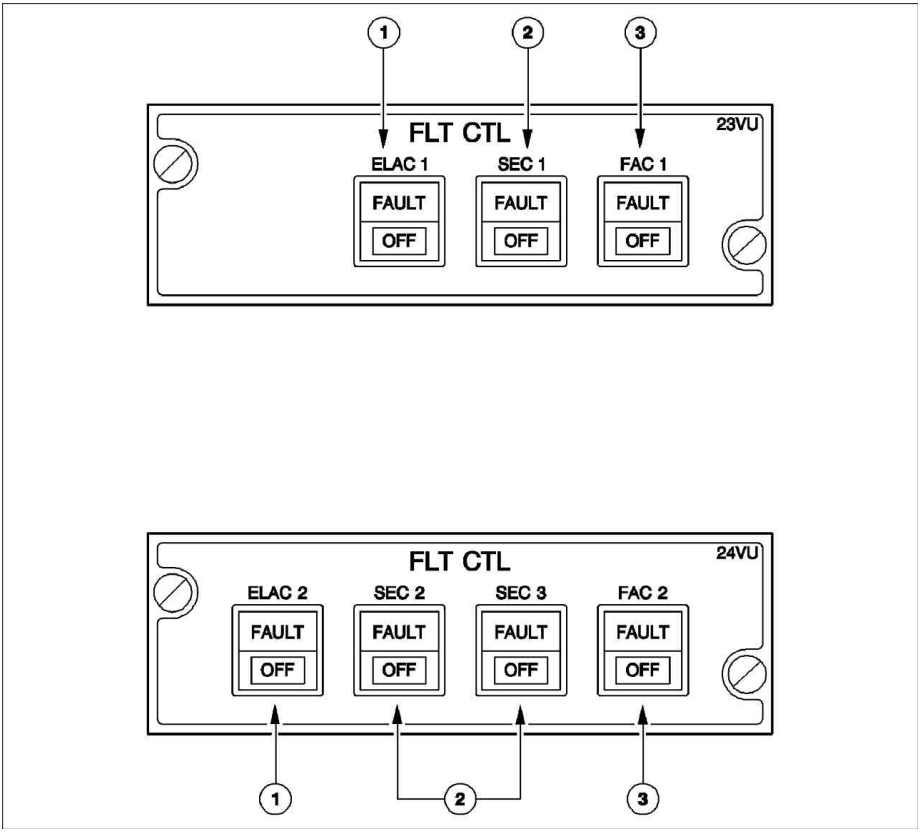
(1) SIDE STICK PRIORITY lt

Red arrow light : - comes on in front of the pilot losing authority.
- goes out if he has recovered his authority
  - if the other pilot releases his TAKEOVER pushbutton prior the priority condition is latched.
    or
  - If he has used his takeover push button to cancel a latched priority situation.
    Sidestick priority audio : A “PRIORITY LEFT” or “PRIORITY RIGHT” audio voice message is given each time priority is taken.

Green CAPT and F/O lights :
- Both lights flash when the pilots move both sidesticks simultaneously and neither takes priority.
- When a pilot has taken priority by pressing the takeover pushbutton and the other pilot's sidestick is not at neutral, the light in front of the pilot with priority lights up. It goes out when the other pilot returns his stick to the neutral position.

OVERHEAD PANEL

Applicable to: ALL



(1) ELAC 1(2) pushbutton

Controls the Elevator and Aileron Control (ELAC) Computer 1(2).

ON : ELAC 1(2) performs the following functions:

- Normal pitch and roll
- Alternate pitch
- Direct pitch and roll
- Abnormal attitude
- Aileron droop
- Acquisition of autopilot orders.

OFF : The corresponding computer is not active. Switching it OFF, then ON, resets the computer.

FAULT : Comes on amber, along with an ECAM caution:
- When a failure is detected
- During ELAC power-up test (eight seconds).

Note: *The ELAC power-up test occurs when electrical power is turned on, or after the occurrence of an electrical transient lasting longer than 25 ms.*

The FAULT light goes off, when the pilot selects OFF, or at the end of the ELAC power-up test, if its results are satisfactory.

(2) SEC 1(2)(3) pushbutton

Controls the spoiler and elevator (SEC) computers 1(2)(3).

ON : SEC 1(2)(3) performs the following functions:
- Normal roll (by controlling the spoilers)
- Speedbrakes and ground spoilers
- Alternate pitch (SEC 1 and SEC 2 only)
- Direct pitch (SEC 1 and SEC 2 only)
- Direct roll
- Abnormal attitude.

OFF : The corresponding computer is not active. Switching it OFF, then on, resets the computer.

FAULT : Comes on amber, along with an ECAM caution, when a failure is detected. The FAULT light goes off, when the pilot selects OFF.

(3) FAC 1(2) pb sw

Controls the flight augmentation computer (FAC) 1(2).

ON : Both FACs perform the following functions:
- Normal roll (coordinating turns and damping dutch roll)
- Rudder trim
- Rudder travel limit
- Alternate yaw

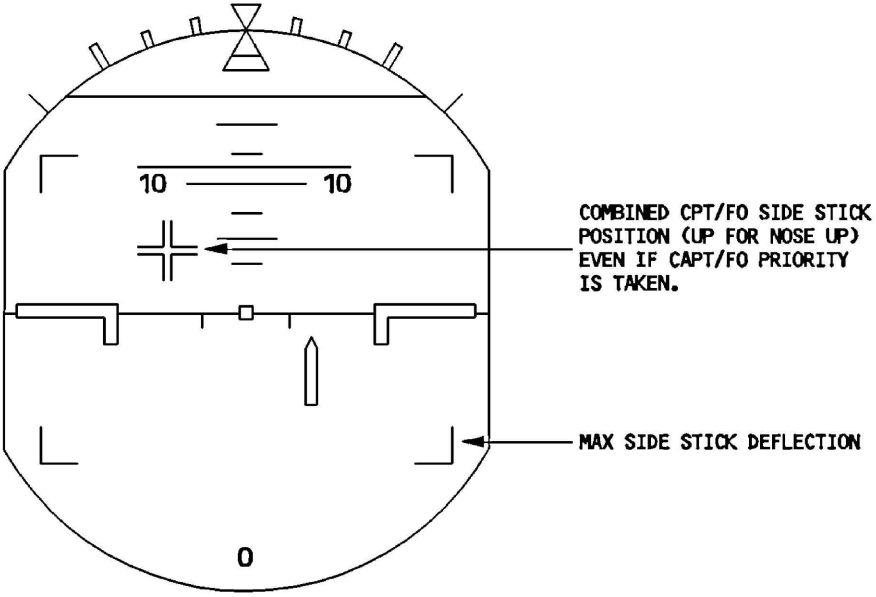
OFF : The corresponding computer is not active. Switching it OFF and then ON resets the computer.

FAULT : Lights up in amber, along with a caution on ECAM, when a failure is detected. The FAULT light goes out when the pilot selects OFF.

SIDE STICK INDICATIONS ON PFD

Applicable to: ALL

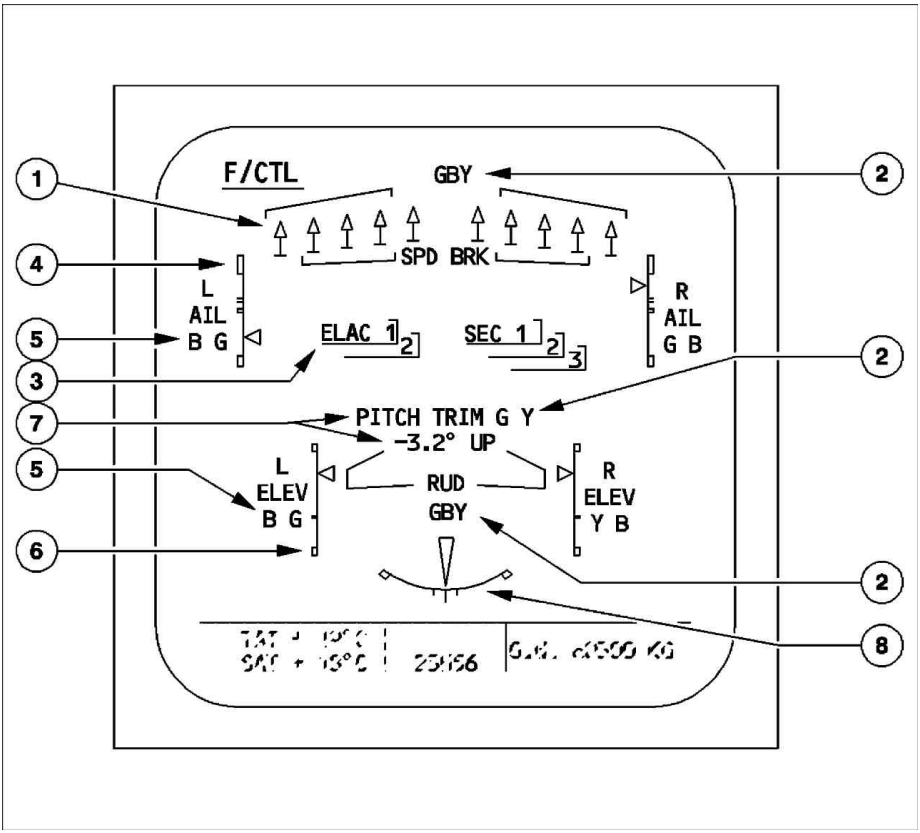
On the ground, after the first engine start, sidestick position indications appear white on both PFDs. The indications disappear when the aircraft goes from the ground into flight.



ECAM F/CTL PAGE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

3



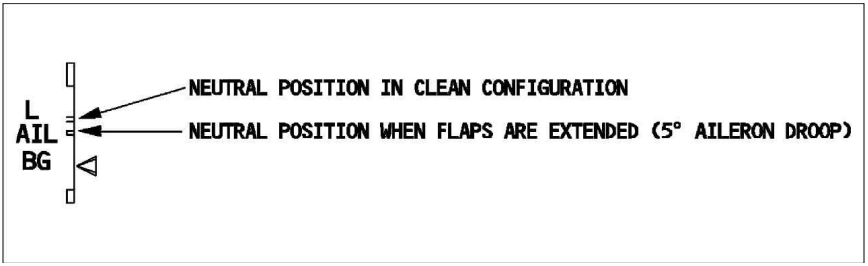
(1) Spoilers/Speed brakes Indication

⍋	: SPOILER DEFLECTED BY MORE THAN 2.5°(GREEN)
–	: SPOILER RETRACTED (GREEN)
⍋	: SPOILER FAULT DEFLECTED (AMBER)
1	: SPOILER FAULT RETRACTED (AMBER)

(2) Hydraulic System Pressure Indication
It is normally green. It becomes amber, if the hydraulic system's pressure decreases.

(3) ELAC/SEC Indication
Normally green. Changes to amber if there is a failure in the ELAC or the SEC, or if ELAC or SEC pushbutton is off, or if both flight control data concentrators (FCDCs) fail.
The surrounding box is normally grey. It changes to amber if the ELAC or SEC indication does.

(4) Aileron position indication
It is indicated with a white scale and green index. It changes to amber, when neither (green nor blue) servojack is available.

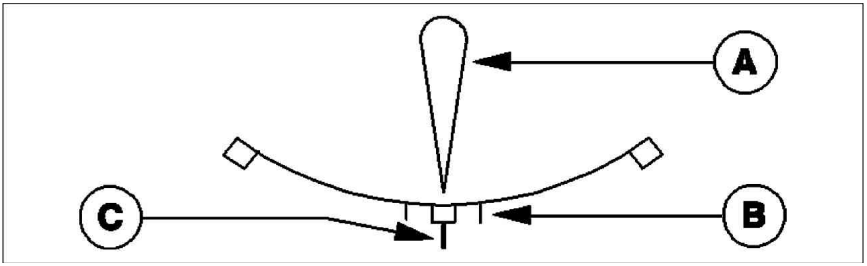


(5) Aileron and elevator actuator indication
"G" and "B" are normally displayed in green.
The color changes to amber, in case of a green or blue hydraulic system low pressure.
The partial box also changes to amber, if the associated computer or actuator fails.

(6) Elevator position indication
It is indicated with a white scale and green index. The index becomes amber, when both associated actuators are not available.

(7) Pitch trim position indication
The pitch trim numbers are in green. They become amber, if green and yellow hydraulic system pressure decreases.
The "PITCH TRIM" legend is in white. It becomes amber, if the pitch trim jams.

(8) Yaw control indications



(A) Rudder position indication
It is normally in green. The rudder symbol becomes amber, if the blue, green, and yellow hydraulic pressures are low.

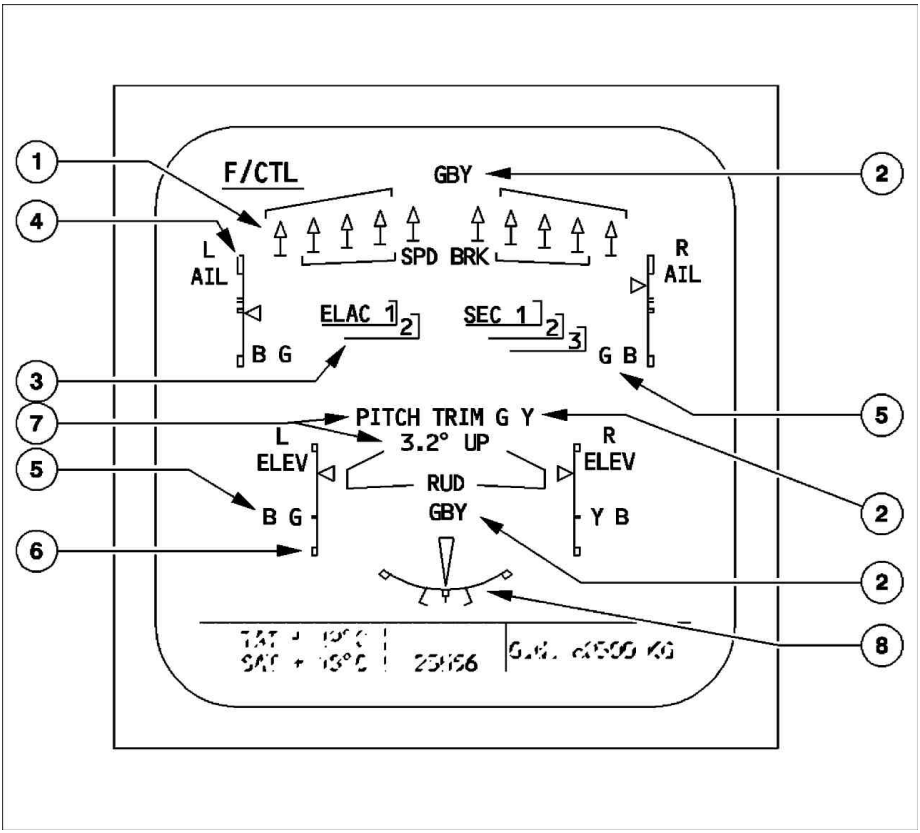
(B) Rudder travel limiter
It is normally in green. It becomes amber when travel limiter 1 and 2 are faulty.

(C) Rudder trim position
It is normally in blue. It becomes amber, if the rudder trim reset fails.

ECAM F/CTL PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

4



(1) Spoilers/Speedbrakes' Indication

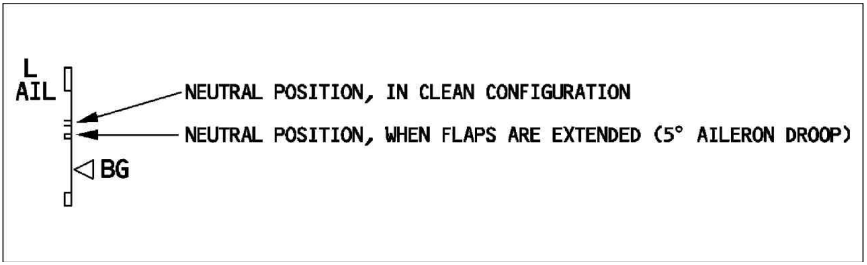
⏄	: SPOILER DEFLECTED BY MORE THAN 2.5°(GREEN)
–	: SPOILER RETRACTED (GREEN)
⏄	: SPOILER FAULT DEFLECTED (AMBER)
⏌	: SPOILER FAULT RETRACTED (AMBER)

(2) Hydraulic System Pressure Indication
It is normally green. It becomes amber, if the hydraulic system's pressure decreases.

(3) ELAC/SEC Indication

- ELAC and SEC labels are always displayed in white
- The computer number is normally in green, and boxed in grey.
  The number and box become amber, if the computer fails, or is switched OFF.

(4) Aileron position indication
It is indicated with a white scale and green index. It changes to amber, when neither (green nor blue) servojack is available.

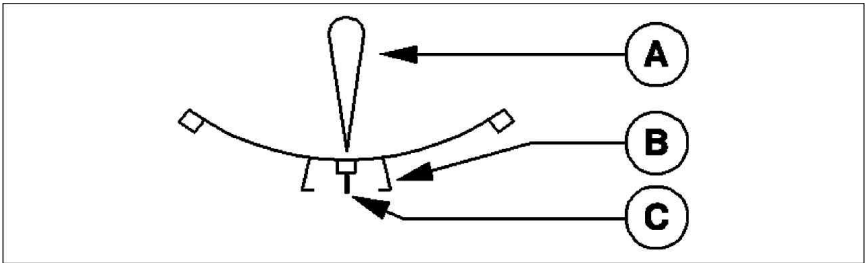


(5) Aileron and elevator actuator indication
"G" and "B" are normally displayed in green.
They become amber, in the case of a green or blue hydraulic system low pressure. The partial box also becomes amber, if the associated computer or actuator fails.

(6) Elevator position indication
It is indicated with a white scale and green index. The index becomes amber, when both associated actuators are not available.

(7) Pitch trim position indication
The pitch trim numbers are in green. They become amber, if green and yellow hydraulic system pressure decreases.
The "PITCH TRIM" legend is in white. It becomes amber, if the pitch trim jams.

(8) Yaw control indications



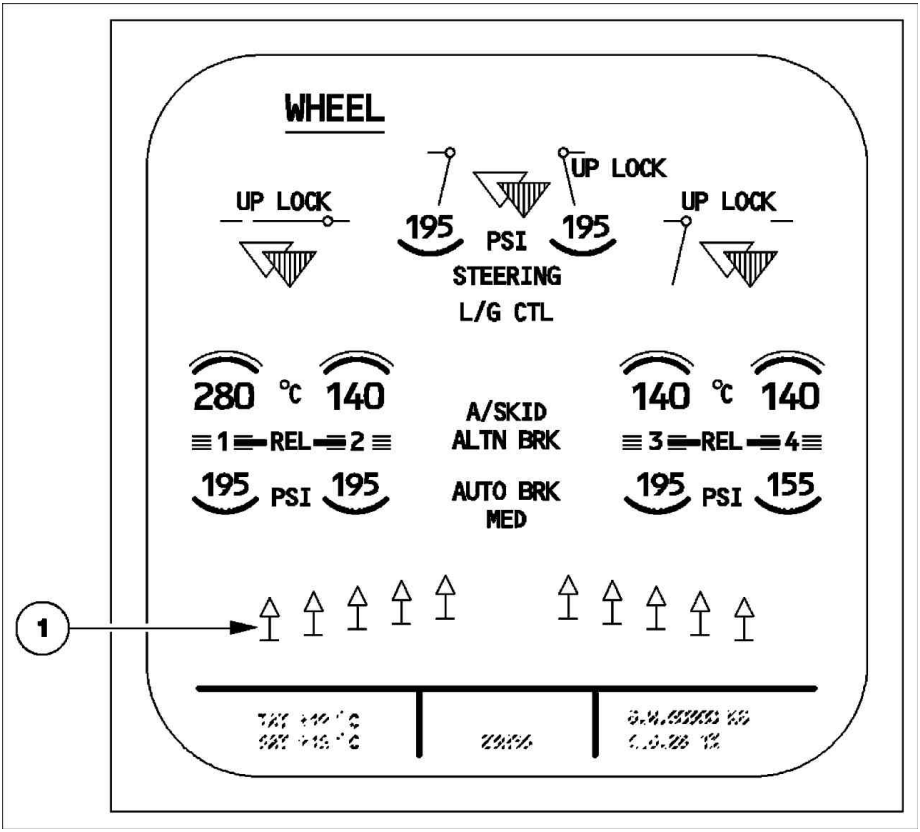
(A) Rudder position indication
It is normally in green. The rudder symbol becomes amber, if the blue, green, and yellow hydraulic pressures are low.

(B) Rudder travel limiter
It is normally in green. It becomes amber when travel limiter 1 and 2 are faulty.
Two TLU messages are displayed in amber when the TLU indexes are suppressed.

(C) Rudder trim position
It is normally in blue. It becomes amber, if the rudder trim reset fails.

ECAM WHEEL PAGE

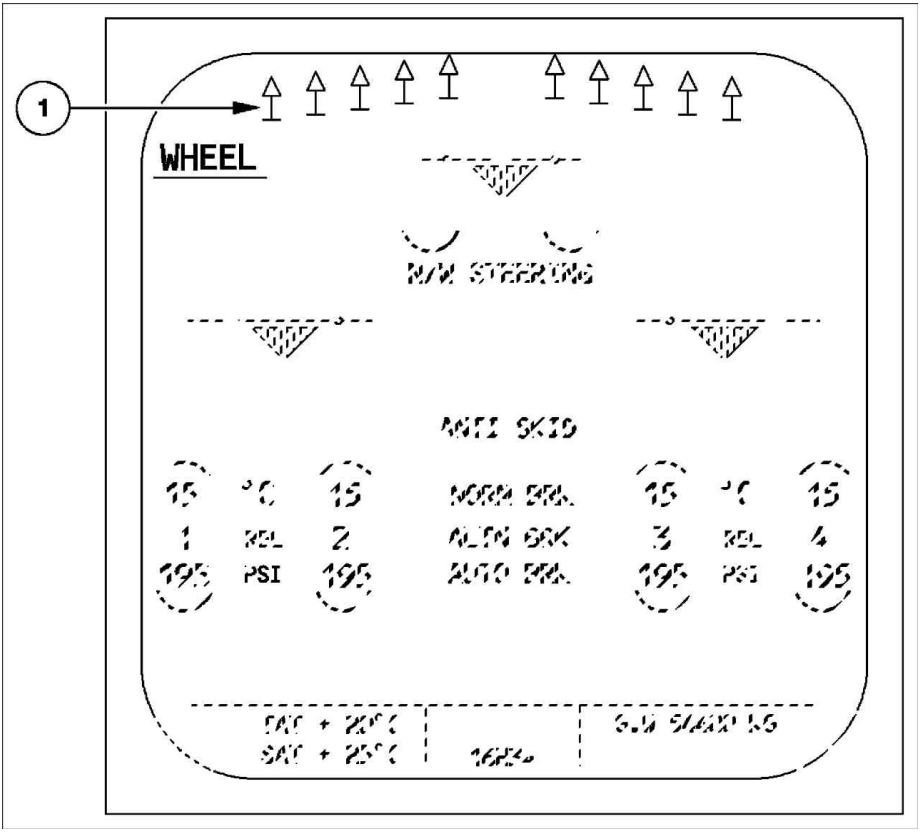
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



(1) Spoilers/Speedbrakes' Indication
These indications are identical to those displayed on the FLT CTL page.

ECAM WHEEL PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) Spoilers/Speedbrakes' Indication
These indications are identical to those displayed on the FLT CTL page.

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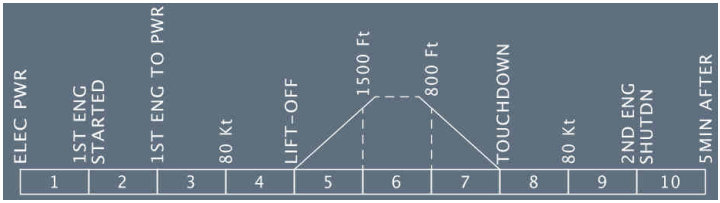
WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
CONFIG SLATS/FLAPS NOT IN T.O CONFIG, or **CONFIG SPD BRK NOT RETRACTED, or** **CONFIG PITCH TRIM NOT IN TO RANGE, or** **CONFIG RUD TRIM NOT IN T.O RANGE** A/C not in TO configuration when thrust levers are set at TO, or Flex TO, or when pressing TO CONFIG. pb.	CRC	MASTER WARN	NIL F/CTL	NIL	5, 6, 7, 8
CONFIG R (L) SIDESTICK FAULT (BY TAKE OVER) L or R sidestick is inoperative (takeover pb pressed more than 30 s) when thrust levers are set at TO, or Flex TO, or when pressing TO CONFIG pb.			NIL	Red (1)SIDESTICK PRIORITY lt	
L + R ELEV FAULT Loss of both elevators.			F/CTL	PFD message	NIL
L (R) SIDESTICK FAULT Transducers, on pitch or roll axis, are failed on one sidestick.	SINGLE CHIME	MASTER CAUT		NIL	
ELAC 1 (2) FAULT Failure of ELAC				FAULT lt on ELAC pb	3, 4, 5, 7, 8
ELAC 1 (2) FAULT One sidestick transducer fault.				NIL	
SEC 1 (2) (3) FAULT Failure of one SEC.				FAULT lt on SEC pb	3, 4, 5
FCDC 1 + 2 FAULT Failure of both FCDCs.				NIL	4, 5, 7
DIRECT LAW Direct laws are active.				PFD message	4, 5, 7, 8
ALTN LAW Alternate laws are active.			NIL	NIL	
DUAL INPUT Both sidesticks are moved simultaneously.	Synthetic voice repeated every 5 s	NIL		SIDESTICK Priority light	NIL

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Continued from the previous page

E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
GND SPLR FAULT Loss of ground spoiler function in SEC 1 + 3 or 1 + 2 or 2 + 3 or 1 + 2 + 3.	SINGLE CHIME	MASTER CAUTION	F/CTL	NIL	3, 4, 5
SPD BRK DISAGREE Position disagree between surfaces and lever position.					
SPD BRK FAULT Speedbrake lever transducers to SEC 1 and 3 failed.					
SPD BRK STILL OUT Speedbrake out with at least one engine not at idle.			NIL		1, 2, 3, 4, 5, 8, 9, 10
STABILIZER JAM Loss of the electrical control of the stabilizer (with or without jamming of the stabilizer)			F/CTL		4, 5
L (R) ELEV FAULT Loss of both servojacks on one elevator, or activation of elevator flutter protection in ELAC.					
L (R) AIL FAULT Loss of both servojacks on one aileron.					
SPLR FAULT Loss of one or more spoilers.					3, 4, 5, 7
ELAC 1 PITCH FAULT Failure of pitch channel in ELAC 1.	NIL	NIL			3, 4, 5, 7, 8
ELAC 2 PITCH FAULT Failure of pitch channel in ELAC 2, or loss of one or both ELAC 2 rudder pedal transducers.					
GND SPLR 1 + 2 (3 + 4) Ground spoiler channel failed in SEC 3 (1).					3, 4, 5
ELEV SERVO FAULT Loss of one servojack on one elevator.					
SPD BRK 2 (3 + 4) FAULT Speedbrake lever transducers to SEC 3 (1) failed.					3, 4, 5, 7, 8
AIL SERVO FAULT Loss of one servojack on one aileron, or loss of one or both ELAC 1 rudder pedal transducers.					
FCDC 1 (2) FAULT			NIL		

Continued on the following page

Continued from the previous page

E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
SIDESTICK PRIORITY Failure in a sidestick priority logic circuit.					3, 4, 5, 6, 7, 8, 9

(1) The red SIDESTICK PRIORITY light comes on, as soon as the sidestick becomes inoperative.

MEMO DISPLAY

- The “SPEED BRK”memo display logic:
  - When the speedbrakes are extended in Flight Phases 2, 3, 4, and 5, the “SPEED BRK”memo flashes in amber.
  - When the speedbrakes are extended in Flight Phases 6 and 7, the “SPEED BRK”memo appears in green. It flashes in amber, after 50 s, if at least one engine is above idle.
- The “GND SPLRS ARMED” message appears in green, when the ground spoilers are armed.

BUS EQUIPMENT LIST

Applicable to: ALL

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
COMPUTERS	MAIN FLT CTL	ELAC 1				X	HOT 1 (1)
		ELAC 2		DC2			HOT 2 (1)
		SEC 1				X	HOT 1 (1)
		SEC 2		DC2			
		SEC 3		DC2			
		FAC 1			X	SHED	
		FAC 2	AC2	DC2			
		FCDC 1				SHED	
		FCDC 2		DC2			
PITCH TRIM		MOTOR 1		DC2			HOT 2 (1)
		MOTOR 2				X	
		MOTOR 3		DC2			
RUDDER TRIM		MOTOR 1				X	
		MOTOR 2		DC2			
		INDIC		DC2			
RUDDER TRAVEL LIMIT		MOTOR 1				X	
		MOTOR 2		DC2			

(1) standby supply

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GENERAL

Applicable to: ALL 320

Each wing has the following lift augmentation devices :
- Two flap surfaces.
- Five slat surfaces.

These surfaces are electrically controlled and hydraulically operated.
The pilot extends slats and flaps by moving the FLAPS lever on the center pedestal.
It has five positions.

GENERAL

Applicable to: ALL 321

Each wing has the following lift augmentation devices :
- Two double-slotted flap surfaces.
- Five slat surfaces.

These surfaces are electrically controlled and hydraulically operated.
The pilot extends slats and flaps by moving the FLAPS lever on the center pedestal.
It has five positions.

MAIN COMPONENTS

Applicable to: ALL 320

The slat and flap systems are similar, comprising :
- Two slat flap control computers (SFCCs), each containing one slat channel and one flap channel.
- A power control unit (PCU) consisting of two independent hydraulic motors coupled by a differential gearbox.
  The motors use green and blue hydraulic power for the slats and yellow and green power for the flaps.
  Pressure-off brakes (POBs) lock the transmission when the slat or flap surfaces have reached the selected position or if hydraulic power fails.
- Five slat surfaces and two flap surfaces per wing.
- An assymetry position pick-off unit (APPU) that measures the assymetry between the left and right wings.
- A flap disconnect detection system, which detects attachment failure and inhibits flap operation in order to prevent further damage. A sensor detects the failure by measuring excessive differential movement between the inner and the outer flaps.

- Wingtip brakes (WTBs), activated in case of assymetry, mechanism overspeed, symmetrical runaway, or uncommanded movement of the surfaces. They cannot be released in flight.
  They use blue and green hydraulic power for the slats and for the right wing flaps, and blue and yellow hydraulic power for the left wing flaps.
- Feedback position pick-off units (FPPUs) that feed back position information to the SFCCs.
- An instrumentation position pick-off unit (IPPU) that sends position data to the ECAM.

Note: *If the flap wingtip brakes are on, the pilot can still operate the slats, and if the slat wingtip brakes are on, he can still operate the flaps.*
If one SFCC is inoperative, slats and flaps both operate at half speed.
If one hydraulic system is inoperative, the corresponding surfaces (slats or flaps) operate at half speed.

MAIN COMPONENTS

Applicable to: ALL 321

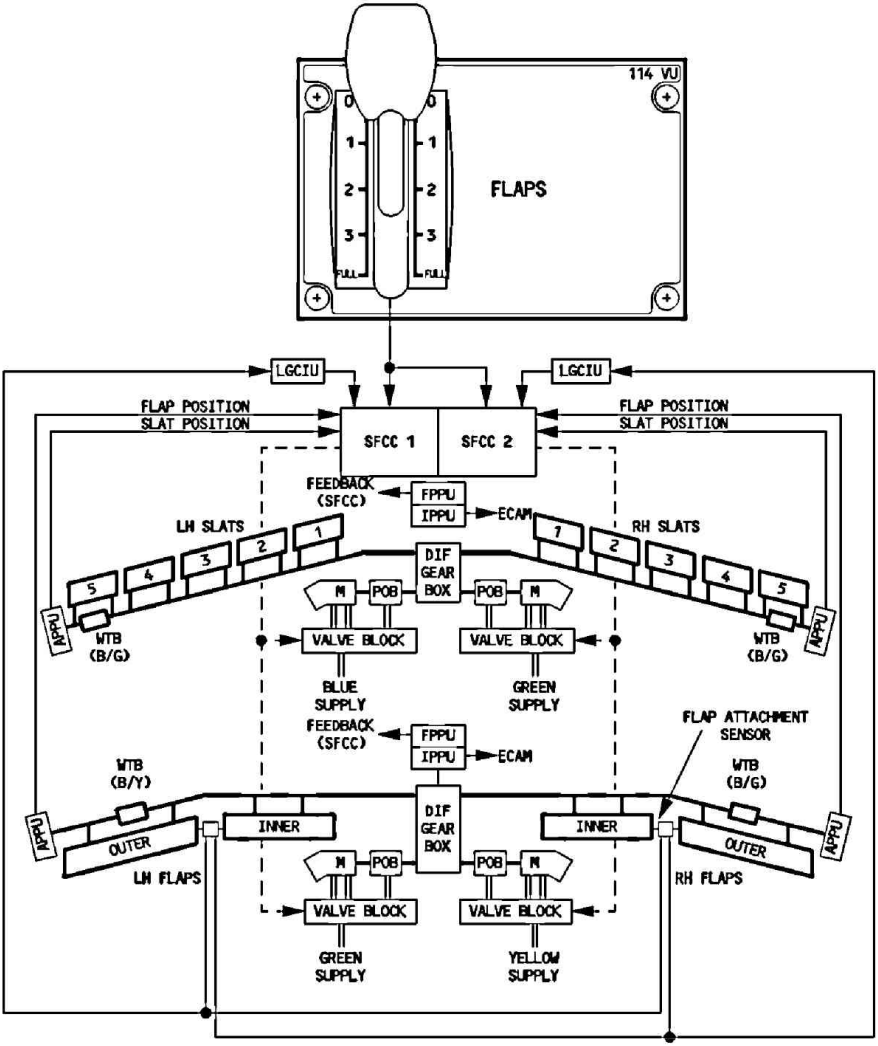
The slat and flap systems are similar, comprising :

- Two slat flap control computers (SFCCs), each containing one slat channel and one flap channel.
- A power control unit (PCU) consisting of two independent hydraulic motors coupled by a differential gearbox.
  The motors use green and blue hydraulic power for the slats and yellow and green power for the flaps.
  Pressure-off brakes (POBs) lock the transmission when the slat or flap surfaces have reached the selected position or if hydraulic power fails.
- Five slat surfaces and two double-slotted flap surfaces per wing.
- An assymetry position pick-off unit (APPU) that measures the assymetry between the left and right wings.
- A flap disconnect detection system, which detects attachment failure and inhibits flap operation in order to prevent further damage. A sensor detects the failure by measuring excessive differential movement between the inner and the outer flaps.
- Wingtip brakes (WTBs), activated in case of assymetry, mechanism overspeed, symmetrical runaway, or uncommanded movement of the surfaces. They cannot be released in flight.
  They use blue and green hydraulic power for the slats and for the right wing flaps, and blue and yellow hydraulic power for the left wing flaps.
- Feedback position pick-off units (FPPUs) that feed back position information to the SFCCs.
- An instrumentation position pick-off unit (IPPU) that sends position data to the ECAM.

Note: *If the flap wingtip brakes are on, the pilot can still operate the slats, and if the slat wingtip brakes are on, he can still operate the flaps.*
If one SFCC is inoperative, slats and flaps both operate at half speed.
If one hydraulic system is inoperative, the corresponding surfaces (slats or flaps) operate at half speed.

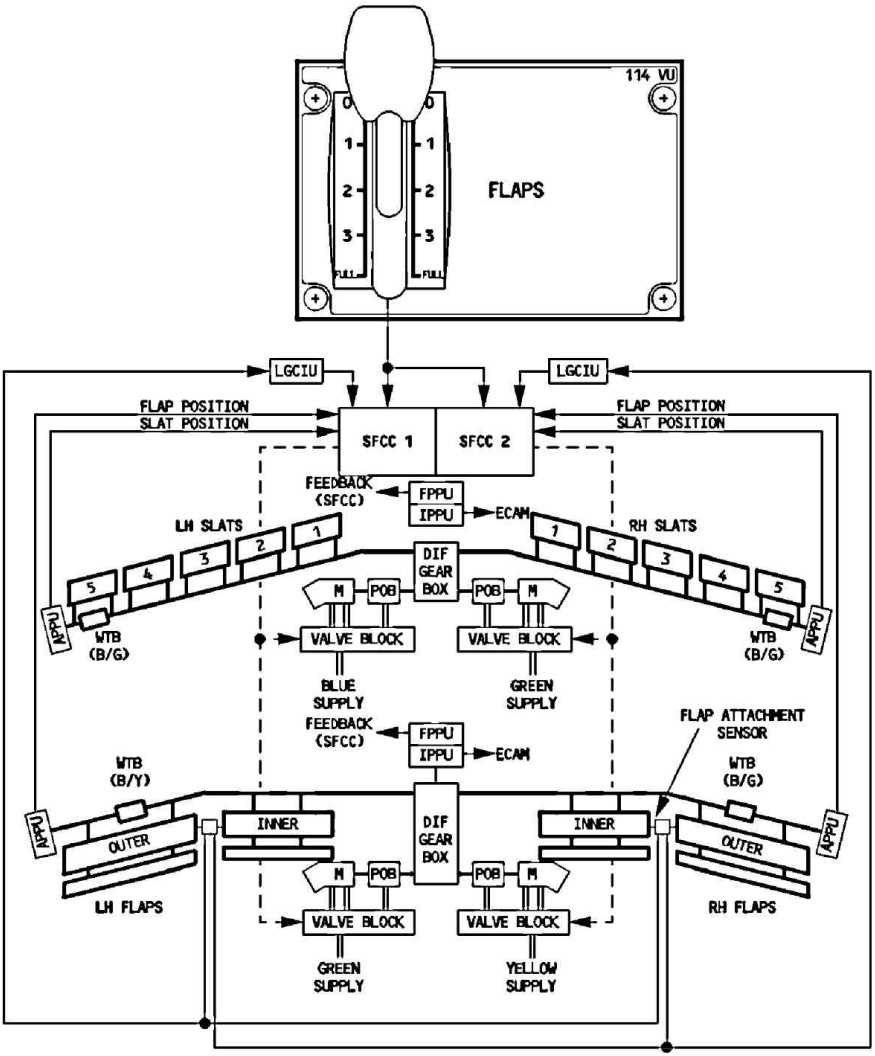
ARCHITECTURE

Applicable to: ALL 320



ARCHITECTURE

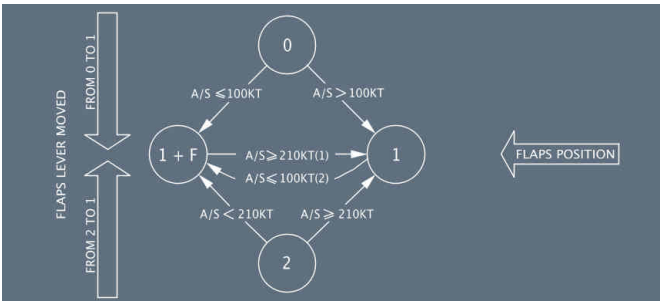
Applicable to: ALL 321



CONFIGURATIONS

Applicable to: ALL

The FLAPS lever has five positions: 0, 1, 2, 3 and FULL.
Two configurations correspond to position 1: Configuration 1 and Configuration 1 + F.
The pilot selects these as follows:



(1) When in Configuration 1 + F, the flaps retract to 0 ° automatically at 210 kt (before the airspeed reaches VFE).

(2) When in configuration 1, the flaps extend to 10 ° automatically at 100 kt.

ALPHA/SPEED LOCK FUNCTION (SLATS)

Applicable to: ALL 320

This function inhibits slat retraction at high angles-of-attack and low speeds.
The SFCCs use corrected angle-of-attack (alpha) or airspeed information from the ADIRUs to inhibit slat retraction.
If alpha exceeds 8.5 ° or the airspeed goes below 148 kt, retraction from position 1 to position 0 is inhibited.
The inhibition is removed when alpha goes below 7.6 ° and, when the speed exceeds 154 kt.

This function is not active if :
- Alpha exceeds 8.5 ° or the airspeed goes below 148 kt, after the flight crew has moved the lever to 0
- The aircraft is on the ground, and its speed is less than 60 kt.

ALPHA/SPEED LOCK FUNCTION (SLATS)

Applicable to: ALL 321

This function inhibits slat retraction at high angles-of-attack and low speeds.

The SFCCs use corrected angle-of-attack (alpha) or airspeed information from the ADIRUs to inhibit slat retraction.
If alpha exceeds 8.0 ° or the airspeed goes below 165 kt, retraction from position 1 to position 0 is inhibited.
The inhibition is removed when alpha goes below 7.1 ° and, when the speed exceeds 171 kt.

This function is not active if :

- Alpha exceeds 8.0 ° or the airspeed goes below 165 kt, after the flight crew has moved the lever to 0
- The aircraft is on the ground, and its speed is less than 60 kt.

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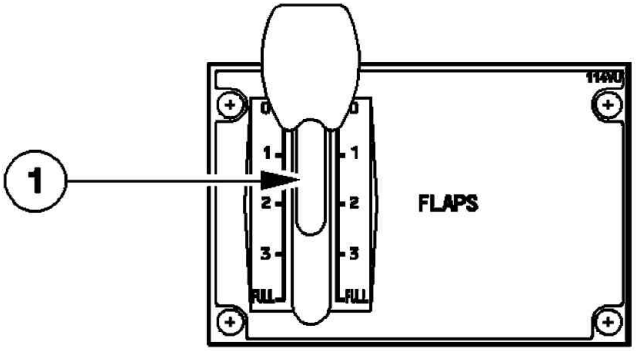
PEDESTAL

Applicable to: ALL 320



(1) FLAPS lever

The FLAPS lever selects simultaneous operation of the slats and flaps.

The five lever positions correspond to the following surface positions:

Position	SLATS	FLAPS	Indications on ECAM			
0	0	0			CRUISE	HOLD
1	18	0	1			
		10	1 + F			
2	22	15	2	TAKEOFF		APPR
3	22	20	3		LDG	
FULL	27	40	FULL			

Before selecting any position, the pilot must pull the lever out of the detent. Balks at positions 1 and 3 prevent the pilot from calling for excessive flap/slat travel with a single action.

Note: The pilot cannot select an intermediate lever position.

TAKEOFF IN CONFIGURATION 1

1 + F (18 °/10 °) is selected. If the pilot does not select configuration 0 after takeoff, the flaps retract automatically at 210 kt.

TAKEOFF OR GO-AROUND IN CONFIGURATION 2 OR 3

If the pilot selects configuration 1, he gets 1 + F (18 °/10 °) if airspeed is under 210 kt.
If the pilot does not select configuration 0 after takeoff, the flaps retract automatically at 210 kt.

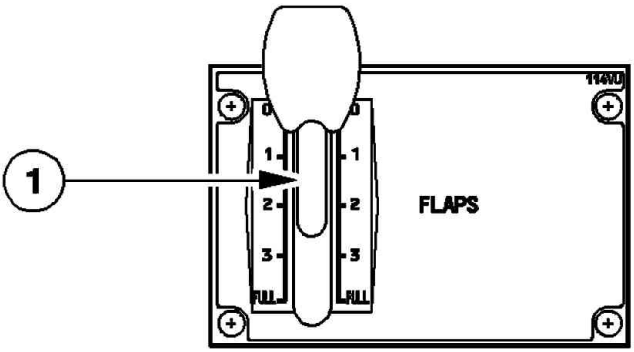
CONFIGURATION 0 TO CONFIGURATION 1 IN FLIGHT

Configuration 1 (18 °/0 °) is selected.

Note: After flap retraction, configuration 1 + F is no longer available until the airspeed is 100 kt or less, unless configuration 2, 3, or FULL has been selected previously.

PEDESTAL

Applicable to: ALL 321



(1) FLAPS lever
The FLAPS lever selects simultaneous operation of the slats and flaps.

The five lever positions correspond to the following surface positions :

Position	SLATS	FLAPS	Indications on ECAM			
0	0	0			CRUISE	HOLD
1	18	0	1			
		10	1 + F	TAKEOFF		
2	22	14	2			APPR
3	22	21	3		LDG	
FULL	27	25	FULL			

Before selecting any position, the pilot must pull the lever out of the detent. Balks at positions 1 and 3 prevent the pilot from calling for excessive flap/slat travel with a single action.

Note: The pilot cannot select an intermediate lever position.

TAKEOFF IN CONFIGURATION 1

1 + F (18 °/10 °) is selected. If the pilot does not select configuration 0 after takeoff, the flaps retract automatically at 210 kt.

TAKEOFF OR GO-AROUND IN CONFIGURATION 2 OR 3

If the pilot selects configuration 1, he gets 1 + F (18 °/10 °) if airspeed is under 210 kt.
If the pilot does not select configuration 0 after takeoff, the flaps retract automatically at 210 kt.

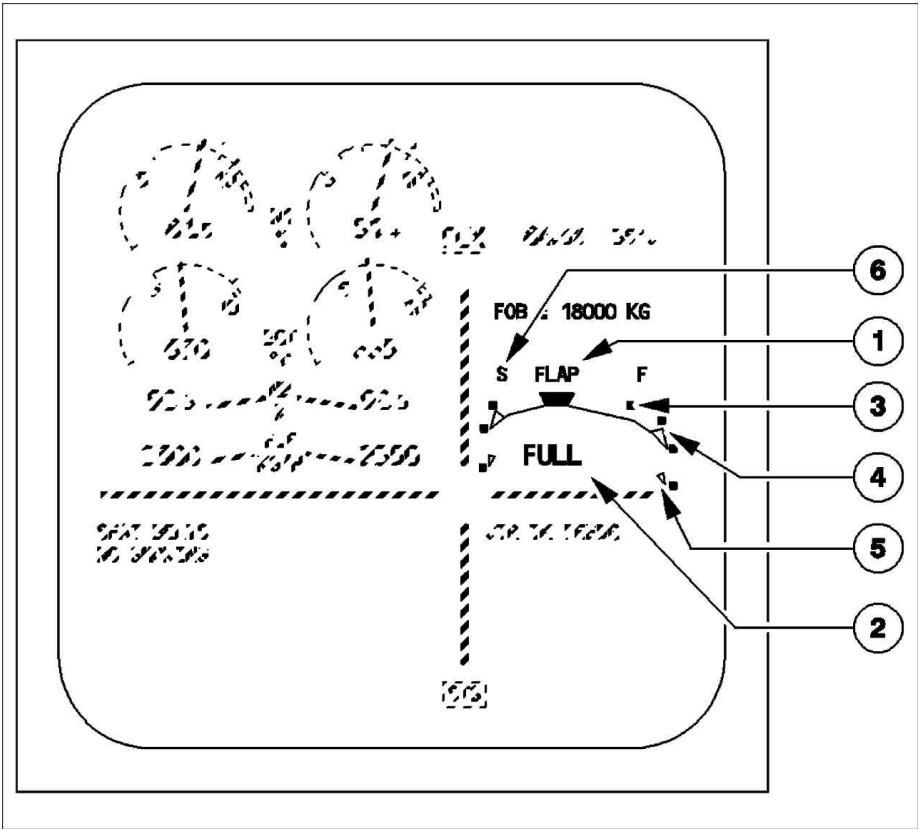
CONFIGURATION 0 TO CONFIGURATION 1 IN FLIGHT

Configuration 1 (18 °/0 °) is selected.

Note: After flap retraction, configuration 1 + F is no longer available until the airspeed is 100 kt or less, unless configuration 2, 3, or FULL has been selected previously.

ECAM UPPER DISPLAY

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



(1) FLAP indication

The “FLAP” legend appears when the slats or the flaps are not fully retracted.

- The legend is white when the slats and flaps are in the selected position.
- The legend is cyan when the slats and flaps are in transit.
- The legend is amber if:
  - Both relevant hydraulic systems go down (except on the ground with engines stopped).
  - The wingtip brakes are on.
  - There is a fault in the slats or flaps.

(2) Flap lever position

The “0”, “1 + F”, “1”, “2”, “3”, or “FULL” appears.
- It is green, when the slats and flaps are in the selected position. “0” is not displayed, when the aircraft attains clean configuration.
- The legend is cyan when the slats and flaps are in transit.
  The legend “S (F) LOCKED” appears in amber, associated with an ECAM caution, when the wingtip brakes are applied or when the system detects a non-alignment between two flaps.
  The legend “A-LOCK” pulses in cyan when the slat alpha/speed-lock function is active.

(3) Position indexes

These white points indicate that the slats and flaps are in a selectable position. They do not appear when the aircraft is in the clean configuration.

(4) Slat and flap position

These green triangles indicate the actual position of the slats and flaps.

They change to amber if:
- Both relevant hydraulic systems go down, unless the aircraft is on the ground with both engines stopped.
- The wingtip brakes are on.
- There is a fault in the slats or flaps.

(5) Selected surface position

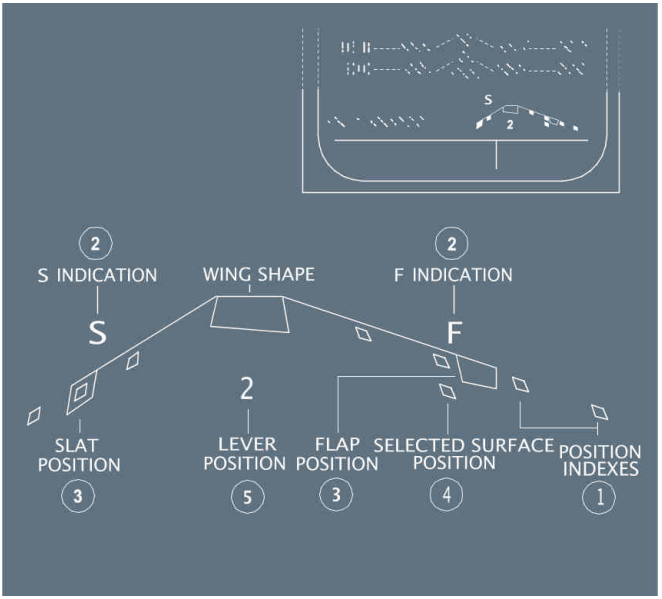
These blue triangles indicate the position the pilot has selected.
(With the current standard display management computer, the blue triangles may disappear before the slats and flaps are all completely in the selected position).

(6) S and F indications

The “S” and “F” normally appear in green. They become amber if:
- Both relevant hydraulic systems go down, unless the aircraft is on the ground with both engines stopped.
- The wingtip brakes are on.
- There is a fault in the slats or flaps.

ECAM UPPER DISPLAY

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) Position indexes

These white points indicate that the slats and flaps are in a selectable position. They do not appear, when the aircraft is in clean configuration.

(2) F and S

"F" and "S" normally appear in white. They become amber, if:

- Both relevant hydraulic systems fail, unless the aircraft is on ground with both engines stopped.
- The wingtip brakes are on.
- There is a slats or flaps fault.

"S (F) LOCKED" legend, appears in amber, in association with an ECAM caution, when the wingtip brakes are applied, or when the system detects a non-alignment between two flaps. The "A-LOCK" legend pulses in green, when the slat alpha/speedlock function is active.

(3) Flaps/Slats' actual position

These green boxes indicate the actual flaps/slats position.

They become amber, if:
- Both relevant hydraulic systems fail, unless the aircraft is on ground with both engines stopped.
- The wingtip brakes are on.
- There is a slats or flaps fault.

(4) Selected position

It is in blue, when the surfaces are in transit.
It disappears, when the selected position is reached.

(5) Flap lever position

The “0”, “1 + F”, “1”, “2”, “3”, or “FULL” legend appears.
- It is green, when the slats and flaps are in the selected position. “0” is not displayed, when the aircraft attains clean configuration.
- It becomes cyan, when the slats and flaps are in transit.

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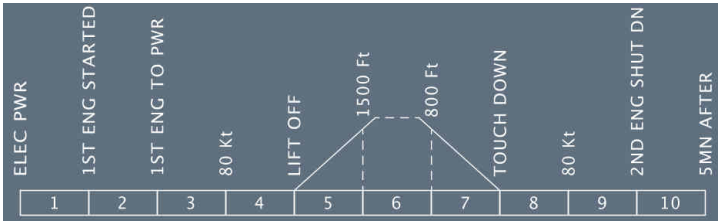
WARNINGS AND CAUTIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HST, B-HSU, B-HTD, B-HTE, B-HTF

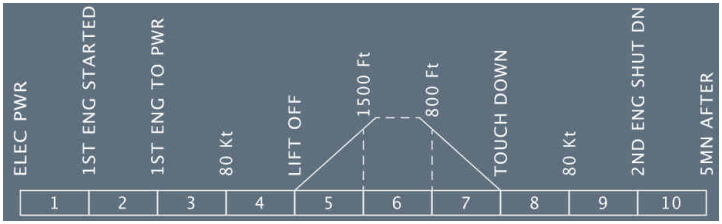


E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
CONFIG SLATS (FLAPS) NOT IN TO CONFIG Slats or flaps are not in takeoff configuration, when thrust levers are set at TO or FLEX TO, or when pressing the TO CONFIG pb.	CRC	MASTER WARN	NIL	NIL	5, 6 (1), 7, 8
SLATS (FLAPS) FAULT Failure of both slat or flap channels.	SINGLE CHIME	MASTER CAUT			4, 5, 8
SLATS (FLAPS) LOCKED Slats or flaps wing tip brakes applied, or non alignment detected between 2 flaps.					
SLATS SYS 1 (2) FAULT Failure of slat channel in one SFCC.	NIL	NIL			3, 4, 5, 7, 8
FLAP SYS 1 (2) FAULT Failure of flap channel in one SFCC.					
SLAT (FLAP) TIP BRK FAULT Failure of one wing tip brake on slats or flaps, or failure of one wing tip brake solenoid on slats, or flaps.					
FLAPS ATTACH SENSOR Failure of flap attachment's failure detection sensor.					

(1) The warning is automatically recalled by pressing the TO CONFIG pb .

WARNINGS AND CAUTIONS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HTG, B-HTH, B-HTI



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
CONFIG SLATS (FLAPS) NOT IN TO CONFIG Slats or flaps are not in takeoff configuration, when thrust levers are set at TO or FLEX TO, or when pressing the TO CONFIG pb.	CRC	MASTER WARN	NIL	NIL	5, 6 (1), 7, 8
FLAP LVR NOT ZERO Flap lever is not in the zero position, and the aircraft is above 22 000 ft.					1, 2, 3, 4, 5, 7, 8, 9, 10
SLATS (FLAPS) FAULT Failure of both slat or flap channels.	SINGLE CHIME	MASTER CAUT			4, 5, 8
SLATS (FLAPS) LOCKED Slats or flaps' wing tip brakes applied, or non alignment detected between 2 flaps.					
SLATS SYS 1(2) FAULT Failure of slat channel in one SFCC.	NIL	NIL			3, 4, 5, 7, 8
FLAP SYS 1 (2) FAULT Failure of flap channel in one SFCC.					
SLAT (FLAP) TIP BRK FAULT Failure of one wing tip brake on slats or flaps, or failure of one wing tip brake solenoid on slats, or flaps.					
FLAPS ATTACH SENSOR Failure of flap attachment's failure detection sensor.					

(1) The warning is automatically recalled by pressing the TO CONFIG pb .

BUS EQUIPMENT LIST

Applicable to: ALL

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
COMPUTERS	FLAPS SLATS	SFCC 1 slats				X	
		SFCC 1 flaps				X	
		SFCC 2 slats		DC2			
		SFCC 2 flaps		DC2			

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AIRCRAFT SYSTEMS

FUEL

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DSC-28-PLP PRELIMINARY PAGES

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Localization Title	Toc Index	ID	Reason
DSC-28-10-20 Tanks	A	1	Improvement of illustration quality
DSC-28-10-20 Tanks	A	2	Improvement of illustration quality
DSC-28-10-20 Tanks	A	3	Improvement of illustration quality
DSC-28-10-30 MAIN COMPONENTS - TANK PUMPS	B	1	Addition of "TANK PUMPS" title.
DSC-28-10-30 MAIN COMPONENTS - SUCTION VALVES	B	2	Addition of "SUCTION VALVES" title.
DSC-28-10-30 MAIN COMPONENTS - SUCTION VALVES	B	3	Addition of "SUCTION VALVES" title.
DSC-28-10-30 Engine Feed	C	4	Improvement of illustration quality.
DSC-28-10-30 Engine Feed	C	5	Improvement of illustration quality.
DSC-28-10-30 Engine Feed	C	6	Improvement of illustration quality.
DSC-28-10-70 Refueling - Defueling	A	1	Improvement of illustration quality
DSC-28-10-70 Refueling - Defueling	A	2	Improvement of illustration quality
DSC-28-10-70 Refueling - Defueling	A	3	Improvement of illustration quality
DSC-28-10-80 Fuel System Architecture	D	1	Improvement of illustration quality.
DSC-28-20 Refueling Control Panel	B	1	Improvement of illustration quality.
DSC-28-20 Refueling Control Panel	B	2	Improvement of illustration quality.
DSC-28-20 Refueling Control Panel	B	3	Improvement of illustration quality.
DSC-28-20 ECAM Fuel Page	C	4	Improvement of illustration quality
DSC-28-20 ECAM Fuel Page	C	5	Documentation update: Addition of "ECAM Fuel Page" documentary unit
DSC-28-20 ECAM Fuel Page	C	6	Improvement of illustration quality
DSC-28-20 ECAM Fuel Page	C	7	Improvement of illustration quality

Localization Title	Toc Index	ID	Reason
DSC-28-20 ECAM Fuel Page	C	8	Improvement of illustration quality
DSC-28-30 Warnings and Cautions	A	1	Documentation update: Addition of "Warnings and Cautions" documentary unit
DSC-28-30 Warnings and Cautions	A	2	Documentation update: Addition of "Warnings and Cautions" documentary unit

GENERAL

Applicable to: ALL 320

The fuel system :

- Stores fuel in the tanks.
- Supplies fuel, in the correct quantities, to the fuel tanks during refueling.
- Supplies fuel to the engines and the Auxiliary Power Unit (APU).
- Circulates fuel to cool the Integrated Drive Generator (IDG).
- Keeps fuel in the outer wing for wing bending and flutter relief.

GENERAL

Applicable to: ALL 321

The fuel system :

- Stores fuel in the tanks.
- Supplies fuel, in the correct quantities, to the fuel tanks during refueling.
- Supplies fuel to the engines and the Auxiliary Power Unit (APU).
- Controls the transfer of fuel from the center tank to the wing tanks.
- Circulates fuel to cool the Integrated Drive Generator (IDG).

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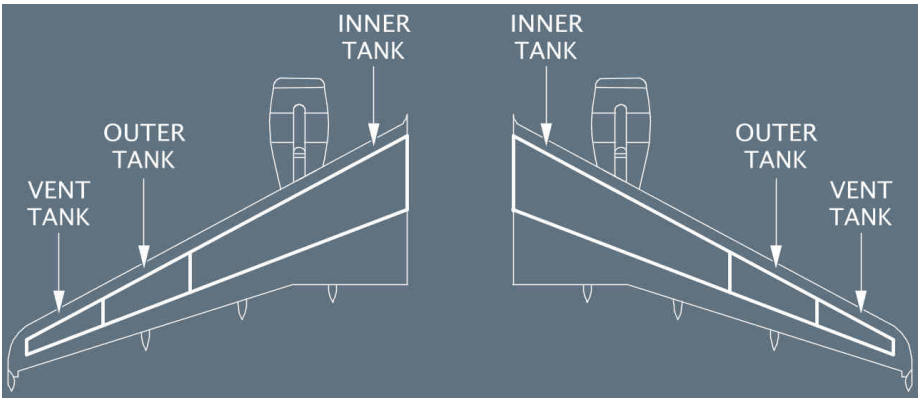
TANKS

Applicable to: B-HTG, B-HTH, B-HTI

1 Tanks, in inner and outer wings store fuel.
There is a vent surge tank outboard of the outer tank in each wing.
When the aircraft has been refueled to maximum capacity, the fuel can expand by 2 % (20 °C temperature rise) without spilling.
There is an overpressure protector in each vent outer and inner tank.

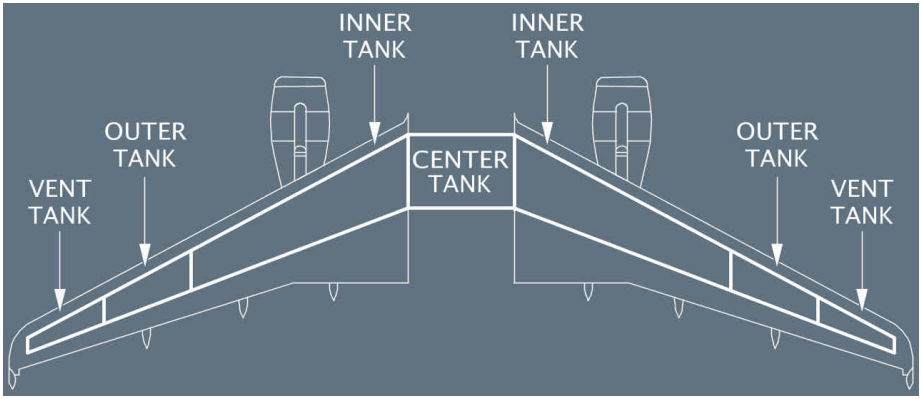


USABLE FUEL			
	OUTER TANKS	INNER TANKS	TOTAL
VOLUME (liters)	880 x 2	7 041 x 2	15 842
WEIGHT (kg) Density 0.785	691 x 2	5 527 x 2	12 436

TANKS

Applicable to: ALL 320

2 The fuel is stored in the wings, and the center section. The wings have inner and outer tanks.
There is a vent surge tank outboard of the outer tank in each wing.
When the aircraft has been refueled to maximum capacity, the fuel can expand by 2 % (20 °C temperature rise) without spilling.
There is an overpressure protector in each vent, outer and inner tank and between the center tank and the left inner tank.



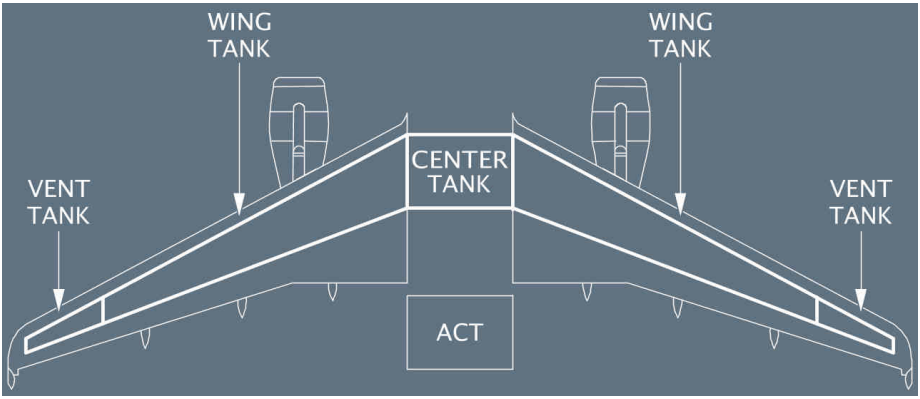
USABLE FUEL					
		OUTER TANKS	INNER TANKS	CENTER TANK	TOTAL
VOLUME	(liters)	880 x 2	6 924 x 2	8 250	23 858
	(US gallons)	232 x 2	1 829 x 2	2 180	6 302
WEIGHT (1)	(KG)	691 x 2	5 435 x 2	6 476	18 728
	(LB)	1 520 x 2	11 982 x 2	14 281	41 285

(1) *Fuel density : 0.785 kg/l or 6.551 lb/US Gal.*

TANKS

Applicable to: B-HTD, B-HTE, B-HTF

3 Fuel is stored in the wings, the center tank, and the Additional Center Tanks (ACTs), when installed.
There is a vent surge tank outboard of each wing tank.
When the aircraft has been refueled to maximum capacity, the fuel can expand by 2 % (20 °C temperature rise) without spilling.
There is an overpressure protector in each vent and wing tank, and between the center tank and the left wing tank.



USABLE FUEL						
		WING TANKS	CENTER TANK	ACT	TOTAL WITHOUT ACT	TOTAL WITH ACT
VOLUME	(liters)	2 x 7 750	8 200	2 900	23 700	26 600
	(US gallons)	2 x 2 047	2 166	766	6 260	7 026
WEIGHT (1)	(KG)	2 x 6 084	6 437	2 277	18 605	20 881
	(LB)	2 x 13 410	14 190	5 019	41 015	46 034

(1) *Fuel density : 0.785 kg/l or 6.551 lb/US Gal.*

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GENERAL

Applicable to: ALL 320

The main fuel pump system supplies fuel from the center tank or the inner wing tanks to the engines. The system has six main fuel pumps.

GENERAL

Applicable to: ALL 321

The main fuel pump system supplies fuel from the wing tanks to the engines. The system has four main fuel pumps.

MAIN COMPONENTS

Applicable to: ALL 321

TANK PUMPS

In normal operation each engine is supplied from two pumps in its own side wing tank.

Applicable to: ALL 320

1 ### TANK PUMPS

In normal operation each engine is supplied by one pump in the center tank or two pumps in its own side wing tank.
All wing tank pumps remain on throughout the flight. They are fitted with pressure relief sequence valves which ensure that, when all pumps are running, the center tank pumps will deliver fuel preferentially.

Applicable to: ALL 320

TRANSFER VALVES

Two electrical transfer valves are mounted in each wing to permit fuel transfer from outer to inner tank.

Applicable to: ALL

CROSS FEED VALVE

A cross feed valve controlled by a double motor allows both engines to be fed from one side or one engine to be fed from both sides.

Applicable to: ALL

ENGINE LP VALVES

The fuel flow to an engine can be stopped by its low pressure (LP) fuel valve, the closure of the LPLP fuel valve is by :

- the engine master switch, or
- the ENG FIRE PUSH pushbutton.

Applicable to: ALL 320

2 ## SUCTION VALVES

Closed by pumps pressure in normal operation, they allow engines to be fed by gravity if the inner tank pumps fail.

Note: Center tank pumps are not fitted with suction valves. Therefore, gravity feeding is not possible from the center tank.

Applicable to: ALL 321

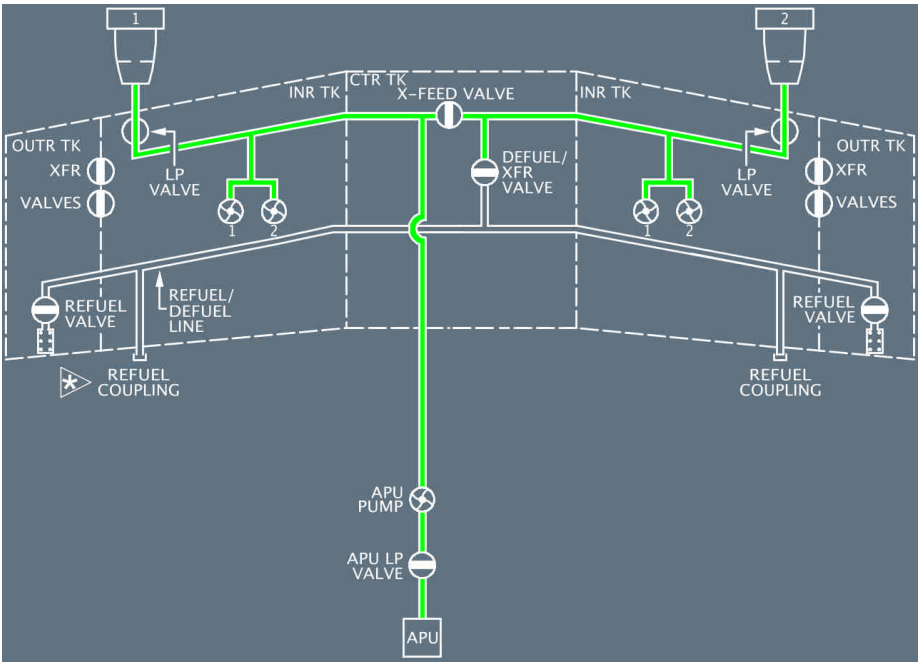
3 ## SUCTION VALVES

Closed by pumps pressure in normal operation, they allow engines to be fed by gravity if the wing tank pumps fail.

ENGINE FEED

Applicable to: B-HTG, B-HTH, B-HTI

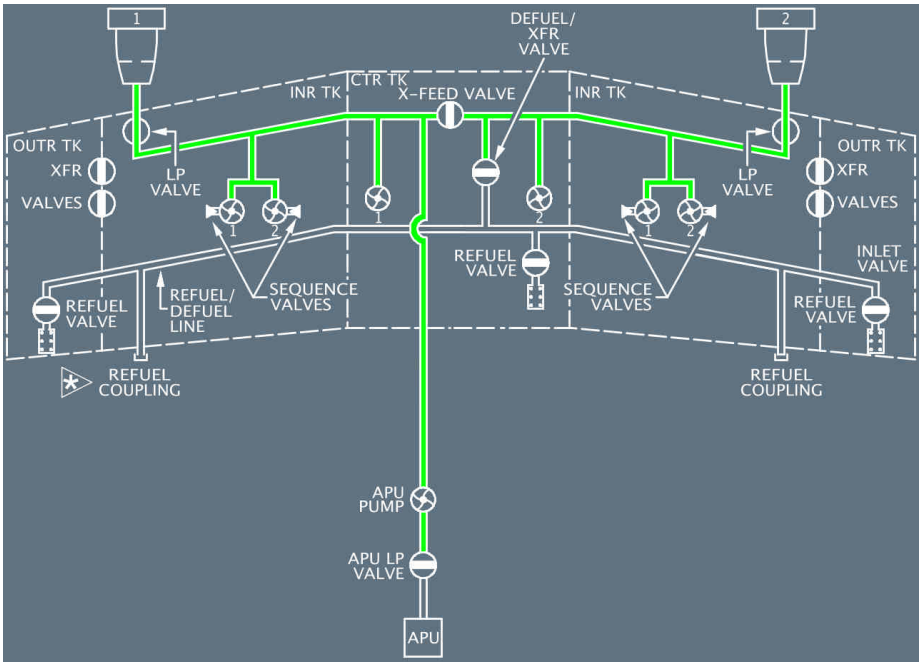
4



ENGINE FEED

Applicable to: ALL 320

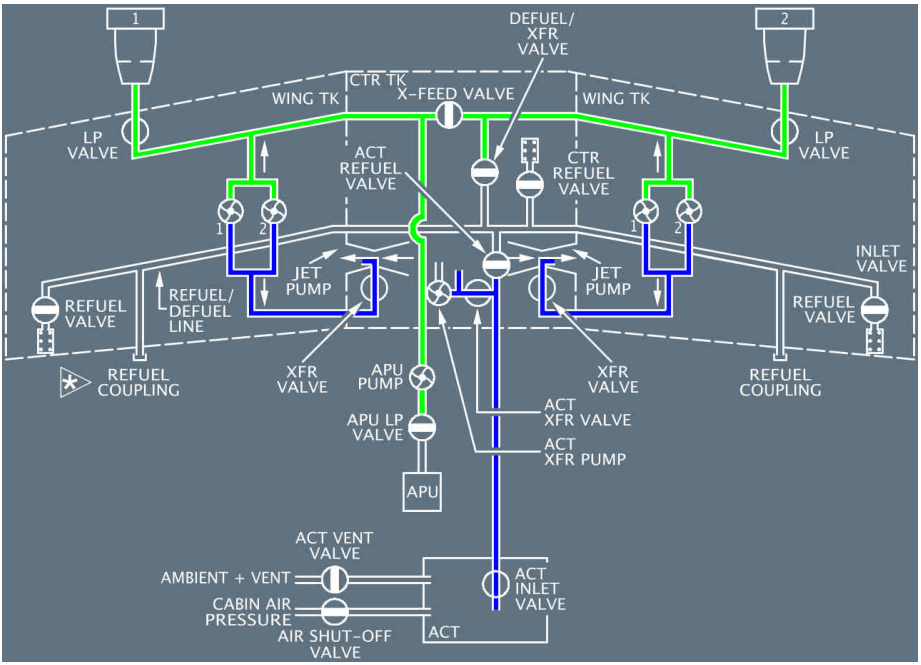
5



ENGINE FEED

Applicable to: B-HTD, B-HTE, B-HTF

6



FUEL FEED SEQUENCE

Applicable to: B-HTG, B-HTH, B-HTI

The tanks empty in the following sequence :

1. The inner tanks : Each inner tank empties down to 750 kg (1 650 lb).
2. The outer tanks : Fuel transfers into the inner tanks.

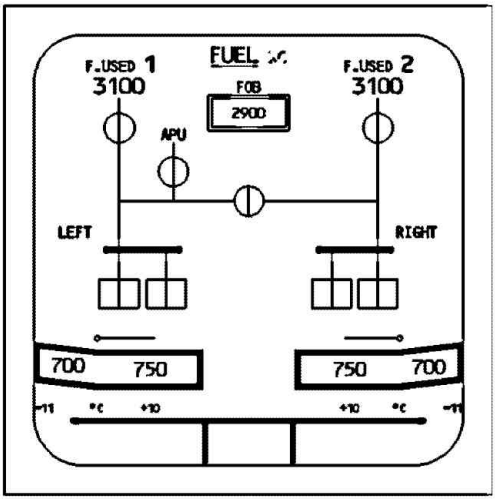
FUEL TRANSFER FROM OUTER TO INNER TANKS

The transfer valves automatically open, when the inner tank fuel reaches the low level (about 750 kg/1 650 lb), thus enabling the fuel to drain from the outer to inner tanks.
When open, the valves are latched open. They will automatically close at the next refueling operation.

Note: *1. Two level sensors are installed in each inner tank. Each sensor controls two transfer valves, one in each wing, ensuring simultaneous transfer to both wings.*

2. The 750 kg/1 650 lb value is based on a level aircraft attitude, with no acceleration. During steep descent or accelerations/decelerations, the transfer valves may open with more than 750 kg/1 650 lb of fuel in each inner tank, and the low level warning may be triggered.

ECAM INDICATION



TRANSFER FROM OUTER
TO INNER TANKS

FUEL FEED SEQUENCE

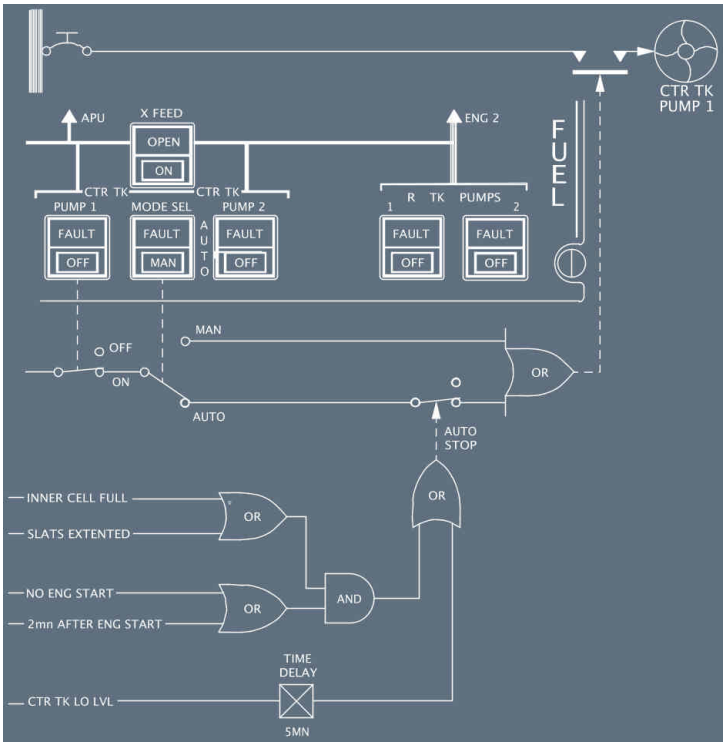
Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

The tanks empty in the following sequence :

1. The center tank.
2. The inner tanks : Each inner tank empties down to 750 kg (1 650 lb).
3. The outer tanks : Fuel transfers into the inner tanks.

The center tank feeds fuel to the engines, when the center tank pumps are not stopped by the control logic described below. The inner tanks feed the engines when the center tank pumps are stopped.

CENTER TANK PUMPS CONTROL LOGIC



* Each center tank pump stops, until approximately 500 kg (1 100 lb) of the fuel in its associated inner tank fuel has been used (when the fuel level reaches the underfull sensors).
With the MODE SEL in the MAN position, the center tank pumps will run. In manual mode, the CTR TK PUMP pb-sw must be selected OFF, when the center tank is empty.

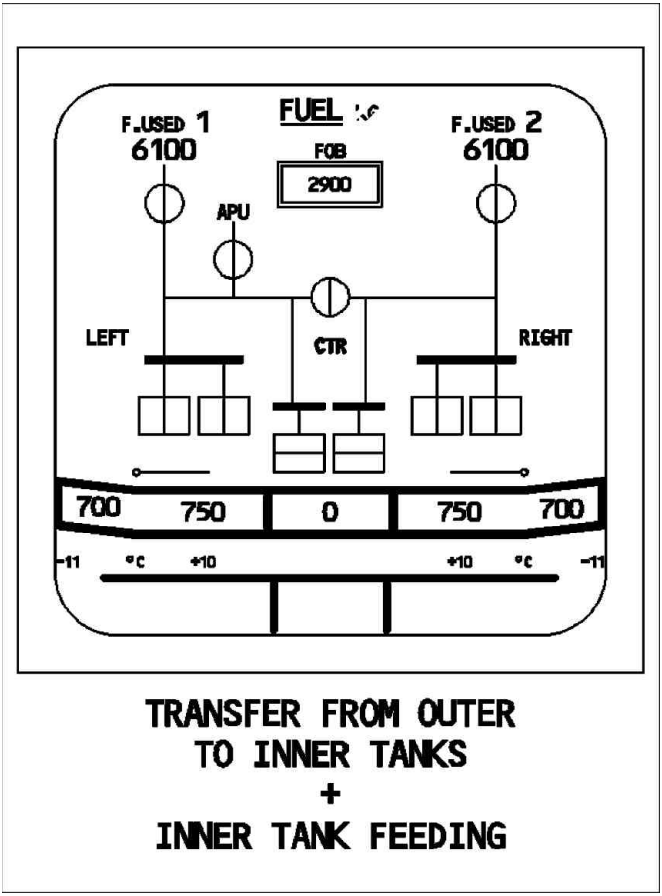
FUEL TRANSFER FROM OUTER TO INNER TANKS

The transfer valves automatically open, when the inner tank fuel reaches the low level (about 750 kg/1 650 lb), thus enabling the fuel to drain from the outer to inner tanks.
When open, the valves are latched open. They will automatically close at the next refueling operation.

Note: *1. Two level sensors are installed in each inner tank. Each sensor controls two transfer valves, one in each wing, ensuring simultaneous transfer to both wings.*

2. The 750 kg/1 650 lb value is based on a level aircraft attitude, with no acceleration. During steep descent or accelerations/decelerations, the transfer valves may open with more than 750 kg/1 650 lb of fuel in each inner tank, and the low level warning may be triggered.

ECAM INDICATION



FUEL FEED SEQUENCE

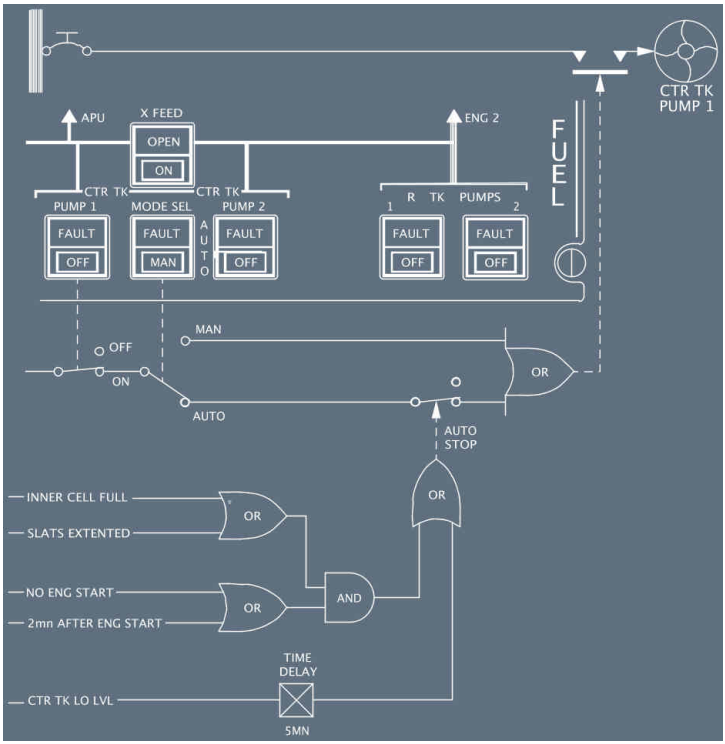
Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The tanks empty in the following sequence :

1. The center tank.
2. The inner tanks : Each inner tank empties down to 750 kg (1 650 lb).
3. The outer tanks : Fuel transfers into the inner tanks.

The center tank feeds fuel to the engines, when the center tank pumps are not stopped by the control logic described below. The inner tanks feed the engines when the center tank pumps are stopped.

CENTER TANK PUMPS CONTROL LOGIC



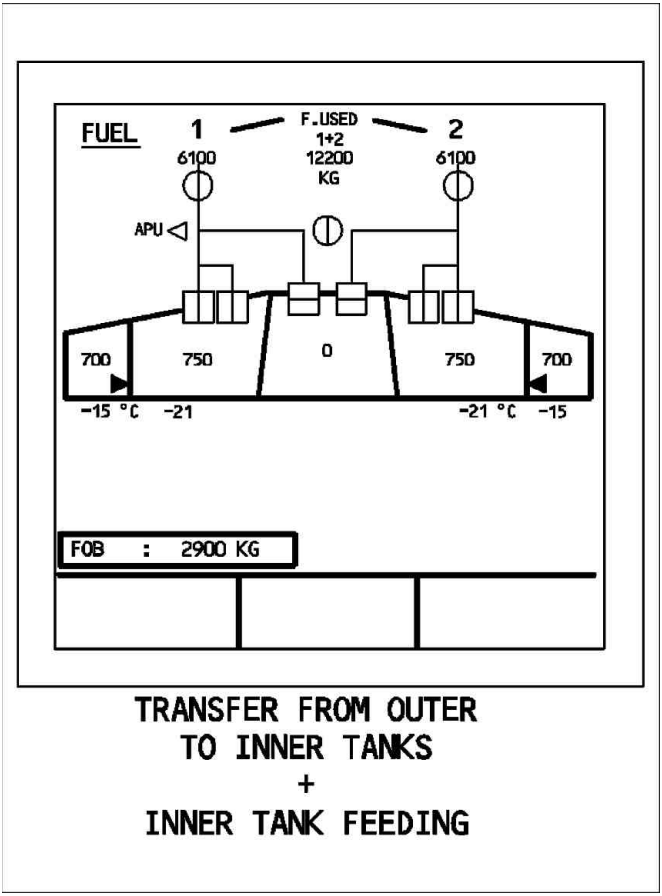
* Each center tank pump stops, until approximately 500 kg (1 100 lb) of the fuel in its associated inner tank fuel has been used (when the fuel level reaches the underfull sensors).
With the MODE SEL in the MAN position, the center tank pumps will run. In manual mode, the CTR TK PUMP pb-sw must be selected OFF, when the center tank is empty.

FUEL TRANSFER FROM OUTER TO INNER TANKS

The transfer valves automatically open, when the inner tank fuel reaches the low level (about 750 kg/1 650 lb), thus enabling the fuel to drain from the outer to inner tanks.
When open, the valves are latched open. They will automatically close at the next refueling operation.

Note:
1. *Two level sensors are installed in each inner tank. Each sensor controls two transfer valves, one in each wing, ensuring simultaneous transfer to both wings.*
2. *The 750 kg/1 650 lb value is based on a level aircraft attitude, with no acceleration. During steep descent or accelerations/decelerations, the transfer valves may open with more than 750 kg/1 650 lb of fuel in each inner tank, and the low level warning may be triggered.*

ECAM INDICATION



FUEL FEED SEQUENCE

Applicable to: B-HTD, B-HTE, B-HTF

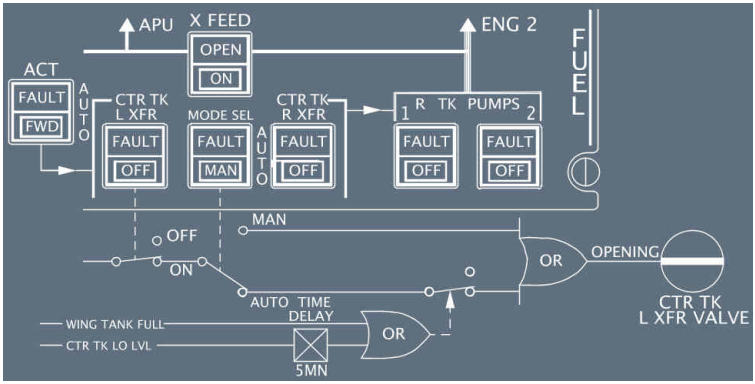
The wing tanks feed fuel to the engines. The tanks empty in the following sequence:

1. The ACT ⋘ : Fuel transfers into the center tank.
2. The center tank: Fuel transferred into the wing tanks.
3. The wing tanks.

CENTER TANK FUEL TRANSFER

The transfer system controls the flow of fuel from the center tank to the wing tanks. The Fuel Level Sensing Control Unit (FLSCU) has automatic control of the transfer valve. When the transfer valve is open, fuel from the wing tank pumps flows through the jet pump and creates a suction in it. This suction moves the fuel from the center tank to the related wing tank.

CENTER TANK TRANSFER VALVE CONTROL LOGIC



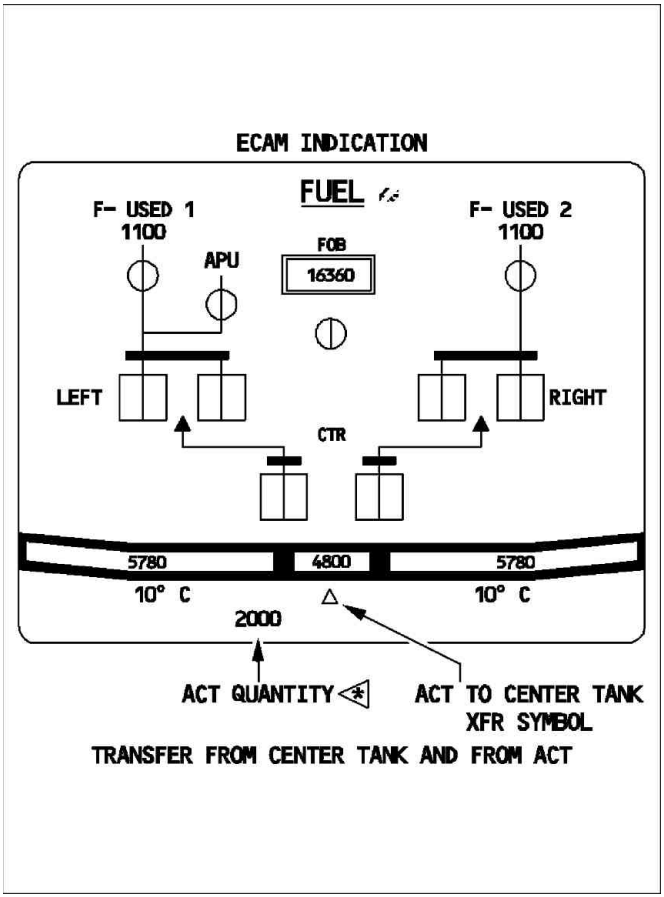
The FLSCU automatically closes the associated center tank transfer valve when the wing tank is full. The FLSCU then reopens the center tank transfer valve when the engines have used 250 kg (550 lb) of wing tank fuel (when the fuel level reaches the underfull sensors).
With the MODE SEL in MAN position, the center tank transfer valves will open. Wing tank overflow must be prevented by selecting the CTR TK XFR pb-sw off when the wing tanks are full. They must also be selected off when the center tank is empty.

ACT TO CENTER TANK TRANSFER

ACT transfer automatically starts after takeoff at slats' retraction, if the center tank high-level sensor has been dry for 10 min, and the ACT is not empty.
Fuel transfers from the ACT to the center tank via pressurization of the tank, by closing the ACT vent valve and opening the air shutoff valve.
When the ACT is empty, the ACT transfer valve, the air shutoff valve and inlet valve close, and the ACT vent valve opens.

Note: *ACT transfer stops, if the center tank high level becomes wet, by closing the ACTs transfer valve. The transfer valve reopens when the center tank high-level sensor becomes dry for 10 min.*

Selecting the ACT pushbutton to FWD opens the ACT transfer valve, the ACT inlet valve, and starts the ACT transfer pump. It must be returned to AUTO, when the ACT is empty.
Center tank overflow is prevented, by returning the ACT pb-sw to AUTO, when the center tank is full.



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APU FEED

Applicable to: ALL

A special fuel pump supplies fuel for APU startup when fuel feed pressure is low (due to loss of tank pumps or loss of normal AC electrical supply). This pump normally runs off the AC ESS SHED, but runs off the AC STAT INV BUS if the AC ESS SHED fails.

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FUEL RECIRCULATION SYSTEM

Applicable to: ALL 320

Refer to DSC-70-45-60 GENERAL

Some of the fuel supplied to each engine goes from the high-pressure fuel line in that engine, through the integrated drive generator (IDG) heat exchanger (where it absorbs heat), to the fuel return valve and to the outer fuel tank.

This operation ensures the IDG cooling when the oil temperature is high or when at low engine power.

The FADEC controls the fuel return valve.

If the outer tank is already full, the fuel overflows to the inner tank through a spill pipe.

If center tank is feeding, the wing tank will tend to overfill and the system automatically selects the CTR TK PUMP off when the inner tank is full. The wing tank pumps will feed until the engine have used approximately 500 kg (1 100 lb) of fuel when the fuel level reaches the underfull sensors. The logic circuits then restart the center tank pumps.

FUEL RECIRCULATION SYSTEM

Applicable to: ALL 321

Refer to DSC-70-45-60 GENERAL

Some of the fuel supplied to each engine goes from the high-pressure fuel line in that engine, through the integrated drive generator (IDG) heat exchanger (where it absorbs heat), to the fuel return valve, and back to the wing tank.

This operation ensures the IDG cooling when the oil temperature is high or when at low engine power.

The FADEC controls the fuel return valve.

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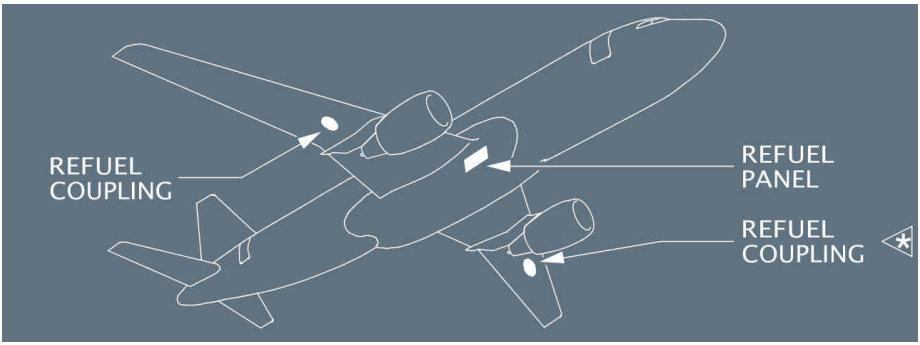
REFUELING - DEFUELING

Applicable to: B-HTG, B-HTH, B-HTI

1

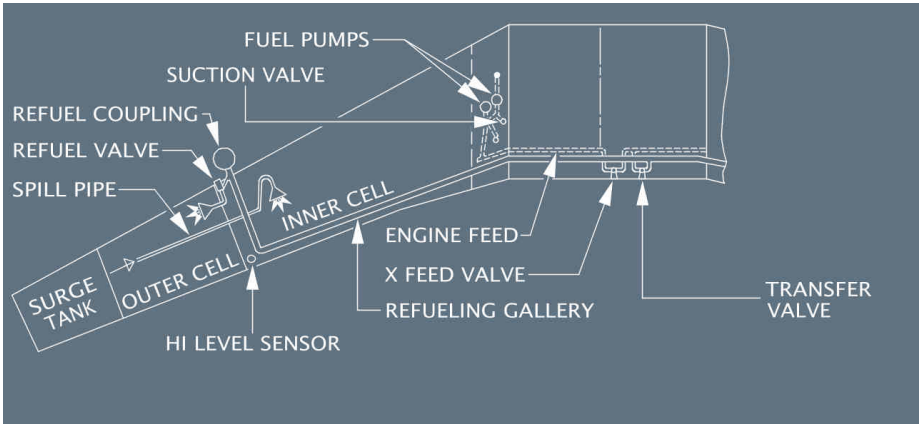
- One (two) refueling point(s) is (are) installed under the wings, enabling the aircraft to be refueled from either the right or left ◁ side.
- A refuel panel is located on the fuselage side beneath the right wing.



A gallery connects the refuel coupling to each tank's refuel valve.
Refueling is normally automatic, the required fuel load being set on the preselector.
Manual control is also available.
Refueling starts by the outer cells which, once full, overflow into the inner cell through a spill pipe.
Refuel valves close automatically, when the tanks contain the preselected load, or when sensors detect a high fuel level.
The aircraft can be refueled, when only battery power is available.
The wing tanks can be refueled by gravity, through refueling points on top of the wings.

A transfer valve, between the engine feed system and the refueling gallery, allows :
- The tank pumps to transfer fuel from one tank to another.
- Defueling through the refuel coupling.

Approximate refueling time at nominal pressure is : 17 min.

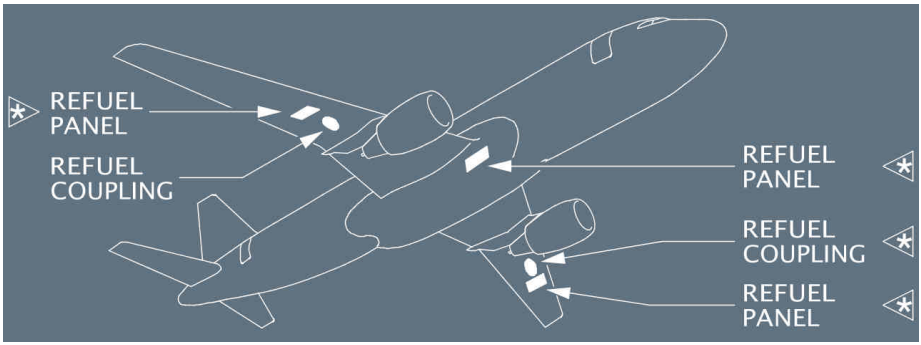


REFUELING - DEFUELING

Applicable to: ALL 320

2

- One (two) refueling point(s) is (are) installed under the wings, enabling the aircraft to be refueled from either the right or left ◁ side.
- A refuel panel is located on the fuselage side beneath the right wing, or under the right or left wing adjacent to the refuel coupling.

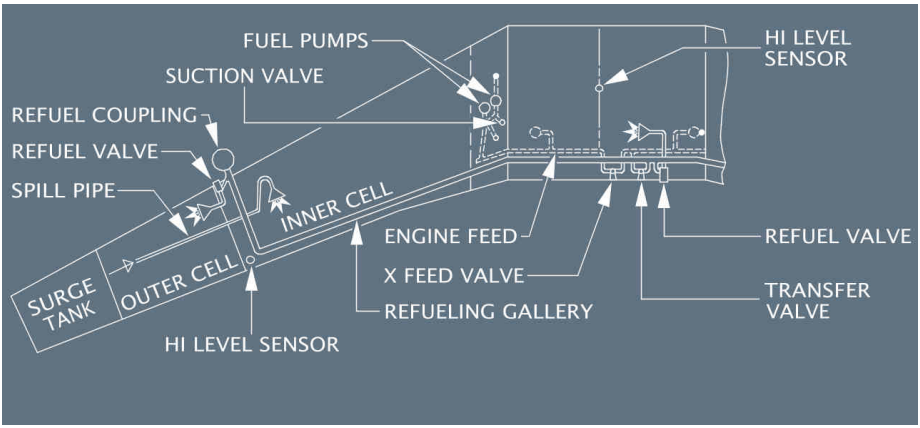


A gallery connects the refuel coupling to each tank's refuel valve.
Refueling is normally automatic, the required fuel load being set on the preselector.
Manual control is also available.

Automatic refueling starts with the outer cells. If the selected fuel load exceeds the wing tank capacity, the center tank is simultaneously refueled.
When an outer cell is full the fuel overflows into the inner cell through a spill pipe.
Refuel valves close automatically, when the tanks contain the preselected load, or when sensors detect a high fuel level.
The aircraft can be refueled, when only battery power is available.
The wing tanks can be refueled by gravity, through refueling points on top of the wings.

A transfer valve, between the engine feed system and the refueling gallery, allows :
- The tank pumps to transfer fuel from one tank to another.
- Defueling through the refuel coupling.

Approximate refueling time at nominal pressure is :
- 17 min for wing tanks.
- 20 min for all tanks.

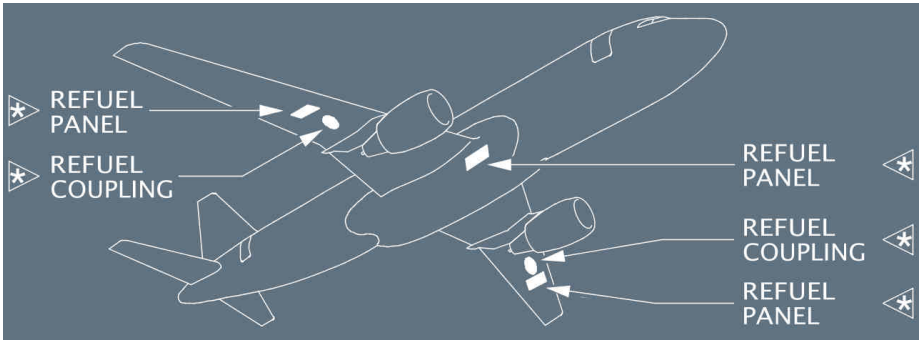


REFUELING - DEFUELING

Applicable to: B-HTD, B-HTE, B-HTF

3

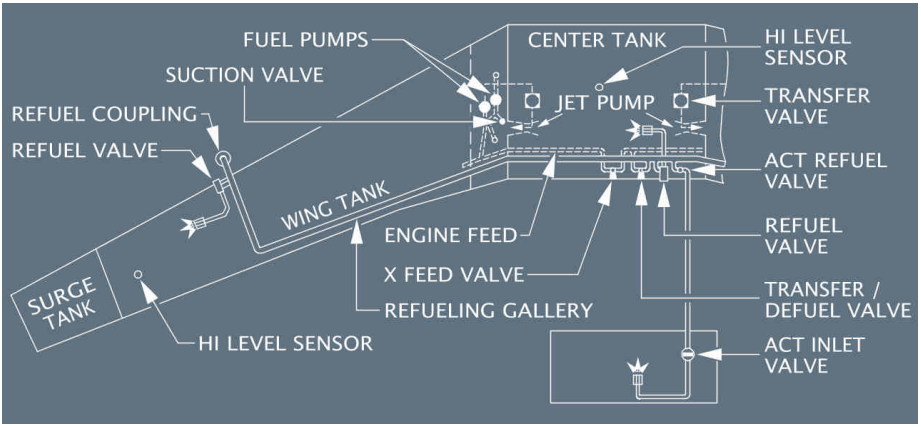
- One (two) refueling point(s) is (are) installed under the wings, enabling the aircraft to be refueled from either the right or left ◁ side.
- A refuel panel is located on the fuselage side beneath the right wing, or under the right or left wing adjacent to the refuel coupling.



A gallery connects the refuel coupling to each tank's refuel valve.
Refueling is normally automatic, the required fuel load being set on the preselector.
Manual control is also available.
Automatic refueling starts with the wing tanks. If the preselected fuel load exceeds the capacity of the wing tanks, the center tank receives fuel simultaneously.
Refuel valves close automatically, when the tanks contain the preselected load, or when sensors detect a high fuel level.
The aircraft can be refueled, when only battery power is available.
The wing tanks can be refueled by gravity, through refueling points on top of the wings.

A transfer valve, between the engine feed system and the refueling gallery, allows :
- The tank pumps to transfer fuel from one tank to another.
- Defueling through the refuel coupling.

Approximate refueling time at nominal pressure is :
- 17 min for wing tanks.
- 25 min for all tanks.


FUEL PUMPS
SUCTION VALVE
REFUEL COUPLING
REFUEL VALVE
WING TANK
SURGE TANK
HI LEVEL SENSOR
CENTER TANK
JET PUMP
ENGINE FEED
X FEED VALVE
REFUELING GALLERY
HI LEVEL SENSOR
TRANSFER VALVE
ACT REFUEL VALVE
REFUEL VALVE
TRANSFER / DEFUEL VALVE
ACT INLET VALVE

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FUEL QUANTITY INDICATION (FQI) SYSTEM

Applicable to: ALL 320

The FQI is a computerized system that :
- transmits the actual total fuel mass, as well as the quantity and temperature of fuel in the tanks, to the ECAM.
- controls automatic refueling.

Two channels perform fuel computations : channel 2 activates automatically if channel 1 fails.

The FQI system has :
- an FQI computer.
- a set of capacitance probes in each tank to measure fuel level and temperature.
- one densitometer (cadensicon) sensor in each wing inner tank permitting the calculation of the fuel quantity.
- one Capacitance Index Compensator (CIC) in each inner tank giving the dielectric constant of the fuel in case of cadensicon failure.
- a quantity indicator for each tank installed on the refuel/defuel panel.
- a preselector on the refuel/defuel panel that shows the preselected and actual total fuel quantity.

FUEL QUANTITY INDICATION (FQI) SYSTEM

Applicable to: ALL 321

The FQI is a computerized system that :
- transmits the actual total fuel mass, as well as the quantity and temperature of fuel in the tanks, to the ECAM.
- controls automatic refueling.

Two channels perform fuel computations : channel 2 activates automatically if channel 1 fails.

The FQI system has :
- an FQI computer.
- a set of capacitance probes in each tank to measure fuel level.
- sensors in each wing tank to measure fuel temperature.
- devices for measuring fuel characteristics such as density
- a multi tank indicator allowing the quantity for each tank to be displayed on the refuel/defuel panel.

FUEL LEVEL SENSING CONTROL UNIT (FLSCU)

Applicable to: ALL 320

The fuel level system generates fuel-level and fuel-temperature signals in order to operate the appropriate switching functions for refueling and defueling and control the IDG cooling recirculation system and the center-tank-to-wing-tank fuel transfer system.

The FLSCU comprises :
- fuel level sensors in the tanks to sense high, low, and overflow levels.
- a fuel temperature sensor to control the IDG cooling recirculation.

When fuel quantity in one wing tank goes below 750 kg (1 650 lb), the low-level sensor triggers the LO LVL warning on ECAM.

FUEL LEVEL SENSING CONTROL UNIT (FLSCU)

Applicable to: ALL 321

The fuel level system generates fuel-level and fuel-temperature signals in order to operate the appropriate switching functions for refueling and defueling and control the IDG cooling recirculation system and the center-tank-to-wing-tank fuel transfer system and ACT ⋘ to center tank fuel transfer system.

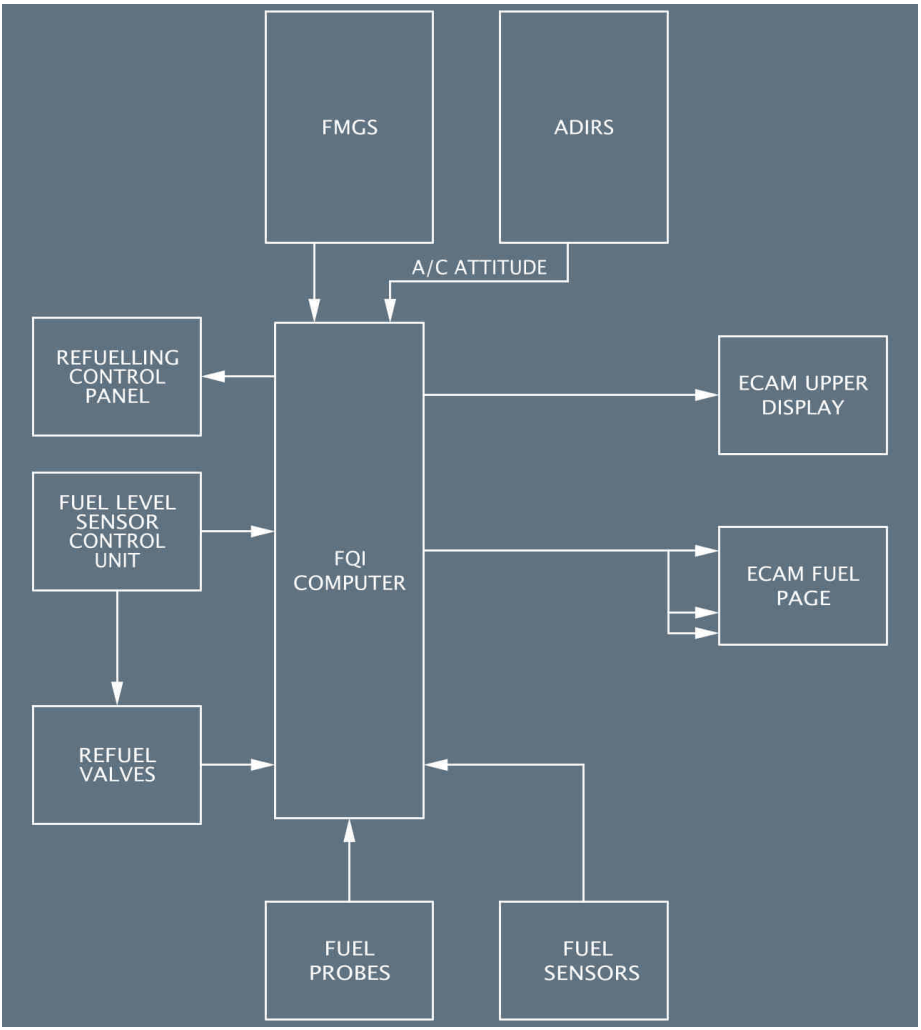
The FLSCU comprises :
- fuel level sensors in the tanks to sense high, low, and overflow levels.
- a fuel temperature sensor to control the IDG cooling recirculation.

When fuel quantity in one wing tank goes below 750 kg (1 650 lb), the low-level sensor triggers the LO LVL warning on ECAM.

FUEL SYSTEM ARCHITECTURE

Applicable to: ALL

1



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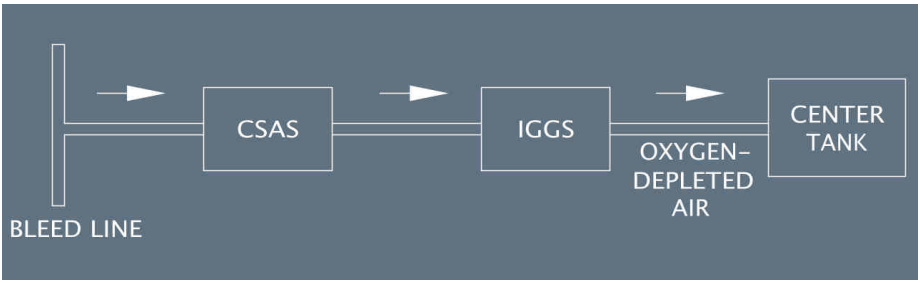
FUEL TANK INERTING SYSTEM

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

The A318, A319, A320 and A321 aircraft are equipped with a Fuel Tank Inerting System.
The aim of this system is to reduce the flammability in the fuel tanks that have a high flammability exposure.
The fuel center tank is the only one that has a high flammability exposure. Therefore, the Fuel Tank Inerting System only needs to be installed for the center tank. All other tanks do not need Fuel Tank Inerting System installation.
To reduce the flammability in the center tank, the Fuel Tank Inerting System produces an oxygen-depleted air that goes in the center tank to replace the ambient air.

The system is installed in the belly fairing of the aircraft, and is composed by:
- A conditioned Service Air System (CSAS)
- An Inert Gas Generation System (IGGS).

The CSAS extracts and conditions some engine bleed air to adequate pressure and temperature. Then, the air goes through the IGGS where an Air Separation Module taps the nitrogen molecules. Therefore, an oxygen-depleted air is produced (with less than 12 % of oxygen) and replaces the ambient air of the center tank.



The Fuel Tank Inerting System does not require any flight crew action. It works independently as soon as the engines start and until they stop.

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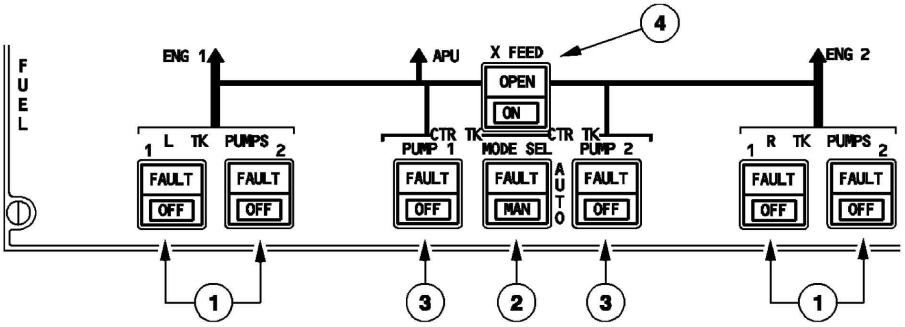
OVERHEAD PANEL

Applicable to: ALL 320



(1) L (R) TK PUMPS 1 (2) pushbutton sw

On : Pump is on, but only fuel feeds, when the center tank pumps' delivery pressure drops below the threshold.

OFF : Pump is OFF, and the OFF button comes on white.

FAULT light : Amber light, and ECAM caution, comes on, when the delivery pressure drops. It does not come on when OFF is selected.

(2) MODE SEL pushbutton sw

AUTO : Control of center tank pumps is automatic.

- They run at engine start for 2 min.
- Before or after the engine start sequence, the pumps run if the slats are retracted.
- They stop automatically 5 min after center tank low level is reached.

MAN : Flight crew manually controls the center tank pumps manually with the center tank pumps' pushbutton.

FAULT light : Amber light comes on, and ECAM caution comes on when center tank has more than 250 kg (550 lb) of fuel and the left or right wing tank has less than 5 000 kg (11 000 lb).

(3) CTR TK PUMP 1(2) pushbutton sw

On :
- Pump runs, if MAN mode is selected on the MODE SEL pushbutton.
- Pump is automatically controlled when AUTO mode is selected.

OFF : Pump is OFF and OFF button comes on white.

FAULT light : Amber light and associated ECAM caution come on, when the pump is in operation and the delivery pressure drops.

(4) X FEED pushbutton sw

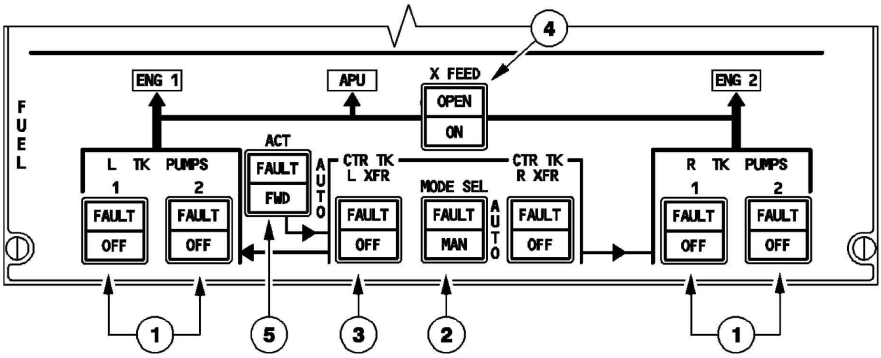
OFF : The valve closes, and the pushbutton does not come on.

ON : The valve opens, and the ON pushbutton comes on in white.

OPEN light : This green light comes on, when the valve is fully open.

OVERHEAD PANEL

Applicable to: ALL 321



(1) L R) TK PUMPS pb-sw

On : Pump is on.

OFF : Pump is OFF, and the OFF button comes on white.

FAULT light : Amber light, and ECAM caution, comes on, when the delivery pressure drops. It does not come on when OFF is selected.

(2) MODE SEL pb-sw

AUTO : Control of center tank transfer valves is automatic.

- They open if the associated wing tank is not full
- They stop automatically 5 min after center tank low level is reached.

MAN : Flight crew manually controls the center tank transfer valves manually with CTR TK XFR pushbutton switches.

FAULT light : Amber light comes on, and ECAM caution comes on when center tank has more than 250 kg (550 lb) of fuel and the left or right wing tank has less than 5 000 kg (11 000 lb) and the MODE SEL pb-sw is at AUTO.

(3) CTR TK L(R) XFR pb-sw

On : - The transfer valve opens, if MAN mode is selected on the MODE SEL pb-sw
- The transfer valve is automatically controlled when AUTO mode is selected.

OFF : The transfer valve is closed.

FAULT light : Amber light and associated ECAM caution come on, if the associated wing tank overflows.

(4) X FEED pushbutton

OFF : The valve closes, and the pushbutton does not come on.

ON : The valve opens, and the ON pushbutton comes on in white.

OPEN light : This green light comes on, when the valve is fully open.

(5) ACT pushbutton

AUTO : Control of the ACTs ◁ transfer is automatic.

- The automatic forward transfer occurs, if:
  - The aircraft is in flight, and
  - The slats are retracted, and
  - At least one ACT low-level sensor is wet, and
  - The center tank high-level sensor has been dry for at least 10 min.
- The automatic forward transfer stops, as soon as one of the above conditions is not met.

FWD : The manual transfer to the center tank is initiated by opening:
- The ACT transfer valve
- TheACT 1 or 2 ◁ inlet valve.

The ACT transfer pump is then commanded on.

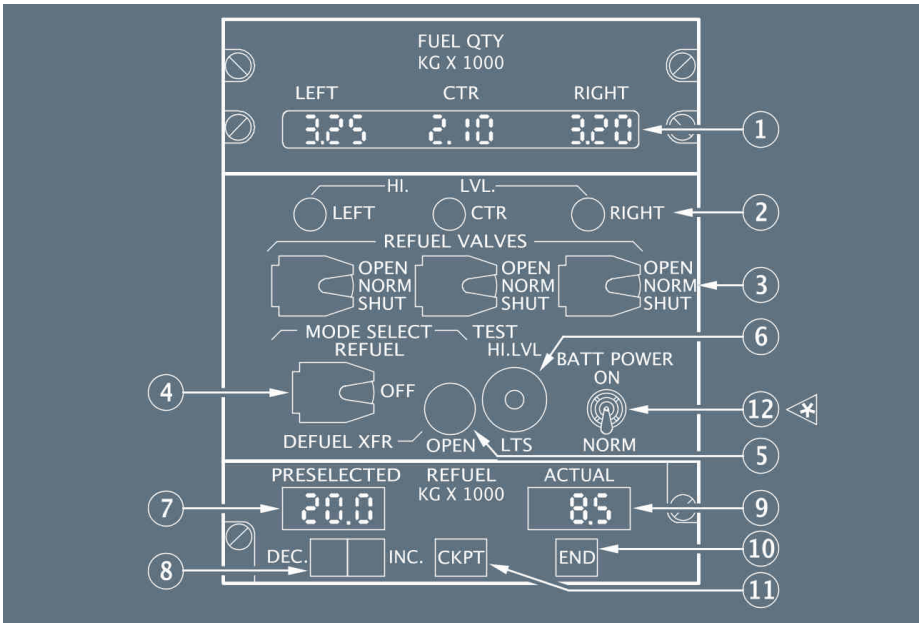
FAULT light : Amber light and associated ECAM caution come on, when:
- The center tank has less than 3 000 kg (6 614 lb) of fuel, and one ACT ◁ has more than 250 kg (550 lb) of fuel, and
- The ACT pushbutton is on AUTO.

Note: When no ACT is installed, the pushbutton is inoperative.

REFUELING CONTROL PANEL

Applicable to: ALL 320

1



(1) FUEL QUANTITY indicator
The number shows the quantity of fuel in each tank.

(2) HI LVL light
This blue light comes on, when the system detects a high fuel level.
The corresponding refuel valve closes automatically.

(3) REFUEL VALVES selector (guarded in NORM)

NORM : Automatic refueling logic controls the refuel valves.

OPEN : Valves open when the MODE SELECT sw is set to the REFUEL or DEFUEL XFR position. Each refuel valve closes, when the system detects a high level in the associated tank.

SHUT : Valves close.

(4) MODE SELECT sw (guarded at OFF)

OFF	:	Refuel system is de-energized. Refuel valves are closed.
REFUEL	:	Refuel valves operate in automatic or in manual mode depending on the position of REFUEL VALVES sw.
DEFUEL XFR	:	Refuel/Defuel transfer valve opens.

Refuel valve opens if the associated REFUEL VALVE sw is at OPEN.

(5) OPEN light
This amber light comes on when the defuel transfer valve is open.

(6) TEST sw

HI LVL	:	The HI LVL lights come on if high level sensors and associated circuits are serviceable.

Note: If tanks are full (HI LVL lights on) during this test, the HI LVL lights go out if high level sensors and associated circuits are serviceable.

LTS	:	Lights on panel and all 8's on FQI and preselector come on.

(7) PRESELECTED display
This display shows the preselected total fuel quantity in kg (lb) × 1 000 (multiply by 1 000 to get actual amount).

(8) Preselector sw
Pressing the left or right side of the switch decreases or increases the preselected quantity.

(9) ACTUAL display
This display shows the total fuel on board.

(10) END light

- This green light comes on steady when automatic refueling is completed
- It flashes green if refueling is aborted.

(11) CKPT light
Not used.

(12) BATT POWER toggle switch

ON : When the flight crew switches this ON momentarily and releases it, HOT BUS 1 supplies the FQI. After completion of the FQI tests (about 40 s), the fuel quantity indications appear and refuel operation can be selected.

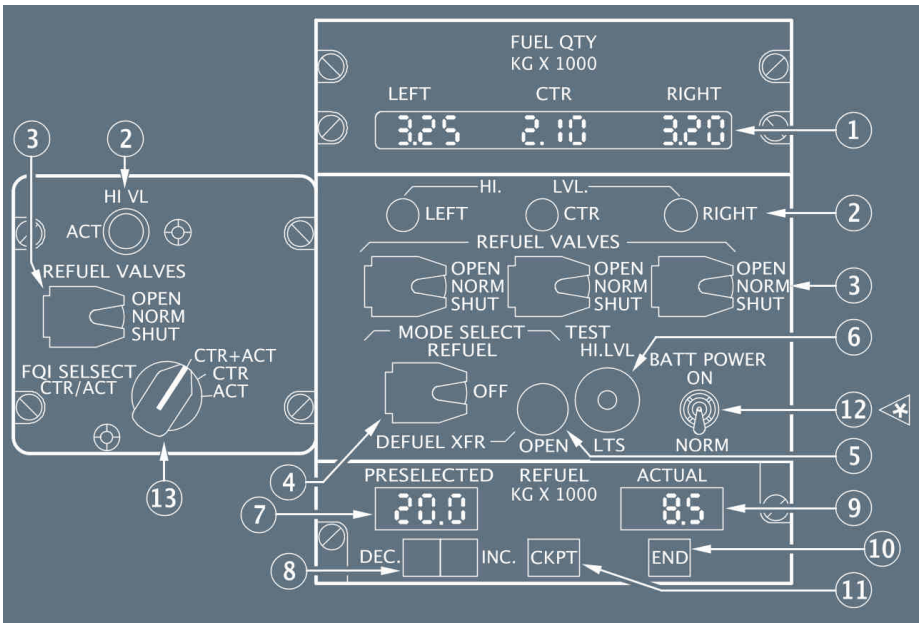
The electrical supply is automatically cut off:
- After 10 min, if no refuel operation is selected, or
- At the end of refueling.

NORM: The FQI is not supplied by batteries.

REFUELING CONTROL PANEL

Applicable to: B-HTD, B-HTE, B-HTF

2



(1) FUEL QUANTITY indicator
The number shows the quantity of fuel in each tank.

(2) HI LVL light
This blue light comes on, when the system detects a high fuel level.

The corresponding refuel valve closes automatically.

(3) REFUEL VALVES selector (guarded in NORM)

NORM : Automatic refueling logic controls the refuel valves.

OPEN : Valves open when the MODE SELECT sw is set to the REFUEL or DEFUEL XFR position. Each refuel valve closes, when the system detects a high level in the associated tank.

SHUT : Valves close.

(4) MODE SELECT sw (guarded at OFF)

OFF : Refuel system is de-energized. Refuel valves are closed.

REFUEL : Refuel valves operate in automatic or in manual mode depending on the position of REFUEL VALVES sw.

DEFUEL XFR : Refuel/Defuel transfer valve opens.

Refuel valve opens if the associated REFUEL VALVE sw is at OPEN.

(5) OPEN light

This amber light comes on when the defuel transfer valve is open.

(6) TEST sw

HI LVL : The HI LVL lights come on if high level sensors and associated circuits are serviceable.

Note: If tanks are full (HI LVL lights on) during this test, the HI LVL lights go out if high level sensors and associated circuits are serviceable.

LTS : Lights on panel and all 8's on FQI and preselector come on.

(7) PRESELECTED display

This display shows the preselected total fuel quantity in kg (lb) × 1 000 (multiply by 1 000 to get actual amount).

(8) Preselector sw

Pressing the left or right side of the switch decreases or increases the preselected quantity.

(9) ACTUAL display

This display shows the total fuel on board.

(10) END light

- This green light comes on steady when automatic refueling is completed
- It flashes green if refueling is aborted.

(11) CKPT light
Not used.

(12) BATT POWER toggle switch

ON : When the flight crew switches this ON momentarily and releases it, HOT BUS 1 supplies the FQI. After completion of the FQI tests (about 40 s), the fuel quantity indications appear and refuel operation can be selected.

The electrical supply is automatically cut off:
- After 10 min, if no refuel operation is selected, or
- At the end of refueling.

NORM: The FQI is not supplied by batteries.

(13) FQI SELECT CTR /ACT sw
This selects the tank(s) quantity to be displayed on the CTR tank indicator.

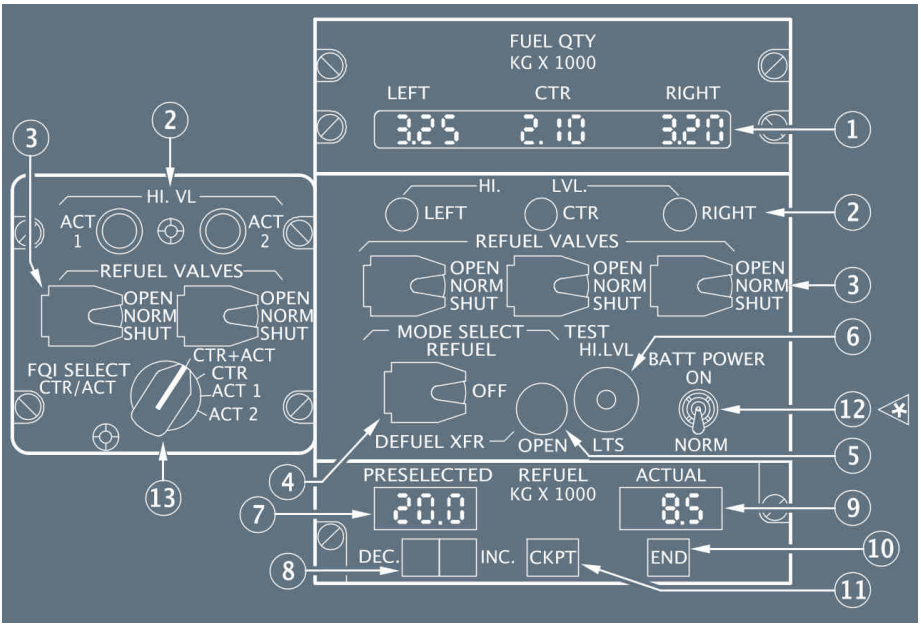
CTR + ACT	:	Center tank and ACT.
CTR	:	Center tank only.
ACT	:	ACT only.

Note: When no ACT is installed, the selector is not active and the CTR tank quantity is always indicated, irrespective of the selector position.

REFUELING CONTROL PANEL

Applicable to: B-HTG, B-HTH, B-HTI

3



(1) FUEL QUANTITY
The number shows the quantity of fuel in each tank.

(2) HI LVL light
This blue light comes on, when the system detects a high fuel level.
The corresponding refuel valve closes automatically.

(3) REFUEL VALVES selector (guarded in NORM)

NORM : Automatic refueling logic controls the refuel valves.

OPEN : Valves open when the MODE SELECT sw is set to the REFUEL or DEFUEL XFR position. Each refuel valve closes, when the system detects a high level in the associated tank.

SHUT : Valves close.

(4) MODE SELECT sw (guarded at OFF)

OFF	:	Refuel system is de-energized. Refuel valves are closed.
REFUEL	:	Refuel valves operate in automatic or in manual mode depending on the position of REFUEL VALVES sw.
DEFUEL XFR	:	Refuel/Defuel transfer valve opens.

Refuel valve opens if the associated REFUEL VALVE sw is at OPEN.

(5) OPEN light
This amber light comes on when the defuel transfer valve is open.

(6) TEST sw

HI LVL	:	The HI LVL lights come on if high level sensors and associated circuits are serviceable.

Note: If tanks are full (HI LVL lights on) during this test, the HI LVL lights go out if high level sensors and associated circuits are serviceable.

LTS	:	Lights on panel and all 8's on FQI and preselector come on.

(7) PRESELECTED display
This display shows the preselected total fuel quantity in kg (lb) × 1 000 (multiply by 1 000 to get actual amount).

(8) Preselector sw
Pressing the left or right side of the switch decreases or increases the preselected quantity.

(9) ACTUAL display
This display shows the total fuel on board.

(10) END light

- This green light comes on steady when automatic refueling is completed
- It flashes green if refueling is aborted.

(11) CKPT light
Not used.

(12) BATT POWER toggle switch

ON : When the flight crew switches this ON momentarily and releases it, HOT BUS 1 supplies the FQI. After completion of the FQI tests (about 40 s), the fuel quantity indications appear and refuel operation can be selected.

The electrical supply is automatically cut off:
- After 10 min, if no refuel operation is selected, or
- At the end of refueling.

NORM: The FQI is not supplied by batteries.

(13) FQI SELECT CTR/ACT sw

This selects the tank(s) quantity to be displayed on the CTR tank indicator.

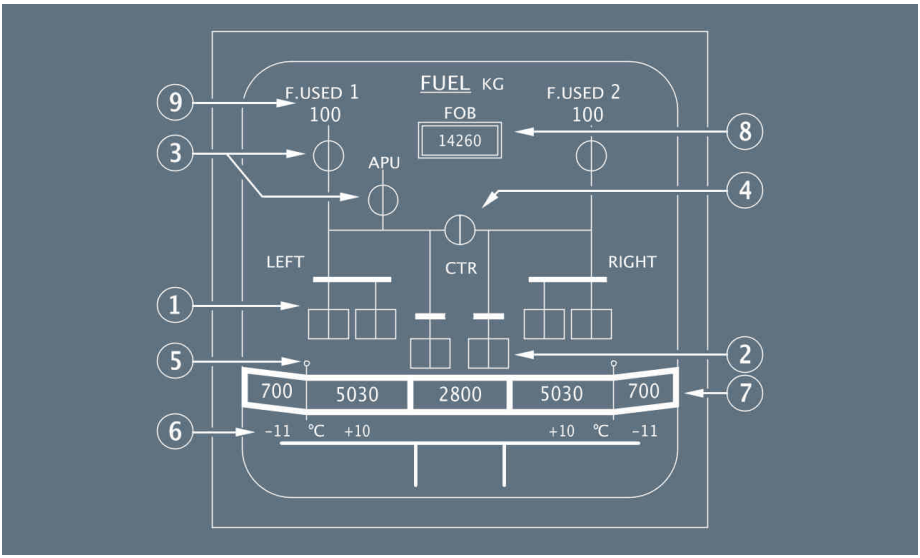
CTR + ACT	:	Center tank and ACT 1 and 2.
CTR	:	Center tank only.
ACT 1	:	ACT 1 only.
ACT 2	:	ACT 2 only.

Note: When no ACT is installed, the selector is not active and the CTR tank quantity is always indicated, irrespective of the selector position.

ECAM FUEL PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

4



(1) Wing pump indications

Inline - Green	:	Pump pressure is normal (pump contactor on).
"LO" - Amber	:	Pump pressure is low (pump contactor on).
Crossline - Amber	:	Pump contactor is off.

(2) CTR tank pump indications

Inline - Green	:	Pump pressure is normal (pump contactor on).
"LO" - Amber	:	Pump pressure is low (pump contactor on).
Crossline - Green	:	Pump contactor is off, and auto shut-off is required.
Crossline - Amber	:	Pump contactor is off, and auto shut-off is not required.

(3) LP valve (ENG-APU) indications

Inline - Green	:	The valve is open.
Inline - Amber	:	The valve is open, with the ENG (APU) MASTER switch OFF or FIRE pushbutton out.
Crossline - Green	:	The APU valve is closed.

Crossline - Amber : The ENG valve is fully closed or APU valve is closed with master switch ON.

Transit - Amber : The valve is in transit.

(4) X feed indications

Inline - Green : The valve is open.

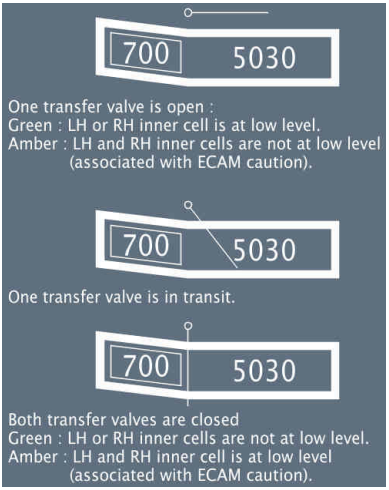
Inline - Amber : The valve is open, with X Feed pushbutton off.

Crossline - Green : The valve is closed.

Crossline - Amber : The valve is closed with X feed pushbutton ON.

Transit - Amber : The valve is in transit.

(5) Transfer valve indications



(6) Fuel temperature indication

This appears, when its associated temperature sensor is wet. It is normally in green.

An advisory only appears in phases 2 and 6, when the fuel temperature is:
- Above 45 °C for the inner cell, or 55 °C for the outer cell.
- Below -40 °C.

It becomes amber, and the ECAM displays a caution, if the temperature goes above the high limit or below the low limit.

(7) Fuel quantity indication



- It is normally in green.
- An amber line appears across the last two digits, when the FQI is inaccurate (*Refer to PRO-SUP-28 FQI IN DEGRADED MODE*). The outer indication is boxed amber, if both transfer valves fail to open when the inner is at low level.
- The center tank indication is boxed amber, if both center tank pumps are failed, or are switched OFF.
- An advisory appears in flight phases 2 and 6, when the difference between the fuel quantities in the two wings is greater than 1 500 kg (3 300 lb). The wing inner and outer tank indications pulse with the highest fuel level.
- Units may either be in KG or LB, depending on the DMC pin program.

(8) Fuel On Board (FOB) indication

It is normally in green.
An amber line appears across the last two digits, when the FQI is inaccurate (*Refer to PRO-SUP-28 FQI IN DEGRADED MODE*).
Units may either be in KG or LB, depending on the DMC pin program.

The indication is boxed in amber, if:
- Center tank pumps fail, or are switched OFF.
- Both transfer valves fail to open, when the inner tank is at low level.

(9) Fuel Used indication

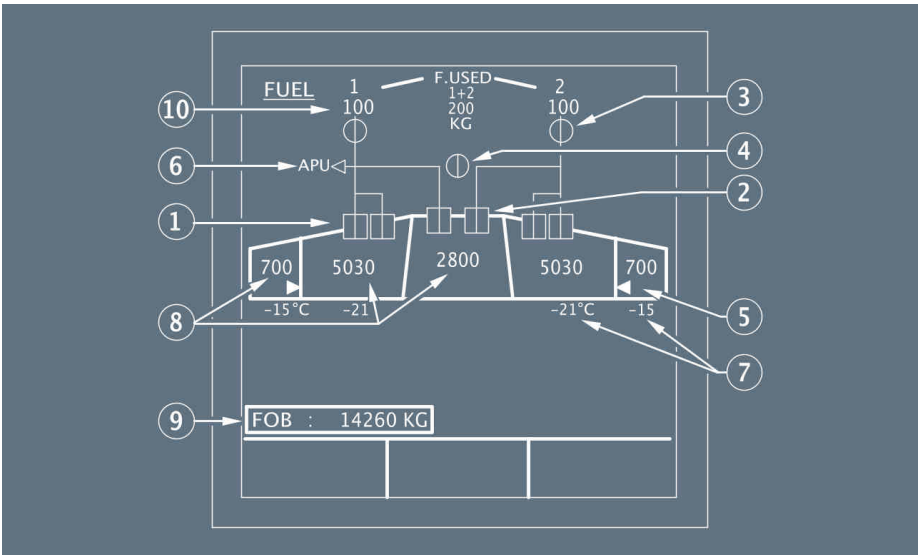
F.USED 1
3 100

- The engine identification number is in amber, when the engine is below idle. It is in white, when it is at, or above, idle.
- The fuel used indication is green from flight phase 2, until electrical power is cut off at the end of the flight. It is automatically reset, when the engine is started on ground.
- Units may either be in KG or LB, depending on the DMC pin program.

ECAM FUEL PAGE

Applicable to: B-HST, B-HSU

5



(1) Wing pump indications

Inline - Green	:	Pump pressure is normal (pump contactor on).
"LO" - Amber	:	Pump pressure is low (pump contactor on).
Crossline - Amber	:	Pump contactor is off.

(2) CTR tank pump indications

Inline - Green	:	Pump pressure is normal (pump contactor on).
"LO" - Amber	:	Pump pressure is low (pump contactor on).
Crossline - Green	:	Pump contactor is off, and auto shut-off is required.
Crossline - Amber	:	Pump contactor is off, and auto shut-off is not required.

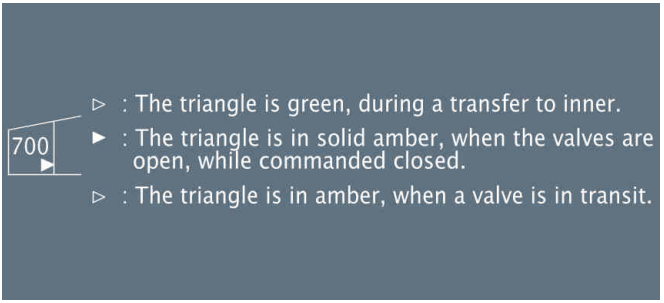
(3) LP valve (ENG) indications

Inline - Green	:	The valve is open.
Inline - Amber	:	The valve is open, with the ENG MASTER switch OFF.
Crossline - Amber	:	The ENG valve is fully closed.
Transit - Amber	:	The valve is in transit.

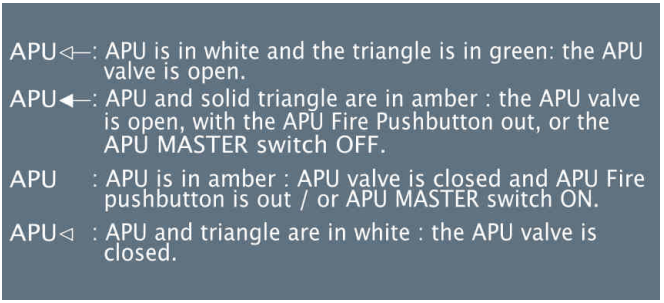
(4) X feed indications

Inline - Green	:	The valve is open.
Inline - Amber	:	The valve is open, with X Feed pushbutton off.
Crossline - Green	:	The valve is closed.
Crossline - Amber	:	The valve is closed with X feed pushbutton ON.
Transit - Amber	:	The valve is in transit.

(5) Transfer valve indications
Outer to Inner Transfer



(6) APU indications

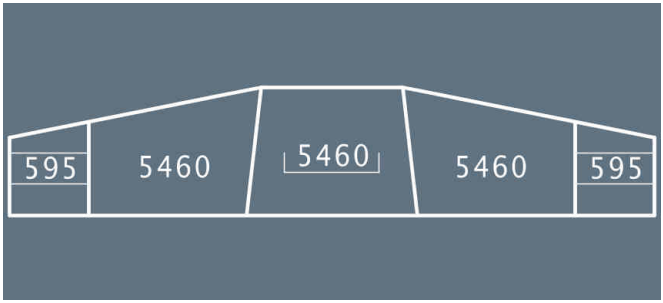


(7) Fuel temperature indication
This appears when its associated temperature sensor is wet. It is normally in green.

An advisory only appears in phases 2 and 6, when the fuel temperature is:
- Above 45 °C for the inner cell, or 55 °C for the outer cell.
- Below -40 °C.

It becomes amber, and the ECAM displays a caution, if the temperature goes above the high limit or below the low limit.

(8) Fuel quantity indication



- It is normally in green.
- An amber line appears across the last two digits, when the FQI is inaccurate (*Refer to PRO-SUP-28 FQI IN DEGRADED MODE*). The outer indication is boxed amber, if both transfer valves fail to open when the inner is at low level.
- The center tank indication is boxed amber, if both center tank pumps are failed, or are switched OFF.
- An advisory appears in flight phases 2 and 6, when the difference between the fuel quantities in the two wings is greater than 1 500 kg (3 300 lb). The wing inner and outer tank indications pulse with the highest fuel level.
- Units may either be in KG or LB, depending on the DMC pin program.

(9) Fuel On Board (FOB) indication

It is normally in green.
An amber line appears across the last two digits, when the FQI is inaccurate (*Refer to PRO-SUP-28 FQI IN DEGRADED MODE*).
Units may either be in KG or LB, depending on the DMC pin program.

The indication is half-boxed in amber, if:
- Center tank pumps fail, or are switched OFF.
- Both transfer valves fail to open, when the inner tank is at low level.

(10) Fuel Used indication

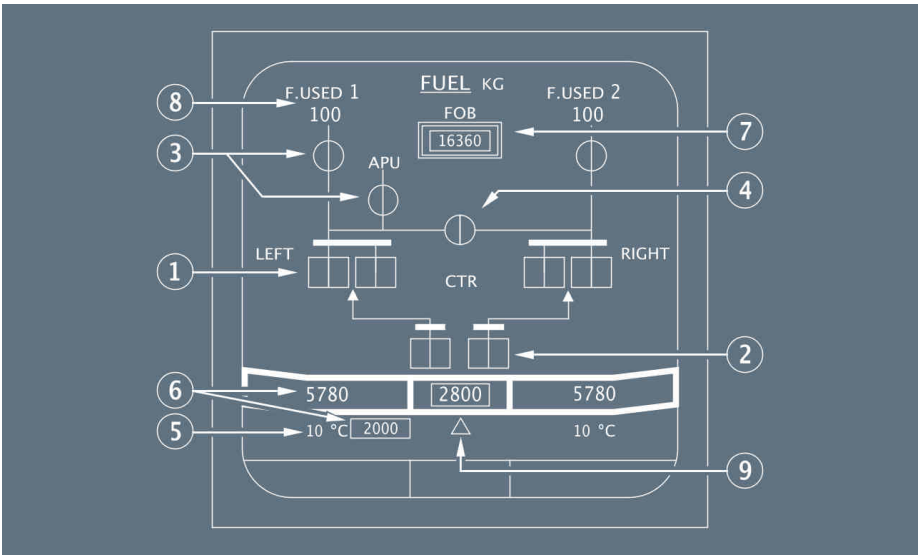
F.USED 1
3 100

- The engine identification number is in amber, when the engine is below idle. It is in white, when it is at, or above, idle.
- The fuel used indication is green from flight phase 2, until electrical power is cut off at the end of the flight. It is automatically reset, when the engine is started on ground.
- Units may either be in KG or LB, depending on the DMC pin program.

ECAM FUEL PAGE

Applicable to: B-HTD, B-HTE, B-HTF

6



(1) Wing pump indications

Inline - Green	:	Pump pressure is normal (pump contactor on).
"LO" - Amber	:	Pump pressure is low (pump contactor on).
Crossline - Amber	:	Pump contactor is off.

(2) CTR tanks valves indications

Inline - Green	:	Transfer valve is open.
Inline - Amber	:	Transfer valve is open, although commanded closed in automatic or manual mode.
Crossline - Green	:	Transfer valve is closed.

Crossline - Amber : Transfer valve is closed, although commanded Open in automatic or manual mode.

(3) LP valve (ENG-APU) indications

Inline - Green : The valve is open.

Inline - Amber : The valve is open, with the ENG (APU) MASTER switch OFF or FIRE pushbutton out.

Crossline - Green : The APU valve is closed.

Crossline - Amber : The ENG valve is fully closed or APU valve is closed with master switch ON.

Transit - Amber : The valve is in transit.

(4) X feed indications

Inline - Green : The valve is open.

Inline - Amber : The valve is open, with X Feed pushbutton off.

Crossline - Green : The valve is closed.

Crossline - Amber : The valve is closed with X feed pushbutton ON.

Transit - Amber : The valve is in transit.

(5) Fuel temperature indication

This appears when its associated temperature sensor is wet.

- It is normally in green.
- It is advisory in phases 2 and 6 only, if the fuel temperature is above 45 °C or below -40 °C.
- It becomes amber, and the ECAM displays a caution, if the temperature goes above the high limit or below the low limit.

(6) Fuel quantity indication



It is normally in green.

- The wing tank indication turns amber, if a wing tank overflows.
- An amber line appears across the last two digits, when the FQI is inaccurate (*Refer to PRO-SUP-28 FQI IN DEGRADED MODE*).
- The center tank indication is boxed amber, if both transfer valves fail in the closed position.

- An advisory appears in flight phases 2 and 6, when the difference between the fuel quantities in the two wings is greater than 1 500 kg (3 300 lb). The indication for the wing with the higher fuel level pulses.
- Units may either be in KG or LB, depending on the DMC pin program.

(7) Fuel On Board (FOB) indication

It is normally in green.

An amber line appears across the last two digits, when the FQI is inaccurate (*Refer to PRO-SUP-28 FQI IN DEGRADED MODE*).

The indication is boxed in amber, when both center tank transfer valves fail in closed position.

Units may either be in KG or LB, depending on the DMC pin program.

(8) Fuel Used indication

- The engine identification number is in amber, when the engine is below idle. It is white, when it is at, or above, idle.
- The fuel used indication is green from flight phase 2, until electrical power is cut off at the end of the flight. It is automatically reset, when the engine is started on ground.
- Units may either be in KG or LB, depending on the DMC pin program.

(9) ACT to center tank fuel transfer indication

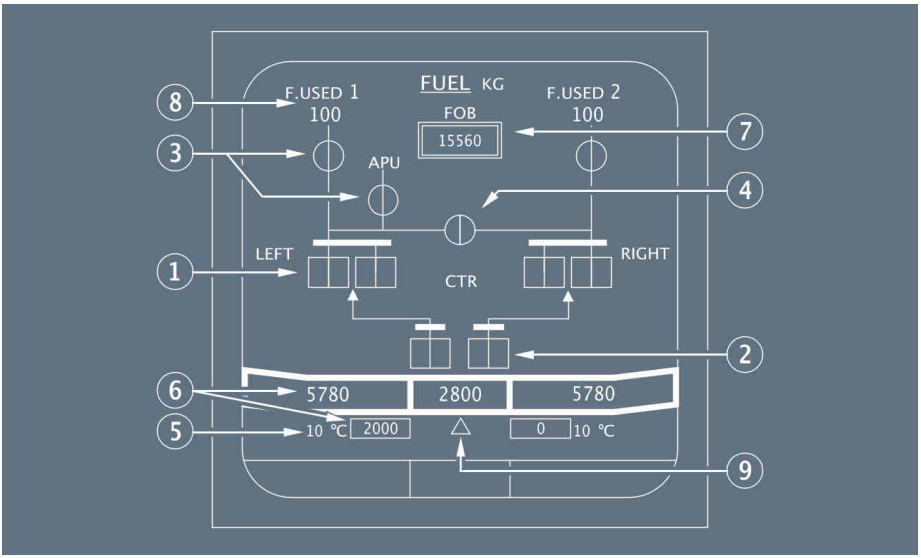
It is normally in green.

A triangle indicates that the ACT fuel transfer is initiated into the center tank.

ECAM FUEL PAGE

Applicable to: B-HTG, B-HTH, B-HTI

7



(1) Wing pump indications

Inline - Green	:	Pump pressure is normal (pump contactor on).
"LO" - Amber	:	Pump pressure is low (pump contactor on).
Crossline - Amber	:	Pump contactor is off.

(2) CTR tanks valves indications

Inline - Green	:	Transfer valve is open.
Inline - Amber	:	Transfer valve is open, although commanded closed in automatic or manual mode.
Crossline - Green	:	Transfer valve is closed.
Crossline - Amber	:	Transfer valve is closed, although commanded Open in automatic or manual mode.

(3) LP valve (ENG-APU) indications

Inline - Green	:	The valve is open.

Inline - Amber	:	The valve is open, with the ENG (APU) MASTER switch OFF or FIRE pushbutton out.
Crossline - Green	:	The APU valve is closed.
Crossline - Amber	:	The ENG valve is fully closed or APU valve is closed with master switch ON.
Transit - Amber	:	The valve is in transit.

(4) X feed indications

Inline - Green	:	The valve is open.
Inline - Amber	:	The valve is open, with X Feed pushbutton off.
Crossline - Green	:	The valve is closed.
Crossline - Amber	:	The valve is closed with X feed pushbutton ON.
Transit - Amber	:	The valve is in transit.

(5) Fuel temperature indication

This appears when its associated temperature sensor is wet.

- It is normally in green.
- It is advisory in phases 2 and 6 only, if the fuel temperature is above 45 °C or below -40 °C.
- It becomes amber, and the ECAM displays a caution, if the temperature goes above the high limit or below the low limit.

(6) Fuel quantity indication



It is normally in green.

- The wing tank indication turns amber, if a wing tank overflows.
- An amber line appears across the last two digits, when the FQI is inaccurate (*Refer to PRO-SUP-28 FQI IN DEGRADED MODE*).
- The center tank indication is boxed amber, if both transfer valves fail in the closed position.
- An advisory appears in flight phases 2 and 6, when the difference between the fuel quantities in the two wings is greater than 1 500 kg (3 300 lb). The indication for the wing with the higher fuel level pulses.
- Units may either be in KG or LB, depending on the DMC pin program.

(7) Fuel On Board (FOB) indication

It is normally in green.

An amber line appears across the last two digits, when the FQI is inaccurate (*Refer to PRO-SUP-28 FQI IN DEGRADED MODE*).

The indication is boxed in amber, if both center tank transfer valves fail in close position.
Units may either be in KG or LB, depending on the DMC pin program.

(8) Fuel Used indication

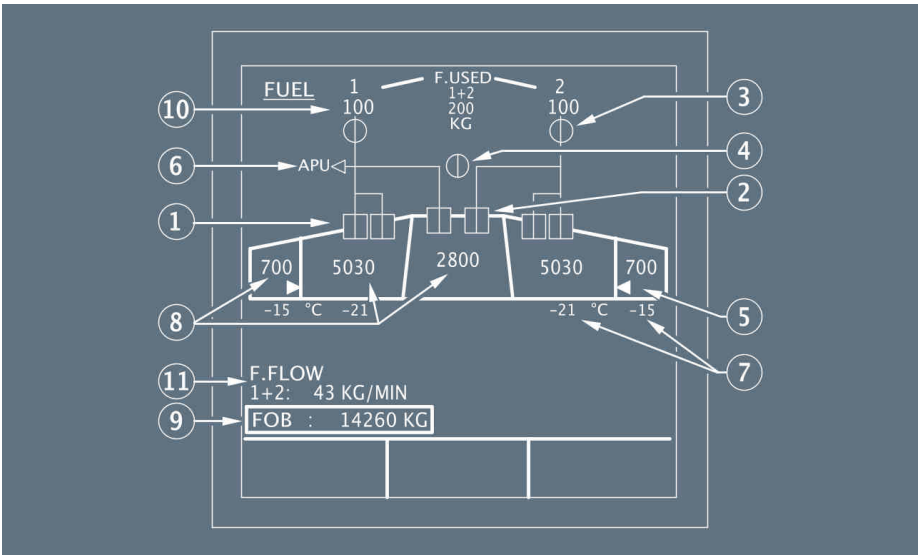
- The engine identification number is in amber, when the engine is below idle. It is white, when it is at, or above, idle.
- The fuel used indication is green from flight phase 2, until electrical power is cut off at the end of the flight. It is automatically reset, when the engine is started on ground.
- Units may either be in KG or LB, depending on the DMC pin program.

(9) ACT to center tank fuel transfer indication
It is normally in green.
A triangle indicates that the ACT fuel transfer is initiated into the center tank.

ECAM FUEL PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR

8



(1) Wing pump indications

Inline - Green	:	Pump pressure is normal (pump contactor on).
"LO" - Amber	:	Pump pressure is low (pump contactor on).

Crossline - Amber : Pump contactor is off.

(2) CTR tank pump indications

Inline - Green : Pump pressure is normal (pump contactor on).

"LO" - Amber : Pump pressure is low (pump contactor on).

Crossline - Green : Pump contactor is off, and auto shut-off is required.

Crossline - Amber : Pump contactor is off, and auto shut-off is not required.

(3) LP valve (ENG) indications

Inline - Green : The valve is open.

Inline - Amber : The valve is open, with the ENG MASTER switch OFF.

Crossline - Amber : The ENG valve is fully closed.

Transit - Amber : The valve is in transit.

(4) X feed indications

Inline - Green : The valve is open.

Inline - Amber : The valve is open, with X Feed pushbutton off.

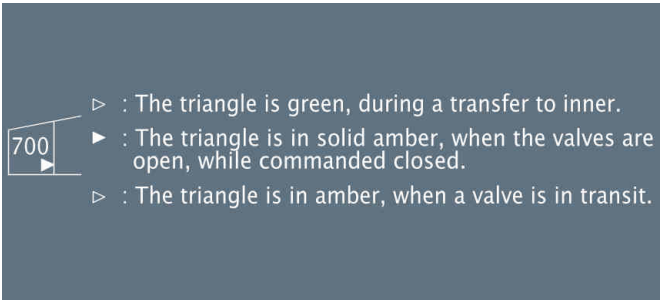
Crossline - Green : The valve is closed.

Crossline - Amber : The valve is closed with X feed pushbutton ON.

Transit - Amber : The valve is in transit.

(5) Transfer valve indications

Outer to Inner Transfer



(6) APU Indications

APU◁—: APU is in white and the triangle is in green: the APU valve is open.
APU◀—: APU and solid triangle are in amber : the APU valve is open, with the APU Fire Pushbutton out, or the APU MASTER switch OFF.
APU : APU is in amber : APU valve is closed and APU Fire pushbutton is out / or APU MASTER switch ON.
APU◁ : APU and triangle are in white : the APU valve is closed.

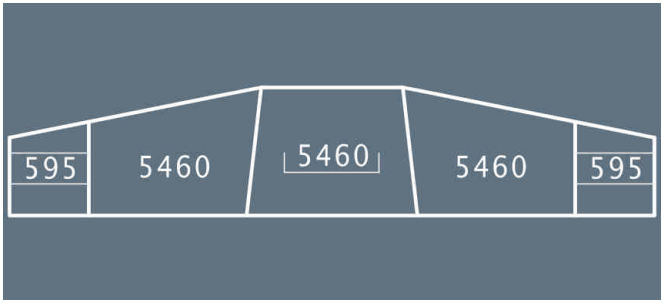
(7) Fuel temperature indication

This appears, when its associated temperature sensor is wet. It is normally in green.

An advisory only appears in phases 2 and 6, when the fuel temperature is:
- Above 45 °C for the inner cell, or 55 °C for the outer cell.
- Below -40 °C.

It becomes amber, and the ECAM displays a caution, if the temperature goes above the high limit or below the low limit.

(8) Fuel quantity indication



- It is normally in green.
- An amber line appears across the last two digits, when the FQI is inaccurate (*Refer to PRO-SUP-28 FQI IN DEGRADED MODE*). The outer indication is boxed amber, if both transfer valves fail to open when the inner is at low level.
- The center tank indication is boxed amber, if both center tank pumps are failed, or are switched OFF.

- An advisory appears in flight phases 2 and 6, when the difference between the fuel quantities in the two wings is greater than 1 500 kg (3 300 lb). The wing inner and outer tank indications pulse with the highest fuel level.
- Units may either be in KG or LB, depending on the DMC pin program.

(9) Fuel On Board (FOB) indication

It is normally in green.

An amber line appears across the last two digits, when the FQI is inaccurate (*Refer to PRO-SUP-28 FQI IN DEGRADED MODE*).

Units may either be in KG or LB, depending on the DMC pin program.

The indication is half-boxed in amber, if:

- Center tank pumps fail, or are switched OFF.
- Both transfer valves fail to open, when the inner tank is at low level.

(10) Fuel Used indication

F.USED 1
3 100

- The engine identification number is in amber, when the engine is below idle. It is in white, when it is at, or above, idle.
- The fuel used indication is green from flight phase 2, until electrical power is cut off at the end of the flight. It is automatically reset, when the engine is started on ground.
- Units may either be in KG or LB, depending on the DMC pin program.

(11) Fuel Flow indication

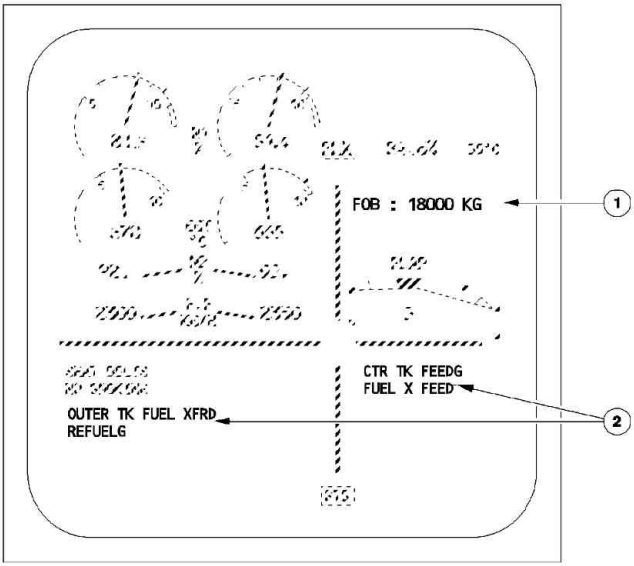
The Total Fuel Flow is displayed in kg/mn.

Units may either be in KG or LB, depending on the DMC pin program.

- It is normally in green.
- It is replaced by an amber XX if there is no valid data.

ECAM UPPER DISPLAY

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



(1) Total fuel indication

An amber half box appears around FOB, when the displayed quantity is not all usable (intercell transfer valve failure or loss of center tank pumps).

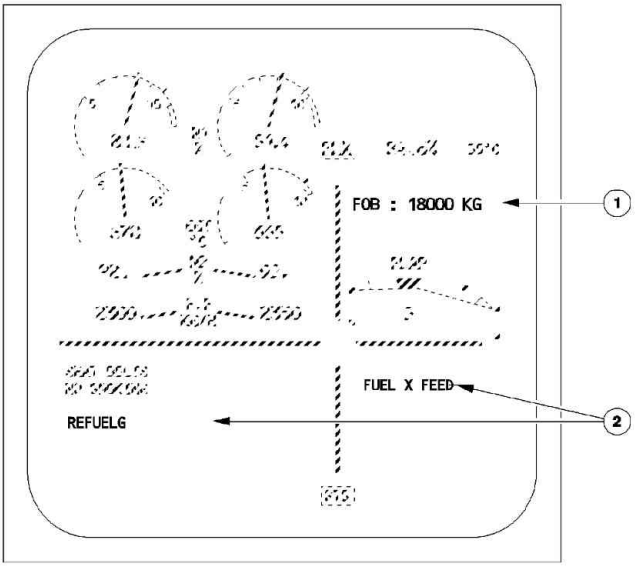
In case of degraded data, the last two significant digits are dashed (*Refer to PRO-SUP-28 FQI IN DEGRADED MODE*).

Units may either be in KG or LB, depending on the DMC pin program.

(2) Memo indications: (green)

ECAM UPPER DISPLAY

Applicable to: ALL 321



(1) Total fuel indication

An amber half box appears around FOB, when the displayed quantity is not all usable (both center tank transfer valves fail in the closed position).

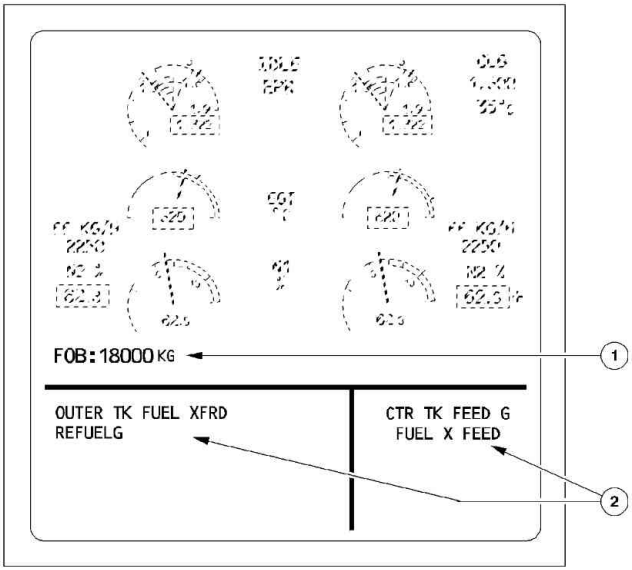
In case of degraded data, the last two significant digits are dashed (*Refer to PRO-SUP-28 FQI IN DEGRADED MODE*).

Units may either be in KG or LB, depending on the DMC pin program.

(2) Memo indications: (green)

ECAM UPPER DISPLAY

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) Total fuel indication

A half amber box appears around FOB, when the displayed quantity is not all usable (intercell transfer valve failure or loss of center tank pumps).

In case of degraded data, the last two significant digits are dashed (*Refer to PRO-SUP-28 FQI IN DEGRADED MODE*).

Units may either be in KG or LB, depending on the DMC pin program.

(2) Memo indications: (green)

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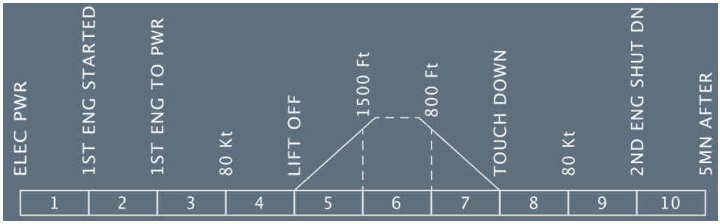
WARNINGS AND CAUTIONS

Applicable to: ALL 320



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
L(R) TK PUMP 1 + 2 LO PR	SINGLE CHIME	MASTER CAUT	FUEL	L(R) TK PUMP 1 + 2 FAULT lt	3, 4, 5, 7, 8 (1)
CTR TK PUMP 1(2) LO PR				CTR TK PUMP 1(2) FAULT lt	
CTR TK PUMPS LO PR				CTR TK PUMP FAULT lts	
CTR TK PUMPS OFF CTR TK pb at OFF with no FAULT				OFF lt on CTR TK PUMP pb	1, 3, 4, 5, 7, 8, 9, 10
AUTO FEED FAULT (CTR TK >250 kg (550 lb) and L or R WING TK <5 000 kg(11 000 lb) ————————OR ———————— (CTR TK pumps do not stop after slat extension or CTR TK low level)				MODE SEL FAULT lts ——— NIL	3, 4, 5, 8
L(R) WING TK LO LVL (750 kg - 1 650 lb)				NIL	3, 4, 5, 7, 8, 9
L + R WING TK LO LVL Low level detected in both wing inner cells (remaining flight time is about 30 min)					
L(R) OUTER TK HI TEMP or **L(R) INNER TK HI TEMP** Fuel TEMP above: In outer cell, above 60 °C In inner cell, above 54 °C					3, 4, 5, 7, 8
L(R) XFR VALVE CLOSED Both transfer valves fail to open after inner cell low level.					
ENG 1(2) LP VALVE OPEN Valve disagree in open position.					4, 5, 7, 8
APU LP VALVE FAULT Valve position disagree.	NIL	NIL			3, 4, 5, 7, 8 (2)
L(R) OUTER TK LO TEMP, or **L(R) INNER TK LO TEMP** Fuel temperature < approx. -43 °C					

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
L(R) TK PUMP 1(2) LO PR				L(R) TK PUMP 1(2) FAULT lt	
L(R) XFR VALVE OPEN Either transfer valve opens before inner tank reaches low level.				NIL	
X FEED VALVE FAULT Valve position disagree.					
FQI CH 1(2) FAULT					
IDG 1(2) COOL FAULT Non-return Valve 1(2) has failed.			NIL		2 to 9
LO LVL DET FAULT Both low level sensors have failed.					3, 4, 5, 7, 8, 9

(1) Inhibited if pump selected OFF

(2) PUMP LO PR is inhibited, if the pump is selected OFF in phases 1 and 10.

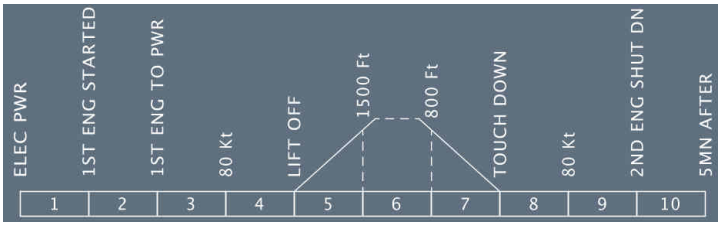
MEMO DISPLAY

- OUTR TK FUEL XFRD appears in green, if at least one transfer valve is open in one wing tank
- CTR TK FEEDG appears in green, if at least one center tank pump is energized
- FUEL X FEED appears in green, if the fuel X FEED valve pushbutton is ON, and the X FEED valve is not fully closed. It appears in amber in flight phases 3, 4, or 5
- REFUELG appears in green, when the door of the refuel control panel ◁ on the fuselage or on the wing is open.

WARNINGS AND CAUTIONS

Applicable to: B-HTD, B-HTE, B-HTF

1



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
L(R) TK PUMP 1 + 2 LO PR	SINGLE CHIME	MASTER CAUT	FUEL	L(R) TK PUMP 1 + 2 FAULT lt	3, 4, 5, 7, 8 (1)
L(R) XFR VALVE FAULT Valve failed open				L(R) XFR FAULT lt	3, 4, 5, 7, 8
L(R) XFR VALVE FAULT Valves failed closed				MODE SEL FAULT lt	
XFR VALVES FAULT Valves failed open				NIL	4, 5, 7, 8
XFR VALVES FAULT Valves failed closed				MODE SEL FAULT lt	
L(R) WING TK OVERFLOW				L(R) CTR TK XFR FAULT lt	3, 4, 5, 7, 8
AUTO TRANSFER FAULT (CTR TK >250 kg (550 lb) and L or R WING TK <5 000 kg (11 000 lb)				MODE SEL FAULT lt	2, 3, 4, 5, 7, 8
CTR TK XFR OFF Both CTR TK XFR pb-sw at OFF when in AUTO mode				L(R) CTR TK XFR OFF lt	1, 3, 4, 5, 7, 8, 9,10
L(R) wing TK LO LVL (750 kg - 1 650 lb)				NIL	3, 4, 5, 7, 8, 9
L + R WING TK LO LVL Low level detected in both wing inner cells.					
L(R) WING TK HI TEMP Fuel TEMP above 54 °C.					3, 4, 5, 7, 8
ENG 1(2) LP VALVE OPEN Valve disagree in open position.					4, 5, 7, 8
APU LP VALVE FAULT Valve position disagree	NIL	NIL			3, 4, 5, 7, 8 (2)
L(R) WING TK LO TEMP Fuel temperature < -44 °C					
L(R) TK PUMP 1(2) LO PR				L(R) TK PUMP 1(2) FAULT lt	
X FEED VALVE FAULT Valve position disagree				NIL	
FQI CH 1(2) FAULT					

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ACT XFR FAULT ACT quantity > 250 kg and CTR TK quantity < 3 000 kg	SINGLE CHIME	MASTER CAUT		ACT FAULT light	3, 4, 5, 7, 8
ACT PUMP LO PR ACT pump low pressure				NIL	
IDG 1(2) COOL FAULT Non-Return Valve 1(2) has failed	NIL	NIL	NIL		2 to 9
LO LVL DET FAULT Both low level sensors have failed					3, 4, 5 7, 8, 9

(1) Inhibited if pump selected OFF

(2) PUMP LO PR is inhibited, if the pump is selected OFF in phases 1 and 10.

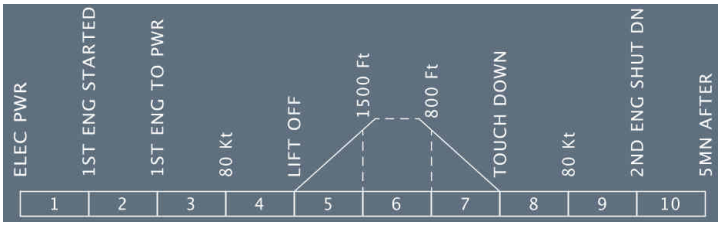
MEMO DISPLAY

- FUEL X FEED appears in green, if the fuel X FEED valve pushbutton is ON, and the X FEED valve is not fully closed. It appears in amber in flight phases 3, 4, or 5
- REFUELG appears in green, when the door of the refuel control panel ◁ on the fuselage or on the wing is open
- FOB BELOW 3 T appears in green, when the fuel quantity in either wing is below 1 500 kg.

WARNINGS AND CAUTIONS

Applicable to: B-HTG, B-HTH, B-HTI

2



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
L(R) TK PUMP 1 + 2 LO PR	SINGLE CHIME	MASTER CAUT	FUEL	L(R) TK PUMP 1 + 2 FAULT lt	3, 4, 5, 7, 8 (1)
L(R) XFR VALVE FAULT Valve failed open				L(R) XFR FAULT lt	3, 4, 5, 7, 8
L(R) XFR VALVE FAULT Valves failed closed				MODE SEL FAULT lt	
XFR VALVES FAULT Valves failed open				NIL	4, 5, 7, 8
XFR VALVES FAULT Valves failed closed				MODE SEL FAULT lt	
L(R) WING TK OVERFLOW				L(R) CTR TK XFR FAULT lt	3, 4, 5, 7, 8
AUTO TRANSFER FAULT (CTR TK >250 kg (550 lb) and L or R WING TK <5 000 kg (11 000 lb)				MODE SEL FAULT lt	2, 3, 4, 5, 7, 8
CTR TK XFR OFF Both CTR TK XFR pb-sw at OFF when in AUTO mode				L(R) CTR TK XFR OFF lt	1, 3, 4, 5, 7, 8, 9,10
L(R) wing TK LO LVL (750 kg - 1 650 lb)				NIL	3, 4, 5, 7, 8, 9
L + R WING TK LO LVL Low level detected in both wing inner cells.					
L(R) WING TK HI TEMP Fuel TEMP above 54 °C.					3, 4, 5, 7, 8
ENG 1(2) LP VALVE OPEN Valve disagree in open position.					4, 5, 7, 8
APU LP VALVE FAULT Valve position disagree	NIL	NIL			3, 4, 5, 7, 8 (2)
L(R) WING TK LO TEMP Fuel temperature < -44 °C					
L(R) TK PUMP 1(2) LO PR				L(R) TK PUMP 1(2) FAULT lt	
X FEED VALVE FAULT Valve position disagree				NIL	
FQI CH 1(2) FAULT					

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ACT XFR FAULT ACT quantity > 250 kg and CTR TK quantity < 3 000 kg	SINGLE CHIME	MASTER CAUT		ACT FAULT light	
ACT UNUSABLE Automatic and manual ACT transfer modes are failed, due to transfer valve failure				NIL	3, 4, 5, 7, 8
ACT PUMP LO PR ACT pump low pressure					
IDG 1(2) COOL FAULT Non-Return Valve 1(2) has failed	NIL	NIL	NIL		2 to 9
LO LVL DET FAULT Both low level sensors have failed					3, 4, 5, 7, 8, 9
OVERFLOW PROT FAULT Center tank high level sensor has failed – Triggered when at least ACT 2 is installed					2 to 9

(1) Inhibited if pump selected OFF

(2) PUMP LO PR is inhibited, if the pump is selected OFF in phases 1 and 10.

MEMO DISPLAY

- FUEL X FEED appears in green, if the fuel X FEED valve pushbutton is ON, and the X FEED valve is not fully closed. It appears in amber in flight phases 3, 4, or 5
- REFUELG appears in green, when the door of the refuel control panel ◁ on the fuselage or on the wing is open
- FOB BELOW 3 T appears in green, when the fuel quantity in either wing is below 1 500 kg.

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BUS EQUIPMENT LIST

Applicable to: ALL 320

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
FQI	CH 1				SHED	(1)
	CH 2		DC2			(1)
INNER TANK PUMPS	L 1	AC1 (3)	DC1		X (2) (3)	
	L 2	AC2	DC2			
	R 1	AC1 (3)	DC1		X (2) (3)	
	R 2	AC2	DC2			
CTR TK PUMPS ◁	1	AC1	DC1			
	2	AC2	DC2			
CROSS FEED VALVE	MOT 1				SHED	
	MOT 2		DC2			
ENGINE LP VALVES	ENG 1 MOT 1				X	
	ENG 1 MOT 2		DC2			
	ENG 2 MOT 1				X	
	ENG 2 MOT 2		DC2			
XFR VALVES	L1				SHED	
	L2		DC2			
	R1				SHED	
	R2		DC2			
APU	PUMP			AC STAT INV or AC ESS SHED		HOT1
	LP VALVE		DC BAT			HOT1
REFUEL VALVES			DC2			(1)

(1) HOT BUS supplies power during refueling on battery.

(2) This occurs, if DC BUS 1 is lost.

(3) In smoke configuration (GEN 1 LINE pushbutton OFF), inner tank pumps 1 are supplied directly by IDG (instead of AC 1) and pump relays by DC ESS (instead of DC 1).

BUS EQUIPMENT LIST

Applicable to: B-HTG, B-HTH, B-HTI

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
FQI	CH 1				SHED	(1)
	CH 2		DC2			(1)

Continued on the following page

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		NORM		EMER ELEC		
		AC	**DC**	**AC ESS**	**DC ESS**	**HOT**
WING TANK PUMPS	L 1	AC1 (3)	DC1		X (2) (3)	
	L 2	AC2	DC2			
	R 1	AC1 (3)	DC1		X (2) (3)	
	R 2	AC2	DC2			
CROSS FEED VALVE	MOT 1				SHED	
	MOT 2		DC2			
ENGINE LP VALVES	ENG 1 MOT 1				X	
	ENG 1 MOT 2		DC2			
	ENG 2 MOT 1				X	
	ENG 2 MOT 2		DC2			
CTR TK XFR VALVES			DC1 DC2			
APU	PUMP			AC STAT INV or AC ESS SHED		HOT1
	LP VALVE		DC BAT			HOT1
REFUEL VALVES			DC2			(1)
ACT	PUMP	AC2				
	XFR VALVE		DC1			(1)
	AIR SHUT OFF VALVE		DC1			(1)
	ACT 1 INLET VALVE		DC1			(1)
	ACT 1 VENT VALVE		DC1			(1)
	ACT 2 INLET VALVE		DC1			(1)
	ACT 2 VENT VALVE		DC1			(1)

(1) *HOT BUS supplies power during refueling on battery.*

(2) *This occurs, if DC BUS 1 is lost.*

(3) *In smoke configuration (GEN 1 LINE pushbutton OFF), wing tank pumps 1 are supplied directly by IDG (instead of AC 1) and pump relays by DC ESS (instead of DC 1).*

BUS EQUIPMENT LIST

Applicable to: B-HTD, B-HTE, B-HTF

		NORM		EMER ELEC		
		AC	**DC**	**AC ESS**	**DC ESS**	**HOT**
FQI	CH 1				SHED	(1)
	CH 2		DC2			(1)

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		NORM		EMER ELEC		
		AC	**DC**	**AC ESS**	**DC ESS**	**HOT**
WING TANK PUMPS	L 1	AC1 (3)	DC1		X (2) (3)	
	L 2	AC2	DC2			
	R 1	AC1 (3)	DC1		X (2) (3)	
	R 2	AC2	DC2			
CROSS FEED VALVE	MOT 1				SHED	
	MOT 2		DC2			
ENGINE LP VALVES	ENG 1 MOT 1				X	
	ENG 1 MOT 2		DC2			
	ENG 2 MOT 1				X	
	ENG 2 MOT 2		DC2			
CTR TK XFR VALVES			DC1 DC2			
APU	PUMP			AC STAT INV or AC ESS SHED		HOT1
	LP VALVE		DC BAT			HOT1
REFUEL VALVES			DC2			(1)
ACT	PUMP	AC2				
	INLET VALVE					(1)
	XFR VALVE		DC2			(1)
	AIR SHUT OFF VALVE		DC1			(1)
	VENT VALVE		DC1			(1)

(1) *HOT BUS supplies power during refueling on battery.*

(2) *This occurs, if DC BUS 1 is lost.*

(3) *In smoke configuration (GEN 1 LINE pushbutton OFF), wing tank pumps 1 are supplied directly by IDG (instead of AC 1) and pump relays by DC ESS (instead of DC 1).*

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AIRCRAFT SYSTEMS

HYDRAULIC

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Localization Title	Toc Index	ID	Reason
DSC-29-20 ECAM HYD Page	C	1	Improvement of illustration quality.
DSC-29-20 ECAM HYD Page	C	2	Improvement of illustration quality.

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GENERAL

Applicable to: ALL

The aircraft has three continuously operating hydraulic systems : blue, green, and yellow. Each system has its own hydraulic reservoir. Normal system operating pressure is 3 000 PSI (2 500 PSI when powered by the RAT). Hydraulic fluid cannot be transferred from one system to another.

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GREEN SYSTEM PUMP

Applicable to: ALL

A pump driven by engine 1 pressurizes the green system.

BLUE SYSTEM PUMPS

Applicable to: ALL

An electric pump pressurizes the blue system. A pump driven by a ram air turbine (RAT) pressurizes this system in an emergency.

YELLOW SYSTEM PUMPS

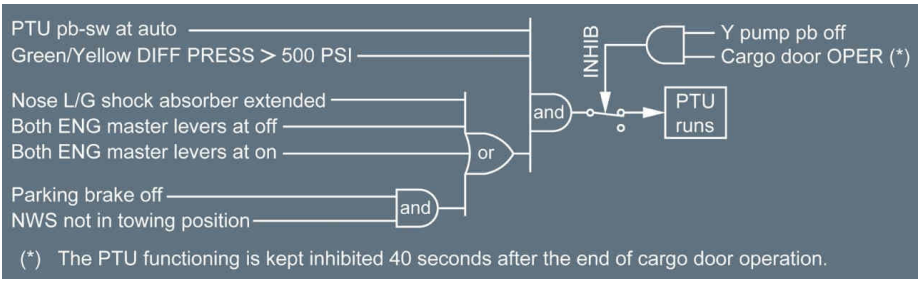
Applicable to: ALL

A pump driven by engine 2 pressurizes the yellow system.
An electric pump can also pressurize the yellow system, which allows yellow hydraulics to be used on the ground when the engines are stopped.
Crew members can also use a hand pump to pressurize the yellow system in order to operate the cargo doors when no electrical power is available.

POWER TRANSFER UNIT (PTU)

Applicable to: ALL

A bidirectional power transfer unit enables the yellow system to pressurize the green system and vice versa.
The power transfer unit comes into action automatically when the differential pressure between the green and the yellow systems is greater than 500 PSI.
The PTU therefore allows the green system to be pressurized on the ground when the engines are stopped.



RAM AIR TURBINE (RAT)

Applicable to: ALL

A drop-out RAT coupled to a hydraulic pump allows the blue system to function if electrical power is lost or both engines fail. The RAT deploys automatically if AC BUS 1 and AC BUS 2 are both lost. It can be deployed manually from the overhead panel. It can be stowed only when the aircraft is on the ground.

SYSTEM ACCUMULATORS

Applicable to: ALL

An accumulator in each system helps to maintain a constant pressure by covering transient demands during normal operation.

PRIORITY VALVES

Applicable to: ALL

Priority valves cut off hydraulic power to heavy load users if hydraulic pressure in a system gets low.

FIRE SHUTOFF VALVES

Applicable to: ALL

Each of the green and yellow systems has a fire shutoff valve in its line upstream of its engine-driven pump. The flight crew can close it by pushing the ENG 1(2) FIRE pushbutton.

LEAK MEASUREMENT VALVES

Applicable to: ALL

Each system has a leak measurement valve upstream of the primary flight controls.
These valves, which measure the leakage in each circuit, are closed by operation of the LEAK MEASUREMENT VALVES pushbutton switch on the maintenance panel.

FILTERS

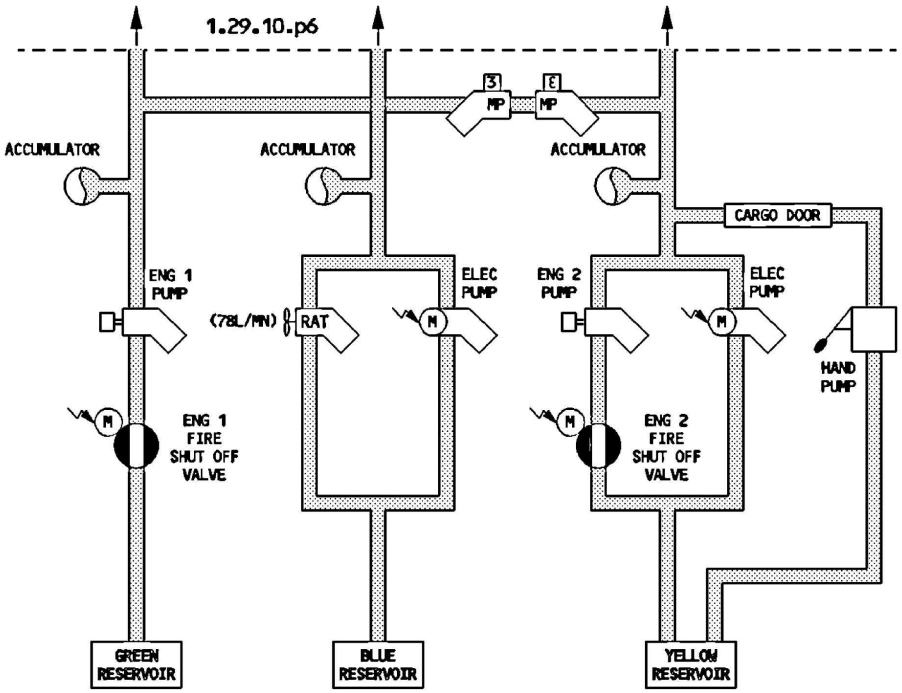
Applicable to: ALL

L3 Filters clean the hydraulic fluid as follows :

- HP filters on each system and on the reservoir filling system and the normal braking system
- return line filters on each line
- case drain filters on engine pumps and the blue electric pump (which permit maintenance crew to monitor pump wear by inspecting the filters for the presence of metallic particles).

GENERATION

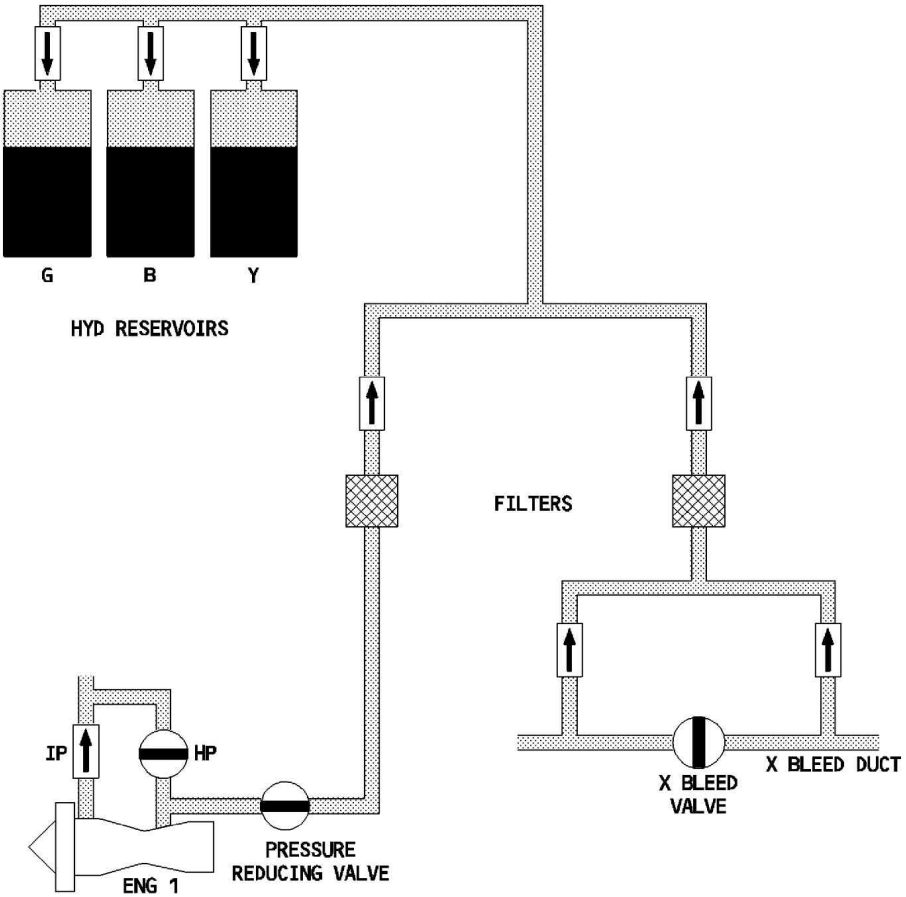
Applicable to: ALL



RESERVOIR PRESSURIZATION

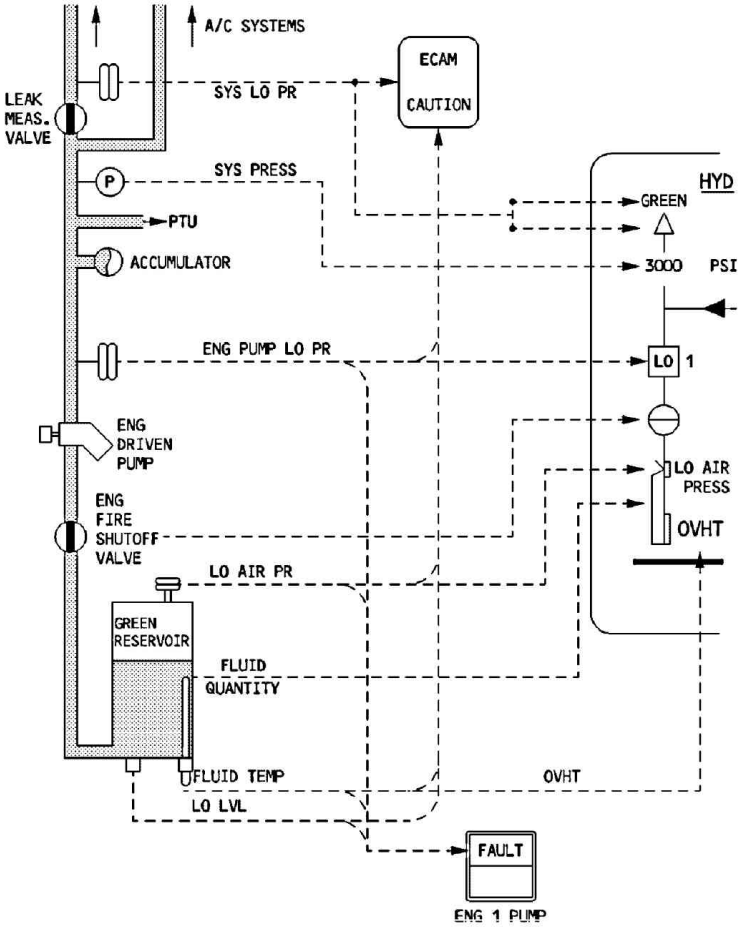
Applicable to: ALL

Normally, HP bleed air from engine 1 pressurizes the hydraulic reservoirs automatically.
If the bleed air pressure is too low, the system takes bleed air pressure from the crossbleed duct.
The systems maintain a high enough pressure to prevent their pumps from cavitating.


G
B
Y
HYD RESERVOIRS
FILTERS
IP
HP
ENG 1
PRESSURE
REDUCING VALVE
X BLEED
VALVE
X BLEED DUCT

INDICATIONS

Applicable to: ALL



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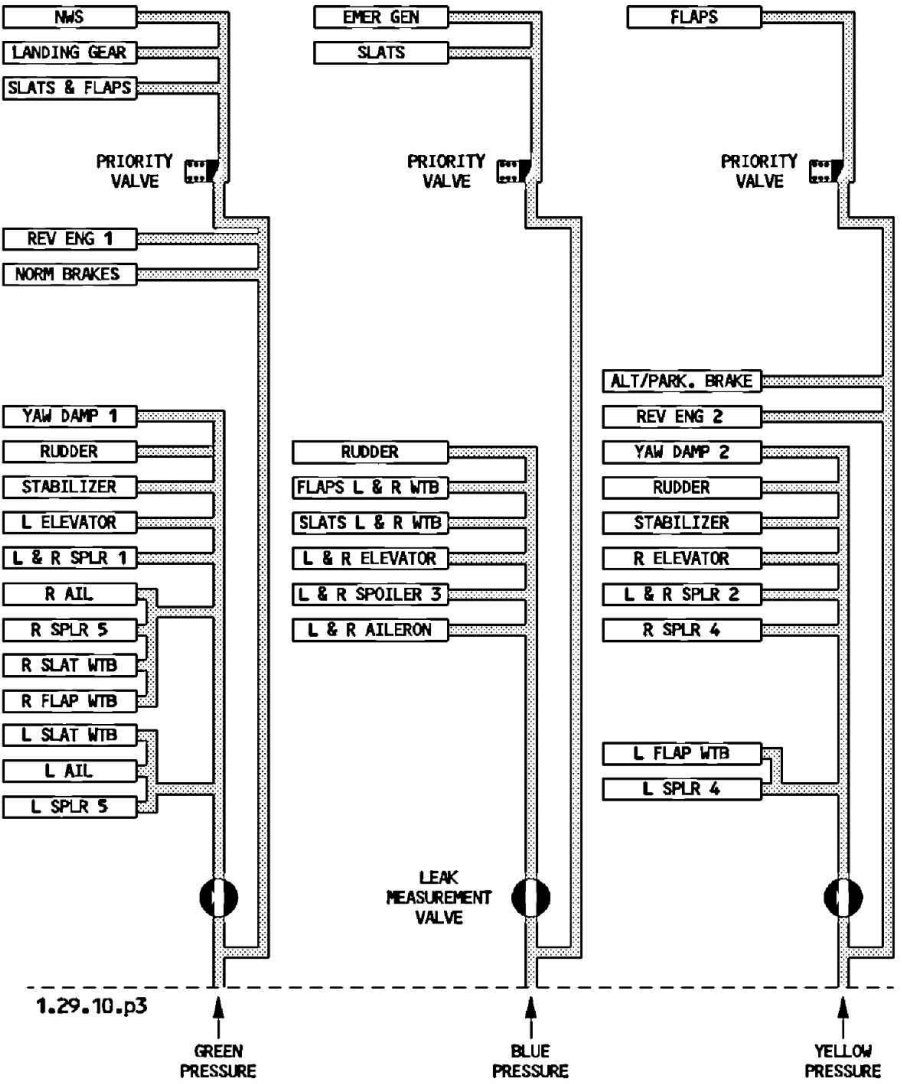
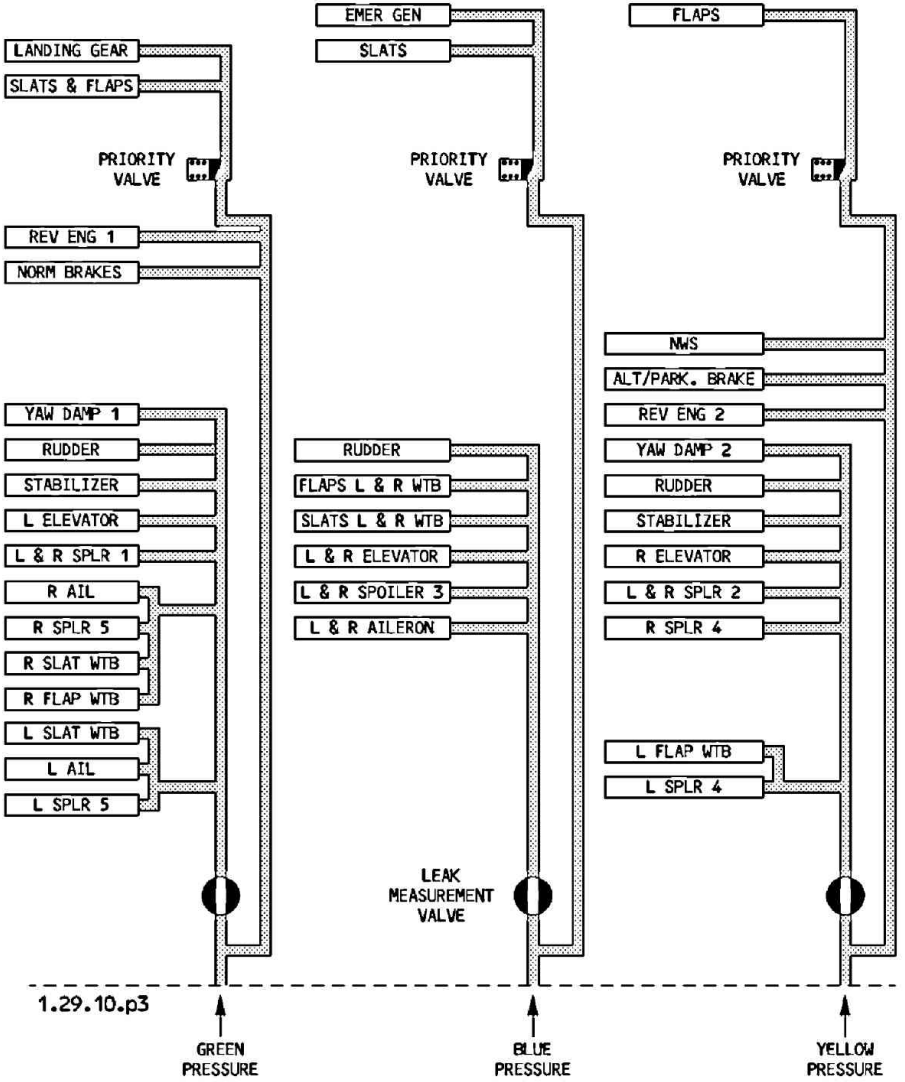
DISTRIBUTION

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN



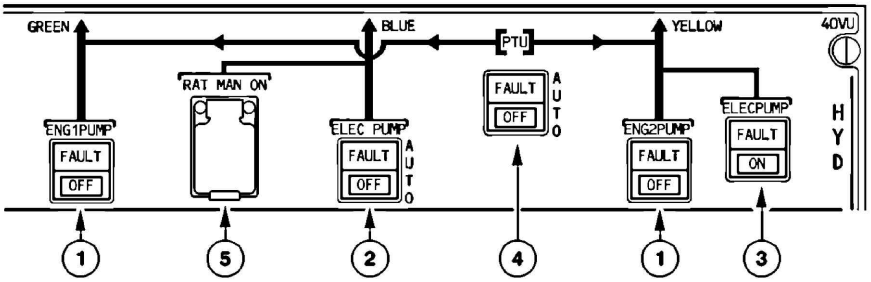
DISTRIBUTION

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



OVERHEAD PANEL

Applicable to: ALL



(1) ENG 1 (2) PUMP pb

On : The pump pressurizes the system when the engine is running.

OFF : The pump is depressurized. The generation of hydraulic power stops.

FAULT lt : This amber light comes on, and the ECAM caution appears, if :
- The reservoir level is low
- The reservoir overheats
- The reservoir air pressure is low
- The pump pressure is low (inhibited on the ground, when the engine is stopped).

This light goes out, when the crew selects OFF, except during an overheat. (The light stays on as long as the overheat lasts).

(2) BLUE ELEC PUMP pb

AUTO : If AC power is available, the electric pump operates :
- In flight
- On the ground, if one engine is running or if the crew has pressed the BLUE PUMP OVRD pushbutton on the maintenance panel.

OFF : The pump is de-energized.

FAULT lt : This amber light comes on, and a caution appears on the ECAM, if :
- The reservoir level is low
- The reservoir overheats
- The air pressure in the reservoir is low
- The pump is delivering low pressure (inhibited on the ground, when the engines are stopped)
- The pump overheats.

The light goes out, when the crew selects OFF, except during an overheat. (The light stays on as long as the overheat lasts).

(3) YELLOW ELEC PUMP pb sw (springloaded)

ON : The electric pump is ON.
If the electrical power supply is removed, the pump will remain off when electrical power is applied again.

Off : The pump is off.
It comes on automatically when a crewman sets the lever of the cargo door manual selector valve to OPEN or CLOSE.
This inhibits the operation of other yellow system functions (except alternate braking and engine 2 reverse).

FAULT lt : This amber light, accompanied by an ECAM caution, comes on if :
- the reservoir level is low
- air pressure in the reservoir is low
- the reservoir overheats
- pump pressure is low
- the pump overheats.

The light goes out when the crew selects OFF, except during an overheat. (The light stays on as long as the overheat lasts).

(4) PTU pb sw

AUTO : The bidirectional power transfer unit is armed and both the yellow and the green electrohydraulic valves are open.
The power transfer unit runs automatically when the differential pressure between the green and yellow systems is more than 500 PSI.

Note: The PTU is inhibited during the first engine start and automatically tested during the second engine start.

OFF : Both the green and the yellow PTU electrohydraulic valves close. Power transfer stops.

FAULT lt : This amber light comes on, and a caution appears on the ECAM, if :
- the green or the yellow reservoir overheats
- the green or the yellow reservoir has low air pressure
- the green or the yellow reservoir has a low flluid level.

The light goes out when the crew selects OFF, except during an overheat. (The light stays on as long as the overheat lasts).

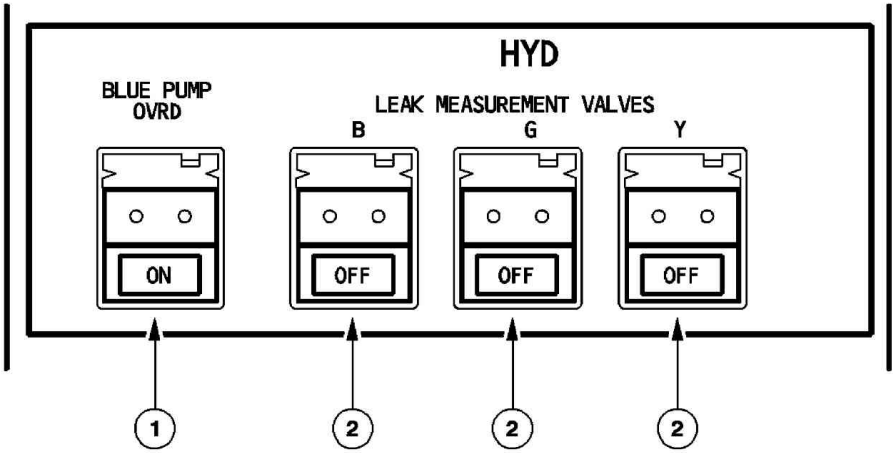
(5) RAT MAN ON pb

The flight crew may extend the RAT at any time by pressing the RAT MAN ON pushbutton.

Note: The RAT extends automatically if AC BUS 1 and AC BUS 2 are lost. (Refer to DSC-24-20 Overhead Panel (Contd)).

MAINTENANCE PANEL

Applicable to: ALL



(1) BLUE PUMP OVRD pb sw (springloaded)

ON : The blue electric pump is on if the ELEC PUMP pushbutton switch on the HYD panel is at AUTO.

Off : The blue electric pump is off.

(2) LEAK MEASUREMENT VALVES pb sw

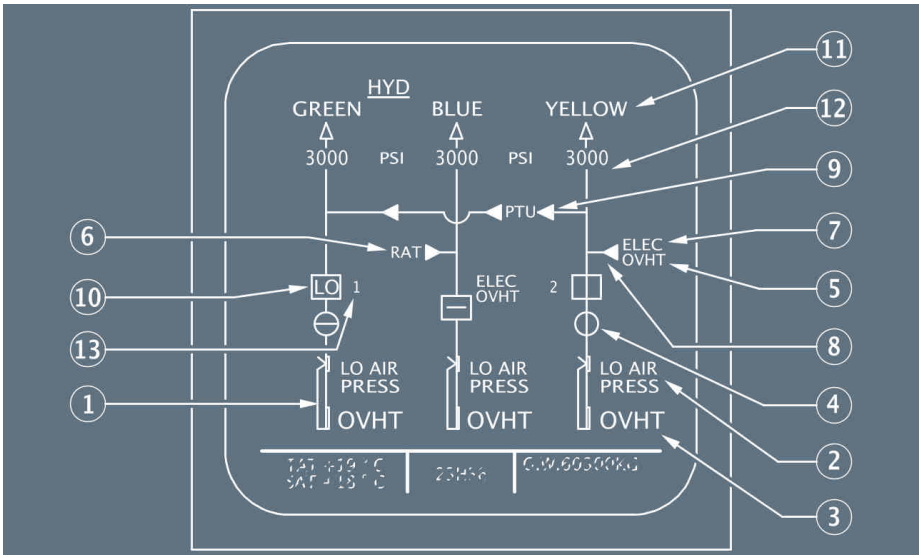
OFF: The corresponding electrohydraulic valve closes and shuts off hydraulic supply to the primary flight controls.

On : The corresponding electrohydraulic valve opens to go back to normal hydraulic supply.

ECAM HYD PAGE

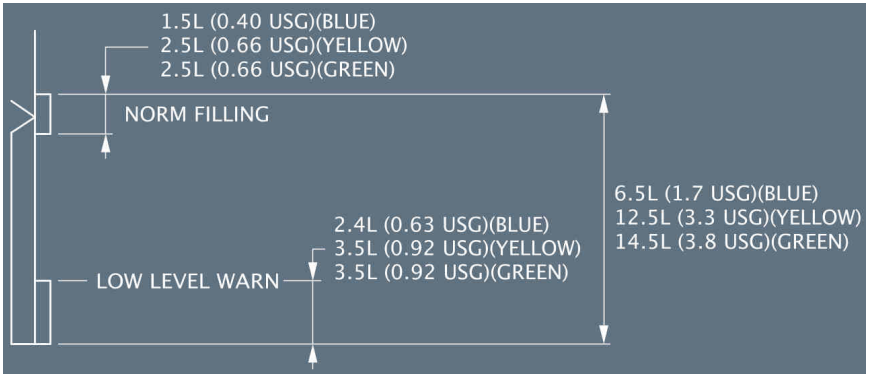
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

1



(1) Reservoir quantity

It is in green, unless the fluid level goes below the warning level, in which case it becomes amber.



(2) Reservoir LO AIR PRESS
This appears in amber, and a caution appears on ECAM, if the air pressure for the indicated reservoir drops below normal.

(3) Reservoir OVHT
This appears in amber, and a caution appears on ECAM, if the temperature of returning hydraulic fluid temperature at the inlet to its reservoir is above normal.

(4) FIRE VALVE

Cross line - Amber	:	The valve is fully closed.
In line - Green	:	The valve is not fully closed.

(5) OVHT
This appears in amber if the electric pump for that system (blue or yellow) overheats.

(6) RAT

RAT ▹White	:	The RAT is stowed.
RAT ▬ Green	:	The RAT is not stowed.
RAT ▸Amber	:	Pressure for stowing the RAT has been applied, or the RAT pump is not available.

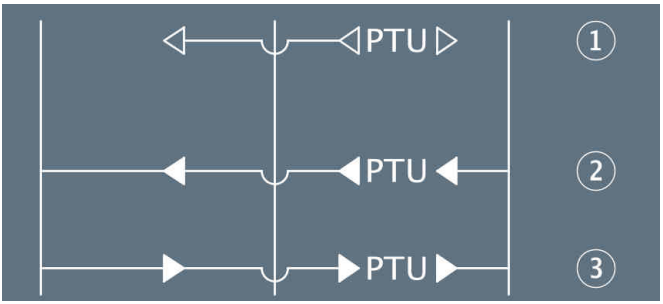
(7) ELEC
This legend, normally white, becomes amber if the associated power supply fails.

(8) YELLOW ELEC PUMP control

◃White	:	The electric pump is off.
▬ Green	:	The electric pump is ON.

◂Amber : The electric pump is ON and the yellow system has low pressure.

(9) PTU control



(1)

Green : The power transfer unit (PTU) pushbutton switch is in AUTO and the PTU is not transferring pressure.

Amber : The PTU pb-sw is OFF.

(2)

Green : The PTU is supplying the green hydraulic system.

(3)

Green : The PTU is supplying the yellow hydraulic system.

(10) ENG PUMP control and low pressure indication

In line (Green) : The pushbutton switch for the designated PUMP is on and hydraulic pressure is normal.

Cross line (Amber) : The pushbutton switch for the designated PUMP is OFF.

"LO" (Amber) : The pushbutton switch for the designated PUMP is on and hydraulic pressure is low.

(11) System label

	pressure > 1 450 PSI	pressure < 1 450 PSI
YELLOW	white	amber
△	green	amber

(12) System pressure

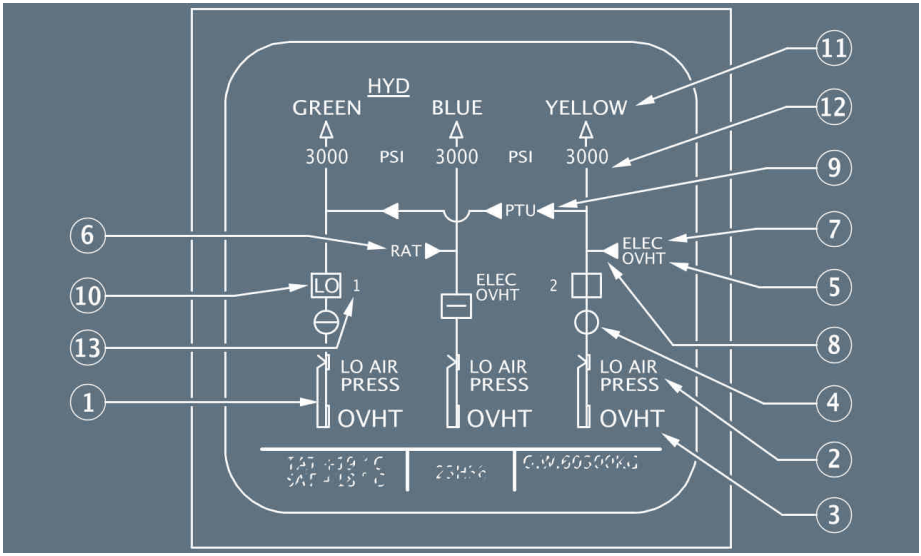
This legend, normally green, becomes amber when system pressure is below 1 450 PSI.

(13) PUMP
This legend, normally white, becomes amber when N2 is below idle.

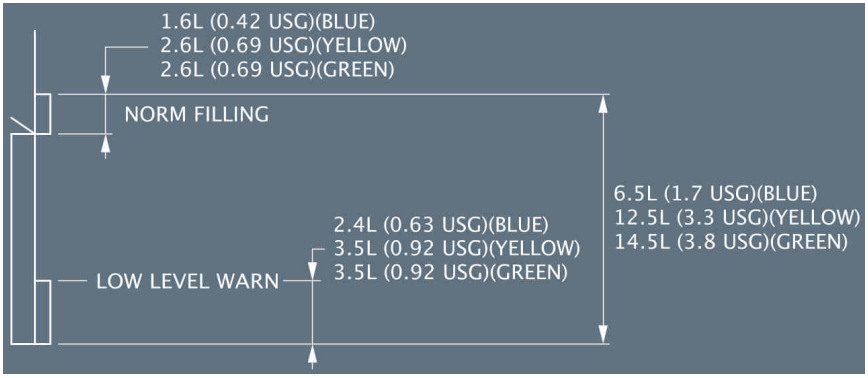
ECAM HYD PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

2



(1) Reservoir quantity
It is in green, unless the fluid level goes below the warning level, in which case it becomes amber.



(2) Reservoir LO AIR PRESS
This appears in amber, and a caution appears on ECAM, if the air pressure for the indicated reservoir drops below normal.

(3) Reservoir OVHT
This appears in amber, and a caution appears on ECAM, if the temperature of returning hydraulic fluid temperature at the inlet to its reservoir is above normal.

(4) FIRE VALVE

Cross line - Amber : The valve is fully closed.

In line - Green : The valve is not fully closed.

(5) OVHT
This appears in amber if the electric pump for that system (blue or yellow) overheats.

(6) RAT

RAT ▹White : The RAT is stowed.

RAT ▬ Green : The RAT is not stowed.

RAT ▸Amber : Pressure for stowing the RAT has been applied, or the RAT pump is not available.

(7) ELEC
This legend, normally white, becomes amber if the associated power supply fails.

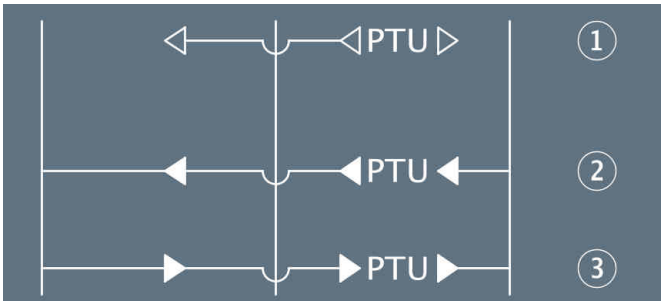
(8) YELLOW ELEC PUMP control

◃White : The electric pump is off.

▬ Green : The electric pump is ON.

◂Amber : The electric pump is ON and the yellow system has low pressure.

(9) PTU control



(1)

Green : The power transfer unit (PTU) pushbutton switch is in AUTO and the PTU is not transferring pressure.

Amber : The PTU pb-sw is OFF.

(2)

Green : The PTU is supplying the green hydraulic system.

(3)

Green : The PTU is supplying the yellow hydraulic system.

(10) ENG PUMP control and low pressure indication

In line (Green) : The pushbutton switch for the designated PUMP is on and hydraulic pressure is normal.

Cross line (Amber) : The pushbutton switch for the designated PUMP is OFF.

"LO" (Amber) : The pushbutton switch for the designated PUMP is on and hydraulic pressure is low.

(11) System label

	pressure > 1 450 PSI	pressure < 1 450 PSI
YELLOW	white	amber
△	green	amber

(12) System pressure

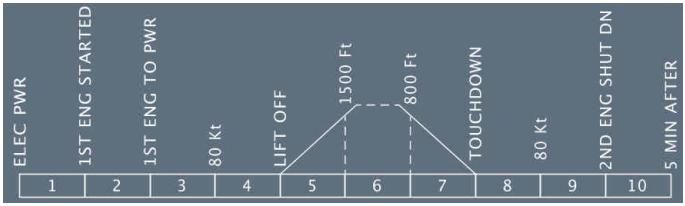
This legend, normally green, becomes amber when system pressure is below 1 450 PSI.

(13) PUMP

This legend, normally white, becomes amber when N2 is below idle.

WARNINGS AND CAUTIONS

Applicable to: ALL 321



E/WD : FAILURE TITLE Conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
B + Y **B + G SYS LO PR** **Y + G** System pressure ≤ 1 450 PSI (reset if pressure ≥ 1 750 PSI)	CRC	MASTER WARN	HYD	FAULT lt	4, 5 (1)
G (Y)(B) RSVR LO AIR PR Air pressure of the reservoir ≤ 22 PSI (reset if air pressure ≥ 25 PSI)	SINGLE CHIME	MASTER CAUT		FAULT lt on associated pump(s) pb and on PTU pb-sw if Y or G SYS affected	3, 4, 5, 7, 8
G (Y)(B) RSVR OVHT Fluid temperature ≥ 93 °C (reset if TEMP ≤88 °C)					
G (Y)(B) RSVR LO LVL Fluid quantity: <3.5 l (0.92 US Gal) (green-yellow) <2.4 l (0.63 US Gal) (blue)					4, 5 (2), 7, 8
G (Y) ENG 1(2) PUMP LO PR Pump outlet pressure ≤ 1 750 PSI (reset if pressure ≥ 2 200 PSI)				FAULT lt on affected pump pb	
Y ELEC PUMP LO PR Yellow system pressure ≤ 1 450 PSI (reset if pressure ≥ 1 750 PSI) with - YELLOW ELEC PUMP pb-sw at ON - Y ENG PUMP and PTU not available					4, 5, 7, 8
B ELEC PUMP LO PR Pump outlet pressure ≤ 1 450 PSI (reset if pressure ≥ 1 750 PSI)					
B ELEC PUMP OVHT **Y ELEC PUMP OVHT**					3, 4, 5, 7, 8
G (Y) SYS LO PR Pump outlet pressure ≤ 1 450 PSI (reset if pressure ≥ 1 750 PSI)					4, 5, 7, 8 (1)
B SYS LO PR System pressure ≤ 1 450 PSI (reset if pressure ≥ 1 750 PSI)				NIL	1, 4, 5, 7, 8, 10
PTU FAULT PTU not running on ground in case the differential pressure is above 650 PSI, between G and Y system, or in flight PTU still at AUTO position				FAULT lt only in case of G or Y RSVR LO LVL or RSVR LO	3, 4, 5, 8, 9, 10

Continued on the following page

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E/WD : FAILURE TITLE Conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
in case of G or Y reservoir low level and G or Y system low pressure.				AIR PR or RSVR OVHT	
RAT FAULT RAT not fully stowed or pressure present in RAT stowing actuator or RAT pump not available				NIL	3, 4, 5, 6, 7, 8, 9

(1) Inhibited on the ground (flight phases 1, 2, 9, 10) when corresponding engine is shut down.

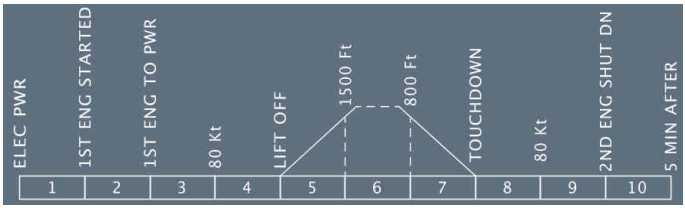
(2) The HYD G(Y) RSVR LO LVL alert is inhibited for the first 15 s of flight phase 5.
The HYD B RSVR LO LVL alert is inhibited for the entire flight phase 5.

MEMO DISPLAY

- "RAT OUT" appears in green, if the ram air turbine is not fully stowed. The color changes to amber during flight phases 1 and 2.
- "HYD PTU"appears in green, when the power transfer unit is running.

WARNINGS AND CAUTIONS

Applicable to: ALL 320



E/WD: FAILURE TITLE Conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
B + Y **B + G SYS LO PR** **Y + G** System pressure ≤ 1 450 PSI (reset if pressure ≥ 1 750 PSI)	CRC	MASTER WARN	HYD	FAULT lt	4, 5 (1)
G (Y) RSVR LO AIR PR Air pressure of the reservoir ≤ 22 PSI (reset if air pressure ≥ 25 PSI)	SINGLE CHIME	MASTER CAUT		FAULT lt on associated pump(s) pb and on PTU pb-sw if Y or G SYS affected	3, 4, 5, 7, 8
B RSVR LO AIR PR Reservoir air pressure ≤ 30 PSI (detected in flight but only displayed on ground after landing)					1, 2, 3, 4, 5, 6, 7
B RSVR LO AIR PR Reservoir air pressure ≤ 22 PSI reset if pressure ≥ 25 PSI					3, 4, 5, 7, 8
G (Y)(B) RSVR OVHT Fluid temperature ≥ 93 °C (reset if TEMP ≤88 °C)					
G (Y)(B) RSVR LO LVL Fluid quantity: <3.5 l (0.92 US Gal) (green-yellow) <2.4 l (0.63 US Gal) (blue)					4, 5 (2), 7, 8
G (Y) ENG 1(2) PUMP LO PR Pump outlet pressure ≤ 1 750 PSI (reset if pressure ≥ 2 200 PSI)				FAULT lt on affected pump pb	
Y ELEC PUMP LO PR Yellow system pressure ≤ 1 450 PSI (reset if pressure ≥ 1 750 PSI) with - YELLOW ELEC PUMP pb-sw at ON - Y ENG PUMP and PTU not available					4, 5, 7, 8
B ELEC PUMP LO PR Pump outlet pressure ≤ 1 450 PSI (reset if pressure ≥ 1 750 PSI)					
B ELEC PUMP OVHT **Y ELEC PUMP OVHT**					3, 4, 5, 7, 8
G (Y) SYS LO PR System pressure ≤ 1 450 PSI (reset if pressure ≥ 1 750 PSI)					4, 5, 7, 8 (1)

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E/WD: FAILURE TITLE Conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
B SYS LO PR System pressure ≤ 1 450 PSI (reset if pressure ≥ 1 750 PSI)				NIL	1, 4, 5, 7, 8, 10
PTU FAULT PTU not running on ground in case the differential pressure is above650 PSI, between G and Y system, or in flight PTU still at AUTO position in case of G or Y reservoir low level and G or Y system low pressure.				FAULT lt only in case of G or Y RSVR LO LVL or RSVR LO AIR PR or RSVR OVHT	3, 4, 5, 8, 9, 10
RAT FAULT RAT not fully stowed or pressure present in RAT stowing actuator or RAT pump not available				NIL	3, 4, 5, 6, 7, 8, 9

(1) Inhibited on the ground (flight phases 1, 2, 9, 10) when corresponding engine is shut down.

(2) The HYD G(Y) RSVR LO LVL alert is inhibited for the first 15 s of flight phase 5.
The HYD B RSVR LO LVL alert is inhibited for the entire flight phase 5.

MEMO DISPLAY

- "RAT OUT" appears in green, if the ram air turbine is not fully stowed. The color changes to amber during flight phases 1 and 2.
- "HYD PTU"appears in green, when the power transfer unit is running.

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BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
ENG 1 driven PUMP control			DC1			
ENG 2 driven PUMP control			DC2			
ENG 1 FIRE shut off valve					X	
ENG 2 FIRE shut off valve					X	
BLUE ELEC PUMP	power	AC1				
	control				X	
Yellow ELEC PUMP	power	AC2(1)				
	control		DC2			
Power Transfer Unit			DC2			
LEAK MEASUREMENT VALVES			DC GRND/FLT			
RAT	Manual control					HOT 2
	Auto control					HOT 1

(1) or from external power.

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AIRCRAFT SYSTEMS

ICE AND RAIN PROTECTION

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DSC-30-PLP PRELIMINARY PAGES

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DSC-30-70-30 ELECTRICAL SUPPLY
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Localization Title	Toc Index	ID	Reason
DSC-30-10-10 Anti-Ice	B	1	To improve DU explanation, illustration migrate from "Rain Removal" to "Anti-Ice" DU.
DSC-30-10-10 Rain Removal	C	2	To improve DU explanation, illustration migrate from "Rain Removal" to "Anti-Ice" DU.
DSC-30-20-10 Description	A	1	Improvement of illustration quality.
DSC-30-40-10 Description	A	1	Improvement of illustration quality.
DSC-30-50-10 Description	A	1	Improvement of illustration quality.

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GENERAL

Applicable to: ALL

The ice and rain protection system allows unrestricted operation of the aircraft in icing conditions and heavy rain.

ANTI-ICE

Applicable to: ALL

1

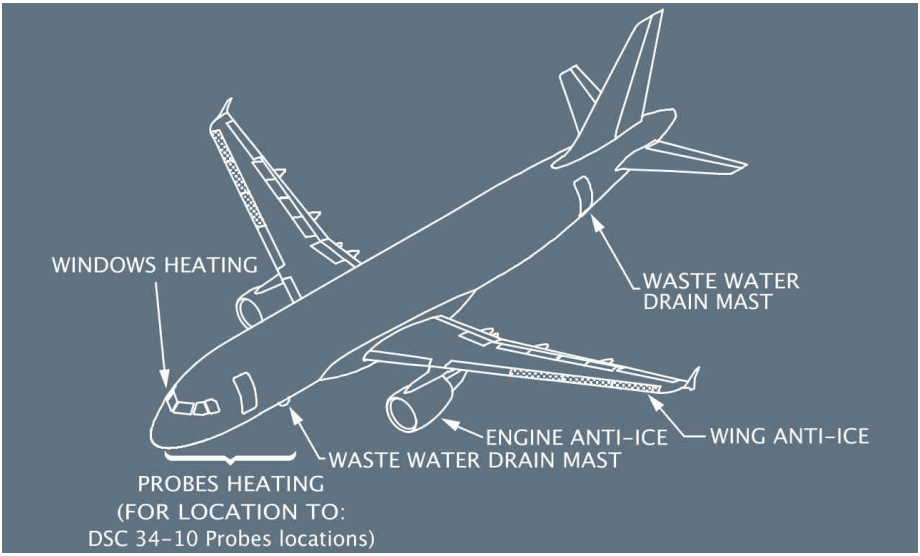
Either hot air or electrical heating protects critical areas of the aircraft as follows:

HOT AIR

- Three outboard leading-edge slats of each wing
- Engine air intakes.

ELECTRICAL HEATING

- Flight compartment windows
- Sensors, pitot probes and static ports
- Waste-water drain mast.



RAIN REMOVAL

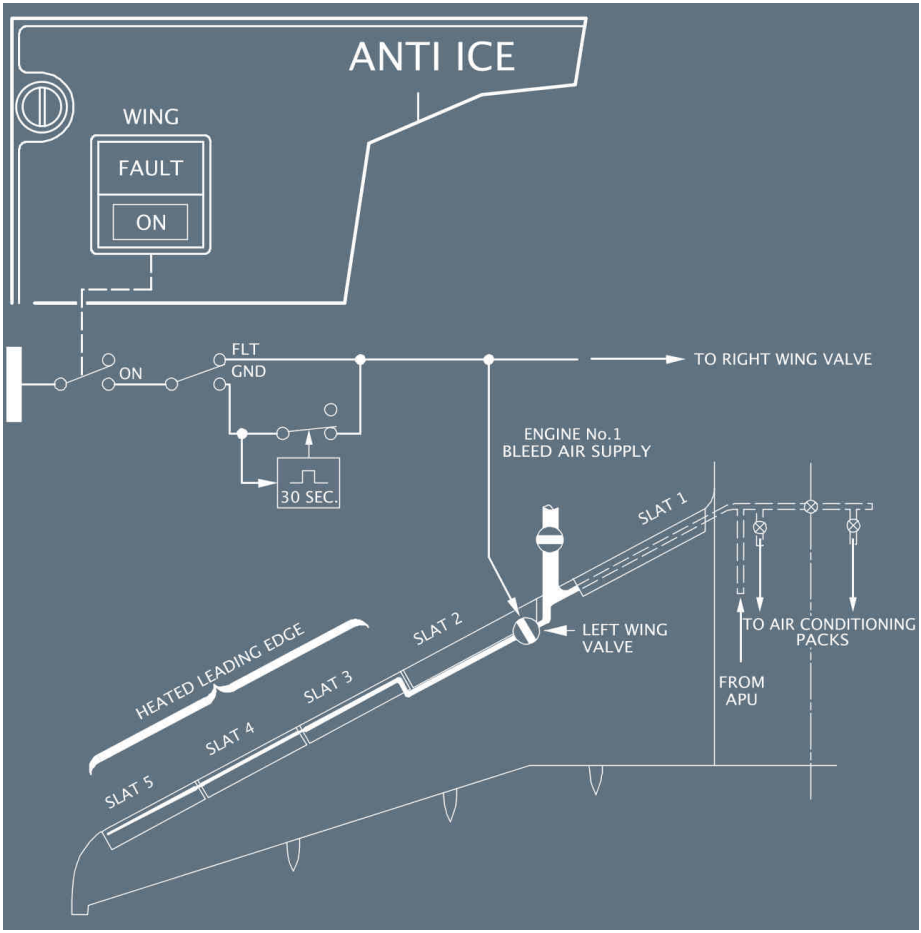
Applicable to: ALL

[2] Wipers and when necessary, fluid rain repellent, remove rain from the front windshield panels.

DESCRIPTION

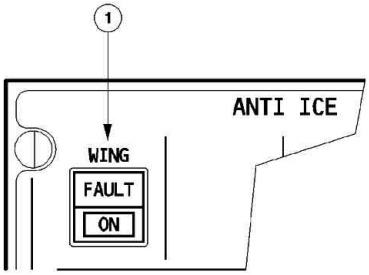
Applicable to: ALL

1 In flight, hot air from the pneumatic system heats the three outboard slats (3-4-5) of each wing.
Air is supplied through one valve in each wing.
The WING pushbutton on the ANTI ICE panel controls the valves.
When the aircraft is on ground, the flight crew can initiate a 30 s test sequence by turning the system ON.
If the system detects a leak during normal operation, the affected side's wing anti-ice valve automatically closes (*Refer to DSC-36-10-50 LEAK DETECTION*).
When wing anti-ice is selected, the EPR limit is automatically reduced, and the idle EPR is automatically increased.
If the electrical power supply fails, the valves close.


ANTI ICE
WING
FAULT
ON
FLT
GND
ON
TO RIGHT WING VALVE
ENGINE No.1
BLEED AIR SUPPLY
30 SEC.
SLAT 1
SLAT 2
SLAT 3
SLAT 4
SLAT 5
HEATED LEADING EDGE
LEFT WING
VALVE
TO AIR CONDITIONING
PACKS
FROM
APU

OVERHEAD PANEL

Applicable to: ALL



(1) WING ANTI ICE pb sw

This switch controls the wing anti ice system on the left and right sides simultaneously.

ON : It lights up blue.
WING A. ICE appears on the ECAM MEMO page.
Wing anti ice control valves open if a pneumatic supply is available.
On the ground the wing anti-icing control valves open for 30 s only (test sequence).

Off : ON light goes off.
Wing anti-icing control valves close.

FAULT : Amber light comes on, and caution appears on ECAM, if:
- the position of the anti-icing control valve is not the required position, or
- low pressure is detected.

Note: The amber FAULT light comes on briefly as the valves transit.

ECAM BLEED PAGE

Applicable to: ALL

Refer to DSC-36-20 ECAM Bleed Page

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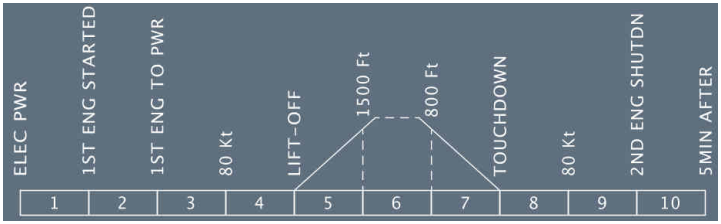
WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
WING A. ICE OPEN ON GND On ground, valves remain open more than 35 s after wing anti-ice is selected ON.	SINGLE CHIME	MASTER CAUT	BLEED	NIL	3, 4, 5, 6, 7, 8
SYS FAULT Valve not open when wing anti-ice selected ON.				ANTI ICE WING FAULT lt	3, 4, 5, 7, 8
L (R) VALVE OPEN Valve not closed when wing anti-ice selected off					4, 5, 7, 8
HI PR High pressure detected when the wing anti-ice is selected ON.	NIL	NIL		NIL	3, 4, 5, 7, 8

MEMO DISPLAY

The “WING A. ICE” message is displayed in green, if the WING ANTI ICE pb-sw is ON.

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BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
WING ANTI ICE	L and R SHUT-OFF VALVES				SHED	

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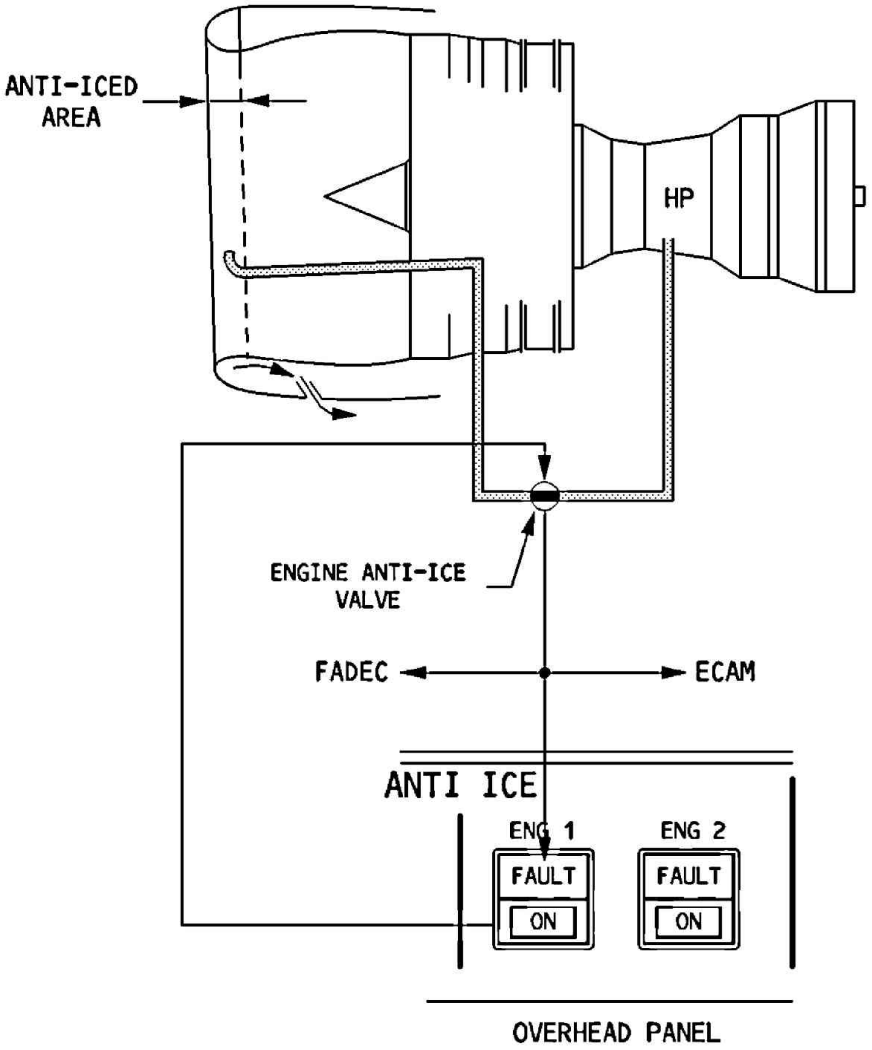
DESCRIPTION

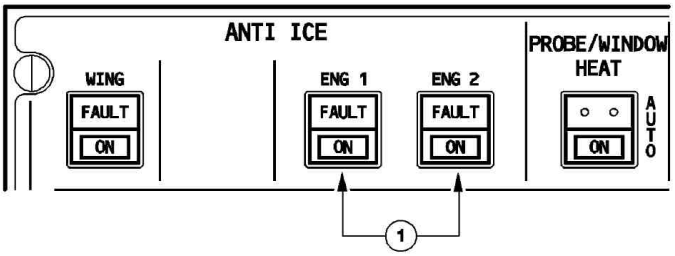
Applicable to: ALL

An independent air bleed from the high pressure compressor protects each engine nacelle from ice.
Air is supplied through a two-position (open and closed) valve that the flight crew controls with two pushbuttons, one for each engine.
The valve automatically closes, if air is unavailable (engine not running).
When an engine anti-ice valve is open, the EPR limit is automatically reduced and, if necessary, the idle EPR is automatically increased for both engines in order to provide the required pressure.
If electrical power fails, the valves open.


ANTI-ICED
AREA
HP
ENGINE ANTI-ICE
VALVE
FADEC
ECAM
ANTI ICE
ENG 1
ENG 2
FAULT
ON
FAULT
ON
OVERHEAD PANEL

OVERHEAD PANEL

Applicable to: ALL



(1) ENG 1 (2) ANTI ICE pb-sw

ON : light comes on blue.
ECAM MEMO displays “ENG A. ICE”.
Engine anti-icing valve opens if bleed air is available from the engine.
Continuous ignition is selected when the valve is opened and the ENG ANTI ICE pb-sw is selected ON. This makes the IGNITION memo appear on the ECAM.

Off : ON light goes out.
Engine anti-ice valve closes.

FAULT : Amber light comes on, and caution message appears on ECAM, if the position of the anti-ice valve disagrees with the ENG 1 (2) pushbutton selection.

Note: The amber FAULT light comes on briefly as valve transits.

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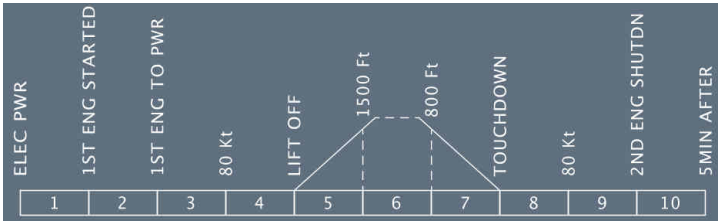
WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLTPHASE INHIB
ENG 1(2) VALVE OPEN Valve disagree in the open position.	SINGLE CHIME	MASTER CAUT	NIL	ENG 1 (2) ANTI ICE FAULT lt	3, 4, 5, 7, 8
ENG 1(2) VALVE CLSD Valve disagree in the closed position.					

MEMO DISPLAY

This display shows “ENG A. ICE” in green, if one or both ENG ANTI ICE pb-sw are ON.

Intentionally left blank

BUS EQUIPMENT LIST

Applicable to: ALL

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
ENG ANTI ICE CLOSURE	VALVE	1		DC1			
		2		DC2			

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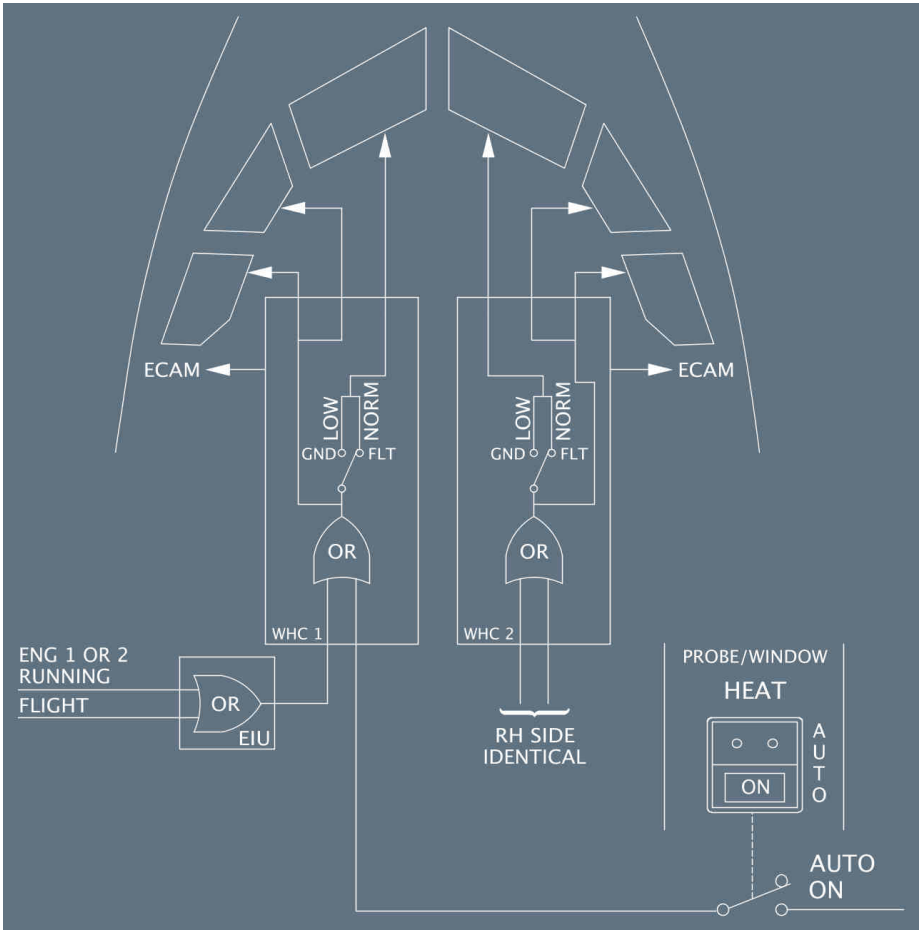
DESCRIPTION

Applicable to: ALL

1 The aircraft uses electrical heating for anti-icing each windshield and demisting the cockpit side windows.
Two independent Window Heat Computers (WHCs), one on each side, automatically regulate the system, protect it against overheating, and indicate faults.

Window heating comes on:
- automatically when at least one engine is running, or when the aircraft is in flight.
- manually, before engine start, when the flight crew switches ON the PROBE/WINDOW HEAT pushbutton switch.

Windshield heating operates at low power on the ground and at normal power in flight. The changeover is automatic.
Only one heating level exists for the windows.


ECAM
ECAM
LOW
NORM
GND
FLT
LOW
NORM
GND
FLT
OR
OR
WHC 1
WHC 2
ENG 1 OR 2
RUNNING
FLIGHT
OR
EIU
RH SIDE
IDENTICAL
PROBE/WINDOW
HEAT
ON
AUTO
AUTO
ON

OVERHEAD PANEL

Applicable to: ALL

Refer to DSC-30-50-20 Overhead Panel

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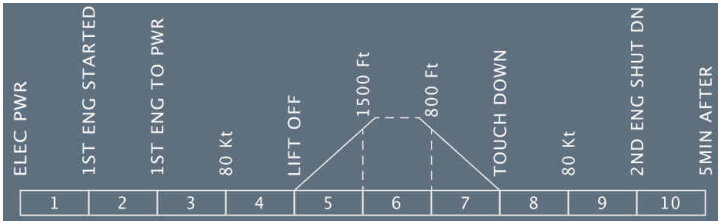
WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNINGS	FLT PHASE INHIB
L(R) WINDSHIELD Failure of L or R windshield heating	SINGLE CHIME	MASTER CAUT	NIL	NIL	3, 4, 5, 7, 8
L+R WINDSHIELD Failure of both windshield heating					
L(R) WINDOW Failure of L or R window heating	NIL	NIL			

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BUS EQUIPMENT LIST

Applicable to: ALL

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
WINDOW HEAT	WHC	1		DC1			
		2		DC2			
	HEATING POWER	L	AC1				
		R	AC2				

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DESCRIPTION

Applicable to: ALL

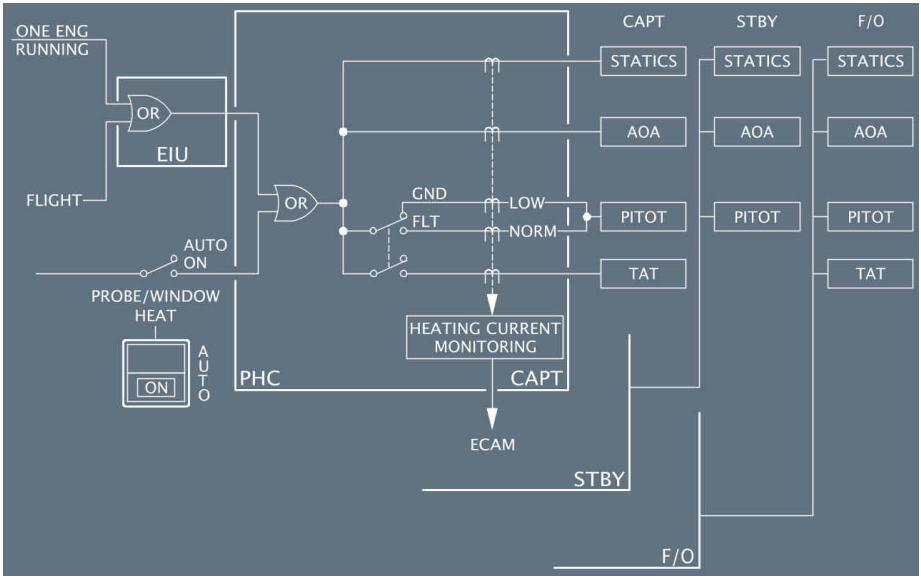
[1] Electrical heating protects:
- Pitot heads
- Static ports
- Angle-Of-Attack probes (AOAs)
- Total Air Temperature (TAT) probes.

Three independent Probe Heat Computers (PHCs) automatically control and monitor:
- Captain probes
- F/O probes
- STBY probes.

They protect against overheating and indicate faults.

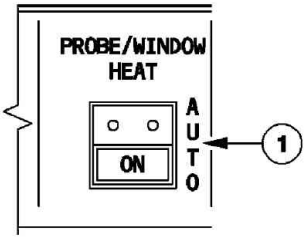
The probes are heated:
- Automatically when at least one engine is running, or when the aircraft is in flight.
- Manually, when the flight crew switches ON the PROBE/WINDOW HEAT pb.

On the ground, the TAT probes are not heated and pitot heating operates at a low level (the changeover to normal power in flight is automatic).


ONE ENG
RUNNING
OR
EIU
FLIGHT
OR
AUTO
ON
PROBE/WINDOW
HEAT
ON
AUTO
PHC
GND
FLT
LOW
NORM
HEATING CURRENT
MONITORING
CAPT
ECAM
STBY
F/O
CAPT
STBY
F/O
STATICS
STATICS
STATICS
AOA
AOA
AOA
PITOT
PITOT
PITOT
TAT
TAT

OVERHEAD PANEL

Applicable to: ALL



(1) PROBE/WINDOW HEAT pb

AUTO : Probes/Windows are heated automatically :
- In flight, or
- On the ground (except TAT probes) provided one engine is running.

ON : Probes and windows are heated permanently. Blue light comes on.

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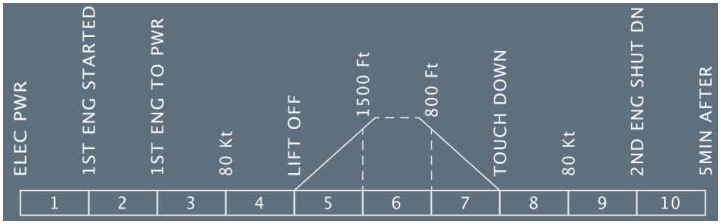
WARNINGS AND CAUTIONS

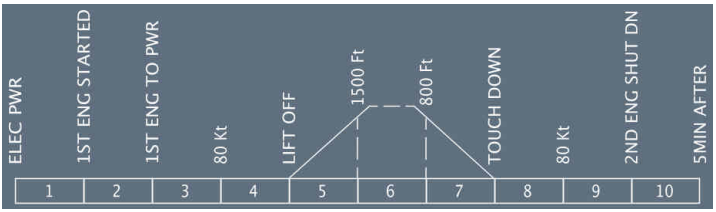
Applicable to: B-HST, B-HSU



E/WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
CAPT (F/O) PITOT CAPT (F/O) L(R) STAT CAPT (F/O) AOA CAPT (F/O) TAT Failure of corresponding probe heating	SINGLE CHIME	MASTER CAUT	NIL	NIL	3, 4, 5, 7, 8
STBY PITOT STBY L(R) STAT STBY AOA Failure of corresponding probe heating					
CAPT (F/O) (STBY) PROBES Failure of one probe heat channel/computer					

WARNINGS AND CAUTIONS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR



E/WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
CAPT (F/O) PITOT CAPT (F/O) L(R) STAT CAPT (F/O) AOA CAPT (F/O) TAT Failure of corresponding probe heating	SINGLE CHIME	MASTER CAUT	NIL	NIL	3, 4, 5, 7, 8
STBY PITOT STBY L(R) STAT STBY AOA Failure of corresponding probe heating					
CAPT (F/O) (STBY) PROBES Failure of one probe heat channel/computer					
CAPT + F/O PITOT CAPT+ STBY PITOT F/O + STBY PITOT Failure of the corresponding probes heating					4, 5, 8
ALL PITOT Failure of CAPT, F/O and STBY probes heating					

BUS EQUIPMENT LIST

Applicable to: ALL

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
PROBE HEAT	PHC	CAPT				X	
		F/O		DC2			
		STBY		DC1			
	STATICS	CAPT and STBY		DC1			
		F/O		DC2			
	PITOT	CAPT			X (1)		
		F/O	AC2				
		STBY	AC1				
	AOA	CAPT			SHED		
		F/O	AC2				
		STBY	AC1				
	TAT	CAPT	AC1				
		F/O	AC2				

(1) When AC1 and AC2 are lost and AIR DATA is switched to " CAPT 3", the STBY pilot is switched to AC ESS bus and CAPT pitot heating is lost.

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WIPERS

Applicable to: B-HSQ, B-HSR

Each front windshield has a dual-speed electric wiper, which are each controlled by a rotary selector.

WIPERS

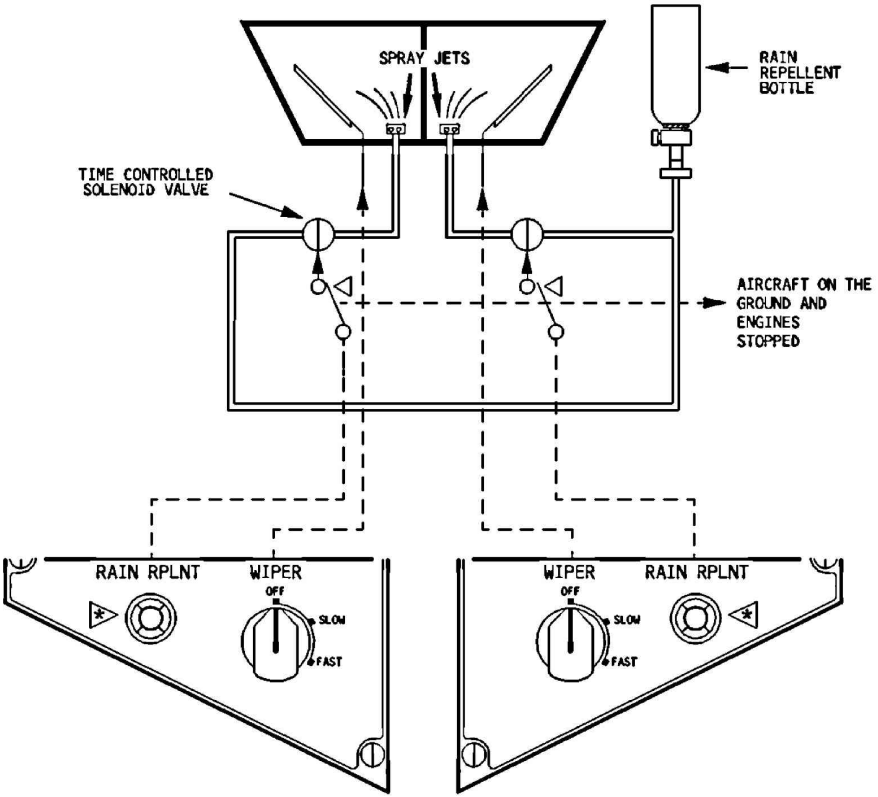
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

Each front windshield has a two speed electric wiper, with an intermittent sweep function. A rotary selector controls each.

RAIN REPELLENT (IF INSTALLED)

Applicable to: B-HSQ, B-HSR

In moderate to heavy rain, the flight crew can spray a rain repellent liquid on the windshield to improve visibility.
After about 30 s, the windows are covered with spray.
Separate pushbuttons control rain repellent application on each side of the windshield.



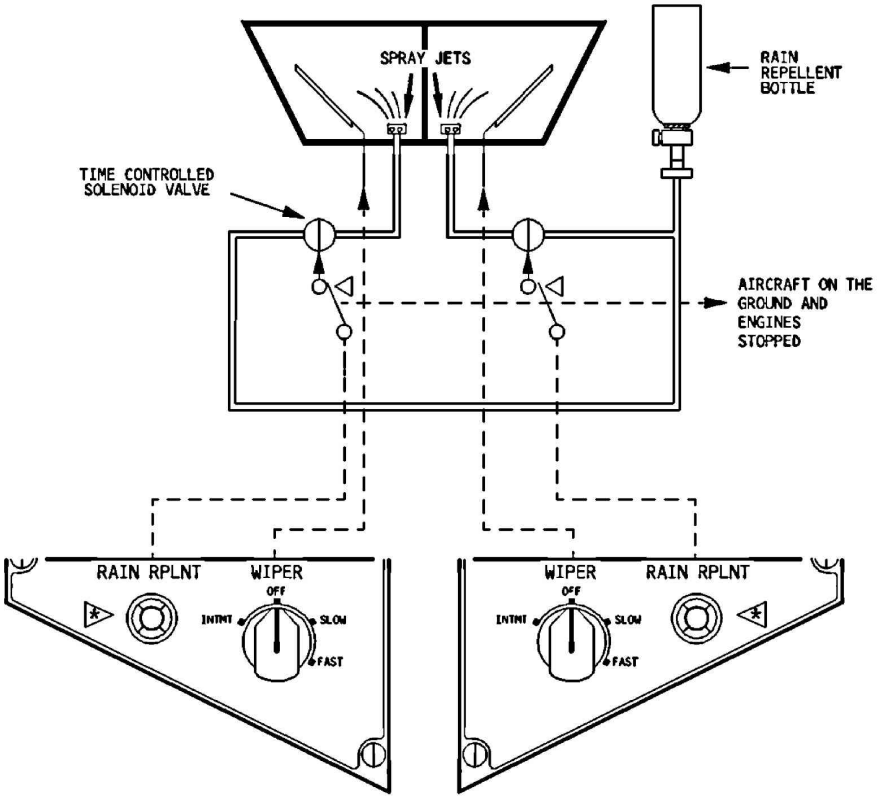
RAIN REPELLENT (IF INSTALLED)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

In moderate to heavy rain, the flight crew can spray a rain repellent liquid on the windshield to improve visibility.

After about 30 s, the windows are covered with spray.

Separate pushbuttons control rain repellent application on each side of the windshield.


SPRAY JETS
RAIN REPELLENT BOTTLE
TIME CONTROLLED SOLENOID VALVE
AIRCRAFT ON THE GROUND AND ENGINES STOPPED
RAIN RPLNT
WIPER
OFF
INTMT
SLOW
FAST
WIPER
RAIN RPLNT
OFF
INTMT
SLOW
FAST

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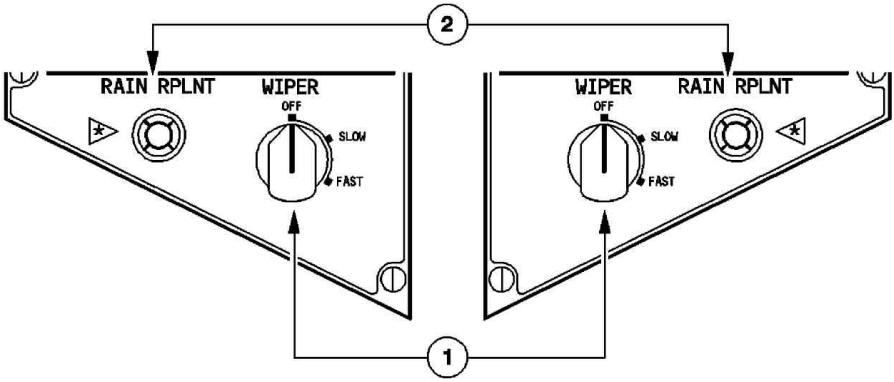
OVERHEAD PANEL

Applicable to: B-HSQ, B-HSR

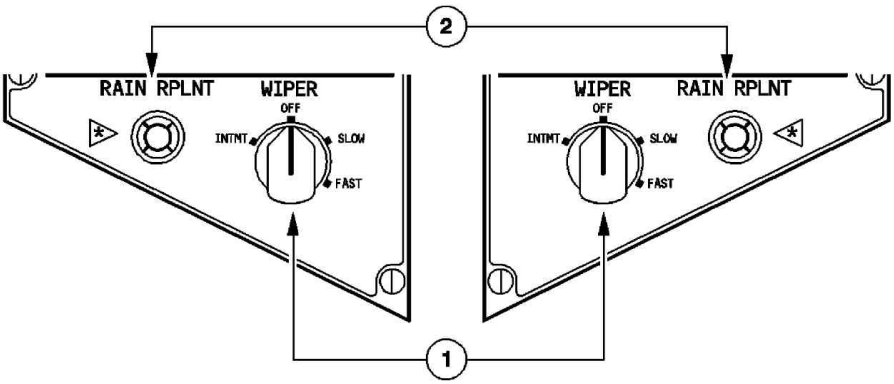


(1) WIPER rotary selector
Each rotary selector controls its wiper at low or high speed. When turned off, the wiper stops out of view.

(2) RAIN RPLNT pushbuttons
Each of these buttons controls the application of rain repellent fluid to the corresponding side of the front windshield.
When the flight crew pushes the button, the timer applies a measured quantity of rain repellent to the windshield. To repeat the cycle, the flight crew must push the button again.
This function is inhibited when the aircraft is on the ground and the engines are stopped.

OVERHEAD PANEL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

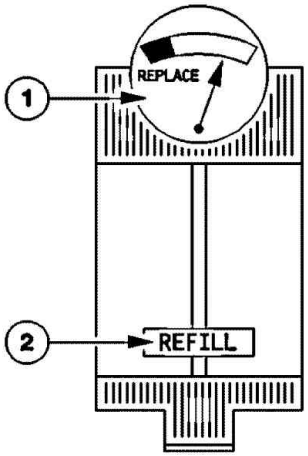


(1) WIPER rotary selector
Each rotary selector controls its wiper at low speed, high speed, or intermittent sweeping. When turned off, the wiper stops out of view.

(2) RAIN RPLNT pushbuttons
Each of these buttons controls the application of rain repellent fluid to the corresponding side of the front windshield.
When the flight crew pushes the button, the timer applies a measured quantity of rain repellent to the windshield. To repeat the cycle, the flight crew must push the button again.
This function is inhibited when the aircraft is on the ground and the engines are stopped.

REAR COCKPIT

Applicable to: ALL



(1) RAIN RPLNT pressure indicator
This gauge shows the nitrogen pressure in the rain repellent bottle. When the needle is in the yellow sector the bottle should be replaced.

(2) RAIN RPLNT quantity indicator
When the REFILL float is in view the bottle should be replaced.

Intentionally left blank

BUS EQUIPMENT LIST

Applicable to: ALL

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
RAIN REMOVAL	WIPER	CAPT		DC1			
		F/O		DC2			
	RAIN REPELLENT ◁	CAPT				X	
		F/O		DC2			

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VISUAL ICE INDICATOR

Applicable to: ALL

An external visual ice indicator is installed between the two windshields.
The indicator has also a light.

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BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
ICE DETECT SYSTEM ◁◁	DETECTOR 1	AC1				
	DETECTOR 2	AC2				

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AIRCRAFT SYSTEMS

INDICATING / RECORDING SYSTEMS

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DSC-31-20 Permanent Data	D	3	Documentation update: Addition of "Permanent Data" documentary unit
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DSC-31-40 General	A	2	Improvement of illustration quality.
DSC-31-40 Specific Ground Indications	B	3	Improvement of illustration quality.
DSC-31-40 Altitude	E	4	Improvement of illustration quality
DSC-31-40 Altitude	E	5	Improvement of illustration quality
DSC-31-40 Altitude	E	6	Improvement of illustration quality
DSC-31-40 Altitude	E	7	Improvement of illustration quality
DSC-31-40 Altitude	E	8	Improvement of illustration quality
DSC-31-40 Altitude	E	9	Improvement of illustration quality
DSC-31-40 Altitude	E	10	Documentation update: Addition of "Altitude" documentary unit
DSC-31-40 Heading	I	11	Improvement of illustration quality.
DSC-31-40 Heading	I	12	Improvement of illustration quality.
DSC-31-40 Trajectory Deviation - ILS Approach (CONT'D)	L	13	Improvement of illustration quality.

Localization Title	Toc Index	ID	Reason
DSC-31-40 Trajectory Deviation - ILS Approach (CONT'D)	L	14	Improvement of illustration quality.
DSC-31-40 Trajectory Deviation - ILS Approach (CONT'D)	L	15	Improvement of illustration quality.
DSC-31-40 Altitude Alert	O	16	Improvement of illustration quality.
DSC-31-40 Flags and Messages Displayed on PFD	P	17	Improvement of illustration quality
DSC-31-40 Flags and Messages Displayed on PFD	P	18	Improvement of illustration quality
DSC-31-40 Flags and Messages Displayed on PFD	P	19	Improvement of illustration quality
DSC-31-40 Flags and Messages Displayed on PFD	P	20	Improvement of illustration quality
DSC-31-40 Flags and Messages Displayed on PFD	P	21	Improvement of illustration quality
DSC-31-45 ROSE Modes	D	1	Update of the Wind Direction reference. "the analog direction (green arrow) indicate the north reference that is in use." appears instead of "the analog direction (green arrow) is with respect to magnetic north".
DSC-31-45 ROSE Modes	D	2	Update of the Wind Direction reference. "the analog direction (green arrow) indicate the north reference that is in use." appears instead of "the analog direction (green arrow) is with respect to magnetic north".
DSC-31-45 ROSE LS Mode	F	3	Improvement of illustration quality
DSC-31-45 ROSE LS Mode	F	4	Improvement of illustration quality
DSC-31-45 ROSE NAV Mode/ARC Mode	H	5	Improvement of illustration quality
DSC-31-45 ROSE NAV Mode/ARC Mode	H	6	Improvement of illustration quality
DSC-31-45 ROSE NAV Mode/ARC Mode	H	7	Documentation update: Addition of "ROSE NAV Mode/ARC Mode" documentary unit
DSC-31-45 ROSE NAV Mode/ARC Mode	H	8	Improvement of illustration quality

Localization Title	Toc Index	ID	Reason
DSC-31-45 Weather Radar	J	9	Improvement of illustration quality.
DSC-31-45 Weather Radar	J	10	Improvement of illustration quality.
DSC-31-45 Weather Radar	J	11	Improvement of illustration quality.
DSC-31-45 EGPWS	L	12	Improvement of illustration quality
DSC-31-45 EGPWS	L	13	Improvement of illustration quality
DSC-31-45 EGPWS	L	14	Improvement of illustration quality
DSC-31-45 EGPWS	L	15	Improvement of illustration quality
DSC-31-60-20 Pedestal	B	1	Improvement of illustration quality.

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INTRODUCTION

Applicable to: ALL

The Electronic Instrument System (EIS) presents data on six identical Display Units (DUs):

- The Electronic Flight Instrument System (EFIS) displays mostly flight parameters and navigation data on the Primary Flight Displays (PFDs) and Navigation Displays (NDs).
- The Electronic Centralized Aircraft Monitor (ECAM) presents data on the Engine/Warning Display (E/WD) and System Display (SD) :
  - Primary engine indications, fuel quantity, flap and slat position
  - Warning and caution alerts, or memos
  - Synoptic diagrams of aircraft systems, and status messages
  - Permanent flight data

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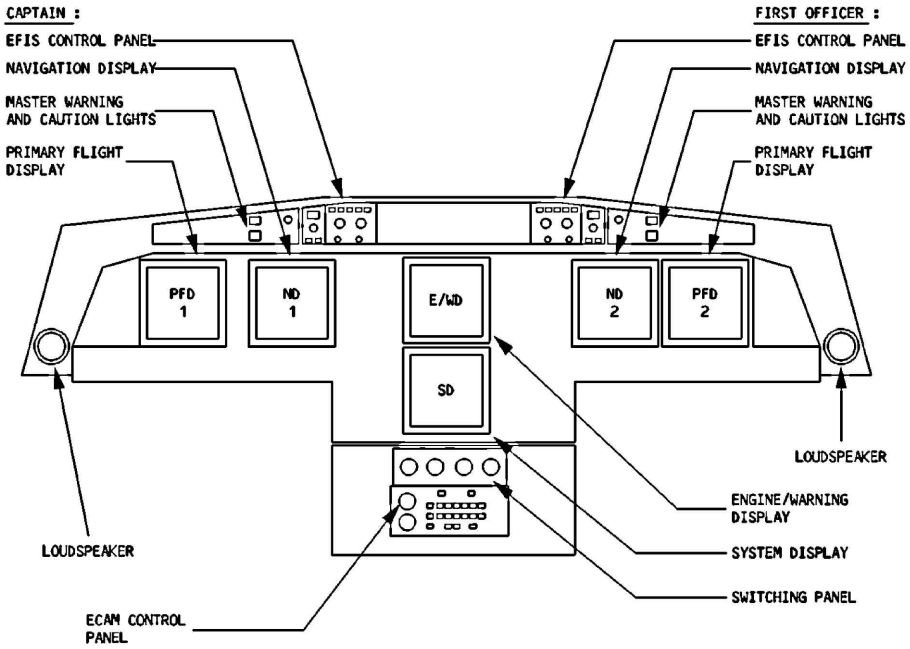
COCKPIT ARRANGEMENT

Applicable to: ALL



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DISPLAY UNIT (DU)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

The instrument panels have six identical units.
These DUs are full-color cathode ray tubes.

DISPLAY UNIT (DU)

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The instrument panels have six identical units.
These DUs are full-color Liquid Crystal Displays (LCD).

DISPLAY MANAGEMENT COMPUTER (DMC)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

Three identical Display Management Computers acquire and process all the signals received from sensors and other computers to generate the images to be displayed on the primary flight displays, navigation displays, engine/warning display, and system display.
Each DMC has two independent channels : An EFIS channel and an ECAM channel. Each DMC is able to simultaneously drive one PFD, one ND, and either one of the ECAMs in its engine warning or system status mode.

DISPLAY MANAGEMENT COMPUTER (DMC)

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

Three identical Display Management Computers (DMCs) obtain data from the different sensors and computers, and send it to the display units. The display units then generate and display the applicable images. Each DMC has a single DMC channel, and can simultaneously supply one PFD, one ND and both ECAM display units (E/WD and SD).

SYSTEM DATA ACQUISITION CONCENTRATOR (SDAC)

Applicable to: ALL

The two identical SDACs acquire data, then generate signals. Some of these signals go to the three DMCs, which use them to generate displays of system pages and engines parameters. Others go to the flight warning computers, which use them to generate ECAM messages and aural alerts.

FLIGHT WARNING COMPUTER (FWC)

Applicable to: ALL

The two identical FWCs generate alert messages, memos, aural alerts, and synthetic voice messages. For this purpose they acquire data :

- Directly from aircraft sensors, or systems, to generate red warnings.
- Through the SDACs to generate amber cautions.

The ECAM display units display the alert messages generated by the FWCs.

The FWCs also generate :

- Radio altitude callouts
- Decision height callouts
- Landing distance and landing speed increments.

ATTENTION - GETTERS

Applicable to: ALL

The FWCs also drive the attention-getters. Each pilot has a set of these on the panel under the glareshield. They are :

- A master warning light, that flashes “MASTER WARN” in red, for red warnings.
- A master caution light, that illuminates “MASTER CAUT” in amber, for amber cautions.

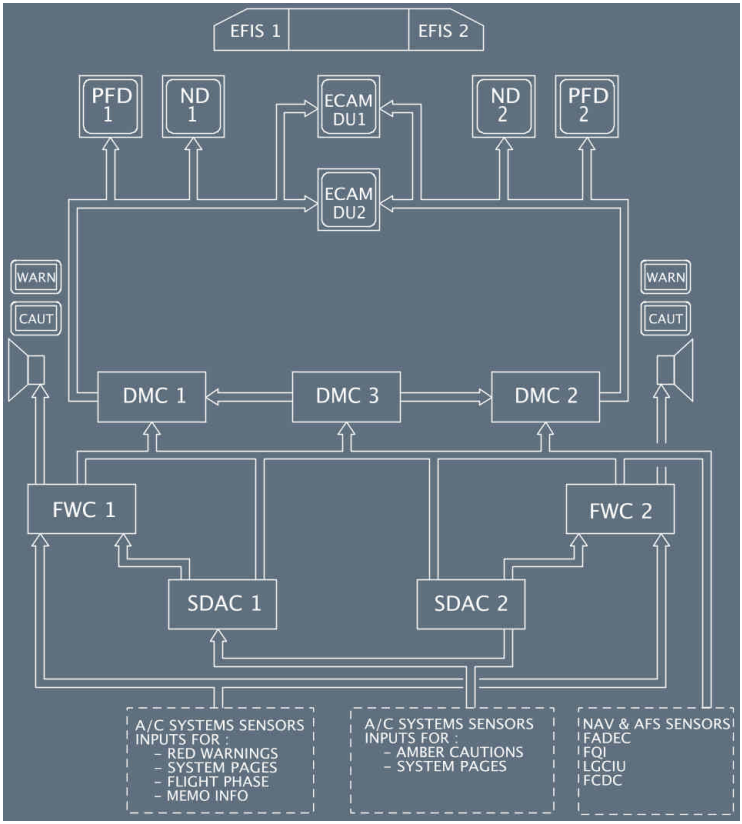
LOUDSPEAKER

Applicable to: ALL

The communications loudspeakers announce aural alerts and voice messages, and do so even when they are turned off.

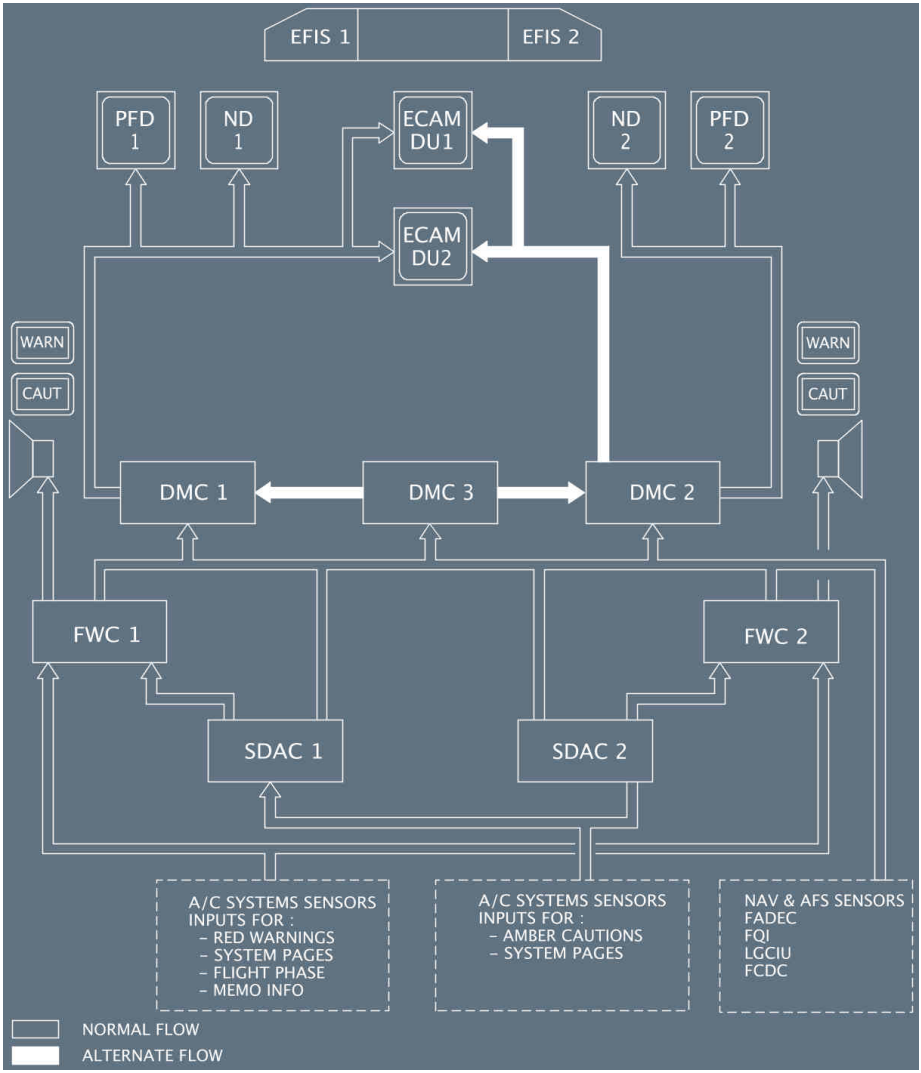
EIS BLOCK DIAGRAM

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



EIS BLOCK DIAGRAM

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



ECAM CONTROL PANEL (ECP)

Applicable to: ALL

The ECAM Control Panel, located on the pedestal, includes :

- Such E/WD controls, as CLR, STS, and the brightness control knob.
- Such SD controls, as ENG, BLEED, PRESS..., system page selector, and the brightness control knob.

EIS DMC SWITCHING SELECTOR

Applicable to: ALL

A switch near the center of the SWITCHING panel which is located just above the ECAM control panel, enables the flight crew to replace the Captain or First Officer's Display Management Computer (DMC 1, or DMC 2) by DMC 3.

ECAM/ND SWITCHING

Applicable to: ALL

A switch on the right-hand side of the SWITCHING panel enables the flight crew to transfer the ECAM System Display to either the Captain or First Officer's Navigation Display.

EFIS SWITCHING

Applicable to: ALL

A PFD/ND XFR pushbutton on each side console enables the pilot to swap displays to the respective onside DUs.

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RECONFIGURING THE DISPLAY MANAGEMENT COMPUTER (DMC)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

In normal operation, each DMC drives the following Display Units :
- DMC 1 drives the CAPT PFD, CAPT ND the ECAM DUs.
- DMC 2 drives the F/O PFD and F/O ND, and the lower ECAM DU.
- DMC 3 is on standby.

If a DMC fails (corresponding DU shows a diagonal line), the flight crew can replace DMC 1 or 2 with DMC 3 by turning the EIS DMC switch on the SWITCHING panel to “CAPT 3” or “F/O 3”.

RECONFIGURING THE DISPLAY MANAGEMENT COMPUTER (DMC)

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

In normal operation, each DMC drives the following Display Units :
- DMC 1 drives the CAPT PFD, CAPT ND the ECAM DUs.
- DMC 2 drives the F/O PFD and F/O ND.
- DMC 3 is on standby, ready to drive any DU.

If DMC 1 or 2 fails (the “INVALID DATA” message is displayed on the DUs), the crew manually selects the DMC 3 source (“CAPT 3” or “F/O 3”).
If DMC 1 fails (or DMC 3, if “CAPT 3” was selected), DMC 2 automatically drives the ECAM.

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FAILURE OF UPPER ECAM DU (OR CTL/BRIGHTNESS KNOB TURNED TO OFF)

Applicable to: ALL

If the upper ECAM display fails, or is switched off :

- The engine/warning page automatically replaces the system/status page on the lower ECAM DU.

The flight crew can display the system/status page by :

- Using the “ECAM/ND XFR“ switch, on the SWITCHING panel, to move it to a Navigation Display Unit (NDU), or
- Pushing and holding (for a maximum of 3 min) the related system page pushbutton, on the ECAM control panel, to temporarily display it on the lower ECAM DU (instead of the engine/warning page).

FAILURE OF LOWER ECAM DU (OR CTL/BRIGHTNESS KNOB TURNED TO OFF)

Applicable to: ALL

If the lower ECAM display fails, or is switched off, the flight crew can display the system/status page by :

- Using the "ECAM/ND XFR" switch, on the SWITCHING panel, to display it on the NDU, or
- Pushing and holding (for a maximum of 3 min) the related system page pushbutton, on the ECAM control panel, to temporarily display it on the upper ECAM DU (instead of the engine/warning page).

FAILURE OF BOTH ECAM DUs

Applicable to: ALL

If both ECAM displays fail, the flight crew may :

- Use the "ECAM/ND XFR", on the SWITCHING panel, to display the engine/warning page on a navigation display and, if needed,
- Push and hold (for a maximum of 3 min) the related system page pushbutton, on the ECAM control panel, to temporarily display the system/status page on an ND.

PFDU/NDU RECONFIGURATION

Applicable to: ALL

If a PFDU fails, the system automatically transfers the PFD image to the NDU.

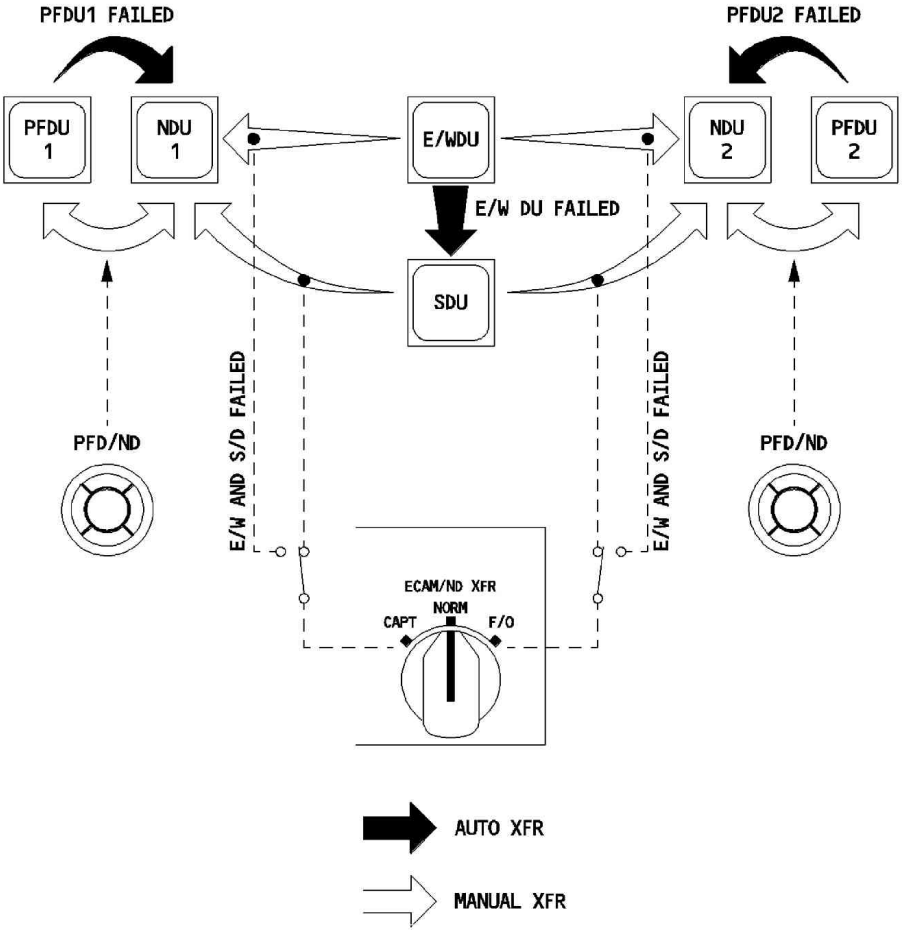
The pilot can also make this transfer manually by :

- turning the PFD ON-OFF/brightness control OFF, or
- pressing the PFD/ND/XFR pushbutton, which cross-changes the images between the PFDU and the NDU.

If an NDU fails, the pilot can use the PFD/ND/XFR pushbutton to transfer the ND image to the PFDU.

DU RECONFIGURATION

Applicable to: ALL



GENERAL

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

These messages are displayed on either the EFIS or the ECAM Display Unit (DU) depending on the current EFIS or ECAM configuration.

FAILURE OF A DU

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

If a DU fails, the flight crew may find one of the following displays:
- A blank screen with an “F” letter in amber, or
- A distorted display, or
- A blank screen with the “INVALID DISPLAY UNIT” message in amber.

FEEDBACK MESSAGES

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The DU displays the following messages in amber when the Display Management Computer (DMC) detects a discrepancy between the parameters obtained by the DMC and the operational parameters displayed on the DU:
- ”CHECK CAPT PFD”(“CHECK F/O PFD”) if the discrepancy concerns the PFD parameters
- ”CHECK CAPT ND”(“CHECK F/O ND”) if the discrepancy concerns the ND parameters
- ”CHECK EWD”if the discrepancy concerns the E/WD parameters
- ”CHECK SD”if the discrepancy concerns the SD parameters.

In addition, if the aircraft is on ground, the “DU NOT MONITORED” message is displayed in amber when there is only one DMC, instead of two DMCs, that provides the affected DU with feedback information.
This message means that there is either a DMC test in progress or that there is an EIS failure.
In the case of an EIS failure, a maintenance action is necessary.

SIDE1/SIDE2 DISCREPANCY MESSAGES

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The DU displays the following messages along with a caution on the ECAM E/WD when there is a discrepancy between the parameters displayed on the Captain's EFIS and the First Officer's EFIS:

- Both PFDs display the message "CHECK ATT"if there is a discrepancy of at least 5 ° between the attitude values, pitch and/or roll
- Both PFDs display the message "CHECK ALT"if there is a discrepancy between the altitude values greater than 250 ft when the flight crew selects a QNH different from STD, or 500 ft when the flight crew selects a QNH STD
- Both PFDs and NDs display the message "CHECK HDG"if there is a discrepancy of at least 5 ° between the heading values.

Note: *The message "CHECK HDG"flashes for a few seconds on the NDs, and then it remains steady. If the flight crew selects the PLAN mode on the NDs the message "CHECK HDG"does not appear.*

DU RESET

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

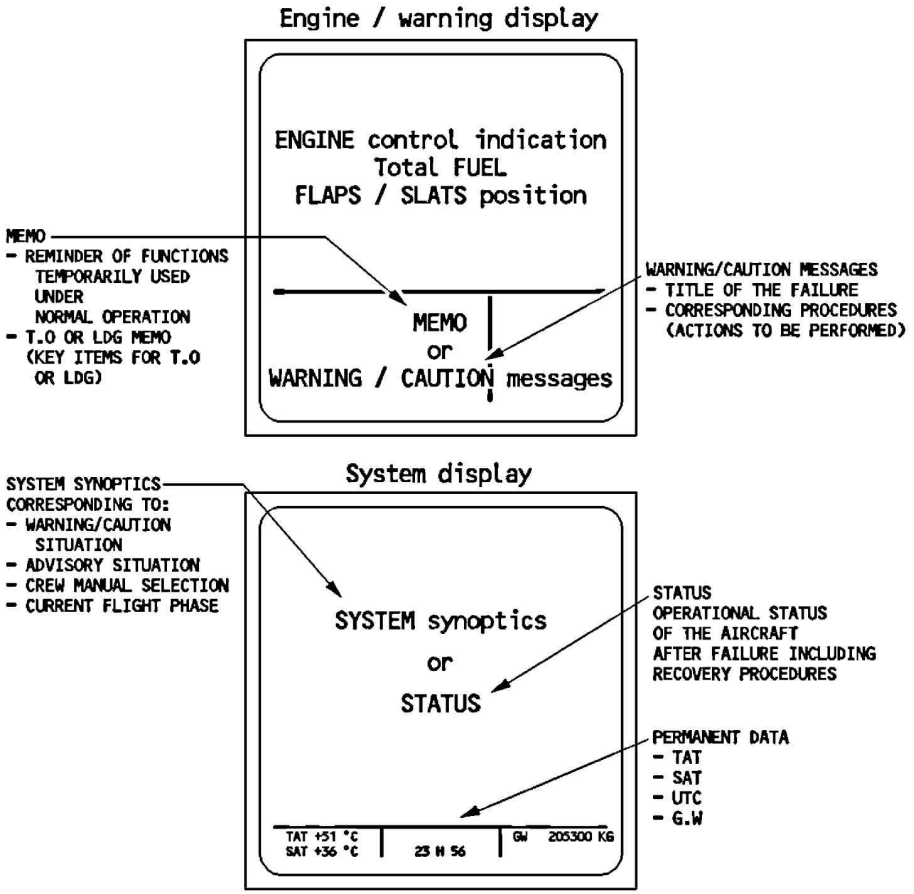
In the case of a DU reset, the message "SELF TEST IN PROGRESS" can be displayed in green and/or the message "WAITING FOR DATA" may be displayed in green during the EIS initialization.

ECAM DU ARRANGEMENT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HST, B-HSU

The ECAM has two display units :

- one for the engine/warning display (E/WD).
- one for the system/status display (SD).

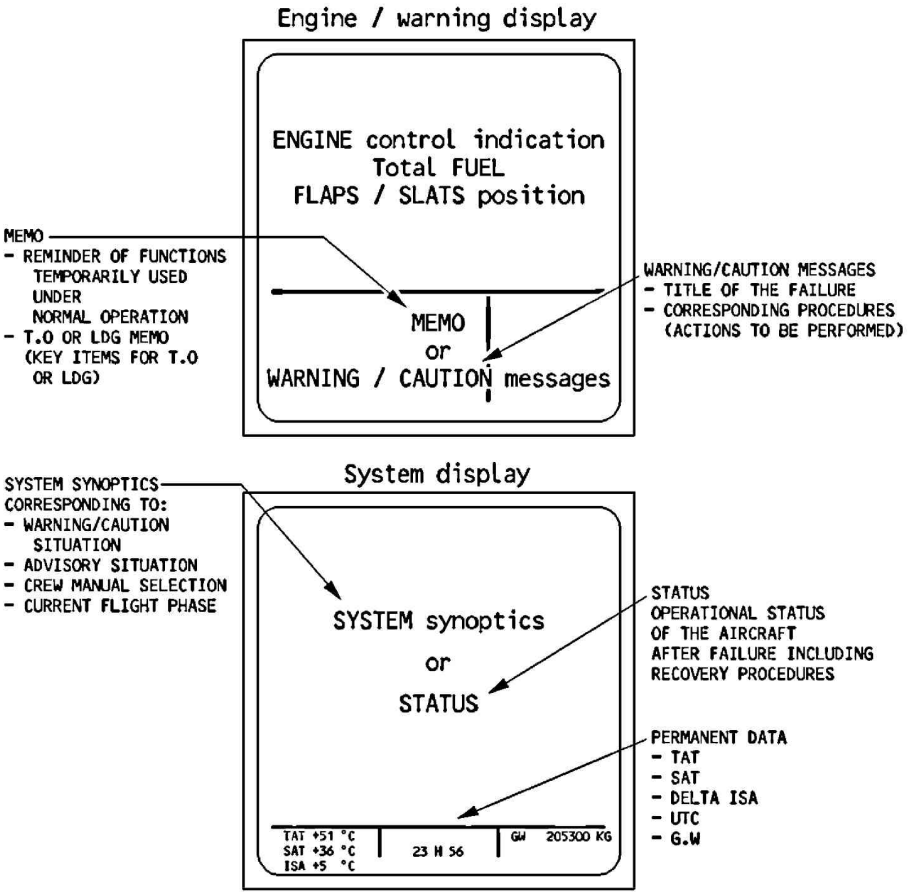


ECAM DU ARRANGEMENT

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR

The ECAM has two display units :

- one for the engine/warning display (E/WD).
- one for the system/status display (SD).



COLOR CODE

Applicable to: ALL

The ECAM display uses a color code that indicates the importance of the failure or the indication.

- RED : The configuration or failure requires immediate action.
- AMBER : The flight crew should be aware of the configuration or failure, but need not take immediate action.
- GREEN : The item is operating normally.
- WHITE : These titles and remarks guide the flight crew, as they execute various procedures.
- BLUE : These are actions to be carried out, or limitations.
- MAGENTA : These are particular messages that apply to particular pieces of equipment or situations (inhibition messages, for example).

WARNING/CAUTION CLASSIFICATION

Applicable to: ALL

	LEVEL	SIGNIFICATION	AURAL	VISUAL
FAILURE MODE	Level 3	Red warning : The configuration, or failure requires immediate action : - Aircraft in dangerous configuration, or limit flight conditions (eg: stall, o/speed) - System failure altering flight safety (eg : Eng fire, excess cab alt)	Continuous Repetitive Chime (CRC) or specific sound or synthetic voice	- MASTER WARN light red flashing or specific red light - Warning message (red) on E/WD - Automatic call of the relevant system page on the S/D (1).
	Level 2	Amber caution : The flight crew should be aware of the configuration or failure, but does not need to take any immediate action. However, time and situation permitting, these cautions should be considered without delay to prevent any further degradation of the affected system : - System failure without any direct consequence on the flight safety (eg: HYD G SYS LO PR)	Single Chime (SC)	- MASTER CAUT light amber steady - Caution message (amber) on E/WD - Automatic call of the relevant system page on the S/D (1).
	Level 1	Amber caution : Requires crew monitoring : - Failures leading to a loss of redundancy or system degradation (eg : FCDC fault)	NONE	- Caution message (amber) on E/WD generally without procedure.
INFORMATION	ADVISORY	System parameters monitoring	NONE	- Automatic call of the relevant system page on the S/D. The affected parameter pulses green.
	MEMO	Information : Recalls normal or automatic selection of functions which are temporarily used	NONE	- Green, Amber, or Magenta message on E/WD

(1) *except in some cases*

PRIORITY RULES

Applicable to: ALL

There are three priority levels for warnings and cautions :
- A level 3 warning has priority over a level 2 caution which has priority over a level 1 caution.
The FWC observes these priorities.

TYPES OF FAILURES

Applicable to: ALL

Independent : a failure that affects an isolated system or item of equipment without degrading the performance of others in the aircraft.

Primary : a failure of a system or an item of equipment that costs the aircraft the use of other systems or items of equipment.

Secondary : the loss of a system or an item of equipment resulting from a primary failure.

AUDIO INDICATORS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

AUDIO INDICATOR	MEANING	DURATION	AUDIO INDICATOR CANCELLATION (1)
CONTINUOUS REPETITIVE CHIME	RED WARNINGS	PERMANENT	Press (1) MASTER WARN lt
SINGLE CHIME	AMBER CAUTION	1/2 seconds	
CAVALRY CHARGE (3)	A/P DISCONNECTION BY TAKE OVER pb	1.5 s	Second push on TAKE OVER pb
	A/P DISCONNECTION DUE TO FAILURE	PERMANENT	Press MASTER WARN lt or TAKE OVER pb
TRIPLE CLICK	LANDING CAPABILITY CHANGE or "GPS PRIMARY LOST" in approach	1/2 sec. (3 pulses)	
CRICKET + "STALL" message (synthetic voice)	STALL	PERMANENT	NIL
BUZZER	CABIN CALL	3 s	NIL
	EMER CABIN CALL	3 s REPEATED 3 TIMES	NIL
	MECH CALL (2)	As long as outside pb pressed	NIL
CONTINUOUS BUZZER (2)	SELCAL CALL	PERMANENT	Press RESET key on ACP

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AUDIO INDICATOR	MEANING	DURATION	AUDIO INDICATOR CANCELLATION (1)
"WINDSHEAR" (synthetic voice)	WINDSHEAR	REPEATED 3 TIMES	NIL
C CHORD	ALTITUDE ALERT (*Refer to DSC-31-40 Altitude Alert*)	1.5 s or PERMANENT	new ALTITUDE selection or press MASTER WARN pb
AUTO CALL OUT (synthetic voice)	HEIGHT ANNOUNCEMENT BELOW 2 500 ft (*Refer to DSC-34-40-10 Automatic Call Out - General*)	PERMANENT	NIL
GROUND PROXIMITY WARNING (synthetic voice)	(*Refer to DSC-34-70-10 Description*)	PERMANENT	NIL
"PRIORITY LEFT" "PRIORITY RIGHT" (synthetic voice)	A/P TAKE OVER pb	1 s	NIL
"RETARD" (synthetic voice)	Thrust levers not in IDLE position for landing	ONE TIME at 20 ft (10 ft in autoland with A/THR ON), then PERMANENT until thrust levers are set to IDLE	NIL
TCAS (synthetic voice)	(*Refer to DSC-34-80-20 Aural Messages*)	PERMANENT	NIL
"SPEED, SPEED, SPEED" (Synthetic voice)	Current thrust is not sufficient to recover a positive flight through pitch control	Every 5 s until thrust is increased	THRUST LEVER(s)
"DUAL INPUT" (synthetic voice)	Both sidesticks are moved simultaneously	Every 5 s	One sidestick deactivated

(1) *The pilot can cancel any audio indicator, by pressing:*
- *The EMER CANC pb on the ECAM control panel,*
- *The MASTER WARN pushbutton, except for OVERSPEED or L/G NOT DOWN warnings.*

(2) *The pilot can cancel the continuous buzzer, by pressing the MASTER CAUT pushbutton.*

(3) *When the flight crew presses the MASTER WARN pushbutton (following a warning that leads to an AP disconnection), the Cavalry Charge sound is only inhibited when it has been emitted in order to avoid an unintended cancellation.*

AUDIO INDICATORS

Applicable to: B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG, B-HTH

AUDIO INDICATOR	MEANING	DURATION	AUDIO INDICATOR CANCELLATION (1)
CONTINUOUS REPETITIVE CHIME	RED WARNINGS	PERMANENT	Press (1) MASTER WARN lt
SINGLE CHIME	AMBER CAUTION	1/2 seconds	
CAVALRY CHARGE (3)	A/P DISCONNECTION BY TAKE OVER pb	1.5 s	Second push on TAKE OVER pb
	A/P DISCONNECTION DUE TO FAILURE	PERMANENT	Press MASTER WARN lt or TAKE OVER pb
TRIPLE CLICK	LANDING CAPABILITY CHANGE or "GPS PRIMARY LOST" in approach	1/2 sec. (3 pulses)	
CRICKET + "STALL" message (synthetic voice)	STALL	PERMANENT	NIL
BUZZER	CABIN CALL	3 s	NIL
	EMER CABIN CALL	3 s REPEATED 3 TIMES	NIL
	MECH CALL (2)	As long as outside pb pressed	NIL
CONTINUOUS BUZZER (2)	SELCAL CALL	PERMANENT	Press RESET key on ACP
"WINDSHEAR" (synthetic voice)	WINDSHEAR	REPEATED 3 TIMES	NIL
"GO AROUND WIND SHEAR AHEAD" (synthetic voice)	Windshear ahead detected during the landing phase	PERMANENT	NIL
"WINDSHEAR AHEAD" (twice) (synthetic voice)	Windshear ahead detected during the takeoff phase	PERMANENT	NIL
"MONITOR RADAR DISPLAY" (synthetic voice)	Windshear ahead detected caution message	PERMANENT	NIL
C CHORD	ALTITUDE ALERT (*Refer to DSC-31-40 Altitude Alert*)	1.5 s or PERMANENT	new ALTITUDE selection or press MASTER WARN pb
AUTO CALL OUT (synthetic voice)	HEIGHT ANNOUNCEMENT BELOW 2 500 ft (*Refer to DSC-34-40-10 Automatic Call Out - General*)	PERMANENT	NIL

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AUDIO INDICATOR	MEANING	DURATION	AUDIO INDICATOR CANCELLATION (1)
GROUND PROXIMITY WARNING (synthetic voice)	(*Refer to DSC-34-70-10 Description*)	PERMANENT	NIL
"PRIORITY LEFT" "PRIORITY RIGHT" (synthetic voice)	A/P TAKE OVER pb	1 s	NIL
"RETARD" (synthetic voice)	Thrust levers not in IDLE position for landing	ONE TIME at 20 ft (10 ft in autoland with A/THR ON), then PERMANENT until thrust levers are set to IDLE	NIL
TCAS (synthetic voice)	(*Refer to DSC-34-80-20 Aural Messages*)	PERMANENT	NIL
"SPEED, SPEED, SPEED" (Synthetic voice)	Current thrust is not sufficient to recover a positive flight through pitch control	Every 5 s until thrust is increased	THRUST LEVER(s)
"DUAL INPUT" (synthetic voice)	Both sidesticks are moved simultaneously	Every 5 s	One sidestick deactivated

(1) The pilot can cancel any audio indicator, by pressing:
- *The EMER CANC pb on the ECAM control panel,*
- *The MASTER WARN pushbutton, except for OVERSPEED or L/G NOT DOWN warnings.*

(2) The pilot can cancel the continuous buzzer, by pressing the MASTER CAUT pushbutton.

(3) When the flight crew presses the MASTER WARN pushbutton (following a warning that leads to an AP disconnection), the Cavalry Charge sound is only inhibited when it has been emitted in order to avoid an unintended cancellation.

AUDIO INDICATORS

Applicable to: B-HSL, B-HSM, B-HSN, B-HST, B-HSU, B-HTI

AUDIO INDICATOR	MEANING	DURATION	AUDIO INDICATOR CANCELLATION (1)
CONTINUOUS REPETITIVE CHIME	RED WARNINGS	PERMANENT	Press (1) MASTER WARN lt
SINGLE CHIME	AMBER CAUTION	0.5 s	
CAVALRY CHARGE (3)	A/P DISCONNECTION BY TAKE OVER pb	1.5 s	Second push on TAKE OVER pb
	A/P DISCONNECTION DUE TO FAILURE	PERMANENT	Press MASTER WARN lt or TAKE OVER pb

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AUDIO INDICATOR	MEANING	DURATION	AUDIO INDICATOR CANCELLATION (1)
TRIPLE CLICK	Landing capability downgrade or "GPS PRIMARY LOST" in approach, or mode reversion	0.5 s. (3 pulses)	
CRICKET + "STALL" message (synthetic voice)	STALL	PERMANENT	NIL
BUZZER	CABIN CALL	3 s	NIL
	EMER CABIN CALL	3 s REPEATED 3 TIMES	NIL
	MECH CALL (2)	As long as outside pb pressed	NIL
CONTINUOUS BUZZER (2)	SELCAL CALL	PERMANENT	Press RESET key on ACP
"WINDSHEAR" (synthetic voice)	WINDSHEAR	REPEATED 3 TIMES	NIL
"GO AROUND WINDSHEAR AHEAD" (synthetic voice)	Windshear ahead detected during the landing phase	PERMANENT	NIL
"WINDSHEAR AHEAD" (twice) (synthetic voice)	Windshear ahead detected during the takeoff phase	PERMANENT	NIL
"MONITOR RADAR DISPLAY" (synthetic voice)	Windshear ahead detected caution message	PERMANENT	NIL
C CHORD	ALTITUDE ALERT (*Refer to DSC-31-40 Altitude Alert*)	1.5 s or PERMANENT	new ALTITUDE selection or press MASTER WARN pb
AUTO CALL OUT (synthetic voice)	HEIGHT ANNOUNCEMENT BELOW 2 500 ft (*Refer to DSC-34-40-10 Automatic Call Out - General*)	PERMANENT	NIL
GROUND PROXIMITY WARNING (synthetic voice)	(*Refer to DSC-34-70-10 Description*)	PERMANENT	NIL
"PRIORITY LEFT" "PRIORITY RIGHT" (synthetic voice)	A/P TAKE OVER pb	1 s	NIL

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AUDIO INDICATOR	MEANING	DURATION	AUDIO INDICATOR CANCELLATION (1)
"RETARD" (synthetic voice)	Thrust levers not in IDLE position for landing	ONE TIME at 20 ft (10 ft in autoland with A/THR ON), then PERMANENT until thrust levers are set to IDLE	NIL
TCAS (synthetic voice)	(*Refer to DSC-34-80-20 Aural Messages*)	PERMANENT	NIL
"SPEED, SPEED, SPEED" (Synthetic voice)	Current thrust is not sufficient to recover a positive flight through pitch control	Every 5 s until thrust is increased	THRUST LEVER(s)
"DUAL INPUT" (synthetic voice)	Both sidesticks are moved simultaneously	Every 5 s	One sidestick deactivated

(1) *The pilot can cancel any audio indicator, by pressing the:*
- *The EMER CANC pb on the ECAM control panel, or*
- *The MASTER WARN pushbutton, except for OVERSPEED or L/G NOT DOWN warnings.*

(2) *The pilot can cancel the continuous buzzer, by pressing the MASTER CAUT pushbutton.*

(3) *When the flight crew presses the MASTER WARN pushbutton (following a warning that leads to an AP disconnection), the Cavalry Charge sound is only inhibited when it has been emitted in order to avoid an unintended cancellation.*

AUDIO INDICATORS

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR

1

AUDIO INDICATOR	MEANING	DURATION	AUDIO INDICATOR CANCELLATION (1)
CONTINUOUS REPETITIVE CHIME	RED WARNINGS	PERMANENT	Press (1) MASTER WARN lt
SINGLE CHIME	AMBER CAUTION	0.5 s	
CAVALRY CHARGE (3)	A/P DISCONNECTION BY TAKE OVER pb	1.5 s	Second push on TAKE OVER pb
	A/P DISCONNECTION DUE TO FAILURE	PERMANENT	Press MASTER WARN lt or TAKE OVER pb
TRIPLE CLICK	Landing capability downgrade or "GPS PRIMARY LOST" in approach, or mode reversion	0.5 s. (3 pulses)	

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AUDIO INDICATOR	MEANING	DURATION	AUDIO INDICATOR CANCELLATION (1)
CRICKET + "STALL" message (synthetic voice)	STALL	PERMANENT	NIL
BUZZER	CABIN CALL	3 s	NIL
	EMER CABIN CALL	3 s REPEATED 3 TIMES	NIL
	MECH CALL (2)	As long as outside pb pressed	NIL
CONTINUOUS BUZZER (2)	SELCAL CALL	PERMANENT	Press RESET key on ACP
"WINDSHEAR" (synthetic voice)	WINDSHEAR	REPEATED 3 TIMES	NIL
"GO AROUND WIND SHEAR AHEAD" (synthetic voice)	Windshear ahead detected during the landing phase	PERMANENT	NIL
"WINDSHEAR AHEAD" (twice) (synthetic voice)	Windshear ahead detected during the takeoff phase	PERMANENT	NIL
"MONITOR RADAR DISPLAY" (synthetic voice)	Windshear ahead detected caution message	PERMANENT	NIL
C CHORD	ALTITUDE ALERT (*Refer to DSC-31-40 Altitude Alert*)	1.5 s or PERMANENT	new ALTITUDE selection or press MASTER WARN pb
AUTO CALL OUT (synthetic voice)	HEIGHT ANNOUNCEMENT BELOW 2 500 ft (*Refer to DSC-34-40-10 Automatic Call Out - General*)	PERMANENT	NIL
GROUND PROXIMITY WARNING (synthetic voice)	(*Refer to DSC-34-70-10 Description*)	PERMANENT	NIL
"PRIORITY LEFT" "PRIORITY RIGHT" (synthetic voice)	A/P TAKE OVER pb	1 s	NIL
"RETARD" (synthetic voice)	Thrust levers not in IDLE position for landing	ONE TIME at20 ft (10 ft in autoland with A/THR ON), then PERMANENT until thrust levers are set to IDLE	NIL
TCAS (synthetic voice)	(*Refer to DSC-34-80-20 Aural Messages*)	PERMANENT	NIL

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AUDIO INDICATOR	MEANING	DURATION	AUDIO INDICATOR CANCELLATION (1)
″SPEED, SPEED, SPEED″ (Synthetic voice)	Current thrust is not sufficient to recover a positive flight through pitch control	Every 5 s until thrust is increased	THRUST LEVER(s)
″DUAL INPUT″ (synthetic voice)	Both sidesticks are moved simultaneously	Every 5 s	One sidestick deactivated
“PITCH, PITCH” (Synthetic voice)	The aircraft pitch attitude is becoming excessive during flare and landing.	one time	NIL

(1) The pilot can cancel any audio indicator, by pressing the:
- *The EMER CANC pb on the ECAM control panel, or*
- *The MASTER WARN pushbutton, except for OVERSPEED or L/G NOT DOWN warnings.*

(2) The pilot can cancel the continuous buzzer, by pressing the MASTER CAUT pushbutton.

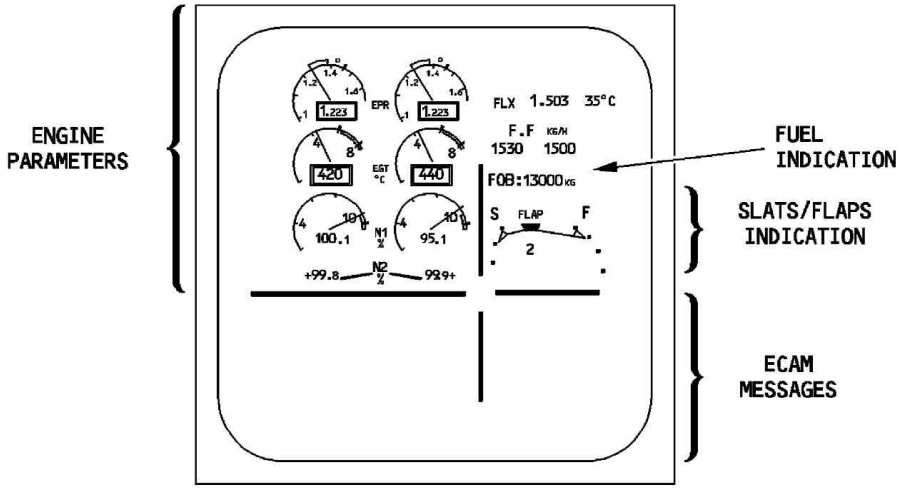
(3) When the flight crew presses the MASTER WARN pushbutton (following a warning that leads to an AP disconnection), the Cavalry Charge sound is only inhibited when it has been emitted in order to avoid an unintended cancellation.

GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

The Engine Warning Display (E/WD) appears on the ECAM's upper Display Unit (DU).

- The upper part of this DU displays :
  - Engine parameters (*Refer to DSC-70-95 ECAM - Primary Parameters*)
  - Fuel On Board (FOB) (*Refer to DSC-28-20 ECAM Upper Display*)
  - Slats/Flaps' position (*Refer to DSC-27-20-30 ECAM F/CTL Page*)
- The lower part of this DU displays messages generated by the FWC :
  - Warning and caution messages, when a failure occurs.
  - Memos, when there is no failure.



The lower part, dedicated to ECAM messages, is divided into two sections of several lines each.

Bottom left : - Primary or independent warnings and cautions, or
- Memo information.

Bottom right : - Title of the system affected by a primary or independent warning or caution, in case of overflow on the bottom left part, or
- Secondary failure, or
- Memo, or
- Special lines (such as “AP OFF”, “LAND ASAP”).

As soon as the FWC detects a failure, and if there is no flight phase inhibition active, the E/WD displays the title of the failure and actions to be taken.
The action line automatically clears, when the flight crew has performed the required action.

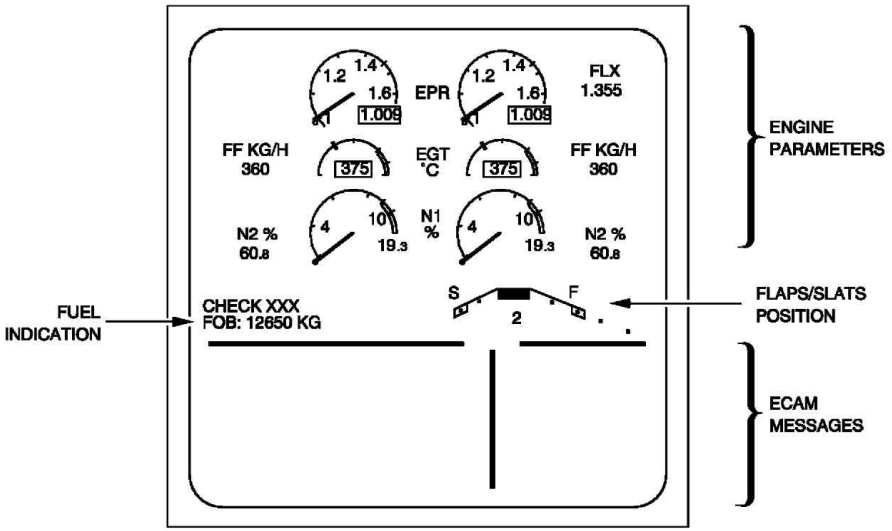
Note: *Certain actions lines will not disappear after being done.*

GENERAL

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The Engine Warning Display (E/WD) appears on the ECAM's upper Display Unit (DU).

- The upper part of this DU displays:
  - Engine parameters (*Refer to DSC-70-95 ECAM - Primary Parameters*)
  - Feedback messages (*Refer to DSC-31-05-60 Feedback Messages*)
  - Fuel On Board (FOB) (*Refer to DSC-28-20 ECAM Upper Display*)
  - Slats/Flaps' position (*Refer to DSC-27-20-30 ECAM F/CTL Page*)
- The lower part of this DU displays messages generated by the FWC:
  - Warning and caution messages, when a failure occurs
  - Memos when there is no failure.



The lower part of the DU, dedicated to ECAM messages, is divided into two sections of several lines each.

Bottom left : - Primary or independent warnings and cautions, or
- Memo information.

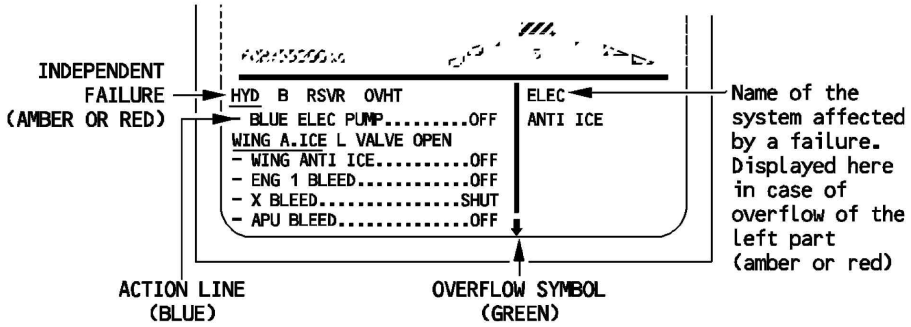
Bottom right : - Title of the system affected by a primary or independent warning or caution, in case of overflow on the bottom left part, or
- Secondary failure, or
- Memo, or
- Special lines (such as “AP OFF”, “LAND ASAP”).

As soon as the FWC detects a failure, and if there is no flight phase inhibition active, the E/WD displays the title of the failure and actions that the flight crew must perform.
The action line automatically clears, when the flight crew has performed the necessary action.

Note: Some action lines do not disappear from the E/WD even after the flight crew performs the necessary action.

INDEPENDENT FAILURE

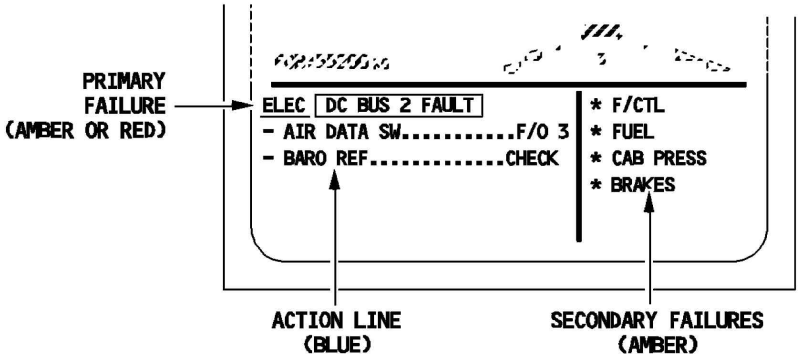
Applicable to: ALL



If there are too many ECAM messages for the amount of space available in the lower part of the E/WD, a green arrow appears at the bottom of the display, pointing down to show that the information has overflowed off the screen. The pilot can scroll down to view additional messages by pushing the CLR pushbutton on the ECAM control panel (on the pedestal, just below the lower ECAM DU).

PRIMARY AND SECONDARY FAILURE

Applicable to: ALL



The ECAM DU displays a primary failure as a boxed title.
It identifies a secondary failure by putting a star in front of the title of the affected system.

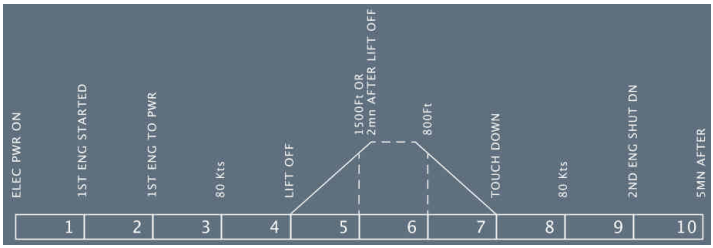
Note: The DU displays the overflow symbol, if primary or secondary failures overflow. In case of ELEC EMER CONFIG, the secondary failures are inhibited.

FLIGHT PHASES

Applicable to: ALL

GENERAL

The FWC divides its functions according to these ten flight phases :

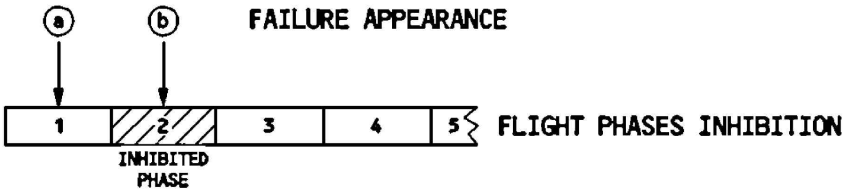


To improve its operational efficacy, the computer inhibits some warnings and cautions for certain flight phases. It does so to avoid alerting the pilots unnecessarily at times when they have high workloads, such as during takeoff or landing. In these two phases, the DU displays magenta memos : “T.O. INHIBIT” (flight phases 3, 4, and 5), and “LDG INHIBIT” (flight phases 7 and 8).

Note: These flight phases are different from and independent of the ones that the FMGC uses.

FLIGHT PHASE INHIBITION

Two cases are possible (for instance) :



Effect on E/WD :

(a) The failure occurs during phase 1. The E/WD displays the warning immediately and continues to display it as long as the failure is present, even in phase 2.

(b) The failure occurs during phase 2. The E/WD displays the warning only when the aircraft has entered phase 3, where it is not inhibited. Then the warning remains displayed as long as the failure is present.

MEMOS

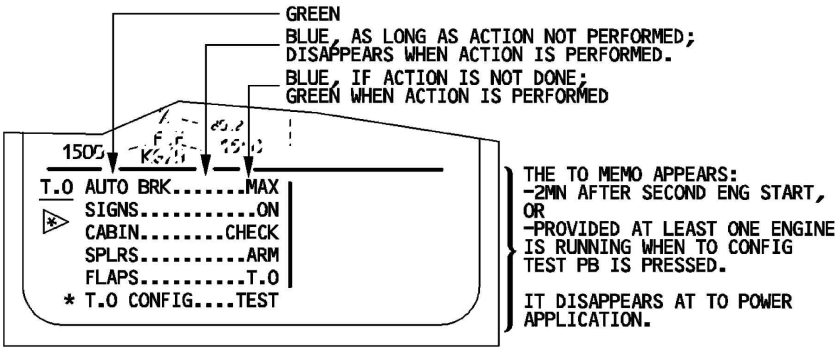
Applicable to: ALL

DISPLAY

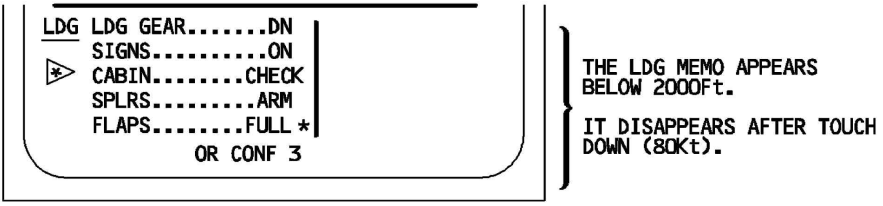
Memos appear in the lower part of the E/WD. They are normally in green, but may be amber in abnormal situations.
Memos list functions or systems that are temporarily used in normal operations.
Each chapter of the “Warning and Cautions” section of this manual lists memo messages.

TO AND LDG MEMOS

During the takeoff and landing phases, the right side of the memo area displays specific TO INHIBIT or LDG INHIBIT (magenta) memos.
Takeoff and landing memos are displayed, as follows, during the related flight phases:



(*) This line disappears when the test is completed. It is replaced by “TO CONFIG NORMAL”, if aircraft configuration is correct.
The test is requested again, if the configuration becomes abnormal.



(*) “CONF 3” is displayed in alternate or direct law, or if the GPWS LDG FLAP 3 pushbutton is ON.

CONFIGURATION WARNINGS

Applicable to: ALL

The following warnings and cautions appear in the lower part of the E/WD if the aircraft is not in takeoff configuration when the flight crew presses the TO CONFIG pushbutton on the ECAM control panel or applies takeoff power.

WARNINGS/CAUTIONS	TO CONFIG TEST	TO POWER
CONFIG RUD TRIM NOT IN TO RANGE (R)	TRIGGERED	TRIGGERED
CONFIG PITCH TRIM NOT IN TO RANGE (R)		
CONFIG FLAPS NOT IN TO CONFIG (R)		
CONFIG SPD BRK NOT RETRACTED (R)		
CONFIG SLATS NOT IN TO CONFIG (R)		
CONFIG L SIDESTICK FAULT (R)		
CONFIG R SIDESTICK FAULT (R)		
DOOR (A)		
FWS OEB/FWC DISCREPANCY (A)		
BRAKES HOT (A)		
FUEL R(L) TK PUMP 1+2 LO PR (A)		NOT TRIGGERED
HYD G(Y) ENG 1(2) PUMP LO PR (A)		
HYD G(Y)(B) SYS LO PR (A)		
ELEC IDG 1(2) DISCONNECTED (A)	TRIGGERED if the two GENs are inop.	
ELEC GEN 1(2) FAULT (A)		
ELEC GEN 1(2) OFF (A)		
ENG 1 OIL LO TEMP (A)	TRIGGERED	
ENG 2 OIL LO TEMP (A)		
CONFIG PARK BRK ON (R)	NOT TRIGGERED	TRIGGERED
ENG FLEX THR LEVERS NOT SET (A)		

(R) Red warning

(A) Amber caution

Intentionally left blank

GENERAL

Applicable to: ALL

The system/status display (SD) uses the lower ECAM DU to display :
- pages showing synoptic diagrams of the aircraft systems, or
- the status page.

SYSTEM PAGES

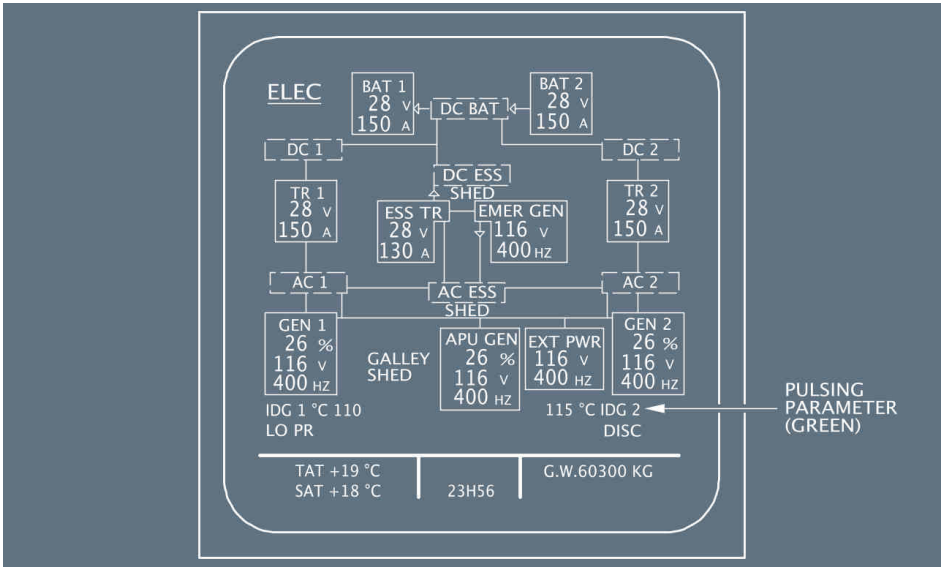
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

1

The lower ECAM DU can display 12 system pages (For description see relevant FCOM chapter):
- ENGINE (secondary engine parameters)
- BLEED (air bleed)
- CAB PRESS (cabin pressurization)
- ELEC (electric power)
- HYD (hydraulic)
- FUEL (fuel)
- APU (auxiliary power unit)
- COND (air conditioning)
- DOOR/OXY (doors/oxygen)
- WHEEL (landing gear, braking, ground spoilers, etc.)
- F/CTL (flight controls)
- CRUISE (cruise)

The pilot may manually call up a system page for display on the lower ECAM DU, or the system may automatically display a page.
- Manual:
  - The pilot can, at any time, use the pushbutton on the ECAM's control panel to call up and display any system page, except the CRUISE page.
  - The corresponding pushbutton on the ECAM control panel lights up.
  - A failure-related or advisory display automatically replaces a page the pilot has manually called up.
- Automatic, related to a failure:
  - The relevant system page automatically appears, as soon as any fault or malfunction triggers a caution or warning message.

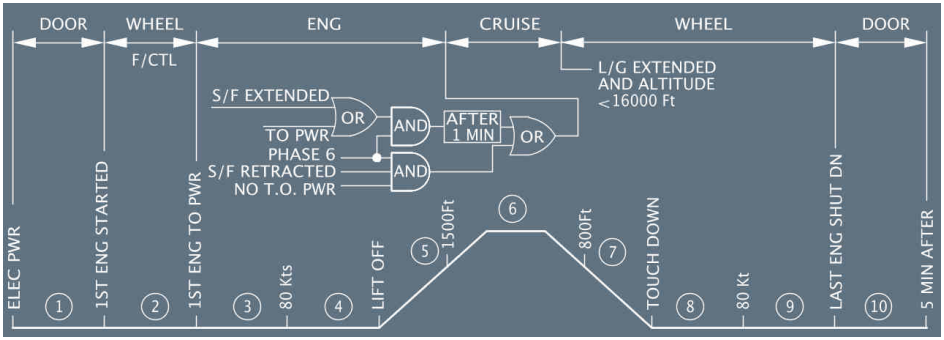
- Automatic, advisory:
  - The relevant system page automatically appears, when a parameter drifts out of its normal range.
  - The value (shown in green) pulses, as long as it is outside its limits.
  - The advisory mode is inhibited in some flight phases.



Note: *If an advisory is triggered, when the ECAM is in the single-display configuration, an advisory message appears on the upper part of the E/WD, and the associated key on the ECAM control panel flashes to identify the appropriate system page.*

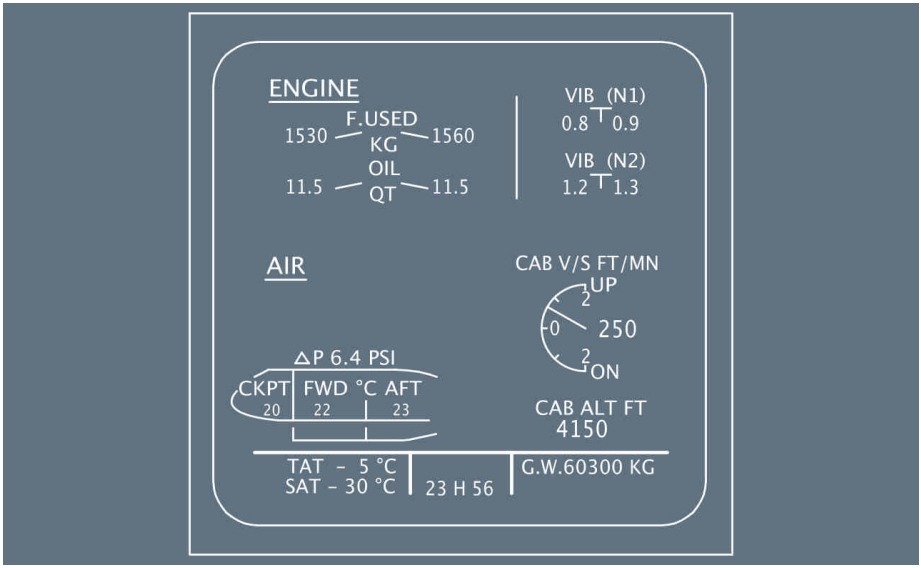


- Automatic, flight phase mode
  - If no other mode is engaged, the SD displays the system page related to the present flight phase, as shown in the following diagram.



- Phase 2 : The F/CTL page replaces the WHEEL page for 20 s when either pilot moves his sidestick (more than 3 ° in pitch or roll) or when the rudder pedal deflection is more than 22 °.
- The APU page appears when the APU MASTER switch is ON. It disappears when APU RPM has been above 95 % for 10 s, or when the APU MASTER switch is switched OFF.
- The ENGINE page appears at the beginning of start sequence or when a pilot selects “CRANK”. It disappears 10 s after the end of the start sequence, when the ENG MODE sel is set to NORM.

For a description of the ENGINE and AIR indications that appear when the SD is displaying the CRUISE page, see the relevant FCOM chapter.



SYSTEM PAGES

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

2

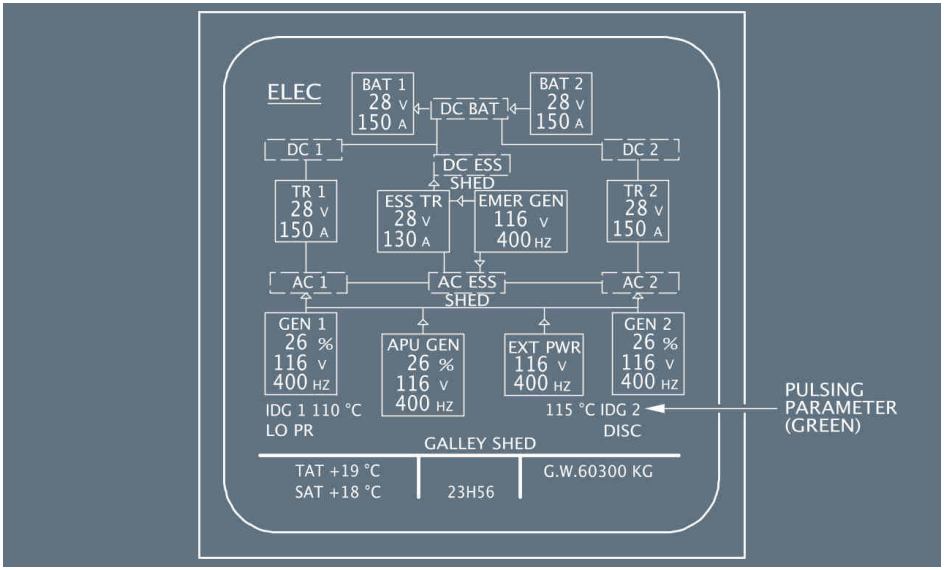
The lower ECAM DU can display 12 system pages (For description see relevant FCOM chapter):

- ENGINE (secondary engine parameters)
- BLEED (air bleed)
- CAB PRESS (cabin pressurization)
- ELEC (electric power)
- HYD (hydraulic)
- FUEL (fuel)
- APU (auxiliary power unit)
- COND (air conditioning)
- DOOR/OXY (doors/oxygen)
- WHEEL (landing gear, braking, ground spoilers, etc.)
- F/CTL (flight controls)
- CRUISE (cruise)

The pilot may manually call up a system page for display on the lower ECAM DU, or the system may automatically display a page.

- Manual:
  - The pilot can, at any time, use the pushbutton on the ECAM's control panel to call up and display any system page, except the CRUISE page.
  - The corresponding pushbutton on the ECAM control panel lights up.
  - A failure-related or advisory display automatically replaces a page the pilot has manually called up.
- Automatic, related to a failure:
  - The relevant system page automatically appears, as soon as any fault or malfunction triggers a caution or warning message.

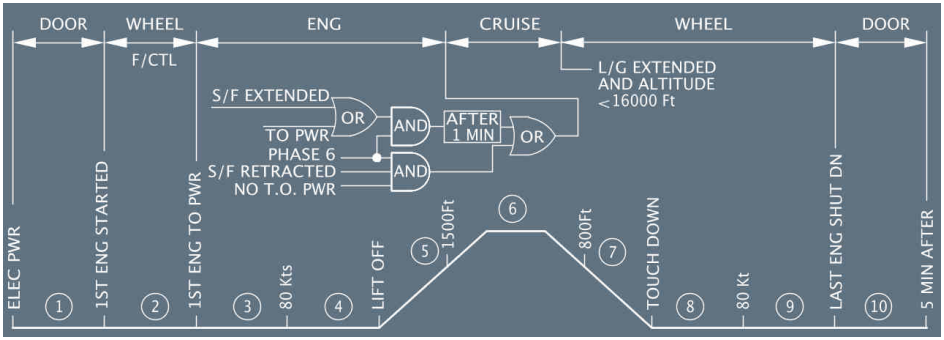
- Automatic, advisory:
  - The relevant system page automatically appears, when a parameter drifts out of its normal range.
  - The value (shown in green) pulses, as long as it is outside its limits.
  - The advisory mode is inhibited in some flight phases.



Note: *If an advisory is triggered, when the ECAM is in the single-display configuration, an advisory message appears on the upper part of the E/WD, and the associated key on the ECAM control panel flashes to identify the appropriate system page.*

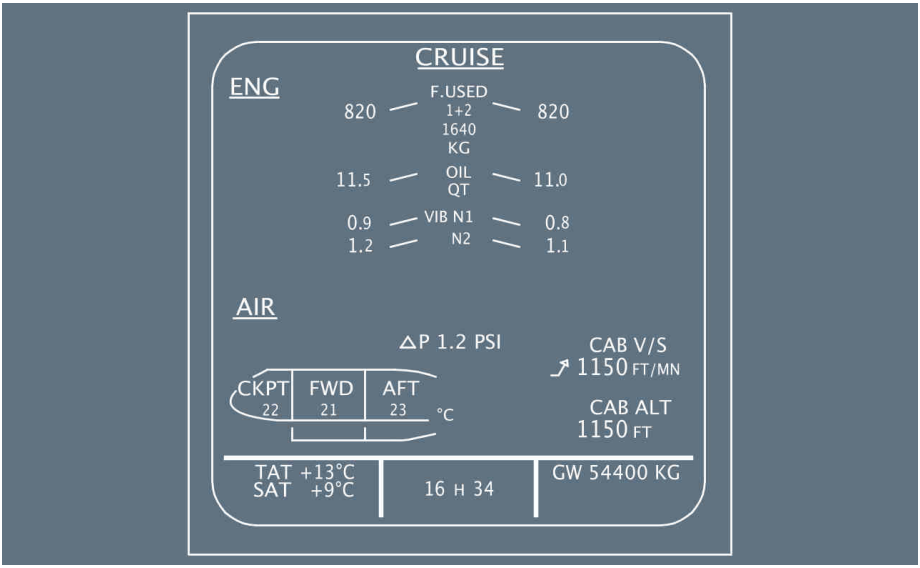


- Automatic, flight phase mode
  - If no other mode is engaged, the SD displays the system page related to the present flight phase, as shown in the following diagram.



- Phase 2 : The F/CTL page replaces the WHEEL page for 20 s when either pilot moves his sidestick (more than 3 ° in pitch or roll) or when the rudder pedal deflection is more than 22 °.
- The APU page appears when the APU MASTER switch is ON. It disappears when APU RPM has been above 95 % for 10 s, or when the APU MASTER switch is switched OFF.
- The ENGINE page appears at the beginning of start sequence or when a pilot selects “CRANK”. It disappears 10 s after the end of the start sequence, when the ENG MODE sel is set to NORM.

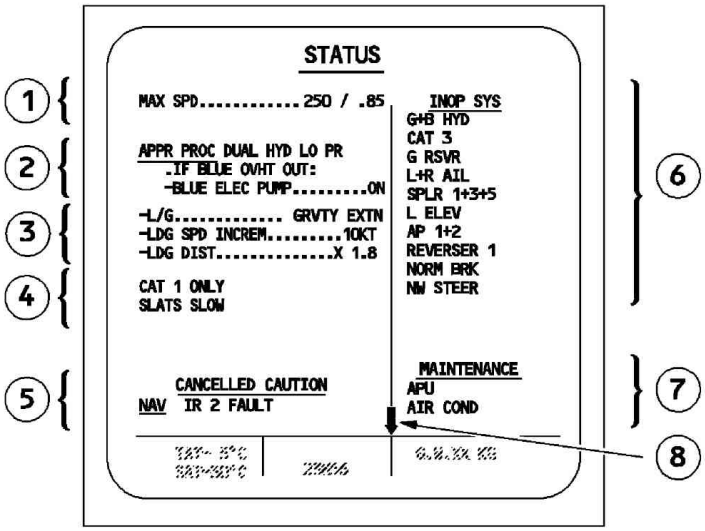
For a description of the ENGINE and AIR indications that appear when the SD is displaying the CRUISE page, see the relevant FCOM chapter.



STATUS PAGE

Applicable to: ALL

The status page displays an operational summary of the aircraft status after the SD has displayed a failure. As shown in the illustration above, the summary includes :



(1) Limitations (speed, flight level) : Blue

(2) Approach procedures : White/Red or Amber

(3) Procedures (corrections to apply for landing) : Blue

(4) Information : Green

(5) Cancelled caution : White

(6) Inoperative system : Amber

(7) Maintenance status : White

(8) Symbol displayed if data overflows the left or right area.

The pilot scrolls the display to view overflow by pressing the CLR pushbutton.

Note: *The titles of the different parts of the display are white and underlined.*

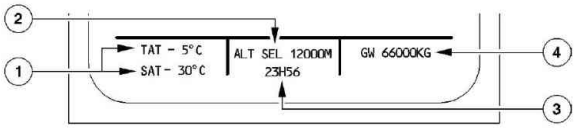
The STATUS page automatically appears, once the crew has cleared all the pages corresponding to the current failure. The STATUS page also appears automatically during descent, when the slats are extended, unless the page is empty. The pilot may manually call up the status page by pressing the STS key on the ECAM control panel.

If the STATUS page holds messages other than “CANCELLED CAUTION”, or the MAINTENANCE part, the E/WD screen shows “STS”(status reminder).

If the STATUS page holds messages in the MAINTENANCE, part on engine shutdown, the "STS"(status reminder) flashes on the E/WD screen.
The screen displays the MAINTENANCE, only when the aircraft is on ground, before engine start-up or after engine shutdown (Phases 1 and 10).

PERMANENT DATA

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



(1) Temperature
The screen displays the Total Air Temperature (TAT) and Static Air Temperature (SAT) in green.

(2) G LOAD - ALT SEL

The screen displays one of the following items:
- The Load factor (G LOAD) in amber, when the value is above 1.4 g or below 0.7 g. The display of the load factor is inhibited during flight phases 1, 2 and 3.
- Altitude in green selected via the Flight Control Unit (FCU), if the flight crew selects metric units, and provided the load factor is not displayed.

(3) UTC
The screen displays the Universal Time Coordinated (UTC), synchronized with the cockpit clock, in green.

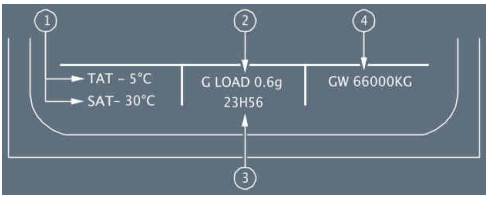
(4) GW
The screen displays the Gross Weight (GW) in green, as soon as the flight crew starts the first engine. The last two digits are dashed, if accuracy is degraded. On ground, blue dashes are displayed instead of the indication, if no computed data is available.

Note: When the Fuel On Board (FOB) indicated on the ECAM exceeds 23 200 kg (51 147 lb), the GW indication is inaccurate. When the FOB on the ECAM goes below 23 200 kg (51 147 lb) GW accuracy is recovered.

PERMANENT DATA

Applicable to: B-HST, B-HSU

3



(1) Temperature

The screen displays the Total Air Temperature (TAT) and Static Air Temperature (SAT) in green.

(2) G LOAD

The screen displays one of the following items:

- Load factor (G LOAD) in amber, when the value is above 1.4 g or, below 0.7 g. The display of the load factor is inhibited during flight phases 1, 2, 3, 9 and 10.
- "CHECK CAPT (F/O) PFD", "CHECK CAPT (F/O) ND"or "CHECK SD"all in amber (*Refer to DSC-31-05-20 Cockpit Arrangement*).

Note: The display of the feedback messages takes priority over the load factor indication.

(3) UTC

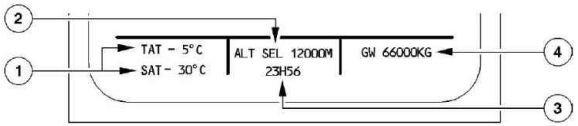
The screen displays the Universal Time Coordinated (UTC), synchronized with the cockpit clock, in green.

(4) GW

The screen displays the Gross Weight (GW) in green, as soon as the flight crew starts the first engine. The last two digits are dashed, if accuracy is degraded. On ground, blue dashes are displayed instead of the indication, if no computed data is available.

PERMANENT DATA

Applicable to: B-HSJ, B-HSK, B-HTG



(1) Temperature
The screen displays the Total Air Temperature (TAT) and Static Air Temperature (SAT) in green.

(2) G LOAD - ALT SEL

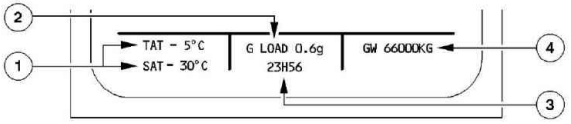
The screen displays one of the following items:
- The Load factor (G LOAD) in amber, when the value is above 1.4 g or below 0.7 g. The display of the load factor is inhibited during flight phases 1, 2 and 3.
- Altitude in green selected via the Flight Control Unit (FCU), if the flight crew selects metric units, and provided the load factor is not displayed.

(3) UTC
The screen displays the Universal Time Coordinated (UTC), synchronized with the cockpit clock, in green.

(4) GW
The screen displays the Gross Weight (GW) in green, as soon as the flight crew starts the first engine. The last two digits are dashed, if accuracy is degraded. On ground, blue dashes are displayed instead of the indication, if no computed data is available.

PERMANENT DATA

Applicable to: B-HTH, B-HTI



(1) Temperature
The screen displays the Total Air Temperature (TAT) and Static Air Temperature (SAT) in green.

(2) G Load
The screen displays the load factor (G LOAD) in amber, when the value is above 1.4 g or below 0.7 g. The display of the load factor is inhibited during flight phases 1, 2 and 3.

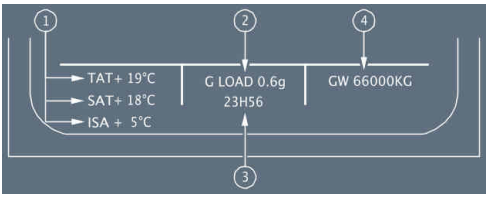
(3) UTC
The screen displays the Universal Time Coordinated (UTC), synchronized with the cockpit clock, in green.

(4) GW

The screen displays the Gross Weight (GW) in green, as soon as the flight crew starts the first engine. The last two digits are dashed, if accuracy is degraded. On ground, blue dashes are displayed instead of the indication, if no computed data is available.

PERMANENT DATA

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR



(1) Temperature

The screen displays the Total Air Temperature (TAT) and Static Air Temperature (SAT) in green.

International Standard Atmosphere temperature (ISA) is displayed in GREEN, in standard altitude mode and when the SAT is valid.

(2) G LOAD

The screen displays the load factor (G LOAD) in amber, when the value is above 1.4 g or below 0.7 g. The display of the load factor is inhibited during flight phases 1, 2 and 3.

(3) UTC

The screen displays the Universal Time Coordinated (UTC), synchronized with the cockpit clock, in green.

(4) GW

The screen displays the Gross Weight (GW) in green, as soon as the flight crew starts the first engine. The last two digits are dashed, if accuracy is degraded. On ground, blue dashes are displayed instead of the indication, if no computed data is available.

Note: When the Fuel On Board (FOB) indicated on the ECAM exceeds 23 200 kg (51 147 lb), the GW indication is inaccurate. When the FOB on the ECAM goes below 23 200 kg (51 147 lb) GW accuracy is recovered.

AMBER CROSSES "XX" ON THE SD

Applicable to: ALL

If a parameter value on any SD page is not available for display, amber crosses "XX" appear instead of the value.

GENERAL

Applicable to: ALL

If ECAM detects a failure :

- The E/WD displays warning or caution messages.
- The master warning or master caution lights light up (except in the case of a level 1 caution).
- The system sounds an aural signal (except in the case of a level 1 caution).
- The system display (SD) shows the system page for the affected system.
- The CLR pushbutton on the ECAM control panel lights up.

In addition, a local warning light controlled directly by the affected system can light up.

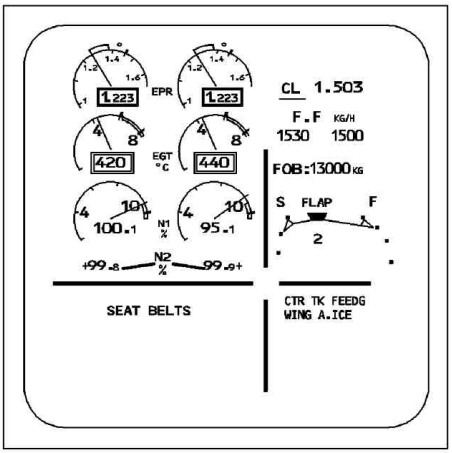
After completing remedial procedures, the flight crew must push the CLR pushbutton repeatedly until the displays return to their normal configurations :

- MEMO messages on the E/WD
- The system page related to the present flight phase on the SD.
- The CLR light on the ECAM control panel turned off.

Intentionally left blank

1 - THE ECAM DETECTS NO FAILURE

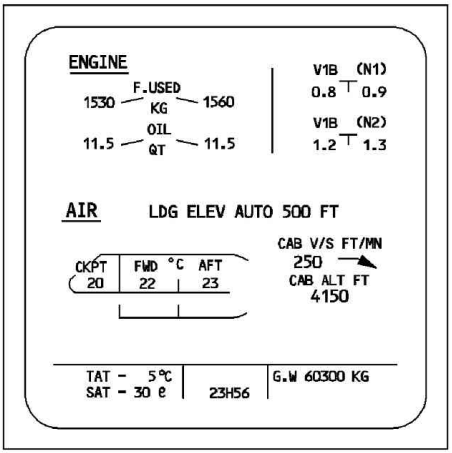
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



ECAM UPPER DISPLAY (E/WD)

- ENGINE CONTROL PARAMETERS
- FUEL QUANTITY INDICATION
- FLAPS/SLATS POSITION

- MEMO INFORMATION



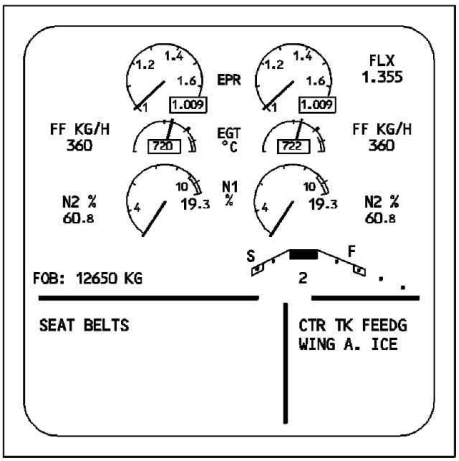
ECAM LOWER DISPLAY

- FLIGHT PHASE RELATED SYSTEM PAGE (CRUISE PAGE IN THIS EXAMPLE)

- PERMANENT DATA

1 - THE ECAM DETECTS NO FAILURE

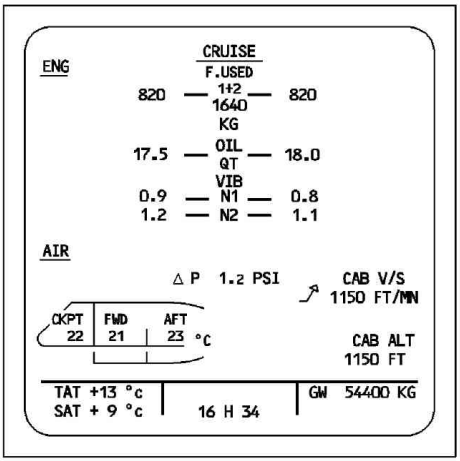
Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



ECAM UPPER DISPLAY (E/WD)

- ENGINE CONTROL PARAMETERS
- FUEL QUANTITY INDICATION
- FLAPS/SLATS' POSITION

- MEMO INFORMATION



ECAM LOWER DISPLAY

- FLIGHT PHASE RELATED SYSTEM PAGE (CRUISE PAGE IN THIS EXAMPLE)

- PERMANENT DATA

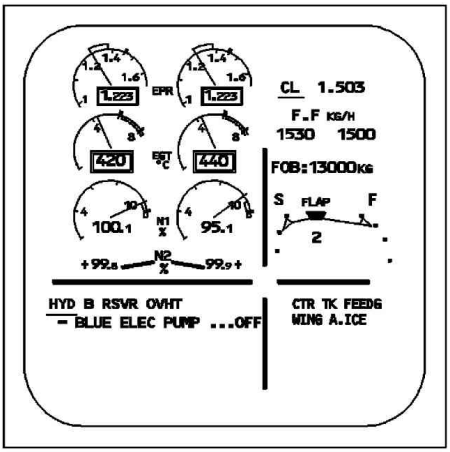
2 - THE ECAM DETECTS A FAILURE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

For example, a hydraulic reservoir is overheat.

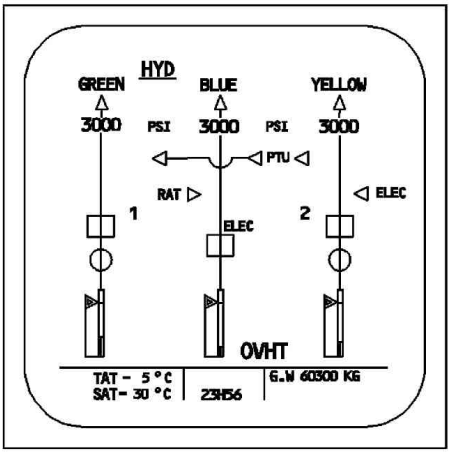
COCKPIT INDICATIONS

- A single chime sounds.
- Both MASTER CAUTION lights come on, and stay on.
- A FAULT light, on the overhead HYD panel, comes on.
- The memo space on the E/WD displays the “HYD B RSVR OVHT”message, and the “BLUE ELEC PUMP . . . . . OFF” instruction.
- The lower ECAM display (SD) automatically calls up the hydraulic system's diagram, and displays “OVHT”in amber next to the blue system.
- The ECAM's CLR pushbutton lights up.



ECAM UPPER DISPLAY (E/WD)

- LEFT PART
  . INDEPENDENT FAILURE
    -TITLE OF THE FAILURE
    -ACTIONS TO BE PERFORMED
- RIGHT PART
  . MEMO INFORMATION



ECAM LOWER DISPLAY (SD)

- SYNOPTIC OF THE AFFECTED SYSTEM AUTOMATICALLY CALLED
OVHT IS DISPLAYED IN AMBER

2 - THE ECAM DETECTS A FAILURE

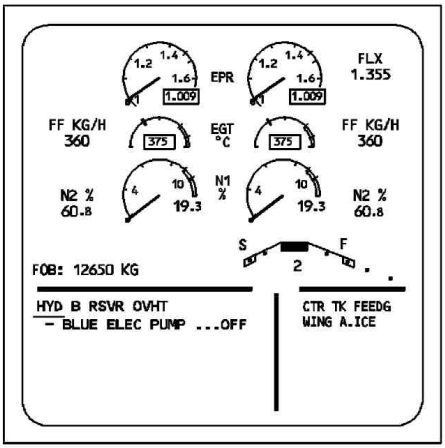
Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

For example, a hydraulic reservoir is overheat.

COCKPIT INDICATIONS

- A single chime sounds.
- Both MASTER CAUTION lights come on, and stay on.

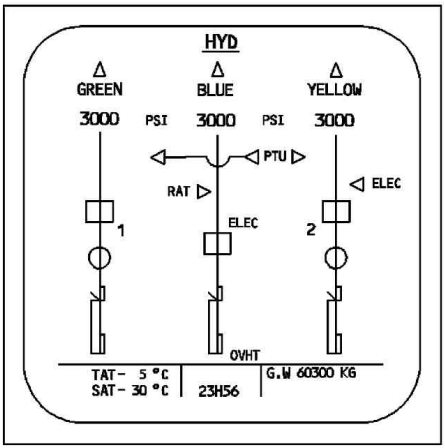
- A FAULT light, on the overhead HYD panel, comes on.
- The memo space on the E/WD displays the “HYD B RSVR OVHT”message, and the “BLUE ELEC PUMP . . . . . OFF” instruction.
- The lower ECAM display (SD) automatically calls up the hydraulic system's diagram, and displays “OVHT”in amber next to the blue system.
- The ECAM's CLR pushbutton lights up.



ECAM UPPER DISPLAY (E/WD)

- BOTTOM LEFT
  . INDEPENDENT FAILURE
    -TITLE OF THE FAILURE
    -ACTIONS TO BE PERFORMED

- BOTTOM RIGHT
  . MEMO INFORMATION



ECAM LOWER DISPLAY (SD)

- SYNOPTIC OF THE AFFECTED SYSTEM AUTOMATICALLY CALLED OVHT IS DISPLAYED IN AMBER

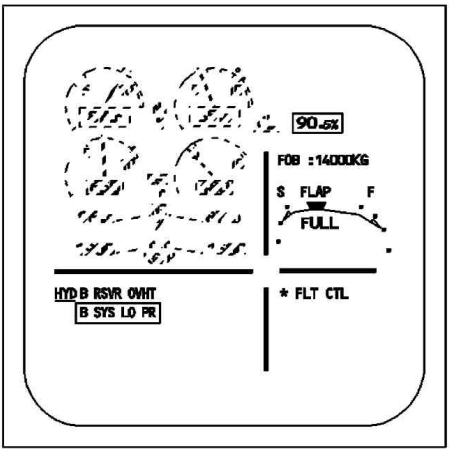
3 - THE FLIGHT CREW FOLLOWS THE INSTRUCTION DISPLAYED ON THE E/WD

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

The flight crew switches off the BLUE ELEC PUMP pushbutton, depressurizing the blue hydraulic circuit.

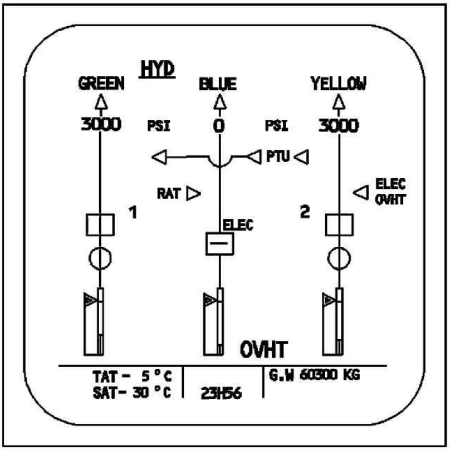
COCKPIT INDICATIONS

- A single chime sounds.
- Both MASTER CAUTION lights stay on.
- A FAULT/OFF light, on the overhead panel, comes on.
- The second part of the message on the E/WD changes to “B SYS LO PR”.
- The SD's system diagram shows an amber zero for the pressure in the blue system, along with the amber “OVHT”.
- The right side of the memo area indicates a secondary failure in the flight control system.
- The ECAM control panel's CLR pushbutton remains on.



ECAM UPPER DISPLAY (E/WD)

- LEFT PART
  . INDEPENDENT FAILURE AND PRIMARY FAILURE
- RIGHT PART
  .SECONDARY FAILURE



ECAM LOWER DISPLAY (SD)

- THE SYNOPTIC OF THE SYSTEM PAGE IS CHANGED ACCORDING TO THE NEW SYSTEM CONFIGURATION
OVHT AND THE PRESSURE ARE DISPLAYED IN AMBER

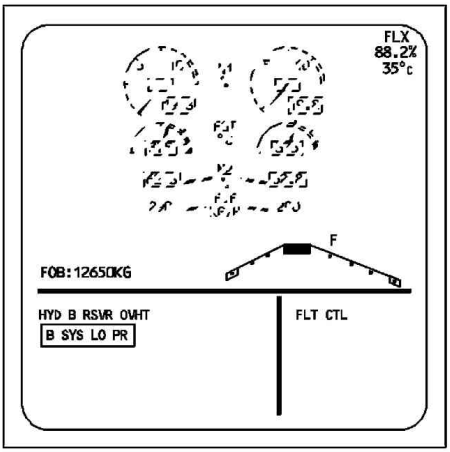
3 - THE FLIGHT CREW FOLLOWS THE INSTRUCTION DISPLAYED ON THE E/WD

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The flight crew switches off the BLUE ELEC PUMP pushbutton, depressurizing the blue hydraulic circuit.

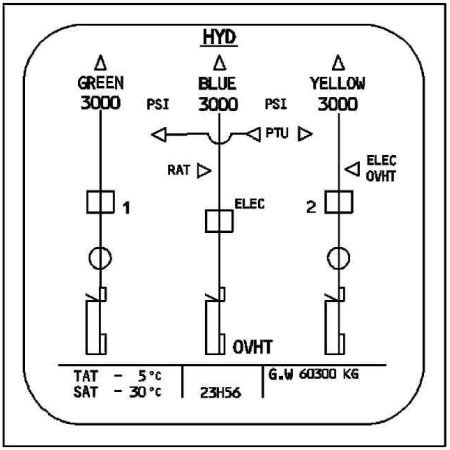
COCKPIT INDICATIONS

- A single chime sounds.
- Both MASTER CAUTION lights stay on.
- A FAULT/OFF light, on the overhead panel, comes on.
- The second part of the message on the E/WD changes to “B SYS LO PR”.
- The SD's system diagram shows an amber zero for the pressure in the blue system, along with the amber “OVHT”.
- The right side of the memo area indicates a secondary failure in the flight control system.
- The ECAM control panel's CLR pushbutton remains on.



ECAM UPPER DISPLAY (E/WD)

- BOTTOM LEFT
  . INDEPENDENT FAILURE AND PRIMARY FAILURE
- BOTTOM RIGHT
  .SECONDARY FAILURE



ECAM LOWER DISPLAY (SD)

- THE SYNOPTIC OF THE SYSTEM PAGE IS CHANGED ACCORDING TO THE NEW SYSTEM CONFIGURATION
OVHT AND THE PRESSURE ARE DISPLAYED IN AMBER

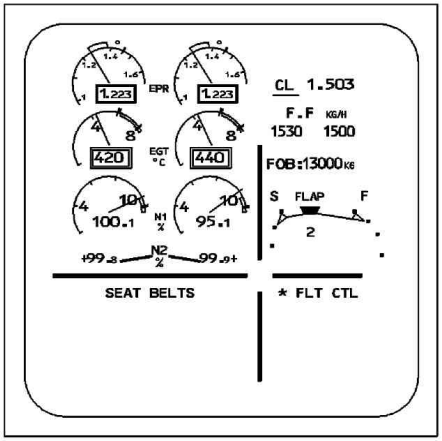
4 - ONE OF THE PILOTS PUSHES THE CLR PUSHBUTTON ON THE ECP

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

COCKPIT INDICATIONS

- The CLR pushbutton stays on.
- The FAULT/OFF light stays on.

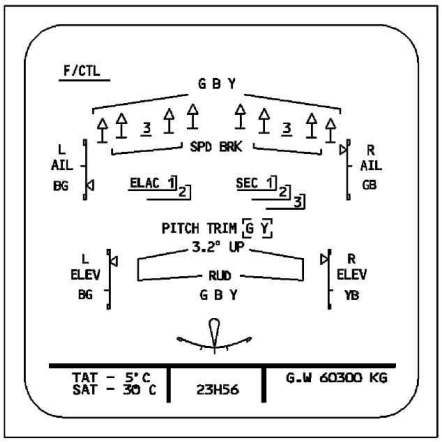
- Hydraulic system messages disappear from the E/WD, and the right side of the memo area indicates a secondary failure in the flight control system.
- The SD automatically calls up the flight control system page, with surface actuator indications (associated with the blue hydraulic system) shown in amber.



ECAM UPPER DISPLAY (E/WD)

– LEFT PART
.MEMO INFORMATION

– RIGHT PART
.SECONDARY FAILURE



ECAM LOWER DISPLAY (SD)

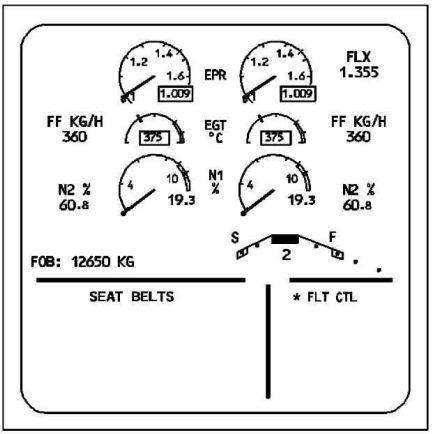
– F/CTL SYSTEM PAGE
AUTOMATICALLY DISPLAYED
FAULTY SPOILERS (n°3)
AND SURFACE ACTUATORS PRESSURE
INDICATIONS B ARE DISPLAYED
IN AMBER

4 - ONE OF THE PILOTS PUSHES THE CLR PUSHBUTTON ON THE ECP

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

COCKPIT INDICATIONS

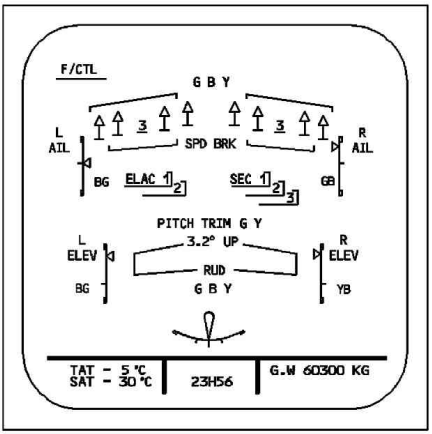
- The CLR pushbutton stays on.
- The FAULT/OFF light stays on.
- Hydraulic system messages disappear from the E/WD, and the right side of the memo area indicates a secondary failure in the flight control system.
- The SD automatically calls up the flight control system page, with surface actuator indications (associated with the blue hydraulic system) shown in amber.



ECAM UPPER DISPLAY (E/WD)

- BOTTOM LEFT
  . MEMO INFORMATION

- BOTTOM RIGHT
  . SECONDARY FAILURE



ECAM LOWER DISPLAY (SD)

- F/CTL SYSTEM PAGE AUTOMATICALLY DISPLAYS FAULTY SPOILERS (n°3) AND SURFACE ACTUATOR B PRESSURE INDICATIONS IN AMBER.

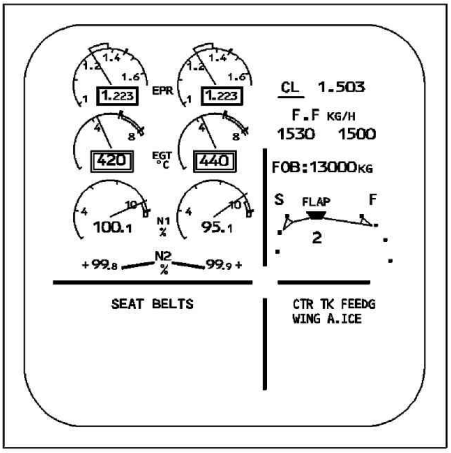
5 - ONE OF THE PILOTS PUSHES THE CLR PUSHBUTTON A SECOND TIME

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

COCKPIT INDICATIONS

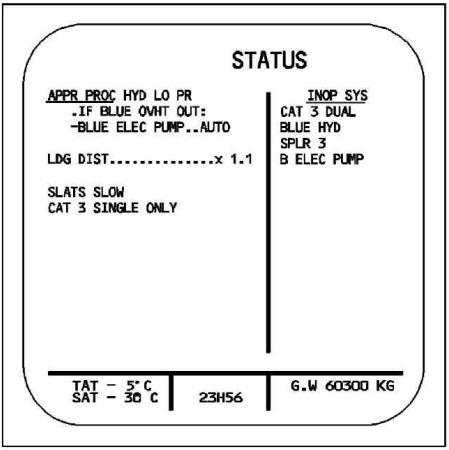
- The ECP's CLR and STS pushbuttons light up.
- The FAULT/OFF lights stay on.

- The E/WD's memo area returns to normal.
- The STATUS page automatically appears on the SD, displaying the procedures for completing the flight with a faulty blue system.



ECAM UPPER DISPLAY (E/WD)

- FULL MEMO DISPLAYED



ECAM LOWER DISPLAY (SD)

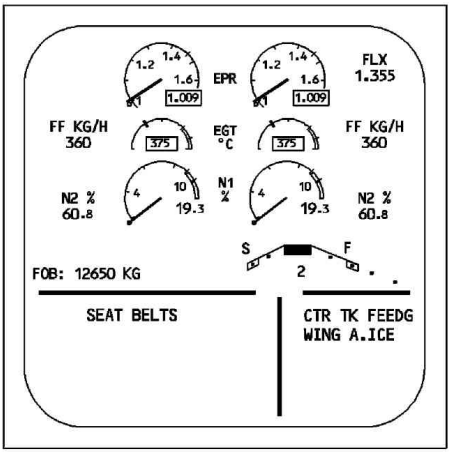
- THE STATUS PAGE IS AUTOMATICALLY DISPLAYED TO:
  - .PROVIDE THE PROCEDURE TO BE APPLIED FOR APPROACH.
  - .PROVIDE LANDING DISTANCE FACTORS AND INFORMATION.
  - .LIST THE INOPERATIVE SYSTEMS.

5 - ONE OF THE PILOTS PUSHES THE CLR PUSHBUTTON A SECOND TIME

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

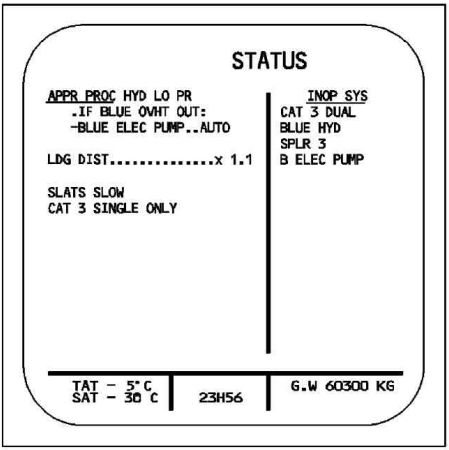
COCKPIT INDICATIONS

- The ECP's CLR and STS pushbuttons light up.
- The FAULT/OFF lights stay on.
- The E/WD's memo area returns to normal.
- The STATUS page automatically appears on the SD, displaying the procedures for completing the flight with a faulty blue system.



ECAM UPPER DISPLAY (E/WD)

- FULL MEMO DISPLAYED



ECAM LOWER DISPLAY (SD)

- THE STATUS PAGE IS AUTOMATICALLY DISPLAYED TO:
  - .PROVIDE THE PROCEDURE TO BE APPLIED FOR APPROACH.
  - .PROVIDE LANDING DISTANCE FACTORS AND INFORMATION.
  - .LIST THE INOPERATIVE SYSTEMS.

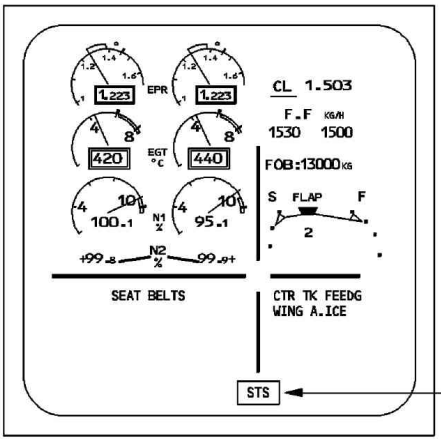
6 - ONE OF THE PILOTS PUSHES THE CLR PUSHBUTTON A THIRD TIME

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

COCKPIT INDICATIONS

- The CLR pushbutton light goes off.
- The FAULT/OFF lights stay on.

- A status reminder appears at the bottom of the E/WD.
- The SD automatically displays the system page corresponding to the flight phase.

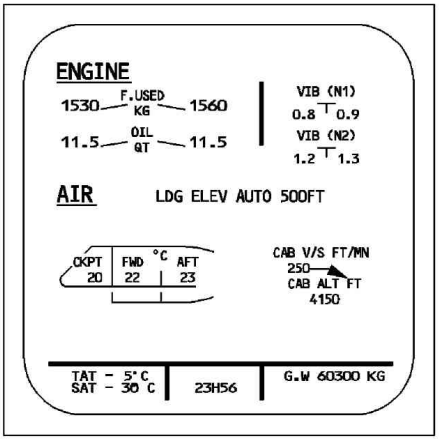


ECAM UPPER DISPLAY (E/WD)

– FULL MEMO DISPLAYED

STATUS REMINDER

ECAM LOWER DISPLAY (SD)



– RETURN TO THE FLIGHT PHASE RELATED SYSTEM PAGE : CRUISE PAGE

6 - ONE OF THE PILOTS PUSHES THE CLR PUSHBUTTON A THIRD TIME

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

COCKPIT INDICATIONS

- The CLR pushbutton light goes off.
- The FAULT/OFF lights stay on.
- A status reminder appears at the bottom of the E/WD.
- The SD automatically displays the system page corresponding to the flight phase.



Intentionally left blank

GENERAL

Applicable to: ALL

The OEB reminder function provides operational help to the crew by enabling them to clearly identify (on the ECAM) all procedures and status messages affected by an OEB.
When a situation leading to a warning/caution occurs, a message informs the crew in real time that an OEB exists for the displayed warning and/or status and, consequently, that the procedure and/or status presented on the ECAM is not applicable.
Then the crew must refer to the QRH where the correct information is provided.

DESCRIPTION

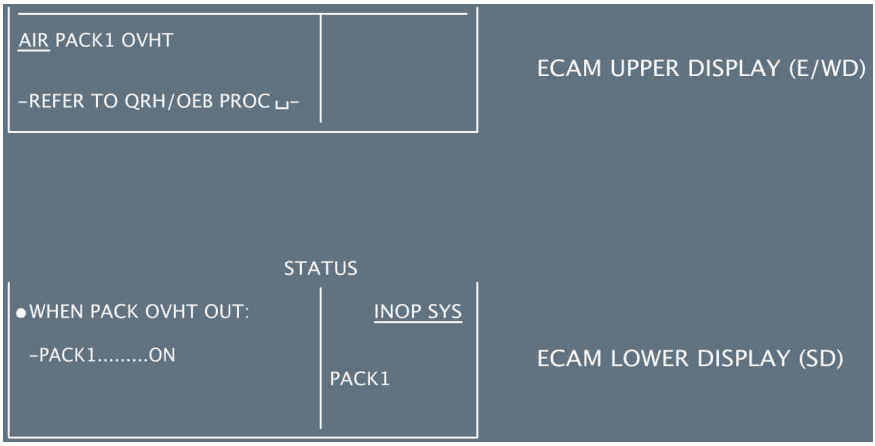
Applicable to: ALL

The OEB reminder flag may apply to the:
- ECAM procedure only,
- ECAM procedure and corresponding status messages,
- Status message only.

1 **PROCEDURE ONLY AFFECTED**

- The ECAM warning title remains unaltered,
- All corresponding actions are suppressed and replaced by the “REFER TO QRH/OEB PROC”message,
- The related status messages on the ECAM system display remains unaltered.

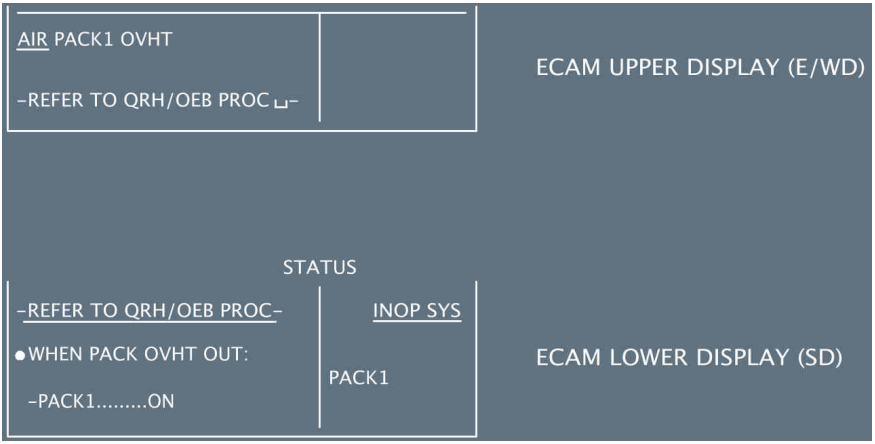
COCKPIT INDICATION



2 **PROCEDURE AND STATUS AFFECTED**

- The ECAM warning title remains unaltered,
- All corresponding actions are suppressed and replaced by the “REFER TO QRH/OEB PROC”message,
- The related status messages on the ECAM system display remains unchanged, except for the additional “REFER TO QRH/OEB PROC”title.

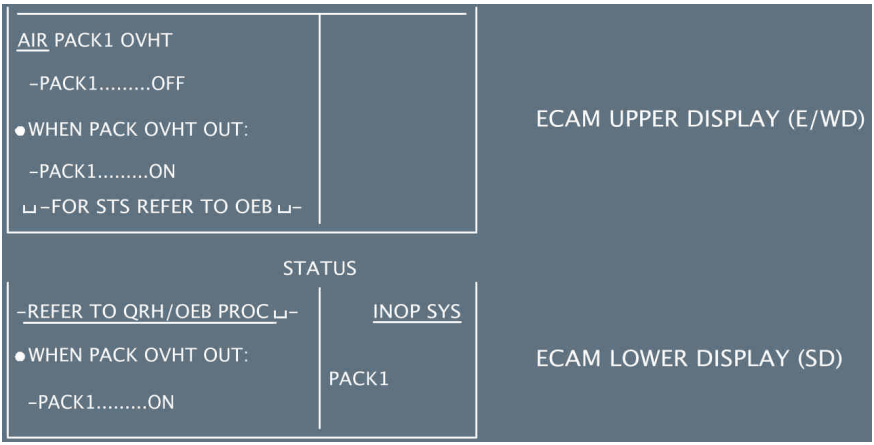
COCKPIT INDICATION



3 **STATUS MESSAGE ONLY AFFECTED**

- The ECAM warning title remains unaltered,
- The corresponding procedure remains unchanged, except for the additional “FOR STS REFER TO OEB"line.
- The related status messages on the ECAM system display remains unchanged, except for the additional " REFER TO QRH/OEB PROC"title.

COCKPIT INDICATION



OEB DATABASE

Applicable to: ALL

The OEB database lists the warnings and cautions affected by an OEB.

The OEB database can be :

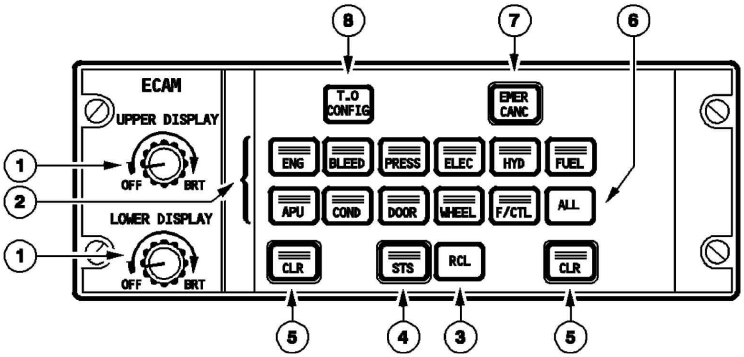
- Loaded manually on the aircraft via the MCDU, and stored in both FWCs.
- Crossloaded from one FWC to the other FWC.
- Updated by entering a code via the MCDU.
- Checked via the MCDU.

Note: *The code provided on the OEB is designed to ensure that the OEB database is not updated before the OEB is available.*

Intentionally left blank

ECAM CONTROL PANEL

Applicable to: ALL



(1) OFF / BRT knobs

Used to turn the ECAM DUs on and off, and to control their brightness (automatic adjustment of brightness for ambient light conditions is superimposed on this manual control).

Note: When the pilot turns the UPPER DISPLAY knob to OFF, the engine/warning (E/W) display appears on the lower display unit (automatic transfer).

(2) System page pushbuttons

- Call up the corresponding system pages on the SD
- Light up, when pushed for manual selection, or when an advisory is detected
- Call up the aircraft system page corresponding to the present flight phase or the current warning when pushed a second time.

  When only one ECAM display is on, the pilot can display a system page for up to 3 min by pushing and holding the system page pushbutton.
  - If an advisory condition arises, the relevant system page is not automatically displayed, but the pushbutton light pulses
  - If an ECAM warning is triggered, the relevant system page is not automatically displayed, and the system page pushbutton does not light up.

(3) RCL pb

If the flight crew pushes the RCL pb , the E/WD displays:

- All warning, caution messages, and status pages that have been suppressed by the activation of the CLR pb, and
- All the alerts that are still active but inhibited in the whole active flight phase.

If there are no suppressed warnings or cautions, the E/WD shows “NORMAL” for 5 s.
If the flight crew holds this pushbutton down for more than 3 s, the E/WD displays any caution messages that were suppressed by the EMER CANC pb.

(4) STS pb

The pilot pushes this pushbutton to display the STATUS page on the lower SD. The pushbutton remains lit, as long as the SD displays the STS page. If the system has no status messages, the status page displays “NORMAL” for 5 s.
The pilot can clear the STATUS page by pushing the CLR pb, or by pushing the STS pb a second time.

When only one ECAM display is on :

- It displays the STATUS page only when the pilot pushes the STATUS pushbutton and holds it. He can display the next STATUS page, if any, by releasing the pushbutton and pushing it again (before 2 s have elapsed). The new page then appears after a short delay.
- The pilot can keep the STS pb pressed to display the STATUS page for a maximum of 3 min, after which the ECAM automatically displays the engine/warning page.

(5) CLR pb

This pushbutton remains lit as long as the E/WD is displaying a warning or caution message, or a status message on the SD.
If it is lit, pressing it changes the ECAM display.

(6) ALL pb

When this pushbutton is pressed and held down, the SD successively displays all the system pages at one-second intervals.
If the ECAM control panel fails, the pilot can use this pushbutton to page through the system pages until he comes to the one he wants to look at. He then releases the pushbutton to select that page.

(7) EMER CANC pb

This pushbutton affects the following :

- Warnings :
  - Cancel (stop) an aural warning for as long as the failure condition continues
  - Extinguishes the MASTER WARNINGS lights
  - Does not affect the ECAM message display.
- Cautions :
  - Cancel any present caution (single chime, MASTER CAUTION lights, ECAM message) for the rest of the flight
  - Automatically calls up the STATUS page, which displays “CANCELLED CAUTION” and the title of the failure that is inhibited.

The inhibition is automatically suppressed when Flight Phase 1 is initiated. The pilot may restore it manually by pressing the RCL pb for more than 3 s.

Note: This pushbutton should only be used to suppress spurious MASTER CAUTIONS.

(8) T.O CONFIG pb

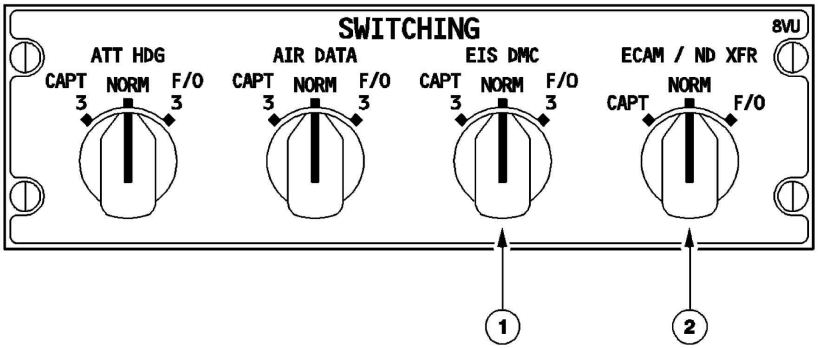
This pushbutton simulates the application of takeoff power. This is a test that triggers a warning, if the aircraft is not in takeoff configuration. (*Refer to DSC-31-15 Configuration Warnings*).
If the configuration is correct, the E/WD displays the “TO CONFIG NORMAL” message in the TO MEMO section.

Note: If the ECAM control panel fails, the CLR, RCL, STS, EMER CANC, and ALL pushbuttons remain operative, because their contacts are directly wired to the flight warning and display management computers.

SWITCHING PANEL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

ON PEDESTAL



(1) EIS DMC rotsel

NORM : DMC 1 drives the CAPT's PFD, the CAPT's ND, and the upper ECAM DU.
DMC 2 drives the F/O's PFD and the F/O's ND, .and the lower ECAM DU

CAPT 3 : DMC 3 replaces DMC 1.

F/O 3 : DMC 3 replaces DMC 2.

Note: If a DMC fails, each of its associated DUs displays a diagonal line.

(2) ECAM/ND XFR rostel

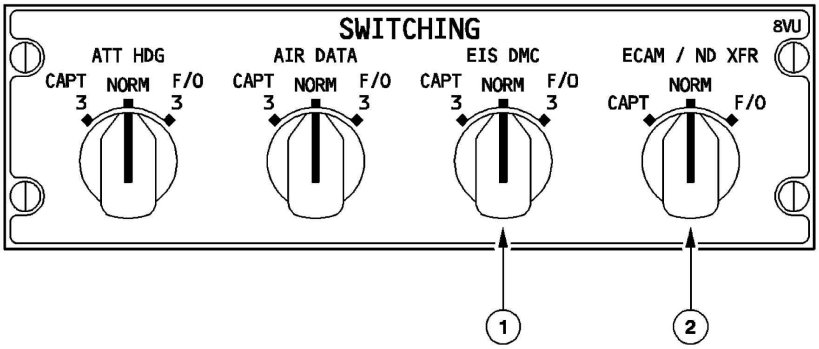
Transfers the system/status display to either the Captain's or the First Officer's ND.

Note: If both ECAM DUs (E/WD and SD) fail, the flight crew can use this switch to transfer the E/WD display to either navigation display.

SWITCHING PANEL

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

ON PEDESTAL



(1) EIS DMC rotary selector

NORM : DMC 1 supplies the CAPT's PFD, the CAPT's ND, and the ECAM's DUs.
DMC 2 supplies the F/O's PFD and the F/O's ND.

CAPT 3 : DMC 3 replaces DMC 1.

F/O 3 : DMC 3 replaces DMC 2.

Note: If a DMC fails, each of its associated DUs displays an "INVALID DATA" message.

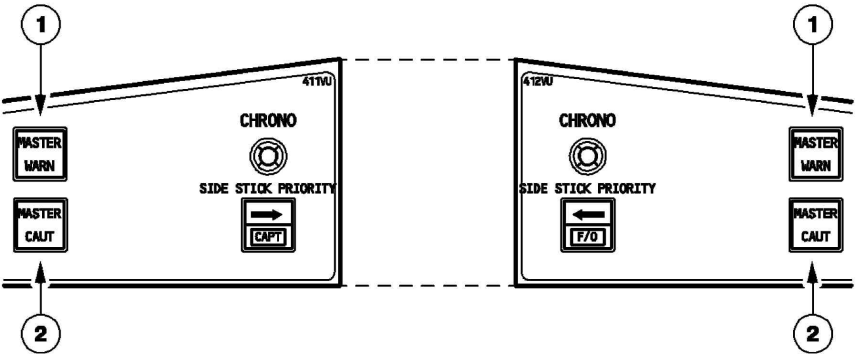
(2) ECAM/ND XFR rotary selector

Transfers the system/status display to either the Captain's or the First Officer's ND.
The "ECAM ON ND" message is displayed on the lower ECAM display.

Note: If both ECAM DUs (E/WD and SD) fail, the flight crew may use this switch to transfer the E/WD display to either navigation display. In this case, the "ECAM ON ND" message is not displayed.

ATTENTION GETTERS

Applicable to: ALL



(1) MASTER WARN lights

- Flash red for level 3 warning
- Accompanied by an aural warning (continuous repetitive chime, specific sounds or synthetic voice).

(2) MASTER CAUT lights

- Light up steady amber for a level 2 caution
- Accompanied by a single chime.

These lights go out when :

- One pilot presses the light (except for some red warnings, such as the overspeed and stall warnings)
- The warning/caution situation is over
- The pilot presses the CLR pb on the ECAM control panel (except for some red warnings, such as the overspeed and stall warnings).
- The pilot presses the EMER CANC pb on the ECAM control panel.

The aural warnings cease when :

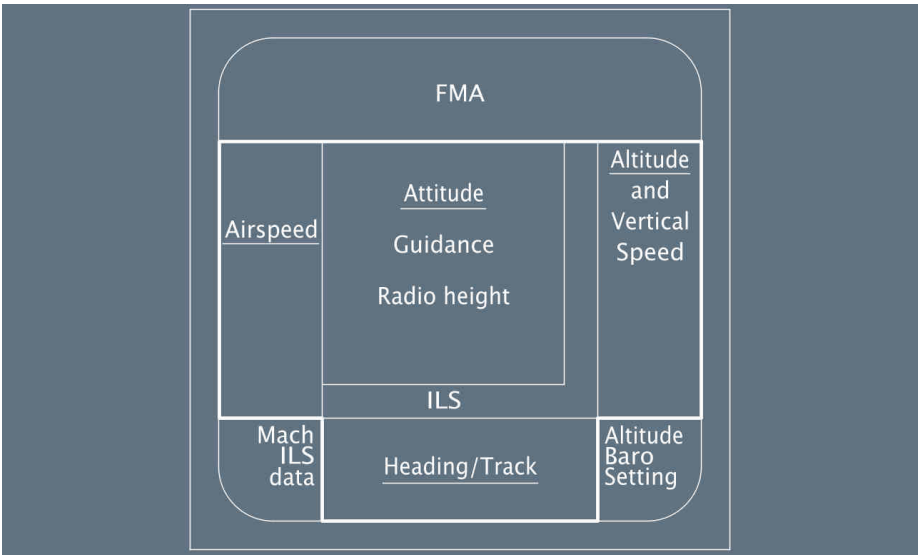
- One pilot presses the MASTER WARN light (except for some red warnings, such as the overspeed and stall warnings)
- The warning situation is over
- The pilot presses the EMER CANC pb on the ECAM control panel.

GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

1 The Primary Flight Display (PFD) provides the following information to the flight crew:

- Attitude and guidance
- Airspeed
- Altitude (BARO and radio) and vertical speed
- Heading and track
- FMGS modes (Flight Mode Annunciator)
- Vertical and lateral deviations
- Radio navigation information (ILS, DME).



The FWC monitors main parameters such as attitude, heading, and altitude. For more information, *Refer to DSC-31-40 Flags and Messages Displayed on PFD.*

Note: A grey background appears on the speed, the heading vertical speed, and the altitude speed scales of the PFD. If the Primary Flight Display (PFD) Unit temperature exceeds a defined threshold, the grey background disappears, in order to limit power consumption and prevent a DU overheat. Any additional increase in temperature will lead to a complete cut off of the power supply to this display unit.

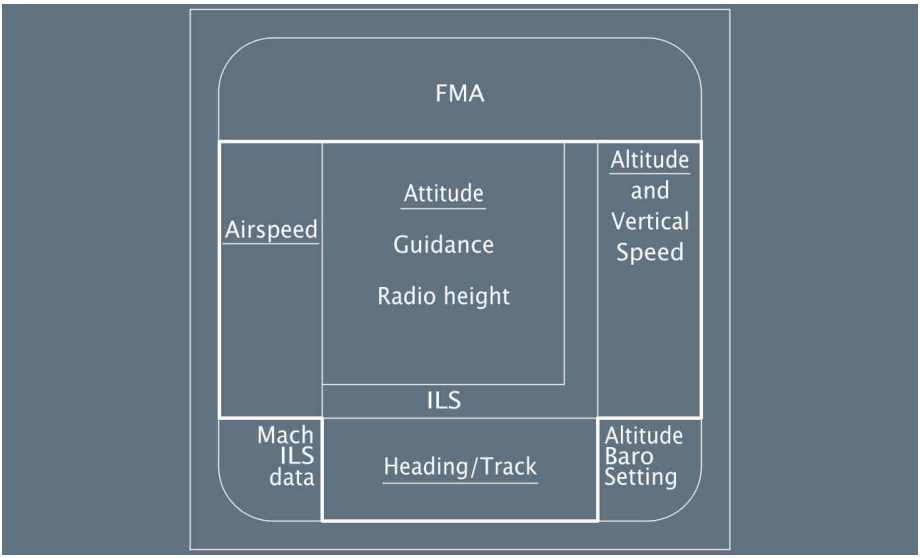
GENERAL

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

2

The Primary Flight Display (PFD) provides the following information to the flight crew:

- Attitude and guidance
- Airspeed
- Altitude (BARO and radio) and vertical speed
- Heading and track
- FMGS modes (Flight Mode Annunciator)
- Vertical and lateral deviations
- Radio navigation information (ILS, DME).

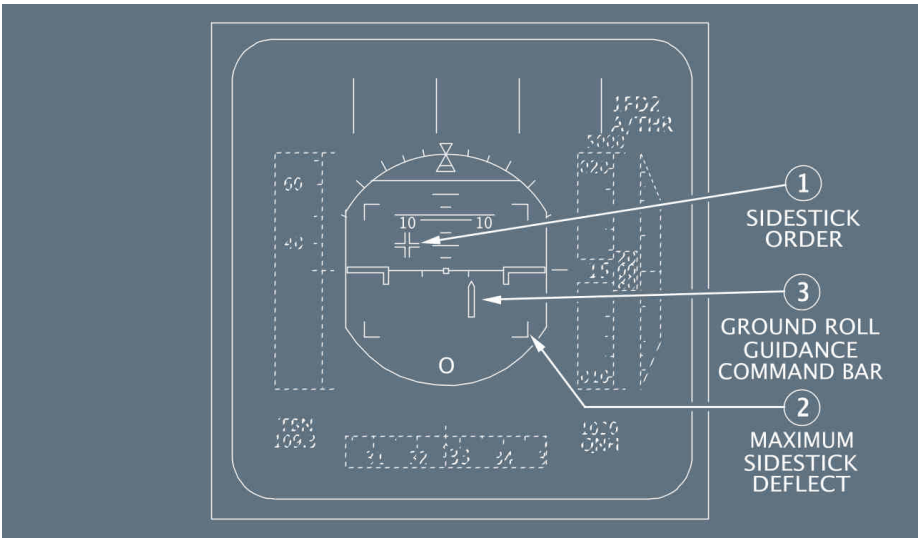


The FWC monitors main parameters such as attitude, heading, and altitude. For more information, *Refer to DSC-31-40 Flags and Messages Displayed on PFD.*

SPECIFIC GROUND INDICATIONS

Applicable to: ALL

3



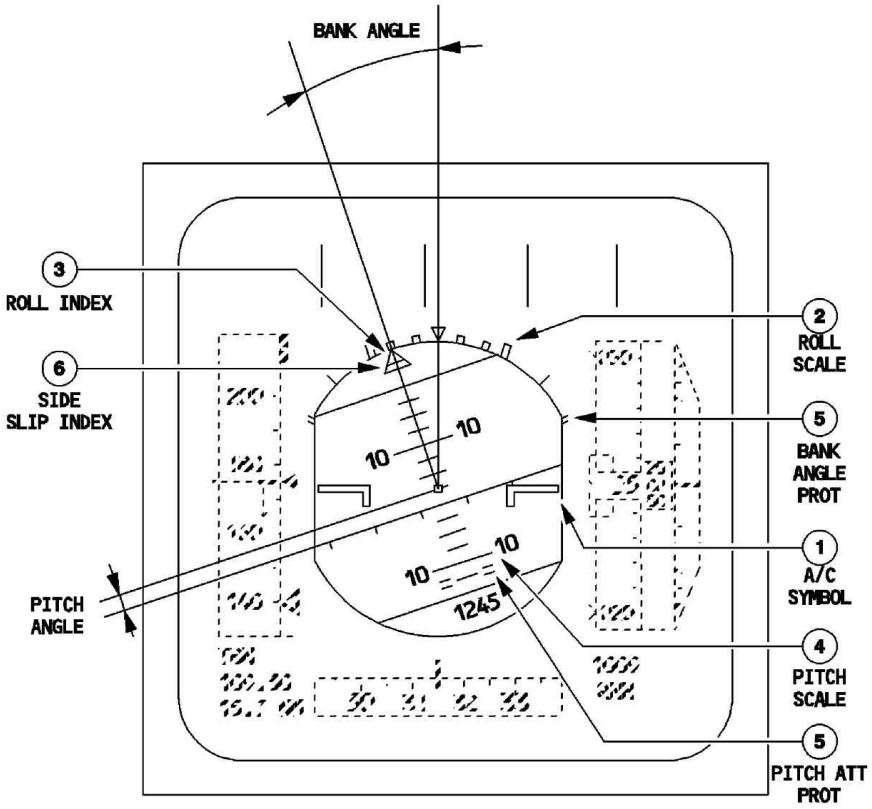
(1) Sidestick order indication
This symbol is in white, and appears as soon as one engine is started.
It indicates the total of the Captain's and First Officer's sidestick orders (shown here as left wing down, pitch up).

(2) Max Sidestick Deflection
This symbol is in white, and appears as soon as one engine is started.

(3) Ground Roll Guidance Command Bar
This symbol is in green, and appears when the aircraft is on ground, or below 30 ft radio altitude, provided that a localizer signal is available. It indicates the Flight Director yaw orders, to maintain the aircraft on the runway centerline.

ATTITUDE DATA

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



(1) Fixed Aircraft Symbol
This symbol is in black, and outlined in yellow. The yellow outline is dimmed if the flight crew selects TRK-FPA, unless the FMA is in TOGA or FLX mode.

(2) Roll Scale
This scale is in white, and has markers at 0, 10, 20, 30, and 45 ° of bank.

(3) Roll Index (yellow)
This pointer indicates the bank angle. When the bank angle exceeds 45 °, all the PFD symbols, except those for attitude, speed, heading, altitude, and vertical speed, disappear. The display returns to normal when the bank angle decreases below 40 °.

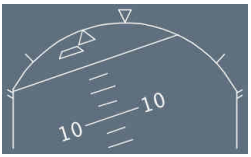
(4) Pitch Scale (white)
This scale has markers every 10 ° between 80 ° nose up and 80 ° nose down (every 2.5 ° between 10 ° nose down and 30 ° nose up). When pitch angle exceeds 25 ° nose up or 13 ° nose down, all the PFD displays except attitude, speed, speed trend, heading, altitude, and vertical speed disappear. Beyond 30 °, large red arrowheads indicate that the attitude has become excessive and show the direction to move the nose in order to reduce it. The display returns to normal when pitch angle becomes less than 22 ° nose up or 10 ° nose down.

(5) Flight Control Protection Symbols

The display shows these symbols in green:
- On the roll scale at ± 67 ° to mark the bank angle limits
- On the pitch scale at 15 ° nose down or 30 ° nose up to mark the pitch limits.

An amber x replaces these symbols if the corresponding protection is lost.
(*Refer to DSC-27-20-10-20 Protections - General*)

(6) Sideslip Index (yellow)
This trapezoidal index moves beneath the roll index. On the ground it represents the lateral acceleration of the aircraft: In flight it shows sideslip (as computed by the FAC). One centimeter of displacement indicates 0.2 g. The sideslip index is against its stop at 0.3 g.



In case of engine failure at takeoff or go around, the sideslip index changes from yellow to blue.

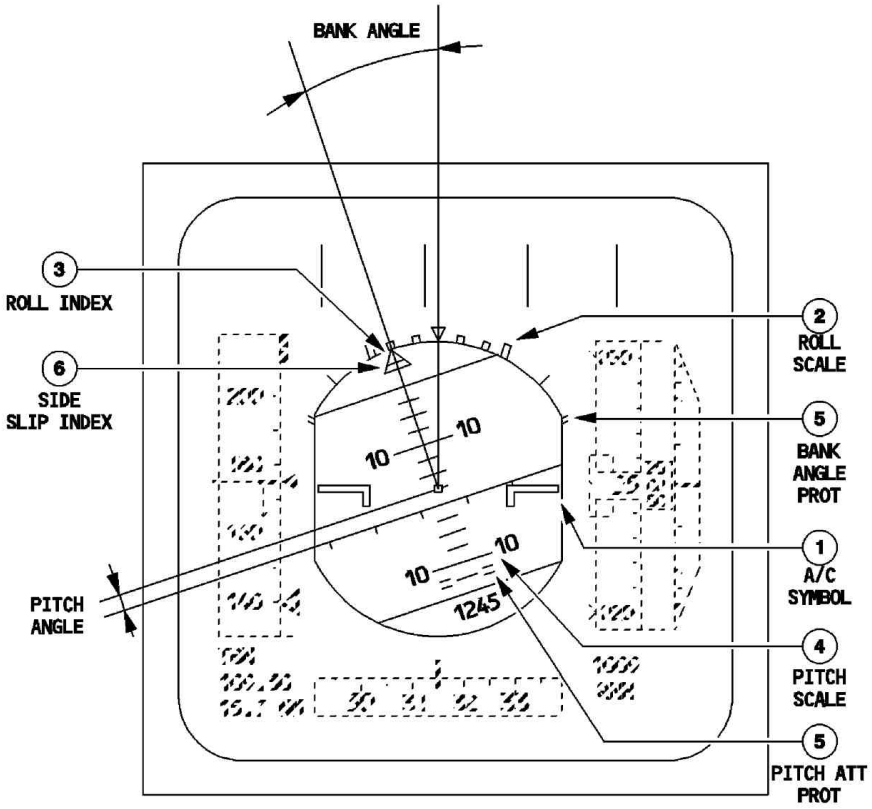
Note: *The sideslip target is blue, if:*
- *CONF 1, 2, or 3 is selected, and*
- *Any ENG EPR >1.25, and*
- *The difference between the ENG EPR's exceeds 0.25.*

In this case the sideslip index is called β target.

When this index is centered with the roll index, the sideslip equals the sideslip target for optimum aircraft performance.

ATTITUDE DATA

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



(1) Fixed Aircraft Symbol
This symbol is in black, and outlined in yellow. The yellow outline is dimmed if the flight crew selects TRK-FPA, unless the FMA is in TOGA or FLX mode.

(2) Roll Scale
This scale is in white, and has markers at 0, 10, 20, 30, and 45 ° of bank.

(3) Roll Index (yellow)

This pointer indicates the bank angle. When the bank angle exceeds 45 °, all the PFD symbols except those for attitude, speed, heading, altitude, and vertical speed, disappear. The display returns to normal when the bank angle decreases below 40 °.

(4) Pitch Scale (white)

This scale has markers every 10 ° between 80 ° nose up and 80 ° nose down (every 2.5 ° between 10 ° nose down and 30 ° nose up). When pitch angle exceeds 25 ° nose up or 13 ° nose down, all the PFD displays except attitude, speed, speed trend, heading, altitude, and vertical speed disappear. Beyond 30 °, large red arrowheads indicate that the attitude has become excessive and show the direction to move the nose in order to reduce it. The display returns to normal when pitch angle becomes less than 22 ° nose up or 10 ° nose down.

(5) Flight Control Protection Symbols

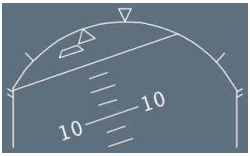
The display shows these symbols in green:

- On the roll scale at ± 67 ° to mark the bank angle limits
- On the pitch scale at 15 ° nose down or 30 ° nose up to mark the pitch limits.

An amber x replaces these symbols if the corresponding protection is lost.
(*Refer to DSC-27-20-10-20 Protections - General*)

(6) Sideslip Index (yellow)

This trapezoidal index moves beneath the roll index. On ground, it represents the lateral acceleration of the aircraft. In flight, it shows sideslip (as computed by the FAC). One centimeter of displacement indicates 0.2 g. The sideslip index is against its stop at 0.3 g.



In case of engine failure at takeoff or go around, the sideslip index changes from yellow to blue.

Note: *The sideslip target is blue, if:*

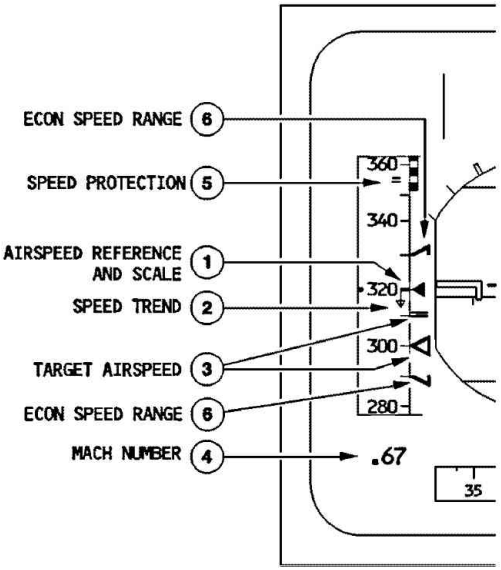
- *CONF 1, 2, or 3 is selected, and*
- *Any ENG EPR >1.25 or one Thrust Lever > MCT (≥ FLX if FLX or DERATED TO), and*
- *The difference between the ENG EPR's exceeds 0.25.*

In this case, the sideslip index is called β target.

When this index is centered with the roll index, the sideslip equals the sideslip target for optimum aircraft performance.

AIRSPEED

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



(1) Actual Airspeed Reference Line and Scale
A white scale on a grey background moves in front of a fixed yellow reference line next to a yellow triangle to show airspeed. The minimum airspeed indication is 30 kt.

(2) Speed Trend (yellow)
This pointer starts at the speed symbol. The tip shows the speed the aircraft will reach in 10 s if its acceleration remains constant. The pointer appears only when it is greater than 2 kt and disappears when it is less than 1 kt.
It also disappears, if the FACs fail.

(3) Target Airspeed (magenta or blue)
This symbol gives the target airspeed or the airspeed corresponding to the target Mach number.
The target airspeed is the airspeed computed by FMGC in managed speed mode (magenta) or entered manually on the FCU for selected speed mode (blue). The target speed is a magenta double bar (=) when associated with the ECON speed range.
Otherwise it is a triangle (magenta or blue).

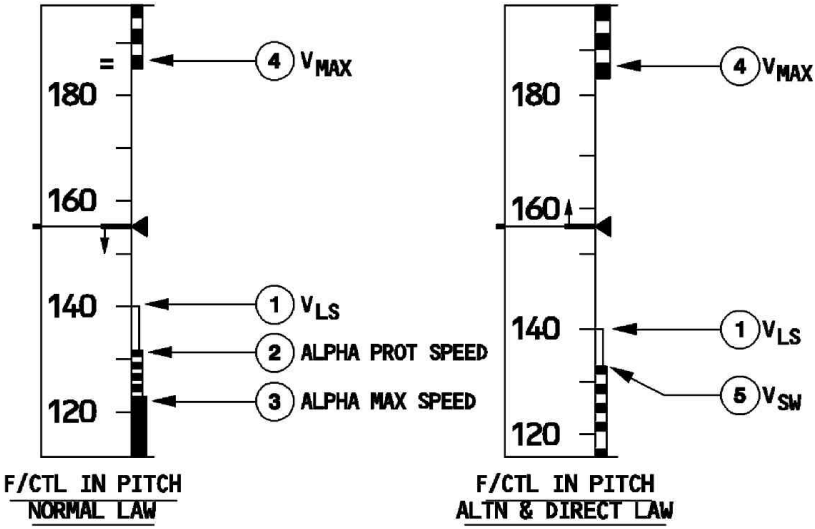
When the target speed is off the speed scale, its value is displayed as numbers below or above the speed scale.

(4) Mach Number (green)
This is displayed when it is greater than 0.5.

(5) Speed Protection (green)
This symbol indicates the speed (VMO +6 kt or MMO +0.01) at which overspeed protection becomes active (*Refer to DSC-27-20-10-20 Protections - General*).

(6) ECON Speed Range (magenta)

In descent mode with the ECON/AUTO SPD mode active, these two half triangles replace the selected speed symbol. It shows the upper and lower limits calculated by the FMGC:
- The upper speed is target speed +20 kt, limited to VMAX or VMO -3 kt or MMO -0.006, whichever is lowest.
  If a speed limit or a speed constraint applies, the upper margin is limited to ECON SPD +5 kt
- The lower speed margin is the target speed -20 kt, limited to green dot, F, S, or VLS, whichever is higher.



(1) Minimum Selectable Speed (VLS)

The top of the amber strip along the speed scale indicates this speed. It represents the lowest selectable speed providing an appropriate margin to the stall speed. (*Refer to PRO-SUP-10 Characteristic Speeds*)

VLS information is inhibited from touchdown until 10 s after liftoff.

(2) Alpha Protection Speed

The top of a black and amber strip along the speed scale indicates this speed.

It represents the speed corresponding to the angle of attack at which alpha protection becomes active (*Refer to DSC-27-20-10-20 Protections - General*).

It is displayed when in pitch normal law.

(3) Alpha MAX Speed

The top of a red strip along the speed scale indicates this speed. It represents the speed corresponding to the maximum angle of attack that the aircraft can attain in pitch normal law (*Refer to DSC-27-20-10-20 Protections - General*).

It is displayed when in pitch normal law.

(4) VMAX

The lower end of a red and black strip along the speed scale defines this speed.

It is the lowest of the following:

- VMO or the speed corresponding to MMO
- VLE
- VFE

(*Refer to PRO-SUP-10 Characteristic Speeds*)

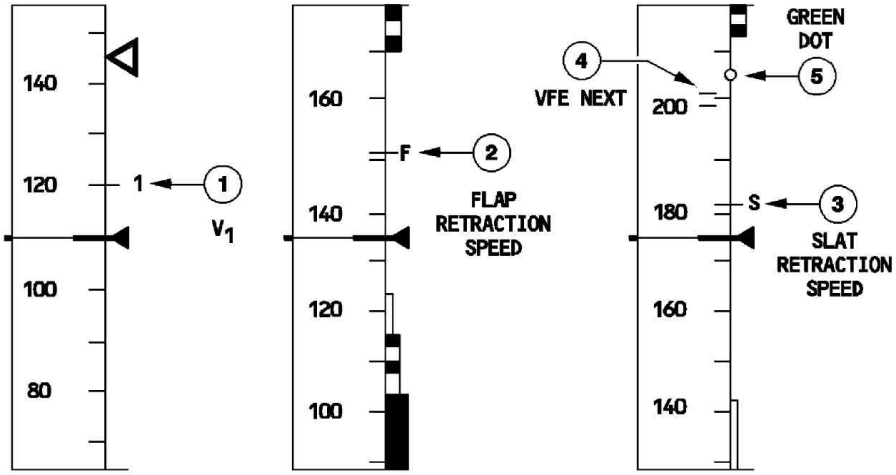
(5) Stall Warning Speed (VSW)

The top of a red and black strip along the speed scale defines this speed.

It is the speed corresponding to the stall warning. (*Refer to DSC-27-20-10-20 Protections - General*).

VSW information is inhibited from touchdown until 5 s after liftoff.

It is displayed when operating in pitch alternate or pitch direct law.



(1) Decision Speed (V1)
This is a blue symbol (numeral one) that the crew manually inserts via the MCDU. When it is off the scale, the upper part of the scale shows it in numbers.
It disappears after liftoff. (*Refer to PRO-SUP-10 Other Speeds*).

(2) Minimum Flap Retraction Speed
This is a green symbol (letter F).
It appears when the flap selector is in position 3 or 2. (*Refer to PRO-SUP-10 Characteristic Speeds*).

(3) Minimum Slat Retraction Speed
This is a green symbol (letter S).
It appears when the flap selector is in position 1. (*Refer to PRO-SUP-10 Characteristic Speeds*).

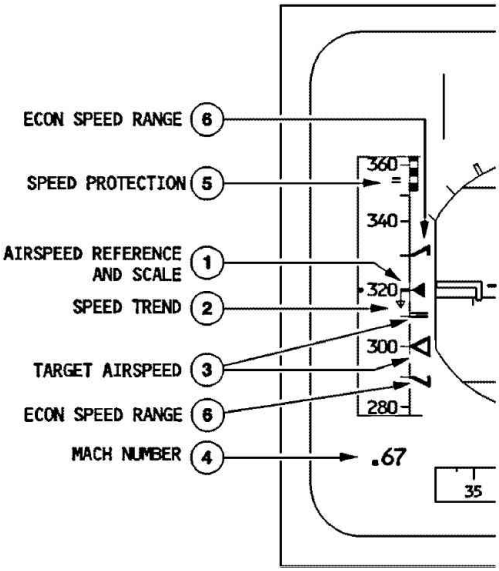
(4) VFE NEXT
This symbol, an amber =, shows the VFE corresponding to the next flap lever position.
It appears when the aircraft altitude is below 15 000 ft or 20 000 ft, depending upon the FAC standard. (*Refer to PRO-SUP-10 Protection Speeds*).

(5) Green Dot (Engine-out operating speed in clean configuration)
This green dot appears when the aircraft is flying in the clean configuration.

It shows the speed corresponding to the best lift-to-drag ratio.

AIRSPEED

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI



(1) Actual Airspeed Reference Line and Scale
A white scale on a grey background moves in front of a fixed yellow reference line next to a yellow triangle to show airspeed. The minimum airspeed indication is 30 kt.

(2) Speed Trend (yellow)
This pointer starts at the speed symbol. The tip shows the speed the aircraft will reach in 10 s if its acceleration remains constant. The pointer appears only when it is greater than 2 kt and disappears when it is less than 1 kt.
It also disappears, if the FACs fail.

(3) Target Airspeed (magenta or blue)
This symbol gives the target airspeed or the airspeed corresponding to the target Mach number.
The target airspeed is the airspeed computed by FMGC in managed speed mode (magenta) or entered manually on the FCU for selected speed mode (blue). The target speed is a magenta double bar (=) when associated with the ECON speed range.

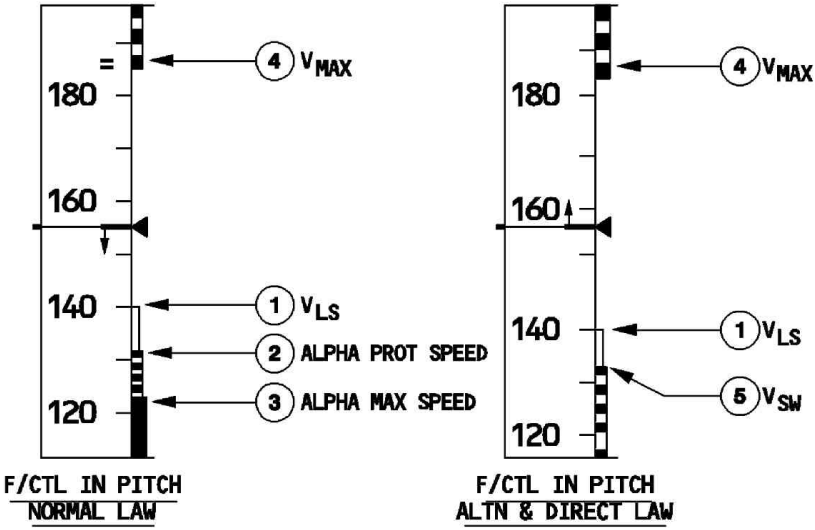
Otherwise it is a triangle (magenta or blue).
When the target speed is off the speed scale, its value is displayed as numbers below or above the speed scale.

(4) Mach Number (green)
This is displayed when it is greater than 0.5.

(5) Speed Protection (green)
This symbol indicates the speed (VMO +6 kt or MMO +0.01) at which overspeed protection becomes active (*Refer to DSC-27-20-10-20 Protections - General*).

(6) ECON Speed Range (magenta)

In descent mode with the ECON/AUTO SPD mode active, these two half triangles replace the selected speed symbol. It shows the upper and lower limits calculated by the FMGC:
- The upper speed is target speed +20 kt, limited to VMAX or VMO -3 kt or MMO -0.006, whichever is lowest.
  If a speed limit or a speed constraint applies, the upper margin is limited to ECON SPD +5 kt
- The lower speed margin is the target speed -20 kt, limited to green dot, F, S, or VLS, whichever is higher.



(1) Minimum Selectable Speed (VLS)

The top of the amber strip along the speed scale indicates this speed. It represents the lowest selectable speed providing an appropriate margin to the stall speed. (*Refer to PRO-SUP-10 Characteristic Speeds*)

VLS information is inhibited from touchdown until 10 s after liftoff.

(2) Alpha Protection Speed

The top of a black and amber strip along the speed scale indicates this speed.

It represents the speed corresponding to the angle of attack at which alpha protection becomes active (*Refer to DSC-27-20-10-20 Protections - General*).

It is displayed when in pitch normal law.

(3) Alpha MAX Speed

The top of a red strip along the speed scale indicates this speed. It represents the speed corresponding to the maximum angle of attack that the aircraft can attain in pitch normal law (*Refer to DSC-27-20-10-20 Protections - General*).

It is displayed when in pitch normal law.

(4) VMAX

The lower end of a red and black strip along the speed scale defines this speed.

It is the lowest of the following:

- VMO or the speed corresponding to MMO
- VLE
- VFE

(*Refer to PRO-SUP-10 Characteristic Speeds*)

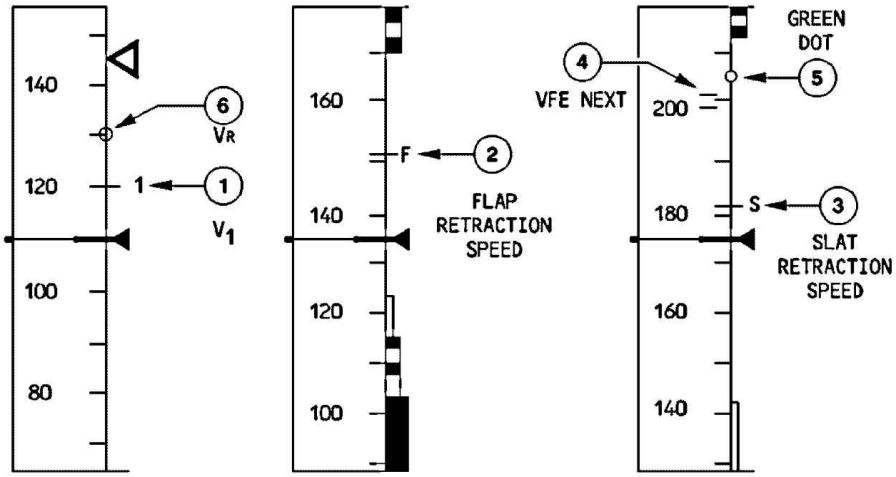
(5) Stall Warning Speed (VSW)

The top of a red and black strip along the speed scale defines this speed.

It is the speed corresponding to the stall warning. (*Refer to DSC-27-20-10-20 Protections - General*).

VSW information is inhibited from touchdown until 5 s after liftoff.

It is displayed when operating in pitch alternate or pitch direct law.



(1) Decision Speed (V1)
This is a blue symbol (numeral one) that the crew manually inserts via the MCDU. When it is off the scale, the upper part of the scale shows it in numbers.
It disappears after liftoff. (*Refer to PRO-SUP-10 Other Speeds*).

(2) Minimum Flap Retraction Speed
This is a green symbol (letter F).
It appears when the flap selector is in position 3 or 2. (*Refer to PRO-SUP-10 Characteristic Speeds*).

(3) Minimum Slat Retraction Speed
This is a green symbol (letter S).
It appears when the flap selector is in position 1. (*Refer to PRO-SUP-10 Characteristic Speeds*).

(4) VFE NEXT
The VFE next symbol is an amber equal sign showing the VFE corresponding to the next flap lever position.
It appears when the aircraft altitude is below 15 000 ft or 20 000 ft, depending upon the FAC standard. (*Refer to PRO-SUP-10 Protection Speeds*).

(5) Green Dot (Engine-out operating speed in clean configuration)
This green dot appears, when the aircraft is flying in the clean configuration.

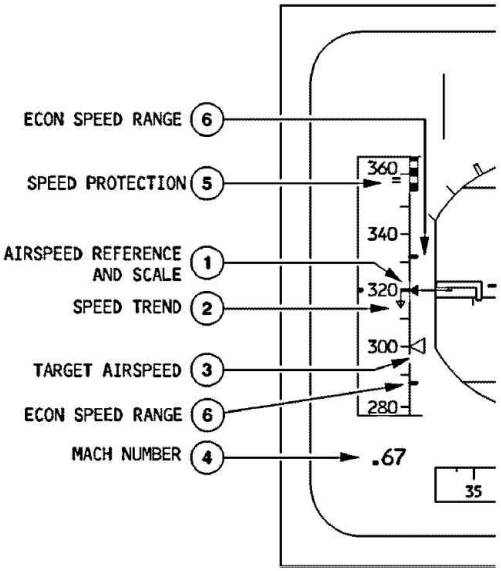
It shows the speed corresponding to the best lift-to-drag ratio.

(6) Rotation speed: (VR)
VR is entered on the PERF takeoff page of the MCDU, and is indicated by a cyan circle. This cyan circle is visible during takeoff.

Note: V2 is represented by the target speed index during takeoff.
V2 is manually inserted by the crew via the MCDU.

AIRSPEED

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) Actual Airspeed Reference Line and Scale
A white scale, on a grey background, moves in front of a fixed yellow reference line (next to a yellow triangle) to indicate airspeed. The minimum airspeed indication is 30 kt.

(2) Speed Trend (yellow)
This pointer starts at the speed symbol. The tip indicates the speed the aircraft will reach in 10 s, if its acceleration remains constant. The pointer only appears, when it is greater than 2 kt, and disappears when it is less than 1 kt.
It also disappears, if the FACs fail.

(3) Target Airspeed (magenta or blue)

This symbol gives the target airspeed, or the airspeed corresponding to the target Mach number.

The target airspeed is the airspeed computed by FMGC in managed speed mode (magenta), or the airspeed manually entered on the FCU in selected speed mode (blue). The target speed is indicated by a magenta or blue triangle.

When the target speed is off the speed scale, its value is displayed as numbers, either above or below the speed scale.

(4) Mach Number (green)

It is displayed, when it is greater than0.5.

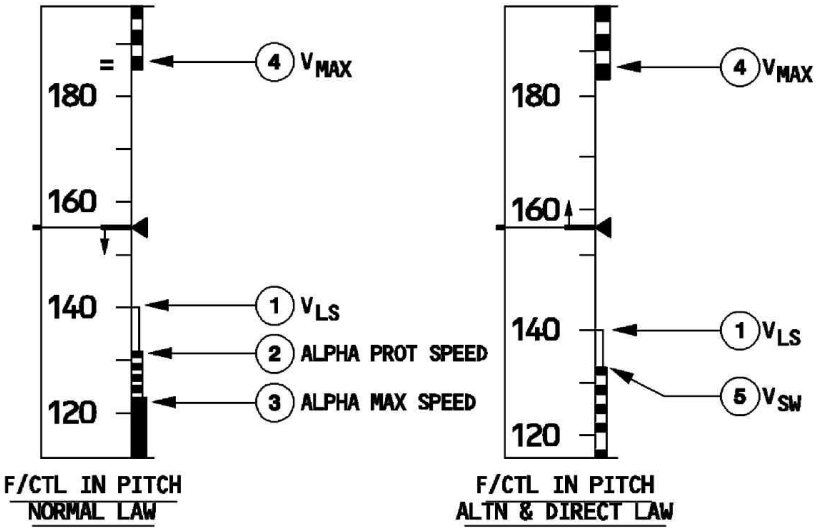
(5) Speed Protection (green)

This symbol indicates the speed (VMO +6 kt or MMO +0.01) at which overspeed protection becomes active (*Refer to DSC-27-20-10-20 Protections - General*).

(6) ECON Speed Range (magenta)

In descent mode with the ECON/AUTO SPD mode active, these two thick lines replace the selected speed symbol. It shows the upper and lower limits, calculated by the FMGC.

- The upper speed is target speed +20 kt, limited to VMAX or VMO -3 kt or MMO -0.006, whichever is lowest.
  If a speed limit or a speed constraint applies, the upper margin is limited to ECON SPD +5 kt.
- The lower speed margin is the target speed -20 kt, limited to green dot, F, S, or VLS, whichever is higher.



(1) Minimum Selectable Speed (VLS)
The top of the amber strip along the speed scale indicates this speed. It represents the lowest selectable speed providing an appropriate margin to the stall speed. (*Refer to PRO-SUP-10 Characteristic Speeds*)
VLS information is inhibited from touchdown until 10 s after liftoff.

(2) Alpha Protection Speed
The top of a black and amber strip along the speed scale indicates this speed.
It represents the speed corresponding to the angle of attack at which alpha protection becomes active (*Refer to DSC-27-20-10-20 Protections - General*).
It is displayed when in pitch normal law.

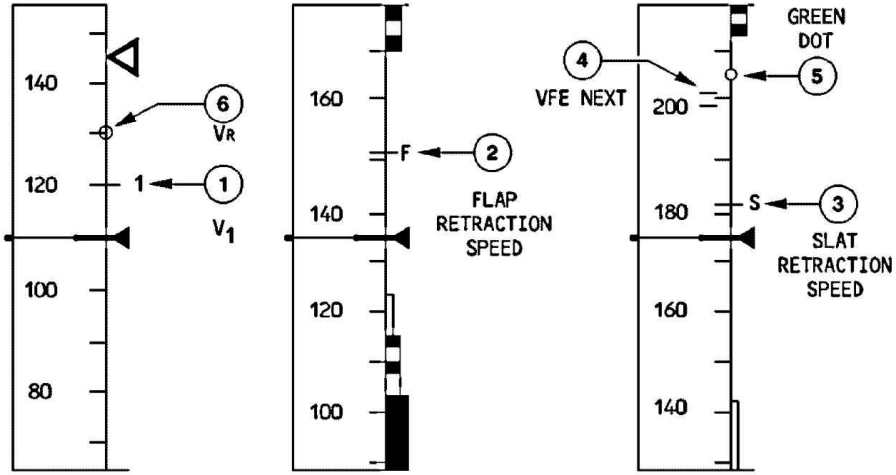
(3) Alpha MAX Speed
The top of a red strip along the speed scale indicates this speed. It represents the speed corresponding to the maximum angle of attack that the aircraft can attain in pitch normal law (*Refer to DSC-27-20-10-20 Protections - General*).
It is displayed when in pitch normal law.

(4) VMAX
The lower end of a red and black strip along the speed scale defines this speed.

It is the lowest of the following:
- VMO or the speed corresponding to MMO
- VLE
- VFE

(*Refer to PRO-SUP-10 Characteristic Speeds*)

(5) Stall Warning Speed (VSW)
The top of a red and black strip along the speed scale defines this speed.
It is the speed corresponding to the stall warning. (*Refer to DSC-27-20-10-20 Protections - General*).
VSW information is inhibited from touchdown until 5 s after liftoff.
It is displayed when operating in pitch alternate or pitch direct law.



(1) Decision Speed (V1)
This is a blue symbol (numeral one) that the crew manually inserts via the MCDU. When it is off the scale, the upper part of the scale shows it in numbers.
It disappears after liftoff. (*Refer to PRO-SUP-10 Other Speeds*).

(2) Minimum Flap Retraction Speed
This is a green symbol (letter F).
It appears when the flap selector is in position 3 or 2. (*Refer to PRO-SUP-10 Characteristic Speeds*).

(3) Minimum Slat Retraction Speed
This is a green symbol (letter S).
It appears when the flap selector is in position 1. (*Refer to PRO-SUP-10 Characteristic Speeds*).

(4) VFE NEXT
The VFE next symbol is an amber equal sign showing the VFE corresponding to the next flap lever position.
It appears when the aircraft altitude is below 15 000 ft or 20 000 ft, depending upon the FAC standard. (*Refer to PRO-SUP-10 Protection Speeds*).

(5) Green Dot (Engine-out operating speed in clean configuration)
This green dot appears, when the aircraft is flying in the clean configuration.
It shows the speed corresponding to the best lift-to-drag ratio.

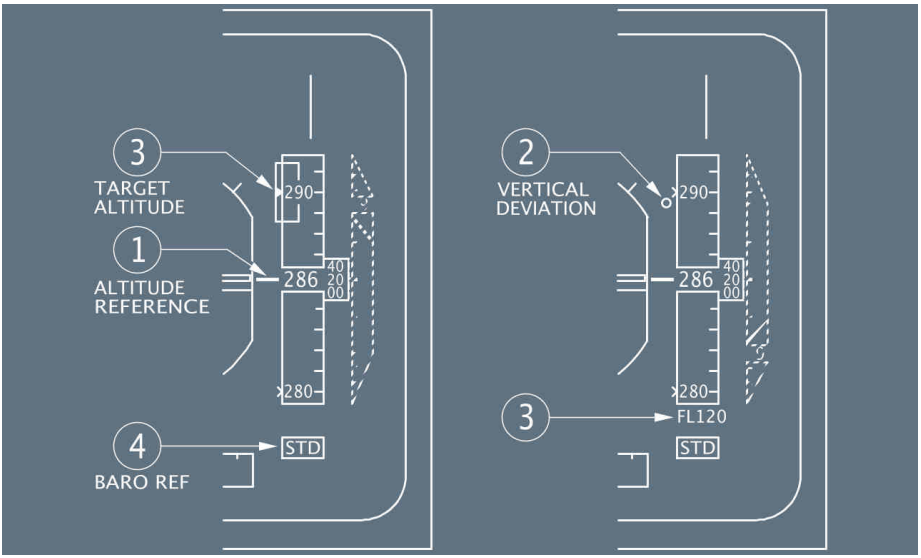
(6) Rotation speed: (VR)
VR is entered on the PERF takeoff page of the MCDU, and is indicated by a cyan circle.
This cyan circle is visible during takeoff.

Note: *V2 is represented by the target speed index during takeoff.*
V2 is manually inserted by the crew via the MCDU.

ALTITUDE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG

4



(1) Altitude Indication

This appears both as a white moving scale, and as a green digital readout on a grey background. Small white marks are positioned on the scale against the round values (e.g. 280, 290...). "NEG" appears in the window in white for negative values. The altitude window changes from yellow to amber, if the aircraft deviates from the FCU-selected altitude or flight level.

On any approach for which an MDA (MDH) is entered in the FMGS, the altitude numbers change from green to amber, when the aircraft goes below the MDA (MDH).

(2) Vertical Deviation (magenta)

This symbol appears next to the altitude corresponding to the theoretical vertical profile computed by the FMGC. It is displayed from the top of descent down to the MAP altitude. The pilot can read the VDEV directly from the altitude scale. The range is ±500 ft. When the VDEV value exceeds ±500 ft, the symbol stays at the range limit and the PROG page displays the exact value.

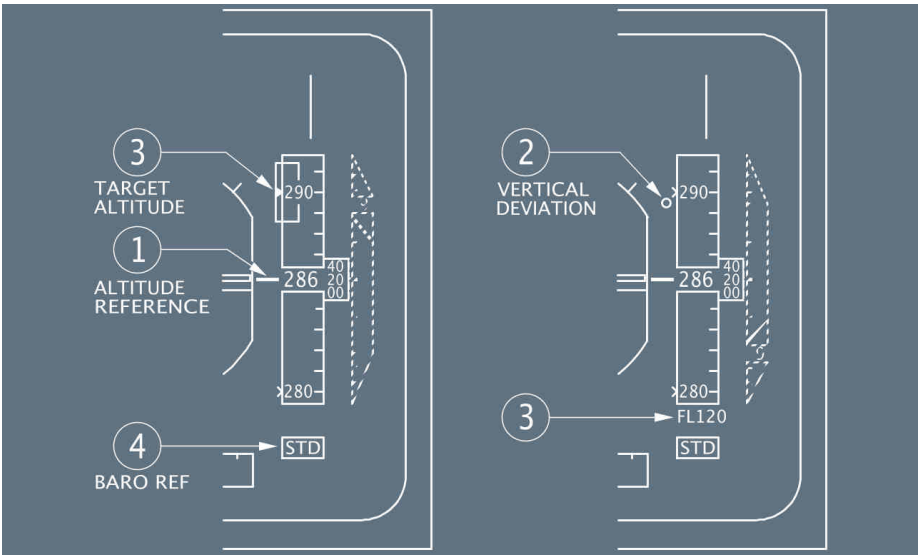
(3) Target Altitude or Selected Flight Level Symbol (blue)
This symbol shows the FCU selected altitude (if QNH BARO reference is selected) or the selected flight level (if STD BARO reference is selected.)
When the FMGC operates in the vertical managed mode, this symbol is magenta if it represents a flight plan altitude constraint that the FMGC will follow. If the target altitude or flight level is on the scale, the symbol is displayed and the numerical value appears inside the symbol.
If it is off the scale, the symbol is not displayed, and the numerical value appears above or underneath the scale.

(4) Barometric Reference
The display shows “STD”or it shows “QNH”and the numerical setting in hectoPascals or inches of mercury.
It pulses when the selection made by the pilot is not correct (STD not selected above transition altitude in climb or STD still selected in approach below transition level or 2 500 ft radio height if transition level is not available).

ALTITUDE

Applicable to: B-HTH, B-HTI

5



(1) Altitude Indication

This appears both as a white moving scale, and as a green digital readout on a grey background. Small white marks are positioned on the scale against the round values (e.g. 280, 290...). “NEG” appears in the window in white for negative values. The altitude window changes from yellow to amber, if the aircraft deviates from the FCU-selected altitude or flight level.

On any approach for which an MDA (MDH) is entered in the FMGS, the altitude numbers change from green to amber, when the aircraft goes below the MDA (MDH).

(2) Vertical Deviation (magenta)

This symbol appears next to the altitude corresponding to the theoretical vertical profile computed by the FMGC. It is displayed from the top of descent down to the MAP altitude. The pilot can read the VDEV directly from the altitude scale. The range is ±500 ft. When the VDEV value exceeds ±500 ft, the symbol stays at the range limit and the PROG page displays the exact value.

(3) Target Altitude or Selected Flight Level Symbol (blue)

This symbol shows the FCU selected altitude (if QNH BARO reference is selected) or the selected flight level (if STD BARO reference is selected.)

When the FMGC operates in the vertical managed mode, this symbol is magenta if it represents a flight plan altitude constraint that the FMGC will follow. If the target altitude or flight level is on the scale, the symbol is displayed and the numerical value appears inside the symbol.

If it is off the scale, the symbol is not displayed, and the numerical value appears above or underneath the scale.

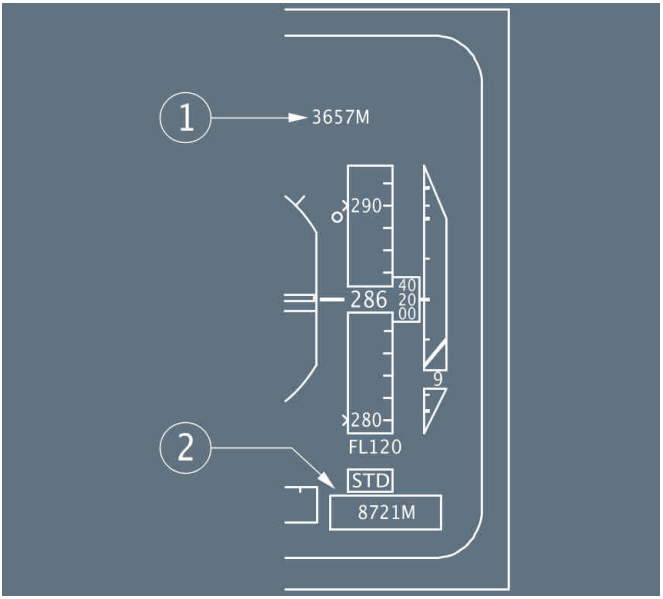
(4) Barometric Reference

The display shows “STD”or it shows “QNH”and the numerical setting in hectoPascals or inches of mercury.

It pulses when the selection made by the pilot is not correct (STD not selected above transition altitude in climb or STD still selected in approach below transition level or 2 500 ft radio height if transition level is not available).

6 **METRIC ALTITUDE INDICATION**

If metric reference is selected on the FCU two additional symbols are displayed on PFD.



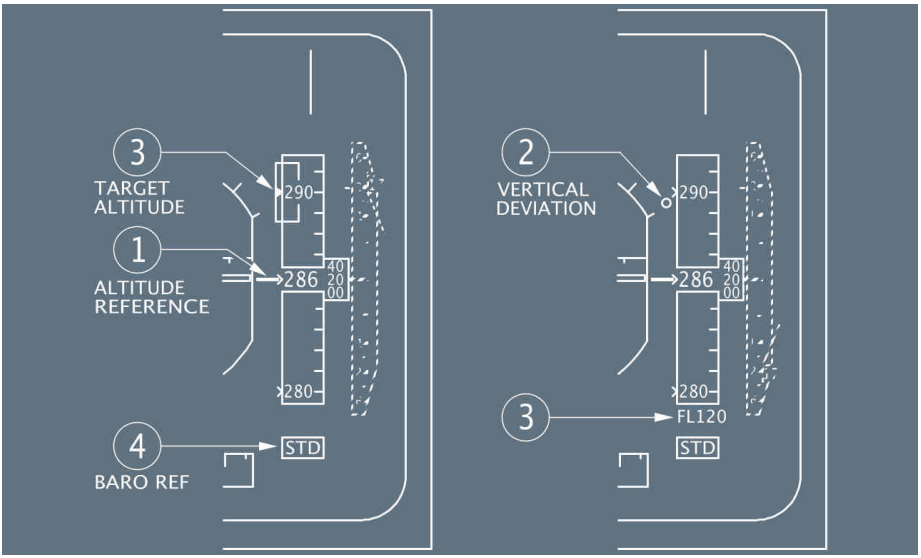
(1) Target altitude or selected flight level (magenta or blue)
The display shows the selected altitude value in meters.

(2) Altitude indication (green)
The display shows the actual aircraft altitude value in meters.

ALTITUDE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

7



(1) Altitude Indication

This appears both as a white moving scale, and as a green digital readout on a grey background. Small white marks are positioned on the scale against the round values (e.g. 280, 290...). “NEG” appears in the window in white for negative values. The altitude window changes from yellow to amber, if the aircraft deviates from the FCU-selected altitude or flight level.

On any approach for which an MDA (MDH) is entered in the FMGS, the altitude numbers change from green to amber, when the aircraft goes below the MDA (MDH).

(2) Vertical Deviation (magenta)

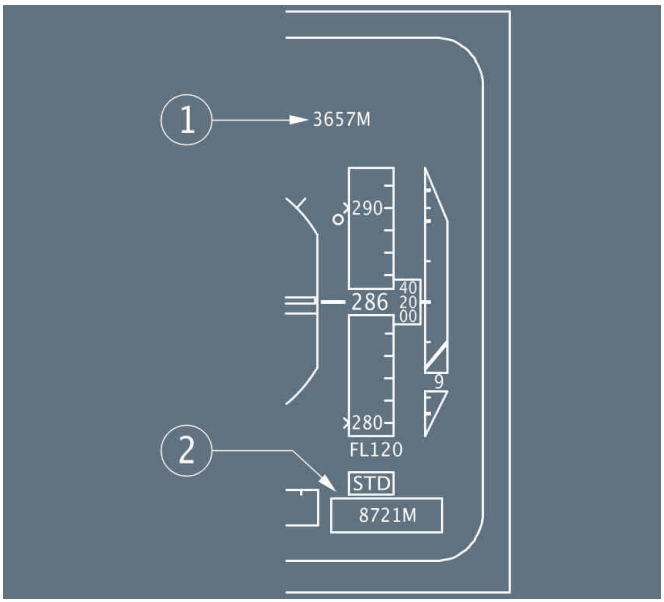
This symbol appears next to the altitude corresponding to the theoretical vertical profile computed by the FMGC. It is displayed from the top of descent down to the MAP altitude. The pilot can read the VDEV directly from the altitude scale. The range is ±500 ft. When the VDEV value exceeds ±500 ft, the symbol stays at the range limit and the PROG page displays the exact value.

(3) Target Altitude or Selected Flight Level Symbol (blue)
This symbol shows the FCU selected altitude (if QNH BARO reference is selected) or the selected flight level (if STD BARO reference is selected.)
When the FMGC operates in the vertical managed mode, this symbol is magenta if it represents a flight plan altitude constraint that the FMGC will follow. If the target altitude or flight level is on the scale, the symbol is displayed and the numerical value appears inside the symbol.
If it is off the scale, the symbol is not displayed, and the numerical value appears above or underneath the scale.

(4) Barometric Reference
The display shows “STD”or it shows “QNH”and the numerical setting in hectoPascals or inches of mercury.
It pulses when the selection made by the pilot is not correct (STD not selected above transition altitude in climb or STD still selected in approach below transition level or 2 500 ft radio height if transition level is not available).

8 **METRIC ALTITUDE INDICATION**

If metric reference is selected on the FCU two additional symbols are displayed on PFD.



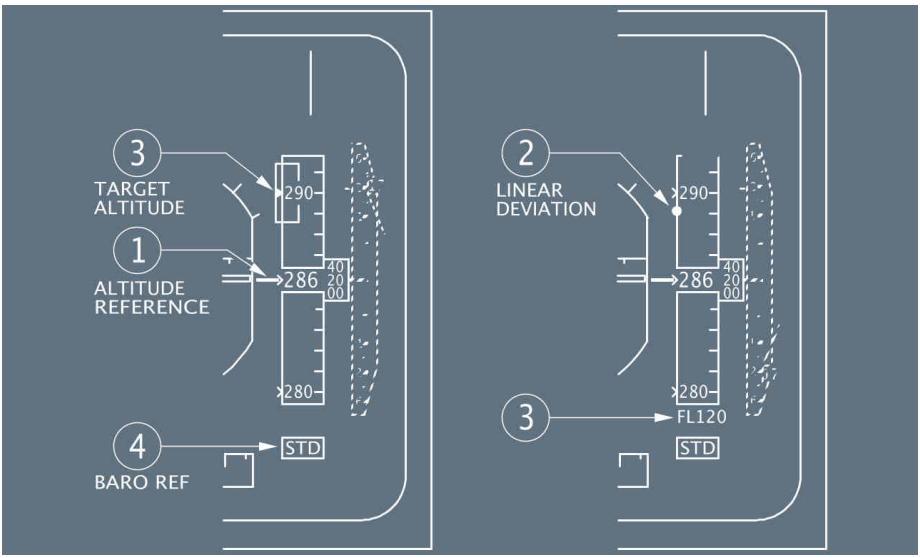
(1) Target altitude or selected flight level (magenta or blue)
The display shows the selected altitude value in meters.

(2) Altitude indication (green)
The display shows the actual aircraft altitude value in meters.

ALTITUDE

Applicable to: B-HSQ, B-HSR

9



(1) Altitude Indication
This appears both as a white moving scale, and as a green digital readout on a grey background. Small white marks are positioned on the scale against the round values (e.g. 280, 290...). “NEG” appears in the window in white for negative values. The altitude window changes from yellow to amber, if the aircraft deviates from the FCU-selected altitude or flight level.
On any approach for which an minimum is entered in the FMGC, the altitude numbers change from green to amber, when the aircraft goes below the minimum.

(2) Linear Deviation (green filled circle)
This symbol appears next to the altitude corresponding to the theoretical vertical profile computed by the FMGC. It is displayed from the top of descent down to the MAP altitude.

The flight crew can read the linear deviation directly from the altitude scale. The range is ±500 ft. When the linear deviation value exceeds ±500 ft, the symbol stays at the range limit but changes to a half filled circle and the PROG page displays the exact value.

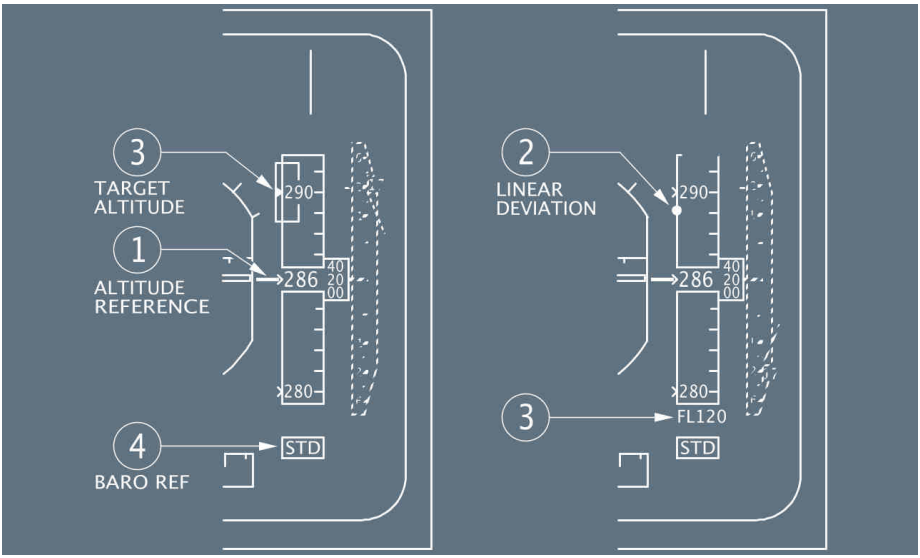
(3) Target Altitude or Selected Flight Level Symbol (blue)
This symbol shows the FCU selected altitude (if QNH BARO reference is selected) or the selected flight level (if STD BARO reference is selected.)
When the FMGC operates in the vertical managed mode, this symbol is magenta if it represents a flight plan altitude constraint that the FMGC will follow. If the target altitude or flight level is on the scale, the symbol is displayed and the numerical value appears inside the symbol.
If it is off the scale, the symbol is not displayed, and the numerical value appears above or underneath the scale.

(4) Barometric Reference
The display shows “STD”or it shows “QNH”and the numerical setting in hectoPascals or inches of mercury.
It pulses when the selection made by the flight crew is not correct (STD not selected above transition altitude in climb or STD still selected in approach below transition level or 2 500 ft radio height if transition level is not available).

ALTITUDE

Applicable to: B-HST, B-HSU

10



(1) Altitude Indication

This appears both as a white moving scale, and as a green digital readout on a grey background. Small white marks are positioned on the scale against the round values (e.g. 280, 290...). "NEG" appears in the window in white for negative values. The altitude window changes from yellow to amber, if the aircraft deviates from the FCU-selected altitude or flight level.

On any approach for which an minimum is entered in the FMGS, the altitude numbers change from green to amber, when the aircraft goes below the minimum.

(2) Linear Deviation (green filled circle)

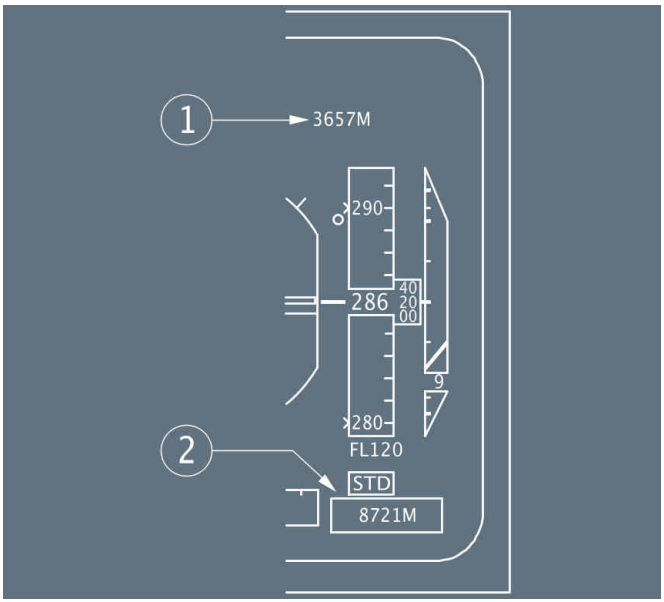
This symbol appears next to the altitude corresponding to the theoretical vertical profile computed by the FMGC. It is displayed from the top of descent down to the MAP altitude. The flight crew can read the linear deviation directly from the altitude scale. The range is ±500 ft. When the linear deviation value exceeds ±500 ft, the symbol stays at the range limit but changes to a half filled circle and the PROG page displays the exact value.

(3) Target Altitude or Selected Flight Level Symbol (blue)
This symbol shows the FCU selected altitude (if QNH BARO reference is selected) or the selected flight level (if STD BARO reference is selected.)
When the FMGC operates in the vertical managed mode, this symbol is magenta if it represents a flight plan altitude constraint that the FMGC will follow. If the target altitude or flight level is on the scale, the symbol is displayed and the numerical value appears inside the symbol.
If it is off the scale, the symbol is not displayed, and the numerical value appears above or underneath the scale.

(4) Barometric Reference
The display shows “STD”or it shows “QNH”and the numerical setting in hectoPascals or inches of mercury.
It pulses when the selection made by the flight crew is not correct (STD not selected above transition altitude in climb or STD still selected in approach below transition level or 2 500 ft radio height if transition level is not available).

METRIC ALTITUDE INDICATION

If metric reference is selected on the FCU two additional symbols are displayed on PFD.

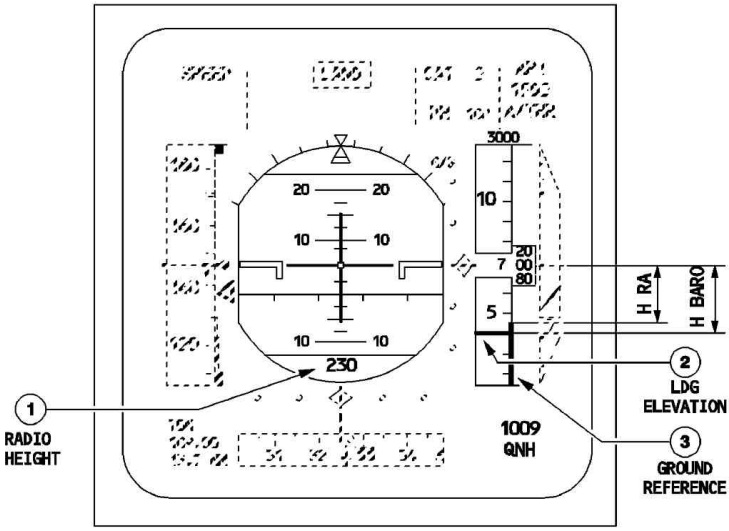


(1) Target altitude or selected flight level (magenta or blue)
The display shows the selected altitude value in meters.

(2) Altitude indication (green)
The display shows the actual aircraft altitude value in meters.

ALTITUDE (CONT'D)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



(1) Radio Height

This quantity appears when it is less than 2 500 ft.

- If a DH has been entered, the radio height appears:
  - In green, when DH + 100 ft <RA <2 500 ft
  - In amber, when RA <DH + 100 ft

  If "NO" is entered as the DH on the MCDU APPROACH page, 0 ft becomes a default value. When the aircraft reaches the decision height selected on the MCDU, DH letters flash amber for 3 s, then remain amber above the radio height indication.
- If no DH has been entered, or if both FMGCs fail, the radio height appears:
  - In green, when 400 ft <RA <2 500 ft
  - In amber, when RA ≤400 ft

The radio altitude indication changes every 10 ft down to 50 ft, then every 5 ft down to 10 ft, then every foot.

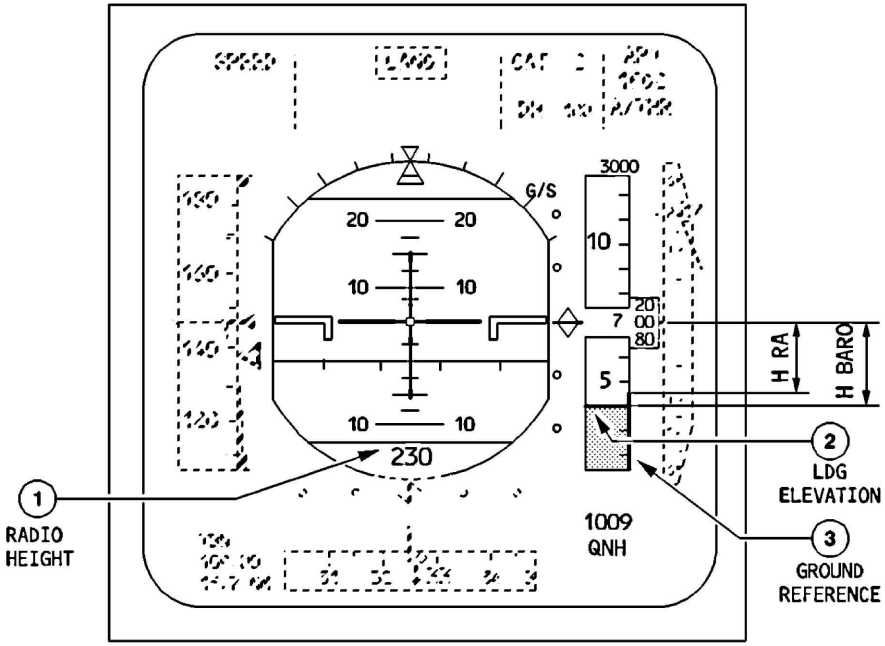
(2) Landing Elevation (blue)
The horizontal bar on the altitude scale shows the landing elevation at the flight-planned destination.

It is displayed:
- during flight phases 7 and 8 and
- if the QNH reference mode is selected.

(3) Ground reference
A red ribbon on the right of the altitude scale represents the field elevation. This ribbon, which is driven by the radio altimeter signal, is displayed below 570 ft.
It moves up, as does the lower line of the attitude sphere, with the altitude scale as the aircraft descends. When the aircraft has touched down, the top of this ribbon is at the middle of the altitude window.

ALTITUDE (CONT'D)

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) Radio Height

A value appears, when the aircraft is lower than 2 500 ft.

- If a DH has been entered, the radio height appears :
  - In green, when DH + 100 ft <RA <2 500 ft
  - In amber, when RA <DH + 100 ft

  If "NO" is entered as the DH on the MCDU APPROACH page, 0 ft becomes a default value. When the aircraft reaches the decision height selected on the MCDU, DH letters flash amber for 9 s, then remain amber above the radio height indication.
- If no DH has been entered, or if both FMGCs fail, the radio height appears :
  - In green, when 400 ft <RA <2 500 ft
  - In amber, when RA ≤400 ft

The radio altitude indication changes every 10 ft down to 50 ft, then every 5 ft down to 10 ft, then every foot.

(2) Landing Elevation (blue)

The top of the brown surface on the altitude scale represents the landing elevation at the flight-planned destination.

It is displayed :

- during flight phases 7 and 8 and
- if the STD reference mode is not selected.

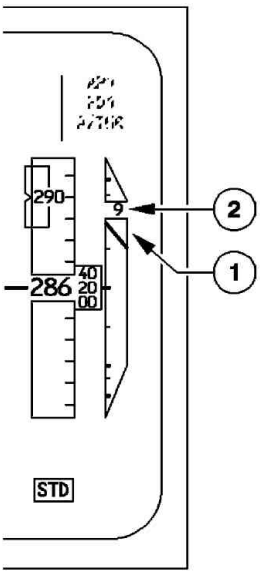
(3) Ground reference

A red ribbon on the right of the altitude scale represents the field elevation. This ribbon, which is driven by the radio altimeter signal, is displayed below 570 ft.
It moves up, as does the lower line of the attitude sphere, with the altitude scale as the aircraft descends. When the aircraft has touched down, the top of this ribbon is at the middle of the altitude window.

VERTICAL SPEED

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

The displayed vertical speed information is normally based on both inertial and barometric data. If inertial data is not available, it is automatically replaced by barometric information.
In this case, the window around the numerical value becomes amber.



(1) Analog pointer
This pointer, which is normally in green, points to a white vertical speed scale, displayed on a grey background and graduated at intervals of 500 ft/min.
If the V/S is greater than 6 000 ft/min, the pointer stays at the end of the scale.

(2) Digital indication
This number, normally in green, is the vertical speed in hundreds of feet per minute.
It disappears, if the vertical speed is less than 200 ft/min.

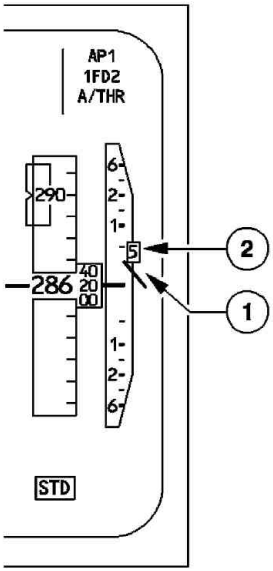
The analog pointer and the digital indication become amber, if:
- V/S is greater than 6 000 ft/min, (climb or descent)
- V/S is greater than 2 000 ft/min, during descent when 1 000 ft <RA <2 500 ft, or
- V/S is greater than 1 200 ft/min, during descent and RA <1 000 ft.

Note: For TCAS, refer to DSC / 34.Navigation / 80.TCAS / 20.Controls and Indicators.

VERTICAL SPEED

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The displayed vertical speed information is normally based on both inertial and barometric data. If inertial data is not available, it is automatically replaced by barometric information.
In this case, the window around the numerical value becomes amber.



(1) Analog pointer
This pointer, which is normally in green, points to a white vertical speed scale, displayed on a grey background and graduated at intervals of 500 ft/min.
If the V/S is greater than 6 000 ft/min, the pointer stays at the end of the scale.

(2) Digital indication
This number, normally in green, is the vertical speed in hundreds of feet per minute.
It disappears, if the vertical speed is less than 200 ft/min.

The analog pointer and the digital indication become amber, if:
- V/S is greater than 6 000 ft/min, (climb or descent)
- V/S is greater than 2 000 ft/min, during descent when 1 000 ft <RA <2 500 ft, or
- V/S is greater than 1 200 ft/min, during descent and RA <1 000 ft.

Note: For TCAS, refer to DSC / 34.Navigation / 80.TCAS / 20.Controls and Indicators.

HEADING

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

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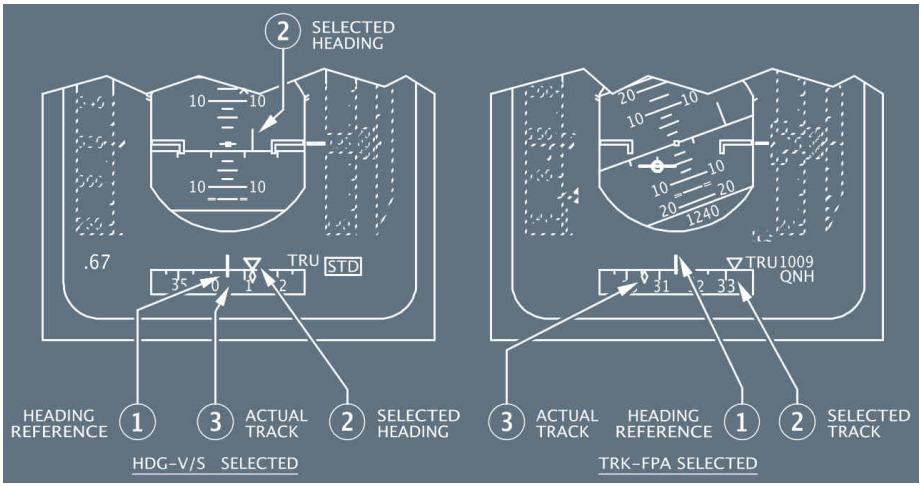

(1) Heading Reference Line and Scale
A white scale on a grey background moves in front of a fixed yellow reference line to indicate the actual magnetic heading.
"TRU"appears, when the display indicates the true heading, rather than the magnetic heading (latitude above 73 ° North or below 60 ° South).

(2) Selected Heading or Track Index (blue)
The pointer indicates the heading or track displayed on the FCU HDG-TRK window.
The index is replaced by digits on the right or left side of the scale, when the selected value is off the scale.
If the FD pushbutton is OFF, a second heading/track symbol appears on the horizon line, and markers are displayed every 10 °.

(3) Actual Track Symbol
This symbol is a small green diamond.

HEADING

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

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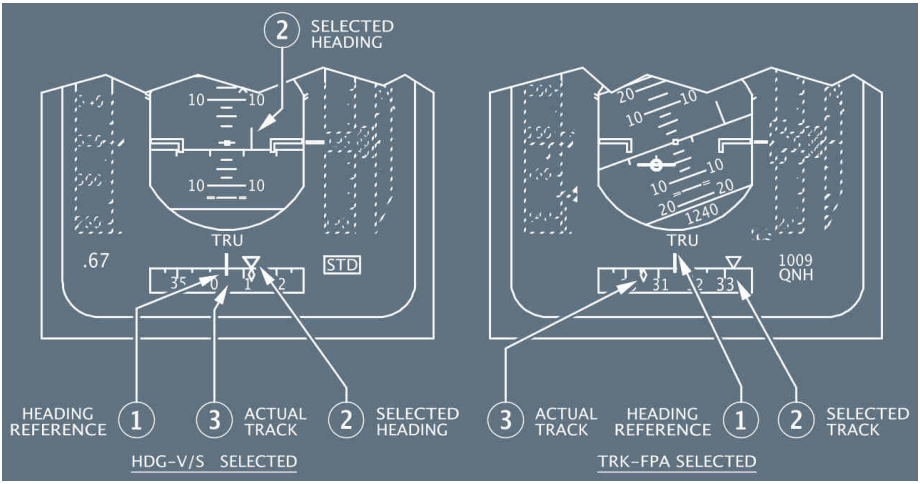


(1) Heading Reference Line and Scale
A white scale on a grey background moves in front of a fixed yellow reference line to indicate the actual magnetic heading.
"TRUE" appears, when the display indicates the true heading, rather than the magnetic heading (latitude above 73 ° North or below 60 ° South).

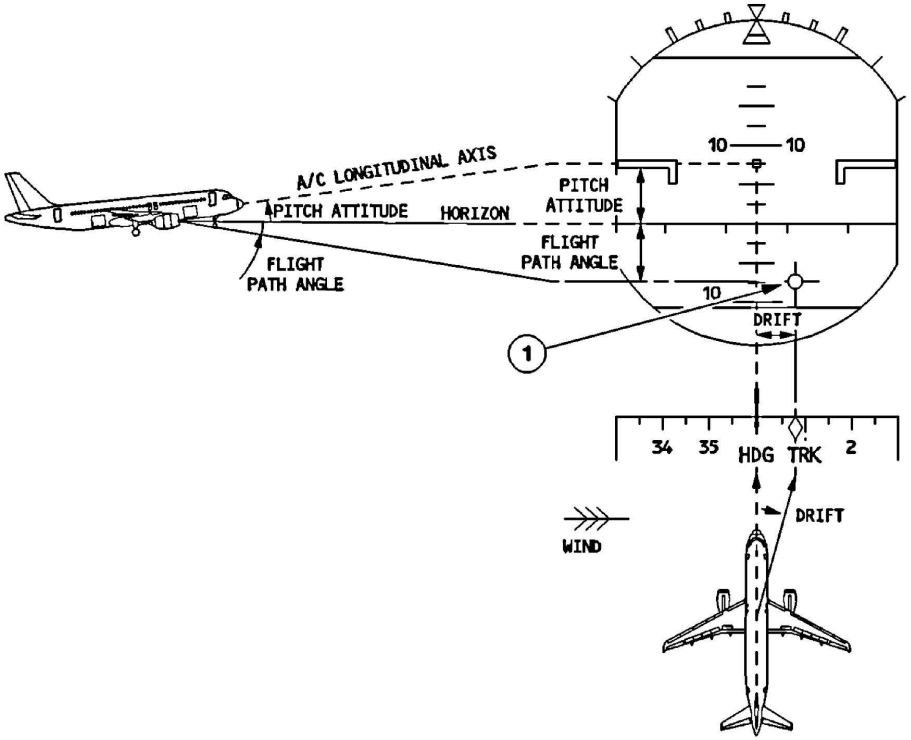
(2) Selected Heading or Track Index (blue)
This pointer is in blue, and indicates the heading or track displayed on the FCU HDG-TRK window.
The index is replaced by digits on the right or left side of the scale, when the selected value is off the scale.

If the FD pushbutton is OFF, a second heading/track symbol appears on the horizon line, and markers are displayed every 10 °.

(3) Actual Track Symbol
This symbol is a small green diamond.

FLIGHT PATH VECTOR

Applicable to: ALL



(1) Flight Path Vector (FPV)
This symbol appears, when the pilot selects TRK/FPA on the FCU.

The flight path vector represents the lateral and vertical trajectory of the aircraft with respect to the ground.

- On the lateral scale, it indicates the aircraft's track.
- On the vertical scale, it indicates the aircraft's flight path angle.

Example : The aircraft flies a track of 009 ° (heading 360 °, wind from west) and descends with a flight path angle of minus 7.5 °.

GUIDANCE

Applicable to: ALL

Two completely different flight director modes are available, each with its own characteristic symbols. The symbol displayed corresponds to the basic operating reference the pilot has selected – either HDG V/S or TRK FPA.
In normal operation, PFD1 displays FD1 orders.
If FD1 fails, PFD1 automatically displays FD2 orders on PFD1, the FD2 indication in the right column of the FMA flashes for a few seconds.
This is also applicable to FD2 orders, that are displayed on PFD2.

IF THE CREW HAS SELECTED HDG V/S TO BE THE BASIC REFERENCE :

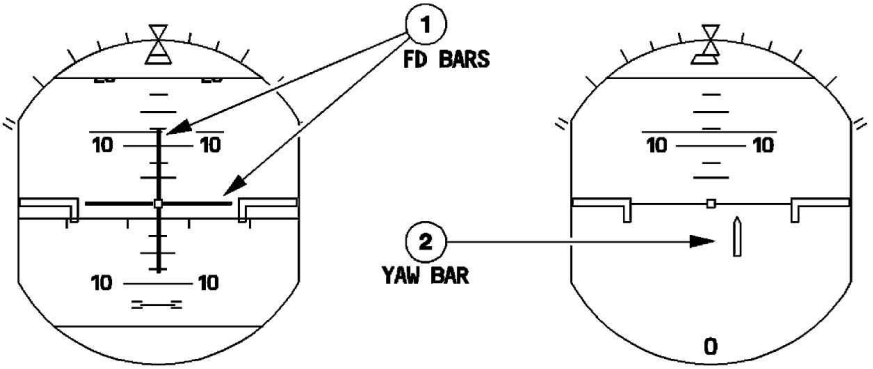
The PFD displays FD bars in green. They automatically move out of view at touchdown in ROLL OUT mode.

They flash for 10 s, and then remain steady, if the following occur :

- A reversion to the HDG V/S basic mode (manual or automatic), or
- The selected flight level is changed, when ALT CAPTURE mode is engaged, or
- The loss of LOC or G/S in LAND mode or loss of LAND mode, or
- At the first AP or FD engagement.

The PFD displays a yaw bar in green below 30 ft radio altitude, if a localizer signal is available:

- During takeoff (in RWY mode)
- Upon landing (in FLARE and ROLL OUT mode).

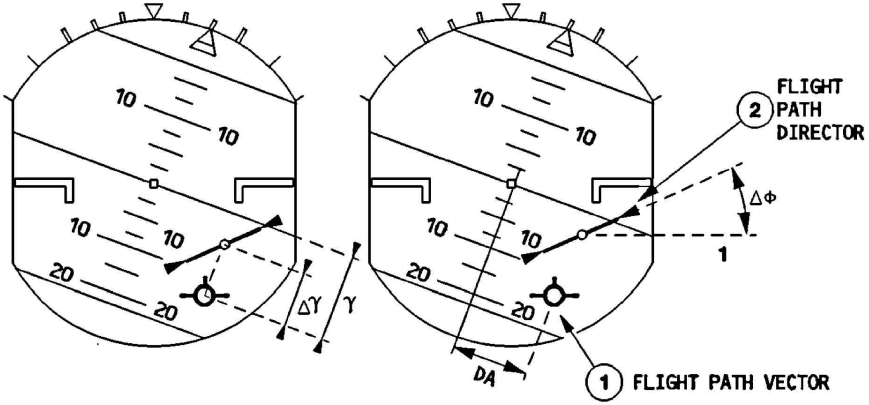


(1) FD Crossed Bars (green)

(2) Yaw Bar (green)

THE CREW HAS SELECTED TRK FPA AS THE BASIC REFERENCE :

An inertial flight path vector defines the aircraft's horizontal and vertical track, taking wind effect into account.
An associated flight path director symbol guides the flight crew onto the vertical and horizontal flight path targets.



Υ REPRESENTS THE FLIGHT PATH ANGLE
DA REPRESENTS THE DRIFT ANGLE
ΔΥ REPRESENTS THE DIFFERENCE BETWEEN THE ORDERED FLIGHT PATH ANGLE AND THE ACTUAL ONE
ΔΦ REPRESENTS THE DIFFERENCE BETWEEN THE ORDERED ROLL ANGLE AND THE ACTUAL ONE

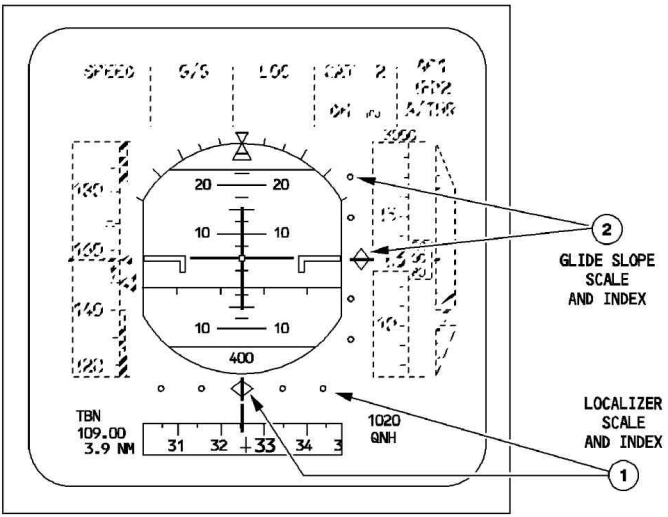
(1) Flight Path Vector (green)

(2) Flight Path Director (green)

TRAJECTORY DEVIATION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

ILS APPROACH



(1) Localizer Deviation Scale and Index

(2) Glide slope Deviation Scale and Index

Deviation scales appear as soon as the flight crew pushes an LS pushbutton switch on the EFIS control panel. Deviation indexes appear when the glide slope and localizer signals are valid if deviation scales are displayed.

When a deviation index is out of the displayed range, only half a symbol appears at the end of the scale.

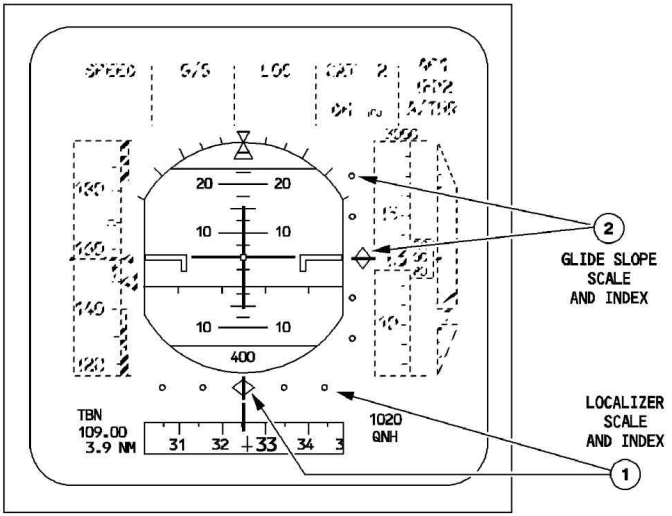
The LOC scale flashes and continues to flash if the deviation exceeds 1/4 dot for two seconds while the aircraft is between 15 ft and 1 000 ft, and CAT2 or CAT3 capability displayed on the FMA, and either LOC, LAND, or FLARE is engaged. The glideslope scale flashes and continues to flash if the deviation exceeds one dot for two seconds (above 100 ft RA).

“LOC”and the glideslope scale half index symbols flash, and continue to flash, when the deviation exceeds two dots for two seconds.

0ne dot represents a deviation of ± 0.8 ° on the localizer scale, and ± 0.4 ° on the glideslope scale.

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI

ILS APPROACH



(1) Localizer Deviation Scale and Index

(2) Glideslope Deviation Scale and Index

Deviation scales appear as soon as the flight crew pushes an LS pushbutton switch on the EFIS control panel. Deviation indexes appear when the glide slope and localizer signals are valid if deviation scales are displayed.

When a deviation index is out of the displayed range, only half a symbol appears at the end of the scale.

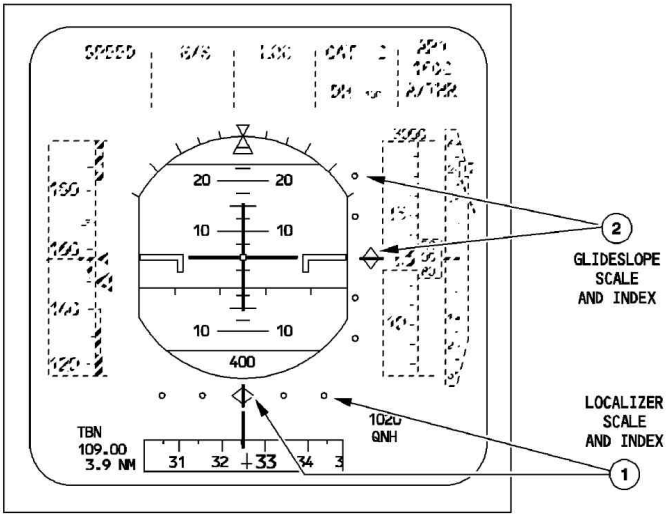
The LOC scale flashes, and continues to flash, if the deviation exceeds 1/4 dot for two seconds while the aircraft is between 15 ft and 1 000 ft , and CAT2 or CAT3 capability displayed on the FMA, and either LOC, LAND, or FLARE is engaged. The glideslope scale flashes, and continues to flash, if the deviation exceeds one dot for two seconds (above 100 ft RA).

“LOC”and the glideslope scale half index symbols flash, and continue to flash, when the deviation exceeds two dots for two seconds.

0ne dot represents a deviation of plus or minus 0.8 ° on the localizer scale, and plus or minus 0.4 ° on the glideslope scale.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

ILS APPROACH



(1) Localizer Deviation Scale and Index

(2) Glideslope Deviation Scale and Index

Deviation scales appear as soon as the flight crew pushes an LS pushbutton on the EFIS control panel. Deviation indexes appear, when the glideslope and localizer signals are valid, if deviation scales are displayed.

When a deviation index is out of the displayed range, only half a symbol appears at the end of the scale.

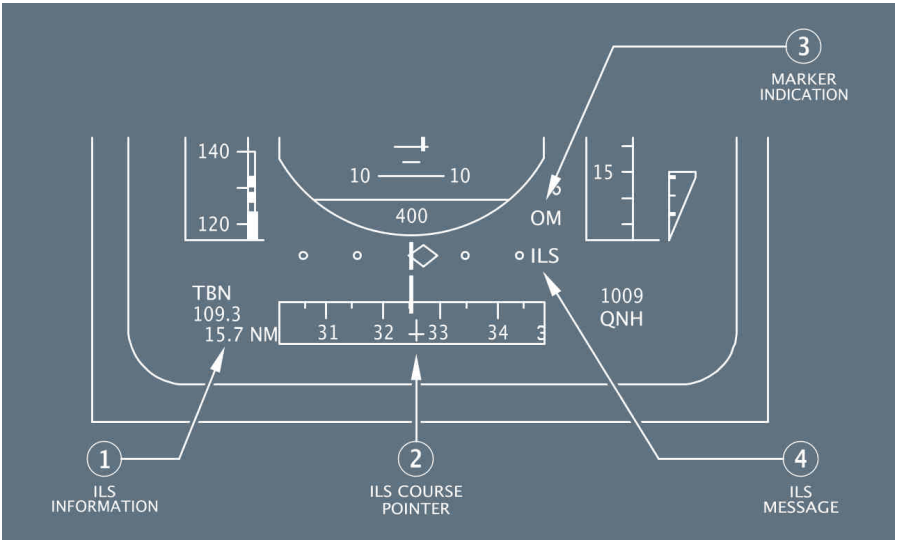
The LOC scale flashes and continues to flash if the deviation exceeds 1/4 dot for two seconds while the aircraft is between 15 ft and 1 000 ft and CAT2 or CAT3 capability displayed on the FMA, and either LOC, LAND, or FLARE is engaged. The glideslope scale flashes and continues to flash, if the deviation exceeds one dot for two seconds (above 100 ft RA).

“LOC”and the glideslope scale half index symbols flash and continue to flash, when the deviation exceeds two dots for two seconds.

0ne dot represents a deviation of ± 0.8 ° on the localizer scale, and ± 0.4 ° on the glideslope scale.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

13 ILS APPROACH (CONT'D)



(1) ILS information (magenta)

The following information appears on the PFD, when the crew has selected an ILS frequency and course, and pushed the ILS pb:

- ILS identification, as decoded by the ILS receiver;
- ILS frequency;
- DME distance, if the ILS has a DME

(2) ILS course Pointer (magenta)

This pointer appears on the PFD, when the crew has selected an ILS frequency and course, and pushed the ILS pb.
It is a dagger-shaped symbol on the heading scale.
The ILS course (numerical) appears in magenta, on the right or the left side of the scale, when it is outside the displayed range of headings.

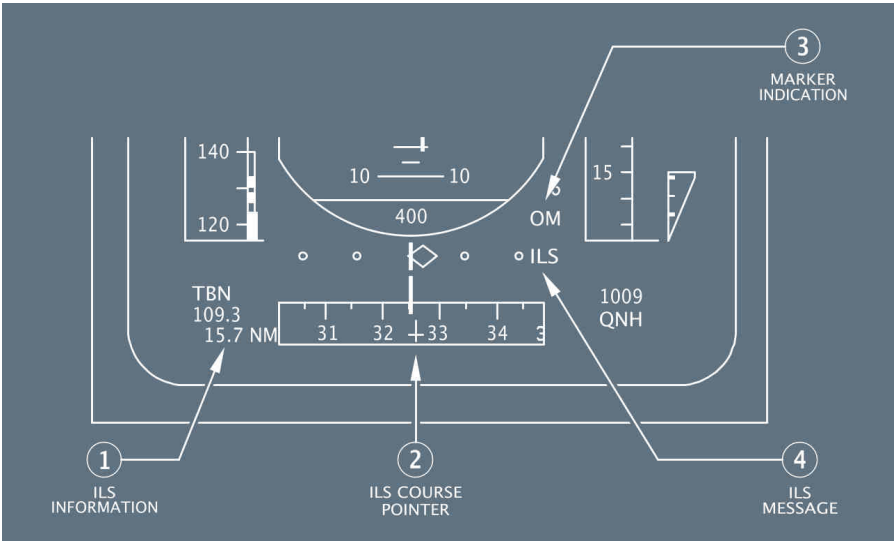
(3) Marker Indications

OM appears in blue, when the aircraft flies over the outer marker.
MM appears in amber, when it flies over the middle marker.
AWY appears in white, when it flies over an airways marker beacon or the ILS inner marker.

(4) ILS Message
This flashes amber, when the APPR mode is armed and the ILS display is not selected.

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI

14 **ILS APPROACH (CONT'D)**



(1) ILS information (magenta)

The following information appears on the PFD, when the crew has selected an ILS frequency and course, and pushed the LS pb:
- ILS identification, as decoded by the ILS receiver;
- ILS frequency;
- DME distance, if the ILS has a DME

(2) ILS course Pointer (magenta)
This pointer appears on the PFD, when the crew has selected an ILS frequency and course, and pushed the LS pb.
It is a dagger-shaped symbol on the heading scale.
The ILS course pointer is replaced by digits on the right or left hand of the heading scale (in a white box) when the ILS course value is outside the displayed portion of the heading scale.

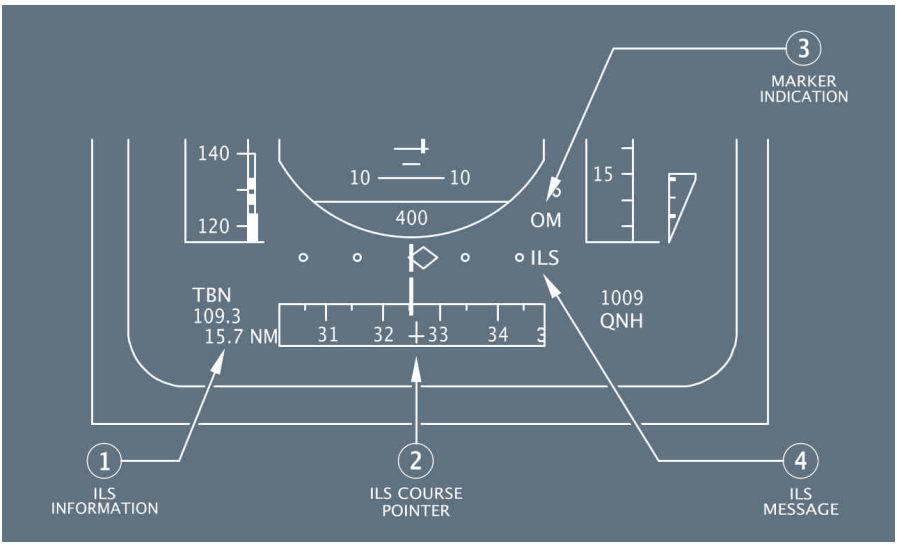
(3) Marker Indications
OM appears in blue, when the aircraft flies over the outer marker.
MM appears in amber, when it flies over the middle marker.

AWY appears in white, when it flies over an airways marker beacon or the ILS inner marker.

(4) ILS Message
This flashes amber, when the APPR mode is armed and the ILS display is not selected.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

15 **ILS APPROACH (CONT'D)**



(1) ILS information (magenta)

The following information appears on the PFD, when the crew has selected an ILS frequency and course, and pushed the LS pb:

- ILS identification, as decoded by the ILS receiver;
- ILS frequency;
- DME distance, if the ILS has a DME

(2) ILS course Pointer (magenta)
This pointer appears on the PFD, when the crew has selected an ILS frequency and course, and pushed the LS pb.
It is a dagger-shaped symbol on the heading scale.
The ILS course pointer is replaced by digits on the right or left hand of the heading scale (in a white box) when the ILS course value is outside the displayed portion of the heading scale.

(3) Marker Indications

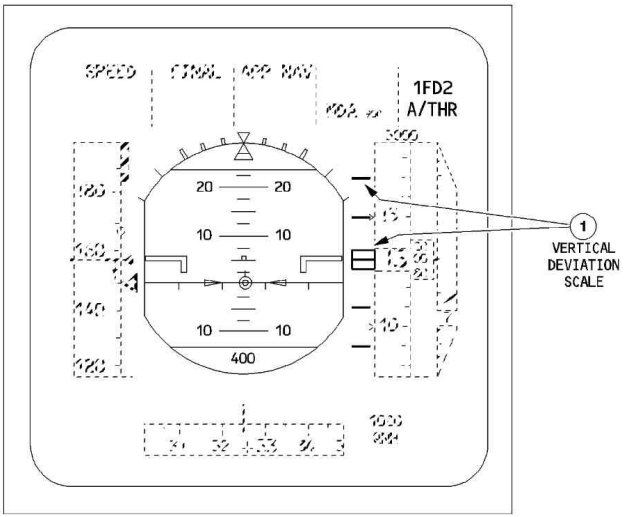
OM appears in blue, when the aircraft flies over the outer marker.
MM appears in amber, when it flies over the middle marker.
IM appears in white, when it flies over an airways marker beacon or the ILS inner marker.

(4) ILS Message

This flashes amber, when the APPR mode is armed and the ILS display is not selected.

Applicable to: B-HSD, B-HSE

NON PRECISION APPROACH



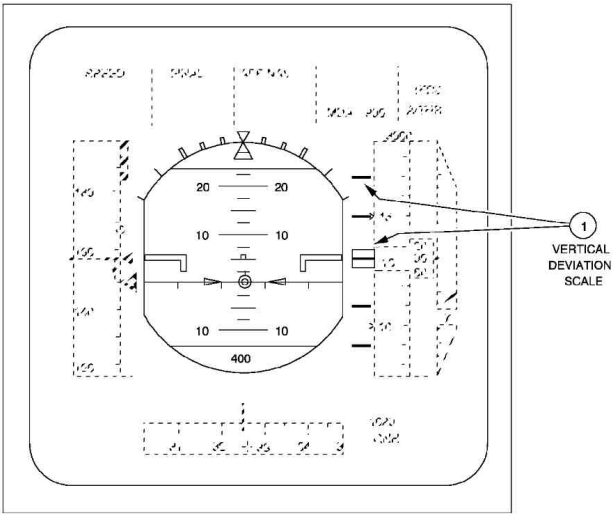
(1) Vertical Deviation Scale and Index

These symbols appear when in the approach phase and FINAL mode armed/engaged. They are displayed until the MDA has been reached. They give the vertical deviation from the trajectory defined by the FMGC. Each index scale graduation represents 100 ft. The range ± 200 ft.

Note: If the ILS pushbutton is pressed, glide deviation has priority over vertical deviation information. As long as VDEV display conditions are met, and the ILS pushbutton is selected, an amber VDEV message flashes above the glide scale.

Applicable to: B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

NON PRECISION APPROACH



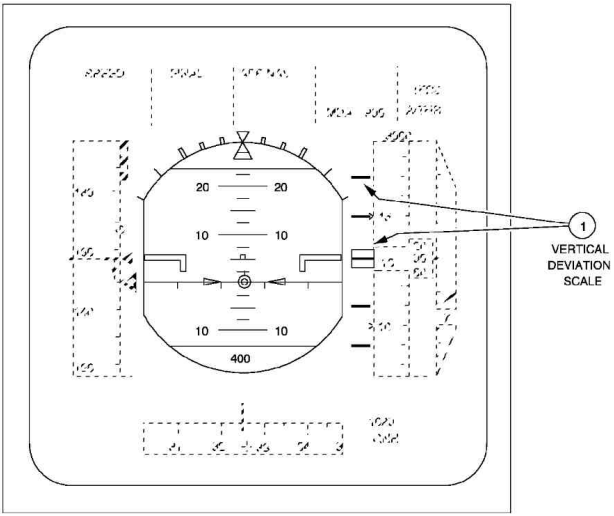
(1) Vertical Deviation Scale and Index

These symbols appear when in the approach phase and, when either FINAL is armed/engaged or a non-LS approach has been entered. They are displayed in the approach or go-around phase, until the MDA has been reached, or the MAP or the runway has been sequenced. They give the vertical deviation from the trajectory defined by the FMGC. Each index scale graduation represents 100 ft. The range is ± 200 ft.

Note: If the ILS pushbutton is pressed, glide deviation has priority over vertical deviation information. As long as VDEV display conditions are met, and the ILS pushbutton is selected, an amber VDEV message flashes above the glide scale.

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI

NON PRECISION APPROACH



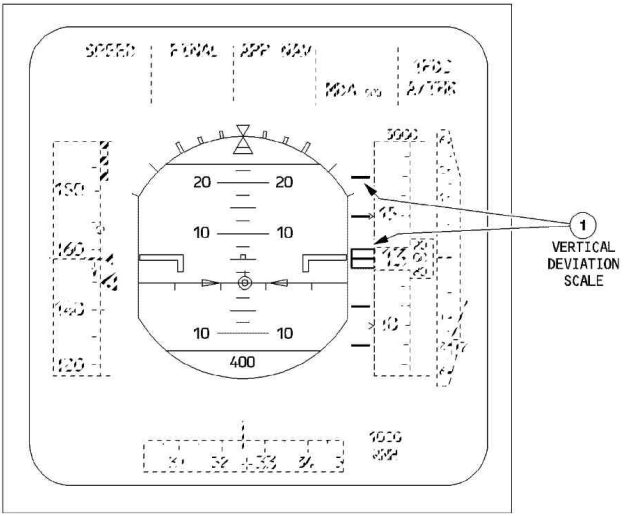
(1) Vertical Deviation Scale and Index

These symbols appear when in the approach phase and, when either FINAL is armed/engaged or a non-LS approach has been entered. They are displayed in the approach or go-around phase, until the MDA has been reached, or the MAP or the runway has been sequenced. They give the vertical deviation from the trajectory defined by the FMGC. Each index scale graduation represents 100 ft. The range is ± 200 ft.

Note: If the LS pushbutton is pressed, glide deviation has priority over vertical deviation information. As long as VDEV display conditions are met, and the LS pushbutton is selected, an amber VDEV message flashes above the glide scale.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

NON PRECISION APPROACH



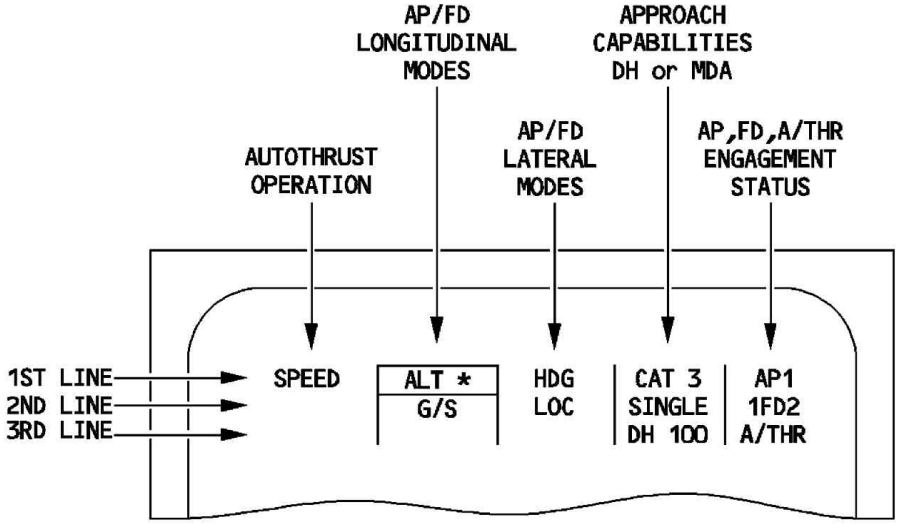
(1) Vertical Deviation Scale and Index

These symbols appear when in the approach phase and, when either FINAL is armed/engaged or a non-LS approach has been entered. They are displayed in the approach or go-around phase, until the MDA has been reached, or the MAP or the runway has been sequenced. They give the vertical deviation from the trajectory defined by the FMGC. Each index scale graduation represents 100 ft. The range is ± 200 ft.

Note: If the LS pb is pressed, glide deviation has priority over vertical deviation information. As long as VDEV display conditions are met, and the LS pb is selected, an amber VDEV message flashes above the glide scale.

FLIGHT MODE ANNUNCIATOR

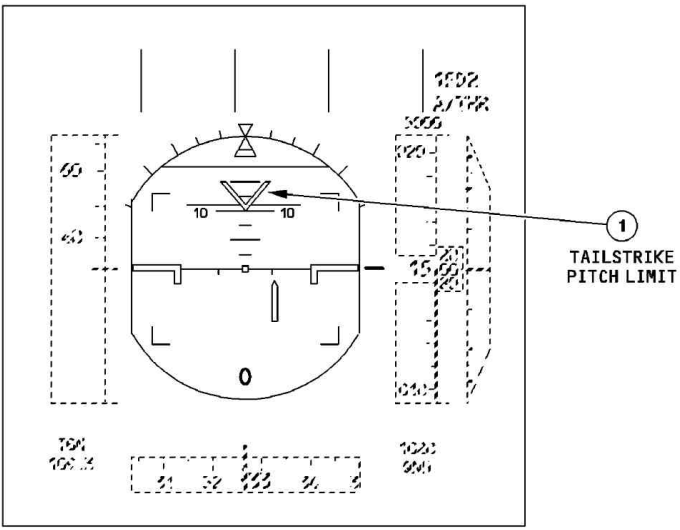
Applicable to: ALL



For a detailed discussion of legends and messages that may appear during FMGS operations, see FLIGHT GUIDANCE chapter (*Refer to DSC-22_30-100 Flight Mode Annunciator (FMA) - General*).

TAILSTRIKE PITCH LIMIT INDICATOR

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR

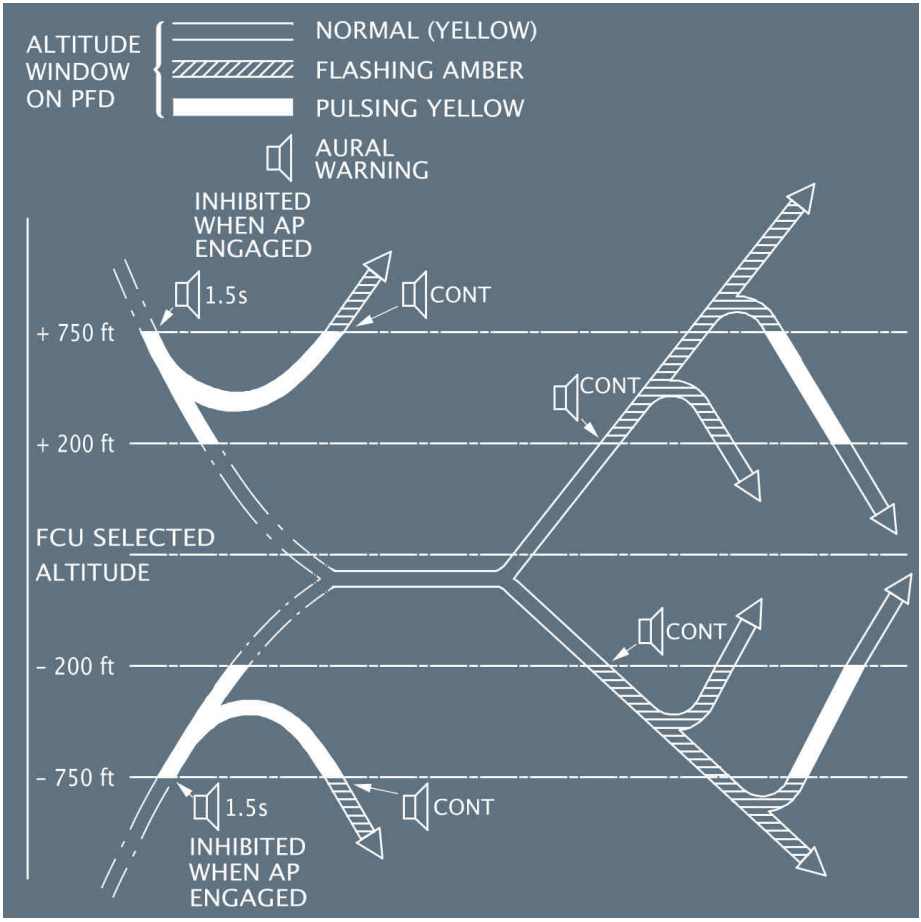


(1) Tailstrike Pitch Limit
The pitch limit indicates the maximum pitch attitude to avoid the tailstrike risk at landing. The indication is a fixed value corresponding to the main landing gear compressed. The indication appears at 400 ft radio height. The indication disappears, when there is no longer a risk of tailstrike.

ALTITUDE ALERT

Applicable to: ALL

16 The FWC generates an altitude warning (C chord sound and PFD's altitude window pulses in yellow or flashes in amber), when the aircraft approaches a preselected altitude or flight level, or when it deviates from its selected altitude or flight level.
This warning results from a comparison between the altitude (ADIRS) and the preselected altitude displayed on FCU.

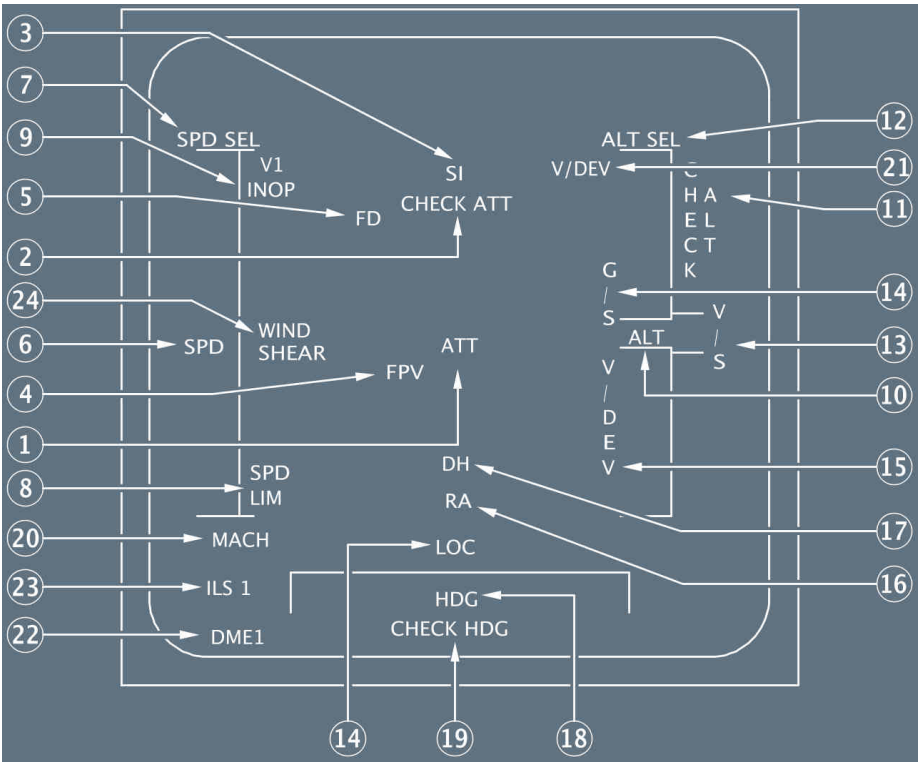


- Selecting a new altitude, or pushing the ECAM's EMER CANC pushbutton, or pressing either MASTER WARN pushbutton, cancels the continuous C chord.
- Selecting a new altitude stops the flashing of the altitude window.
- The altitude alert is inhibited:
  - When the slats are out, with the landing gear is selected down, or
  - In approach after the aircraft captures the glideslope, or
  - When the landing gear is locked down.

FLAGS AND MESSAGES DISPLAYED ON PFD

Applicable to: B-HSD, B-HSE

17



(1) ATT flag (red)
If the PFD loses all attitude data, its entire sphere is cleared to display the ATT flag.

(2) CHECK ATT (amber)
"CHECK ATT"appears, when there is a disagreement (of a least 5 °) between the attitude information displayed by the two PFDs. The CHECK ATT flag appears on both PFDs, and a caution appears on the ECAM.

(3) SI flag (red)
If the sideslip information is lost or any reverse is deployed in flight, the index disappears and a red SI flag appears.

(4) FPV flag (red)
In the TRK FPA mode, when the drift angle or flight path angle is not valid, an FPV flag appears.

(5) FD flag (red)
If both FMGCs fail, or if both FDs are disengaged and the FD pushbutton is on and the attitude is valid, a red FD flag appears.

(6) SPD flag (red)
If the speed information fails, a SPD flag replaces the speed scale.

(7) SPD SEL flag (red)
If the selected speed information fails, a SPD SEL flag appears.

(8) SPD LIM flag (red)
This flag appears when both FACs are inoperative, or in case of SFCC dual flap/slat channel failure.
In this case, the following PFD information is lost : VLS, S, F, Green Dot, Vtrend, VMAX, VFE next, VSW.

(9) V1 INOP flag (red)
When the V1 signal is not valid, a V1 INOP flag replaces the digital value.

(10) ALT flag (red)
If the altitude information fails, the ALT flag replaces the altitude scale.

(11) CHECK ALT flag (amber)
The CHECK ALT flag appears, as does an ECAM caution, if the disagree between the two PFD altitude indications is greater than 250 ft when QNH is selected, or 500 ft when STD is selected.
The caution and the flag disappear, when the Pilot's and the Co-pilot's barometer references disagree.

(12) ALT SEL flag (red)
If the selected altitude information fails, an ALT SEL flag appears.

(13) V/S flag (red)
If the vertical speed information fails, the V/S flag replaces the vertical speed scale.

(14) LOC and G/S flags (red)
If the localizer or glideslope receiver fails, a LOC or G/S flag appears on the deviation scale.

(15) VDEV flag (red)
If the vertical deviation information fails, and the ILS pb is not pressed, a VDEV flag replaces the VDEV scale.

(16) RA flag (red)
If both radio altimeters fail, this flag appears in place of the radio height indication.

(17) DH flag (amber)
A DH flag appears, when the aircraft reaches the selected DH.

(18) HDG flag (red)
If the heading information fails, the HDG flag replaces the heading scale.

(19) CHECK HDG flag (amber)
The CHECK HDG flag appears, as does an ECAM caution, if there is a discrepancy (5 °) between pilots's, and copilot's heading indications.

(20) MACH flag (red)
This flag appears, if the Mach data fails.

(21) VDEV (amber)
At the top of the glide scale, this message flashes when either the FINAL mode is armed/engaged, and the ILS pb is selected.

(22) DME 1 flag (red)
When the DME distance is not valid, a DME 1 (on PFD 1) or DME 2 (on PFD 2) flag replaces the DME distance indication.

(23) ILS1 flag (red)
If an ILS frequency fails, or if either the LOC or G/S signals fail, an ILS 1 (on PFD 1) or ILS 2 (on PFD 2) flag replaces the ILS frequency indication.

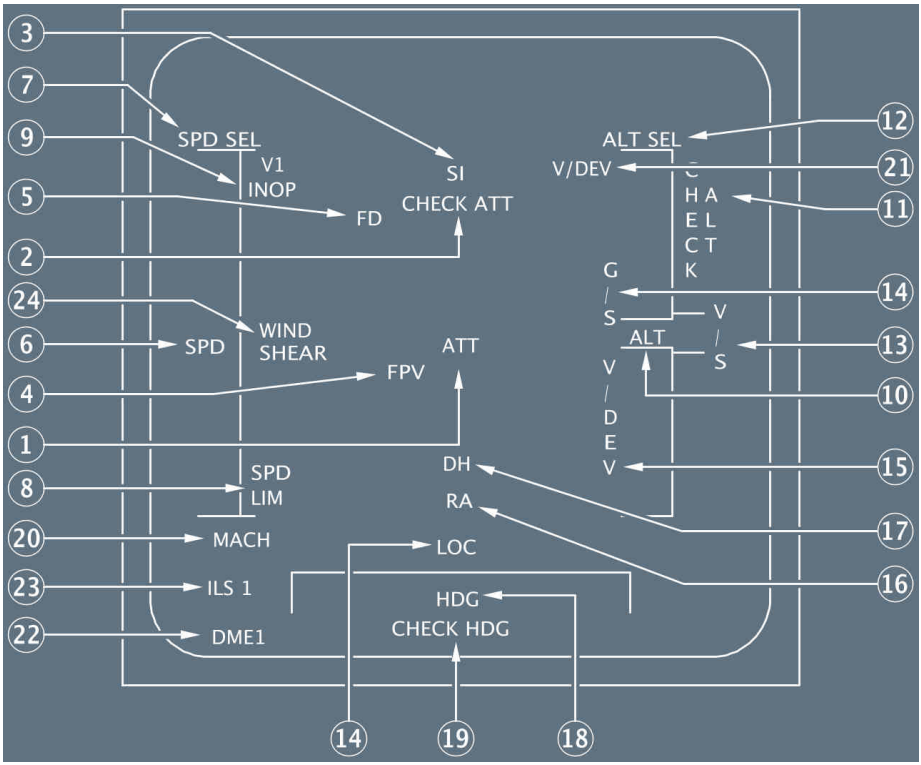
(24) WINDSHEAR warning (red)
This message is displayed, when windshear is detected (reactive windshear warning) by the FAC.
Refer to DSC-22_40-40 Windshear Detection Function

Note: *1. All flags, except SI, V1 INOP and DME 1 which are steady, flash for 9 s, then remain steady.*
The DH flag flashes for 3 s, then remains steady.
2. For information on the TCAS flag, Refer to DSC-34-80-10 TCAS Modes.

FLAGS AND MESSAGES DISPLAYED ON PFD

Applicable to: B-HSG, B-HSI

18



(1) ATT flag (red)
If the PFD loses all attitude data, its entire sphere is cleared to display the ATT flag.

(2) CHECK ATT (amber)
"CHECK ATT"appears, when there is a disagreement (of a least 5 °) between the attitude information displayed by the two PFDs. The CHECK ATT flag appears on both PFDs, and a caution appears on the ECAM.

(3) SI flag (red)
If the sideslip information is lost or any reverse is deployed in flight, the index disappears and a red SI flag appears.

(4) FPV flag (red)
In the TRK FPA mode, when the drift angle or flight path angle is not valid, an FPV flag appears.

(5) FD flag (red)
If both FMGCs fail, or if both FDs are disengaged and the FD pushbutton is on and the attitude is valid, a red FD flag appears.

(6) SPD flag (red)
If the speed information fails, a SPD flag replaces the speed scale.

(7) SPD SEL flag (red)
If the selected speed information fails, a SPD SEL flag appears.

(8) SPD LIM flag (red)
This flag appears when both FACs are inoperative, or in case of SFCC dual flap/slat channel failure.
In this case, the following PFD information is lost : VLS, S, F, Green Dot, Vtrend, VMAX, VFE next, VSW.

(9) V1 INOP flag (red)
When the V1 signal is not valid, a V1 INOP flag replaces the digital value.

(10) ALT flag (red)
If the altitude information fails, the ALT flag replaces the altitude scale.

(11) CHECK ALT flag (amber)
The CHECK ALT flag appears, as does an ECAM caution, if the disagree between the two PFD altitude indications is greater than 250 ft when QNH is selected, or 500 ft when STD is selected.
The caution and the flag disappear, when the Pilot's and the Co-pilot's barometer references disagree.

(12) ALT SEL flag (red)
If the selected altitude information fails, an ALT SEL flag appears.

(13) V/S flag (red)
If the vertical speed information fails, the V/S flag replaces the vertical speed scale.

(14) LOC and G/S flags (red)
If the localizer or glideslope receiver fails, a LOC or G/S flag appears on the deviation scale.

(15) VDEV flag (red)
If the vertical deviation information fails, and the LS pb is not pressed, a VDEV flag replaces the VDEV scale.

(16) RA flag (red)
If both radio altimeters fail, this flag appears in place of the radio height indication.

(17) DH flag (amber)
A DH flag appears, when the aircraft reaches the selected DH.

(18) HDG flag (red)
If the heading information fails, the HDG flag replaces the heading scale.

(19) CHECK HDG flag (amber)
The CHECK HDG flag appears, as does an ECAM caution, if there is a discrepancy (5 °) between pilots's, and copilot's heading indications.

(20) MACH flag (red)
This flag appears, if the Mach data fails.

(21) VDEV (amber)
At the top of the glide scale, this message flashes in approach phase and, when either the FINAL mode is armed/engaged, or a non-LS approach has been selected, and the ILS pushbutton is selected.

(22) DME 1 flag (red)
When the DME distance is not valid, a DME1 (on PFD 1) or DME 2 (on PFD 2) flag replaces the DME distance indication.

(23) ILS1 flag (red)
If an ILS frequency fails, or if either the LOC or G/S signals fail, an ILS 1 (on PFD 1) or ILS 2 (on PFD2) flag replaces the ILS frequency indication.

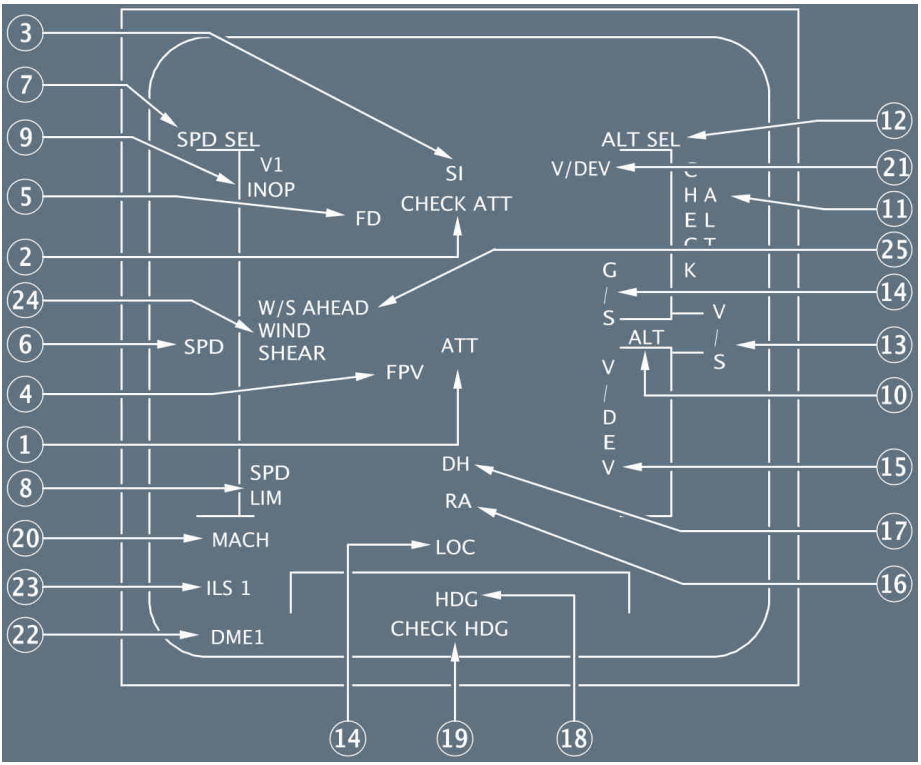
(24) WINDSHEAR warning (red)
This message is displayed, when windshear is detected (reactive windshear warning) by the FAC.
Refer to DSC-22_40-40 Windshear Detection Function

Note: *1. All flags, except SI, V1 INOP and DME 1 which are steady, flash for 9 s, then remain steady.*
The DH flag flashes for 3 s, then remains steady.
2. For information on the TCAS flag, Refer to DSC-34-80-10 TCAS Modes.

FLAGS AND MESSAGES DISPLAYED ON PFD

Applicable to: B-HTD, B-HTE, B-HTF

19



(1) ATT flag (red)
If the PFD loses all attitude data, its entire sphere is cleared to display the ATT flag.

(2) CHECK ATT (amber)
"CHECK ATT"appears, when there is a disagreement (of a least 5 °) between the attitude information displayed by the two PFDs. The CHECK ATT flag appears on both PFDs, and a caution appears on the ECAM.

(3) SI flag (red)
If the sideslip information is lost or any reverse is deployed in flight, the index disappears and a red SI flag appears.

(4) FPV flag (red)
In the TRK FPA mode, when the drift angle or flight path angle is not valid, an FPV flag appears.

(5) FD flag (red)
If both FMGCs fail, or if both FDs are disengaged and the FD pushbutton is on and the attitude is valid, a red FD flag appears.

(6) SPD flag (red)
If the speed information fails, a SPD flag replaces the speed scale.

(7) SPD SEL flag (red)
If the selected speed information fails, a SPD SEL flag appears.

(8) SPD LIM flag (red)
This flag appears when both FACs are inoperative, or in case of SFCC dual flap/slat channel failure.
In this case, the following PFD information is lost : VLS, S, F, Green Dot, Vtrend, VMAX, VFE next, VSW.

(9) V1 INOP flag (red)
When the V1 signal is not valid, a V1 INOP flag replaces the digital value.

(10) ALT flag (red)
If the altitude information fails, the ALT flag replaces the altitude scale.

(11) CHECK ALT flag (amber)
The CHECK ALT flag appears, as does an ECAM caution, if the disagree between the two PFD altitude indications is greater than 250 ft when QNH is selected, or 500 ft when STD is selected.
The caution and the flag disappear, when the Pilot's and the Co-pilot's barometer references disagree.

(12) ALT SEL flag (red)
If the selected altitude information fails, an ALT SEL flag appears.

(13) V/S flag (red)
If the vertical speed information fails, the V/S flag replaces the vertical speed scale.

(14) LOC and G/S flags (red)
If the localizer or glideslope receiver fails, a LOC or G/S flag appears on the deviation scale.

(15) VDEV flag (red)
If the vertical deviation information fails, and the LS pb is not pressed, a VDEV flag replaces the VDEV scale.

(16) RA flag (red)
If both radio altimeters fail, this flag appears in place of the radio height indication.

(17) DH flag (amber)
A DH flag appears, when the aircraft reaches the selected DH.

(18) HDG flag (red)
If the heading information fails, the HDG flag replaces the heading scale.

(19) CHECK HDG flag (amber)
The CHECK HDG flag appears, as does an ECAM caution, if there is a discrepancy (5 °) between pilots's, and copilot's heading indications.

(20) MACH flag (red)
This flag appears, if the Mach data fails.

(21) VDEV (amber)
At the top of the glide scale, this message flashes in approach phase and, when either the FINAL mode is armed/engaged, or a non-LS approach has been selected, and the LS pushbutton is selected.

(22) DME 1 flag (red)
When the DME distance is not valid, a DME1 (on PFD1) or DME2 (on PFD2) flag replaces the DME distance indication.

(23) ILS1 flag (red)
If an ILS frequency fails, or if either the LOC or G/S signals fail, an ILS1 (on PFD1) or ILS2 (on PFD2) flag replaces the ILS frequency indication.

(24) WINDSHEAR (red)
This message is displayed, when windshear is detected (reactive windshear warning) by the FAC.
Refer to DSC-22_40-40 Windshear Detection Function

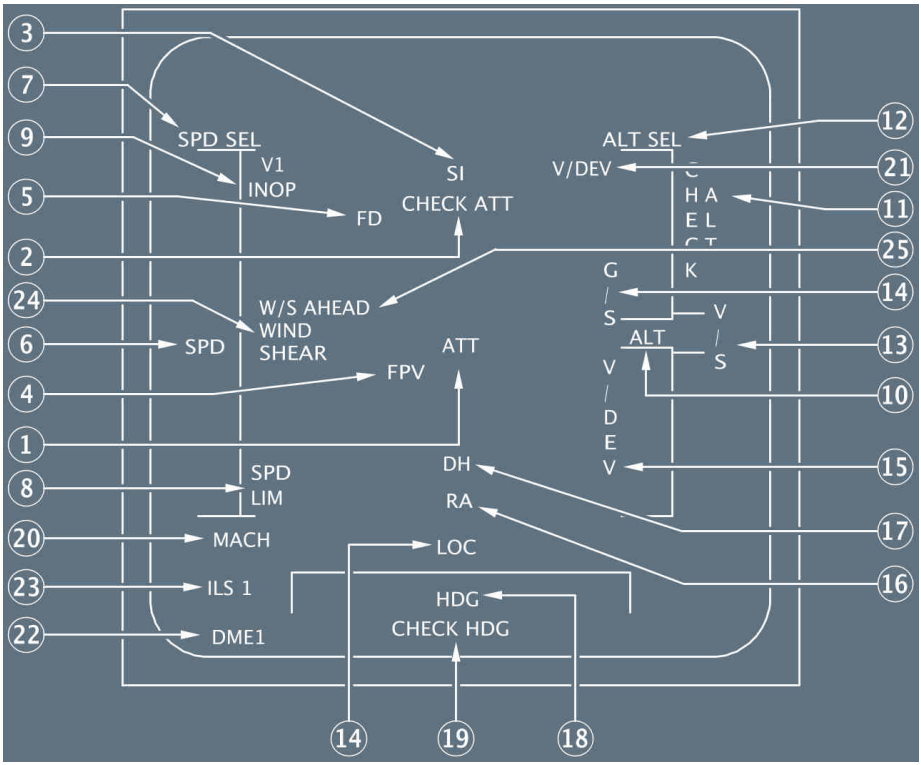
(25) W/S AHEAD
This message is displayed, when the predictive windshear system has detected windshear ahead of the aircraft.
The message is in amber or red, depending on the alert level.
Refer to DSC-34-60-30 Windshear Alerts Inhibition

Note: *1. All flags, except SI, V1 INOP and DME 1 which are steady, flash for 9 s, then remain steady.*
The DH flag flashes for 3 s, then remains steady.
2. For information on the TCAS flag, Refer to DSC-34-80-10 TCAS Modes.

FLAGS AND MESSAGES DISPLAYED ON PFD

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI

20



(1) ATT flag (red)
If the PFD loses all attitude data, its entire sphere is cleared to display the ATT flag.

(2) CHECK ATT (amber)
"CHECK ATT"appears, when there is a disagreement (of a least 5 °) between the attitude information displayed by the two PFDs. The CHECK ATT flag appears on both PFDs, and a caution appears on the ECAM.

(3) SI flag (red)
If the sideslip information is lost or any reverse is deployed in flight, the index disappears and a red SI flag appears.

(4) FPV flag (red)
In the TRK FPA mode, when the drift angle or flight path angle is not valid, an FPV flag appears.

(5) FD flag (red)
If both FMGCs fail, or if both FDs are disengaged and the FD pushbutton is on and the attitude is valid, a red FD flag appears.

(6) SPD flag (red)
If the speed information fails, a SPD flag replaces the speed scale.

(7) SPD SEL flag (red)
If the selected speed information fails, a SPD SEL flag appears.

(8) SPD LIM flag (red)
This flag appears when both FACs are inoperative, or in case of SFCC dual flap/slat channel failure.
In this case, the following PFD information is lost : VLS, S, F, Green Dot, Vtrend, VMAX, VFE next, VSW.

(9) V1 INOP flag (red)
When the V1 signal is not valid, a V1 INOP flag replaces the digital value.

(10) ALT flag (red)
If the altitude information fails, the ALT flag replaces the altitude scale.

(11) CHECK ALT flag (amber)
The CHECK ALT flag appears, as does an ECAM caution, if the disagree between the two PFD altitude indications is greater than 250 ft when QNH is selected, or 500 ft when STD is selected.
The caution and the flag disappear, when the Pilot's and the Co-pilot's barometer references disagree.

(12) ALT SEL flag (red)
If the selected altitude information fails, an ALT SEL flag appears.

(13) V/S flag (red)
If the vertical speed information fails, the V/S flag replaces the vertical speed scale.

(14) LOC and G/S flags (red)
If the localizer or glideslope receiver fails, a LOC or G/S flag appears on the deviation scale.

(15) VDEV flag (red)
If the vertical deviation information fails, and the LS pb is not pressed, a VDEV flag replaces the VDEV scale.

(16) RA flag (red)
If both radio altimeters fail, this flag appears in place of the radio height indication.

(17) DH flag (amber)
A DH flag appears, when the aircraft reaches the selected DH.

(18) HDG flag (red)
If the heading information fails, the HDG flag replaces the heading scale.

(19) CHECK HDG flag (amber)
The CHECK HDG flag appears, as does an ECAM caution, if there is a discrepancy (5 °) between pilots's, and copilot's heading indications.

(20) MACH flag (red)
This flag appears, if the Mach data fails.

(21) VDEV (amber)
At the top of the glide scale, this message flashes in approach phase and, when either the FINAL mode is armed/engaged, or a non-LS approach has been selected, and the LS pushbutton is selected.

(22) DME 1 flag (red)
When the DME distance is not valid, a DME1 (on PFD1) or DME2 (on PFD2) flag replaces the DME distance indication.

(23) ILS1 flag (red)
If an ILS frequency fails, or if either the LOC or G/S signals fail, an ILS1 (on PFD1) or ILS2 (on PFD2) flag replaces the ILS frequency indication.

(24) WINDSHEAR warning (red)
This message is displayed, when windshear is detected (reactive windshear warning) by the FAC.
Refer to DSC-22_40-40 Windshear Detection Function

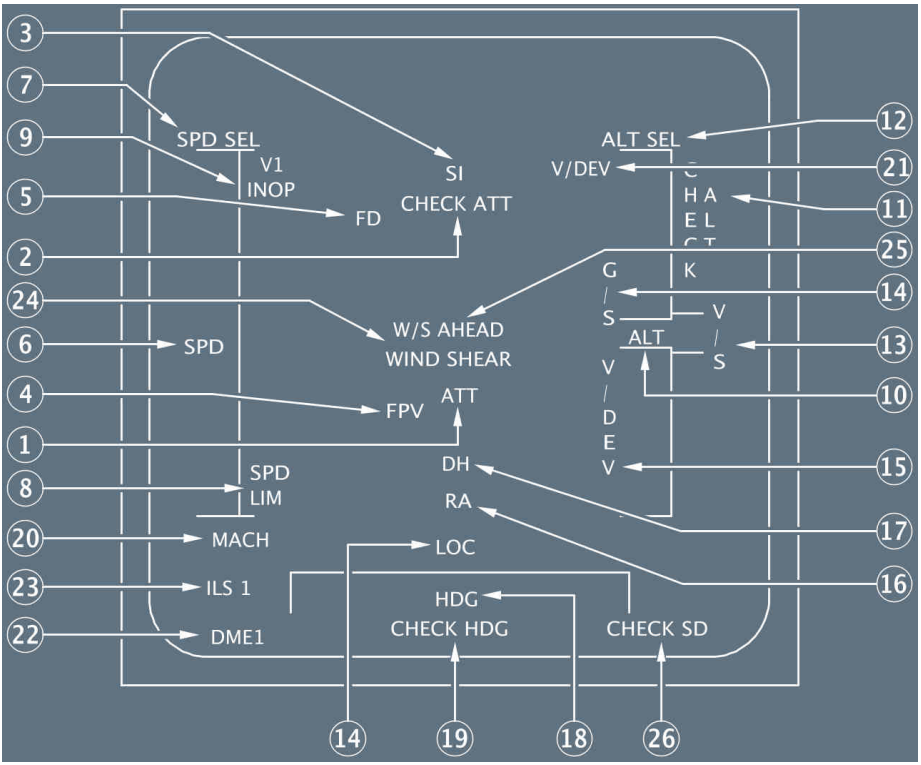
(25) W/S AHEAD
This message is displayed, when the predictive windshear system has detected windshear ahead of the aircraft.
The message is in amber or red, depending on the alert level.
Refer to DSC-34-60-30 Windshear Alerts Inhibition

Note: *1. All flags, except SI, V1 INOP and DME 1 which are steady, flash for 9 s, then remain steady.*
The DH flag flashes for 3 s, then remains steady.
2. For information on the TCAS flag, Refer to DSC-34-80-10 TCAS Modes.

FLAGS AND MESSAGES DISPLAYED ON PFD

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

21



(1) ATT flag (red)
If the PFD loses all attitude data, its entire sphere is cleared to display the ATT flag.

(2) CHECK ATT, CHECK CAPT (F/O) PFD, CHECK EWD, DU NOT MONITORED (amber)
For more information, *Refer to DSC-31-05-10 Introduction*

(3) SI flag (red)
If the sideslip information is lost or any reverse is deployed in flight, the index disappears and a red SI flag appears.

(4) FPV flag (red)
In the TRK FPA mode, when the drift angle or flight path angle is not valid, an FPV flag appears.

(5) FD flag (red)
If both FMGCs fail, or if both FDs are disengaged and the FD pushbutton is on and the attitude is valid, a red FD flag appears.

(6) SPD flag (red)
If the speed information fails, a SPD flag replaces the speed scale.

(7) SPD SEL flag (red)
If the selected speed information fails, a SPD SEL flag appears.

(8) SPD LIM flag (red)
This flag appears when both FACs are inoperative, or in case of SFCC dual flap/slat channel failure.
In this case, the following PFD information is lost : VLS, S, F, Green Dot, Vtrend, Vmax, VFE next, VSW.

(9) V1 INOP flag (red)
When the V1 signal is not valid, a V1 INOP flag replaces the digital value.

(10) ALT flag (red)
If the altitude information fails, the ALT flag replaces the altitude scale.

(11) CHECK ALT flag (amber)
For more information, *Refer to DSC-31-05-10 Introduction*

(12) ALT SEL flag (red)
If the selected altitude information fails, an ALT SEL flag appears.

(13) V/S flag (red)
If the vertical speed information fails, the V/S flag replaces the vertical speed scale.

(14) LOC and G/S flags (red)
If the localizer or glideslope receiver fails, a LOC or G/S flag appears on the deviation scale.

(15) VDEV flag (red)
If the vertical deviation information fails, and the LS pb is not pressed, a VDEV flag replaces the VDEV scale.

(16) RA flag (red)
If both radio altimeters fail, this flag appears in place of the radio height indication.

(17) DH flag (amber)
A DH flag appears, when the aircraft reaches the selected DH.

(18) HDG flag (red)
If the heading information fails, the HDG flag replaces the heading scale.

(19) CHECK HDG flag (amber)
For more information, *Refer to DSC-31-05-10 Introduction*

(20) MACH flag (red)
This flag appears, if the Mach data fails.

(21) VDEV (amber)
At the top of the glide scale, this message flashes in approach phase and, when either the FINAL mode is armed/engaged, or a non-LS approach has been selected, and the LS pushbutton is selected.

(22) DME 1 flag (red)
When the DME distance is not valid, a DME1 (on PFD1) or DME2 (on PFD2) flag replaces the DME distance indication.

(23) ILS1 flag (red)
If an ILS frequency fails, or if either the LOC or G/S signals fail, an ILS1 (on PFD1) or ILS2 (on PFD2) flag replaces the ILS frequency indication.

(24) WINDSHEAR warning (red)
This message is displayed, when windshear is detected (reactive windshear warning) by the FAC.
Refer to DSC-22_40-40 Windshear Detection Function

(25) W/S AHEAD
This message is displayed, when the predictive windshear system has detected windshear ahead of the aircraft.
The message is in amber or red, depending on the alert level.
Refer to DSC-34-60-30 Windshear Alerts Inhibition

Note: *1. All flags, except, V1 INOP which is steady, flash for 9 s, then remain steady.*
2. For information on the TCAS flag, Refer to DSC-34-80-20 PFD Indications.

(26) CHECK SD, CHECK CAPT (F/O) ND (amber)
For more information, *Refer to DSC-31-05-10 Introduction.*

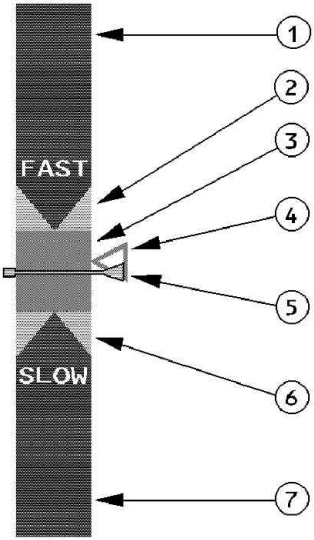
BACKUP SPEED/ALTITUDE SCALE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

GENERAL

A backup speed scale and a backup altitude scale replace simultaneously the normal speed and altitude scales when all the three ADRs are switched OFF. This enables the flight crew to fly at a safe speed and altitude in case of an unreliable speed/altitude indication.
The backup speed scale information is based on the angle–of–attack, and depends on the slat/flap configuration.
The backup altitude scale displays the GPS altitude.

BACKUP SPEED SCALE



(1) Red FAST area:
This red area indicates excessive speed range.

(2) Amber area:
This amber area indicates excessive speed range while keeping an appropriate margin to the maximum structural speeds.

(3) GREEN area:
The green area indicates the safe speed range.

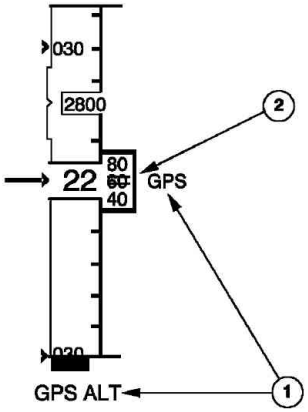
(4) Target speed (green):
This symbol indicates the optimum target speed.
During approach, it indicates the target speed for the approach.

(5) Actual Speed Reference Line (Yellow):
This fixed reference line, next to a yellow triangle, indicates the aircraft's current speed.

(6) Amber area:
The amber area indicates too low speed while keeping an appropriate margin to the stall speed.

(7) Red SLOW area:
The red SLOW area indicates the speeds that are lower than the stall speed.

BACKUP ALTITUDE SCALE



(1) GPS ALT and GPS flags (White):
These flags appear to highlight the fact that the barometric altitude is replaced by the GPS altitude.

(2) Altitude indication:
Amber dashes appear over the last two digits to indicate a degraded altitude display mode.

GENERAL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

There are five different displays (five modes to display navigation information) :
- ROSE ILS
- ROSE VOR
- ROSE NAV
- ARC
- PLAN

The Navigation Display (ND) can provide a weather radar image in all modes, except PLAN.

Note: *In case avionics ventilation is not sufficient (e.g. due to a blower and extract fan failure), and the Navigation Display (ND) Unit temperature exceeds a defined threshold, the ND will not display the weather radar image, in order to limit power consumption and prevent a DU overheat. Any additional increase in temperature will lead to a complete cut off of the power supply to this display unit.*

GENERAL

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI

There are five different displays (five modes to display navigation information):
- ROSE LS
- ROSE VOR
- ROSE NAV
- ARC
- PLAN

The Navigation Display (ND) can provide a weather radar image in all modes, except PLAN.

Note: *In case avionics ventilation is not sufficient (e.g. due to a blower and extract fan failure), and the Navigation Display (ND) Unit temperature exceeds a defined threshold, the ND will not display the weather radar image, in order to limit power consumption and prevent a DU overheat. Any additional increase in temperature will lead to a complete cut off of the power supply to this display unit.*

GENERAL

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

There are five different displays (five modes to display navigation information) :
- ROSE LS
- ROSE VOR
- ROSE NAV

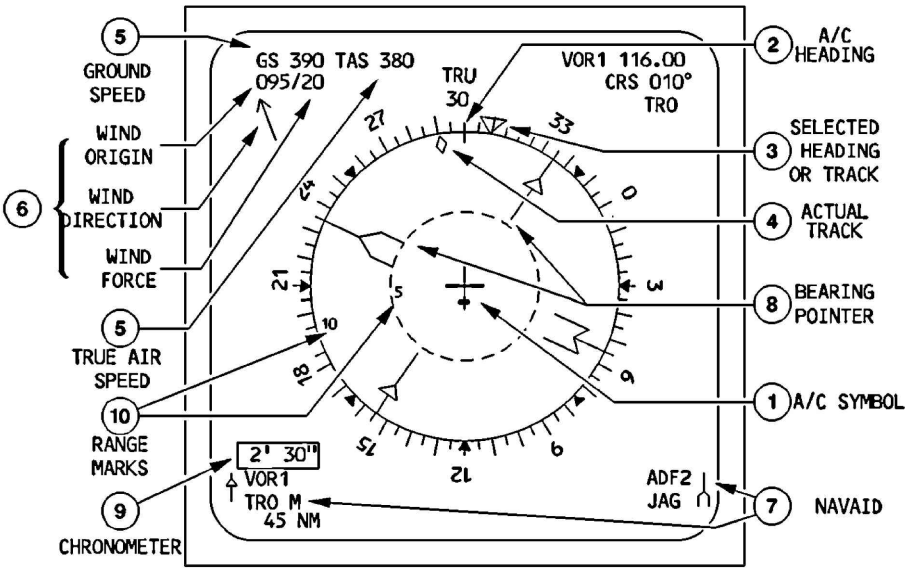
- ARC
- PLAN

The Navigation Display (ND) can provide a weather radar image in all modes, except PLAN.

ROSE MODES

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

1



(1) Aircraft symbol (yellow)
Fixed and centered in the display, this symbol points to the yellow lubber line.

(2) Aircraft heading
The fixed yellow lubber line points to the aircraft magnetic heading on the moving white compass rose. Small white triangles are fixed at 45 ° intervals on the circumference of the compass rose.
“TRU” appears at the top of the compass rose, when it is displaying true heading instead of magnetic heading (latitude above 73 ° North or 60 ° South).

(3) Selected heading or track (blue)
This pointer shows the heading or track indicated on the FCU's HDG TRK counter.

(4) Actual aircraft track (green)
This symbol is a small green diamond.

(5) Ground speed and true air speed (green)
ADIRS furnishes these speeds.

(6) Wind direction and speed
ADIRS provides the wind direction and speed. The digital direction and the analog direction (green arrow) indicate the north reference that is in use. The green arrow only appears, if the wind speed is above two knots.
If the display does not receive either wind speed or direction, dashes replace the numbers on the display.

(7) NAVAIDs

When the ADF-OFF-VOR selector switch on either the pilot's or copilot's EFIS control panel is set to ADF or VOR, the onside ND displays the following characteristics of the corresponding NAVAID in white for VOR or in green for ADF (left side for receiver 1 and right side for receiver 2):
- Type of NAVAID (ADF or VOR)
- Shape and color of the associated bearing pointer (if the bearing pointer is in view).
- NAVAID identification (or frequency by default)
- DME distance if a DME is collocated with the selected VOR. ADF and DME distance are never displayed at the same time.
- Mode of tuning
  - M for a NAVAID tuned manually by the pilot through the MCDU (underlined and dimmed),
  - R for a NAVAID tuned from an RMP (Radio Management Panel) (underlined and dimmed),
  - Nothing for a NAVAID tuned automatically by the FMGC.

If reception fails, the ND stops displaying the associated data (except for the identification or frequency).

(8) Bearing pointer (green for ADF, white for VOR)
This pointer appears when bearing data is available.
If the aircraft is not receiving the beacon or if a receiver fails, the associated bearing pointer disappears.

(9) Chronometer Indication (white)
These numbers appear when the onside chronometer is started.
They display the elapsed time.
The indication is in minutes and seconds from 0 to 59 min 59 s, and in hours and minutes from 1 h to 99 h 59 min (Seconds are not displayed beyond 59 min 59 s.).

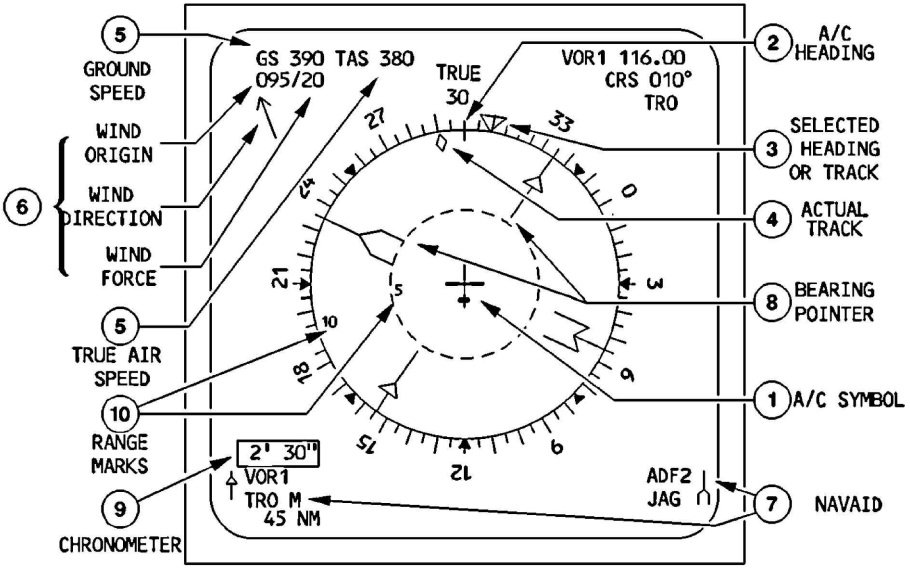
(10) Range marks

The range scale value selected on the EFIS control panel (10 to 320 nm) governs the scale of the ND.

ROSE MODES

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

2



(1) Aircraft symbol (yellow)

Fixed and centered in the display, this symbol points to the yellow lubber line.

(2) Aircraft heading

The fixed yellow lubber line points to the aircraft magnetic heading on the moving white compass rose. Small white triangles are fixed at 45 ° intervals on the circumference of the compass rose.

"TRUE" appears at the top of the compass rose, when it is displaying true heading instead of magnetic heading (latitude above 73 ° North or 60 ° South).

(3) Selected heading or track (blue)

This pointer shows the heading or track indicated on the FCU's HDG TRK counter.

(4) Actual aircraft track (green)
This symbol is a small green diamond.

(5) Ground speed and true air speed (green)
ADIRS furnishes these speeds.

(6) Wind direction and speed
ADIRS provides the wind direction and speed. The digital direction and the analog direction (green arrow) indicate the north reference that is in use. The green arrow only appears, if the wind speed is above two knots.
If the display does not receive either wind speed or direction, dashes replace the numbers on the display.

(7) NAVAIDs

When the ADF-OFF-VOR selector switch on either the pilot's or copilot's EFIS control panel is set to ADF or VOR, the onside ND displays the following characteristics of the corresponding NAVAID in white for VOR or in green for ADF (left side for receiver 1 and right side for receiver 2):
- Type of NAVAID (ADF or VOR)
- Shape and color of the associated bearing pointer (if the bearing pointer is in view).
- NAVAID identification (or frequency by default)
- DME distance if a DME is collocated with the selected VOR. ADF and DME distance are never displayed at the same time.
- Mode of tuning
  - M for a NAVAID tuned manually by the pilot through the MCDU (underlined and dimmed),
  - R for a NAVAID tuned from an RMP (Radio Management Panel) (underlined and dimmed),
  - Nothing for a NAVAID tuned automatically by the FMGC.

If reception fails, the ND stops displaying the associated data (except for the identification or frequency).

(8) Bearing pointer (green for ADF, white for VOR)
This pointer appears when bearing data is available.
If the aircraft is not receiving the beacon or if a receiver fails, the associated bearing pointer disappears.

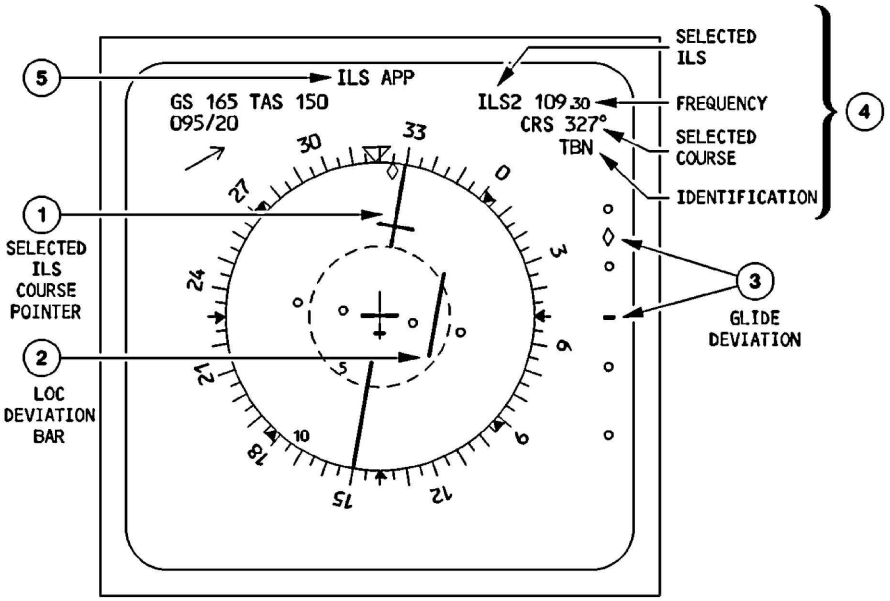
(9) Chronometer Indication (white)
These numbers appear when the onside chronometer is started.
They display the elapsed time.
The indication is in minutes and seconds from 0 to 59 min 59 s, and in hours and minutes from 1 h to 99 h 59 min (Seconds are not displayed beyond 59 min 59 s).

(10) Range marks

The range scale value selected on the EFIS control panel (10 to 320 nm) governs the scale of the ND.

ROSE ILS MODE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



(1) ILS course pointer (magenta)

This dagger-shaped symbol points to the selected ILS course.
The ILS is selected either by the FMGC (autotuned or manually) or through the RMP in backup mode. If no course has been entered, the value defaults to 360 °.

(2) Localizer deviation bar (magenta)

This bar moves laterally with respect to the course pointer. Its scale consists of two dots on each side of zero deviation. Each dot represents a deviation of about ±0.8 °.
If the deviation becomes excessive (1/4 dot, 0.2 °) above 15 ft RA, the bar and the scale pulse.

(3) Glide deviation (magenta)

This diamond moves on a vertical scale consisting of two white dots on each side of the yellow reference line. Each dot represents a deviation of about ± 0.4 °.

If the deviation becomes greater than one dot above 100 ft RA, the scale and the diamond flash.

(4) Selected ILS information
This display shows the ILS frequency (magenta), selected course (blue), and identification (magenta).

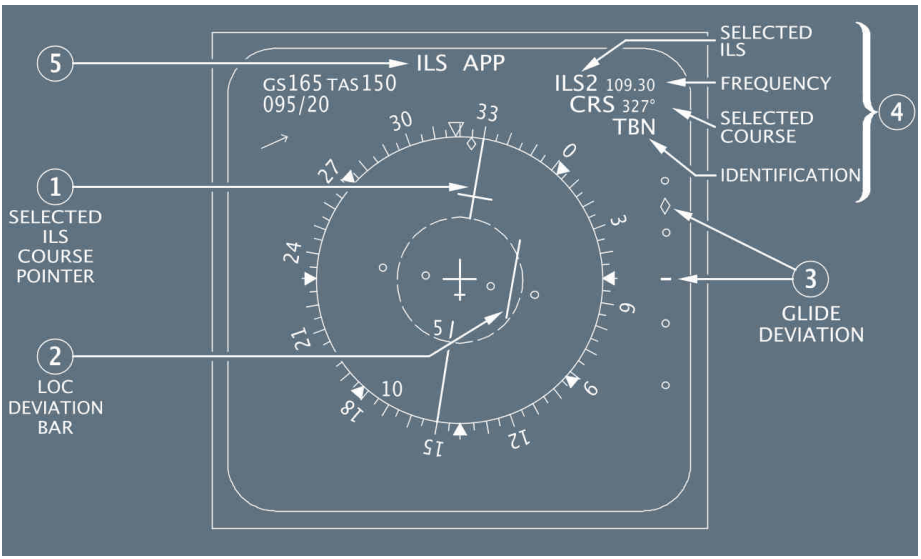
(5) ILS APP message (green)
This message appears when the flight crew selects an ILS approach on the MCDU.

Note: ILS 1 information appears on PFD 1 and ND 2.
ILS 2 information appears on PFD 2 and ND 1.

ROSE LS MODE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

3



(1) ILS course pointer (magenta)
This dagger-shaped symbol points to the selected ILS course.
The ILS is selected either by the FMGC (autotuned or manually) or through the RMP in backup mode. If no course has been entered, the value defaults to 360 °.

(2) Localizer deviation bar (magenta)
This bar moves laterally with respect to the course pointer. Its scale consists of two dots on each side of zero deviation. Each dot represents a deviation of about ±0.8 °.
If the deviation becomes excessive (1/4 dot, 0.2 °) above 15 ft RA, the bar and the scale pulse.

(3) Glide deviation (magenta)
This diamond moves on a vertical scale that has two white dots on each side of the yellow reference line. Each dot represents a deviation of about ±0.4 °.
If the deviation becomes greater than one dot above 100 ft RA, the scale and the diamond flash.

(4) Selected ILS information
This display shows the ILS frequency (magenta), selected course (blue), and identification (magenta).

(5) ILS APP message (green)

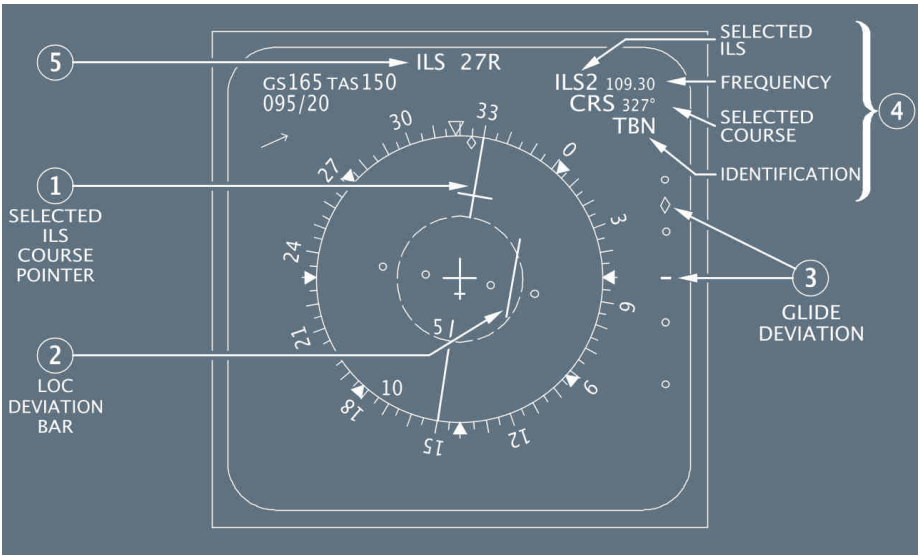
This message appears:
- When the flight crew selects an ILS approach on the MCDU, and
- When the FMS flight phase is DES, APP or GA, or the FMS phase is CRZ and the along track distance to destination is less then 250 nm.

Note: ILS 1 information appears on PFD 1 and ND 2.
ILS 2 information appears on PFD 2 and ND 1.

ROSE LS MODE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

4



(1) ILS course pointer (magenta)
This dagger-shaped symbol points to the selected ILS course.
The ILS is selected either by the FMGC (autotuned or manually) or through the RMP in backup mode. If no course has been entered, the value defaults to 360 °.

(2) Localizer deviation bar (magenta)
This bar moves laterally with respect to the course pointer. Its scale consists of two dots on each side of zero deviation. Each dot represents a deviation of about ±0.8 °.
If the deviation becomes excessive (1/4 dot, 0.2 °) above 15 ft RA, the bar and the scale pulse.

(3) Glide deviation (magenta)
This diamond moves on a vertical scale that has two white dots on each side of the yellow reference line. Each dot represents a deviation of about ±0.4 °.
If the deviation becomes greater than one dot above 100 ft RA, the scale and the diamond flash.

(4) Selected ILS information
This display shows the ILS frequency (magenta), selected course (blue), and identification (magenta).

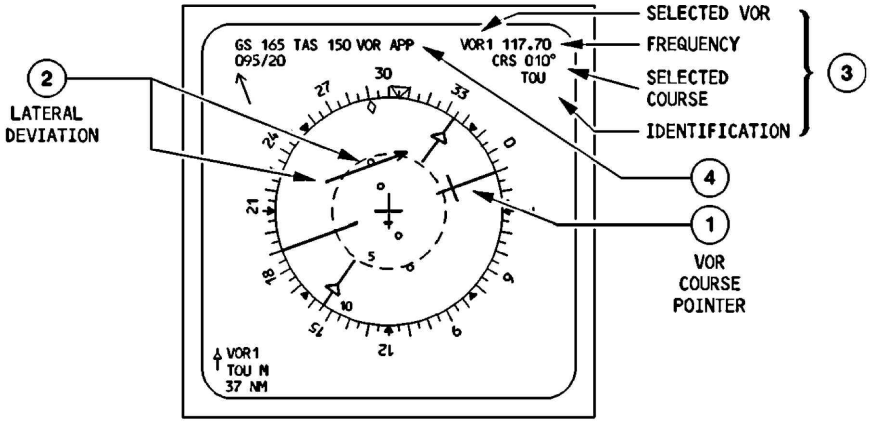
(5) ILS message (green)

This message shows the full runway name of the selected approach. It appears:
- When the flight crew selects an ILS approach on the MCDU, and
- When the FMS flight phase is DES, APP or GA, or the FMS phase is CRZ and the along track distance to destination is less then 250 nm.

Note: ILS 1 information appears on PFD 1 and ND 2.
ILS 2 information appears on PFD 2 and ND 1.

ROSE VOR MODE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP



(1) VOR course pointer (blue)
This dagger-shaped symbol points to the selected VOR course.
The VOR course is automatically selected by the FMGC or manually by the crew using the MCDU pages or the RMP backup mode.

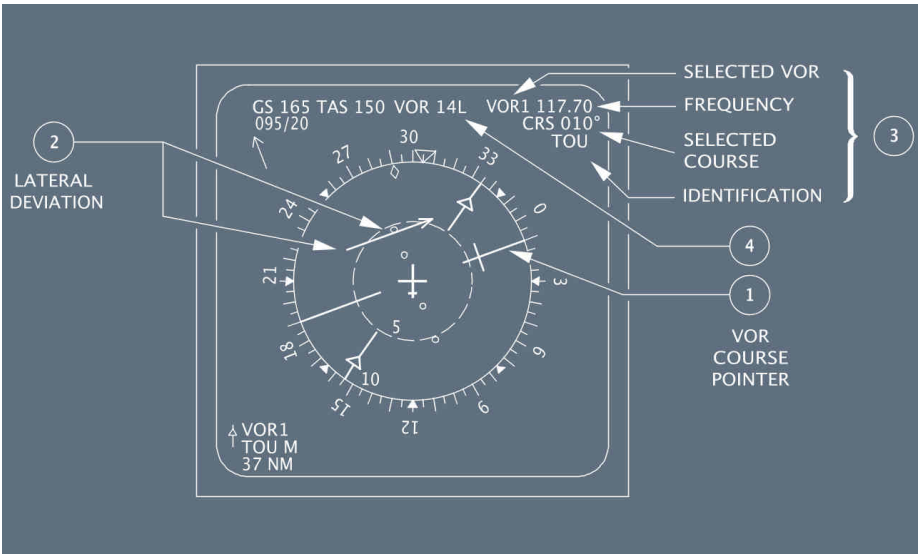
(2) Lateral deviation bar (blue)
This bar shows the VOR deviation on a lateral scale.
Each dot represents 5 °. When the lateral deviation exceeds 10 °, the bar remains displayed on the outer dot.
The arrow on the bar gives the TO/FROM indication.

(3) VOR information (white)
This area displays the frequency of the selected VOR and its identification (if decoded by the receiver), the selected course.

(4) VOR APP or GPS APP messages (green)
VOR APPR appears when the flight crew has selected a VOR approach on the MCDU .
GPS APP appears when the crew has selected a GPS approach.

ROSE VOR MODE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU



(1) VOR course pointer (blue)
This dagger-shaped symbol points to the selected VOR course.
The VOR course is automatically selected by the FMGC or manually by the crew using the MCDU pages or the RMP backup mode.

(2) Lateral deviation bar (blue)
This bar shows the VOR deviation on a lateral scale.
Each dot represents 5 °. When the lateral deviation exceeds 10 °, the bar remains displayed on the outer dot.
The arrow on the bar gives the TO/FROM indication.

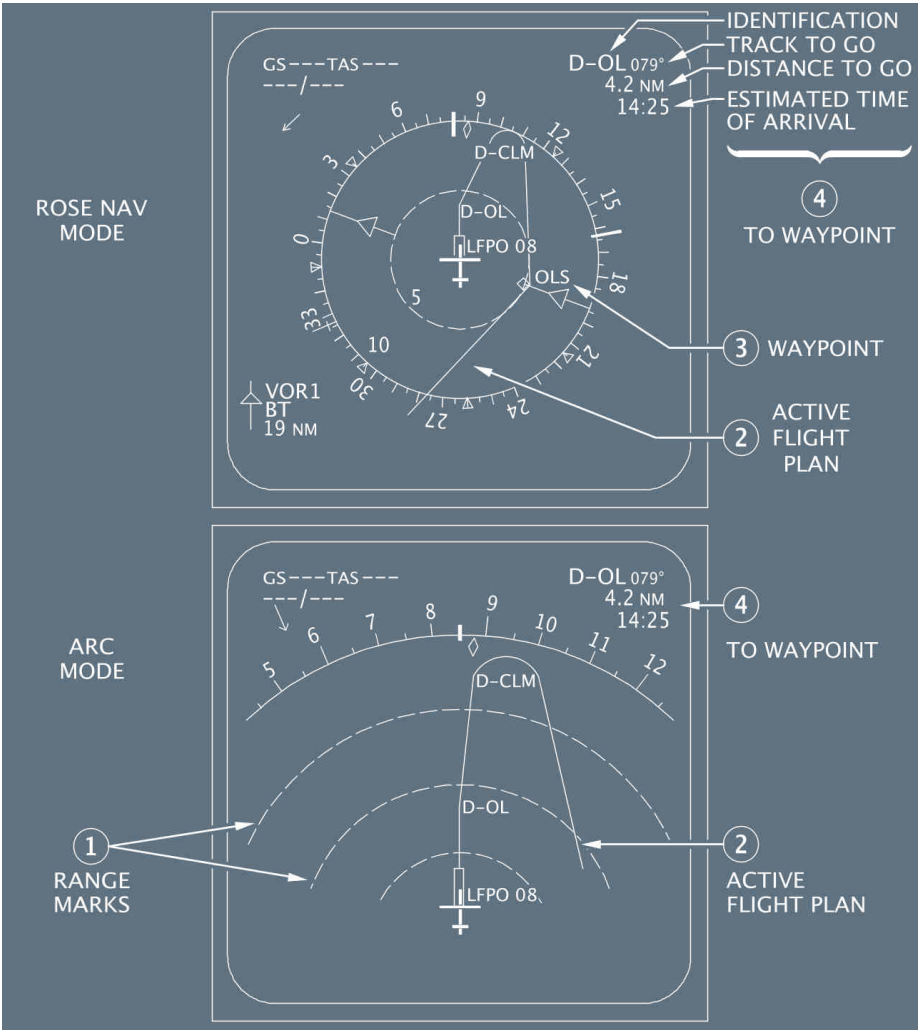
(3) VOR information (white)
This area displays the frequency of the selected VOR and its identification (if decoded by the receiver), the selected course.

(4) VOR or GPS message (green)
VOR 14L appears when the flight crew has selected a VOR approach on the MCDU.
GPS 14L appears when the crew has selected a GPS approach.

ROSE NAV MODE/ARC MODE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

5 ROSE NAV and ARC modes give the pilot the same information, but ARC mode limits it to the forward 90 ° sector.


IDENTIFICATION
TRACK TO GO
DISTANCE TO GO
ESTIMATED TIME OF ARRIVAL
GS---TAS---
---/---
D-OL 079°
4.2 NM
14:25
ROSE NAV MODE
D-CLM
D-OL
LFPO 08
OLS
VOR1
BT
19 NM
4 TO WAYPOINT
3 WAYPOINT
2 ACTIVE FLIGHT PLAN
ARC MODE
1 RANGE MARKS
2 ACTIVE FLIGHT PLAN
4 TO WAYPOINT

(1) Range Marks and Values

The values displayed on the ND are:

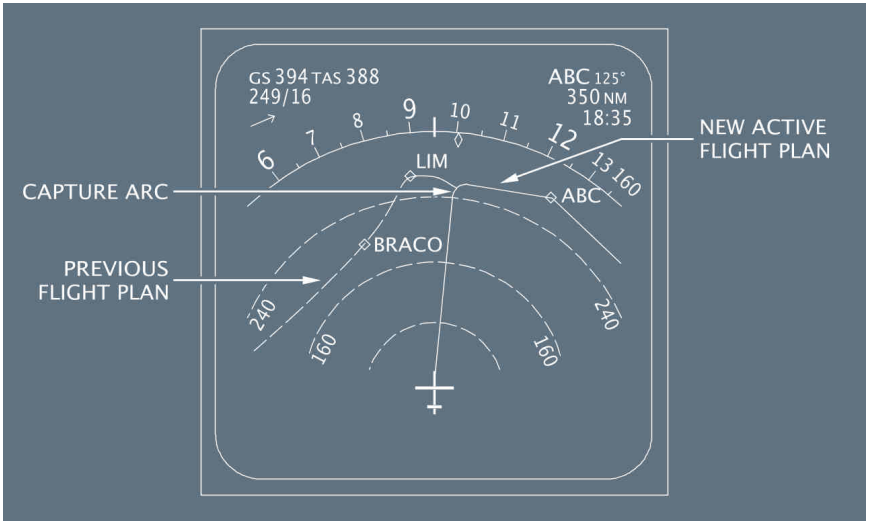
In ROSE NAV mode	1/4 of the selected range for the inner circle.
	1/2 of the selected range for the heading scale circle.
In ARC mode	1/4 of the selected range for the first inner arc.
	1/2 of the selected range for the second inner arc.
	3/4 of the selected range for the third inner arc.

(2) Flight Plan

The crew can use the MCDU to select various types of flight plan:

- The active flight plan (the flight plan the aircraft is actually following when the NAV mode is engaged) is represented by a continuous green line. The ND shows only the part of the flight plan that is ahead of the aircraft, as well as the waypoints that are still to be overflown and the waypoint from which the aircraft is coming.
  The ND does not show a SID or a STAR, except for the last waypoint of the SID and the first waypoint of the STAR, when the selected range is 160 or 320 nm.
  If the primary flight plan is not active, it is represented by a dotted green line.
- A continuous blue line portrays the missed approach procedure, and a dashed blue line portrays the flight plan to the alternate.

  The missed approach and the alternate flight plan are displayed when:
  - In ARC or ROSE NAV mode, a missed approach waypoint or an alternate flight plan waypoint is displayed on the onside MCDU.
  - In PLAN mode a missed approach or alternate waypoint is displayed in the 2L field of the onside MCDU.
- The secondary flight plan is represented by a continuous white line. The ND continues to display the active flight plan
- Temporary flight plan
  The revised portion of the flight plan is represented by a dotted yellow line
- Flight plan capture
  When the aircraft is off the primary flight plan and is flying toward it in HDG mode with the NAV mode armed, the ND shows the new active flight plan as a continuous green line if the FMGC has computed the intercept path.
  The part of the flight plan before the interception point shows as a dotted green line.



(3) Waypoint

The ND can display various kinds of waypoints:

Flight plan waypoints

The ND displays these as green diamonds (white, for TO waypoints). When the flight crew selects the WPT option on his EFIS control panel, all waypoints other than flight plan waypoints are displayed in magenta.

Pseudo waypoint

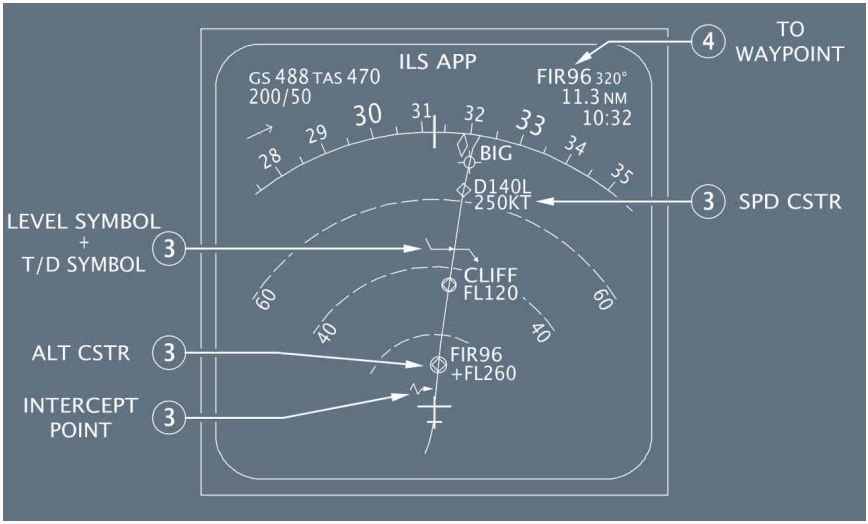
Point of the flight path where the aircraft is predicted to reach a selected altitude or speed.

Pseudo waypoint	Definition
	Level symbol (top of climb or level-off position), when the aircraft reaches: - The FCU-selected altitude (blue arrow), or - The constrained altitude, if it is more restrictive than the FCU altitude and if appropriate modes are engaged (magenta) - It does not appear when the aircraft is within 100 ft above, or below, the selected altitude.
	Top of descent symbol, or continue descent symbol: - White, if DES is not armed - Blue, if DES is armed.

Continued on the following page

Continued from the previous page

Pseudo waypoint	Definition
	Start of CLIMB symbol: - White, if CLB is not armed - Blue, if CLB is armed.
	Intercept point symbol: - White, if only the NAV mode is engaged - Blue, if DES mode is engaged - Indicates the point at which the aircraft is predicted to intercept the descent path, if there is any vertical deviation while the aircraft is in DES mode.
•	Speed change symbol (magenta): Indicates the point at which the aircraft will start an automatic acceleration or deceleration from the current speed to a new computed speed for SPD LIM, SPD CSTR, or HOLDING SPD.
	Decelerate point symbol (magenta): Indicates where the aircraft will start an automatic deceleration toward VAPP (and thus switch to the approach phase). Although the symbol is always displayed, automatic deceleration only occurs if in managed speed, and NAV or approach mode is engaged.
	ALT CSTR symbol set around the constrained waypoint: - Magenta, when the ALT CSTR is predicted to be satisfied - Amber, when the ALT CSTR is predicted to be met - White, when the ALT CSTR is not taken into account by the FMGS, and NAV mode is engaged.
	Energy circle symbol (green arc) centered on the aircraft position and oriented to the current track line. Represents the Required Distance to Land. Only displayed if the lateral guidance mode is heading or track, and the current FMS flight phase is in cruise, descent or approach, and the aircraft is within 180 nm of the destination.

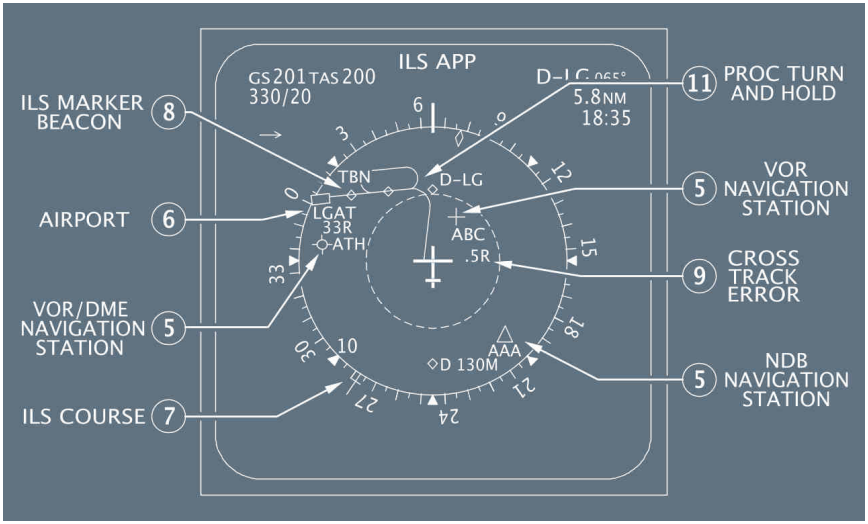


(4) TO waypoint

This is the next waypoint to be overflown.

This area of the screen also shows:

- Waypoint identification (white)
- Track to go (green)
- Distance to go (green)
- Estimated time of arrival (green), assuming the aircraft will fly directly from its present position to the TO waypoint at the current ground speed.



(5) NAVAIDs

The display uses specific symbols for NAVAIDs:

◇	DME or TACAN
+	VOR
⊙	VOR/DME
△	NDB

The symbol appears:

- In green if the NAVAID is a current waypoint of the flight plan
- In white if it is the TO waypoint
- In blue when the NAVAID is tuned for display either automatically by the FMGC or manually through the MCDU
- In magenta when the NAVAID is not part of the flight plan and is called for display as an option (corresponding option pushbutton pressed on the FCU EFIS control panel).

(6) Airport

Airport included in the flight plan:

- If the runway is not specified, the airport is represented by a star and the identification is displayed in white.
  Example: * LSGG
- If the runway is specified, it is represented by an oriented runway symbol in white.



The runway is drawn to scale (paved length) if the selected range is 10, 20 or 40 NM.

Optional airport information

The airports that are not displayed as part of the flight plan may be called for display (ARPT pushbutton on the EFIS control panel).
They are represented by a star and the identification in magenta.

(7) ILS Course (Magenta)

When the pilot pushes the LS pb-sw on the EFIS control panel, and if an ILS station has been selected, the display shows an ILS course symbol.

(8) ILS Marker Beacons

The screen shows these as waypoints (diamonds).

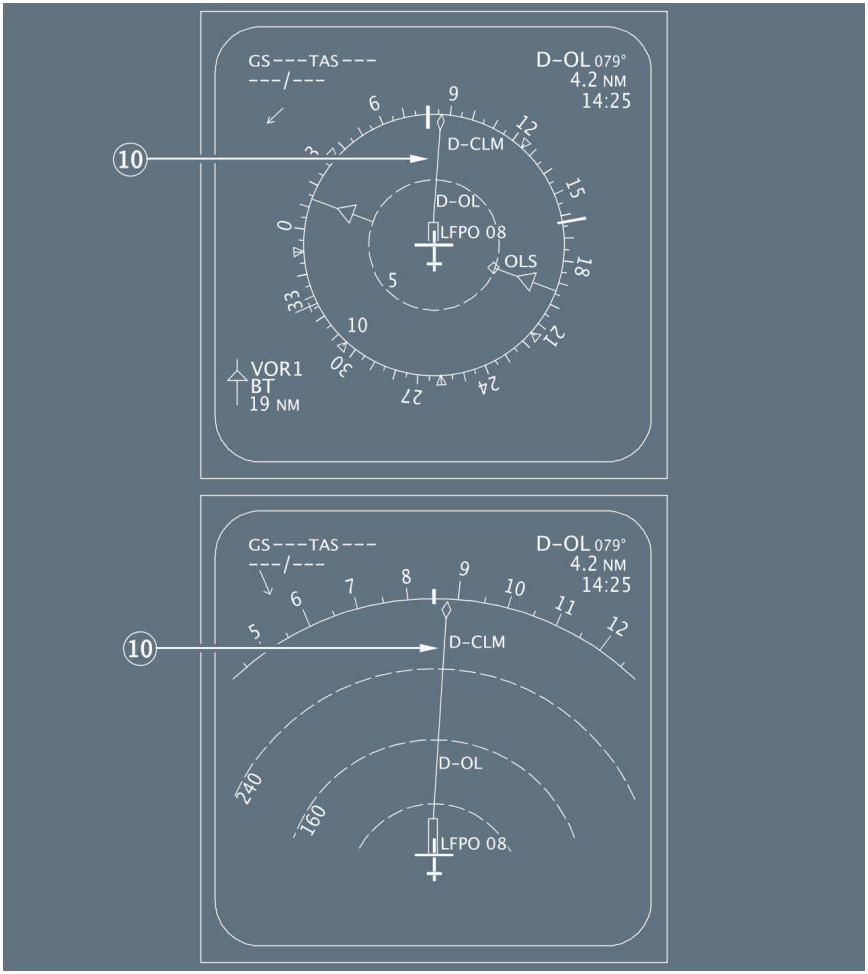
When the aircraft overflies a marker beacon, the corresponding symbol flashes:
Blue for the outer marker.
Amber for the middle marker.
White for the inner marker.

(9) Cross Track Error

This is the aircraft's lateral deviation from the active leg of the flight plan (related to the great circle route). It is indicated in nautical miles (NM), with the letter R (right) or L (left), according to the position of the aircraft with respect to the flight plan.

(10) Track line

This line appears in green only in the ROSE NAV or ARC mode when HDG or TRK has been selected on the FCU.



(11) Procedure turns and holding patterns

These only appear when they are part of the flight plan. For the 160 and 320 nm range scales, each one is represented by a white arrow that originates at the associated fix and indicates the direction of the turn.



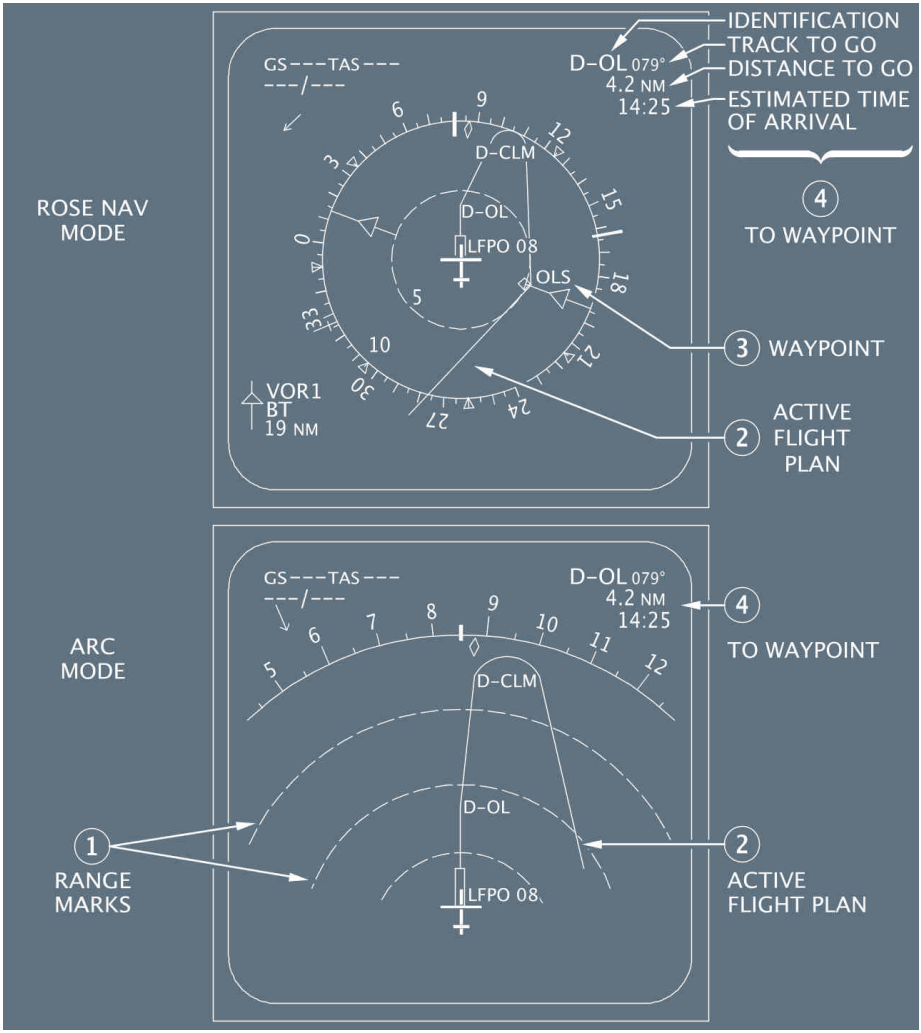
For shorter range scales, and if the procedure turn or the holding pattern is in the next or the active leg, the display shows the full circuit or pattern.



ROSE NAV MODE/ARC MODE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

6 ROSE NAV and ARC modes give the pilot the same information, but ARC mode limits it to the forward 90 ° sector.


ROSE NAV MODE
GS---TAS---
---/---
D-OL 079°
4.2 NM
14:25
IDENTIFICATION
TRACK TO GO
DISTANCE TO GO
ESTIMATED TIME OF ARRIVAL
4
TO WAYPOINT
D-CLM
D-OL
LFPO 08
OLS
3
WAYPOINT
VOR1
BT
19 NM
2
ACTIVE FLIGHT PLAN
ARC MODE
GS---TAS---
---/---
D-OL 079°
4.2 NM
14:25
4
TO WAYPOINT
D-CLM
D-OL
LFPO 08
1
RANGE MARKS
2
ACTIVE FLIGHT PLAN

(1) Range Marks and Values

The values displayed on the ND are:

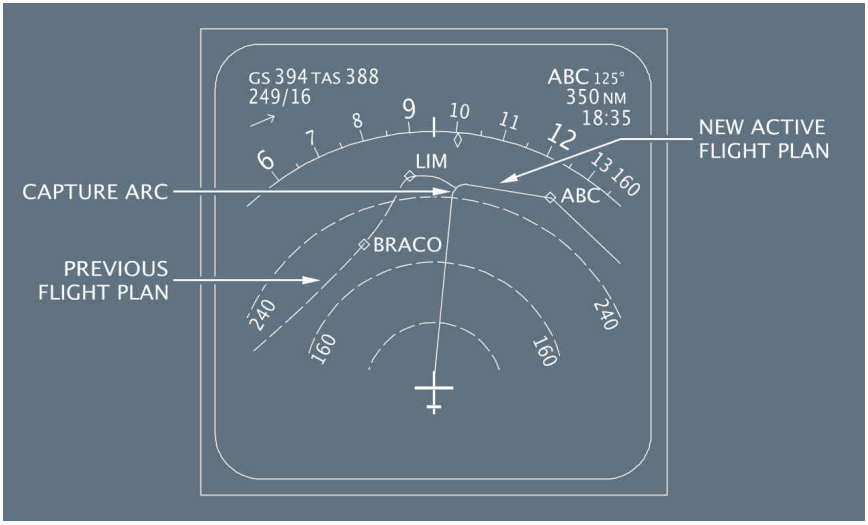
In ROSE NAV mode	1/4 of the selected range for the inner circle.
	1/2 of the selected range for the heading scale circle.
In ARC mode	1/4 of the selected range for the first inner arc.
	1/2 of the selected range for the second inner arc.
	3/4 of the selected range for the third inner arc.

(2) Flight Plan

The crew can use the MCDU to select various types of flight plan:

- The active flight plan (the flight plan the aircraft is actually following when the NAV mode is engaged) is represented by a continuous green line. The ND shows only the part of the flight plan that is ahead of the aircraft, as well as the waypoints that are still to be overflown and the waypoint from which the aircraft is coming.
  The ND does not show a SID or a STAR, except for the last waypoint of the SID and the first waypoint of the STAR, when the selected range is 160 or 320 nm.
  If the primary flight plan is not active, it is represented by a dotted green line.
- A continuous blue line portrays the missed approach procedure, and a dashed blue line portrays the flight plan to the alternate.

  The missed approach and the alternate flight plan are displayed when:
  - In ARC or ROSE NAV mode, a missed approach waypoint or an alternate flight plan waypoint is displayed on the onside MCDU.
  - In PLAN mode a missed approach or alternate waypoint is displayed in the 2L field of the onside MCDU.
- The secondary flight plan is represented by a continuous white line. The ND continues to display the active flight plan
- Temporary flight plan
  The revised portion of the flight plan is represented by a dotted yellow line
- Flight plan capture
  When the aircraft is off the primary flight plan and is flying toward it in HDG mode with the NAV mode armed, the ND shows the new active flight plan as a continuous green line if the FMGC has computed the intercept path.
  The part of the flight plan before the interception point shows as a dotted green line.



(3) Waypoint

The ND can display various kinds of waypoints:

Flight plan waypoints

The ND displays these as green diamonds (white, for TO waypoints). When the flight crew selects the WPT option on his EFIS control panel, all waypoints other than flight plan waypoints are displayed in magenta.

Pseudo waypoint

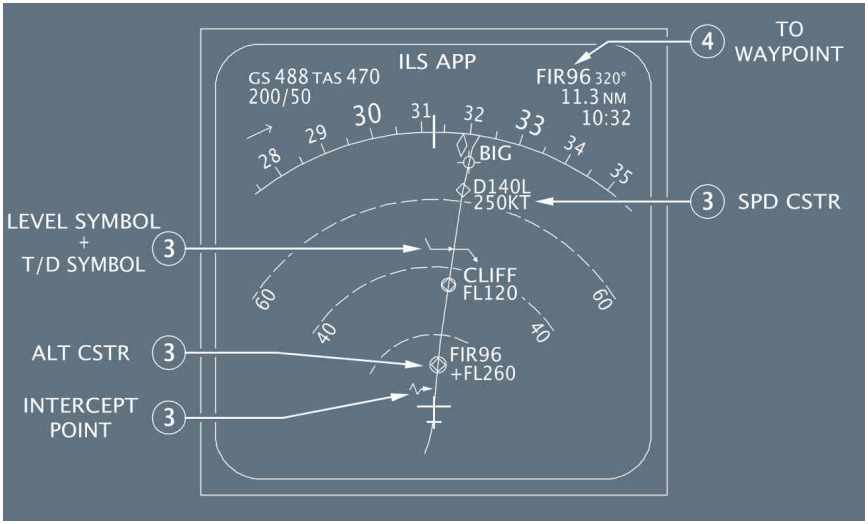
Point of the flight path where the aircraft is predicted to reach a selected altitude or speed.

Pseudo waypoint	Definition
	Level symbol (top of climb or level-off position), when the aircraft reaches: - The FCU-selected altitude (blue arrow), or - The constrained altitude, if it is more restrictive than the FCU altitude and if appropriate modes are engaged (magenta) - It does not appear when the aircraft is within 100 ft above, or below, the selected altitude.
	Top of descent symbol, or continue descent symbol: - White, if DES is not armed - Blue, if DES is armed.

Continued on the following page

Continued from the previous page

Pseudo waypoint	Definition
	Start of CLIMB symbol: - White, if CLB is not armed - Blue, if CLB is armed.
	Intercept point symbol: - White, if only the NAV mode is engaged - Blue, if DES mode is engaged - Indicates the point at which the aircraft is predicted to intercept the descent path, if there is any vertical deviation while the aircraft is in DES mode.
•	Speed change symbol (magenta): Indicates the point at which the aircraft will start an automatic acceleration or deceleration from the current speed to a new computed speed for SPD LIM, SPD CSTR, or HOLDING SPD.
	Decelerate point symbol: - Indicates the point at which the aircraft is predicted to decelerate for approach (and thus switch to the approach phase) - Magenta, if in managed speed and NAV or approach mode is engaged - White, if in selected speed or HDG/TRK mode - Automatic decelerations only occur when displayed in magenta.
	ALT CSTR symbol set around the constrained waypoint: - Magenta, when the ALT CSTR is predicted to be met - Amber, when the ALT CSTR is predicted to be missed - White, when the ALT CSTR is not taken into account by the FMGS, and NAV mode is engaged.
	Energy circle symbol (green arc) centered on the aircraft position and oriented to the current track line. Represents the Required Distance to Land. Only displayed if the lateral guidance mode is heading or track, and the current FMS flight phase is in cruise, descent or approach, and the aircraft is within 180 nm of the destination.

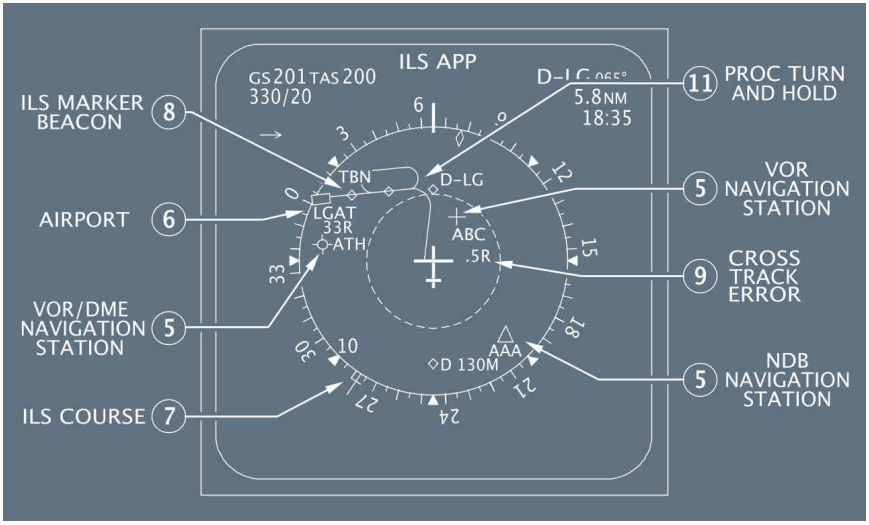


(4) TO waypoint

This is the next waypoint to be overflown.

This area of the screen also shows:

- Waypoint identification (white)
- Track to go (green)
- Distance to go (green)
- Estimated time of arrival (green), assuming the aircraft will fly directly from its present position to the TO waypoint at the current ground speed.



(5) NAVAIDs

The display uses specific symbols for NAVAIDs:

◇	DME or TACAN
+	VOR
◇	VOR/DME
△	NDB

The symbol appears:

- In green if the NAVAID is a current waypoint of the flight plan
- In white if it is the TO waypoint
- In blue when the NAVAID is tuned for display either automatically by the FMGC or manually through the MCDU
- In magenta when the NAVAID is not part of the flight plan and is called for display as an option (corresponding option pushbutton pressed on the FCU EFIS control panel).

(6) Airport

Airport included in the flight plan:

- If the runway is not specified, the airport is represented by a star and the identification is displayed in white.
  Example: * LSGG
- If the runway is specified, it is represented by an oriented runway symbol in white.



The runway is drawn to scale (paved length) if the selected range is 10, 20 or 40 NM.

Optional airport information

The airports that are not displayed as part of the flight plan may be called for display (ARPT pushbutton on the EFIS control panel).
They are represented by a star and the identification in magenta.

(7) ILS Course (Magenta)

When the pilot pushes the LS pb-sw on the EFIS control panel, and if an ILS station has been selected, the display shows an ILS course symbol.

(8) ILS Marker Beacons

The screen shows these as waypoints (diamonds).

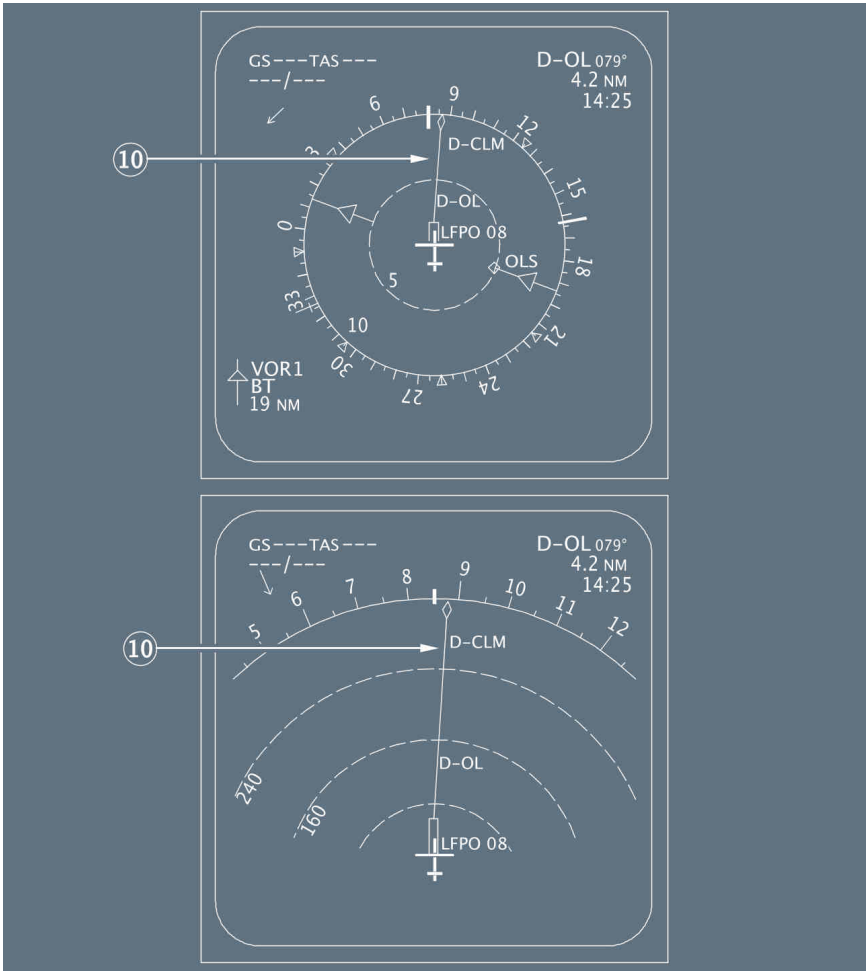
When the aircraft overflies a marker beacon, the corresponding symbol flashes:
Blue for the outer marker.
Amber for the middle marker.
White for the inner marker.

(9) Cross Track Error

This is the aircraft's lateral deviation from the active leg of the flight plan (related to the great circle route). It is indicated in nautical miles (NM), with the letter R (right) or L (left), according to the position of the aircraft with respect to the flight plan.

(10) Track line

This line appears in green only in the ROSE NAV or ARC mode when HDG or TRK has been selected on the FCU.



(11) Procedure turns and holding patterns

These only appear when they are part of the flight plan. For the 160 and 320 nm range scales, each one is represented by a white arrow that originates at the associated fix and indicates the direction of the turn.



For shorter range scales, and if the procedure turn or the holding pattern is in the next or the active leg, the display shows the full circuit or pattern.

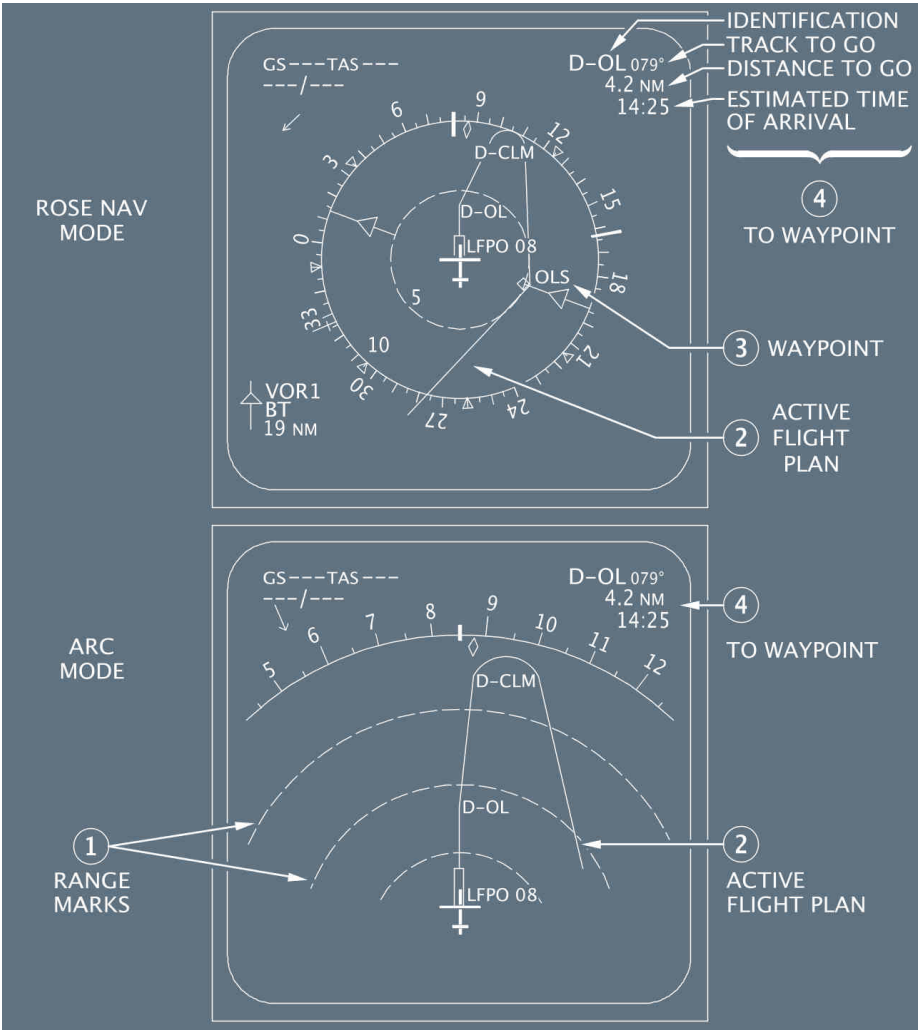


ROSE NAV MODE/ARC MODE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

7

ROSE NAV and ARC modes give the pilot the same information, but ARC mode limits it to the forward 90 ° sector.


ROSE NAV MODE
GS---TAS---
---/---
D-OL 079°
4.2 NM
14:25
IDENTIFICATION
TRACK TO GO
DISTANCE TO GO
ESTIMATED TIME OF ARRIVAL
4
TO WAYPOINT
D-CLM
D-OL
LFPO 08
OLS
3 WAYPOINT
2 ACTIVE FLIGHT PLAN
VOR1
BT
19 NM
ARC MODE
GS---TAS---
---/---
D-OL 079°
4.2 NM
14:25
4
TO WAYPOINT
D-CLM
D-OL
LFPO 08
1
RANGE MARKS
2
ACTIVE FLIGHT PLAN

(1) Range Marks and Values

The values displayed on the ND are:

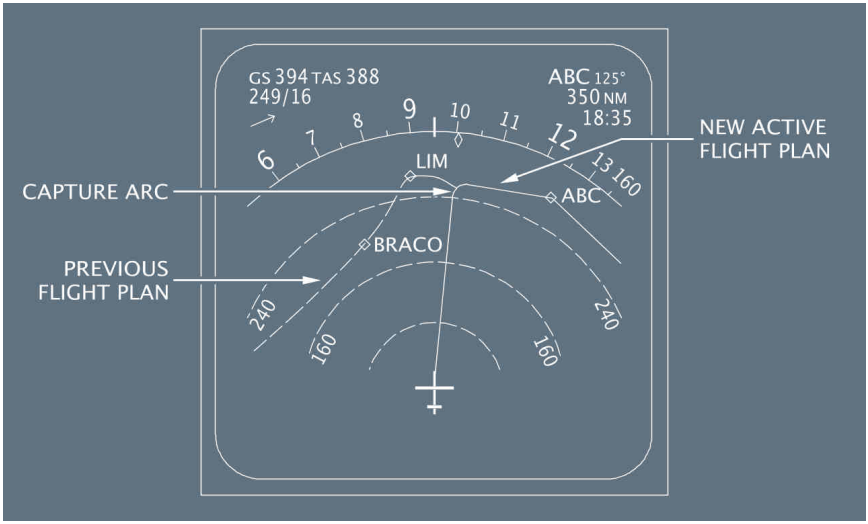
In ROSE NAV mode	1/4 of the selected range for the inner circle.
	1/2 of the selected range for the heading scale circle.
In ARC mode	1/4 of the selected range for the first inner arc.
	1/2 of the selected range for the second inner arc.
	3/4 of the selected range for the third inner arc.

(2) Flight Plan

The crew can use the MCDU to select various types of flight plan:

- The active flight plan (the flight plan the aircraft is actually following when the NAV mode is engaged) is represented by a continuous green line. The ND shows only the part of the flight plan that is ahead of the aircraft, as well as the waypoints that are still to be overflown and the waypoint from which the aircraft is coming.
  The ND does not show a SID or a STAR, except for the last waypoint of the SID and the first waypoint of the STAR, when the selected range is 160 or 320 nm.
  If the primary flight plan is not active, it is represented by a dotted green line.
- A continuous blue line portrays the missed approach procedure, and a dashed blue line portrays the flight plan to the alternate.

  The missed approach and the alternate flight plan are displayed when:
  - In ARC or ROSE NAV mode, a missed approach waypoint or an alternate flight plan waypoint is displayed on the onside MCDU.
  - In PLAN mode a missed approach or alternate waypoint is displayed in the 2L field of the onside MCDU.
- The secondary flight plan is represented by a continuous white line. The ND continues to display the active flight plan
- Temporary flight plan
  The revised portion of the flight plan is represented by a dotted yellow line
- Flight plan capture
  When the aircraft is off the primary flight plan and is flying toward it in HDG mode with the NAV mode armed, the ND shows the new active flight plan as a continuous green line if the FMGC has computed the intercept path.
  The part of the flight plan before the interception point shows as a dotted green line.



(3) Waypoint

The ND can display various kinds of waypoints:

Flight plan waypoints

The ND displays these as green diamonds (white, for TO waypoints). When the flight crew selects the WPT option on his EFIS control panel, all waypoints other than flight plan waypoints are displayed in magenta.

Pseudo waypoint

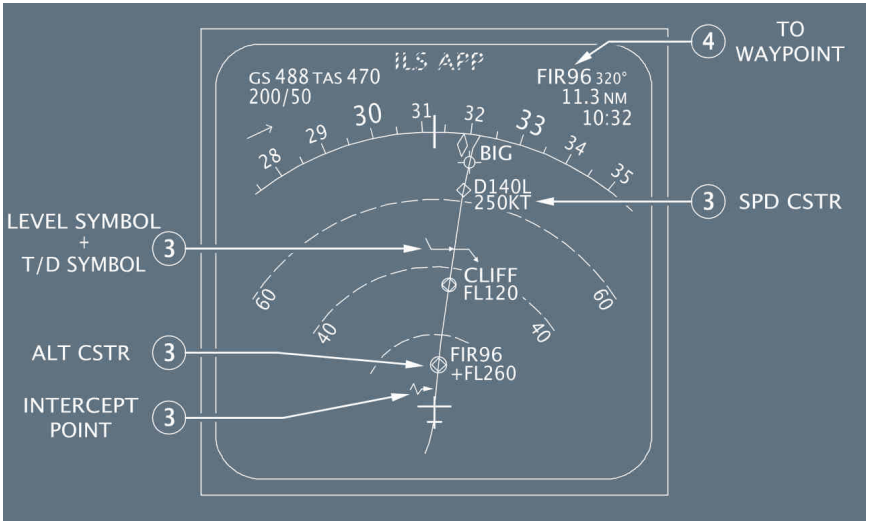
Point of the flight path where the aircraft is predicted to reach a selected altitude or speed.

Pseudo waypoint	Definition
	Level symbol (top of climb or level-off position), when the aircraft reaches: - The FCU-selected altitude (blue arrow), or - The constrained altitude, if it is more restrictive than the FCU altitude and if appropriate modes are engaged (magenta) - It does not appear when the aircraft is within 100 ft above, or below, the selected altitude.
	Top of descent symbol, or continue descent symbol: - White, if DES is not armed - Blue, if DES is armed.

Continued on the following page

Continued from the previous page

Pseudo waypoint	Definition
	Start of CLIMB symbol: - White, if CLB is not armed - Blue, if CLB is armed.
	Intercept point symbol: - White, if only the NAV mode is engaged - Blue, if DES mode is engaged - Indicates the point at which the aircraft is predicted to intercept the descent path, if there is any vertical deviation while the aircraft is in DES mode.
•	Speed change symbol (magenta): Indicates the point at which the aircraft will start an automatic acceleration or deceleration from the current speed to a new computed speed for SPD LIM, SPD CSTR, or HOLDING SPD.
	Decelerate point symbol: - Indicates the point at which the aircraft is predicted to decelerate for approach (and thus switch to the approach phase) - Magenta, if in managed speed and NAV or approach mode is engaged - White, if in selected speed or HDG/TRK mode - Automatic decelerations only occur when displayed in magenta.
	ALT CSTR symbol set around the constrained waypoint: - Magenta, when the ALT CSTR is predicted to be met - Amber, when the ALT CSTR is predicted to be missed - White, when the ALT CSTR is not taken into account by the FMGS, and NAV mode is engaged.
	Energy circle symbol (green arc) centered on the aircraft position and oriented to the current track line. Represents the Required Distance to Land. Only displayed if the lateral guidance mode is heading or track, and the current FMS flight phase is in cruise, descent or approach, and the aircraft is within 180 nm of the destination.

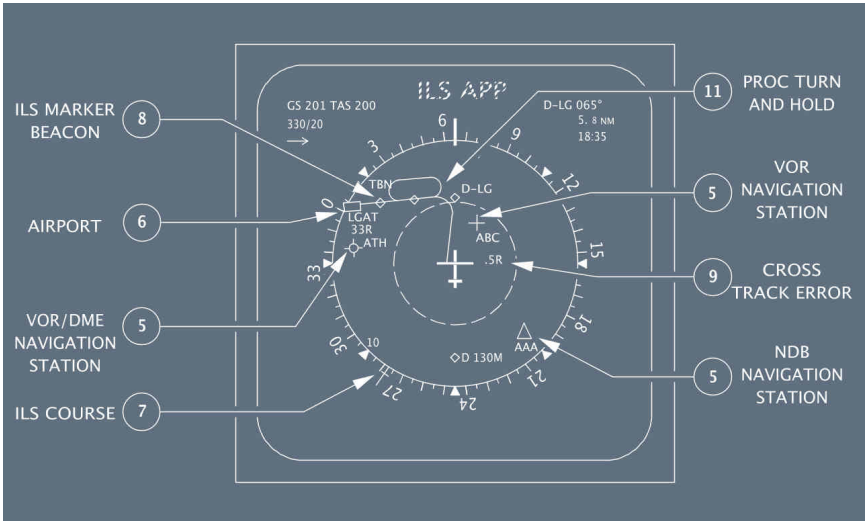


(4) TO waypoint

This is the next waypoint to be overflown.

This area of the screen also shows:

- Waypoint identification (white)
- Track to go (green)
- Distance to go (green)
- Estimated time of arrival (green), assuming the aircraft will fly directly from its present position to the TO waypoint at the current ground speed.



(5) NAVAIDs

The display uses specific symbols for NAVAIDs:

◇	DME or TACAN
+	VOR
⊙	VOR/DME
△	NDB

The symbol appears:

- In green if the NAVAID is a current waypoint of the flight plan
- In white if it is the TO waypoint
- In blue when the NAVAID is tuned for display either automatically by the FMGC or manually through the MCDU
- In magenta when the NAVAID is not part of the flight plan and is called for display as an option (corresponding option pushbutton pressed on the FCU EFIS control panel).

(6) Airport

Airport included in the flight plan:

- If the runway is not specified, the airport is represented by a star and the identification is displayed in white.
  Example: * LSGG
- If the runway is specified, it is represented by an oriented runway symbol in white.



The runway is drawn to scale (paved length) if the selected range is 10, 20 or 40 NM.

Optional airport information

The airports that are not displayed as part of the flight plan may be called for display (ARPT pushbutton on the EFIS control panel).
They are represented by a star and the identification in magenta.

(7) ILS Course (Magenta)

When the pilot pushes the LS pb-sw on the EFIS control panel, and if an ILS station has been selected, the display shows an ILS course symbol.

(8) ILS Marker Beacons

The screen shows these as waypoints (diamonds).

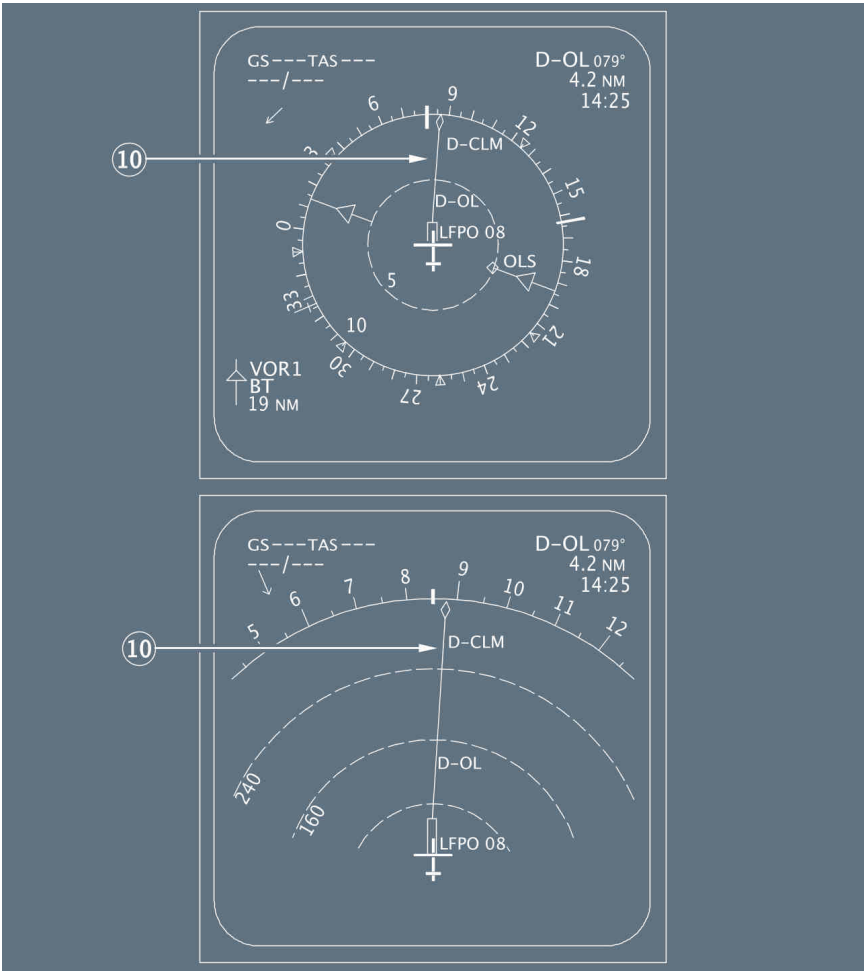
When the aircraft overflies a marker beacon, the corresponding symbol flashes:
Blue for the outer marker.
Amber for the middle marker.
White for the inner marker.

(9) Cross Track Error

This is the aircraft's lateral deviation from the active leg of the flight plan (related to the great circle route). It is indicated in nautical miles (NM), with the letter R (right) or L (left), according to the position of the aircraft with respect to the flight plan.

(10) Track Line

This line appears in green only in the ROSE NAV or ARC mode when HDG or TRK has been selected on the FCU.



(11) Procedure turns and holding patterns

These only appear when they are part of the flight plan. For the 160 and 320 nm range scales, each one is represented by a white arrow that originates at the associated fix and indicates the direction of the turn.



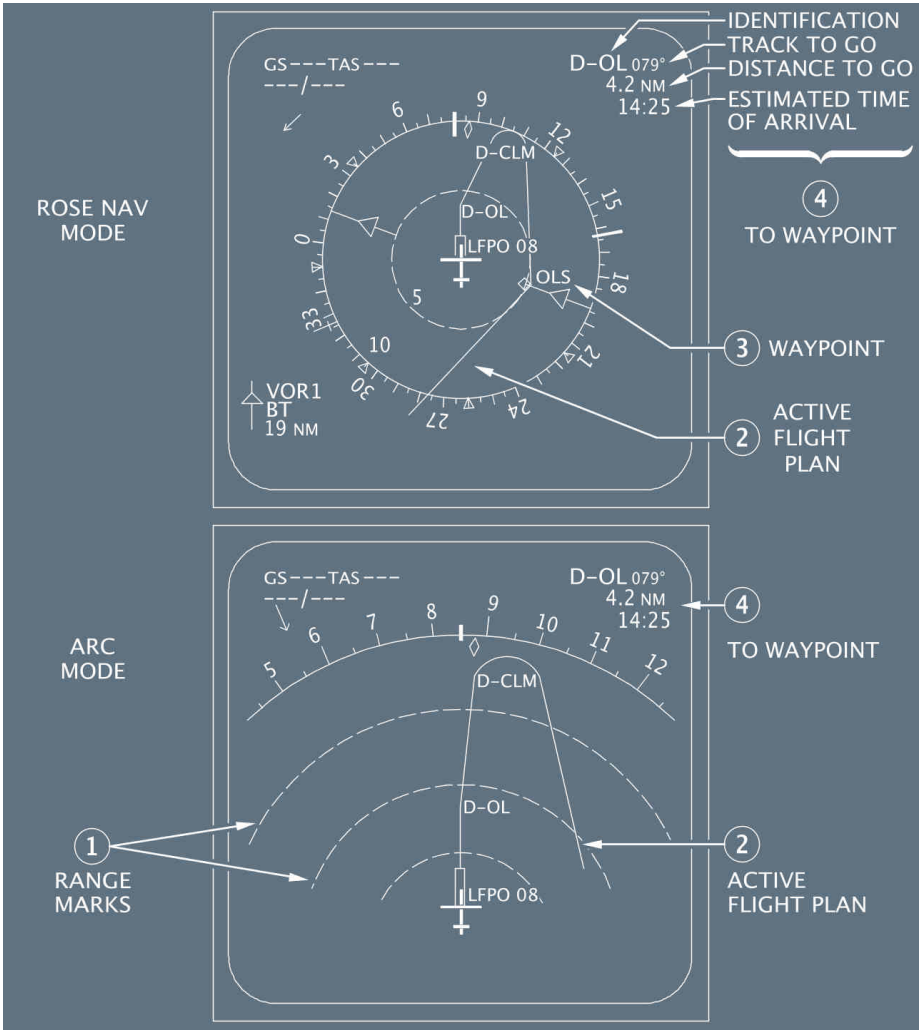
For shorter range scales, and if the procedure turn or the holding pattern is in the next or the active leg, the display shows the full circuit or pattern.



ROSE NAV MODE/ARC MODE

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI

8 ROSE NAV and ARC modes give the pilot the same information, but ARC mode limits it to the forward 90 ° sector.


ROSE NAV MODE
GS---TAS---
---/---
D-OL 079°
4.2 NM
14:25
IDENTIFICATION
TRACK TO GO
DISTANCE TO GO
ESTIMATED TIME OF ARRIVAL
4 TO WAYPOINT
D-CLM
D-OL
LFPO 08
OLS
3 WAYPOINT
2 ACTIVE FLIGHT PLAN
VOR1
BT
19 NM
ARC MODE
GS---TAS---
---/---
D-OL 079°
4.2 NM
14:25
4 TO WAYPOINT
D-CLM
D-OL
LFPO 08
1 RANGE MARKS
2 ACTIVE FLIGHT PLAN

(1) Range Marks and Values

The values displayed on the ND are:

In ROSE NAV mode	1/4 of the selected range for the inner circle.
	1/2 of the selected range for the heading scale circle.
In ARC mode	1/4 of the selected range for the first inner arc.
	1/2 of the selected range for the second inner arc.
	3/4 of the selected range for the third inner arc.

(2) Flight Plan

The crew can use the MCDU to select various types of flight plan:

- The active flight plan (the flight plan the aircraft is actually following when the NAV mode is engaged) is represented by a continuous green line. The ND shows only the part of the flight plan that is ahead of the aircraft, as well as the waypoints that are still to be overflown and the waypoint from which the aircraft is coming.
  The ND does not show a SID or a STAR, except for the last waypoint of the SID and the first waypoint of the STAR, when the selected range is 160 or 320 nm.
  If the primary flight plan is not active, it is represented by a dotted green line.
- A continuous blue line portrays the missed approach procedure, and a dashed blue line portrays the flight plan to the alternate.

  The missed approach and the alternate flight plan are displayed when:
  - In ARC or ROSE NAV mode, a missed approach waypoint or an alternate flight plan waypoint is displayed on the onside MCDU.
  - In PLAN mode a missed approach or alternate waypoint is displayed in the 2L field of the onside MCDU.
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- Temporary flight plan
  The revised portion of the flight plan is represented by a dotted yellow line
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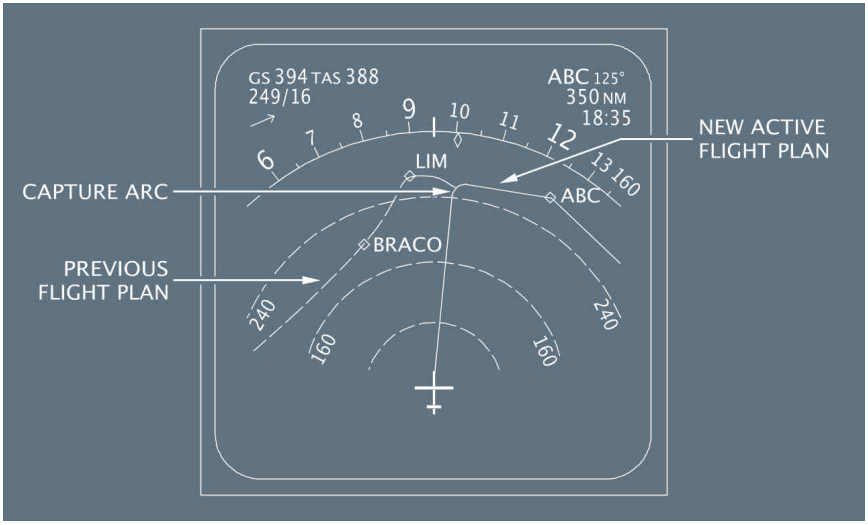
  When the aircraft is off the primary flight plan and is flying toward it in HDG mode with the NAV mode armed, the ND shows the new active flight plan as a continuous green line if the FMGC has computed the intercept path.
  The part of the flight plan before the interception point shows as a dotted green line.



(3) Waypoint

The ND can display various kinds of waypoints:

Flight plan waypoints

The ND displays these as green diamonds (white, for TO waypoints). When the flight crew selects the WPT option on his EFIS control panel, all waypoints other than flight plan waypoints are displayed in magenta.

Pseudo waypoint

Point of the flight path where the aircraft is predicted to reach a selected altitude or speed.

Pseudo waypoint	Definition
	Level symbol (top of climb or level-off position), when the aircraft reaches: - The FCU-selected altitude (blue arrow), or - The constrained altitude, if it is more restrictive than the FCU altitude and if appropriate modes are engaged (magenta) - It does not appear when the aircraft is within 100 ft above, or below, the selected altitude.
	Top of descent symbol, or continue descent symbol: - White, if DES is not armed - Blue, if DES is armed.

Continued on the following page

Continued from the previous page

Pseudo waypoint	Definition
	Start of CLIMB symbol: - White, if CLB is not armed - Blue, if CLB is armed.
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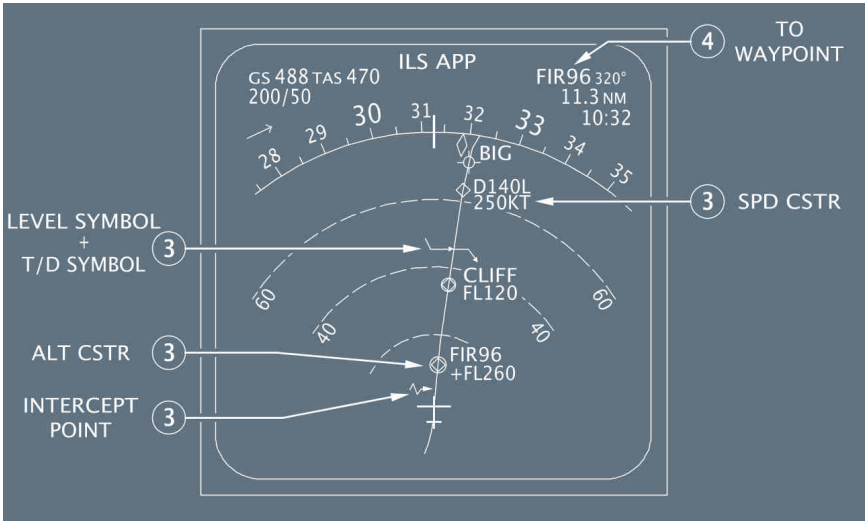
	Decelerate point symbol: - Indicates the point at which the aircraft is predicted to decelerate for approach (and thus switch to the approach phase) - Magenta, if in managed speed and NAV or approach mode is engaged - White, if in selected speed or HDG/TRK mode - Automatic decelerations only occur when displayed in magenta.
	ALT CSTR symbol set around the constrained waypoint: - Magenta, when the ALT CSTR is predicted to be satisfied - Amber, when the ALT CSTR is predicted to be missed - White, when the ALT CSTR is not taken into account by the guidance, and NAV mode is engaged.
(ETP)  (HHMM)	TIME MARKERS or EQUI-TIME POINT (ETP) symbol appears in green, to indicate where the aircraft will reach the time marker or equitime point.
	ENERGY CIRCLE symbol (green arc): - Is centered on the aircraft position and oriented to the current track line - Represents the Required Distance to Land - Only displayed in the descent and approach phases, when a selected lateral mode is engaged (HDG or TRK).

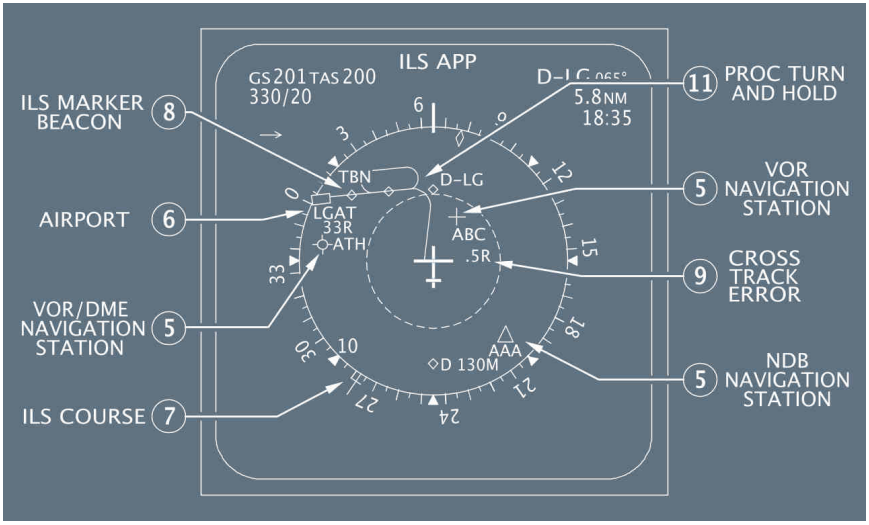


(4) TO Waypoint

This is the next waypoint to be overflown, except when a DIR TO with ABEAM PTS has been performed (in this case, the DIR TO waypoint is displayed on the top of the screen instead of the NEXT ABEAM waypoint).

This area of the screen also shows:

- Waypoint identification (white)
- Track to go (green)
- Distance to go (green)
- Estimated time of arrival (green), assuming the aircraft will fly directly from its present position to the TO waypoint at the current ground speed.



(5) NAVAIDs

The display uses specific symbols for NAVAIDs:

◇	DME or TACAN
+	VOR
◇	VOR/DME
△	NDB

The symbol appears:

- In green if the NAVAID is a current waypoint of the flight plan
- In white if it is the TO waypoint
- In blue when the NAVAID is tuned for display either automatically by the FMGC or manually through the MCDU
- In magenta when the NAVAID is not part of the flight plan and is called for display as an option (corresponding option pushbutton pressed on the FCU EFIS control panel).

(6) Airport

Airport included in the flight plan:

- If the runway is not specified, the airport is represented by a star and the identification is displayed in white.
  Example: * LSGG
- If the runway is specified, it is represented by an oriented runway symbol in white.



The runway is drawn to scale (paved length) if the selected range is 10, 20 or 40 NM.

Optional airport information

The airports that are not displayed as part of the flight plan may be called for display (ARPT pushbutton on the EFIS control panel).
They are represented by a star and the identification in magenta.

(7) ILS Course (Magenta)

When the pilot pushes the LS pb-sw on the EFIS control panel, and if an ILS station has been selected, the display shows an ILS course symbol.

(8) ILS Marker Beacons

The screen shows these as waypoints (diamonds).

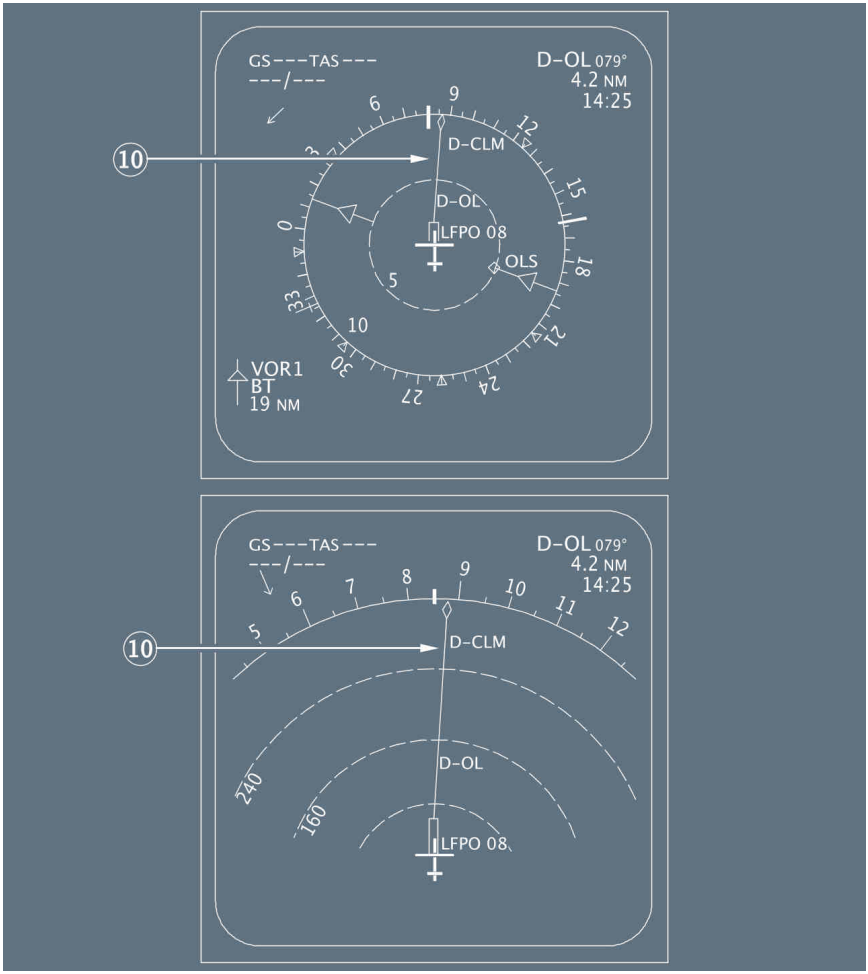
When the aircraft overflies a marker beacon, the corresponding symbol flashes:
Blue for the outer marker.
Amber for the middle marker.
White for the inner marker.

(9) Cross Track Error

This is the aircraft's lateral deviation from the active leg of the flight plan (related to the great circle route). It is indicated in nautical miles (NM), with the letter R (right) or L (left), according to the position of the aircraft with respect to the flight plan.

(10) Track Line

This line appears in green only in the ROSE NAV or ARC mode when HDG or TRK has been selected on the FCU.



(11) Procedure Turns and Holding Patterns

These only appear when they are part of the flight plan. For the 160 and 320 nm range scales, each one is represented by a white arrow that originates at the associated fix and indicates the direction of the turn.



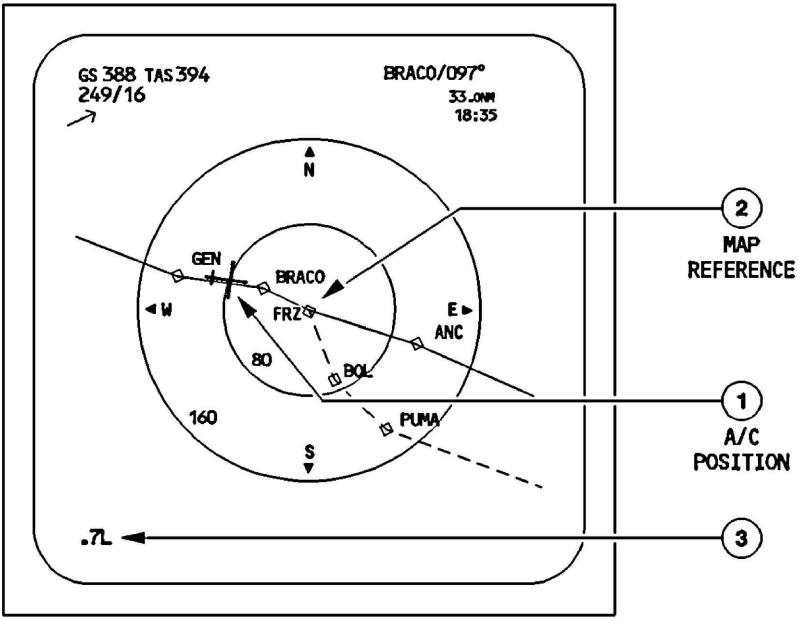
For shorter range scales, and if the procedure turn or the holding pattern is in the next or the active leg, the display shows the full circuit or pattern.



PLAN MODE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This mode statically displays the flight plan legs on a map oriented to true north. The map is centered on a map reference point, that the pilot selects by scrolling to it on his MCDU.
The map reference point is the waypoint displayed on the second line of the MCDU's F-PLN page. It can either be the active waypoint (next waypoint to be overflown), or any other waypoint of the flight plan.
The pilot can scroll through the overall flight plan, and display it in PLAN mode.
The pilot chooses the scale of the map with the range selector (the diameter of the outer circle corresponds to the selected range).
Data on NAVAIDs and on their characteristics and associated bearing pointers are not available in this mode.



(1) Aircraft Position and True Track
The orientation of the yellow aircraft symbol always indicates the true track of the aircraft. Its position represents the aircraft position given by the FMGS.

(2) Map Reference Point

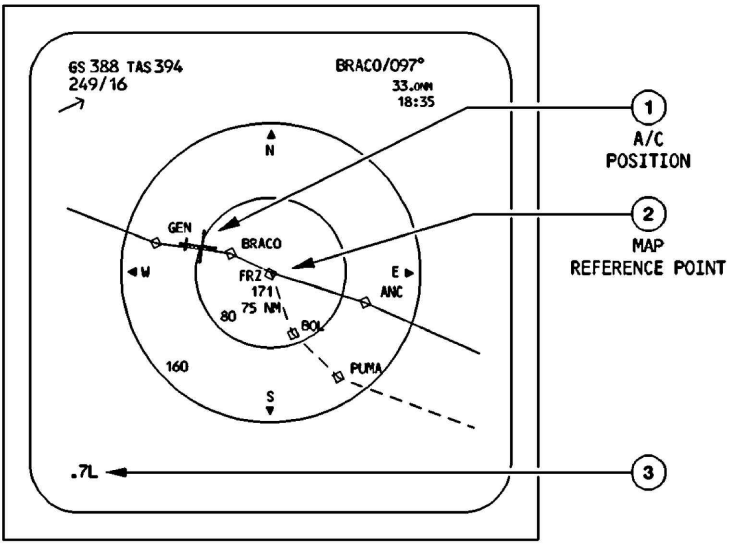
(3) Cross Track Error
Refer to DSC-31-45 ROSE NAV Mode/ARC Mode.

PLAN MODE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

This mode statically displays the flight plan legs on a map oriented to true north. The map is centered on a map reference point, that the pilot selects by scrolling to it on his MCDU.
The map reference point is the waypoint displayed on the second line of the MCDU's F-PLN page. It can either be the active waypoint (next waypoint to be overflown), or any other waypoint of the flight plan.
The pilot can scroll through the overall flight plan, and display it in PLAN mode.

The pilot chooses the scale of the map with the range selector (the diameter of the outer circle corresponds to the selected range).
Data on NAVAIDs and on their characteristics and associated bearing pointers are not available in this mode.



(1) Aircraft Position and True Track
The orientation of the yellow aircraft symbol always indicates the true track of the aircraft. Its position represents the aircraft position given by the FMGS.

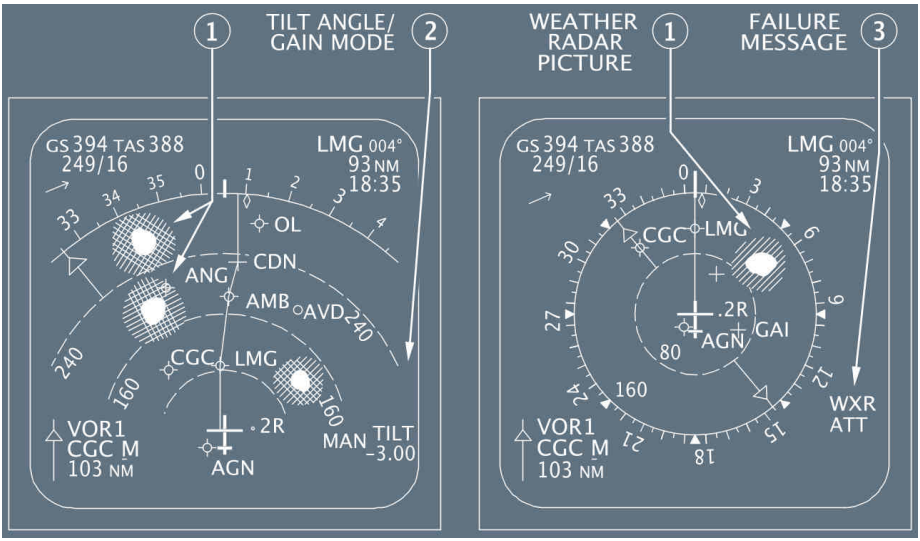
(2) Map Reference Point
If the CSTR option is not selected, the track and distance from the map reference point to the next F-PLN waypoint is displayed in magenta.

(3) Cross Track Error
Refer to DSC-31-45 ROSE NAV Mode/ARC Mode.

WEATHER RADAR

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

9



(1) Weather Radar Picture

- When the radar is operating, and when the ND is not in PLAN mode, the ND displays the weather radar picture.
- The echoes appear in different colors, depending on the precipitation rates (black, green, yellow, red or magenta).
- The selected ND range will determine how often the image is refreshed.

(2) Tilt Angle and Gain Mode

- The value of the tilt angle is in degrees, and quarters of a degree. It appears in blue in the lower right-hand corner of the screen. This angle is the angle between the horizon and the radar beam axis.
- ”MAN”appears in white, when the manual gain mode is selected.

(3) Failure Messages

The ND lists the detected failures.
If the message is in “red”, the ND does not display a radar image.
If the message is in “amber”, the image is not affected.

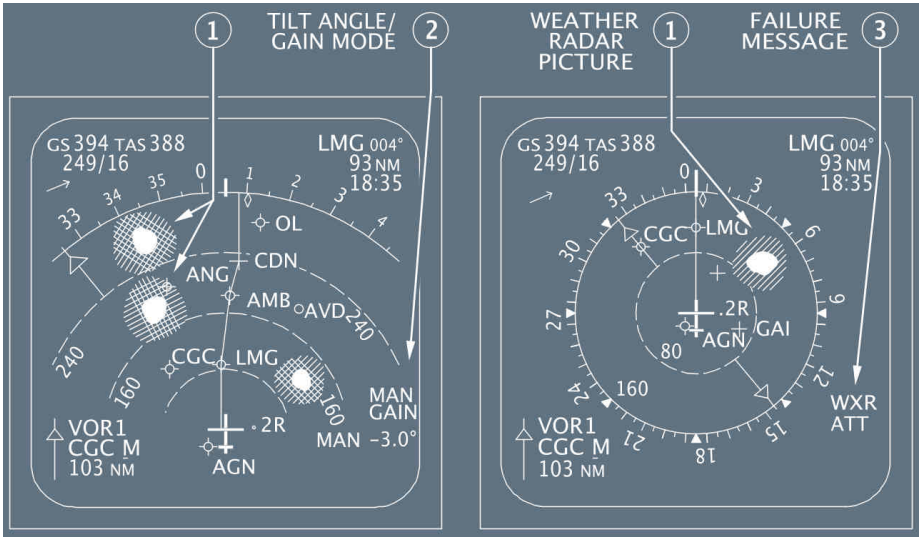
WXR RT (red) : Radar transceiver failure.

WXR ANT (red)	:	Radar antenna failure.
WXR CTL (red)	:	Radar control unit failure.
WXR RNG (red)	:	Range error.
WXR WEAK (amber)	:	Calibration failure.
WXR ATT (amber)	:	Attitude control failure.
WXR STAB (amber)	:	Antenna stabilization failure.

WEATHER RADAR

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

10



(1) Weather Radar Picture

- When the radar is operating, and when the ND is not in PLAN mode, the ND displays the weather radar picture.
- The echoes appear in different colors, depending on the precipitation rates (black, green, yellow, red or magenta).
- The selected ND range will determine how often the image is refreshed.

(2) Tilt Angle and Gain Mode

- The value of the tilt angle is in degrees, and quarters of a degree. It appears in blue in the lower right-hand corner of the screen along with MAN indication. This angle is the angle between the horizon and the radar beam axis.
- "MAN GAIN" appears in white, when the manual gain mode is selected.

(3) Failure Messages

The ND lists the detected failures.
If the message is in "red", the ND does not display a radar image.
If the message is in "amber", the image is not affected.

WXR RT (red)	:	Radar transceiver failure.
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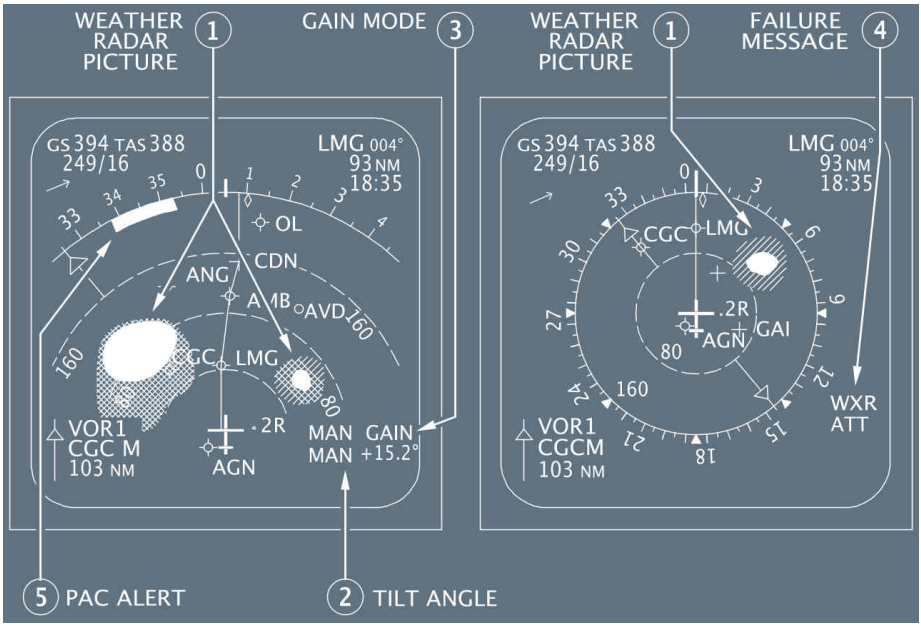
WXR ATT (amber)	:	Attitude control failure.
WXR STAB (amber)	:	Antenna stabilization failure.

WEATHER RADAR

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

11



(1) Weather Radar Picture

- When the radar is operating, and when the ND is not in PLAN mode, the ND displays the weather radar picture.
- The echoes appear in different colors, depending on the precipitation rates (black, green, yellow, red or magenta).
- The selected ND range will determine how often the image is refreshed.

(2) Tilt Angle

- The multiscan function of the weather radar alternatively scans at low and high beam, and automatically sets the tilt of these beams to optimize the weather radar detection. The displayed weather radar picture is the result of the storing and merging of the information from each beam.
- The value of the tilt angle is in degrees, and quarters of a degree. It appears in the lower right corner of the screen:
  - In green, when the MULTISCAN sw is set to AUTO. This value represents the average of the lower and the upper beam tilts.
  - In blue, next to the blue “MAN”indication, when the flight crew sets the MULTISCAN sw to MAN.
    The tilt angle is the angle between the horizon and the radar beam axis.
  - When the multiscan function is lost, the tilt value is dashed and the “NO AUTO TILT” message appears in amber on the ND, until the flight crew sets the MULTISCAN sw to MAN.

(3) Gain Mode

- ”MAN”appears in white, when the flight crew selects the manual gain mode.

(4) Failure Messages

The ND lists the detected failures.
If the message is in “red”, the ND does not display a radar image.
If the message is in “amber”, the image is not affected.

WXR RT (red)	:	Radar transceiver failure.
WXR ANT (red)	:	Radar antenna failure.
WXR CTL (red)	:	Radar control unit failure.
WXR RNG (red)	:	Range error.
WXR WEAK (amber)	:	Calibration failure.
WXR ATT (amber)	:	Attitude control failure.
WXR STAB (amber)	:	Antenna stabilization failure.

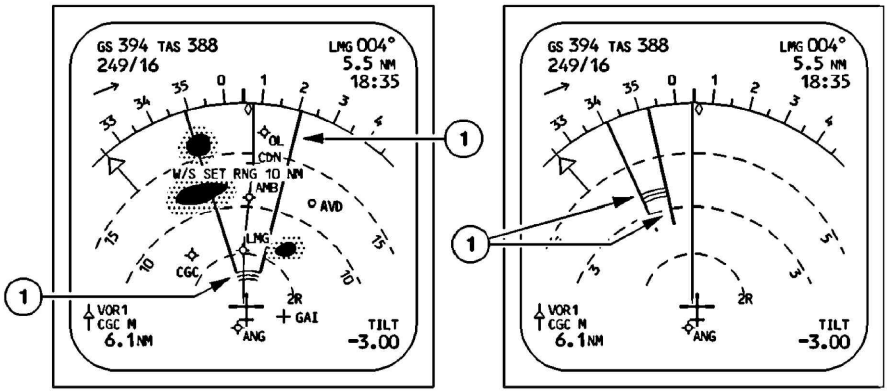
(5) PAC alert

When the flight crew sets the weather radar mode to WX or WX + T, and sets the gain to CAL, and when the aircraft is within 80 nm of a thunderstorm, the Path Attenuation Compensation (PAC) alert is available.
The PAC alert displays a yellow arc on the outermost scale of the ND, when an intervening rainfall creates an attenuated area behind a thunderstorm (also called a radar shadow).

Note: *The PAC alert is available during both automatic and manual operation (MULTISCAN sw either in AUTO or MAN position).*

PREDICTIVE WINDSHEAR SYSTEM

Applicable to: ALL 321, B-HSJ, B-HSK



(1) Predictive windshear area indication

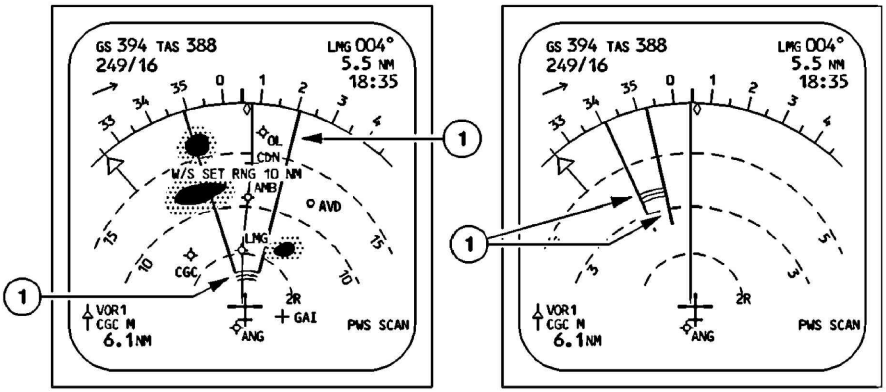
The predicted windshear area is indicated by a red and black icon and two yellow radial lines. Windshear information is available in ARC and ROSE ND modes.

When the ND range is set above 10 nm, a W/S SET RNG 10 nm (Windshear, set range 10 nm) message appears, requesting the crew to adjust the ND range. It is displayed even if the weather radar is switched off, provided the WINDSHEAR switch on the weather radar panel is set to AUTO.

Depending on the windshear alert level, ND indication may be completed with a PFD message (*Refer to DSC-31-40 Flags and Messages Displayed on PFD*).

PREDICTIVE WINDSHEAR SYSTEM

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) Predictive windshear area indication

A PWS SCAN message is displayed when the Predictive Windshear system is active on the ND.

The predicted windshear area is indicated by a red and black icon and two yellow radial lines. Windshear information is available in ARC and ROSE ND modes.

When the ND range is set above 10 nm, a W/S SET RNG 10 nm (Windshear, set range 10 nm) message appears, requesting the crew to adjust the ND range. It is displayed even if the weather radar is switched off, provided the WINDSHEAR switch on the weather radar panel is set to AUTO.

Depending on the windshear alert level, ND indication may be completed with a PFD message (*Refer to DSC-31-40 Flags and Messages Displayed on PFD*).

EGPWS

Applicable to: B-HSI

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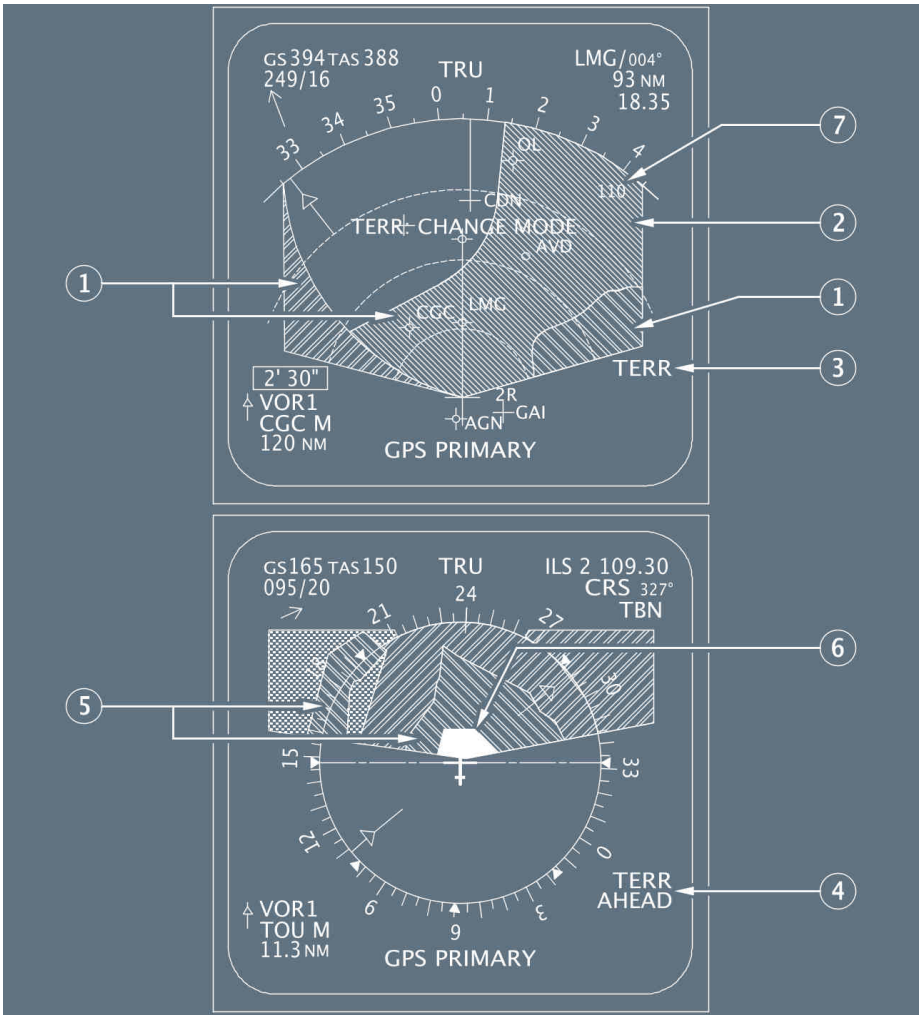
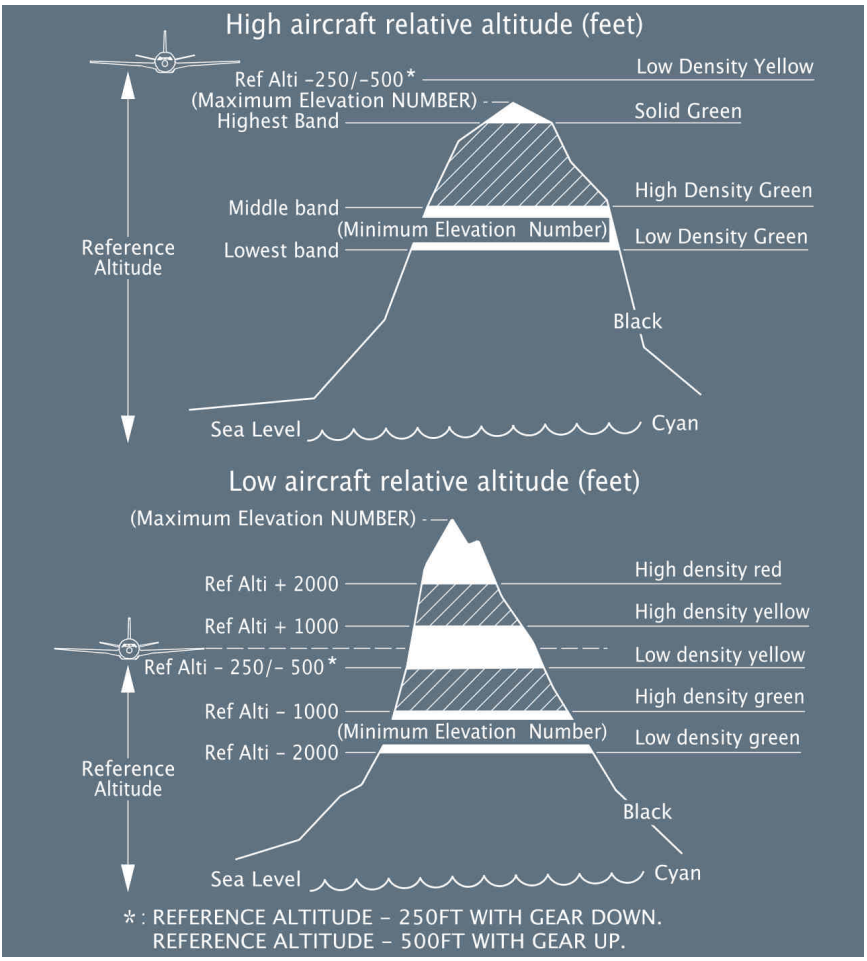


(1) EGPWS terrain picture

The ND displays the EGPWS terrain picture, when the TERR ON ND switch is selected ON, and the ND is not in PLAN mode. The terrain picture replaces the weather radar image. Terrain data is displayed independently of the aircraft relative altitude.

The terrain appears in different colors and densities, in accordance with its relative height:



Note: - *Areas without available terrain data in the EGPWS database appear in magenta*
- *The reference altitude is computed based on the current aircraft altitude or, if descending more than 1 000 ft/min, the altitude expected in 30 s*
- *In case of flight above the maximum elevation number, the relief between the minimum and maximum displayed elevations is displayed by using three different green levels.*

(2) Center Part Messages

- The "TERR CHANGE MODE" indication is displayed in red (or amber), in the case of a Terrain Awareness Display (TAD) warning (or caution) alert, if the current selected display mode is PLAN
- The "TERR REDUCE RANGE" indication is displayed in red (or amber), in the case of a Terrain Awareness Display (TAD) warning (or caution) alert, if the selected range is 160 nm or 320 nm.

(3) TERR indication

To differentiate between the terrain and the weather display, the weather radar TILT is replaced by a blue TERR, and the terrain display sweeps from the center outward to both ND sides.

(4) Warning and caution messages

TERR AHEAD (amber) : For a terrain or obstacle caution.

TERR AHEAD (red) : For a terrain or obstacle warning.

When triggered, these messages flash for 9 s, then remain steady until the caution or warning alert condition disappears.

TERR RNG (red) : For a RANGE error warning.

TERR TST (amber) : Appears during the EGPWS test, when the terrain pattern is displayed, and there is no failure.

(5) Terrain or obstacle caution alert

Generated when a conflict exists between the terrain caution envelope, ahead of the aircraft, and database-stored terrain/obstacles. The conflict area is shown in solid yellow.

(6) Terrain or obstacle warning alert

Generated when a conflict exists between the terrain warning envelope, ahead of the aircraft, and terrain/obstacles data stored in the database. The conflict area is shown in solid red.

Note: *When an alert is generated (either caution or warning) and TERR ON ND is not selected, the terrain is automatically displayed and the TERR ON ND's pushbutton ON light comes on.*

(7) Highest Elevation

The highest elevation encountered within the selected range is only displayed in ARC mode, in the top righthand corner of the terrain frame, using the color code of paragraph 1.

EGPWS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

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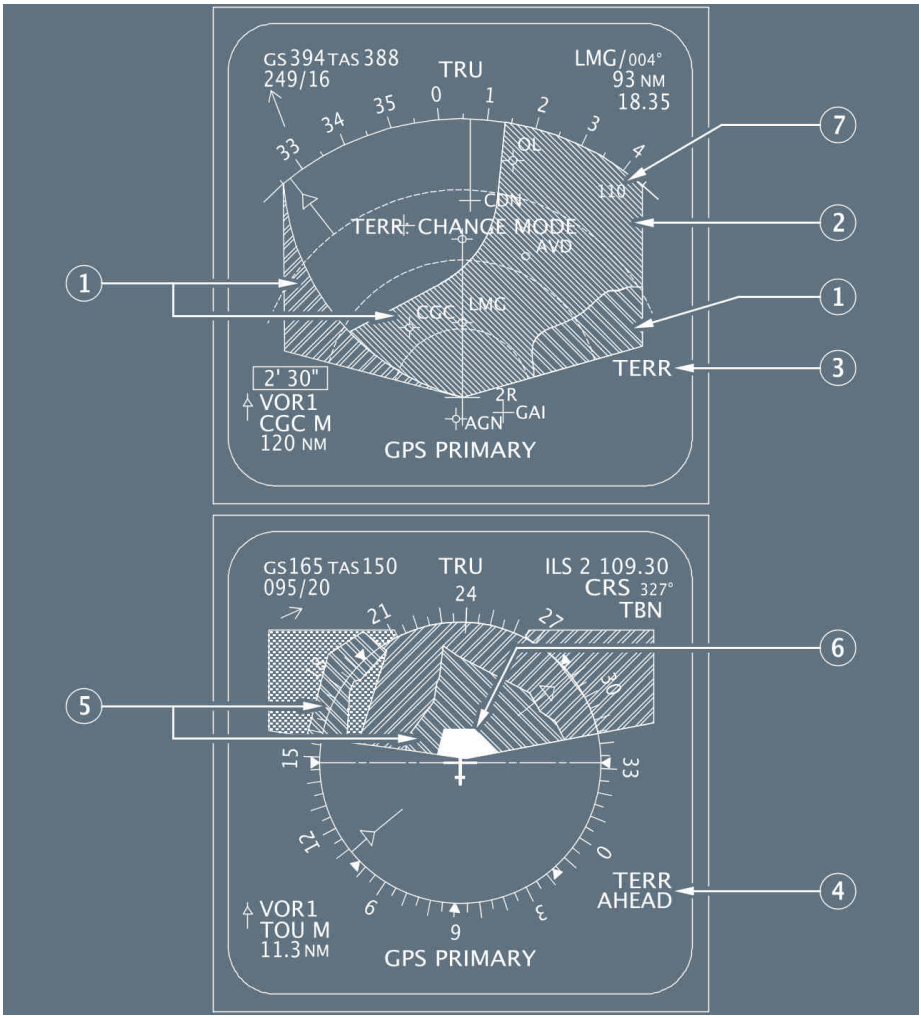
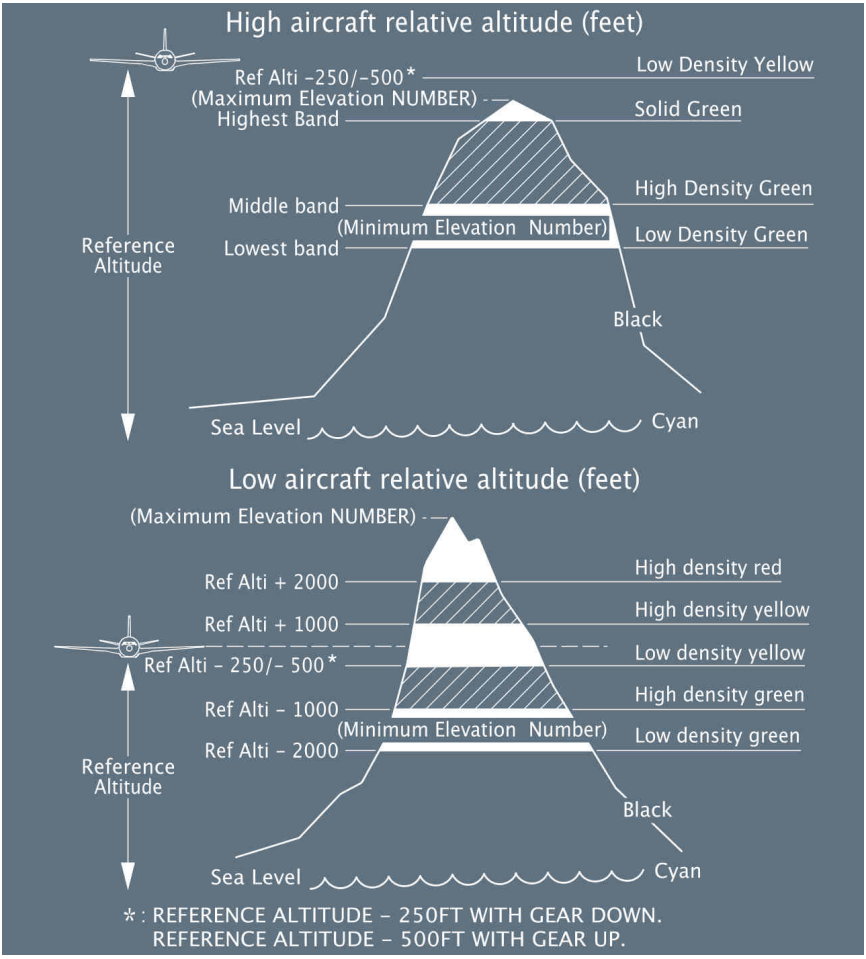


(1) EGPWS terrain picture

The ND displays the EGPWS terrain picture, when the TERR ON ND switch is selected ON, and the ND is not in PLAN mode. The terrain picture replaces the weather radar image. Terrain data is displayed independently of the aircraft relative altitude.

The terrain appears in different colors and densities, accordance with its relative height:



Note: - *Areas without available terrain data in the EGPWS database appear in magenta*
- *The reference altitude is computed based on the current aircraft altitude or, if descending more than 1 000 ft/min, the altitude expected in 30 s*
- *In case of flight above the maximum elevation number, the relief between the minimum and maximum displayed elevations is displayed by using three different green levels.*

(2) Center Part Messages

- The "TERR CHANGE MODE" indication is displayed in red (or amber), in the case of a Terrain Awareness Display (TAD) warning (or caution) alert, if the current selected display mode is PLAN
- The "TERR REDUCE RANGE" indication is displayed in red (or amber), in the case of a Terrain Awareness Display (TAD) warning (or caution) alert, if the selected range is 160 nm or 320 nm.

(3) TERR indication

To differentiate between the terrain and the weather display, the weather radar TILT is replaced by a blue TERR, and the terrain display sweeps from the center outward to both ND sides.

(4) Warning and caution messages

TERR AHEAD or OBST AHEAD (amber) : For a caution.

TERR AHEAD or OBST AHEAD (red) : For a warning.

When triggered, these messages flash for 9 s, then remain steady until the caution or warning alert condition disappears.

TERR RNG (red) : For a RANGE error warning.

TERR TST (amber) : Appears during the EGPWS test, when the terrain pattern is displayed, and there is no failure.

(5) Terrain or obstacle caution alert

Generated when a conflict exists between the terrain caution envelope, ahead of the aircraft, and database-stored terrain/obstacles. The conflict area is shown in solid yellow.

(6) Terrain or obstacle warning alert

Generated when a conflict exists between the terrain warning envelope, ahead of the aircraft, and terrain/obstacles data stored in the database. The conflict area is shown in solid red.

Note: *When an alert is generated (either caution or warning) and TERR ON ND is not selected, the terrain is automatically displayed and the TERR ON ND pushbutton ON light comes on.*

(7) Highest Elevation

The highest elevation encountered within the selected range is only displayed in ARC mode, in the top righthand corner of the terrain frame, using the color code of paragraph 1.

EGPWS

Applicable to: B-HTF

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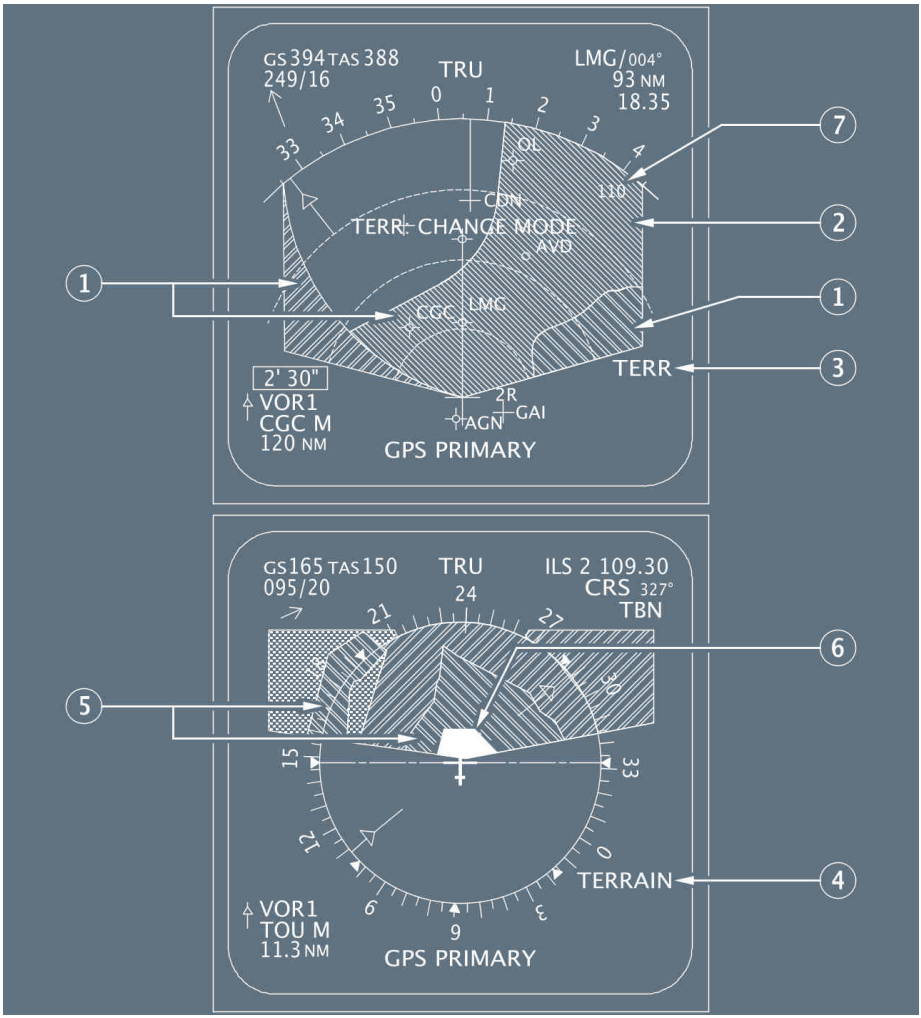
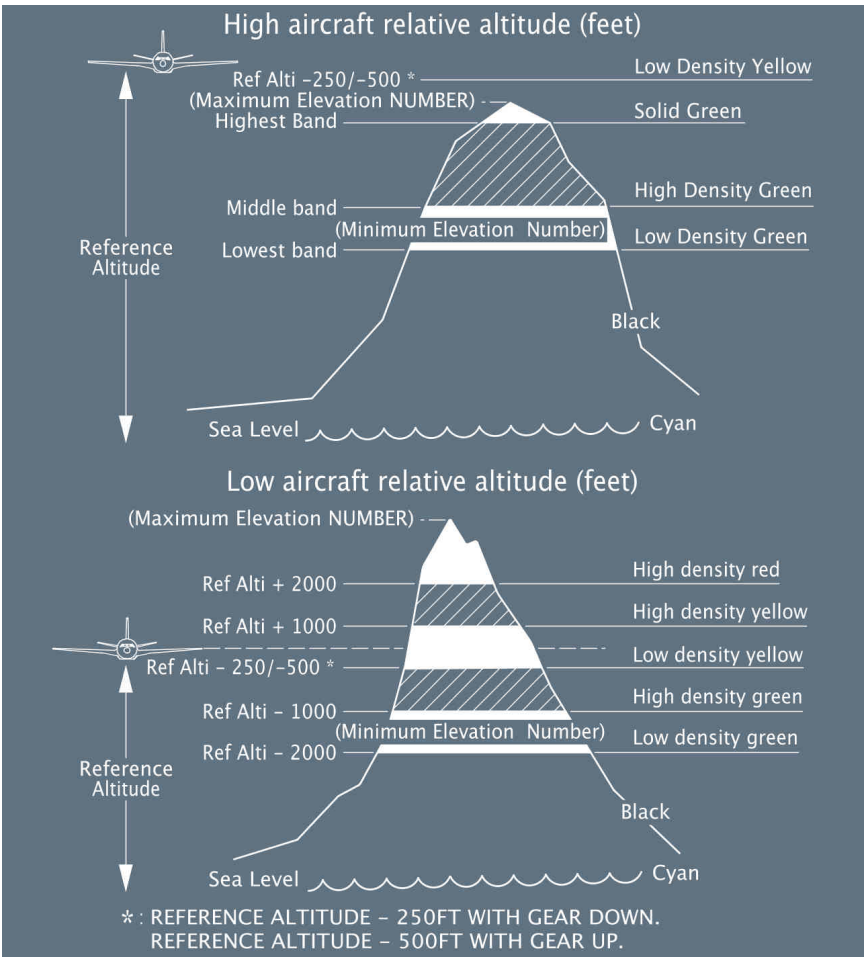


(1) EGPWS terrain picture

The ND displays the EGPWS terrain picture, when the TERR ON ND switch is selected ON, and the ND is not in PLAN mode. The terrain picture replaces the weather radar image. Terrain data is displayed independently of the aircraft relative altitude.

The terrain appears in different colors and densities, in accordance with its relative height:



Note: - *Areas without available terrain data in the EGPWS database appear in magenta*
- *The reference altitude is computed based on the current aircraft altitude or, if descending more than 1 000 ft/min, the altitude expected in 30 s*
- *In case of flight above the maximum elevation number, the relief between the minimum and maximum displayed elevations is displayed by using three different green levels.*

(2) Center Part Messages

- The "TERR CHANGE MODE" indication is displayed in red (or amber), in the case of a Terrain Awareness Display (TAD) warning (or caution) alert, if the current selected display mode is PLAN
- The "TERR REDUCE RANGE" indication is displayed in red (or amber), in the case of a Terrain Awareness Display (TAD) warning (or caution) alert, if the selected range is 160 nm or 320 nm.

(3) TERR indication

To differentiate between the terrain and the weather display, the weather radar TILT is replaced by a blue TERR, and the terrain display sweeps from the center outward to both ND sides.

(4) Warning and caution messages

TERRAIN or OBST (amber) : For a caution.

TERRAIN or OBST (red) : For a warning.

When triggered, these messages flash for 9 s, then remain steady until the caution or warning alert condition disappears.

TERR RNG (red) : For a RANGE error warning.

TERR TST (amber) : Appears during the EGPWS test, when the terrain pattern is displayed, and there is no failure.

(5) Terrain or obstacle caution alert

Generated when a conflict exists between the terrain caution envelope, ahead of the aircraft, and database-stored terrain/obstacles. The conflict area is shown in solid yellow.

(6) Terrain or obstacle warning alert

Generated when a conflict exists between the terrain warning envelope, ahead of the aircraft, and terrain/obstacles data stored in the database. The conflict area is shown in solid red.

Note: *When an alert is generated (either caution or warning) and TERR ON ND is not selected, the terrain is automatically displayed and the TERR ON ND's pushbutton ON light comes on.*

(7) Highest Elevation

The highest elevation encountered within the selected range is only displayed in ARC mode, in the top righthand corner of the terrain frame, using the color code of paragraph 1.

EGPWS

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

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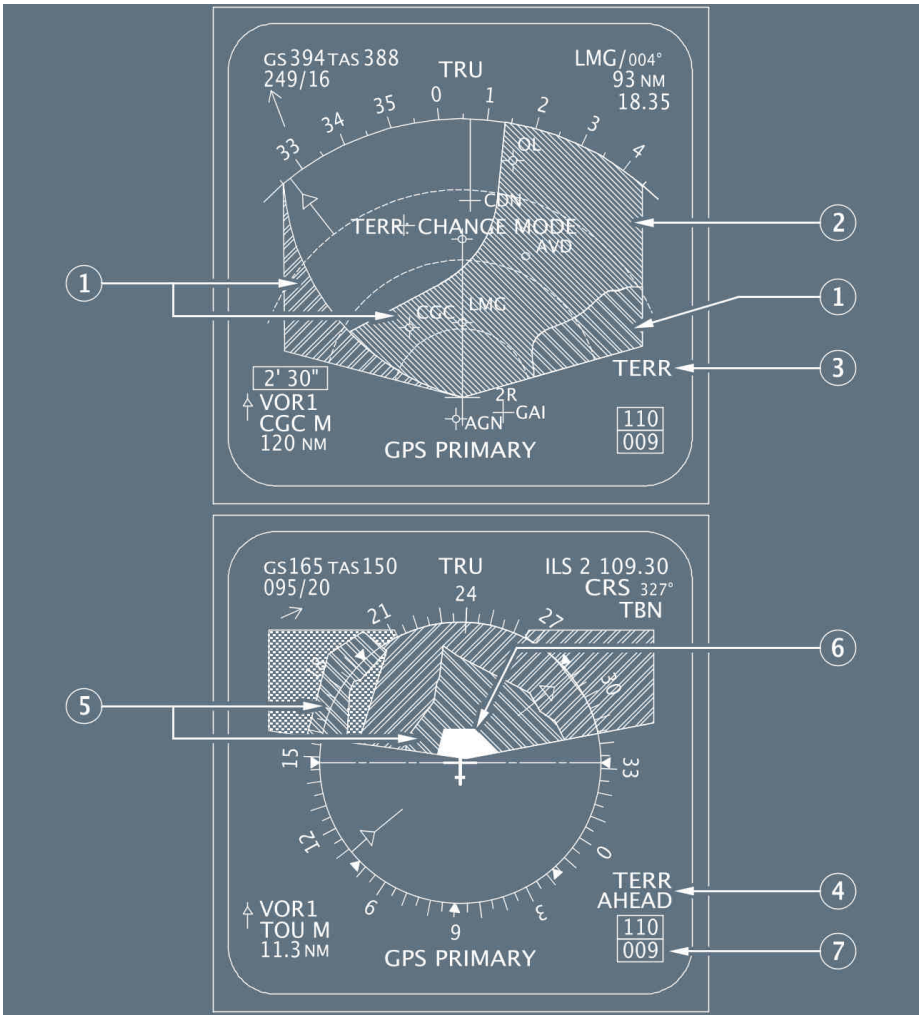
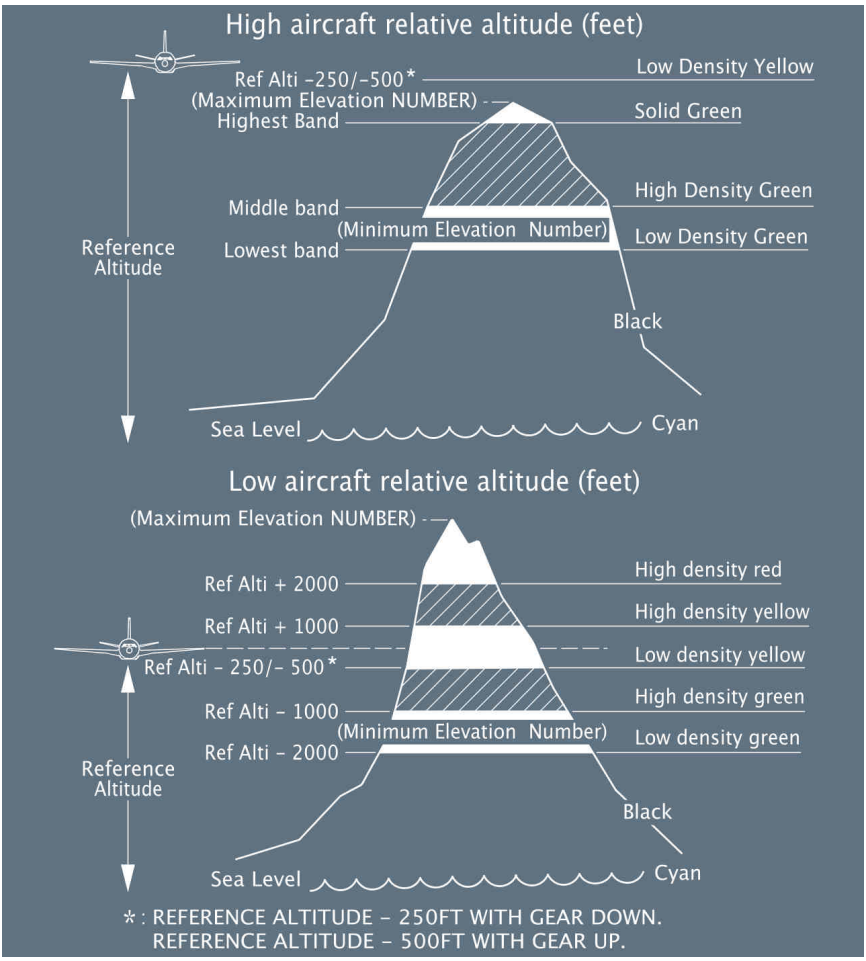


(1) EGPWS terrain picture

The ND displays the EGPWS terrain picture, when the TERR ON ND switch is selected ON, and the ND is not in PLAN mode. The terrain picture replaces the weather radar image. Terrain data is displayed independently of the aircraft relative altitude.

The terrain appears in different colors and densities, in accordance with its relative height:



Note: - *Areas without available terrain data in the EGPWS database appear in magenta*
- *The reference altitude is computed based on the current aircraft altitude or, if descending more than 1 000 ft/min, the altitude expected in 30 s*
- *In case of flight above the maximum elevation number, the relief between the minimum and maximum displayed elevations is displayed by using three different green levels.*

(2) Center Part Messages

- The "TERR CHANGE MODE" indication is displayed in red (or amber), in the case of a Terrain Awareness Display (TAD) warning (or caution) alert, if the current selected display mode is PLAN
- The "TERR REDUCE RANGE" indication is displayed in red (or amber), in the case of a Terrain Awareness Display (TAD) warning (or caution) alert, if the selected range is 160 nm or 320 nm.

(3) TERR indication

To differentiate between the terrain and the weather display, the weather radar TILT is replaced by a blue TERR, and the terrain display sweeps from the center outward to both ND sides.

(4) Warning and caution messages

TERR AHEAD or OBST AHEAD (amber) : For a caution.

TERR AHEAD or OBST AHEAD (red) : For a warning.

When triggered, these messages flash for 9 s, then remain steady until the caution or warning alert condition disappears.

TERR RNG (red) : For a RANGE error warning.

TERR TST (amber) : Appears during the EGPWS test, when the terrain pattern is displayed, and there is no failure.

(5) Terrain or obstacle caution alert

Generated when a conflict exists between the terrain caution envelope, ahead of the aircraft, and database-stored terrain/obstacles. The conflict area is shown in solid yellow.

(6) Terrain or obstacle warning alert

Generated when a conflict exists between the terrain warning envelope, ahead of the aircraft, and terrain/obstacles data stored in the database. The conflict area is shown in solid red.

Note: *When an alert is generated (either caution or warning) and TERR ON ND is not selected, the terrain is automatically displayed and the TERR ON ND's pushbutton ON light comes on.*

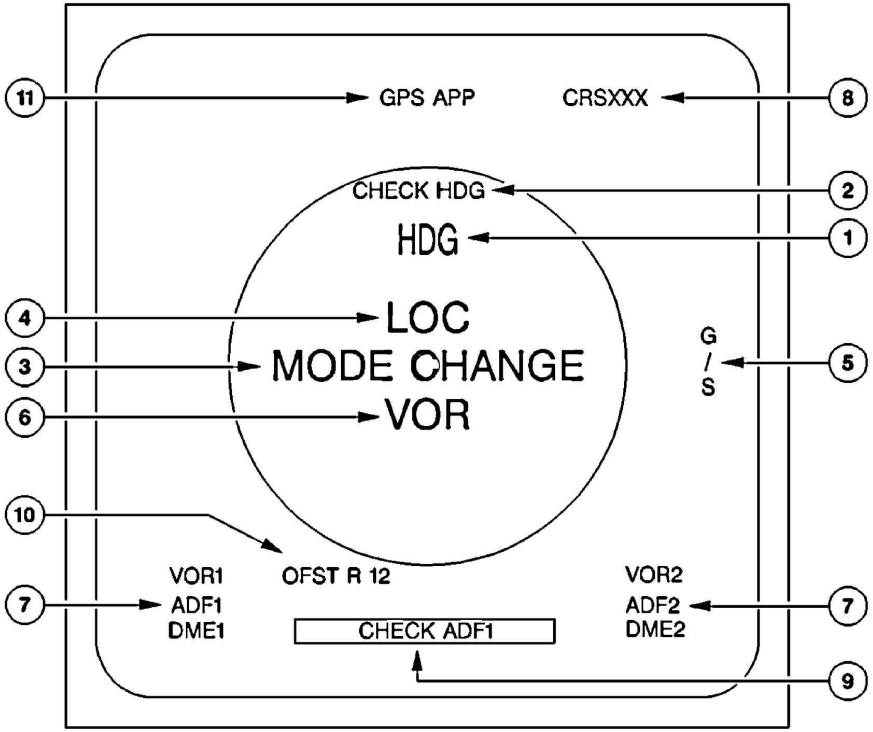
(7) Lowest and highest elevations

Minimum and maximum elevations encountered within the selected range, are respectively displayed in this square, using the color code of paragraph 1.

Note: The elevations shown on the ND correspond to the terrain included in the selected ND range, ahead of the aircraft. In ARC mode, the elevations are linked with the terrain displayed on the ND. In ROSE mode, the elevations may not represent the lowest and highest terrain currently displayed on the ND.

FLAGS AND MESSAGES DISPLAYED ON ND

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI



(1) HDG Flag (red)

If the heading data fails, the rose, arc and associated symbols disappear.
A HDG flag flashes for 9 s, then remains steady in the upper part of the ND.

(2) CHECK HDG Flag (amber)
When the flight warning computer detects a disagree (5 °) between sides 1 and 2, a CHECK HDG flag appears on both NDs, and a caution appears on the ECAM.

(3) Center Part Messages

- The screen displays a MODE CHANGE message in green if there is a discrepancy between the selected mode on the EFIS control panel and the mode sent from the onside FMGC, or while the DMC is preparing a new page for display
- The screen displays a RANGE CHANGE message in green if there is a discrepancy between the range selected on the EFIS control panel and the range sent from the onside FMGC. A MODE CHANGE message has priority over a RANGE CHANGE message
- The screen displays a MAP NOT AVAIL message in red for several reasons:
  - The MODE CHANGE or RANGE CHANGE message has been displayed more than 6 s, or
  - The FMGC has failed, or
  - The FMGC has delivered an invalid aircraft position.

(4) LOC Flag (red)
If LOC data fails, this flag flashes for 9 s, then remains steady.

(5) G/S Flag (red)
If G/S data fails, this flag flashes for 9 s, then remains steady.

(6) VOR Flag (red)
In ROSE VOR mode, when the VOR bearing is not valid, this flag flashes for 9 s, then remains steady.

(7) VOR 1(2) or ADF 1(2) or DME 1 Flag (red)
If a navigation receiver fails, the appropriate one of these flags flashes for 9 s, then remains steady.

(8) VOR Course Flag
If the VOR course fails, a red CRSXXX flag appears.
If there is non-computed data (NCD), a blue CRS - - - flag appears.

(9) Other messages

MAP PARTLY DISPLAYED (amber)	:	In case of incomplete data transmission between the FMGC (priority criteria) and the DMC, or if the DMC cannot draw the complete MAP. This message is also displayed when a very long leg exists in the flight plan. A leg is considered as "very long" when the starting point (or endpoint) is located at more than 45 ° from the aircraft location (45 ° of longitude or latitude). This DMC limitation results from a compromise between accurate drawing precision and maximum leg length that can be displayed.
NAV ACCUR UPGRAD, or (white) NAV ACCUR DOWNGRAD (amber)	:	Signals a change in navigation accuracy.
SPECIFIC VOR/D UNAVAIL (amber)	:	If the NAVAID, that is tuned for the selected approach or departure, is not available.
SET OFFSIDE RNG/MODE (amber)	:	Displayed on ND 1(2), in case of an FMGC 1(2) failure when the two ND ranges or modes selected on the EFIS control panels are different.
GPS PRIMARY (white, boxed white)	:	This message appears when GPS PRIMARY mode is available, or has been recovered. The pilot can clear this message by pressing the CLR key on the MCDU.
GPS PRIMARY LOST (amber, boxed white)	:	This message appears when GPS PRIMARY is not available, and not clearable by pilot action.
↓(green)	:	Overflow arrow, displayed when more than one of the following messages are present at the same time: - NAV ACCUR DOWNGRAD (inhibited when the navigation mode is IRS/GPS) - NAV ACCUR UPGRAD (inhibited when the navigation mode is IRS/GPS) - SPECIF VOR-D UNAVAIL - MAP PARTLY DISPLAYED - SET OFFSIDE RNG/MODE - GPS PRIMARY - GPS PRIMARY LOST.

Note: *For information about the TCAS messages: Refer to DSC-34-80-20 TCAS Messages.*

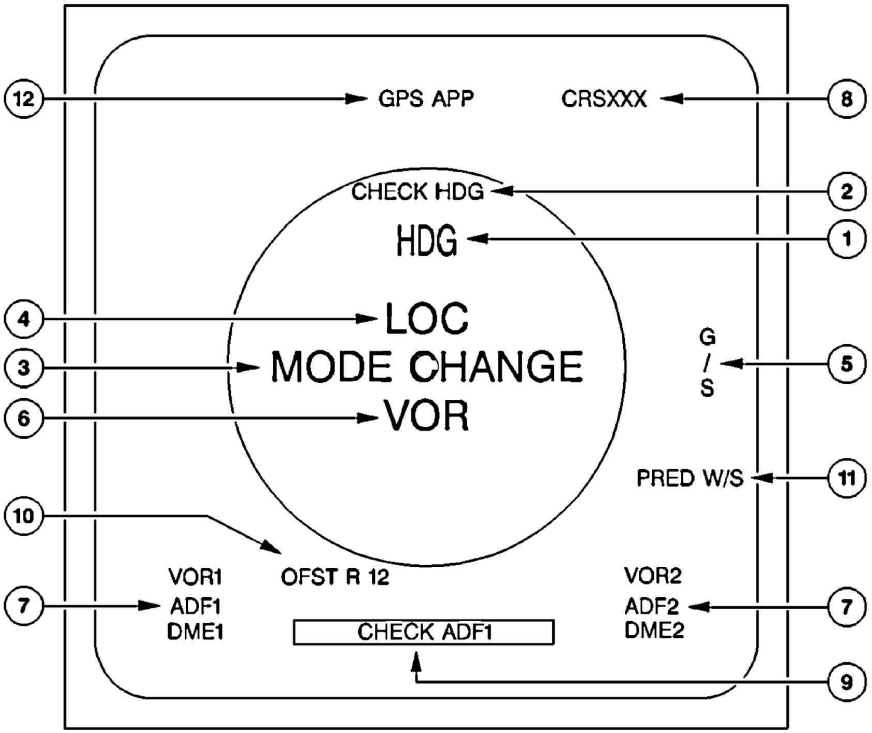
(10) OFST R(L) XX message (yellow)
The screen displays this message, when the flight crew enters a temporary or an offset flight plan.
The offset value is given in NM.

Note: For information about the TCAS messages: Refer to DSC-34-80-20 TCAS Messages.

(11) GPS APP (green)
This message is displayed, when the flight crew selects a GPS approach.

FLAGS AND MESSAGES DISPLAYED ON ND

Applicable to: ALL 321, B-HSJ, B-HSK



(1) HDG Flag (red)
If the heading data fails, the rose, arc and associated symbols disappear.
A HDG flag flashes for 9 s, then remains steady in the upper part of the ND.

(2) CHECK HDG Flag (amber)
When the flight warning computer detects a disagree (5 °) between sides 1 and 2, a CHECK HDG flag appears on both NDs, and a caution appears on the ECAM.

(3) Center Part Messages

- The screen displays a MODE CHANGE message in green if there is a discrepancy between the selected mode on the EFIS control panel and the mode sent from the onside FMGC, or while the DMC is preparing a new page for display
- The screen displays a RANGE CHANGE message in green if there is a discrepancy between the range selected on the EFIS control panel and the range sent from the onside FMGC. A MODE CHANGE message has priority over a RANGE CHANGE message
- The screen displays a MAP NOT AVAIL message in red for several reasons:
  - The MODE CHANGE or RANGE CHANGE message has been displayed more than 6 s, or
  - The FMGC has failed, or
  - The FMGC has delivered an invalid aircraft position.
- The screen displays a W/S SET RNG 10 nm message if a predictive windshear alert is triggered and the range is above 10 nm.
  The message is displayed in the color corresponding to the windshear alert: red for a warning, amber for a caution
- The screen displays a W/S CHANGE MODE message if a predictive windshear alert is triggered and the ND is not in ARC or ROSE mode. The message appears in red for a warning, or amber for a caution.

(4) LOC Flag (red)
If LOC data fails, this flag flashes for 9 s, then remains steady.

(5) G/S Flag (red)
If G/S data fails, this flag flashes for 9 s, then remains steady.

(6) VOR Flag (red)
In ROSE VOR mode, when the VOR bearing is not valid, this flag flashes for 9 s, then remains steady.

(7) VOR 1(2) or ADF 1(2) or DME 1 Flag (red)
If a navigation receiver fails, the appropriate one of these flags flashes for 9 s, then remains steady.

(8) VOR Course Flag
If the VOR course fails, a red CRSXXX flag appears.
If there is non-computed data (NCD), a blue CRS - - - flag appears.

(9) Other messages

MAP PARTLY DISPLAYED (amber)	:	In case of incomplete data transmission between the FMGC (priority criteria) and the DMC, or if the DMC cannot draw the complete MAP. This message is also displayed when a very long leg exists in the flight plan. A leg is considered as "very long" when the starting point (or endpoint) is located at more than 45 ° from the aircraft location (45 ° of longitude or latitude). This DMC limitation results from a compromise between accurate drawing precision and maximum leg length that can be displayed.
NAV ACCUR UPGRAD, or (white) NAV ACCUR DOWNGRAD (amber)	:	Signals a change in navigation accuracy.
SPECIFIC VOR/D UNAVAIL (amber)	:	If the NAVAID, that is tuned for the selected approach or departure, is not available.
SET OFFSIDE RNG/MODE (amber)	:	Displayed on ND 1(2), in case of an FMGC 1(2) failure when the two ND ranges or modes selected on the EFIS control panels are different.
GPS PRIMARY (white, boxed white)	:	This message appears when GPS PRIMARY mode is available, or has been recovered. The pilot can clear this message by pressing the CLR key on the MCDU.
GPS PRIMARY LOST (amber, boxed white)	:	This message appears when GPS PRIMARY is not available, and not clearable by pilot action.
↓(green)	:	Overflow arrow, displayed when more than one of the following messages are present at the same time: - NAV ACCUR DOWNGRAD (inhibited when the navigation mode is IRS/GPS) - NAV ACCUR UPGRAD (inhibited when the navigation mode is IRS/GPS) - SPECIF VOR-D UNAVAIL - MAP PARTLY DISPLAYED - SET OFFSIDE RNG/MODE - GPS PRIMARY - GPS PRIMARY LOST.

Note: For information about the TCAS messages: Refer to DSC-34-80-20 TCAS Messages.

(10) OFST R(L) XX message (yellow)
The screen displays this message, when a temporary or an offset flight plan is entered.
The offset value is given in NM.

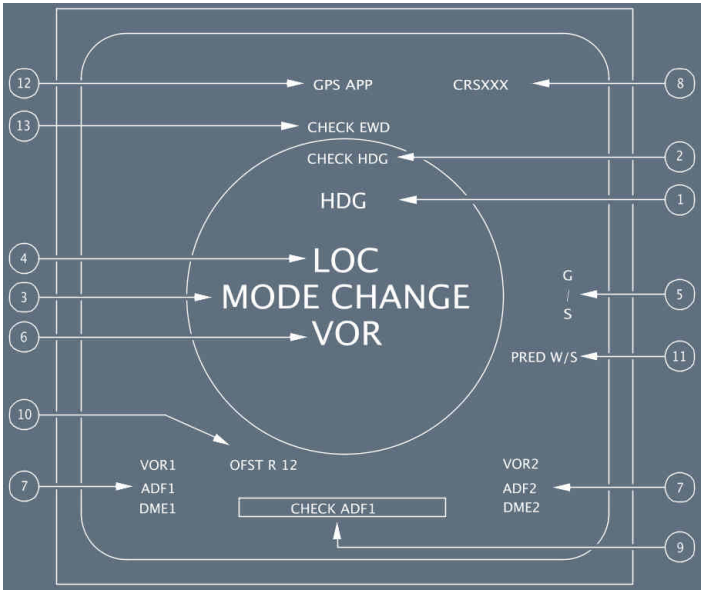
Note: For information about the TCAS messages: Refer to DSC-34-80-20 TCAS Messages.

(11) PRED W/S flag (amber)
The WINDSHEAR sw on the weather radar panel is set to AUTO, and a Predictive Windshear System fault is detected. This message appears on ground, or when flaps and slats are extended.
It is associated with a single chime. The radar image remains available, provided that the fault does not affect the radar mode.

(12) GPS APP (green)
This message is displayed, when a GPS approach has been selected.

FLAGS AND MESSAGES DISPLAYED ON ND

Applicable to: B-HSL, B-HSM, B-HSN



(1) HDG Flag (red)
If the heading data fails, the rose, arc and associated symbols disappear.

A HDG flag flashes for 9 s, then remains steady in the upper part of the ND.

(2) CHECK HDG Flag (amber)
For more information: *Refer to DSC-31-05-60 Side1/Side2 Discrepancy Messages*

(3) Center Part Messages

- The screen displays a MODE CHANGE message in green if there is a discrepancy between the selected mode on the EFIS control panel and the mode sent from the onside FMGC, or while the DMC is preparing a new page for display
- The screen displays a RANGE CHANGE message in green if there is a discrepancy between the range selected on the EFIS control panel and the range sent from the onside FMGC. A MODE CHANGE message has priority over a RANGE CHANGE message
- The screen displays a MAP NOT AVAIL message in red for several reasons:
  - The MODE CHANGE or RANGE CHANGE message has been displayed more than 6 s, or
  - The FMGC has failed, or
  - The FMGC has delivered an invalid aircraft position.
- The screen displays a W/S SET RNG 10 nm message if a predictive windshear alert is triggered and the range is above 10 nm.
  The message is displayed in the color corresponding to the windshear alert: red for a warning, amber for a caution
- The screen displays a W/S CHANGE MODE message if a predictive windshear alert is triggered and the ND is not in ARC or ROSE mode. The message appears in red for a warning, or amber for a caution.

(4) LOC Flag (red)
If LOC data fails, this flag flashes for 9 s, then remains steady.

(5) G/S Flag (red)
If G/S data fails, this flag flashes for 9 s, then remains steady.

(6) VOR Flag (red)
In ROSE VOR mode, when the VOR bearing is not valid, this flag flashes for 9 s, then remains steady.

(7) VOR 1(2) or ADF 1(2) or DME 1 Flag (red)
If a navigation receiver fails, the appropriate one of these flags flashes for 9 s, then remains steady.

(8) VOR Course Flag
If the VOR course fails, a red CRSXXX flag appears.
If there is non-computed data (NCD), a blue CRS - - - flag appears.

(9) Other Messages

MAP PARTLY DISPLAYED (amber)	:	In case of incomplete data transmission between the FMGC (priority criteria) and the DMC, or if the DMC cannot draw the complete MAP. This message is also displayed when a very long leg exists in the flight plan. A leg is considered as "very long" when the starting point (or endpoint) is located at more than 45 ° from the aircraft location (45 ° of longitude or latitude). This DMC limitation results from a compromise between accurate drawing precision and maximum leg length that can be displayed.
NAV ACCUR UPGRAD, or (white) NAV ACCUR DOWNGRAD (amber)	:	Signals a change in navigation accuracy.
SPECIFIC VOR/D UNAVAIL (amber)	:	If the NAVAID, that is tuned for the selected approach or departure, is not available.
SET OFFSIDE RNG/MODE (amber)	:	Displayed on ND 1(2), in case of an FMGC 1(2) failure when the two ND ranges or modes selected on the EFIS control panels are different.
OFFSIDE FM CONTROL (amber)	:	If the offside FM supplies the onside ND.
GPS PRIMARY (white, boxed white)	:	This message appears when GPS PRIMARY mode is available, or has been recovered. The pilot can clear this message by pressing the CLR key on the MCDU.
GPS PRIMARY LOST (amber, boxed white)	:	This message appears when GPS PRIMARY is not available, and not clearable by pilot action.
↓(green)	:	Overflow arrow, displayed when more than one of the following messages are present at the same time: - NAV ACCUR DOWNGRAD - NAV ACCUR UPGRAD - SPECIF VOR-D UNAVAIL - MAP PARTLY DISPLAYED - SET OFFSIDE RNG/MODE - GPS PRIMARY - GPS PRIMARY LOST

Note: *For information about the TCAS messages: Refer to DSC-34-80-20 TCAS Messages.*

(10) OFST R(L) XX message (yellow)
The screen displays this message, when a temporary or an offset flight plan is entered.
The offset value is given in NM.

Note: *For information about the TCAS messages: Refer to DSC-34-80-20 TCAS Messages.*

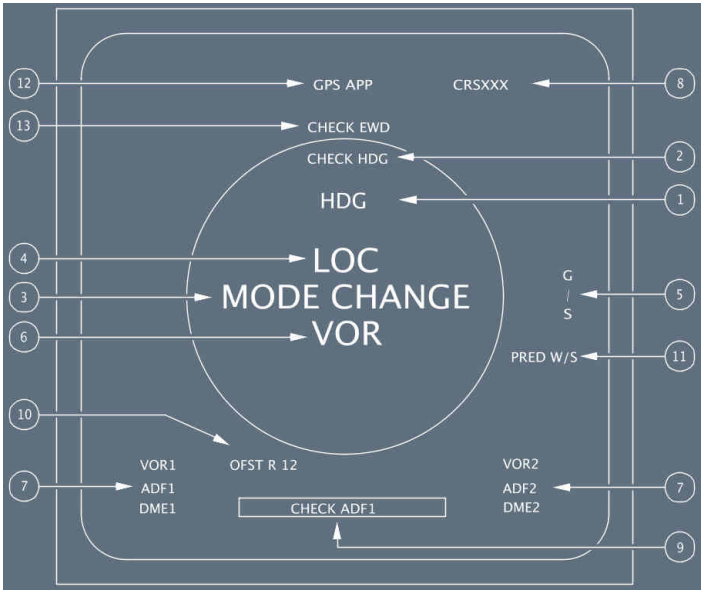
(11) PRED W/S flag (amber)
The WINDSHEAR sw on the weather radar panel is set to AUTO, and a Predictive Windshear System fault is detected. This message appears on ground, or when flaps and slats are extended.
It is associated with a single chime. The radar image remains available, provided that the fault does not affect the radar mode.

(12) GPS message (green)
This message shows the full runway name of the selected approach. It is displayed, when the flight crew selects a GPS approach.

(13) CHECK EWD, CHECK CAPT (F/O) PFD, CHECK SD, CHECK CAPT (F/O) ND (amber)
For more information: *Refer to DSC-31-05-60 Feedback Messages*

FLAGS AND MESSAGES DISPLAYED ON ND

Applicable to: B-HSO, B-HSP



(1) HDG Flag (red)
If the heading data fails, the rose, arc and associated symbols disappear.
A HDG flag flashes for 9 s, then remains steady in the upper part of the ND.

(2) CHECK HDG Flag (amber)
For more information: *Refer to DSC-31-05-60 Side1/Side2 Discrepancy Messages*

(3) Center Part Messages

- The screen displays a MODE CHANGE message in green if there is a discrepancy between the selected mode on the EFIS control panel and the mode sent from the onside FMGC, or while the DMC is preparing a new page for display
- The screen displays a RANGE CHANGE message in green if there is a discrepancy between the range selected on the EFIS control panel and the range sent from the onside FMGC. A MODE CHANGE message has priority over a RANGE CHANGE message

- The screen displays a MAP NOT AVAIL message in red for several reasons:
  - The MODE CHANGE or RANGE CHANGE message has been displayed more than 6 s, or
  - The FMGC has failed, or
  - The FMGC has delivered an invalid aircraft position.
- The screen displays a W/S SET RNG 10 nm message if a predictive windshear alert is triggered and the range is above 10 nm.
  The message is displayed in the color corresponding to the windshear alert: red for a warning, amber for a caution
- The screen displays a W/S CHANGE MODE message if a predictive windshear alert is triggered and the ND is not in ARC or ROSE mode. The message appears in red for a warning, or amber for a caution.

(4) LOC Flag (red)
If LOC data fails, this flag flashes for 9 s, then remains steady.

(5) G/S Flag (red)
If G/S data fails, this flag flashes for 9 s, then remains steady.

(6) VOR Flag (red)
In ROSE VOR mode, when the VOR bearing is not valid, this flag flashes for 9 s, then remains steady.

(7) VOR 1(2) or ADF 1(2) or DME 1 Flag (red)
If a navigation receiver fails, the appropriate one of these flags flashes for 9 s, then remains steady.

(8) VOR Course Flag
If the VOR course fails, a red CRSXXX flag appears.
If there is non-computed data (NCD), a blue CRS - - - flag appears.

(9) Other messages

MAP PARTLY DISPLAYED (amber)	:	In case of incomplete data transmission between the FMGC (priority criteria) and the DMC, or if the DMC cannot draw the complete MAP. This message is also displayed when a very long leg exists in the flight plan. A leg is considered as “very long” when the starting point (or endpoint) is located at more than 45 ° from the aircraft location (45 ° of longitude or latitude). This DMC limitation results from a compromise between accurate drawing precision and maximum leg length that can be displayed.

NAV ACCUR UPGRAD, or (white) NAV ACCUR DOWNGRAD (amber)	:	Signals a change in navigation accuracy.
SPECIFIC VOR/D UNAVAIL (amber)	:	If the NAVAID, that is tuned for the selected approach or departure, is not available.
BACK-UP NAV (amber)	:	If the MCDU back-up navigation mode is activated (*Refer to DSC-22_10-40-10 MCDU - MCDU Interface*)
SET OFFSIDE RNG/MODE (amber)	:	Displayed on ND 1(2), in case of an FMGC 1(2) failure when the two ND ranges or modes selected on the EFIS control panels are different.
OFFSIDE FM CONTROL (amber)	:	If the offside FM supplies the onside ND.
GPS PRIMARY (white, boxed white)	:	This message appears when GPS PRIMARY mode is available, or has been recovered. The pilot can clear this message by pressing the CLR key on the MCDU.
GPS PRIMARY LOST (amber, boxed white)	:	This message appears when GPS PRIMARY is not available, and not clearable by pilot action.
↓(green)	:	Overflow arrow, displayed when more than one of the following messages are present at the same time: - NAV ACCUR DOWNGRAD - NAV ACCUR UPGRAD - SPECIF VOR-D UNAVAIL - MAP PARTLY DISPLAYED - SET OFFSIDE RNG/MODE - GPS PRIMARY - GPS PRIMARY LOST

Note: *For information about the TCAS messages: Refer to DSC-34-80-20 TCAS Messages.*

(10) OFST R(L) XX message (yellow)
The screen displays this message, when a temporary or an offset flight plan is entered. The offset value is given in NM.

Note: *For information about the TCAS messages: Refer to DSC-34-80-20 TCAS Messages.*

(11) PRED W/S flag (amber)
The WINDSHEAR sw on the weather radar panel is set to AUTO, and a Predictive Windshear System fault is detected. This message appears on ground, or when flaps and slats are extended.

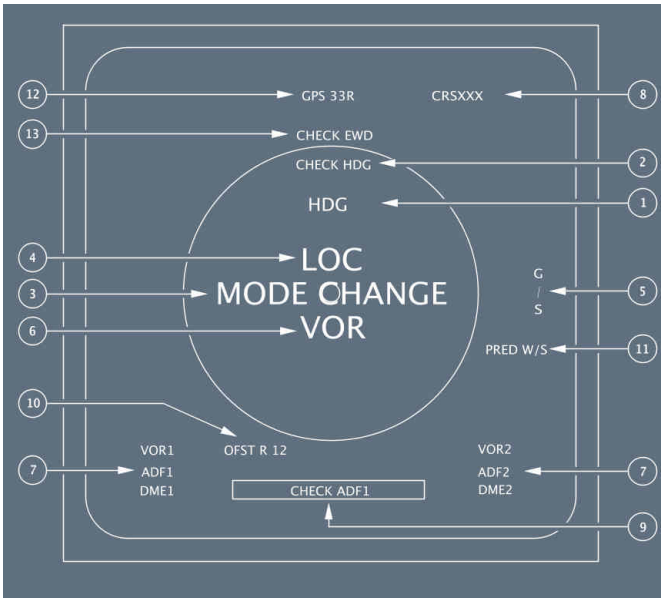
It is associated with a single chime. The radar image remains available, provided that the fault does not affect the radar mode.

(12) GPS message (green)
This message shows the full runway name of the selected approach. It is displayed, when the flight crew selects a GPS approach.

(13) CHECK EWD, CHECK CAPT (F/O) PFD, CHECK SD, CHECK CAPT (F/O) ND (amber)
For more information: *Refer to DSC-31-05-60 Feedback Messages*

FLAGS AND MESSAGES DISPLAYED ON ND

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU



(1) HDG Flag (red)
If the heading data fails, the rose, arc and associated symbols disappear.
A HDG flag flashes for 9 s, then remains steady in the upper part of the ND.

(2) CHECK HDG Flag (amber)
For more information: *Refer to DSC-31-05-60 Side1/Side2 Discrepancy Messages*

(3) Center Part Messages

- The screen displays a MODE CHANGE message in green if there is a discrepancy between the selected mode on the EFIS control panel and the mode sent from the onside FMGC, or while the DMC is preparing a new page for display
- The screen displays a RANGE CHANGE message in green if there is a discrepancy between the range selected on the EFIS control panel and the range sent from the onside FMGC. A MODE CHANGE message has priority over a RANGE CHANGE message
- The screen displays a MAP NOT AVAIL message in red for several reasons:
  - The MODE CHANGE or RANGE CHANGE message has been displayed more than 6 s, or
  - The FMGC has failed, or
  - The FMGC has delivered an invalid aircraft position.
- The screen displays a W/S SET RNG 10 nm message if a predictive windshear alert is triggered and the range is above 10 nm.
  The message is displayed in the color corresponding to the windshear alert: red for a warning, amber for a caution
- The screen displays a W/S CHANGE MODE message if a predictive windshear alert is triggered and the ND is not in ARC or ROSE mode. The message appears in red for a warning, or amber for a caution.

(4) LOC Flag (red)
If LOC data fails, this flag flashes for 9 s, then remains steady.

(5) G/S Flag (red)
If G/S data fails, this flag flashes for 9 s, then remains steady.

(6) VOR Flag (red)
In ROSE VOR mode, when the VOR bearing is not valid, this flag flashes for 9 s, then remains steady.

(7) VOR 1(2) or ADF 1(2) or DME 1 Flag (red)
If a navigation receiver fails, the appropriate one of these flags flashes for 9 s, then remains steady.

(8) VOR Course Flag
If the VOR course fails, a red CRSXXX flag appears.
If there is non-computed data (NCD), a blue CRS - - - flag appears.

(9) Other messages

MAP PARTLY DISPLAYED (amber)	:	In case of incomplete data transmission between the FMGC (priority criteria) and the DMC, or if the DMC cannot draw the complete MAP. This message is also displayed when a very long leg exists in the flight plan. A leg is considered as “very long” when the starting point (or endpoint) is located at more than 45 ° from the aircraft location (45 ° of longitude or latitude). This DMC limitation results from a compromise between accurate drawing precision and maximum leg length that can be displayed.
NAV ACCUR UPGRAD, or (white) NAV ACCUR DOWNGRAD (amber)	:	Signals a change in navigation accuracy.
SPECIFIC VOR/D UNAVAIL (amber)	:	If the NAVAID, that is tuned for the selected approach or departure, is not available.
BACK-UP NAV (amber)	:	If the MCDU back-up navigation mode is activated (*Refer to DSC-22_10-40-10 MCDU - MCDU Interface*)
SET OFFSIDE RNG/MODE (amber)	:	Displayed on ND 1(2), in case of an FMGC 1(2) failure when the two ND ranges or modes selected on the EFIS control panels are different.
OFFSIDE FM CONTROL (amber)	:	If the offside FM supplies the onside ND.
GPS PRIMARY (white, boxed white)	:	This message appears when GPS PRIMARY mode is available, or has been recovered. The pilot can clear this message by pressing the CLR key on the MCDU.
GPS PRIMARY LOST (amber, boxed white)	:	This message appears when GPS PRIMARY is not available, and not clearable by pilot action.
↓(green)	:	Overflow arrow, displayed when more than one of the following messages are present at the same time: - NAV ACCUR DOWNGRAD - NAV ACCUR UPGRAD - SPECIF VOR-D UNAVAIL - MAP PARTLY DISPLAYED - SET OFFSIDE RNG/MODE - GPS PRIMARY - GPS PRIMARY LOST

Note: For information about the TCAS messages: Refer to DSC-34-80-20 TCAS Messages.

(10) OFST R(L) XX message (yellow)
The screen displays this message, when a temporary or an offset flight plan is entered.
The offset value is given in NM.

Note: For information about the TCAS messages: Refer to DSC-34-80-20 TCAS Messages.

(11) PRED W/S flag (amber)
The WINDSHEAR sw on the weather radar panel is set to AUTO, and a Predictive Windshear System fault is detected. This message appears on ground, or when flaps and slats are extended.
It is associated with a single chime. The radar image remains available, provided that the fault does not affect the radar mode.

(12) GPS message (green)
This message shows the full runway name of the selected approach. It is displayed, when the flight crew selects a GPS approach.

(13) CHECK EWD, CHECK CAPT (F/O) PFD, CHECK SD, CHECK CAPT (F/O) ND (amber)
For more information: *Refer to DSC-31-05-60 Feedback Messages*

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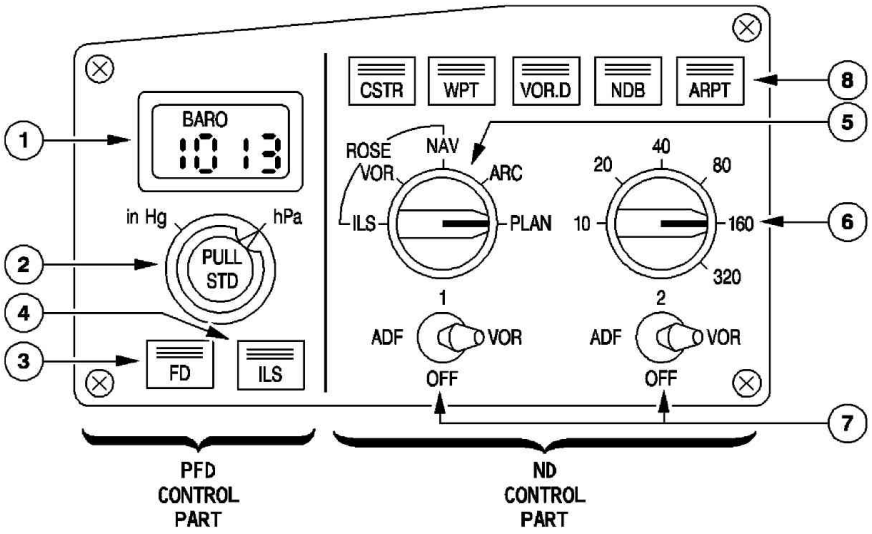
EFIS CONTROL PANEL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



(1) Barometer Reference Display Window

Range : 745 hPa to 1 050 hPa.

(2) Barometer Reference Selector

a. Outer ring : For selection of the units for the barometer reference-either hectoPascals or inches of mercury.

Note: The unit selected does not appear on the PFD.

b. Inner knob : For selection of the reference value displayed in the barometer reference display window and on the PFD below the altitude scale.

At FCU initialization, the window displays 1 013 or 29.92, depending on the unit selected.

- Pulling the knob selects the standard BARO reference setting. The PFD then displays "STD." (Rotating the knob has no effect.)
- Pushing the knob from the STD position makes the last selected QNH BARO setting displayed.

(3) FD Pushbutton
Pushing this button removes the FD bars from the associated PFD (or removes the flight path director symbol if the TRK FPA reference is selected).
The pushbutton light goes out.
Pushing it again restores the FD bars (or the FPD symbol) and the green pushbutton light comes on.

(4) ILS Pushbutton
Pushing this button displays the localizer and glide slope scales on the PFD.
Deviation symbols appear if there is a valid ILS signal.
The green pushbutton light comes on.

(5) Mode Select Switch
This switch selects a navigation display for the onside ND.

(6) Range Select Switch
This switch selects a range scale for the onside ND.

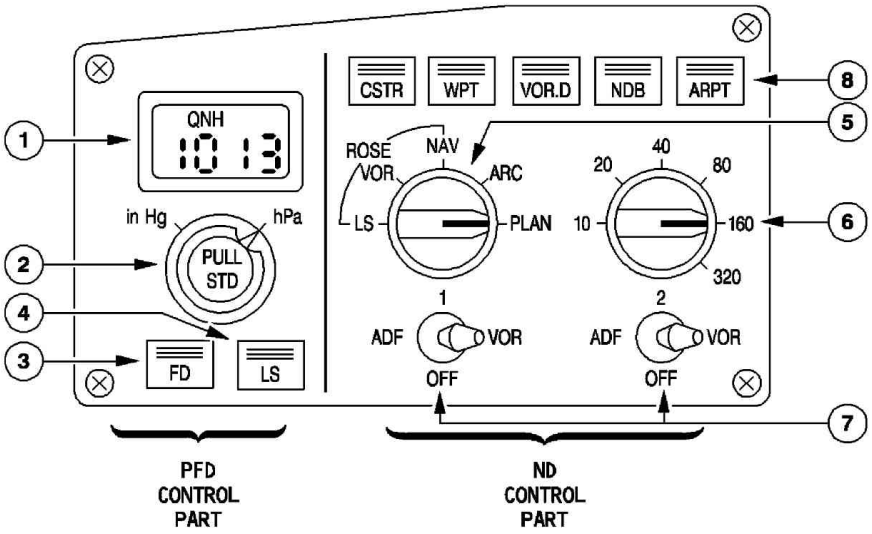
Note: If the mode or the range data fails, the default selection is the ROSE NAV mode and 80 nm range.

(7) ADF-VOR Select Switches
These switches select ADF or VOR bearing pointers and DME distance on the onside ND, as well as the corresponding NAVAID data characteristics in any mode except PLAN mode.

(8) Optional Data Display Pushbutton
Pushing this button displays optional data in addition to the data permanently displayed in PLAN, ARC, or ROSE NAV modes. The green pushbutton light comes on.
Only one option can be activated at a time.

EFIS CONTROL PANEL

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



(1) Barometer Reference Display Window

Range : 745 hPa to 1 100 hPa.

(2) Barometer Reference Selector

a. Outer ring : For selection of the units for the barometer reference-either hectoPascals or inches of mercury.

Note: The unit selected does not appear on the PFD.

b. Inner knob : For selection of the reference value displayed in the barometer reference display window and on the PFD below the altitude scale.

At FCU initialization, the window displays 1 013 or 29.92, depending on the unit selected.

- Pulling the knob selects the standard BARO reference setting. The PFD then displays "STD." (Rotating the knob has no effect.)
- Pushing the knob from the STD position makes the last selected QNH BARO setting available.

(3) FD Pushbutton
Pushing this button removes the FD bars from the associated PFD (or removes the flight path director symbol if the TRK FPA reference is selected).
The pushbutton light goes out.
Pushing it again restores the FD bars (or the FPD symbol) and the green pushbutton light comes on.

(4) LS Pushbutton
Pushing this button displays the localizer and glide slope scales on the PFD.
Deviation symbols appear if there is a valid ILS signal.
The green pushbutton light comes on.

(5) Mode Select Switch
This switch selects a navigation display for the onside ND.

(6) Range Select Switch
This switch selects a range scale for the onside ND.

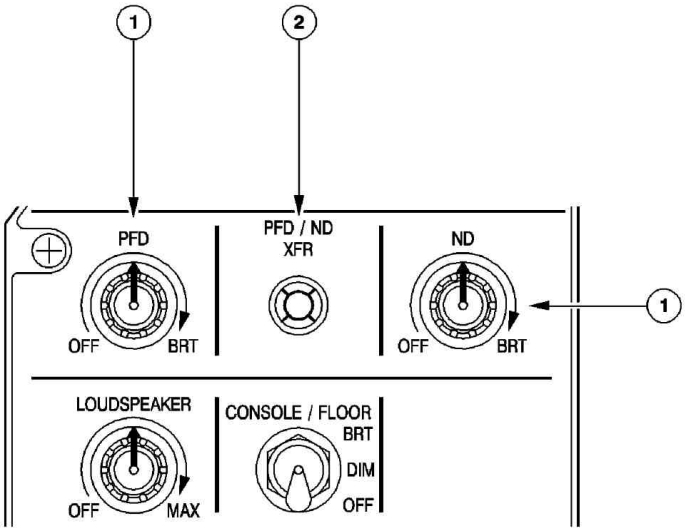
Note: If the mode or the range data fails, the default selection is the ROSE NAV mode and 80 nm range.

(7) ADF-VOR Select Switches
These switches select ADF or VOR bearing pointers and DME distance on the onside ND, as well as the corresponding NAVAID data characteristics in any mode except PLAN mode.

(8) Optional Data Display Pushbutton
Pushing this button displays optional data in addition to the data permanently displayed in PLAN, ARC, or ROSE NAV modes. The green pushbutton light comes on.
Only one option can be activated at a time.

OTHER EFIS CONTROLS

Applicable to: ALL



(1) OFF/BRT knobs

- These knobs turn the PFD and ND display units on and off, and control their brightness.
- The display brightness adjusts automatically for changing light conditions, and is also adjusted manually.

PFD Brightness Control Knob

Rotating this knob all the way counterclockwise switches off the PFD. In this case, the PFD image is automatically displayed on the NDU, but the pilot may recover the ND by means of the PFD-ND XFR pushbutton .

ND Brightness Control Knob

The outer knob controls the brightness of both the weather radar image and EGPWS terrain display.

The inner knob controls the general brightness of the ND symbols.

Rotating this knob all the way counterclockwise switches off the NDU.

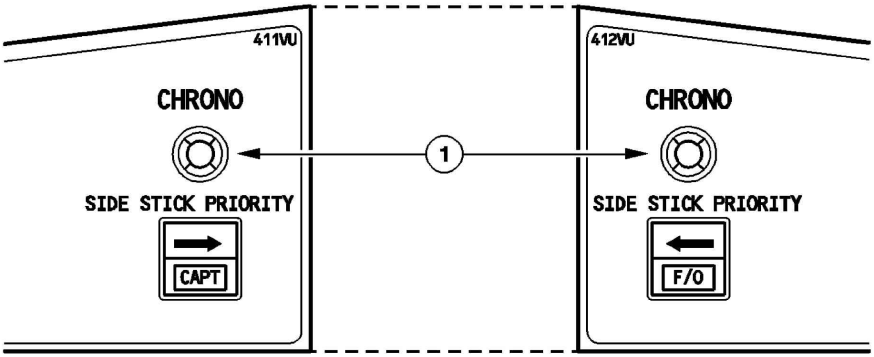
(2) PFD/ND Pushbutton

Pushing this button interchanges the PFD and the ND.

If the PFDU fails, the PFD automatically transfers to the NDU.

CHRONOMETER

Applicable to: ALL



(1) CHRONO Pushbutton
Pushing this button displays chronometer time on the onside ND.
Pushing it again freezes the displayed value.
Pushing it a third time resets the chronometer, and the chronometer time disappears from the display.

GENERAL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

A fully independent clock is on the right side of the control panel.
It sends time to the centralized fault data interface unit, the flight data interface unit, and the flight management and guidance computer.
The clock has two electrical supplies, one of which is a direct connection to the aircraft battery hot bus.
The clock also has an internal battery that allows it to memorize time (for up to 50 h) if the aircraft battery is removed.

The clock performs four functions :
- It displays “UTC” (GMT) time in hours and minutes on the center counter.
- It displays elapsed time (ET) (from engine startup) in hours and minutes on the lower counter.
- It drives the chronometer (CHR), which measures a time interval (from the pushing of the CHRONO button) in minutes and seconds and displays it with a needle and in numbers on the upper counter.
- It can replace the UTC with the date.

GENERAL

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

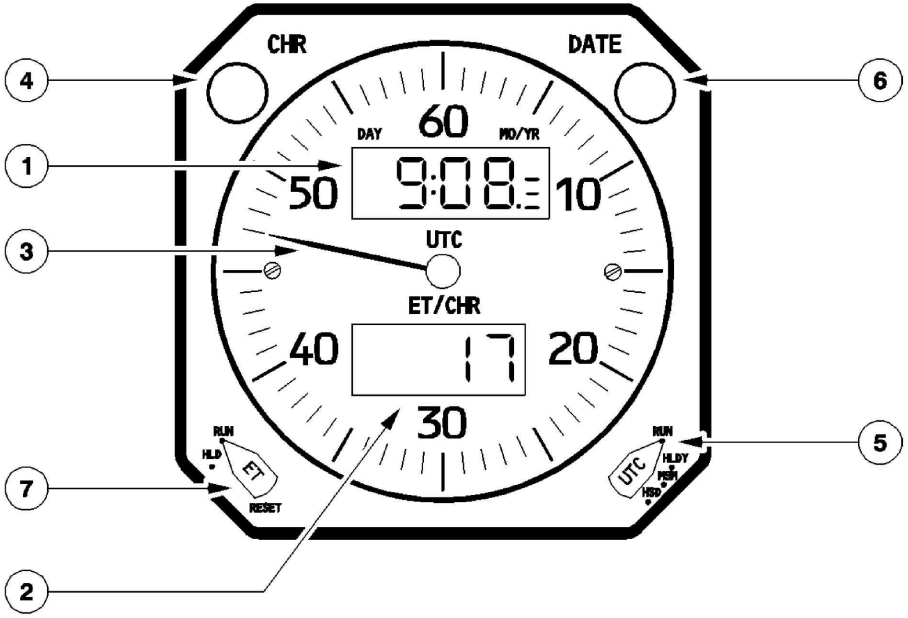
A fully independent clock is on the right side of the control panel.
It sends time to the centralized fault data interface unit, the flight data interface unit, and the flight management and guidance computer.
The clock has two electrical supplies, one of which is a direct connection to the aircraft battery hot bus.

The clock performs four functions :
- It displays “UTC” (GMT) time in hours, minutes and seconds on the center counter.
- It displays elapsed time (ET) (from engine startup) in hours and minutes on the lower counter.
- It drives the chronometer (CHR), which measures a time interval (from the pushing of the CHRONO button) in minutes and seconds.
- It can replace the UTC with the date.

Intentionally left blank

GENERAL

Applicable to: B-HSG



(1) UTC (GMT) counter
This counter displays the present time in 24 h format.

A trend indicator, which divides a minute into four 15 s periods, uses three horizontal marks :

From 0 to 14 s	No mark is lighted.
From 15 to 29 s	The highest mark is lighted.
From 30 to 44 s	The two highest marks are lighted.
From 45 to 59 s	All the three marks are lighted.

(2) Elapsed Time (ET) and chrono counter (CHR)
This counter registers the elapsed time up to 99 h and 59 min.

(3) CHR needle
This needle ticks off chronograph seconds.
It is controlled by the CHR pushbutton.

(4) CHR pushbutton

First push : starts the second needle and the ET/CHR minute display.

Second push : stops the second needle and sums up the minutes in the ET/CHR display.

Third push : resets the second needle to zero and erases the ET/CHR display.

(5) UTC (GMT) selector

«RUN»	**STARTS THE UTCCOUNTER**	
	TIME MODE	**DATE MODE**(1)
«HLDY»	STOPS UTC COUNTER	TO ADVANCE YEARS FOR SETTING
«MSM»	TO ADVANCE MINUTES FOR SETTING	TO ADVANCE MONTHS FOR SETTING
«HSD»	TO ADVANCE HOURS FOR SETTING	TO ADVANCE DAYS FOR SETTING

(1) Press the date pushbutton to switch the clock to date mode.

(6) DATE pushbutton

First push : sets the clock to date mode. The date (day, month, year) replaces the UTC time display.

Second push : sets the clock to time mode. The date display disappears.

Note: in order to select the date mode, the UTC selector must be set to RUN.

(7) ET (elapsed time) selector

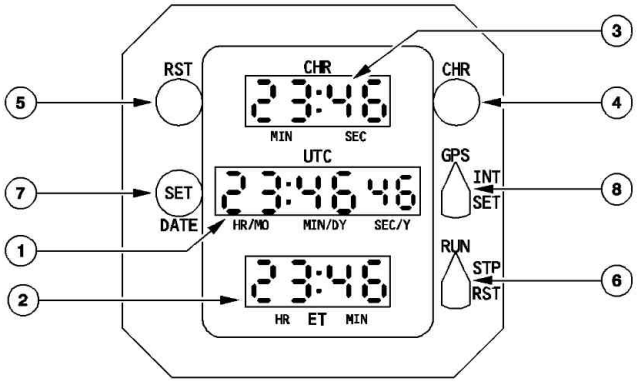
"RUN" position : starts the ET counter.

"HLD" position : stops the counter, keeps the display at its last indication.

"RESET" position : resets counter to zero (transient position).

GENERAL

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



(1) UTC (GMT) counter
This counter displays the present time in 24 h format from 0 to 23 h 59 min 59 s.

(2) Elapsed Time (ET)
This counter registers the elapsed time up to 99 h and 59 min.

(3) Chrono (CHR) counter
This Counter registers elapsed time from 0 to 99 min 59 s. It is controlled by the CHR pushbutton.

(4) CHR pushbutton

First push : starts the CHR counter

Second push : stops the CHR counter, keeps the display at its last indication.

(5) Reset (RST) pushbutton
When pressed, the CHR counter restarts from 0 if the chrono is running.

(6) ET selector

"RUN" : the ET counter starts

"STP" : the ET counter stops counting

spring loaded "RST" : the ET counter is blanked. The selector returns to its STP position when the selector is released.

Note: *A cumulative elapsed time can be realized by alternatively setting this switch in "RUN" and "STP" position.*

(7) DATE/SET pushbutton

First push : sets the clock to date mode. The UTC time display is replaced by the date (day month year).

Second push : sets the clock to time mode. The date display disappears.

Note: *in order to select the date mode, the UTC selector must be set on "GPS"or "INT" position.*

(8) UTC selector

"GPS" : Time (or date, if selected) is displayed, and this data is synchronized on GPS information.

Note:
- *If the signal between the GPS and the clock is not detected, dashes are displayed. Only the "INT" and "SET" positions are then available.*
- *If the signal is detected, but GPS data is invalid, the clock automatically runs on its internal time.*
- *The clock will automatically resynchronize on the GPS information, as soon as the GPS data becomes available.*

"INT" : Internal time (or date, if selected) is displayed.

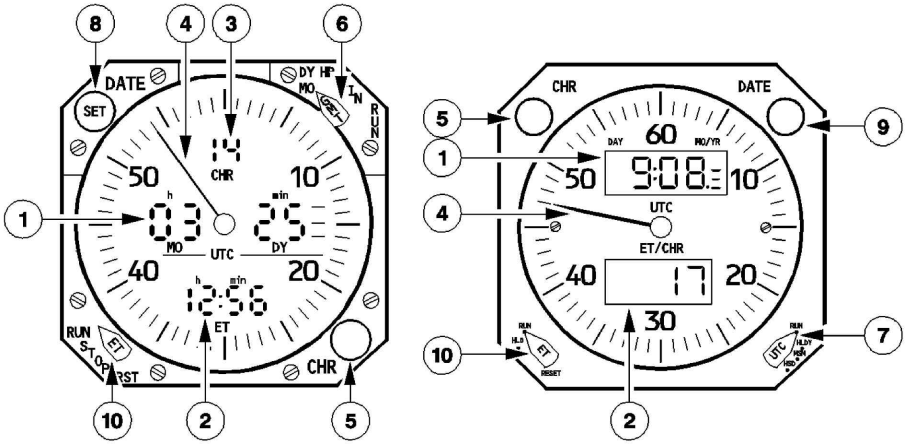
Note:
- *The clock's internal time is initialized with the latest valid GPS information.*
- *If there is no valid GPS information at power up, the internal time will be 00:00:00, until the clock is initialized.*

"SET" : Allows the internal time and date to be initialized.

GENERAL

Applicable to: B-HSD, B-HSE, B-HSI, B-HTD, B-HTE, B-HTF

Either of the following clocks may be installed.



(1) UTC (GMT) counter

This counter displays the present time in 24 h format.

A trend indicator, which divides a minute into four 15 s periods, uses three horizontal marks :

From 0 to 14 s	No mark is lighted.
From 15 to 29 s	The highest mark is lighted.
From 30 to 44 s	The two highest marks are lighted.
From 45 to 59 s	All the three marks are lighted.

(2) Elapsed Time (ET) and chrono counter (CHR)

This counter registers the elapsed time up to 99 h and 59 min.

(3) Chrono (CHR) counter

This Counter registers the elapsed time up to 59 min. It is controlled by the CHR pushbutton.

(4) CHR needle

This needle ticks off chronograph seconds.
It is controlled by the CHR pushbutton.

(5) CHR pushbutton

First push	:	starts the second needle and the minute (or ET/CH) display.
Second push	:	stops the second needle and sums up the minutes in the minute (or ET/CH) display.
Third push	:	resets the second needle to zero and erases the minute (or ET/CH) display.

(6) UTC (GMT) selector

"MO" : sets months and years

"DY" : sets days

"HR" : sets hours

"MIN" : sets minutes

"RUN": starts the UTC counter

Note: Push and turn the selector to switch from MIN to RUN.

(7) UTC (GMT) selector

«RUN»	**STARTS THE UTCCOUNTER**	
	TIME MODE	**DATE MODE**(1)
«HLDY»	STOPS UTC COUNTER	TO ADVANCE YEARS FOR SETTING
«MSM»	TO ADVANCE MINUTES FOR SETTING	TO ADVANCE MONTHS FOR SETTING
«HSD»	TO ADVANCE HOURS FOR SETTING	TO ADVANCE DAYS FOR SETTING

(1) Press the date pushbutton to switch the clock to date mode.

(8) SET pushbutton

Sets the MO, DY, HR, MIN as selected by the UTC selector.
To increase the quantity, turn the button either way.
To decrease the quantity, push the button lightly.

(9) DATE pushbutton

First push : sets the clock to date mode. The date (day, month, year) replaces the UTC time display.

Second push : sets the clock to time mode. The date display disappears.

Note: in order to select the date mode, the UTC selector must be set to RUN.

(10) ET (elapsed time) selector

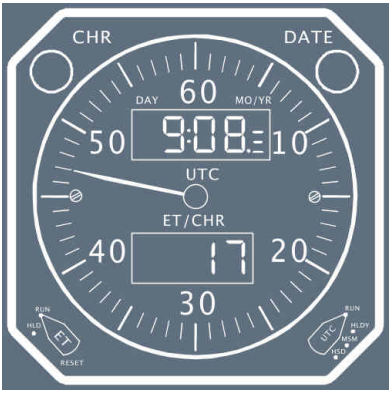
"RUN" position : starts the ET counter.

"STOP" or "HLD" position: stops the counter, keeps the display at its last indication.

"RST" or "RESET" position : resets counter to zero (transient position).

UPDATING OF THE SMITH CLOCK

Applicable to: B-HSD, B-HSE, B-HSI, B-HTD, B-HTE, B-HTF



UPDATING OF DAY, MONTH AND YEAR

Press the DATE pushbutton to set the date mode. The day, month and year appear.

- To advance the day, turn and maintain the UTC selector at the MSD position until the proper day appears.
- For month and year proceed in the same way, using MSM to advance month or HLDY to advance years.

Note: To return to normal functioning, switch the UTC selector to RUN position.

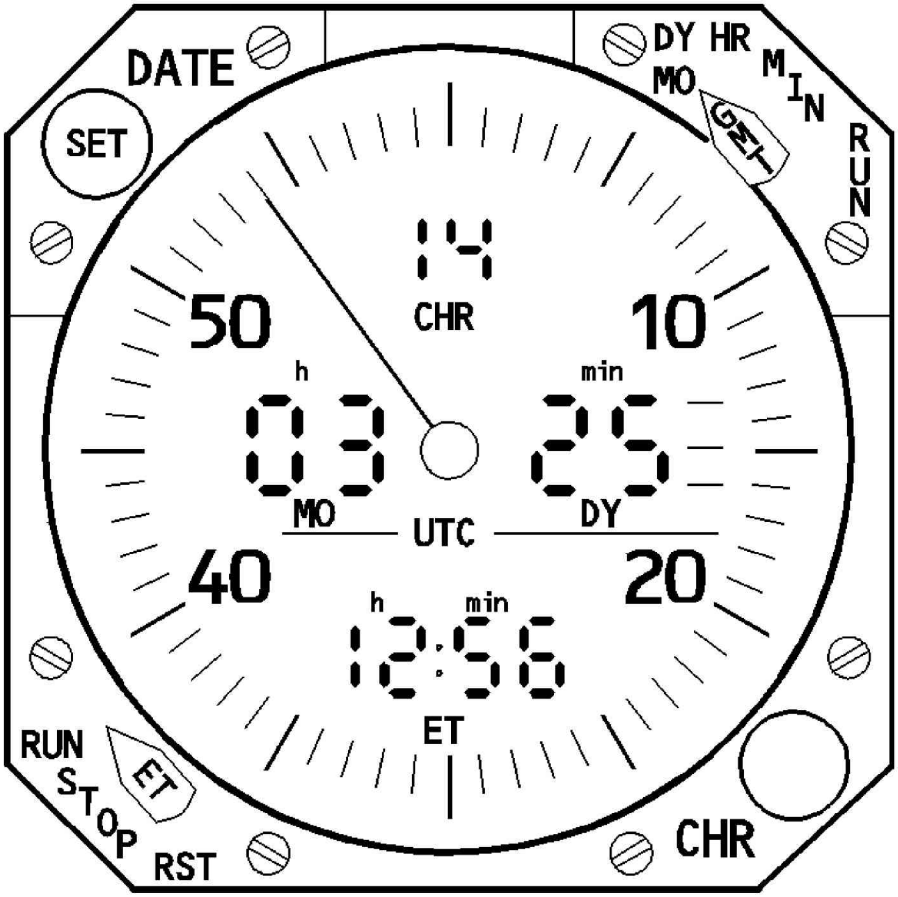
UPDATING OF HOUR AND MINUTE

Use the same procedure in time mode for changing hour and minute. To advance the minute turn the UTC selector to MSM and to HSD for the hour.

Note: To return to normal function, switch the UTC selector to "RUN."

UPDATING OF THE SEXTANT CLOCK

Applicable to: B-HSD, B-HSE, B-HSI, B-HTD, B-HTE, B-HTF



UPDATING MONTH, YEAR

Set the UTC selector on MO. The month and the year appear.

- To advance the month, turn the SET pushbutton until the proper month appears.
- To decrement the month, press the SET pushbutton.
- The year changes automatically when the month changes between 12 and 1.

UPDATING DAY, HOUR, MINUTE

Use the procedure for changing day, hour and minute after selecting the appropriate position for the UTC selector.

Note: To return to normal function, switch the UTC selector to "RUN."

INTERNAL TIME AND DATE INITIALIZATION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

Set the UTC selector on "SET". The minute digits flash, and the seconds' digits are blank.
To increase data, turn the DATE/SET button clockwise.
To decrease data, turn the DATE/SET button counterclockwise.

- First, push on DATE/SET : To set the hour.
- Second, push on DATE/SET : To set the year.
- Third, push on DATE/SET : To set the month.
- Fourth, push on DATE/SET : To set the day.

Switch the UTC selector to the "INT" position, and the clock starts with the seconds' digits at 00.

Note: This process must be completed in less than one minute. Otherwise, it will be necessary to reset the CFDS in order to synchronize the lower ECAM time display with the cockpit clock display. Resetting the CFDS is a maintenance operation.

UPDATING OF DAY, MONTH AND YEAR

Applicable to: B-HSG

Press the DATE pushbutton to set the date mode. The day, month and year appear.

- To advance the day, turn and maintain the UTC selector at the MSD position until the proper day appears.
- For month and year proceed in the same way, using MSM to advance month or HLDY to advance years.

Note: To return to normal functioning, switch the UTCselector to RUN position.

UPDATING OF HOUR AND MINUTE

Applicable to: B-HSG

Use the same procedure in time mode for changing hour and minute. To advance the minute turn the UTC selector to MSM and to HSD for the hour.

Note: To return to normal functioning, switch the UTC selector to RUN position.

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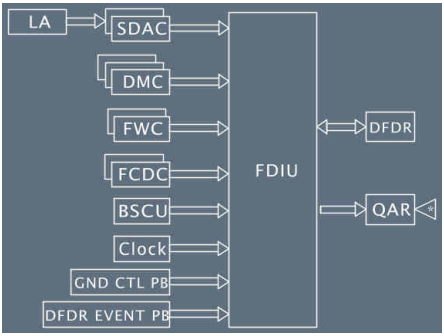
DESCRIPTION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG

The Flight Data Recording System, which records the mandatory parameters, consists of the following components:

- A Flight Data Interface Unit (FDIU)
- A Digital Flight Data Recorder (DFDR)
- A three-axis Linear Accelerometer (LA)

The FDIU collects and processes parameters from the SDACs, DMCs, FWCs, FCDCs, BSCU, the DFDR event pushbutton, the GND CTL pushbutton and the Clock.
It stores the mandatory flight parameters in the DFDR.
The DFDR can store the last 25 h data, at least. It stores this data on a fireproof and shockproof device. An underwater locator beacon is attached to the DFDR.
The linear accelerometer measures the acceleration of the aircraft along each of the three axes.
The QAR is an operational recorder that stores the same data as the DFDR. However the QAR is more accessible for the maintenance crew.



The recording system is automatically active :

- On the ground, during the first five minutes after the aircraft electric network is energized.
- On the ground, after the first engine start.
- In flight (whether the engines are running or not).

On the ground, the recording system stops automatically five minutes after the second engine shuts down.
On the ground, the crew can start the recording system manually by pressing the GND CTL pushbutton.

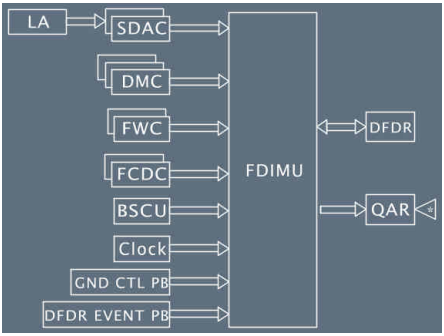
DESCRIPTION

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTH, B-HTI

The Flight Data Recording System, which records the mandatory parameters, consists of the following components:

- A Flight Data Interface and Management Unit (FDIMU)
- A Digital Flight Data Recorder (DFDR)
- A three-axis Linear Accelerometer (LA)

The FDIMU collects and processes parameters from the SDACs, DMCs, FWCs, FCDCs, BSCU, the DFDR event pushbutton, the GND CTL pushbutton and the Clock.
It stores the mandatory flight parameters in the DFDR.
The DFDR can store the last 25 h data, at least. It stores this data on a fireproof and shockproof device. An underwater locator beacon is attached to the DFDR.
The linear accelerometer measures the acceleration of the aircraft along each of the three axes.
The QAR is an operational recorder that stores the same data as the DFDR. However the QAR is more accessible for the maintenance crew.



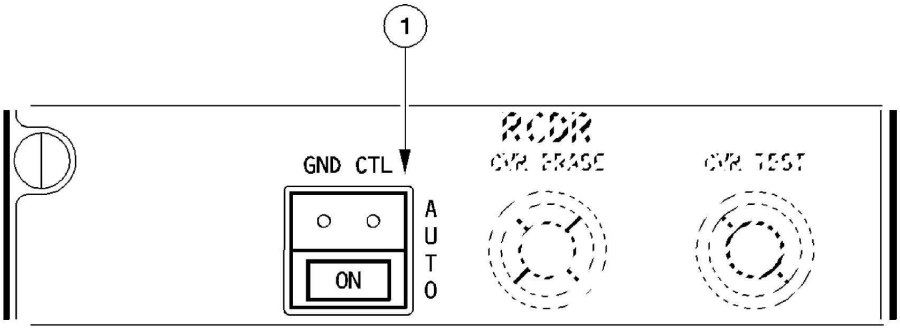
The recording system is automatically active :

- On the ground, during the first five minutes after the aircraft electric network is energized.
- On the ground, after the first engine start.
- In flight (whether the engines are running or not).

On the ground, the recording system stops automatically five minutes after the second engine shuts down.
On the ground, the crew can start the recording system manually by pressing the GND CTL pushbutton.

OVERHEAD PANEL

Applicable to: ALL



(1) GND CTL pushbutton (springloaded)

ON : The Cockpit Voice Recorder (CVR) and the Flight Data Recorders are active. The ON light is on.

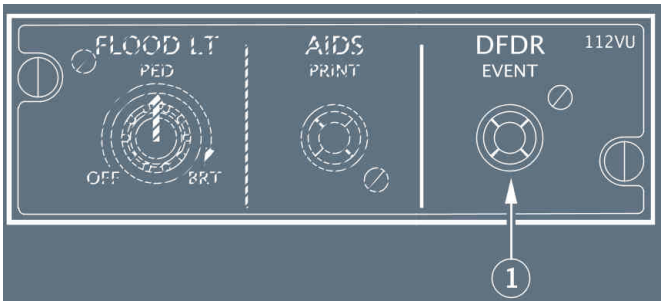
AUTO : The Cockpit Voice Recorder (CVR) and the Flight Data Recorders are active, according to the logic.

The system automatically switches from ON to AUTO at the first engine start, and also in case of an electrical transient.

PEDESTAL

Applicable to: ALL

1



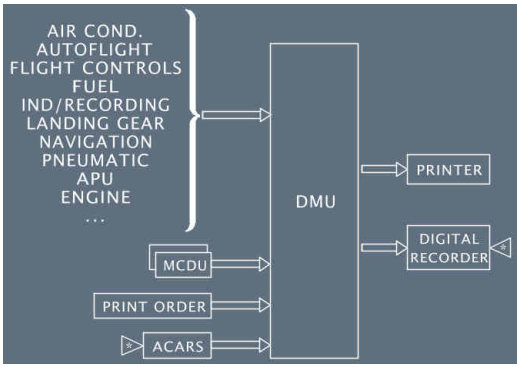
(1) DFDR EVENT pushbutton

Pressing this button (briefly) sets an event mark on the Flight Data records.

DESCRIPTION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG

The AIDS is used to monitor various aircraft system parameters in order to make maintenance easier and to allow formulating operational recommendations.
The AIDS can generate system reports. The Airbus Standard Reports are preprogrammed reports available at aircraft delivery. The operator can create its own reports.
The AIDS consists of a Data Managements Unit (DMU) connected as shown below.
The system may be programmed using the MCDUs. The crew can select any report to be displayed on the MCDUs.
The Printer prints the flight phase programmed reports or any report selected on the MCDU.
This printing may be automatic or in response to the AIDS PRINT pushbutton.
The AIDS may send automatic reports via ACARS ◁ .
An optional Digital Recorder may be installed to extend the recording capacity.

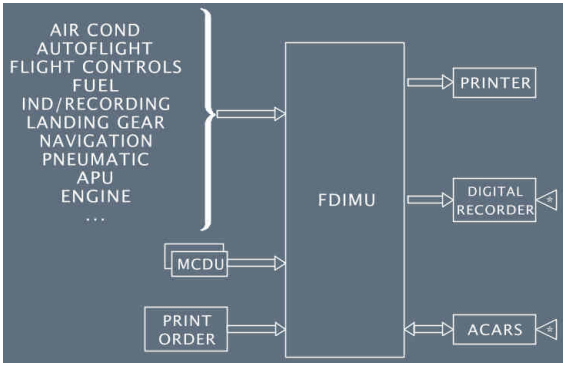


DESCRIPTION

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTH, B-HTI

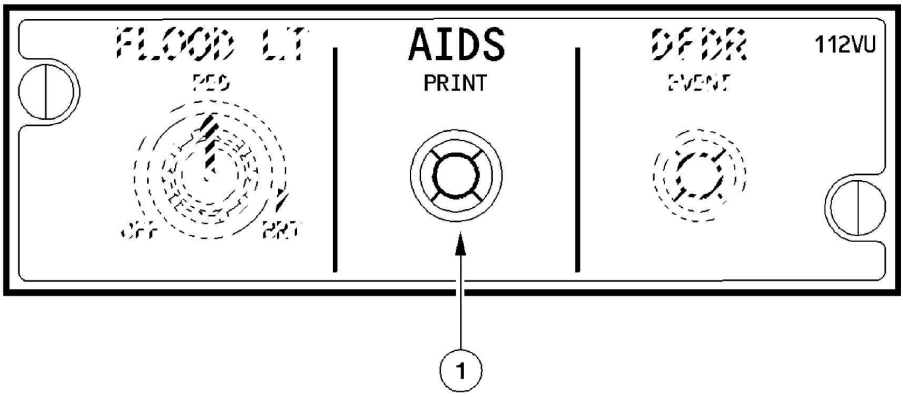
The AIDS is used to monitor various aircraft system parameters in order to make maintenance easier and to allow formulating operational recommendations.
The AIDS can generate system reports. The Airbus Standard Reports are preprogrammed reports available at aircraft delivery. The operator can create its own reports.
The AIDS uses the Flight Data Interface and Management Unit (FDIMU) to acquire the relevant aircraft system parameters. The FDIMU is connected to the rest of the AIDS as shown below.
The system may be programmed using the MCDUs. The crew can select any report to be displayed on the MCDUs.
The Printer prints the flight phase programmed reports or any report selected on the MCDU.
This printing may be automatic or in response to the AIDS PRINT pushbutton.

The AIDS may send automatic reports via ACARS .
An optional Digital Recorder may be installed to extend the recording capacity.



CONTROLS ON PEDESTAL

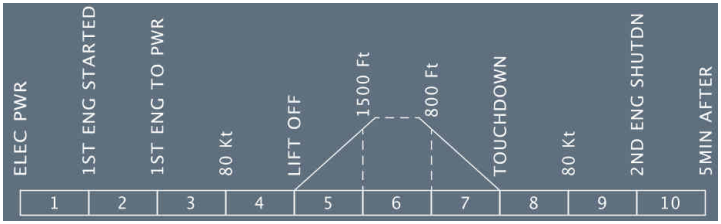
Applicable to: ALL



(1) AIDS PRINT pushbutton
Pushing this pushbutton causes the immediate printing of a specific report, depending on the flight phase. The crew may then use the MCDU to select another report for immediate printing.

WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNINGS	FLT PHASE INHIB
SDAC 1 + 2 FAULT	SINGLE CHIME	MASTER CAUT	NIL	NIL	4, 5, 7, 8
DMC 1 (2) FAULT					3, 4, 5(1), 7, 8
DMC 3 FAULT					
SDAC 1 (2) FAULT	NIL	NIL			3, 4, 5, 7, 8
FWC 1 (2) FAULT					
FWC 1 + 2 FAULT					NIL
DFDR FAULT					3, 4, 5, 7, 8
RECORDER SYS FAULT					
OEB/FWC DISCREPANCY FWC 1 and FWC 2 do not have the same OEBs listed in their OEB reminder database.	SINGLE CHIME	MASTER CAUT			3 to 8

(1) *Inhibited only during first 15 s of Flight Phase 5.*

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BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
DU	CAPT PFD			X		
	CAPT ND			SHED		
	F/O PFD	AC2				
	F/O ND	AC2				
	UPPER ECAM DU			X		
	LOWER ECAM DU	AC2				
DMC	DMC 1			X		
	DMC 2	AC2				
	DMC 3	AC1		X (1)		
FWC	FWC 1			X		
	FWC 2	AC2				
SDAC	SDAC 1			X		
	SDAC 2	AC2				
ECP	ECP				X	
FDIU/QAR ⋖		AC2				
CLOCK					X	X

(1) in case of EIS DMC switching to CAPT/3, with AC BUS 1 failed.

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AIRCRAFT SYSTEMS

LANDING GEAR

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DSC-32-PLP PRELIMINARY PAGES

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DSC-32-10-60 Electrical Supply

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DSC-32-20 Nose Wheel Steering

DSC-32-20-10 Description

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DSC-32-30-30 Warnings and Cautions
Warnings and Cautions....A
DSC-32-30-40 Electrical Supply
BUS EQUIPMENT LIST....A

DSC-32-40 Tire Pressure Indicating System
DSC-32-40-40 Electrical Supply
BUS EQUIPMENT LIST....A

Localization Title	Toc Index	ID	Reason
DSC-32-10-20 Proximity Detector Output Signals	B	1	Improvement of illustration quality.
DSC-32-10-40 ECAM Wheel Page	D	1	Revision of the description related to the landing gear position indication: for aircraft that are equipped with the EIS 2 pre-S8 std, it is not possible to identify which LGCIU is controlling the display of the left or the right side of the gear.
DSC-32-10-40 ECAM Wheel Page	D	2	Description revised to be technically in line with the ECAM display.
DSC-32-30-10 ANTI-SKID SYSTEM	B	1	Update of the wording: The principle of Brakes and Anti-Skid description is simplified.
DSC-32-30-10 Anti-Skid System	C	2	Update of the wording: The principle of Brakes and Anti-Skid description is simplified.
DSC-32-30-20 BRAKE FANS ◁	C	1	Indicator title updated to improve the layout - BRAKE FANS if installed instead of BRK FAN.
DSC-32-30-30 Warnings and Cautions	A	1	BRAKES HOT logic clarified.
DSC-32-30-30 Warnings and Cautions	A	2	BRAKES HOT logic clarified.
DSC-32-30-30 Warnings and Cautions	A	3	Revision of the PARK BRK FAULT title to be in accordance with the correct wording.
			BRAKES HOT logic clarified.

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GENERAL

Applicable to: ALL

The landing gear consists of :
- two main gear that retract inboard,
- a nose gear that retracts forward.

Doors enclose the landing gear bays. Gear and doors are electrically controlled and hydraulically operated.
The doors, which are fitted to the landing gear struts, are operated mechanically by the gear and close at the end of gear retraction.
All gear doors open while the gear is retracting or extending.
Two Landing Gear Control and Interface Units (LGCIUs) control the extension and retraction of the gear and the operation of the doors. They also supply information about the landing gear to ECAM for display, and send signals indicating whether the aircraft is in flight or on the ground to other aircraft systems.
A hand crank on the center pedestal allows the flight crew to extend the landing gear if the aircraft loses hydraulic systems or electrical power.

MAIN GEAR

Applicable to: ALL

Each main gear has twin wheels and an oleopneumatic shock absorber.
Each main wheel has an antiskid brake.

NOSE GEAR

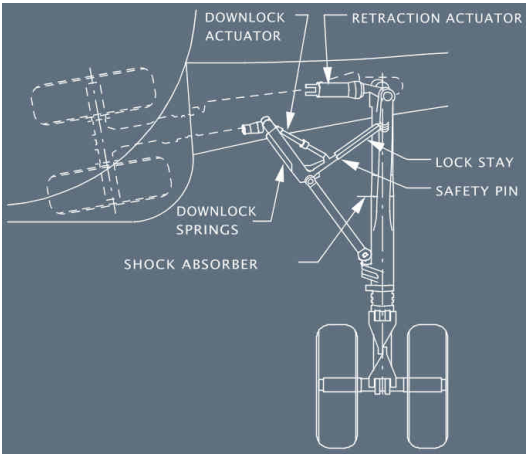
Applicable to: ALL

The two-wheeled nose gear has an oleopneumatic shock strut and a nose wheel steering system.

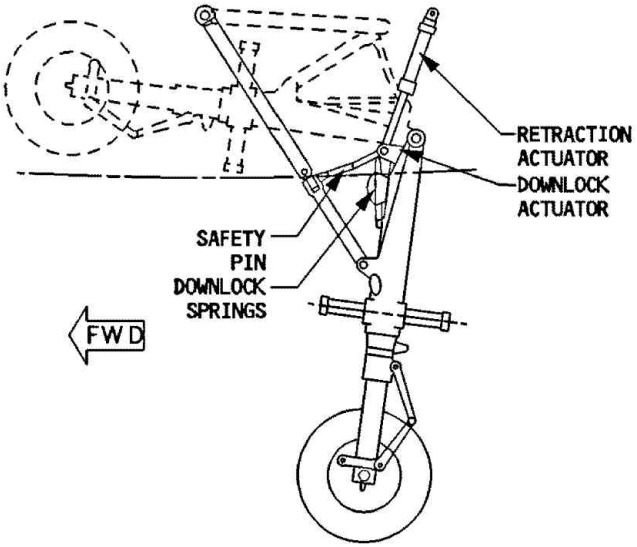
DRAWINGS

Applicable to: ALL

MAIN LANDING GEAR



NOSE GEAR



OPERATION OF GEAR AND DOORS

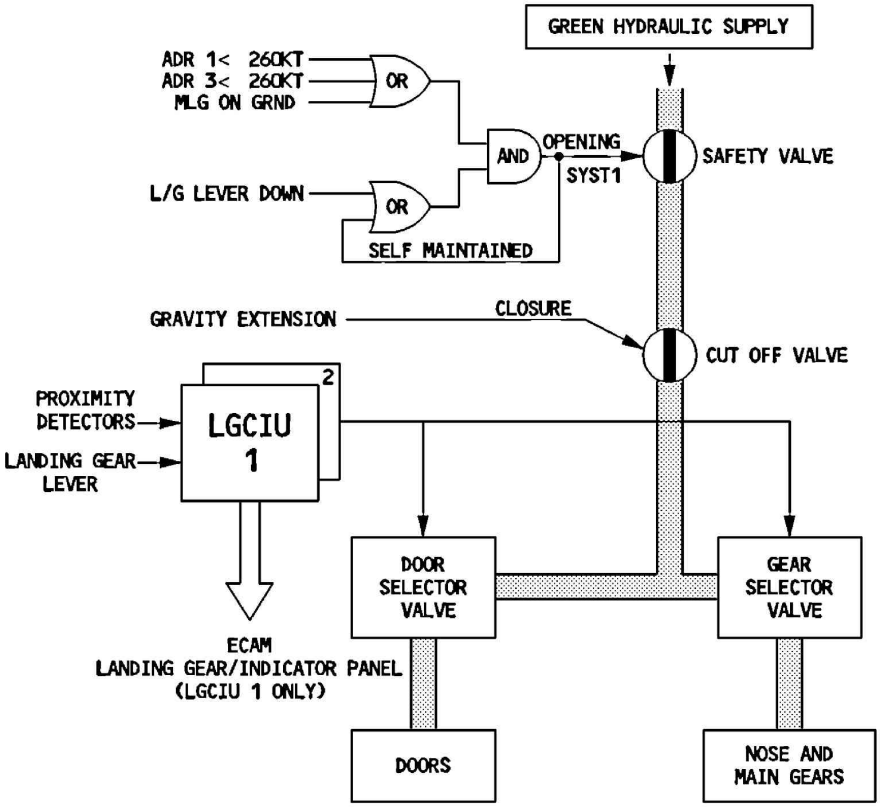
Applicable to: ALL

NORMAL OPERATION

The flight crew normally operates the landing gear by means of the lever on the center instrument panel.

The LGCIUs control the sequencing of gear and doors electrically. One LGCIU controls one complete gear cycle, then switches over automatically to the other LGCIU at the completion of the retraction cycle. It also switches over in case of failure.

The green hydraulic system actuates all gear and doors. When the aircraft is flying faster than 260 kt, a safety valve automatically cuts off hydraulic supply to the landing gear system. Below 260 kt, the hydraulic supply remains cut off as long as the landing gear lever is up.



EMERGENCY EXTENSION

If the normal system fails to extend the gear hydraulically, the flight crew can use a crank to extend it mechanically.

When a crew member turns the crank, it :
- isolates the landing gear hydraulics from the green hydraulic system,
- unlocks the landing gear doors and the main and nose main gear,
- allows gravity to drop the gear into the extended position.

Locking springs help the crew to crank the main gear into the locked condition, and aerodynamic forces assist in the locking of the nose gear.
The gear doors remain open.

The flight crew can reset the emergency extension system in flight after using it for training (if green hydraulic pressure is available).

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LGCIUS

Applicable to: ALL

GENERAL

The LGCIUs receive position information from the landing gear, cargo door, and landing flap systems.

LANDING GEAR

The LGCIUs receive the following information about the landing gear from proximity detectors :
- gear locked down or up,
- shock absorbers compressed or extended,
- landing gear door open or closed.

Failure of a proximity detector :

- The LGCIU detects any electrical failure in a proximity detector, and signals the associated output to the flight position (shock absorber not compressed or landing gear uplocked). The other LGCIU then automatically takes over control of the landing gear operation.
- In case of mechanical failure, the LGCIU does not modify the associated output. The effect that such a failure has on the system depends upon which condition is signalled incorrectly.

Electrical failure of an LGCIU :

- The other (healthy) LGCIU takes control of the landing gear.
- The system does not force the outputs of the failed LGCIU to the safe (flight) condition.
  - Some users will see “flight” condition.
  - Some users will see “ground” condition.

CARGO DOORS

Sensors send to the LGCIUs the position of the following components :
- manuel selector valves,
- locking shaft,
- locking handle,
- safety shaft,
- door sills. ◁

The LGCIUs detect electrical failures only in certain proximity switches in the cargo door system :
- locking shaft,
- locking handle,
- safety shaft.

When an LGCIU makes such a detection, it indicates the NON LOCKED condition for that component.

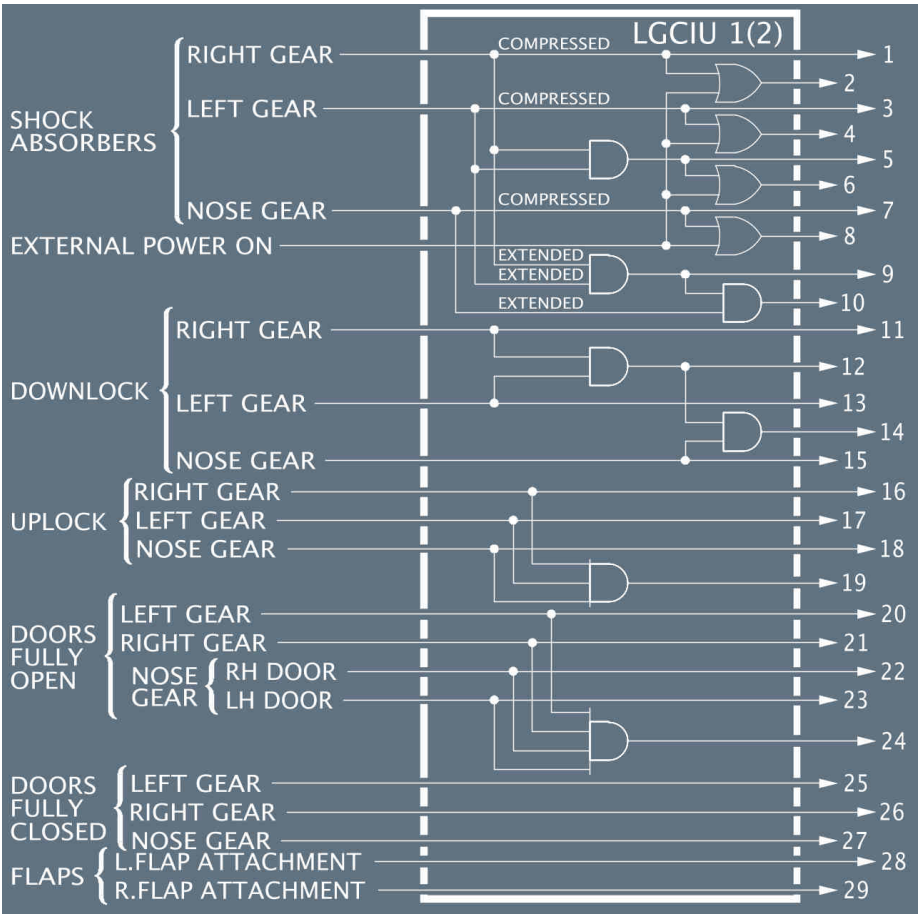
FLAPS

The LGCIUs process the signals from four flap disconnect proximity switches, then send them to the Slat/Flap Control Computers (SFCCs).
The LGCIUs do not monitor failures in the SFCC system.

PROXIMITY DETECTOR OUTPUT SIGNALS

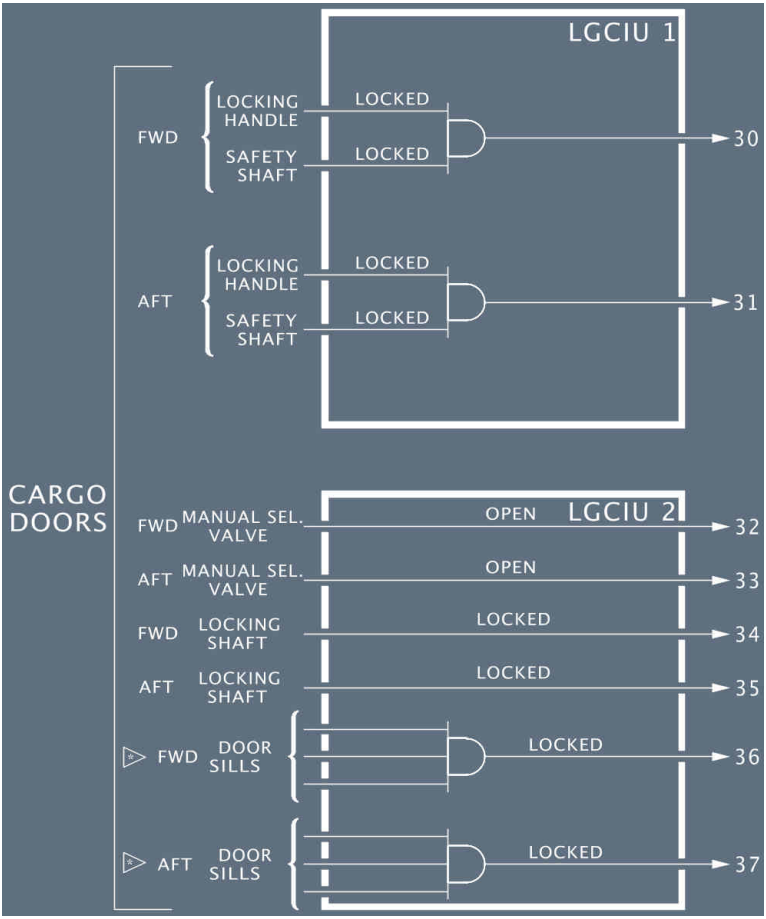
Applicable to: ALL

1



PROXIMITY DETECTOR OUTPUT SIGNALS (CONT'D)

Applicable to: ALL



GENERAL

Applicable to: ALL

The following tables present the operational effects of the proximity detectors on aircraft systems.
How to read the tables :

SYSTEM	LGCIU 1	LGCIU 2	A/C IN FLT	A/C ON GROUND
SERVICE INTERPHONE	**6**	**6**	.....	.....
SFCC 1(2)	**5**	(**5**)	.....	.....

The above lines mean that the service interphone receives the output n° 6 from both LGCIUs, while SFCC 1 receive the output 5 from LGCIU 1 and SFCC 2 the output 5 from LGCIU 2.
The two additional columns give the system functioning when the aircraft is in flight and on the ground.

PROXIMITY DETECTORS ON SHOCK ABSORBERS

Applicable to: B-HSQ, B-HSR

	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	A/C IN FLT	A/C ON GRND
GENERAL	STROBE lts		**5**	On when AUTO selected	Off when AUTO selected
	LOGO lts		**5**	Off when flaps retracted	On
	AIRSTAIRS	**3**	**1**	Control inhibited(1)	Control not inhibited(2)
	CARGO DOOR(5)		**5**	normal control not available	normal control available
	WATER FILLING		**5**	Preselect water servicing inhibited	Preselect water servicing available

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	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	A/C IN FLT	A/C ON GRND
AIR COND	AVNCS COOLING	**5**	**5**	• Skin temp. < 35 °C : The system is in closed conf.(1) • Skin temp. > 35 °C: The system is in intermediate conf.(1)	• Skin temp. < 5 °C : The system is in closed conf.(2) • Skin temp. > 5 °C: The system is in open conf.(2)
	GRND COOLING ❄	**1** **3**	**1** **3**	Inhibited(1)	Not inhibited(2)
	FWDCARGO VENT		**5**	Extract fan stopped when ΔP > 1 PSI	Extract fan on
	CAB PRESS	**5**	**5**	Climb mode active(4)	- Prepressurization active before TO (3) - Depressurization active after LDG (3)
	PACK 1(2) TEMP CONTROL		**3** **(1)**	Pack air inlet flaps opened.	Pack air inlet flap fully closed at TO and LDG
APU	APU AUTO SHUTDOWN	**5**		In case of oil low press, automatic shutdown is delayed by 15.5 s	In case of oil low press, the automatic shutdown is delayed by: • 15.5 s if the oil temp < -4 °C • 0.05 s if oil temp > -4 °C
	APU SPEED CONTROL			Speed is controlled at 101 %	Speed is controlled at 99 % (101 % for ENG start or when ambient temp ≥ 30 °C)

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	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	A/C IN FLT	A/C ON GRND
COMMUNICATIONS	SERVICE INTERPHONE	**6**	**6**	Inhibited(6)	Available(7)
	PUBLIC ADDRESS	**1** **3**	**1** **3**	P.A. increased level(6)	P.A. low level(7)
	ADIRU and AVIONICS ground warning	**1** **3**	**1** **3**	External horn and light inhibited(6)	External horn and light not inhibited(7)
	FLT INTERPHONE	**9**		Communication with ground mechanic inhibited	Communication with ground mechanic available
	COCKPIT CALL LIGHT	**9**		Inhibited	Not inhibited
	ACARS (ACARS MU or ATSU)	**7**		Available	Available
	CVR	**1** **3** **7**	**1** **3**	Runs(6)	Runs : (7) - During the first 5 min following energization - With at least one engine running Stops : (7) 5 min after second engine shutdown
	CVR		**5**	• ERASE function inhibited • No low frequency signal in the loudspeakers if test performed	• ERASE function not inhibited • Low frequency signal in the loudspeakers if test performed
ELEC	DC generation	**5**		APU start on batteries only, is delayed by 45 s	No APU start delay when on batteries only
	GALLEY supply		**5**	Main galley not supplied when APU GEN only is supplying	Main galley supplied when APU GEN only is supplying
EIS	EIS	**5**		Display test inhibited when ANN LT TEST is selected	Display test not inhibited
FIRE	APU	**5**		No APU fire automatic extinguishing	Automatic extinguishing not inhibited

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	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	A/C IN FLT	A/C ON GRND
FLT CTL	SFCC 1(2)	**5**	**(5)**	• For SFCC 1(2): Slats alpha/speed lock function active • For SFCC(2): No flaps movement inhibition if the cargo door is opened	• For SFCC 1(2): Slats alpha/speed lock function active if speed > 60 kt • For SFCC (2): Flaps movement inhibition if cargo door is opened
FLT INST	• DFDR • QAR ✻	**1** **3** **7**	**1** **3**	Runs(6)	Runs: (7) • During the first 5 min following energization • With one engine running Stops: (7) 5 min after second engine shut down
FUEL	FQI	**5**		FQI uses flight attitude correction due to wing bending	FQI uses ground attitude correction

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	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	A/C IN FLT	A/C ON GRND
HYD	BLUE and GREEN pumps	**1** **3**		Blue or green pump "FAULT" light not inhibited when related pump is stopped(6)	Blue or green pump "FAULT" light inhibited when related pump is stopped(7)
	BLUE pump	**7**		Runs when electrical power is available	Runs when at least one engine is running
	BLUE and YELLOW pumps		**1** **3**	Blue or yellow pump "FAULT" light not inhibited when related pump is stopped(6)	Blue or yellow pump "FAULT" light inhibited when related pump is stopped(8)
	PTU		**7**	PTU runs if green/yellow diff. press > 500 PSI	PTU runs if green/yellow diff. press > 500 PSI and • Both MASTER LEVERS are at OFF or • Both MASTER LEVERS are at ON or • Nose wheel steering is not in towing position with parking brake released. PTU is inhibited during the use of the cargo door hand pump and for 40 s after its use.
ICE RAIN PROT	CAPT, (F/O), ((STBY)) probes and CAPT, (F/O) windows heating	**4,** **(2)** **((8))**	**4,** **(2)** **((8))**	• CAPT, (F/O), ((STBY)) pitots and CAPT, (F/O) windows : high heating level applied • All other probes and windows are heated(6)	• With engines stopped: no heating(8) • With at least one engine running: • CAPT, (F/O), ((STBY)) pitots and CAPT, (F/O) windows are heated at low level(8)
	WING ANTI ICE	**3**	**1**	Wing anti ice valves open when the WING ANTI ICE pb is at ON(6)	Wing anti ice valves open for 30 s when the WING ANTI ICE pb is at ON(8)
	RAIN REPELLENT	**1** **3**	**1** **3**	Not inhibited(6)	Inhibited if engines are stopped(7)
	DRAIN MAST(10)		**9**	High heating level is applied	Low heating level is applied

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	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	A/C IN FLT	A/C ON GRND
LANDING GEAR	L/G SAFETY VALVE	**6**		Safety valve closes if aircraft speed > 260 kt	Safety valve opened
	L/G control	**10**	**10**	Retraction not inhibited(9)	Retraction inhibited(9)
	TIRE PRESS		**5**	"TYRE LO PRESS" warning threshold set to its flight level	"TYRE LO PRESS" warning threshold set to its ground level
NAVIGATION	STAND BY ALTI	**5**		VIBRATION function active	Vibration function inhibited
	ATC 1(2)	**3**	**(1)**	ATC 1(2) available in AUTO mode	ATC 1(2) inhibited in AUTO mode
	ADIRU 1(10)	**7**		No external horn when ADIRU supplied from batteries only	External horn not inhibited
POWER PLANT	FADEC 1(2)	**1** **3** **8**	**(1)** **(3)** **(8)**	On ENG 1(2): (6) • Reverse inhibited • No automatic start abort • FADEC always supplied • FLEX not available • If installed, BUMP not selectable	On ENG 1(2): (8) • Reverse available • Automatic start abort available • 5 min after eng-shut down FADEC 1(2) no more supplied • FLEX available • If installed, BUMP selectable
		1 **3** **8**	**(1)** **(3)** **(8)**	Modulated idle and approach idle are available(6)	Modulated idle only available(7)

(1) When either LGCIU indicates flight.
(2) When both LGCIU indicate ground.
(3) When either LGCIU indicates ground.
(4) When both LGCIU indicate flight.
(5) Valid from MSN 44.
(6) When either output indicates flight.
(7) When all outputs indicate ground.
(8) When both outputs indicate ground.
(9) One valid output is sufficient.
(10) Valid from MSN 22.

PROXIMITY DETECTORS ON SHOCK ABSORBERS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	A/C IN FLT	A/C ON GRND
GENERAL	STROBE lts		5	On when AUTO selected	Off when AUTO selected
	LOGO lts		5	Off when flaps retracted	On
	AIRSTAIRS ⋘	3	1	Control inhibited(1)	Control not inhibited(2)
	CARGO DOOR(5)		5	normal control not available	normal control available
	WATER FILLING		5	Preselect water servicing inhibited	Preselect water servicing available
AIR COND	AVNCS COOLING	5	5	• Skin temp. < 35 °C : The system is in closed conf.(1) • Skin temp. > 35 °C: The system is in intermediate conf. (1)	• Skin temp. < 5 °C : The system is in closed conf.(2) • Skin temp. > 5 °C: The system is in open conf.(2)
	GRND COOLING ⋘	1 3	1 3	Inhibited(1)	Not inhibited(2)
	FWD CARGO VENT		5	Extract fan stopped when ΔP > 1 PSI	Extract fan on
	CAB PRESS	5	5	Climb mode active(4)	- Prepressurization active before TO (3) - Depressurization active after LDG (3)
	PACK 1(2) TEMPCONTROL		3 (1)	Pack air inlet flaps opened.	Pack air inlet flap fully closed at TO and LDG
APU	APU AUTO SHUTDOWN	5		In case of oil low press, automatic shutdown is delayed by 15.5 s	- In case of oil low press, the automatic shutdown is delayed by : • 15.5 s if the oil temp < -4 °C • 0.05 s if oil temp > -4 °C

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	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	A/C IN FLT	A/C ON GRND
COMMUNICATIONS	SERVICE INTERPHONE	**6**	**6**	Inhibited(6)	Available(7)
	PUBLIC ADDRESS	**1** **3**	**1** **3**	P.A. increased level(6)	P.A. low level(7)
	ADIRU and AVIONICS ground warning	**1** **3**	**1** **3**	External horn and light inhibited(6)	External horn and light not inhibited(7)
	FLT INTERPHONE	**9**		Communication with ground mechanic inhibited	Communication with ground mechanic available
	COCKPIT CALL LIGHT	**9**		Inhibited	Not inhibited
	ACARS (ACARS MU or ATSU)	**7**		Available	Available
	CVR	**1** **3** **7**	**1** **3**	Runs(6)	Runs: (7) - during the first 5 min following energization - with one engine running Stops: (7) 5 min after second engine shutdown
	CVR		**5**	• ERASE function inhibited • No low frequency signal in the loudspeakers if test performed	• ERASE function not inhibited • Low frequency signal in the loudspeakers if test performed
ELEC	DC generation	**5**		APU start on batteries only, is delayed by 45 s	No APU start delay when on batteries only
	GALLEY supply		**5**	Main galley not supplied when APU GEN only is supplying	Main galley supplied when APU GEN only is supplying
EIS	EIS	**5**		Display test inhibited when ANN LT TEST is selected	Display test not inhibited
FIRE	APU	**5**		No APU fire automatic extinguishing	Automatic extinguishing not inhibited

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	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	A/C IN FLT	A/C ON GRND
FLT CTL	SFCC 1(2)	**5**	**(5)**	• For SFCC 1(2): Slats alpha/speed lock function active • For SFCC(2): No flaps movement inhibition if the cargo door is opened	• For SFCC 1(2): Slats alpha/speed lock function active if speed > 60 kt • For SFCC (2): Flaps movement inhibition if cargo door is opened
FLT INST	• DFDR • QAR	**1** **3** **7**	**1** **3**	Runs(6)	Runs: (7) • During the first 5 min following energization • With one engine running Stops: (7) 5 min after second engine shut down
FUEL	FQI	**5**		FQI uses flight attitude correction due to wing bending	FQI uses ground attitude correction
HYD	BLUE and GREEN pumps	**1** **3**		Blue or green pump "FAULT" light not inhibited when related pump is stopped(6)	Blue or green pump "FAULT" light inhibited when related pump is stopped(7)
	BLUE pump	**7**		Runs when electrical power is available	Runs when at least one engine is running
	BLUE and YELLOW pumps		**1** **3**	Blue or yellow pump "FAULT" light not inhibited when related pump is stopped(6)	Blue or yellow pump "FAULT" light inhibited when related pump is stopped(8)
	PTU		**7**	PTU runs if green/yellow diff. press > 500 PSI	PTU runs if green/yellow diff. press > 500 PSI and • both MASTER LEVERS are at OFF or • Both MASTER LEVERS are at ON or • Nose wheel steering is not in towing position with parking brake released. PTU is inhibited during the use of the cargo door hand pump and for 40 s after its use.

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	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	A/C IN FLT	A/C ON GRND
ICE RAIN PROT	CAPT, (F/O), ((STBY)) probes and CAPT, (F/O) windows heating	**4, (2) ((8))**	**4, (2) ((8))**	• CAPT, (F/O), ((STBY)) pitots and CAPT, (F/O) windows : high heating level applied • All other probes and windows are heated(6)	• With engines stopped: no heating(8) • With at least one engine running: • CAPT, (F/O), ((STBY)) pitots and CAPT, (F/O) windows are heated at low level(8)
	WING ANTI ICE	**3**	**1**	Wing anti ice valves open when the WING ANTI ICE pb is at ON(6)	Wing anti ice valves open for 30 s when the WING ANTI ICE pb is at ON(8)
	RAIN REPELLENT	**1** **3**	**1** **3**	Not inhibited(6)	Inhibited if engines are stopped(7)
	DRAIN MAST(10)		**9**	High heating level is applied	Low heating level is applied
LANDING GEAR	L/G SAFETY VALVE	**6**		Safety valve closes if aircraft speed > 260 kt	Safety valve opened
	L/G control	**10**	**10**	Retraction not inhibited(9)	Retraction inhibited(10)
	TIRE PRESS		**5**	"TYRE LO PRESS" warning threshold set to its flight level	"TYRE LO PRESS" warning threshold set to its ground level
NAVIGATION	STAND BY ALTI	**5**		VIBRATION function active	Vibration function inhibited
	ATC 1(2)	**3**	**(1)**	ATC 1(2) available in AUTO mode	ATC 1(2) inhibited in AUTO mode
	ADIRU 1(10)	**7**		No external horn when ADIRU supplied from batteries only	External horn not inhibited

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	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	A/C IN FLT	A/C ON GRND
POWER PLANT	FADEC 1(2)	**1** **3** **8**	**(1)** **(3)** **(8)**	On ENG 1(2): *(6)* • Reverse inhibited • No automatic start abort • FADEC always supplied • FLEX not available • If installed, BUMP not selectable	On ENG 1(2): *(8)* • Reverse available • Automatic start abort available • 5 min after eng-shut down FADEC 1(2) no more supplied • FLEX available • If installed, BUMP selectable
		1 **3** **8**	**(1)** **(3)** **(8)**	Modulated idle and approach idle are available*(6)*	Modulated idle only available *(7)*

(1) When either LGCIU indicates flight.
(2) When both LGCIU indicate ground.
(3) When either LGCIU indicates ground.
(4) When both LGCIU indicate flight.
(5) Valid from MSN 44.
(6) When either output indicates flight.
(7) When all outputs indicate ground.
(8) When both outputs indicate ground.
(9) One valid output is sufficient.
(10) Valid from MSN 22.

PROXIMITY DETECTORS ON UPLOCKS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	L/G UPLOCKED	L/G NOT UPLOCKED
ELEC	DC generation	**18**		In EMER ELEC config : • STBY GEN is in line when the RAT is extended • APU start available	In EMER ELEC config : • STBY GEN not available • APU start not available • flight time is limited by batteries endurance
LANDING GEAR	L/G control	**19**	**19**	If UP selected : *(1)* L/G doors will close	If UP selected : *(1)* L/G doors will not close
	ECAM WHEEL page	**16** **17** **18**	**16** **17** **18**	If UP selected : *(2)* L/G uplocked indications	If UP selected : *(2)* L/G in transit indications
	L/G indicator panel	**16** **17** **18**		If UP selected : *(2)* no indication	If UP selected : *(2)* "UNLK"red indications

(1) One valid output is sufficient.
(2) When all outputs indicate the same position.

PROXIMITY DETECTORS ON UPLOCKS

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	L/G UPLOCKED	L/G NOT UPLOCKED
LANDING GEAR	L/G control	**19**	**19**	If UP selected :*(1)* L/G doors will close	If UP selected :*(1)* L/G doors will not close
	ECAM WHEEL page	**16** **17** **18**	**16** **17** **18**	If UP selected :*(2)* L/G uplocked indications	If UP selected :*(2)* L/G in transit indications
	L/G indicator panel	**16** **17** **18**		If UP selected :*(2)* no indication	If UP selected :*(2)* "UNLK"red indications

(1) One valid output is sufficient.
(2) When all outputs indicate the same position.

DOORS PROX DET

Applicable to: ALL

	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	DOORS FULLY OPENED	DOORS CLOSED
LANDING GEAR	L/G control	24	24	L/G extension or retraction possible (1)	L/G extension or retraction inhibited (1)
	ECAM WHEEL page	20 21 22 23	20 21 22 23	Doors fully opened indication	Doors closed indication

(1) *One valid output is sufficient.*

PROXIMITY DETECTORS ON DOWNLOCKS

Applicable to: ALL

	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	L/G DOWNLOCKED	L/G NOT DOWNLOCKED
GEN	TAXI/T.O lights		15	lights not inhibited	lights inhibited
COMM	SIGNS	12	12	"NO SMOKING" and "EXIT" signs on when AUTO selected (1)	"NO SMOKING" and EXIT" signs inhibited when AUTO selected (2)
FLT INST	WBS	15	15	active (3)	inhibited (4)
FMGS	FAC 1(2)	12	12	VLE indication displayed on PFD 1(2)	no VLE indication

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	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	L/G DOWNLOCKED	L/G NOT DOWNLOCKED
LANDING GEAR	L/G control	**14**	**14**	If DOWN selected : (5) L/G doors will close	If DOWN selected : (5) L/G doors will not close
	ECAM WHEEL page	**11** **13** **15**	**11** **13** **15**	If DOWN selected : (6) L/G down indications	If DOWN selected : (6) L/G in transit indications
	L/G INDIC panel	**11** **13** **15**		If DOWN selected : (6) L/G down indications	If DOWN selected : (6) L/G in transit indications
	BRAKING STEERING	**15**	**15**	BSCU test operative (1)	BSCU test inhibited (1)
	BRAKES COOLING ◁		**13**	Cooling available when ON selected	Cooling inhibited when ON selected
NAV	GPWS	**13**		"TOO LOW-FLAPS" or "TOO LOW TERRAIN" warning operative	"TOO LOW-GEAR" or "TOO LOW TERRAIN" warning operative

(1) When either output indicates DOWNLOCK.
(2) When both outputs indicate NOT DOWNLOCK.
(3) When both outputs indicate DOWNLOCK.
(4) When either output indicates NOT DOWNLOCK.
(5) One valid output is sufficient.
(6) When all outputs indicate the same position.

PROXIMITY DETECTORS ON CARGO DOORS

Applicable to: ALL

LOCKING HANDLE OR SHAFT, DOOR SILLS

	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	LOCKED	UNLOCKED
CRG DOORS	ECAM DOOR PAGE	**30** **(31)**		Forward (aft) door symbol appears green	Forward (aft) door symbol appears amber, associated with "CARGO" amber.
	CARGO DOOR OPERATION		**34** **(35)**	Forward (aft) door normal opening inhibition	Forward (aft) door normal opening possible
			36 ◁ **(37)** ◁	Forward (aft) door normal operation possible	Forward (aft) door normal operation inhibited

MANUAL SELECTOR VALVE

	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	CLOSE	OPEN
CRG DOORS	CARGO DOOR OPERATION		**32 (33)**	Forward (aft) door normal opening inhibition	Forward (aft) door normal opening possible

PROXIMITY DETECTORS ON FLAP ATTACHMENTS

Applicable to: ALL

	SYSTEM	LGCIU 1 OUTPUT	LGCIU 2 OUTPUT	FLAP ATTACHMENT	FLAP ATTACHMENT FAILURE
FLT CTL	SFCC	**28 (29)**	**28 (29)**	L(R) FLAPS normal operation (1)	"FLAPS LOCKED" warning (2)

(1) When at least one SFCC detects normal operation
(2) When both SFCCs detect attachment failure

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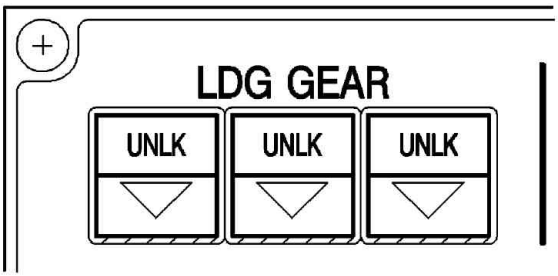
LANDING GEAR INDICATOR PANEL

Applicable to: ALL



This panel is connected to LGCIU1, which receives signals from proximity detectors.

UNLK: comes on red if the gear is not locked in the selected position.

▽ : comes on green if the gear is locked down.

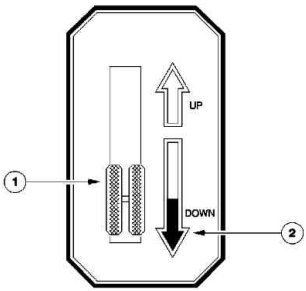
Note: This panel is connected to the LGCIU1 only, therefore, the lights on the LDG GEAR indicator panel come on as long as the LGCIU1 is electrically supplied.
If one UNLK indication remains on, the landing gear position can be confirmed using the WHEEL SD page (information from LGCIU 1 & 2). Only one green triangle on each landing gear is sufficient to confirm that the landing gear is downlocked.

LANDING GEAR SELECTOR LEVER

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

A two-position selector lever sends electrical signals to the two LGCIUs. These control the green hydraulic supply to the landing gear system by means of selector valves.

When the flight crew selects UP or DOWN (and if the airspeed is below 260 kt) :
- All landing gear doors open.
- Each landing gear moves to the selected position.
- All landing gear doors close.



(1) L/G LEVER

UP : This position selects landing gear retraction.
While the landing gear doors are opening, the normal brake system brakes the wheels of the main gear automatically. A brake band in the nose gear well brakes the nose gear wheels as the doors close.

DOWN : This position selects landing gear extension.
An interlock mechanism prevents anyone from accidentally retracting the gear while the aircraft is on the ground. It does so by locking the lever in DOWN position when the shock absorber on either main gear is compressed (aircraft on ground) or the nose wheel steering is not centered.
The landing gear hydraulic system remains pressurized as long as the landing gear is extended (if green hydraulic pressure is available).

(2) RED ARROW

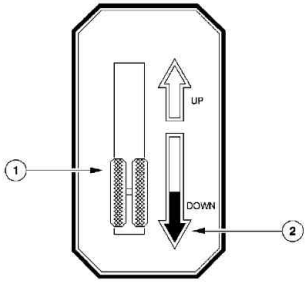
This red arrow lights up if the landing gear is not locked down when the aircraft is in the landing configuration, and a red warning appears on ECAM.

LANDING GEAR SELECTOR LEVER

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

A two-position selector lever sends electrical signals to the two LGCIUs. These control the green hydraulic supply to the landing gear system by means of selector valves.

When the flight crew selects UP or DOWN (and if the airspeed is below 260 kt) :
- All landing gear doors open.
- Each landing gear moves to the selected position.
- All landing gear doors close.



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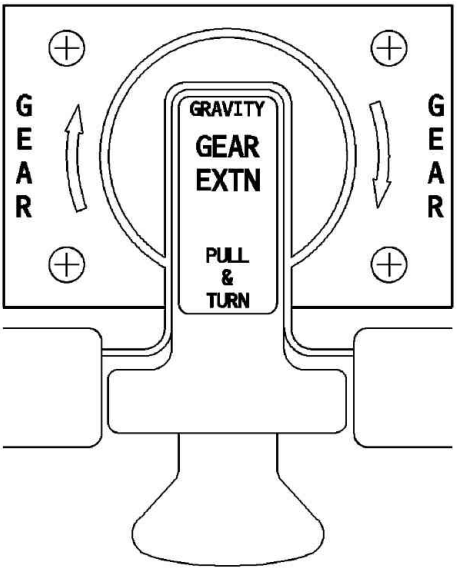
An interlock mechanism prevents anyone from accidentally retracting the gear while the aircraft is on the ground. It does so by locking the lever in DOWN position when the shock absorber on either main gear is compressed (aircraft on ground) or the nose wheel steering is not centered.
The landing gear hydraulic system remains pressurized as long as the landing gear is extended (if green hydraulic pressure is available).

(2) RED ARROW
This red arrow lights up if the landing gear is not locked down when the aircraft is in the landing configuration, and a red warning appears on ECAM.

EMERGENCY EXTENSION

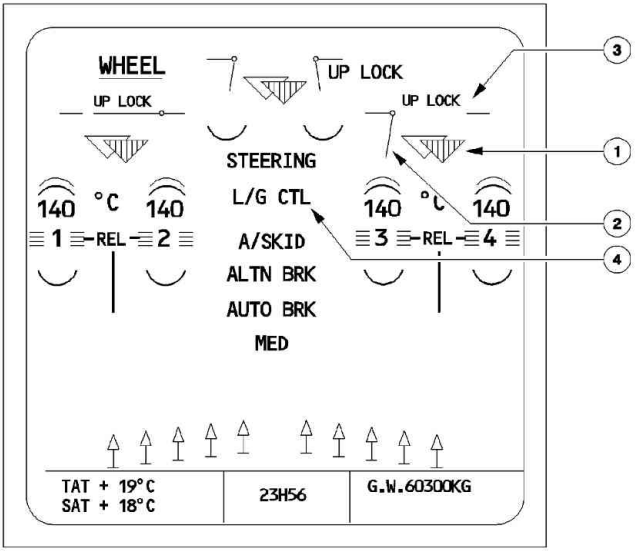
Applicable to: ALL



To put the landing gear down by gravity, the flight crew must pull the gear crank out, then turn it clockwise for 3 turns.
When the flight crew operates the crank handle, the cutout valve shuts off hydraulic pressure to the landing gear system and depressurizes it.

ECAM WHEEL PAGE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



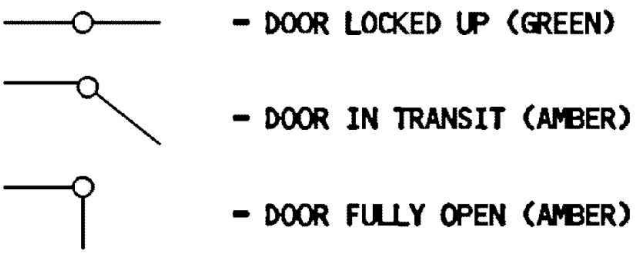
(1) Landing gear position indication

The landing gear positions are indicated by 2 triangles for each gear:

- A green triangle indicates that one LGCIU detects a landing gear downlocked,
- A red triangle indicates that one LGCIU detects a landing gear in transit,
- No triangle indicates that one LGCIU detects a landing gear uplocked,
- Amber crosses indicate that one LGCIU is failed.

Note: Only one green triangle on each landing gear strut is sufficient to confirm that the landing gear is downlocked.

(2) Landing gear door position indication



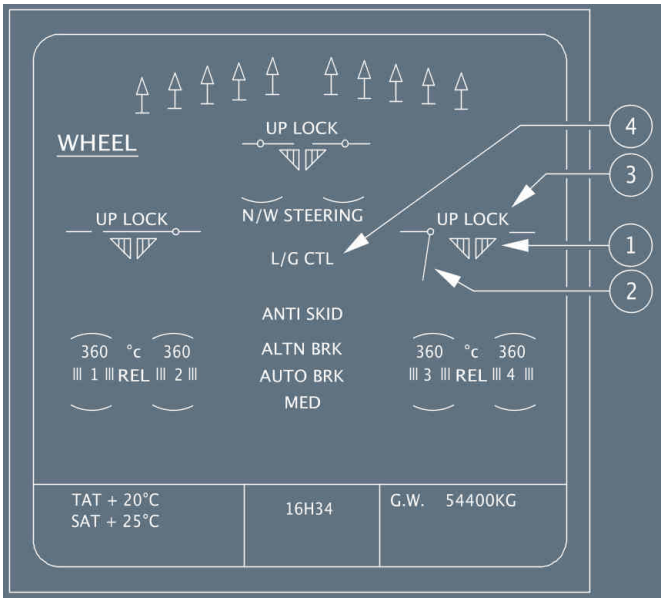
(3) UP LOCK
This legend appears amber along with a caution on the ECAM if the landing gear uplock is engaged when the landing gear is down locked.

(4) L/G CTL
This legend appears in amber when the landing gear lever and the landing gear position do not agree. This legend only appears when the landing gear is moving to the selected position.

ECAM WHEEL PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

1



(1) Landing gear position indication

The landing gear positions are indicated by 2 triangles for each gear.

- A green triangle indicates that one LGCIU detects a landing gear downlocked,
- A red triangle indicates that one LGCIU detects a landing gear in transit,
- No triangle indicates that one LGCIU detects a landing gear uplocked,
- Amber crosses on one triangle indicate that LGCIU1 or LGCIU2 is failed.

Note: Only one green triangle on each landing gear strut is sufficient to confirm that the landing gear is downlocked.

(2) Landing gear door position indication



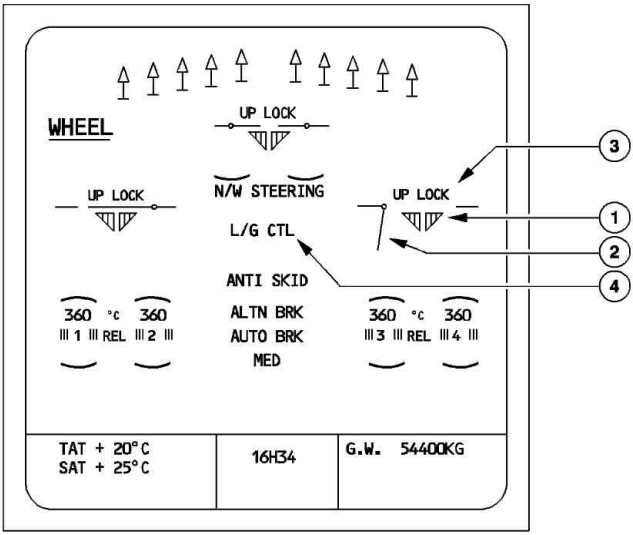
(3) UP LOCK
This legend appears amber along with a caution on the ECAM if the landing gear uplock is engaged when the landing gear is down locked.

(4) L/G CTL
This legend appears amber along with an ECAM caution if the landing gear lever and the landing gear position do not agree. This legend only appears when the landing gear is moving to the selected position.

ECAM WHEEL PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

2



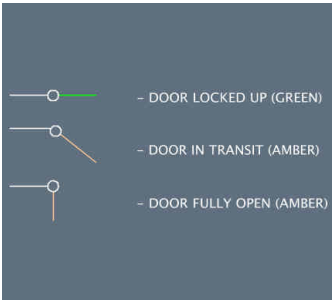
(1) Landing gear position indication

The landing gear positions are indicated by 2 triangles for each gear.

- A green triangle indicates that one LGCIU detects a landing gear downlocked,
- A red triangle indicates that one LGCIU detects a landing gear in transit,
- No triangle indicates that one LGCIU detects a landing gear uplocked,
- Amber crosses will replace the right triangle to indicate that LGCIU 1 or LGCIU 2 has failed.

Note: Only one green triangle on each landing gear strut is sufficient to confirm that the landing gear is downlocked.

(2) Landing gear door position indication

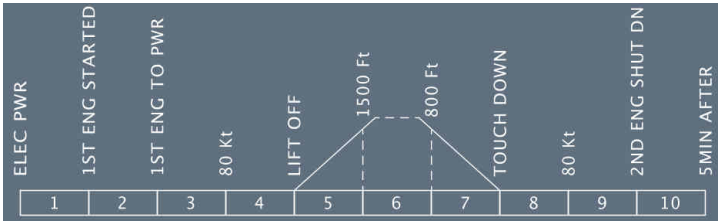


(3) UP LOCK
This legend appears amber along with a caution on the ECAM if the landing gear uplock is engaged when the landing gear is down locked.

(4) L/G CTL
This legend appears in amber along when the landing gear lever and the landing gear position do not agree. This legend only appears when the landing gear is moving to the selected position.

WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
GEAR NOT DOWNLOCKED One gear not downlocked and L/G selected down	CRC	MASTER WARN	WHEEL	UNLK lt on	3, 4, 5
GEAR NOT DOWN 1. L/G not downlocked and radio height lower than 750 ft and both engines N1 lower than 75 % (or if engine shut down N1 of remaining engine lower than 97 %) or 2. L/G not downlocked and radio height lower than 750 ft and both engines not at T.O. power and flaps at 1, 2, 3 or FULL or 3. L/G not downlocked and flaps at 3 or FULL and both radio altimeters failed *Note:* *In the cases 2 and 3 above, the aural warning can only be cancelled by the emergency cancel pushbutton.*			NIL	DOWN ARROW lt on LDGGEAR panel	
SHOCK ABSORBER FAULT One shock absorber not extended when airborne or not compressed after landing	SINGLE CHIME	MASTER CAUT		NIL	1, 3, 4
DOORS NOT CLOSED One gear door is not uplocked			WHEEL		1, 3, 4, 5, 8, 9, 10
GEAR NOT UPLOCKED One gear not uplocked and L/G not selected down				UNLK lt on LDG GEAR panel	3, 4, 7, 8, 9, 10
GEAR UPLOCK FAULT One gear uplock engaged with corresponding gear downlocked					4
LGCIU 1 (2) FAULT	NIL	NIL		NIL	4, 5, 7, 8
SYS DISAGREE Disagree between L/G positions detected by the two LGCIU's					3, 4, 5, 6,7, 8

BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
LANDING GEAR	LGCIU 1		GRND/ FLT		X	
	LGCIU 2		GRND/ FLT			
	SAFETY VALVE				X	
	L/G INDICATOR PANEL			SHED (1)	X	

(1) *The AC STAT INV supplies the landing gear indicator panel when the main generators are lost and the emergency generator is not running.*

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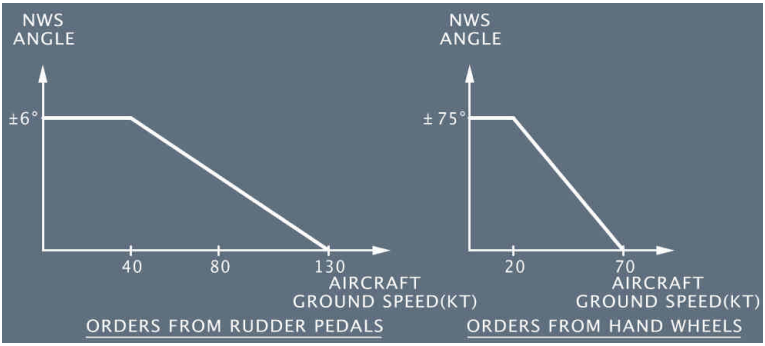
DESCRIPTION

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

A hydraulic actuating cylinder steers the nose wheel. The green hydraulic system supplies pressure to the cylinder, and electric signals from the Brake and Steering Control Unit (BSCU) control it.

The BSCU receives orders from:
- The Captain's and the First Officer's steering hand wheels (orders added algebraically),
- The rudder pedals,
- The autopilot.

The BSCU transforms these orders into nose wheel steering angle. That angle has the following limits, which depend on ground speed and the origin of the orders.



The steering system receives actuating hydraulic pressure when:
- The A/SKID &N/W STRG switch is on and,
- The towing control lever is in normal position and,
- At least one engine is running and,
- The aircraft is on ground.

The nose landing gear doors must be closed in order for the green hydraulic system to apply pressure to the actuating cylinder.
The handwheel can turn the nose wheel up to 75 ° in either direction. A lever on the towing electrical box (on nose landing gear) allows ground crew to deactivate the steering system for towing. This then allows the wheel to be turned 95 ° in either direction.
The pilots can use a pushbutton on either steering handwheel to prevent rudder pedal orders or autopilot orders from going to the BSCU.
An internal cam mechanism returns the nose wheel to the centered position after takeoff.

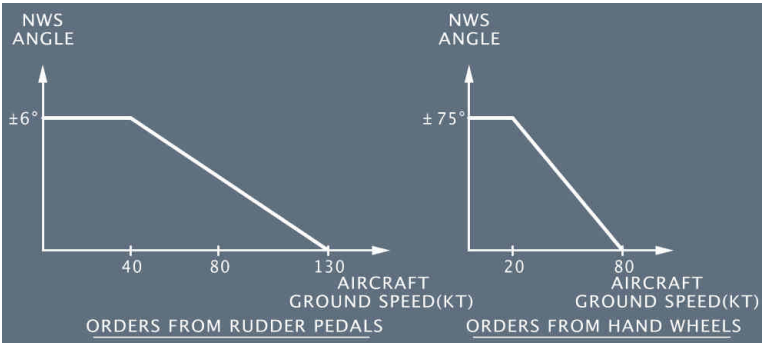
DESCRIPTION

Applicable to: B-HSL, B-HSM, B-HSN

A hydraulic actuating cylinder steers the nose wheel. The green hydraulic system supplies pressure to the cylinder, and electric signals from the Brake and Steering Control Unit (BSCU) control it.

The BSCU receives orders from:
- The Captain's and the First Officer's steering hand wheels (orders added algebraically),
- The rudder pedals,
- The autopilot.

The BSCU transforms these orders into nose wheel steering angle. That angle has the following limits, which depend on ground speed and the origin of the orders.



The steering system receives actuating hydraulic pressure when:
- The A/SKID &N/W STRG switch is on and,
- The towing control lever is in normal position and,
- At least one engine is running and,
- The aircraft is on ground.

The nose landing gear doors must be closed in order for the green hydraulic system to apply pressure to the actuating cylinder.
The handwheel can turn the nose wheel up to 75 ° in either direction. A lever on the towing electrical box (on nose landing gear) allows ground crew to deactivate the steering system for towing. This then allows the wheel to be turned 95 ° in either direction.
The pilots can use a pushbutton on either steering handwheel to prevent rudder pedal orders or autopilot orders from going to the BSCU.
An internal cam mechanism returns the nose wheel to the centered position after takeoff.

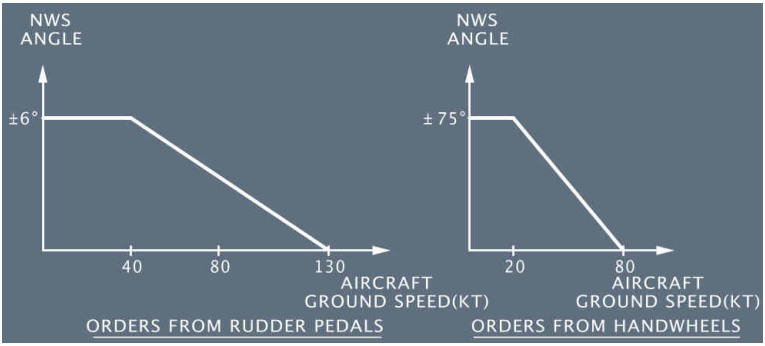
DESCRIPTION

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

A hydraulic actuating cylinder steers the nose wheel. The yellow hydraulic system supplies pressure to the cylinder, and electric signals from the Brake and Steering Control Unit (BSCU) control it.

The BSCU receives orders from:
- The Captain's and the First Officer's steering hand wheels (orders added algebraically),
- The rudder pedals,
- The autopilot.

The BSCU transforms these orders into nose wheel steering angle. That angle has the following limits, which depend on ground speed and the origin of the orders.

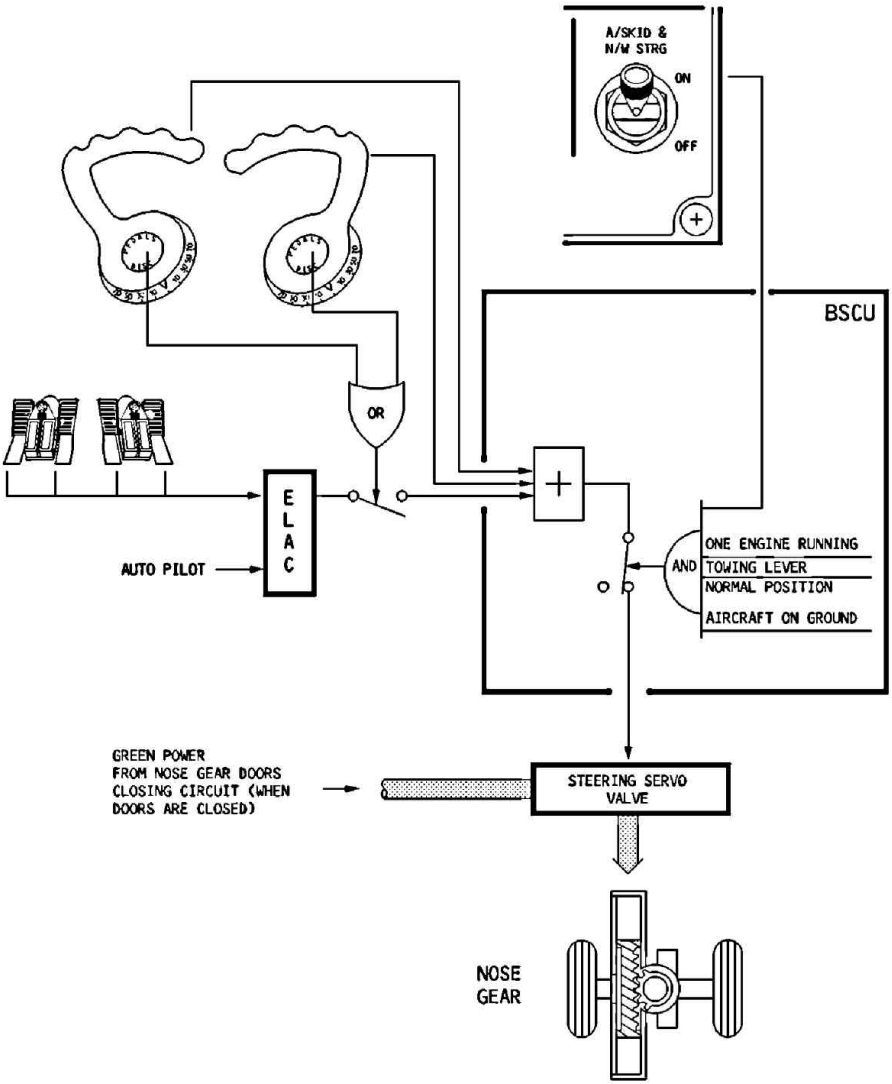


The steering system receives actuating hydraulic pressure when:
- The A/SKID &N/W STRG switch is on and,
- The towing control lever is in normal position and,
- At least one engine is running and,
- The aircraft is on ground.

The handwheel can turn the nosewheel up to 75 ° in either direction. A lever, on the towing electrical box (on nose landing gear), enables ground crew to deactivate the steering system for towing. Then the wheel can be turned 95 ° in either direction.
To prevent rudder pedal orders, or autopilot orders, from going to the BSCU, the pilots can use the pushbutton on either steering handwheel.
An internal cam mechanism returns the nose wheel to the centered position after takeoff.

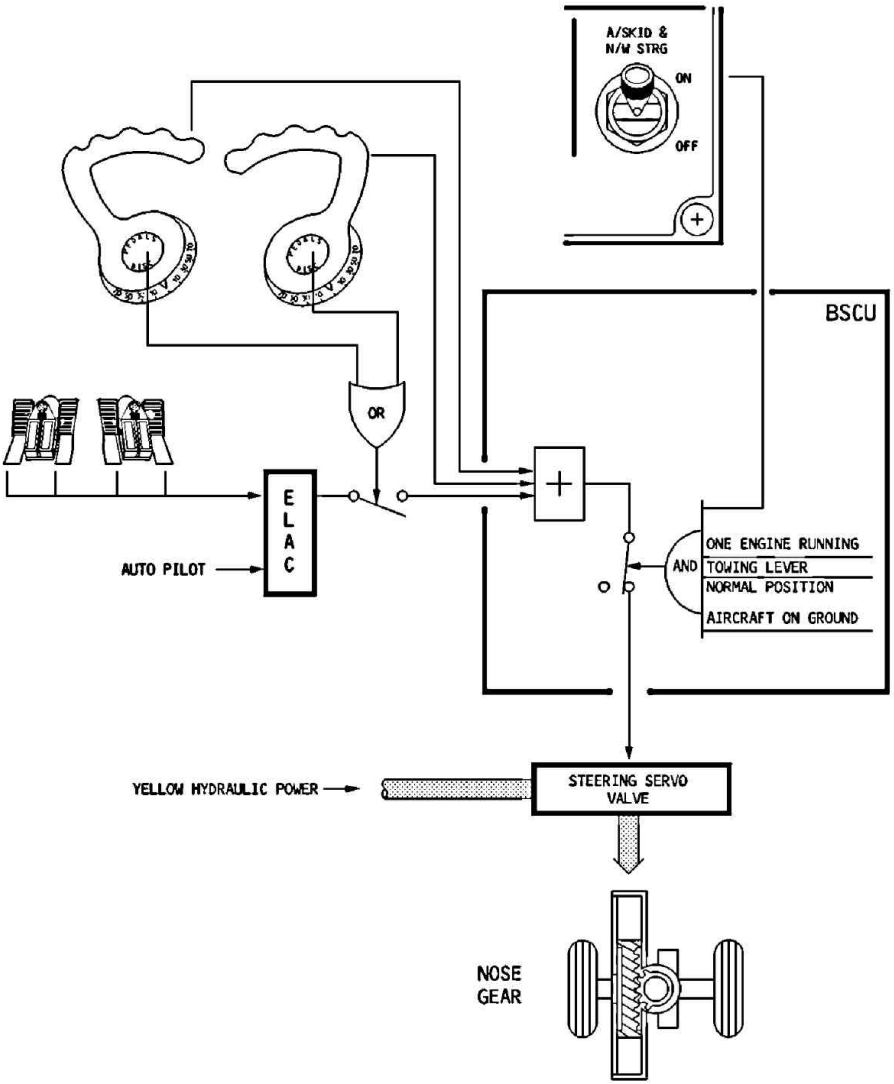
ARCHITECTURE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN



ARCHITECTURE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



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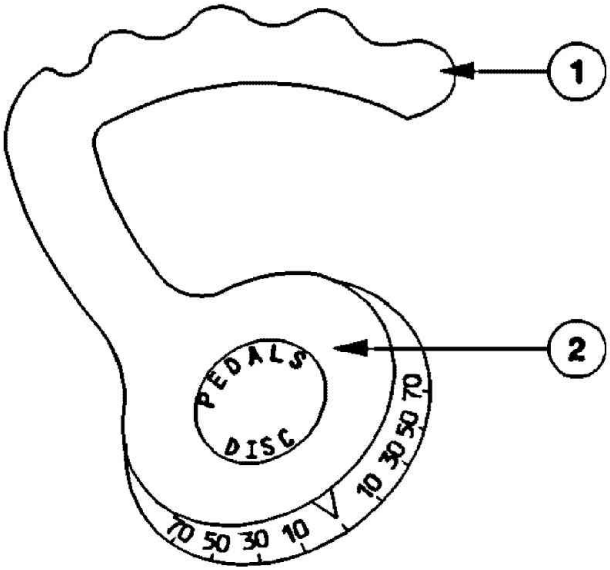
SIDE CONSOLES

Applicable to: ALL



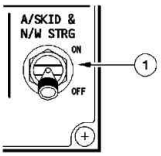
(1) Steering handwheels
The steering handwheels, which are interconnected, can steer the nose wheel up to 75 ° in either direction.

Note: The steering system centers the nose wheel automatically after liftoff.

(2) Rudder PEDAL DISC pb
Pressing this button on either handwheel removes control of nose wheel steering from the rudder pedals until the button is released.

CENTER INSTRUMENT PANEL

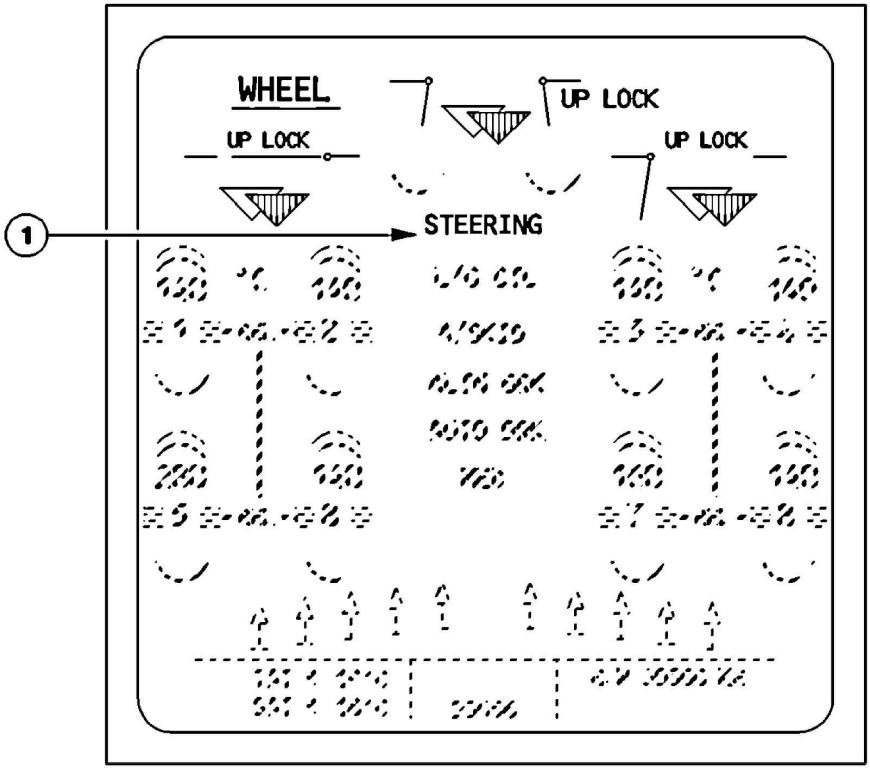
Applicable to: ALL



(1) A/SKID &N/W STRG sw
This ON/OFF switch activates or deactivates the nose wheel steering and anti-skid. (*Refer to DSC-32-30-10 General*).

ECAM WHEEL PAGE

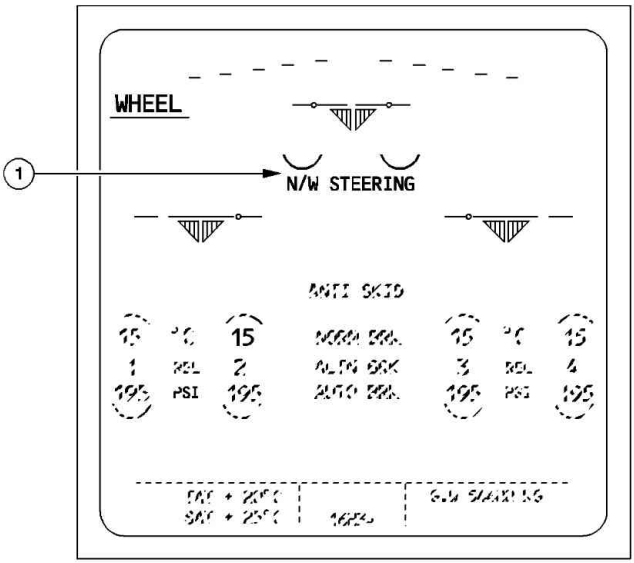
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



(1) STEERING
This legend appears along with an ECAM caution if either the nose wheel steering or the anti-skid feature fails.

ECAM WHEEL PAGE

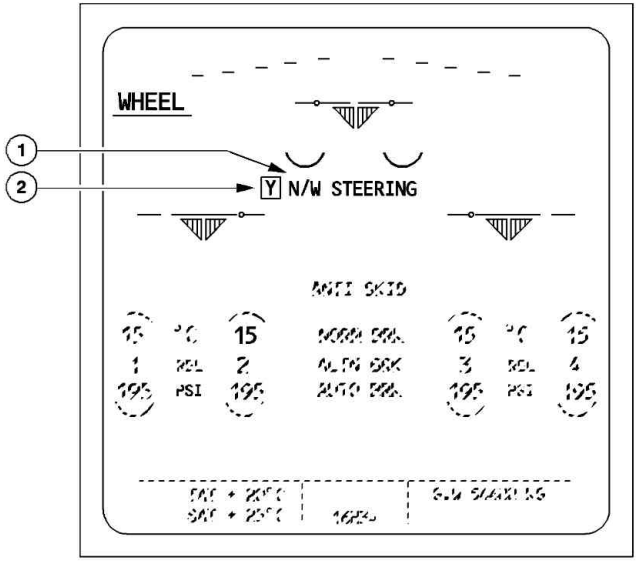
Applicable to: B-HSL, B-HSM, B-HSN



(1) N/W STEERING label
It appears in amber, when nosewheel steering is lost, due to failure of the nosewheel steering system, or of both BSCU channels, or when the A/SKID & N/W STRG switch is OFF.

ECAM WHEEL PAGE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) N/W STEERING label

It appears in amber, when nosewheel steering is lost, due to failure of the nosewheel steering system, or of both BSCU channels, or in case of a yellow hydraulic system low pressure, or if the A/SKID & N/W STRG switch is OFF.

(2) N/W STEERING hydraulic supply indication :

Only when the N/W STEERING label is displayed :

- Y is displayed in green in case the yellow hydraulic system is not failed.
- Y is displayed in amber in case of yellow hydraulic system low pressure.

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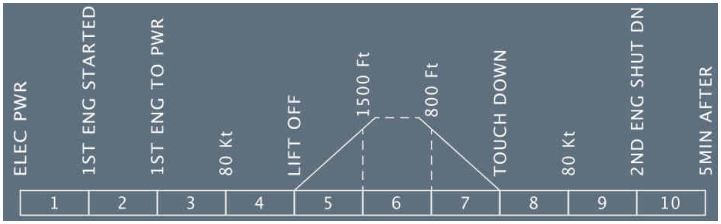
WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
NW STRG FAULT detected by BSCU	SINGLE CHIME	MASTER CAUT	WHEEL	NIL	3, 4, 5, 8

MEMO DISPLAY

When the nose wheel steering selector is in the towing position, this display shows “NW STRG DISC” in green. The legend is amber if one engine is running.

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BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
BRAKES	BSCU CH 1	AC1	DC1			
	BSCU CH 2	AC2	DC2			

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GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The main wheels are equipped with carbon multidisc brakes, which can be actuated by either of two independent brake systems.
The normal system uses green hydraulic pressure, whereas the alternate system uses the yellow hydraulic system backed up by the hydraulic accumulator.
An anti-skid and autobrake system is also provided.
Braking commands come from either the brake pedals (pilot action), or the autobrake system (deceleration rate selected by the crew).
Two units on each main gear monitor the temperature of the brakes.
All braking functions (normal and alternate braking control, anti-skid control, autobraking, brake temperature indication) are controlled by a two-channel Brake and Steering Control Unit (BSCU).
The main wheels have fusible plugs that prevent the tires from bursting if they overheat.
The main wheels may also have brake cooling fans ◁❄ .

GENERAL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The main wheels are equipped with carbon multidisc brakes, which can be actuated by either of two independent brake systems.
The normal system uses green hydraulic pressure, whereas the alternate system uses the yellow hydraulic system backed up by the hydraulic accumulator.
An anti-skid and autobrake system is also provided.
Braking commands come from either the brake pedals (pilot action), or the autobrake system (deceleration rate selected by the crew).
In normal operation, a dual channel Brake and Steering Control Unit (BSCU) controls normal braking and antiskid.

Depending on the failure, braking may revert to:
- Alternate braking with antiskid. This braking mode is controlled by the Alternate Braking Control Unit (ABCU). The antiskid is controlled by the BSCU.
- Alternate braking without antiskid. This braking mode is fully-controlled by the ABCU.
- Alternate braking without antiskid on accumulator. This braking mode is fully-controlled by the ABCU.

All the normal and alternate braking components are fully-monitored. Any detected failure is signaled to the crew via ECAM warnings.

The BSCU performs the following secondary functions:
- It checks the residual pressure in the brakes,
- It monitors the brake temperature,
- It provides discrete wheel speed information to other aircraft systems.

A changeover between the two BSCU channels takes place at each DOWN landing gear lever selection, or in case one channel fails.
The main gear wheels are fitted with fusible plugs which protect against tire burst, in the event of overheat.
Main gear wheels are also equipped with brake cooling fans ◁ , which permit a high speed cooling of brakes.

ANTI-SKID SYSTEM

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The antiskid system provides maximum braking efficiency by maintaining the wheels at the limit of an impending skid.
When a wheel is on the verge of locking, the system sends brake release orders to the normal and alternate servovalves - and to the ECAM, which displays the released brakes.
The antiskid system is deactivated below 20 kt (ground speed).
An ON/OFF switch activates, or deactivates, the antiskid and nosewheel steering systems.

1 **PRINCIPLE**

The speed of each main gear wheel (given by a tachometer) is compared to the aircraft speed (reference speed). When the speed of a wheel decreases below approximately 0.87 times (depending on conditions) reference speed, brake release orders are given to maintain the wheel slip at that value (best braking efficiency).
In normal operation, the reference speed is determined by the BSCU from the horizontal acceleration of ADIRU 1, 2 or 3.
In case all ADIRUs fail, reference speed equals the maximum of either main landing gear wheel speeds.

ANTI-SKID SYSTEM

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The antiskid system provides maximum braking efficiency by maintaining the wheels at the limit of an impending skid.
At skid onset, brake release orders are sent to the normal and alternate servovalves, as well as to the ECAM system which displays the released brakes.
Full braking performance is achieved only with brake pedals at full deflection.
The antiskid system is deactivated below 20 kt (ground speed).

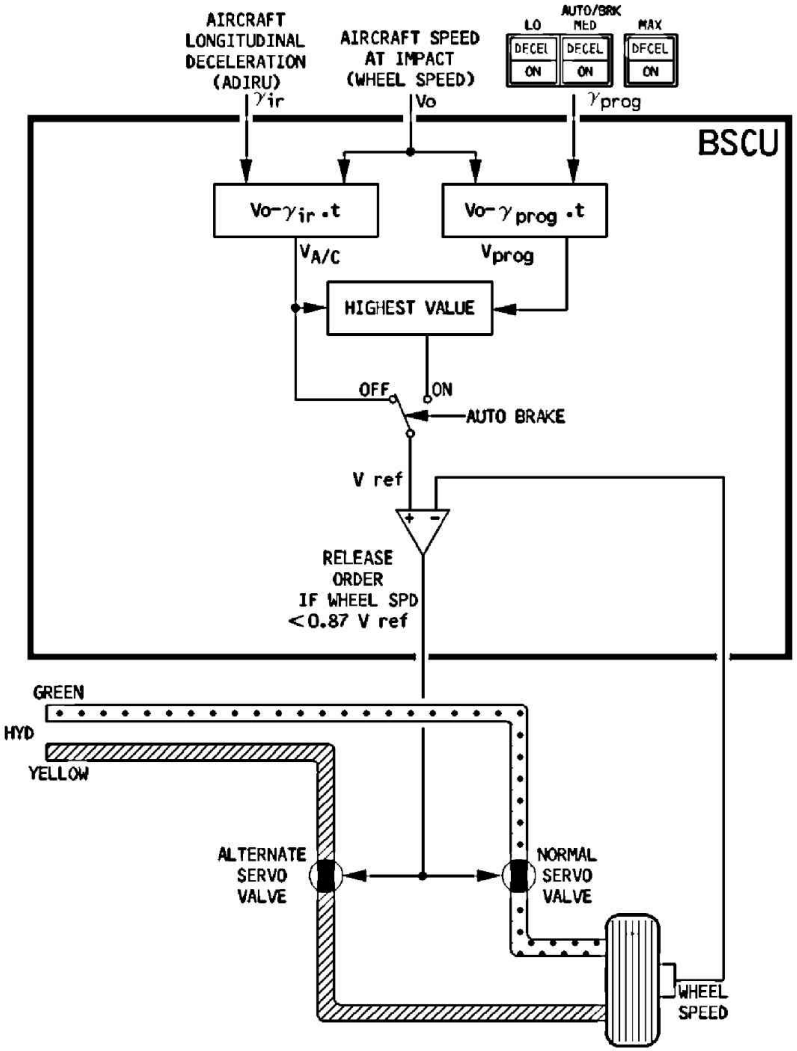
An ON/OFF switch activates, or deactivates, the antiskid and nosewheel steering systems.

2 **PRINCIPLE**

The speed of each main gear wheel (given by a tachometer) is compared to the aircraft speed (reference speed). When the speed of a wheel decreases below approximately 0.87 times (depending on conditions) reference speed, brake release orders are given to maintain the wheel slip at that value (best braking efficiency).
In normal operation, the reference speed is determined by the BSCU from the horizontal acceleration of ADIRU 1, 2 or 3.
In case all ADIRUs fail, reference speed equals the maximum of either main landing gear wheel speeds.

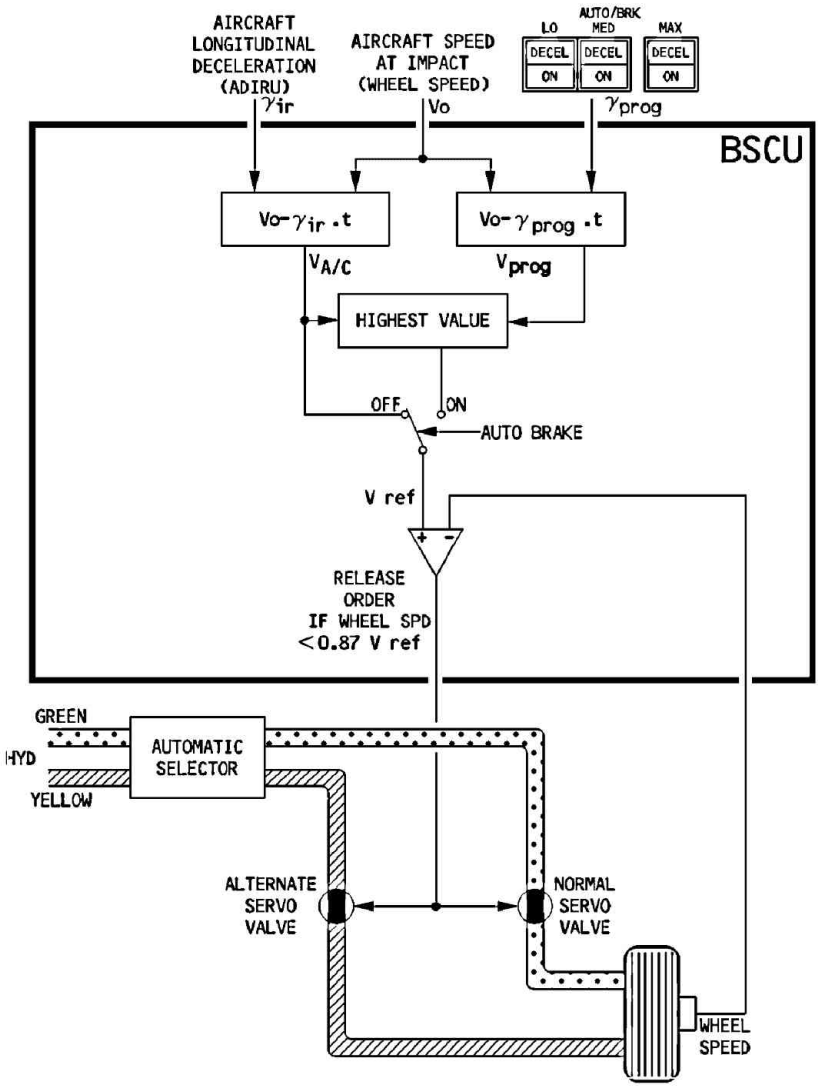
ANTI-SKID PRINCIPLE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



ANTI-SKID PRINCIPLE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN


AIRCRAFT LONGITUDINAL DECELERATION (ADIRU)
γir
AIRCRAFT SPEED AT IMPACT (WHEEL SPEED)
Vo
AUTO/BRK
LO
MED
MAX
DECEL
ON
γprog
BSCU
Vo-γir .t
Vo-γprog .t
VA/C
Vprog
HIGHEST VALUE
OFF
ON
AUTO BRAKE
V ref
RELEASE ORDER IF WHEEL SPD <0.87 V ref
GREEN
HYD
YELLOW
AUTOMATIC SELECTOR
ALTERNATE SERVO VALVE
NORMAL SERVO VALVE
WHEEL SPEED

AUTO BRAKE - GENERAL

Applicable to: ALL

GENERAL

The purposes of this system are :
- to reduce the braking distance in case of an aborted takeoff
- to establish and maintain a selected deceleration rate during landing, thereby improving passenger comfort and reducing crew workload.

SYSTEM ARMING

The system arms when the crew presses the LO, MED, or MAX pushbutton switch if:
- Green pressure is available.
- The anti-skid system has electric power.
- There is no failure in the braking system.
- At least one ADIRS is functioning.

Note: 1. Auto brake may be armed with the parking brake on.
2. MAX autobrake mode cannot be armed in flight.

SYSTEM ACTIVATION

Automatic braking is activated:
- at the command for ground spoilers extension (*Refer to DSC-27-10-20 Speed Brakes and Ground Spoilers - Speed Brake Control*), for LO and MED mode.
- at the command for ground spoilers extension and the aircraft speed is above 40 kt, for MAX mode.

Therefore, if the aircraft makes an acceleration stop and begins to decelerate when its speed is under 72 kt, the automatic braking will not activate because the ground spoilers will not extend. For autobrake to activate, at least two SEC's must be operative.

SYSTEM DEACTIVATION

The system deactivates :
- When it is disarmed (*Refer to DSC-32-30-10 Auto Brake - System Disarming*).
- When the ground spoilers retract. In this case it remains armed.

SYSTEM DISARMING

The system disarms when:
- Flight crew presses the pushbutton switch or,
- One or more arming conditions is lost or,
- Flight crew applies enough deflection to at least one brake pedal when autobrake is active in MAX, MED or LO mode.
- After take-off/touch and go.

OPERATION - GENERAL

Applicable to: ALL

GENERAL

There are four modes of operation :
- Normal braking,
- Alternate braking with antiskid,
- Alternate braking without antiskid,
- Parking brake.

Applicable to: ALL

NORMAL BRAKING

Braking is normal when :
- Green hydraulic pressure is available.
- The A/SKID & N/W STRG switch is ON.

During normal braking, antiskid operates and autobrake is available.

Braking is electrically-controlled through the BSCU :
- From the pilot's pedals, or
- Automatically :
  - On ground by the autobrake system,
  - In flight when the landing gear lever is up.

The antiskid system is controlled by the BSCU via the normal servo valves.
There is no brake pressure indication in the cockpit.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

ALTERNATE BRAKING WITH ANTI-SKID

Autobrake is inoperative.

Braking uses this mode when green hydraulic pressure is insufficient, and :
- Yellow hydraulic pressure is available.
- The A/SKID & N/W STRG switch is ON.
- The parking brake is not ON.

An automatic hydraulic selector changes from the green to the yellow system.
The pedals brake through the auxiliary low-pressure hydraulic distribution line acting on the dual valves. The BSCU controls the anti-skid system via the alternate servo valves.
A triple indicator on the center instrument panel shows the pressure delivered to the left and right brakes, as well as the accumulator pressure.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

ALTERNATE BRAKING WITH ANTI-SKID

Autobrake is inoperative.

Braking uses this mode when green hydraulic pressure is insufficient, and :
- Yellow hydraulic pressure is available.
- The A/SKID & N/W STRG switch is ON.
- The parking brake is not ON.

Braking inputs are made by the brake pedals and sent to the ABCU. Then, taking into account the brake pedal input, the ABCU:
- Energizes the alternate brake selector valve to pressurize the yellow hydraulic circuit,
- Electrically controls the Alternate Servo Valve to obtain the correct pressure for the related brakes.

Antiskid is controlled by the BSCU.
Brake pressure, as well as accumulator pressure, are indicated on a triple indicator located on the center instrument panel.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

ALTERNATE BRAKING WITHOUT ANTI-SKID

The anti-skid system can be deactivated:
- electrically (A/SKID & N/W STRG sw OFF, or power failure or BSCU failure),
- hydraulically (low pressure in both green and yellow systems, brakes being supplied by the brake accumulator only).

The pilot controls the braking with the pedals (acting on the dual valves).
Alternate servo valves are fully open.
The pilot must refer to the triple indicator to limit brake pressure in order to avoid locking a wheel.
The accumulator can supply at least 7 full brake applications.
Autobrake is inoperative.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

ALTERNATE BRAKING WITHOUT ANTI-SKID

Autobrake and antiskid are inoperative.

The antiskid system is either deactivated:
- Electrically (A/SKID & N/W STRG sw OFF, or power supply failure, or BSCU failure), or
- Hydraulically (Y + G system low pressure, the brakes are supplied by the brake accumulator only).

Depending on the brake pedals' demand, the ABCU controls the alternate brake selector and the alternate servovalves.
Brake pressure and accumulator pressure are indicated on a triple indicator, located on the center instrument panel.
To avoid wheel locking and limit the risk of tire burst, brake pressure is automatically limited to 1 000 PSI.
Accumulators are designed to supply at least seven full brake applications.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

PARKING BRAKE

Brakes are supplied by the yellow hydraulic system, or by accumulator via the dual shuttle valves.
Alternate servo valves open allowing full pressure application.
The accumulator maintains the parking pressure for at least 12 h.
If the parking brake is activated and no yellow hydraulic or accumulator brake pressure is available, then the normal braking system can be applied via the brake pedals.
Yellow accumulators can be pressurized by pressing the yellow electrical pump switch.
Brake pressure indications are available on a triple indicator.

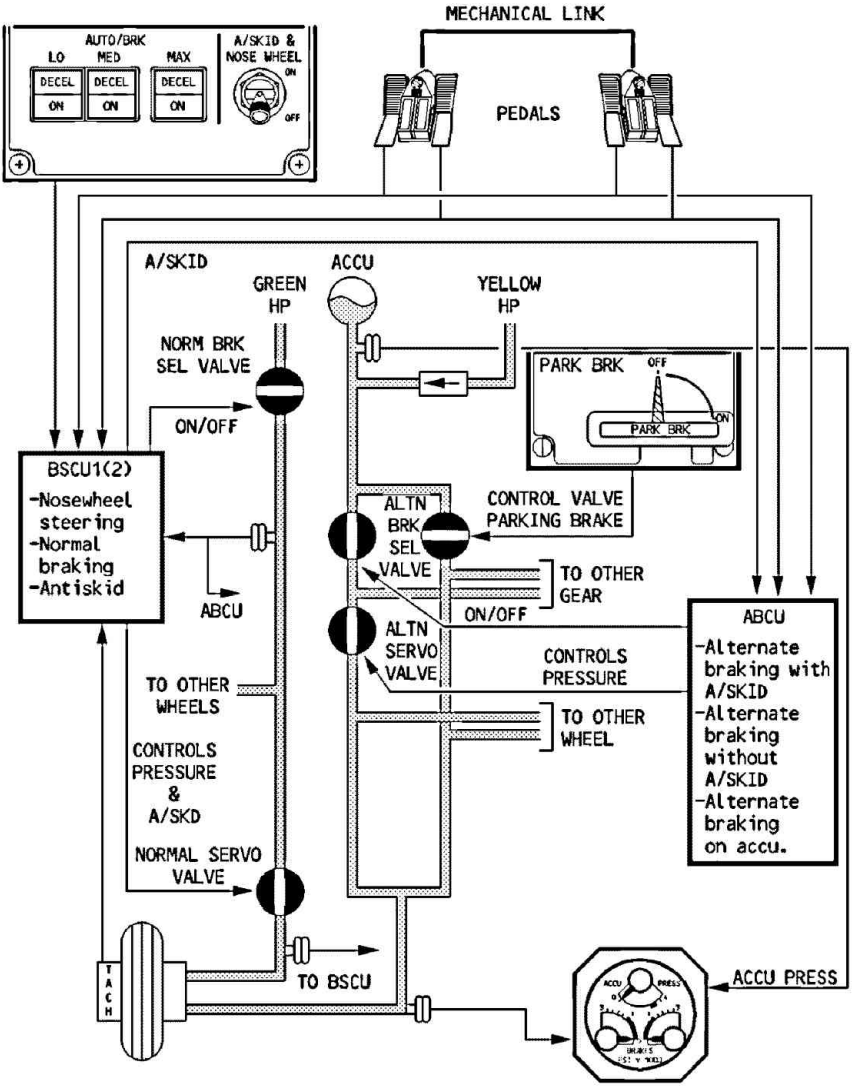
Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

PARKING BRAKE

Brakes are supplied by the yellow hydraulic system, or by accumulator pressure via the parking brake control valve, which opens allowing full pressure application on the main gear wheel brakes.
The accumulator maintains the parking pressure for at least 12 h.
If the parking brake is activated and no yellow hydraulic or accumulator brake pressure is available, then the normal braking system can be applied via the brake pedals.
Yellow accumulators can be pressurized by pressing the yellow electrical pump switch.
Brake pressure and accumulator pressure are indicated on a triple indicator, located on the center instrument panel.

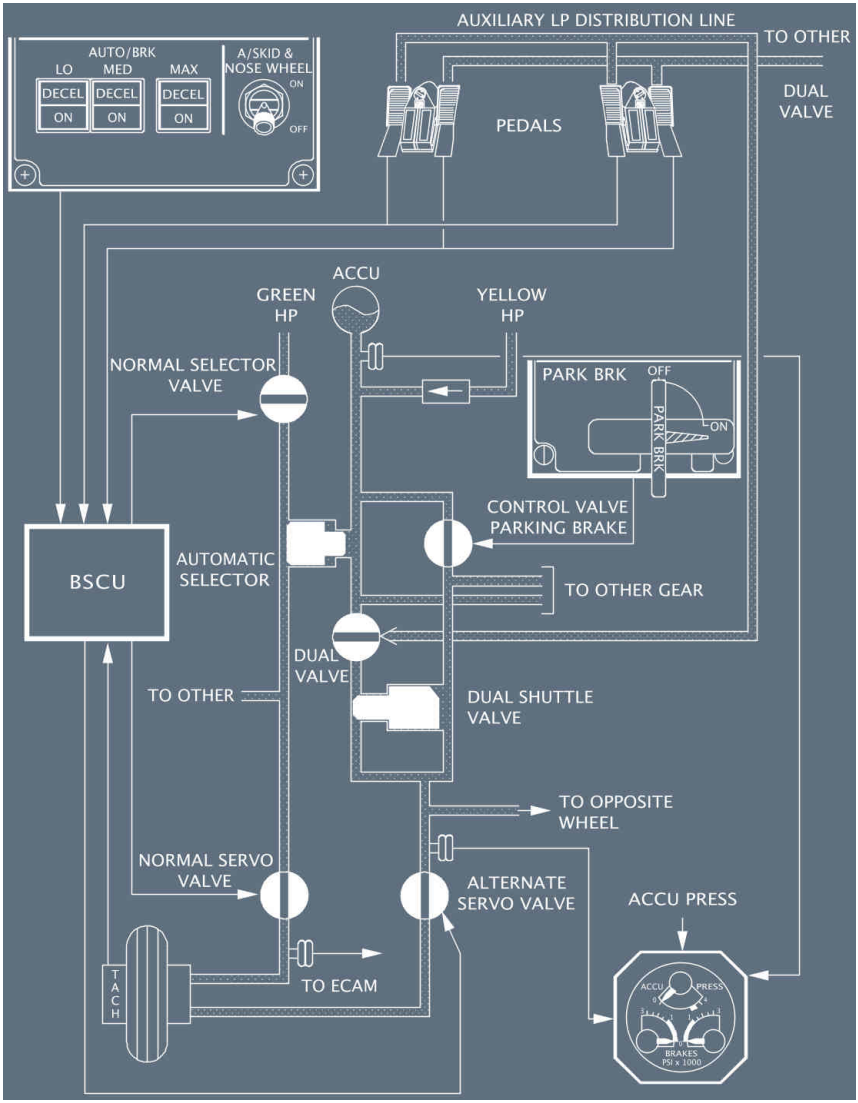
BRAKING SCHEMATIC

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU


MECHANICAL LINK
AUTO/BRK
LO
MED
MAX
DECEL
ON
A/SKID & NOSE WHEEL
ON
OFF
PEDALS
A/SKID
ACCU
GREEN HP
YELLOW HP
NORM BRK SEL VALVE
ON/OFF
PARK BRK
OFF
ON
BSCU1(2)
-Nosewheel steering
-Normal braking
-Antiskid
ABCU
ALTN BRK SEL VALVE
CONTROL VALVE PARKING BRAKE
TO OTHER GEAR
ON/OFF
ALTN SERVO VALVE
CONTROLS PRESSURE
TO OTHER WHEEL
ABCU
-Alternate braking with A/SKID
-Alternate braking without A/SKID
-Alternate braking on accu.
TO OTHER WHEELS
CONTROLS PRESSURE & A/SKD
NORMAL SERVO VALVE
TACH
TO BSCU
ACCU PRESS

BRAKING SCHEMATIC

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN



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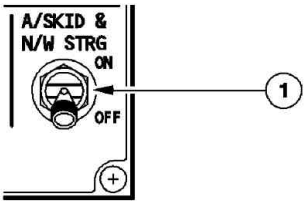
CENTER INSTRUMENT PANEL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN



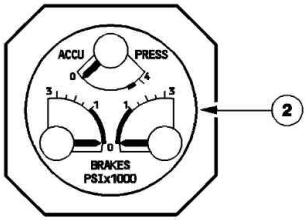
(1) A/SKID & N/W STRG switch

ON : If green hydraulic pressure is available :
- Antiskid is available.
- Nosewheel steering is available.

If green hydraulic pressure is lost, then :
- Yellow hydraulic pressure automatically takes over to supply the brakes,
- Antiskid remains available.
- Nosewheel steering is lost.
- The triple indicator shows yellow system brake pressure.

OFF : The yellow hydraulic system supplies pressure to the brakes.

- Antiskid is deactivated. The pilot must refer to the triple indicator to limit brake pressure and avoid locking a wheel.
- Nosewheel steering is lost.
- Differential braking remains available through the pedals.
- The triple indicator displays yellow system brake pressure.



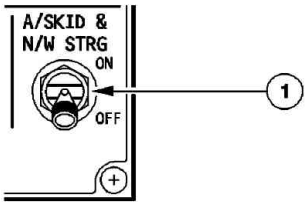
(2) BRAKES and ACCU PRESS indicator

ACCU PRESS : Indicates the pressure in the yellow brake accumulator.

BRAKES : Indicates the yellow pressure delivered to the left and right brakes, as measured upstream of the alternate servovalves.

CENTER INSTRUMENT PANEL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) A/SKID & N/W STRG sw

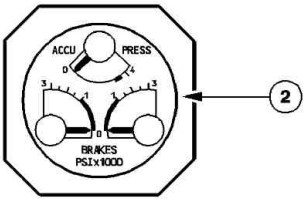
ON : If green hydraulic pressure is available, then antiskid is available.

If green hydraulic pressure is lost, then :

- Yellow hydraulic pressure automatically takes over to supply the brakes,
- Antiskid and nosewheel steering remain available.
- The triple indicator shows yellow system brake pressure.

OFF : The yellow hydraulic system supplies pressure to the brakes.

- Antiskid is deactivated. The pilot must refer to the triple indicator to limit brake pressure and avoid locking a wheel.
- Nosewheel steering is lost.
- Differential braking remains available through the pedals.
- The triple indicator displays yellow system brake pressure.



(2) BRAKES and ACCU PRESS indicator

Brake pressure is only indicated when the yellow hydraulic system controls the brake pressure, which means when the :

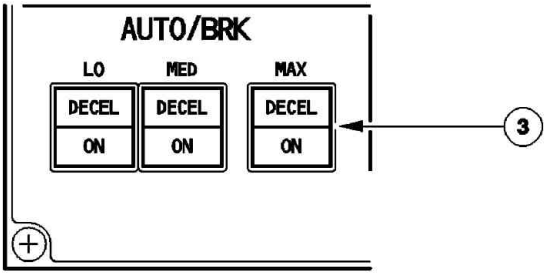
- Alternate braking system is activated, or
- Parking brake is applied.

ACCU PRESS : Indicates the pressure in the yellow brake accumulator.

BRAKES : Indicates the yellow pressure delivered to the left and right brakes, as measured upstream of the alternate servovalves.

AUTO BRK PANEL

Applicable to: ALL



(3) AUTO/BRK panel

The springloaded MAX, MED, and LO pushbutton switches arm the appropriate deceleration rate:

- MAX mode is normally selected for takeoff.
  In the case of an aborted takeoff, maximum pressure goes to the brakes, as soon as the system generates the ground spoiler deployment order.
- MED or LO mode is normally selected for landing:
  - LO mode sends progressive pressure to the brakes 4 s after the ground spoilers deploy, in order to decelerate the aircraft at 1.7 m/s? (5.6 ft/s?).
  - MED mode sends progressive pressure to the brakes 2 s after the ground spoilers deploy in order to decelerate the aircraft at 3 m/s? (9.8 ft/s?).
- Lights:
  - The blue ON light comes on to indicate positive arming.
  - The green DECEL light comes on when the actual deceleration is 80 % of the selected rate.

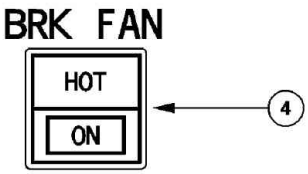
    Note: On slippery runways, the predetermined deceleration may not be reached, due to antiskid operation. In this case, the DECEL light will not come on. This does not mean that autobrake is not working.

  - Off : The corresponding autobrake mode is not armed.

BRAKE FANS

Applicable to: ALL

1



(4) BRK FAN pb sw

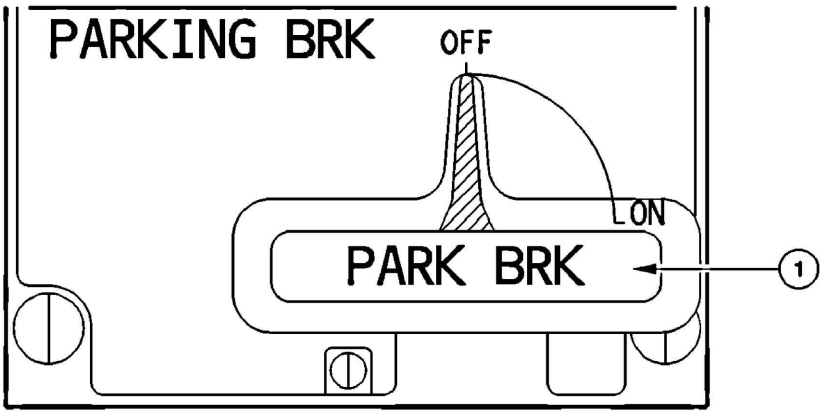
ON : The brake fans run if the lefthand main landing gear is down and locked.

OFF : The brake fans stop.

HOT lt : This amber light comes on when the brakes get too hot. (A caution appears on ECAM, also).

PEDESTAL

Applicable to: ALL



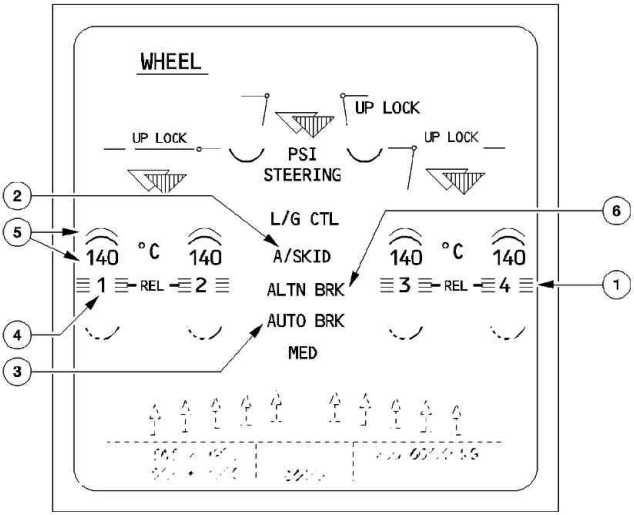
(1) PARKING BRK handle

Flight crew pulls this handle, then turns it clockwise, to apply the parking brake.
The ECAM memo page displays “PARK BRK”.

CAUTION	If the pointer is not at ON, the parking brake is not on.

ECAM WHEEL PAGE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



(1) Release indicators

These green lines appear temporarily after the landing gear has been lowered to indicate that the anti-skid function is ready.
They reappear after touchdown, along with REL (blue), when the anti-skid is active.

(2) A/SKID

This legend appears in amber, along with an ECAM caution, in case of total BSCU failure, or when the A/SKID & N/W STRG sw is OFF, or if the BSCU detects an ANTI-SKID failure.

(3) AUTO BRK

This legend appears:
- in green when auto brake is armed,
- flashing green for 10 s after autobrake disengagement.
- in amber, along with an ECAM caution, to indicate a system failure.

MED, LO, or MAX appears underneath in green to show which rate has been selected.

(4) Wheel number

This white number identifies individual wheels of the main landing gear.

(5) Brake temperature

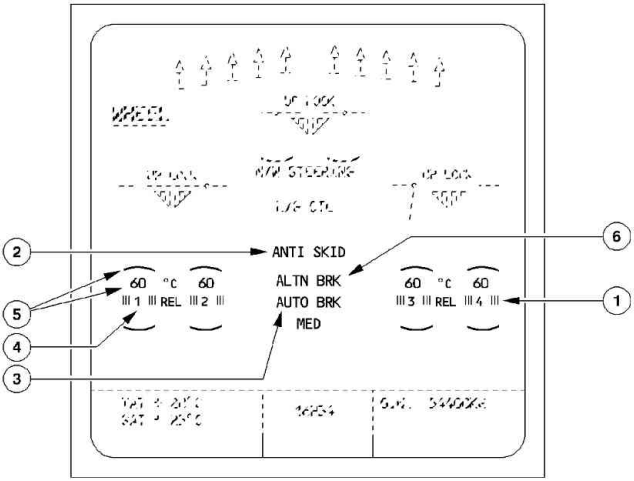
- The temperature normally appears in green.
- The green arc appears on the hottest wheel when one brake temperature exceeds 100 °C.
- The green arc becomes amber, and an ECAM caution appears, when the corresponding brake temperature exceeds 300 °C.

(6) ALTN BRK

This legend appears in green if the braking system is in alternate mode.

ECAM WHEEL PAGE

Applicable to: B-HSL, B-HSM, B-HSN



(1) Release indicators

These green lines appear temporarily after the landing gear has been lowered to indicate that the anti-skid function is ready.
They reappear after touchdown when the anti-skid is active.

(2) ANTI SKID

This legend appears in amber, along with an ECAM caution, in case of total BSCU failure, or when the A/SKID & N/W STRG switch is OFF, or if the BSCU detects an ANTI-SKID failure.

(3) AUTO BRK

This legend appears:
- in green when auto brake is armed,
- flashing green for 10 s after autobrake disengagement.
- in amber, along with an ECAM caution, to indicate a system failure.

MED, LO, or MAX appears underneath in green to show which rate has been selected.

(4) Wheel number
This white number identifies individual wheels of the main landing gear.

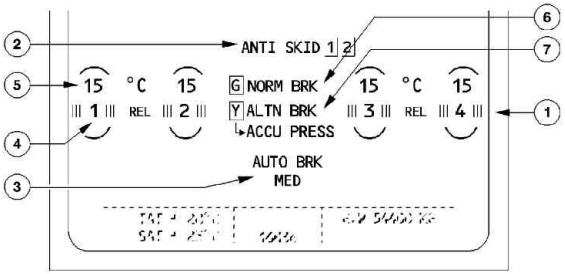
(5) Brake temperature

- The temperature normally appears in green.
- The green arc appears on the hottest wheel when one brake temperature exceeds 100 °C.
- The green arc becomes amber, and an ECAM caution appears, when the corresponding brake temperature exceeds 300 °C.

(6) ALTN BRK
This legend appears in green if the braking system is in alternate mode.

ECAM WHEEL PAGE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) Release indicators
It appears in amber in case of brake released fault.

(2) ANTI SKID indication



(A) ANTISKID label
It appears in amber, a long with an ECAM caution, in case of a total BSCU failure, or when the A/SKID & N/W STRG switch is OFF, or if the BSCU detects an ANTI-SKID failure, or in case of normal braking and yellow hydraulic system low pressure.
It appears in green in case of autobrake, normal braking, or alternate braking failure, and antiskid is still available.

(B) BSCU channel indication
When ANTISKID label is displayed, the number of the failed system(s) is (are) displayed in amber, if any.

(3) AUTO BRK

This legend appears:
- in green when auto brake is armed,
- flashing green for 10 s after autobrake disengagement.
- in amber, along with an ECAM caution, to indicate a system failure.

MED, LO, or MAX appears underneath in green to show which rate has been selected.

(4) Wheel number
This white number identifies individual wheels of the main landing gear.

(5) Brake temperature

- The temperature normally appears in green.
- The green arc appears on the hottest wheel when one brake temperature exceeds 100 °C.
- The green arc becomes amber, and an ECAM caution appears, when the corresponding brake temperature exceeds 300 °C.

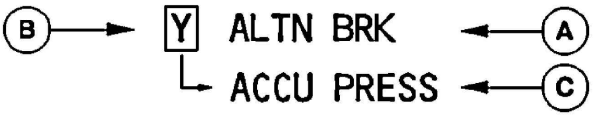
(6) NORM BRK indication



(A) NORM BRK label
This indication appears in green when autobrake or alternate braking is failed, and normal braking is still available.
The legend appears in amber when normal braking is failed due to total BSCU failure, or to the loss of the green hydraulic pressure, or to the loss of antiskid.

(B) NORM BRK hydraulic supply indication
G is displayed when the NORM BRK label is displayed. It is green when green hydraulic pressure is available and amber, in case of green hydraulic low pressure.

(7)



(A) ALTN BRK label
This indication appears in green, if the braking system is in alternate mode and not failed, or in case autobrake or normal braking is failed and alternate braking is still available.
This indication appears in amber when alternate braking is failed.

(B) ALTN BRK hydraulic supply indication
Y is displayed when the ALTN BRK label is displayed. It is green when yellow hydraulic pressure is available and amber, in case of yellow hydraulic low pressure.

(C) ACCU indications



(*) Appears in green, when the ALTN BRK label is displayed, and the yellow hydraulic pressure is available.
Appears in amber, with no arrow, when the yellow hydraulic system and the accumulator are in low pressure.

(**) Appears in green when the alternate braking is pressurized by the yellow accumulator.

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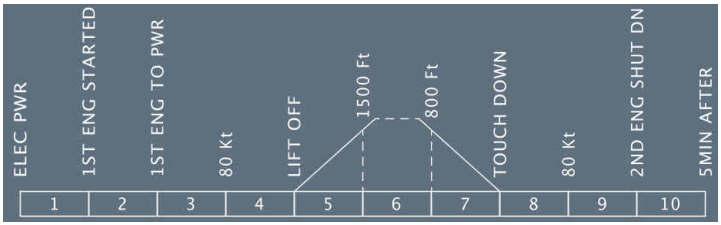
WARNINGS AND CAUTIONS

Applicable to: B-HSO, B-HSP

1



E/WD: FAILURE TITLE condition	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
CONFIG PARK BRK ON parking brake is on when thrust levers are set at TO or FLX TO power position	CRC	MASTER WARN	NIL	NIL	1, 2, 4 to 10
PARK BRK ON Parking brake is ON during flight.	SINGLE CHIME	MASTER CAUT			1 to 5, 8 to 10
BRAKES HOT It is triggered when one brake temperature is higher than 300 °C and off when the highest brake temperature is lower than 290 °C.			WHEEL	HOT lt on BRK FAN pb sw	4, 8 to 10
AUTO BRK FAULT failure of autobrake when armed				NIL	3 to 5
A/SKID NWS FAULT - Loss of normal brake system associated with Y HYD SYS lo PRESS or - Failure of both BSCU channels					4, 5
ANTI SKID/NWS OFF switch at OFF position					4, 5
HYD SEL FAULT failure of brake normal selector valve or NWS selector valve in open position			NIL		3 to 5, 7, 8
SYS 1 (2) FAULT failure of one BSCU channel	NIL	NIL			

Continued on the following page

Continued from the previous page

E/WD: FAILURE TITLE condition	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
RELEASED Brake of one wheel is released. It is detected when the landing gear is downlocked and, at least one engine is running, and normal braking is active.	SINGLE CHIME	MASTER CAUT	WHEEL	NIL	4, 5
NORM BRK FAULT Normal braking function is lost.					3 to 5
ALTN BRK FAULT Alternate braking function is lost.	NIL	NIL			3, 4, 5, 7, 8
ALTN L(R) RELEASED Brakes of one gear is released. It is triggered when the landing gear is downlocked, and at least one engine is running, and alternate braking is active.	SINGLE CHIME	MASTER CAUT	NIL		3, 4, 5
NORM + ALTN FAULT Normal and alternate functions are lost. Parking brake available.			WHEEL		4, 5
BRK Y ACCU LO PR The yellow accumulator is in low pressure.					3, 4, 5, 7, 8
PARK BRK LO PR The yellow accumulator and hydraulic system pressures are low with parking brake on					3 to 8
BRAKES-NWS MINOR FAULT Single system failure, loss of redundancy	NIL	NIL	NIL		2 to 9

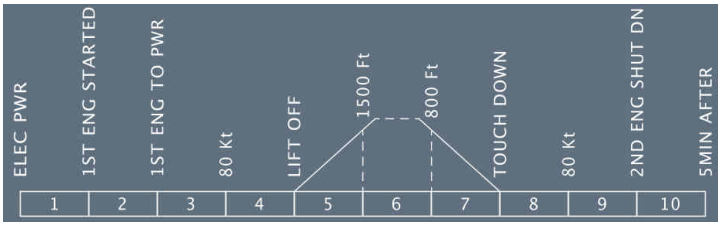
MEMO DISPLAY

- If the parking brake is ON, the “PARK BRK”memo appears in green, during flight phases 1, 2, 9, and 10.
- If the autobrake is armed, AUTO BRK LO, AUTO BRK MED, or AUTO BRK MAX appears.
- If the autobrake is faulty, "AUTO BRK OFF" appears.
- "BRK FAN" appears in green, if the BRK FAN pushbutton is ON.

WARNINGS AND CAUTIONS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

2



E/WD: FAILURE TITLE condition	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
CONFIG PARK BRK ON parking brake is on when thrust levers are set at TO or FLX TO power position	CRC	MASTER WARN	NIL	NIL	1, 2, 4 to 10
PARK BRK ON Parking brake is ON during flight.	SINGLE CHIME	MASTER CAUT			1 to 5, 8 to 10
BRAKES HOT It is triggered when one brake temperature is higher than 300 °C and off when the highest brake temperature is lower than 290 °C.			WHEEL	HOT lt on BRK FAN pb sw	4, 8 to 10
AUTO BRK FAULT failure of autobrake when armed				NIL	3 to 5
A/SKID NWS FAULT - Loss of normal brake system associated with Y HYD SYS lo PRESS or - Failure of both BSCU channels					4, 5
ANTI SKID/NWS OFF switch at OFF position					4, 5
HYD SEL FAULT failure of brake normal selector valve or NWS selector valve in open position			NIL		3 to 5, 7, 8
SYS 1 (2) FAULT failure of one BSCU channel	NIL	NIL			

MEMO DISPLAY

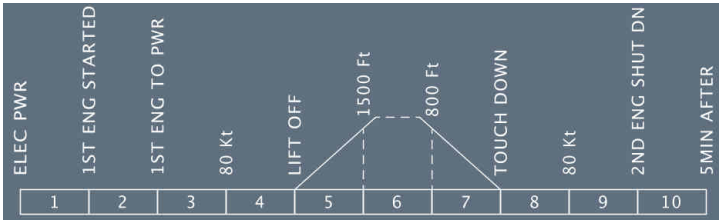
- If the parking brake is ON, the “PARK BRK”memo appears in green, during flight phases 1, 2, 9, and 10.
- If the autobrake is armed, AUTO BRK LO, AUTO BRK MED, or AUTO BRK MAX appears.

- If the autobrake is faulty, "AUTO BRK OFF" appears.
- "BRK FAN" appears in green, if the BRK FAN pushbutton is ON.

WARNINGS AND CAUTIONS

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

3



E/WD: FAILURE TITLE condition	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
CONFIG PARK BRK ON parking brake is on when thrust levers are set at TO or FLX TO power position	CRC	MASTER WARN	NIL	NIL	1, 2, 4 to 10
PARK BRK ON Parking brake is ON during flight.	SINGLE CHIME	MASTER CAUT			1 to 5, 8 to 10
BRAKES HOT It is triggered when one brake temperature is higher than 300 °C and off when the highest brake temperature is lower than 290 °C.			WHEEL	HOT lt on BRK FAN pb sw	4, 8 to 10
AUTO BRK FAULT failure of autobrake when armed				NIL	3 to 5
A/SKID NWS FAULT - Loss of normal brake system associated with Y HYD SYS lo PRESS or - Failure of both BSCU channels					4, 5
ANTI SKID/NWS OFF switch at OFF position					4, 5
HYD SEL FAULT failure of brake normal selector valve or NWS selector valve in open position			NIL		3 to 5, 7, 8
SYS 1 (2) FAULT failure of one BSCU channel	NIL	NIL			

Continued on the following page

Continued from the previous page

E/WD: FAILURE TITLE condition	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
RELEASED Brake of one wheel is released. It is detected when the landing gear is downlocked and, at least one engine is running, and normal braking is active.	SINGLE CHIME	MASTER CAUT	WHEEL	NIL	4, 5
NORM BRK FAULT Normal braking function is lost.					3 to 5
ALTN BRK FAULT Alternate braking function is lost.	NIL	NIL			3, 4, 5, 7, 8
ALTN L(R) RELEASED Brakes of one gear is released. It is triggered when the landing gear is downlocked, and at least one engine is running, and alternate braking is active.	SINGLE CHIME	MASTER CAUT	NIL		3, 4, 5
NORM + ALTN FAULT Normal and alternate functions are lost. Parking brake available.			WHEEL		4, 5
BRK Y ACCU LO PR The yellow accumulator is in low pressure.					3, 4, 5, 7, 8
PARK BRK LO PR The yellow accumulator and hydraulic system pressures are low with parking brake on					3 to 8
BRAKES-NWS MINOR FAULT Single system failure, loss of redundancy	NIL	NIL	NIL		2 to 9
PARK BRK FAULT	SINGLE CHIME	MASTER CAUT	WHEEL		3 to 8

MEMO DISPLAY

- If the parking brake is ON, the “PARK BRK”memo appears in green, during flight phases 1, 2, 9, and 10.
- If the autobrake is armed, AUTO BRK LO, AUTO BRK MED, or AUTO BRK MAX appears.
- If the autobrake is faulty, "AUTO BRK OFF" appears.
- "BRK FAN" appears in green, if the BRK FAN ◁ pushbutton is ON.

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BUS EQUIPMENT LIST

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
BRAKES	BSCU CH 1	AC1	DC1			
	BSCU CH 2	AC2	DC2			
	PARK BRK CTL	DC2	GRND/ FLT			HOT1
	PRESS INDICATOR				X	
	BRK FAN CTL		DC2			
	COOLING FANS (Wheels 1, 2, 3, 4)	AC2	DC2			
	COOLING FANS (bogie : Wheels 5, 6, 7, 8)	AC1	DC1			

BUS EQUIPMENT LIST

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
BRAKES	BSCU CH 1	AC1	DC1			
	BSCU CH 2	AC2	DC2			
	ABCU				X	X
	PARK BRK CTL		GRND/ FLT			HOT1
	PRESS INDICATOR				X	
	BRK FAN CTL		DC2			
	COOLING FANS (Wheels 1, 2, 3, 4)	AC2	DC2			
	COOLING FANS (bogie : Wheels 5, 6, 7, 8)	AC1	DC1			

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BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
TYRE PRESS	TIRE PRESS IND UNIT ◁		DC1			

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AIRCRAFT SYSTEMS

LIGHTS

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DSC-33-PLP PRELIMINARY PAGES

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DSC-33-40 Signs

DSC-33-40-10 Controls and Indicators
Overhead Panel ..... A
Memo Display ..... B

Localization Title	Toc Index	ID	Reason
DSC-33-10-20 Schematic	B	1	Improvement of illustration quality.
DSC-33-10-30 Overhead Panel	A	1	Improvement of illustration quality.
DSC-33-10-30 Maintenance Panel	B	2	Improvement of illustration quality.
DSC-33-10-30 Lateral Window	C	3	Improvement of illustration quality.
DSC-33-10-30 Pedestal	D	4	Improvement of illustration quality.
DSC-33-10-30 Glareshield	E	5	Improvement of illustration quality.
DSC-33-10-30 Main Inst Panel	F	6	Improvement of illustration quality.
DSC-33-30-10 Emergency Lighting Control Logic	C	1	Improvement of illustration quality.
DSC-33-30-10 Emergency Lighting Control Logic	C	2	Improvement of illustration quality.

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GENERAL

Applicable to: ALL

The instrument panel has both integral instrument lighting and flood lighting.
The brightness of all panel lighting is adjustable.
Incandescent spot lights and flood lights illuminate all work surfaces and the side consoles.
Two dimmable dome lights illuminate the overall cockpit. When the batteries are supplying all electrical power, only the righthand dome light is on line.

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DESCRIPTION

Applicable to: ALL

INTEGRATED LIGHTING FOR INSTRUMENTS AND PANELS

All instruments and panels in the cockpit (other than display units) have integral lighting.
The brightness of all integral lighting is adjustable.

ANNUNCIATOR LIGHTS

The ANN LT selector on the overhead panel controls the brightness of all the annunciator lights on the flight deck.
It sets the brightness of all annunciator lights at the same level.
Flight crew can test the annunciator lights by selecting the TEST position on the ANN LT selector and checking to see that all the annunciator lights come on.

DOME LIGHTS

Two dome lights give the cockpit shadow-free illumination.

MAPHOLDER LIGHTING

Each pilot's station has a lighted map and chart holder.

CONSOLE AND BRIEFCASE LIGHTING

Each pilot's station has lighting for the briefcase stowage, the side console, and the floor.

CENTER INSTRUMENT PANEL

Lights under the glareshield illuminate the center instrument panel.

STANDBY COMPASS

The standby compass has integral lighting.

READING LIGHTS

Each pilot's station has a reading light.

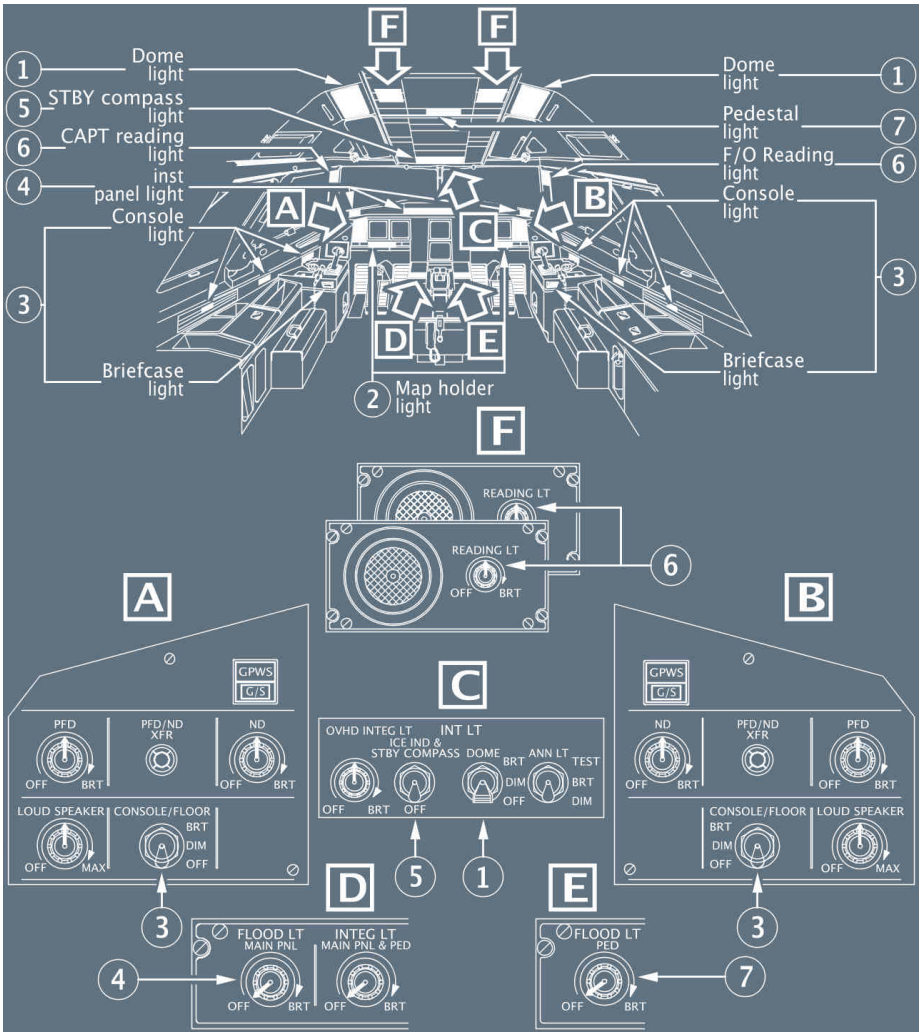
PEDESTAL LIGHTING

A flood light in the middle of the overhead panel illuminates the center pedestal.

SCHEMATIC

Applicable to: ALL

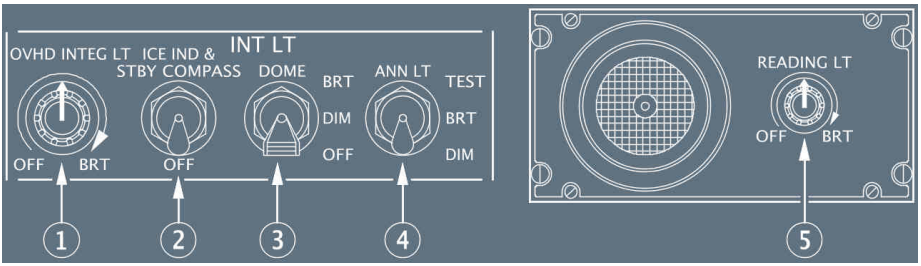
1



OVERHEAD PANEL

Applicable to: ALL

1



(1) OVHD INTEG LT knob
This knob turns the overhead panel's integral lighting on and off, and adjusts its brightness.

(2) ICE IND & STBY COMPASS sw
This switch turns the integral lighting for the standby compass and the visual indicator on and off.

(3) DOME selector
This switch controls both dome lights.

BRT : Both dome lights are on and bright.

DIM : Both dome lights are on and dim.

OFF : Both dome lights are off.

(4) ANN LT selector
This switch sets the brightness of all the cockpit annunciator lights at either "bright" or "dim", and also tests them.

TEST : Turns on all flight deck annunciator lights.
Displays 8's in all Liquid Crystal Displays (LCDs).

DIM : Reduces voltage to all annunciator lights.

BRT : Allows annunciators to function normally.

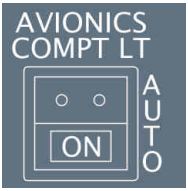
Note: Data transfer between the ECAM and the ND, and switching between the Electronic Instrument System and the Display Management Computer are not allowed during the ANN LT test.

(5) READING LT knob
The reading light on each side of the overhead panel has its own control knob that turns it on and off and adjusts its brightness.

MAINTENANCE PANEL

Applicable to: ALL

2

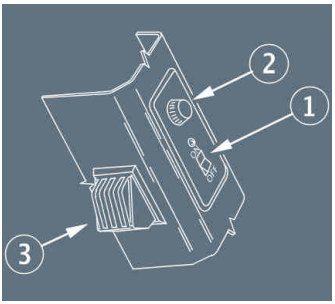


(1) AVIONICS COMPT LT pushbutton switch
AUTO : avionic compartment lighting is automatically controlled by door opening.
ON : avionic compartment lighting is on.

LATERAL WINDOW

Applicable to: ALL

3



(1) Reading LT knob (Captain and F/O).

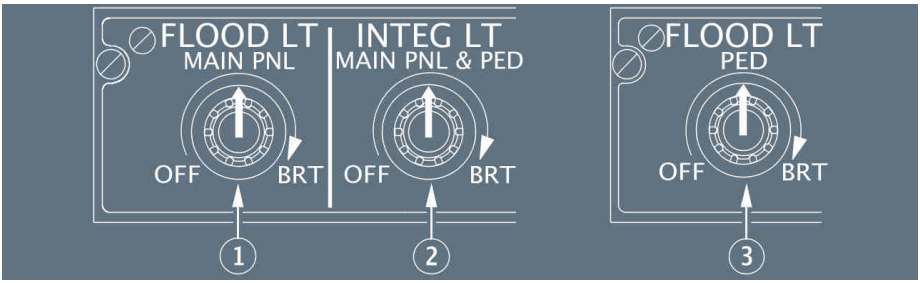
(2) Brightness adjustment

(3) Light

PEDESTAL

Applicable to: ALL

4



(1) FLOOD LT MAIN PANL knob
This knob adjusts the brightness of the flood lighting for the center instrument panel, and turns it on and off.

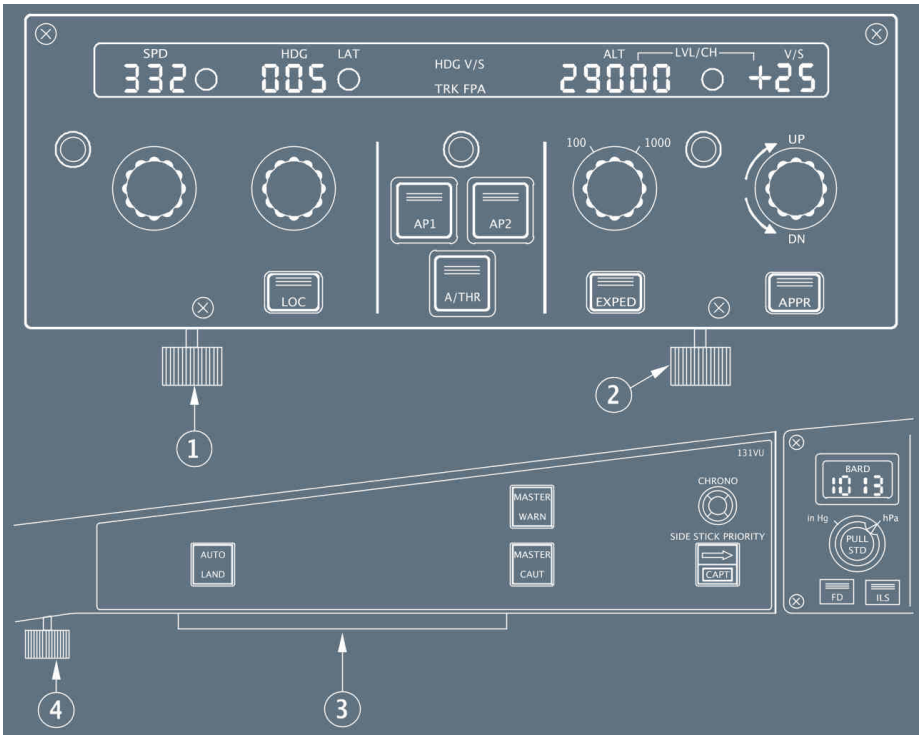
(2) INTEG LT MAIN PNL & PED knob
This knob adjusts the brightness of integral lighting for the main panel and pedestal, and turns it on and off.

(3) FLOOD LT PED knob
This knob adjusts the brightness of the flood lighting for the pedestal, and turns it on and off.

GLARESHIELD

Applicable to: ALL

5



(1) This knob adjusts the brightness of the integral lighting on the glareshield, and of the LEDs on the FCU.

(2) This knob adjusts the brightness of the FCU displays.

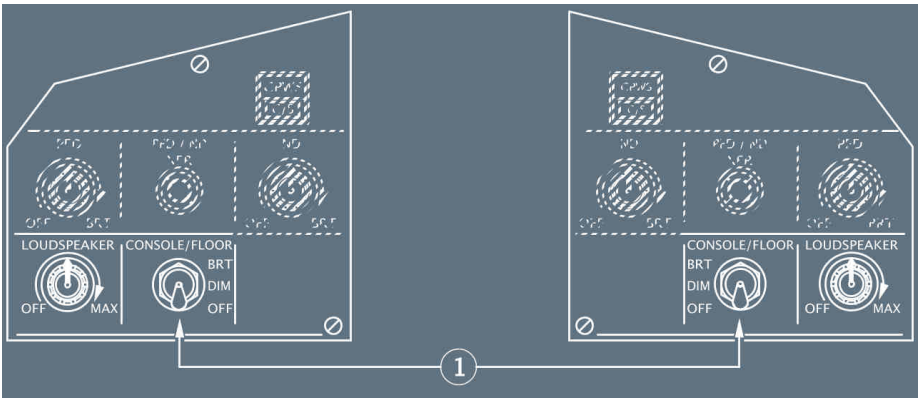
(3) This lighting illuminates the sliding table and map holder.

(4) This knob adjusts the brightness of the sliding table and map holder lighting.

MAIN INST PANEL

Applicable to: ALL

6



(1) CONSOLE/FLOOR switch

Each of these switches controls the lights for the side console and briefcase on one side of the cockpit, and for the floor around one of the pilot's seats. The lights can either be bright, dim, or off.

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BUS EQUIPMENT LIST

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
COCKPIT LIGHTS	Dome light	L		DC GND/ FLT			
		R				X	
	Console light	L		DC1			
		R		DC2			
	Main INST panel	L				X	
		R		DC1			
	STBY compass/ice ind					X	
	Supplementary reading light			DC1			
	Pedestal light			DC1			
	Reading light	L		DC1			
		R		DC2			
	Briefcase light	L		DC1			
		R		DC2			
	Map holder light	L		DC1			
		R		DC2			
	Floor light			DC1			
	INST, panels-integral light		AC1				
	Annunciator light		AC1, 2 and AC STAT INV				
	Annunciator light test/dim			DC2			

BUS EQUIPMENT LIST

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
COCKPIT LIGHTS	Dome light	L		DC GND/ FLT			
		R				X	
	Console light	L		DC 1			
		R		DC 2			
	Main INST panel	L				X	HOT 1 (1)
		R		DC 1			
	STBY compass light					X	
	Supplementary reading light			DC 1			
	Pedestal light			DC 1			
	Reading light	L		DC 1			
		R		DC 2			
	Briefcase light	L		DC 1			
		R		DC 2			
	Map holder light	L		DC 1			
		R		DC 2			
	Floor light			DC 1			
	INST, panels-integral light		AC 1				
	Annunciator light		AC 1, 2 and AC STAT INV				
	Annunciator light test/dim			DC 2			

(1) Backup supply

GENERAL

Applicable to: ALL

Exterior lighting includes :

- navigation lights
- landing lights
- runway turn off lights
- TO and TAXI lights
- logo lights
- anticollision lights
- wing and engine scan lights

Switches on the overhead panel control the exterior lighting.

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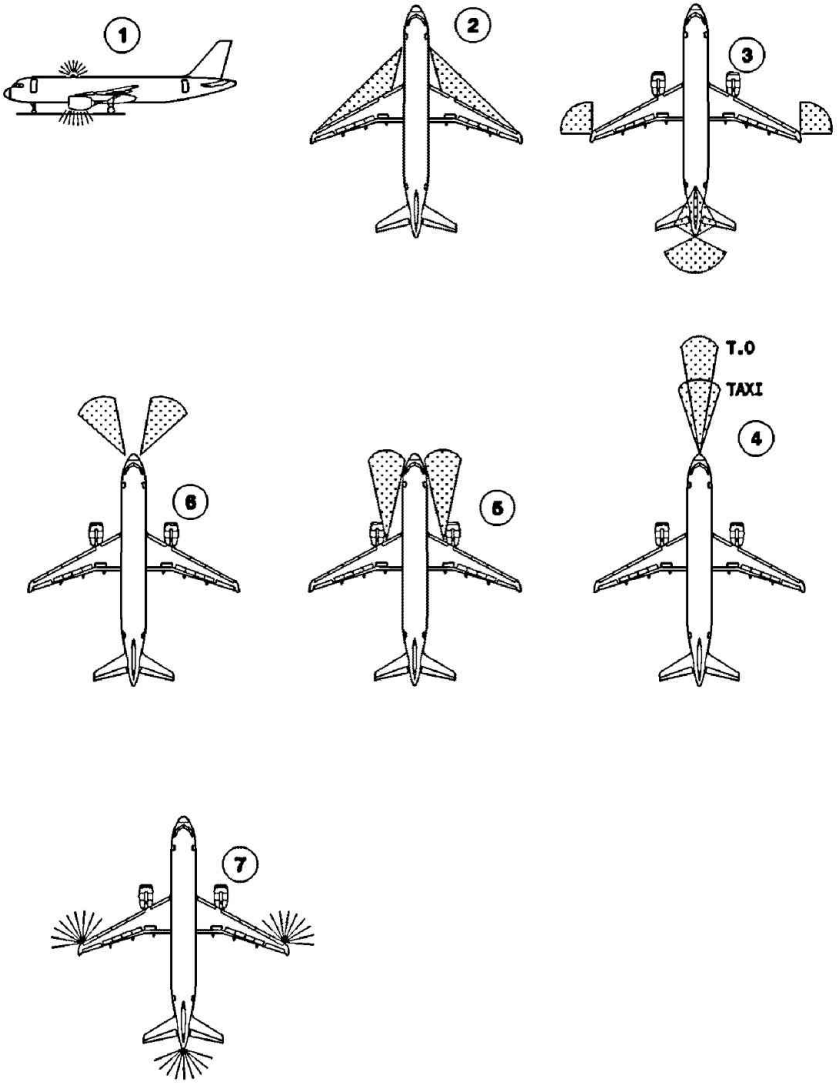
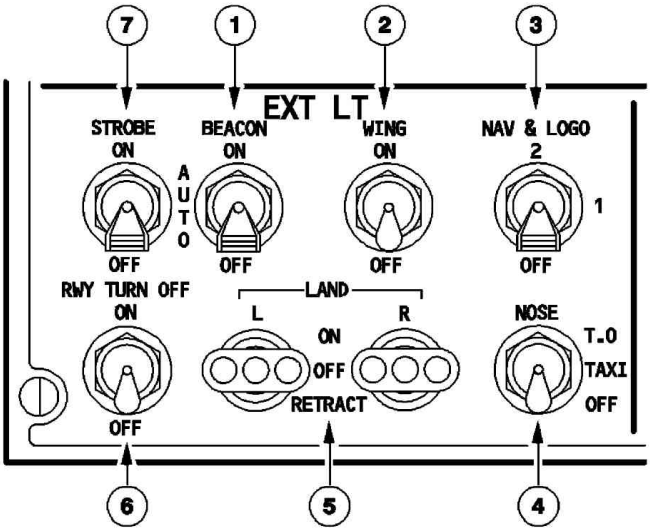
SCHEMATIC

Applicable to: ALL


1
2
3
T.O
TAXI
4
5
6
7

OVERHEAD PANEL

Applicable to: ALL



(1) BEACON sw

This switch turns on and off the two flashing red lights, one on top and one on the bottom of the fuselage.

(2) WING sw

This switch turns on and off two beam lights on each side of the fuselage. These lights illuminate the leading edge of the wing and the engine air intake to show if ice is accumulating there.

(3) NAV and LOGO sw

This switch turns the navigation lights on and off.
There are dual navigation lights on each wing tip and in the APU tail cone.
Logo lights are installed in the upper surface of each horizontal stabilizer to illuminate the company logo on the vertical stabilizer provided the main gear struts are compressed or the flaps are extended at least 15 °.

1	:	Turns on the logo lights and the first set of navigation lights.
2	:	Turns on the logo lights and the second set of navigation lights.
OFF	:	All lights are off.

(4) NOSE sw

This switch turns the taxi and takeoff lights on and off.

TO : Turns on both taxi and takeoff lights.

TAXI : Turns on only taxi light.

OFF : Taxi and takeoff lights off.

Note: These two lights, attached to the nose gear strut, go off automatically when landing gear is retracted.

(5) L and R LAND sel

These selectors control the landing light.

ON : Extends the (left or right) landing light which comes on automatically when fully extended.

OFF : Shut off the landing light but leaves it extended.

RETRACT : Retracts the landing light and shuts it off.

(6) RWY TURN OFF sw

This switch turns the runway turn-off lights on and off.

Note: These lights go off automatically when landing gear is retracted.

(7) STROBE sw

This switch turns on and off the three synchronized strobe lights, one on each wing tip and one below the tail cone.

ON : The strobe lights flash white.

AUTO : The strobe lights come on automatically when the main gear strut is not compressed.

OFF : The strobe light are off.

BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
EXTERIOR LIGHTS	Navigation lights	GRD/FLT				
	Landing lights L	AC1				
	Landing lights R	AC2				
	RWY turn off lights L	AC1	DC 2 (1)			
	RWY turn off lights R	AC2	DC 2 (1)			
	Taxi and TO lights	AC1	DC 2 (1)			
	Taxi and TO lights	AC2	DC 2 (1)			
	Logo lights L	AC1	DC 2 (1)			
	Logo lights R	AC2	DC 2 (1)			
	Beacon lights Upper	AC1				
	Beacon lights Lower	AC2				
	Strobe lights	AC2				
	Wing lights R	AC1				
	Wing lights L	AC2				

(1) *Supply for the light control*

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GENERAL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ

The emergency lighting system has:
- Proximity emergency escape path marking systems (escape path and exit markers),
- Overhead emergency lights,
- EXIT signs,
- Lavatory auxiliary lights,
- Overwing escape route lighting, and
- Escape slide lighting.

EXIT signs come on, if the cabin altitude gets too high, or (depending on the CIDS/CAM programming) if the NO SMOKING signs come on.
The proximity emergency escape path marking system, overhead emergency lighting and EXIT signs come on, if the EMER EXIT LT selector is ON, or if the EMER pb on the Purser panel is pressed.

- With the EMER EXIT LT selector at ARM:
  - The proximity emergency escape path marking system comes on, if:
    - Normal aircraft electrical power fails, or
    - DC SHED ESS BUS is lost.
  - The overhead emergency lights come on, if:
    - Normal aircraft electrical power system fails, or
    - DC SHED ESS BUS fails, or
    - AC BUS 1 fails.
  - Exit signs automatically come on, if:
    - Normal aircraft electrical power system fails, or
    - DC SHED ESS BUS fails.
- When lighted:
  - The proximity emergency escape path marking system is powered by internal batteries for at least 12 min.
  - DC SHED ESS BUS supply the overhead emergency lights and the EXIT signs.
    If DC SHED ESS BUS fails, batteries inside the light fixtures power all the lights.
  - DC SHED ESS BUS charge the internal batteries, if:
    - EMER LT selector is not at ON, and
    - The EMER pb on the Purser's panel is not pressed, and
    - DC SHED ESS BUS is supplied.
    - The NO SMOKING selector is OFF, or at AUTO with the landing gear retracted.

Lavatory auxiliary lights are always on. They are supplied by 28 V DC ESS BUS.

The escape slides have an integral lighting system. The escape slide lights and overwing route lights come on automatically when the slide is armed and the door or emergency exit is open. They are supplied by the internal batteries.

GENERAL

Applicable to: B-HTD, B-HTE, B-HTF

The emergency lighting system has:
- Proximity emergency escape path marking systems (escape path and exit markers),
- Overhead emergency lights,
- EXIT signs,
- Lavatory auxiliary lights, and
- Escape slide lighting.

EXIT signs come on, if the cabin altitude is too high, or (depending on the CIDS/CAM programming) if the NO SMOKING signs come on.
The proximity emergency escape path marking system, overhead emergency lighting and EXIT signs come on, if the EMER EXIT LT selector is ON, or if the EMER pb on the Purser's panel is pressed.

- With the EMER EXIT LT selector at ARM:
  - The proximity emergency escape path marking system comes on, if:
    - Normal aircraft electrical power fails, or
    - DC SHED ESS BUS is lost.
  - The overhead emergency lights come on, if:
    - Normal aircraft electrical power system fails, or
    - DC SHED ESS BUS fails, or
    - AC BUS 1 fails.
  - Exit signs automatically come on, if:
    - Normal aircraft electrical power system fails, or
    - DC SHED ESS BUS fails.
- When on:
  - The proximity emergency escape path marking system is powered by internal batteries for at least 12 min.
  - The DC SHED ESS BUS supplies the overhead emergency lights and the EXIT signs. If the DC SHED ESS BUS fails, batteries inside the light fixtures power all the lights.
  - The DC SHED ESS BUS charge the internal batteries, if the:
    - EMER LT selector is not at ON, and
    - EMER pb on the Purser’s panel is not pressed, and
    - DC SHED ESS BUS is supplied.
    - The NO SMOKING selector is OFF, or at AUTO with the landing gear retracted.

Lavatory auxiliary lights are always on. They are supplied by 28 V DC ESS BUS.

The escape slides have an integral lighting system. The escape slide lights come on automatically, when the slide is deployed. They are supplied by the internal batteries.

GENERAL

Applicable to: B-HTG, B-HTH, B-HTI

The emergency lighting system has:
- Proximity emergency escape path marking systems (escape path and exit markers),
- Overhead emergency lights,
- EXIT signs,
- Lavatory auxiliary lights,
- Escape slide lighting.

EXIT signs come on, if the cabin altitude gets too high, or (depending on the CIDS/CAM programming) if the NO SMOKING signs come on.
The floor proximity emergency escape path marking is a self-luminescent system.
The exit markers, overhead emergency lighting and EXIT sign come on, if the EMER EXIT LT selector is ON, or if the EMER pb on the Purser panel's is pressed.

- With the EMER EXIT LT selector at ARM:
  - The exit markers of the proximity emergency escape path marking system come on, if:
    - Normal aircraft electrical power fails, or
    - DC SHED ESS BUS is lost.
  - The overhead emergency lights come on, if:
    - Normal aircraft electrical power system fails, or
    - DC SHED ESS BUS fails, or
    - AC BUS 1 fails.
  - Exit signs automatically come on, if:
    - Normal aircraft electrical power system fails, or
    - DC SHED ESS BUS fails.
- When lit:
  - The exit markers of the proximity emergency escape path marking system are powered by internal batteries for at least 12 min.
  - DC SHED ESS BUS supply the overhead emergency lights and the EXIT signs.
    If DC SHED ESS BUS fails, batteries inside the light fixtures power all the lights.
  - DC SHED ESS BUS charges the internal batteries, if:
    - EMER LT selector is not at ON, and
    - The Purser panel's EMER pb is not pressed, and
    - DC SHED ESS BUS is supplied.
    - The NO SMOKING selector is OFF, or at AUTO with the landing gear retracted.

Lavatory auxiliary lights are always on. They are supplied by 28 V DC ESS BUS.

The escape slides have an integral lighting system. The escape slide lights come on automatically, when the slide is armed and the door or emergency exit is open. They are supplied by the internal batteries.

GENERAL

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The emergency lighting system has:
- Proximity emergency escape path marking systems (escape path and exit markers),
- Overhead emergency lights,
- EXIT signs,
- Lavatory auxiliary lights,
- Overwing escape route lighting,
- Escape slide lighting.

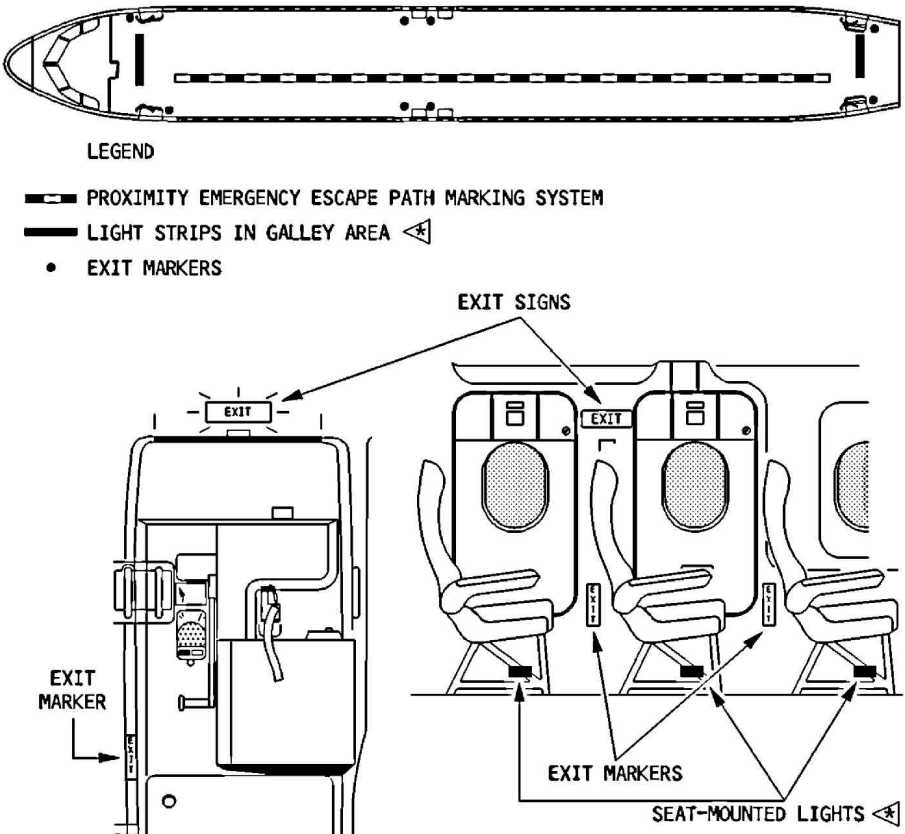
EXIT signs come on, if the cabin altitude gets too high, or (depending on the CIDS/CAM programming) if the NO SMOKING signs come on.
The floor proximity emergency escape path marking is a self-luminescent system.
The exit marker, overhead emergency lighting, and EXIT signs come on, if the EMER EXIT LT selector is ON, or if the Purser panel's EMER pb is pressed.

- With the EMER EXIT LT selector at ARM:
  - The exit markers of the proximity emergency escape path marking system comes on, if:
    - Normal aircraft electrical power fails, or
    - DC SHED ESS BUS is lost.
  - The overhead emergency lights come on, if:
    - Normal aircraft electrical power system fails, or
    - DC SHED ESS BUS fails, or
    - AC BUS 1 fails.
  - Exit signs automatically come on, if:
    - Normal aircraft electrical power system fails, or
    - DC SHED ESS BUS fails.
- When lit:
  - The exit markers of the proximity emergency escape path marking system are powered by internal batteries for at least 12 min.
  - DC SHED ESS BUS supply the overhead emergency lights and the EXIT signs.
    If DC SHED ESS BUS fails, batteries inside the light fixtures power all the lights.
  - DC SHED ESS BUS charge the internal batteries, if:
    - EMER LT selector is not at ON, and
    - The Purser panel's EMER pb is not pressed, and
    - DC SHED ESS BUS is supplied.
    - The NO SMOKING selector is OFF, or at AUTO with the landing gear retracted.

Lavatory auxiliary lights are always on. They are supplied by 28 V DC ESS BUS.
The escape slides have an integral lighting system. The escape slide lights and the overwing route lights come on automatically, when the slide is armed and the door or emergency exit is open. They are supplied by the internal batteries.

PROXIMITY EMERGENCY ESCAPE PATH MARKING SYSTEM/EXIT SIGNS

Applicable to: ALL 320



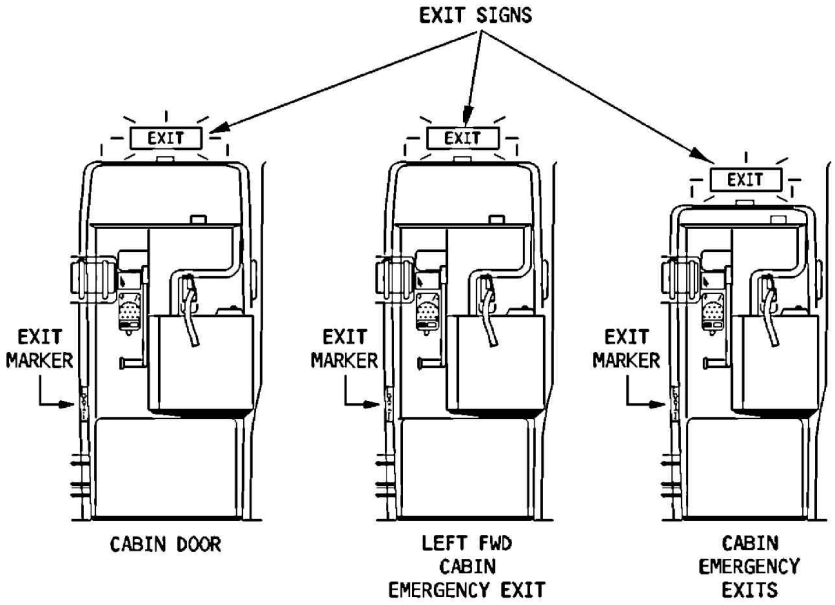
PROXIMITY EMERGENCY ESCAPE PATH MARKING SYSTEM/EXIT SIGNS

Applicable to: ALL 321



LEGEND

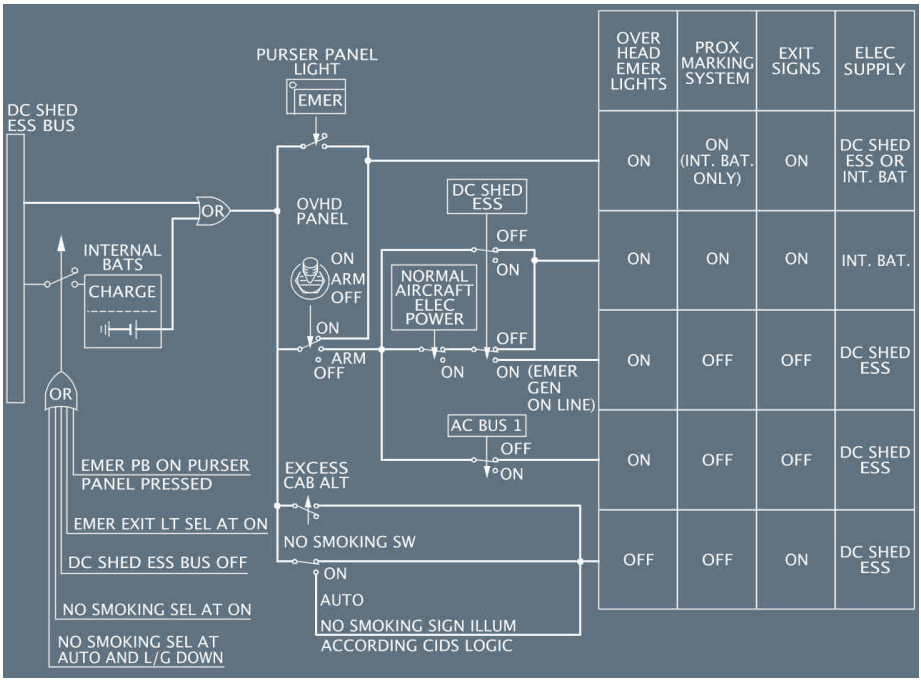
- PROXIMITY EMERGENCY ESCAPE PATH MARKING SYSTEM
- LIGHT STRIPS IN GALLEY AREA
- EXIT MARKERS



EMERGENCY LIGHTING CONTROL LOGIC

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HTD, B-HTE, B-HTF

1

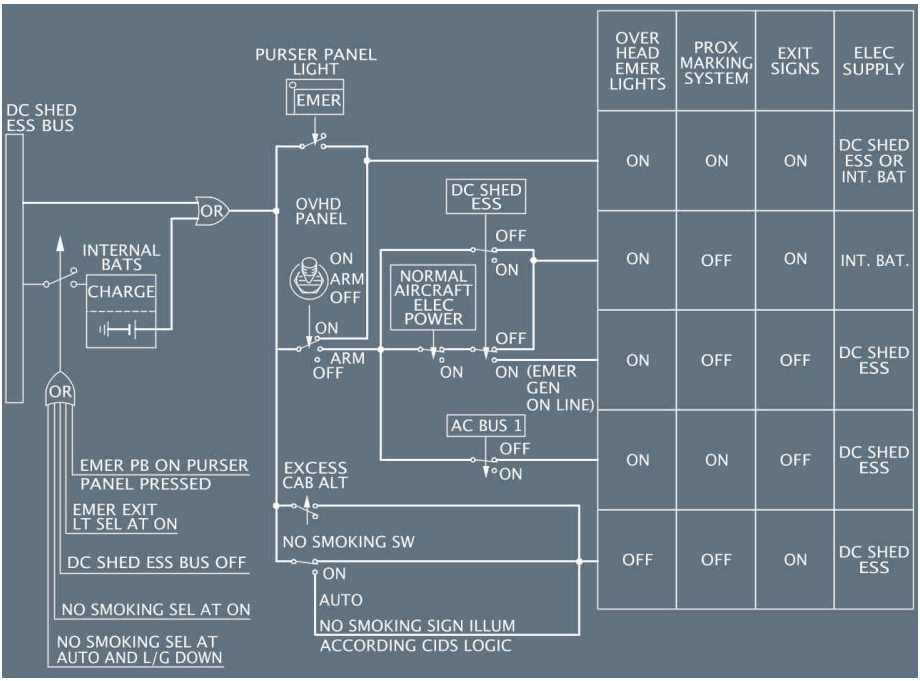


OVER HEAD EMER LIGHTS	PROX MARKING SYSTEM	EXIT SIGNS	ELEC SUPPLY
ON	ON (INT. BAT. ONLY)	ON	DC SHED ESS OR INT. BAT
ON	ON	ON	INT. BAT.
ON	OFF	OFF	DC SHED ESS
ON	OFF	OFF	DC SHED ESS
OFF	OFF	ON	DC SHED ESS

EMERGENCY LIGHTING CONTROL LOGIC

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

2



OVER HEAD EMER LIGHTS	PROX MARKING SYSTEM	EXIT SIGNS	ELEC SUPPLY
ON	ON	ON	DC SHED ESS OR INT. BAT
ON	OFF	ON	INT. BAT.
ON	OFF	OFF	DC SHED ESS
ON	ON	OFF	DC SHED ESS
OFF	OFF	ON	DC SHED ESS

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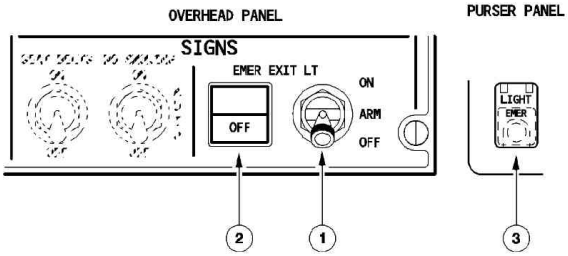
CONTROLS AND INDICATORS

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP



(1) EMER EXIT LT selector

The selector has three detent positions.

ON : Overhead emergency lights, EXIT signs and proximity marking system come on.

OFF : Above lights are off.

ARM :
- The proximity emergency escape path marking system and overhead emergency lighting come on if:
  - Normal aircraft electrical power system fails or
  - DC SHED ESS BUS fails or
  - AC BUS 1 fails.
- Exit signs come on if:
  - Normal aircraft electrical power system fails or
  - DC SHED ESS BUS fails or

Note:
- *With EMER EXIT LT selector set to ON or ARM, the Passenger Address system is supplied by the HOT BUS.*
- *The LIGHT EMER pb on the purser's panel can turn on the emergency lighting independently of the positions of this selector switch.*

(2) EMER EXIT LT-OFF lt

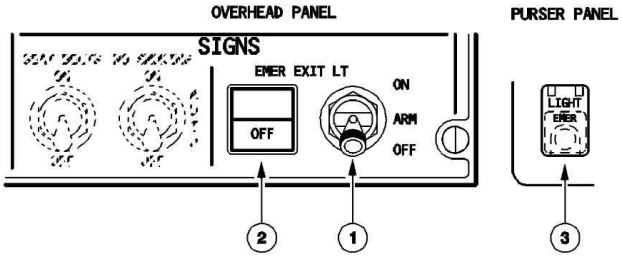
This light comes on amber when the EMER EXIT LT selector is selected OFF.

(3) LIGHT EMER pb

When pressed, this button performs the same function as the EMER EXIT LT switch when it is ON.

CONTROLS AND INDICATORS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HTD, B-HTE, B-HTF



(1) EMER EXIT LT selector
The selector has three detent positions.

ON : Overhead emergency lights, EXIT signs and proximity marking system come on.

OFF : Above lights are off.

ARM :
- The proximity emergency escape path marking system comes on when the normal aircraft electrical power or DC SHED ESS BUS is lost
- The overhead emergency lights come on if:
  - Normal aircraft electrical power system fails or
  - DC SHED ESS BUS fails or
  - AC BUS 1 fails.
- Exit signs come on if:
  - Normal aircraft electrical power system fails or
  - DC SHED ESS BUS fails or

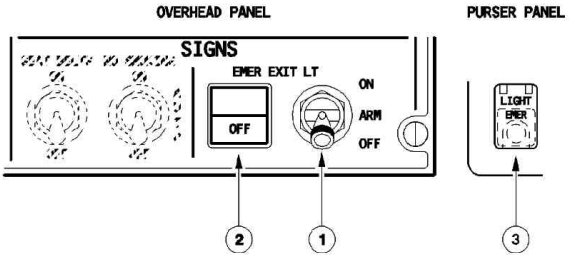
Note:
- *With EMER EXIT LT selector set to ON or ARM, the Passenger Address system is supplied by the HOT BUS*
- *The LIGHT EMER pb on the purser's panel can turn on the emergency lighting independently of the positions of this selector switch.*

(2) EMER EXIT LT-OFF lt
This light comes on amber when the EMER EXIT LT selector is selected OFF.

(3) LIGHT EMER pb
When pressed, this button performs the same function as the EMER EXIT LT switch when it is ON.

CONTROLS AND INDICATORS

Applicable to: B-HSQ, B-HSR



(1) EMER EXIT LT selector

The selector has three detent positions.

ON : Overhead emergency lights, EXIT signs and proximity marking system come on.

OFF : Above lights are off.

ARM :
- Exit markers comes on when the normal aircraft electrical power or DC SHED ESS BUS is lost.
- The overhead emergency lights come on if:
  - Normal aircraft electrical power system fails or
  - DC SHED ESS BUS fails or
  - AC BUS 1 fails.
- Exit signs come on if:
  - Normal aircraft electrical power system fails or
  - DC SHED ESS BUS fails or

Note: The LIGHT EMER pb on the purser's panel can turn on the emergency lighting independently of the positions of this selector switch.

(2) EMER EXIT LT-OFF lt

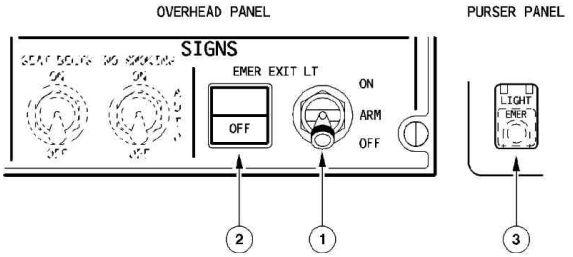
This light comes on amber when the EMER EXIT LT selector is selected OFF.

(3) LIGHT EMER pb

When pressed, this button performs the same function as the EMER EXIT LT switch when it is ON.

CONTROLS AND INDICATORS

Applicable to: B-HSK, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



(1) EMER EXIT LT selector
The selector has three detent positions.

ON : Overhead emergency lights, EXIT signs and proximity marking system come on.

OFF : Above lights are off.

ARM :
- Exit markers comes on when the normal aircraft electrical power or DC SHED ESS BUS is lost
- The overhead emergency lights come on if:
  - Normal aircraft electrical power system fails or
  - DC SHED ESS BUS fails or
  - AC BUS 1 fails.
- Exit signs come on if:
  - Normal aircraft electrical power system fails or
  - DC SHED ESS BUS fails or

Note:
- *With EMER EXIT LT selector set to ON or ARM, the Passenger Address system is supplied by the HOT BUS*
- *The LIGHT EMER pb on the purser's panel can turn on the emergency lighting independently of the positions of this selector switch.*

(2) EMER EXIT LT-OFF lt
This light comes on amber when the EMER EXIT LT is selected OFF.

(3) LIGHT EMER pb
When pressed, this button performs the same function as the EMER EXIT LT switch when it is ON.

BUS EQUIPMENT LIST

Applicable to: ALL

	NORM		EMER ELEC		
	AC	DC	AC ESS	DC ESS	HOT
CABIN LIGHTING	AC1 AC2 and GRND/ FLT			SHED (1)	

(1) *Standby supply (Refer to DSC-33-30-10 Emergency Lighting Control Logic)*

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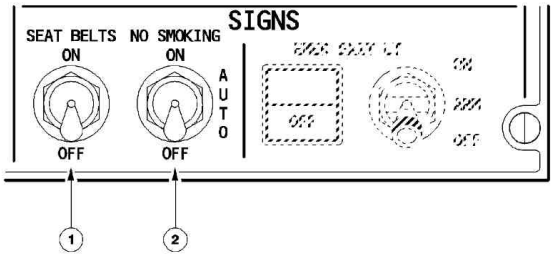
OVERHEAD PANEL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSQ, B-HSR, B-HTD, B-HTE, B-HTF, B-HTG



(1) SEAT BELTS sw

ON : FASTEN SEAT BELT and RETURN TO SEAT signs come on simultaneously, with a low tone chime.

OFF : Signs are off. The low tone chime sounds when the lights turn off (depending on the CIDS/CAM programming).

(2) NO SMOKING selector

ON : NO SMOKING and EXIT signs come on simultaneously with a low tone chime.

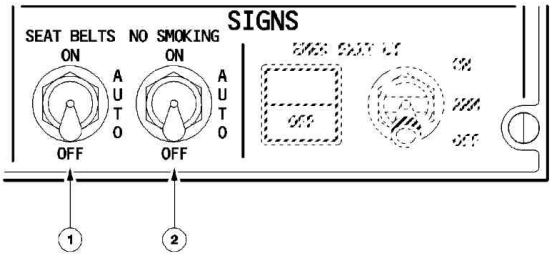
AUTO : NO SMOKING and EXIT signs come on when the landing gear is extended, and turn off when the landing gear is retracted. The low tone chime sounds (depending on the CIDS/CAM programming) when the lights go on or off.

OFF : Signs are off. The low tone chime sounds when the lights turn off (depending on the CIDS/CAM programming).

Note: If the cabin altitude goes above 11 300 ft (±350 ft), the cabin illuminates (depending on the CIDS/CAM programming) and the NO SMOKING, FASTEN SEAT BELT, EXIT signs come on, regardless of the SEAT BELTS and NO SMOKING selector switches.

OVERHEAD PANEL

Applicable to: B-HSO, B-HSP, B-HST, B-HSU



(1) SEAT BELTS sw

ON : FASTEN SEAT BELT and RETURN TO SEAT signs come on simultaneously, with a low tone chime.

AUTO : The FASTEN SEAT BELT and RETURN TO SEAT signs come on automatically, along with a low tone chime (depending on the CIDS/CAM programming), when slats are extended more than 17 ° (position 1, 2, 3 or FULL) or when the main landing gear is extended. After landing, the signs remain on, even if the slats are retracted.

OFF : Signs are off. The low tone chime sounds when the lights turn off (depending on the CIDS/CAM programming).

(2) NO SMOKING selector

ON : NO SMOKING and EXIT signs come on simultaneously with a low tone chime.

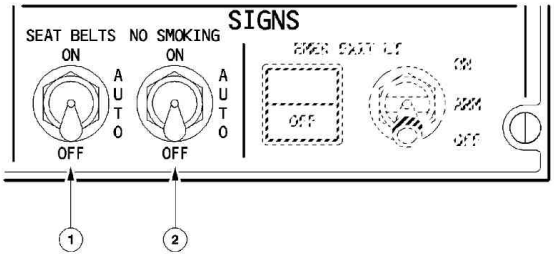
AUTO : NO SMOKING and EXIT signs come on when the landing gear is extended, and turn off when the landing gear is retracted. The low tone chime sounds (depending on the CIDS/CAM programming) when the lights go on or off.

OFF : Signs are off. The low tone chime sounds when the lights turn off (depending on the CIDS/CAM programming).

Note: If the cabin altitude goes above 11 300 ft (±350 ft), the cabin illuminates (depending on the CIDS/CAM programming) and the NO SMOKING, FASTEN SEAT BELT, EXIT signs come on, regardless of the SEAT BELTS and NO SMOKING selector switches.

OVERHEAD PANEL

Applicable to: B-HSL, B-HSM, B-HSN, B-HTH, B-HTI



(1) SEAT BELTS sw

ON : FASTEN SEAT BELT and RETURN TO SEAT signs come on simultaneously, with a low tone chime.

AUTO : The FASTEN SEAT BELT and RETURN TO SEAT signs come on automatically, along with a low tone chime (depending on the CIDS/CAM programming), when slats are extended more than 17 ° (position 1, 2, 3 or FULL) or when the main landing gear is extended. After landing, the signs remain on, even if the slats are retracted.

OFF : Signs are off. The low tone chime sounds when the lights turn off (depending on the CIDS/CAM programming).

(2) NO SMOKING sw

ON : NO SMOKING and EXIT signs come on simultaneously with a low tone chime.

AUTO : The EXIT signs come on when the landing gear is extended, and turn off when the landing gear is retracted. The low tone chime sounds (depending on the CIDS/CAM programming) when the lights go on or off.
The NO SMOKING signs are on.

OFF : The EXIT and NO SMOKING signs are off. The low tone chime sounds when the lights turn off (depending on the CIDS/CAM programming).

Note: If the cabin altitude goes above 11 300 ft (±350 ft), the cabin illuminates (depending on the CIDS/CAM programming) and the NO SMOKING, FASTEN SEAT BELT, EXIT signs come on, regardless of the SEAT BELTS and NO SMOKING selector switches.

MEMO DISPLAY

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSQ, B-HSR

- Displays “LDG LT” in green, if one landing light is extended.
- Displays “STROBE LT OFF” in green, if the STROBE switch is OFF in flight.
- Displays “SEAT BELTS” and “NO SMOKING” messages in green, when the corresponding sign is on.

MEMO DISPLAY

Applicable to: B-HSO, B-HSP, B-HST, B-HSU

- Displays “LDG LT” in green, if one landing light is extended.
- Displays “STROBE LT OFF” in green, if the STROBE switch is OFF in flight.
- Displays “SEAT BELTS” and “NO SMOKING” messages in green, when the corresponding sign is on.
- Displays “CABIN READY” in green, pulsing 10 s then steady, when a signal from cabin crew is sent, in the takeoff and landing phases.

AIRCRAFT SYSTEMS

NAVIGATION

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DSC-34-10-30 Warnings and Cautions	A	1	Documentation update: Addition of "Warnings and Cautions" documentary unit
DSC-34-25 Bugs Function	H	1	Improvement of illustration quality.
DSC-34-30-10 ARCHITECTURE	E	1	Improvement of illustration quality.
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DSC-34-50-20 Automatic Dependent Surveillance - Broadcast (ADS-B)	B	3	Documentation update: Addition of "Automatic Dependent Surveillance - Broadcast (ADS-B)" documentary unit
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DSC-34-60-30 Windshear Alerts During Takeoff Roll, Up to 100 knots	B	1	Improvement of Illustration quality
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DSC-34-60-30 Windshear Alerts Above 50 feet	C	3	Improvement of Illustration quality
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DSC-34-70-40 OVERHEAD PANEL	A	1	Improvement of Illustration quality
DSC-34-80-20 Aural Messages	E	1	Documentation update: Addition of "Aural Messages" documentary unit

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GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The Air Data and Inertial Reference System (ADIRS) supplies temperature, anemometric, barometric and inertial parameters to the EFIS system (PFD and ND) and to other user systems (FMGC, FADEC, ELAC, SEC, FAC, FWC, SFCC, ATC, GPWS, CFDIU, CPC).

The system includes:

- Three identical ADIRU's (Air Data and Inertial Reference Units).

  Each ADIRU is divided in two parts, either of which can work separately in case of failure in the other:
  - The ADR part (Air Data Reference) which supplies barometric altitude, airspeed, mach, angle of attack, temperature and overspeed warnings.
  - The IR part (Inertial Reference) which supplies attitude, flight path vector, track, heading, accelerations, angular rates, ground speed and aircraft position.

    The ADIRU gives true heading instead of magnetic heading:
    - Above 82 ° North
    - Above 73 ° North between 90 ° and 120 ° West (magnetic polar region)
    - Above 60 °South

- One ADIRS control panel (ADIRS CDU) on the overhead panel for selection of modes (NAV, ATT, OFF) and indications of failures.
  The IR is normally initialized through the FMGS, but the ADIRS CDU may be used as a back up.
- Two GPS receivers, which are connected to the IR part of the ADIRU's for GP/IR hybrid position calculation.
- Four types of sensors:
  - Pitot probes (3)
  - Static pressure probes (STAT) (6)
  - Angle of attack sensors (AOA) (3)
  - Total air temperature probes (TAT) (2)

  These sensors are electrically heated to prevent from icing up.
- Eight ADMs (Air Data Modules) which convert pneumatic data from PITOT and STAT probes into numerical data for the ADIRUs.
- A switching facility for selecting ADR 3 or IR 3 for instrument displays in case of ADIRU 1 or 2 failure.

GENERAL

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

The Air Data and Inertial Reference System (ADIRS) supplies temperature, anemometric, barometric and inertial parameters to the EFIS system (PFD and ND) and to other user systems (FMGC, FADEC, ELAC, SEC, FAC, FWC, SFCC, ATC, GPWS, CFDIU, CPC).

The system includes:

- Three identical ADIRU's (Air Data and Inertial Reference Units).

  Each ADIRU is divided in two parts, either of which can work separately in case of failure in the other:
  - The ADR part (Air Data Reference) which supplies barometric altitude, airspeed, mach, angle of attack, temperature and overspeed warnings.
  - The IR part (Inertial Reference) which supplies attitude, flight path vector, track, heading, accelerations, angular rates, ground speed and aircraft position.

  Note: Above 73 ° North and above 60 ° South, the ADIRU gives true heading instead of magnetic heading.

- One ADIRS control panel (ADIRS MSU) on the overhead panel for selection of modes (NAV, ATT, OFF).
  The IR is initialized with the FMGS.
- Two GPS receivers, which are connected to the IR part of the ADIRU's for GP/IR hybrid position calculation.
- Four types of sensors:
  - Pitot probes (3)
  - Static pressure probes (STAT) (6)
  - Angle of attack sensors (AOA) (3)
  - Total air temperature probes (TAT) (2)

  These sensors are electrically heated to prevent from icing up.
- Eight ADMs (Air Data Modules) which convert pneumatic data from PITOT and STAT probes into numerical data for the ADIRUs.
- A switching facility for selecting ADR 3 or IR 3 for instrument displays in case of ADIRU 1 or 2 failure.

GENERAL

Applicable to: B-HSO, B-HSP

The Air Data and Inertial Reference System (ADIRS) supplies temperature, anemometric, barometric and inertial parameters to the EFIS system (PFD and ND) and to other user systems (FMGC, FADEC, ELAC, SEC, FAC, FWC, SFCC, ATC, GPWS, CFDIU, CPC).

The system includes:

- Three identical ADIRU's (Air Data and Inertial Reference Units).

  Each ADIRU is divided in two parts, either of which can work separately in case of failure in the other:
  - The ADR part (Air Data Reference) which supplies barometric altitude, airspeed, mach, angle of attack, temperature and overspeed warnings.
  - The IR part (Inertial Reference) which supplies attitude, flight path vector, track, heading, accelerations, angular rates, ground speed and aircraft position.

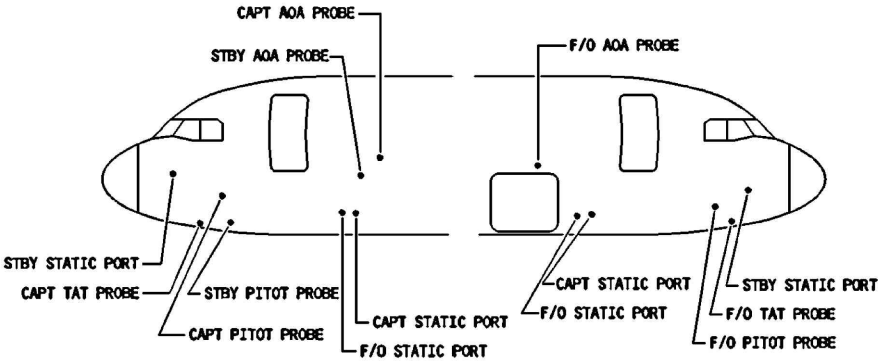
  Note: *The ADIRU gives true heading instead of magnetic heading:*
  - *Above 82 ° North*
  - *Above 73 ° North between 90 ° and 120 ° West (magnetic polar region)*
  - *Above 60 °South*

- One ADIRS control panel (ADIRS MSU) on the overhead panel for selection of modes (NAV, ATT, OFF).
  The IR is initialized with the FMGS.
- Two GPS receivers, which are connected to the IR part of the ADIRU's for GP/IR hybrid position calculation.
- Four types of sensors:
  - Pitot probes (3)
  - Static pressure probes (STAT) (6)
  - Angle of attack sensors (AOA) (3)
  - Total air temperature probes (TAT) (2)

  These sensors are electrically heated to prevent from icing up.
- Eight ADMs (Air Data Modules) which convert pneumatic data from PITOT and STAT probes into numerical data for the ADIRUs.
- A switching facility for selecting ADR 3 or IR 3 for instrument displays in case of ADIRU 1 or 2 failure.

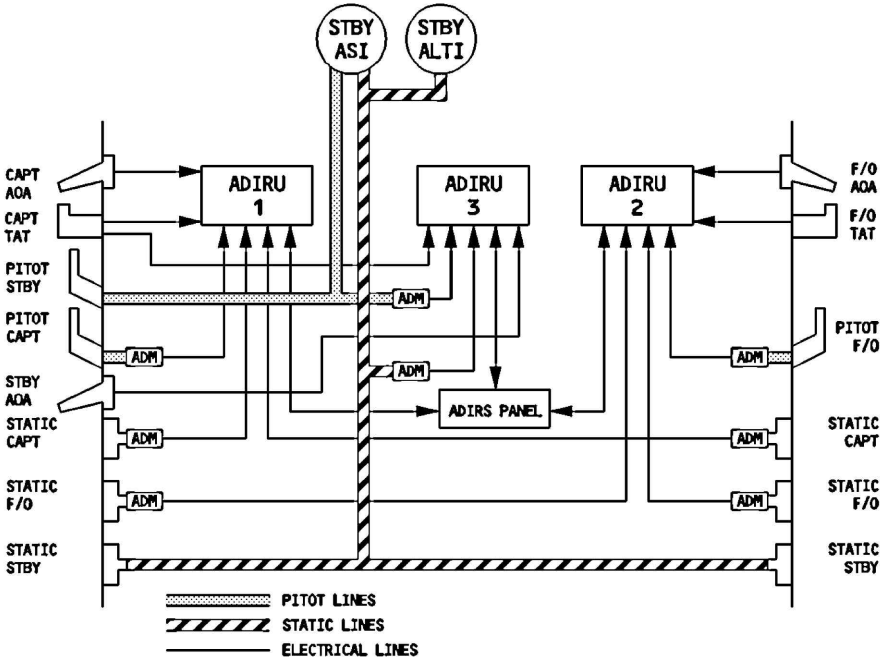
PROBES LOCATION

Applicable to: ALL



PROBES SCHEMATIC

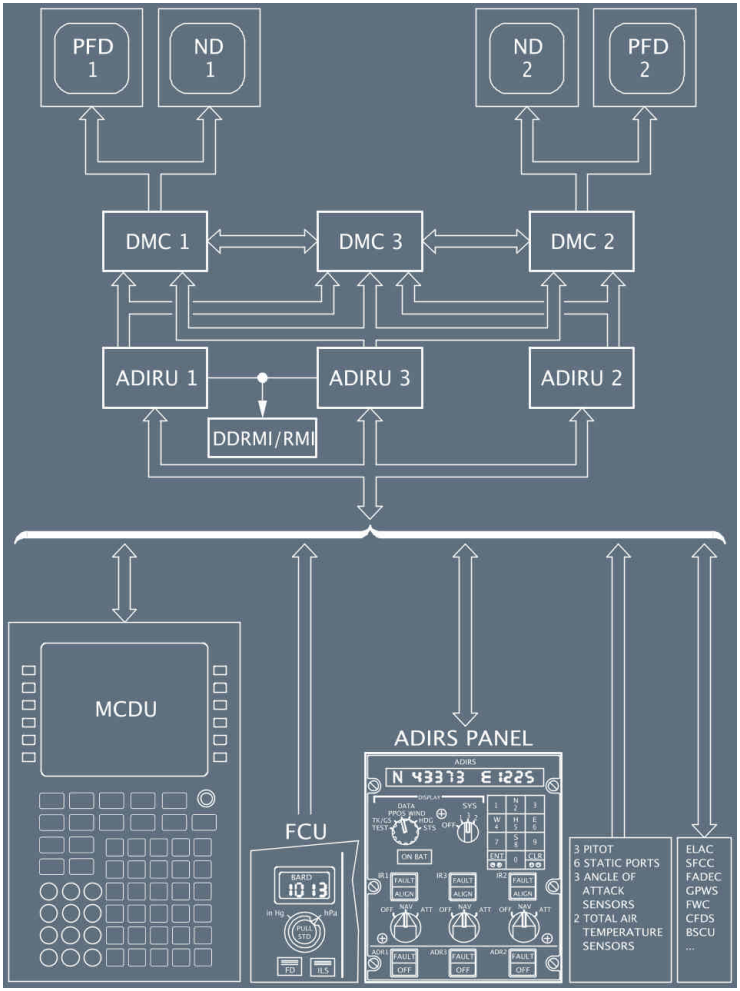
Applicable to: ALL



Note: ADIRU (1) is supplied by CAPT probes,
ADIRU (2) is supplied by F/O probes,
ADIRU (3) is supplied by STBY probes and CAPT TAT.

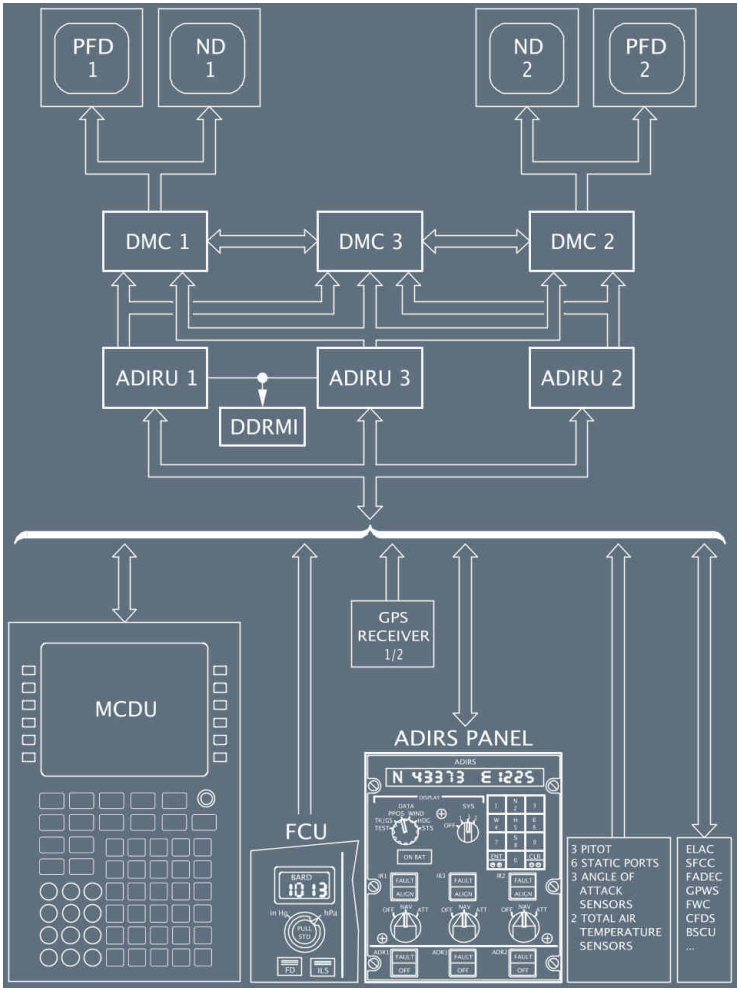
ADIRS SCHEMATIC

Applicable to: B-HSD, B-HSE



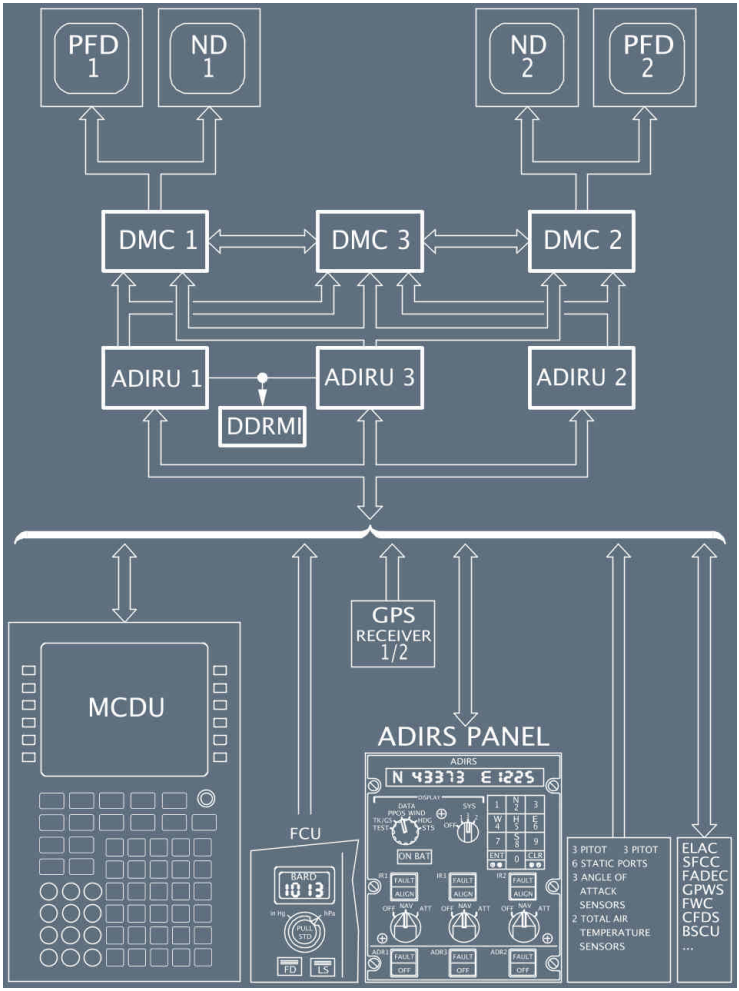
ADIRS SCHEMATIC

Applicable to: B-HSG, B-HSI, B-HTD, B-HTE, B-HTF



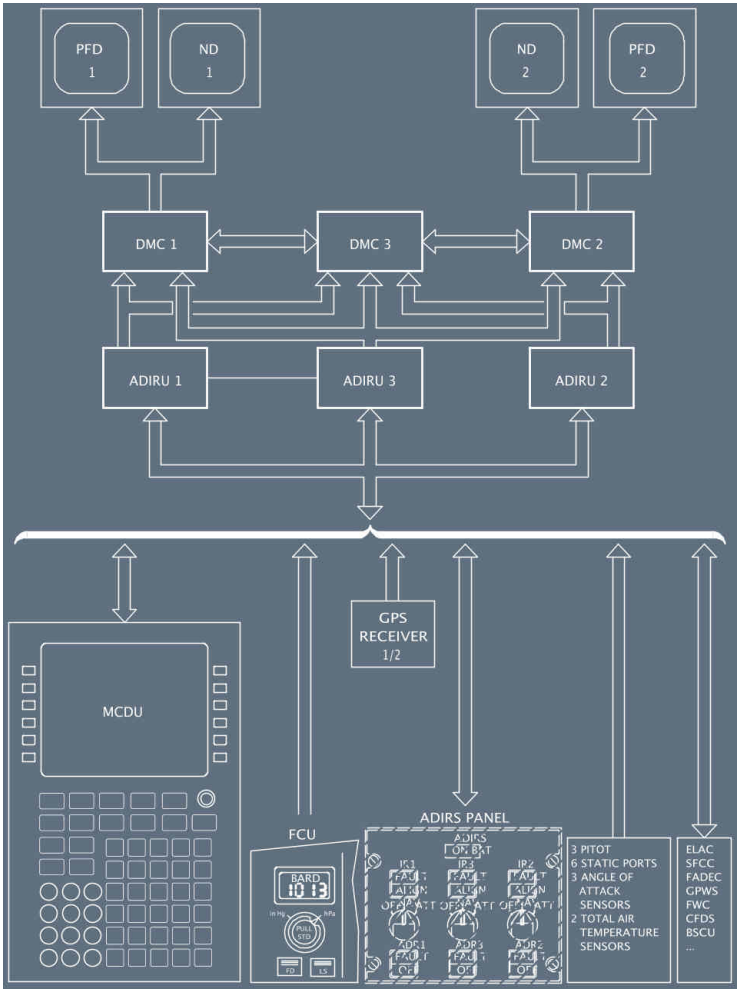
ADIRS SCHEMATIC

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTG, B-HTH, B-HTI



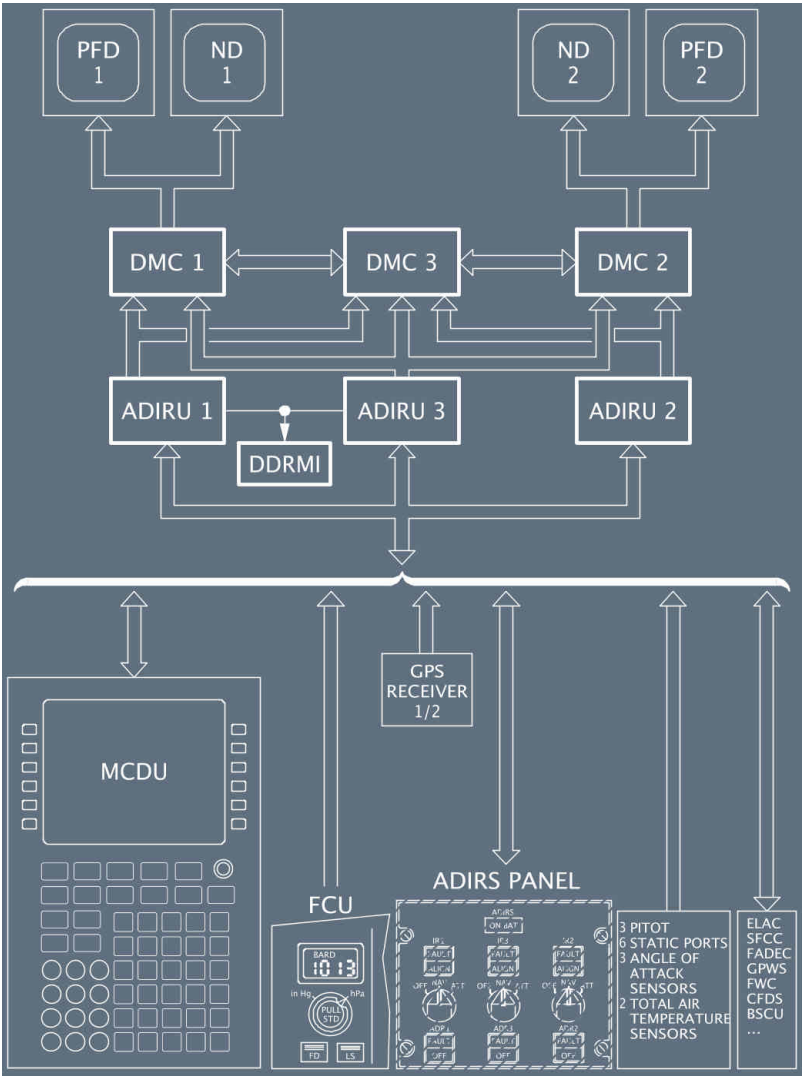
ADIRS SCHEMATIC

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU



ADIRS SCHEMATIC

Applicable to: B-HSO, B-HSP

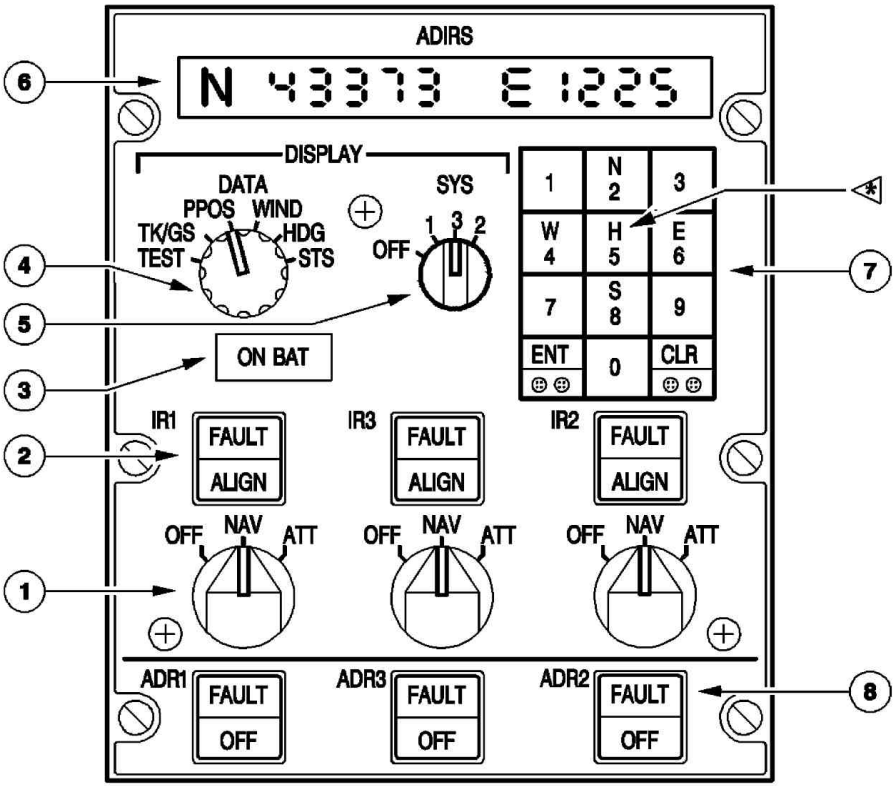


OVERHEAD PANEL

Applicable to: B-HSD, B-HSE

The ADIRS CDU on the overhead panel provides the controls and indicators to permit:

- Selection of power supplies to the ADR and IR systems
- Selection and display of navigation data
- Manual initialization (normally performed through the FMGC)
- Status and fault indication of IRs or ADRs.



(1) IR 1(2)(3) Mode rotary sel

OFF : The ADIRU is not energized. ADR and IR data are not available.

NAV : Normal mode of operation. Supplies full inertial data to aircraft systems.

ATT : IR mode supplying only attitude and heading information, if the system loses its ability to navigate.
The heading must be entered through the CDU keyboard and has to be reset frequently (about every 10 min)

(2) IR 1 (2) (3) lt

FAULT: Comes on amber associated with an ECAM caution when a fault affects the respective IR.

Steady	:	The respective IR is lost.
Flashing	:	The attitude and heading information may be recovered in ATT mode.

ALIGN:

Steady	:	The respective IR is operating normally in align mode.
Flashing if	:	IR alignment fault, or no present position entry after 10 min, or difference between position at shutdown and entered position exceeds 1 ° of latitude or longitude.
Extinguished	:	Alignment has been completed.

(3) ON BAT lt

Comes on amber when one or more IRs is supplied only by the A/C battery. It also comes on for a few sec at the beginning of the alignment, but not for a fast realignment.

Note: If, when the aircraft is on the ground, at least one ADIRU is supplied by aircraft batteries:
- *An external horn sounds*
- *The ADIRU and AVNCS light comes on amber on the EXTERNAL POWER panel.*

(4) DATA selector knob

This knob selects the information to be displayed in the ADIRS display window.

TEST	The ENT and CLR buttons on the keyboard come on, and the display shows all 8's.
TK/GS	The display shows true track and ground speed.
PPOS	The display shows present latitude and longitude
WIND	The display shows true wind direction and speed.
HDG	The display shows true heading and the minutes remaining until alignment is completed.
STS	The display shows an action code.

(5) SYS selector knob

OFF : The CDU display is not energized. ADIRS are still energized if the associated IR mode rotary selectors are not at OFF.

1.2.3 : System selected for data display.

(6) Display
The display presents the data selected by the DATA selector.
A keyboard entry overrides the selected display.

(7) Keyboard
The flight crew can use the keyboard to enter the present position, or the heading in ATT mode, into the selected system.

Letter keys : Used to enter N, S, E, or W for position, or entering H ◁ for heading (ATT mode).

Number keys : Used to enter the present position (or the present magnetic heading in ATT mode).

CLR key : The integral cue light comes on after an entry operation, if the data has an unreasonable value.
Pressing this key clears the data display, that has been keyed in but not yet entered.

ENT Key : The integral cue light comes on when a crew member has keyed in a number for N, S, W, E or H ◁ .
Pressing the key enters data into the ADIRS.

(8) ADR 1 (2) (3) pb (momentary action)

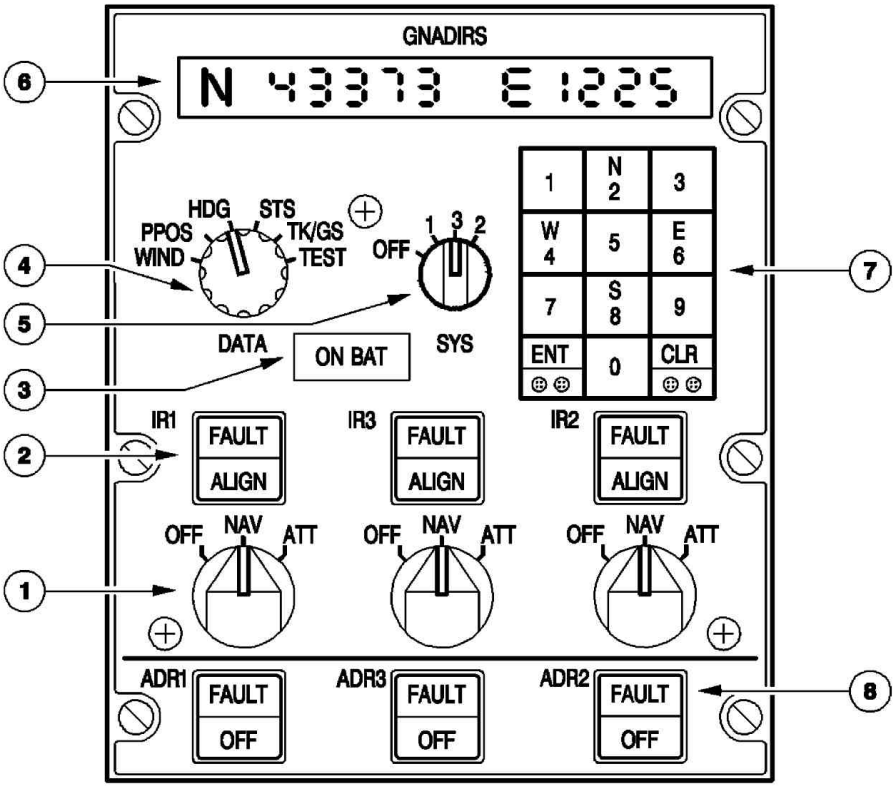
OFF Air data output disconnected.

FAULT This amber light comes on with an ECAM caution, if a fault is detected in the air data reference part.

OVERHEAD PANEL

Applicable to: ALL 321, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The ADIRS CDU on the overhead panel provides the controls and indicators to permit:
- Selection of power supplies to the ADR and IR systems
- Selection and display of navigation data
- Manual initialization (normally performed through the FMGC)
- Status and fault indication of IRs or ADRs.



(1) IR 1(2)(3) Mode rotary sel

OFF : The ADIRU is not energized. ADR and IR data are not available.

NAV : Normal mode of operation. Supplies full inertial data to aircraft systems.

ATT : IR mode supplying only attitude and heading information, if the system loses its ability to navigate.
The heading must be entered through the CDU keyboard and has to be reset frequently (about every 10 min)

(2) IR 1 (2) (3) lt

FAULT: Comes on amber associated with an ECAM caution when a fault affects the respective IR.

- Steady : The respective IR is lost.
- Flashing : The attitude and heading information may be recovered in ATT mode.

ALIGN:

- Steady : The respective IR is operating normally in align mode.
- Flashing if : IR alignment fault, or no present position entry after 10 min, or difference between position at shutdown and entered position exceeds 1 ° of latitude or longitude.
- Extinguished : Alignment has been completed.

(3) ON BAT lt

Comes on amber when one or more IRs is supplied only by the A/C battery. It also comes on for a few sec at the beginning of the alignment, but not for a fast realignment.

Note: If, when the aircraft is on the ground, at least one ADIRU is supplied by aircraft batteries:

- *An external horn sounds*
- *The ADIRU and AVNCS light comes on amber on the EXTERNAL POWER panel.*

(4) DATA selector knob

This knob selects the information to be displayed in the ADIRS display window.

- TEST The ENT and CLR buttons on the keyboard come on, and the display shows all 8's.
- TK/GS The display shows true track and ground speed.
- PPOS The display shows present latitude and longitude
- WIND The display shows true wind direction and speed.
- HDG The display shows true heading and the minutes remaining until alignment is completed.
- STS The display shows an action code.

(5) SYS selector knob

- OFF : The CDU display is not energized. ADIRS are still energized if the associated IR mode rotary selectors are not at OFF.
- 1.2.3 : System selected for data display.

(6) Display

The display presents the data selected by the DATA selector.
A keyboard entry overrides the selected display.

(7) Keyboard

The flight crew can use the keyboard to enter the present position, or the heading in ATT mode, into the selected system.

Letter keys : Used to enter N, S, E, or W for position, or entering H ◁ for heading (ATT mode).

Number keys : Used to enter the present position (or the present magnetic heading in ATT mode).

CLR key : The integral cue light comes on after an entry operation, if the data has an unreasonable value.
Pressing this key clears the data display, that has been keyed in but not yet entered.

ENT Key : The integral cue light comes on when a crew member has keyed in a number for N, S, W, E or H ◁ .
Pressing the key enters data into the ADIRS.

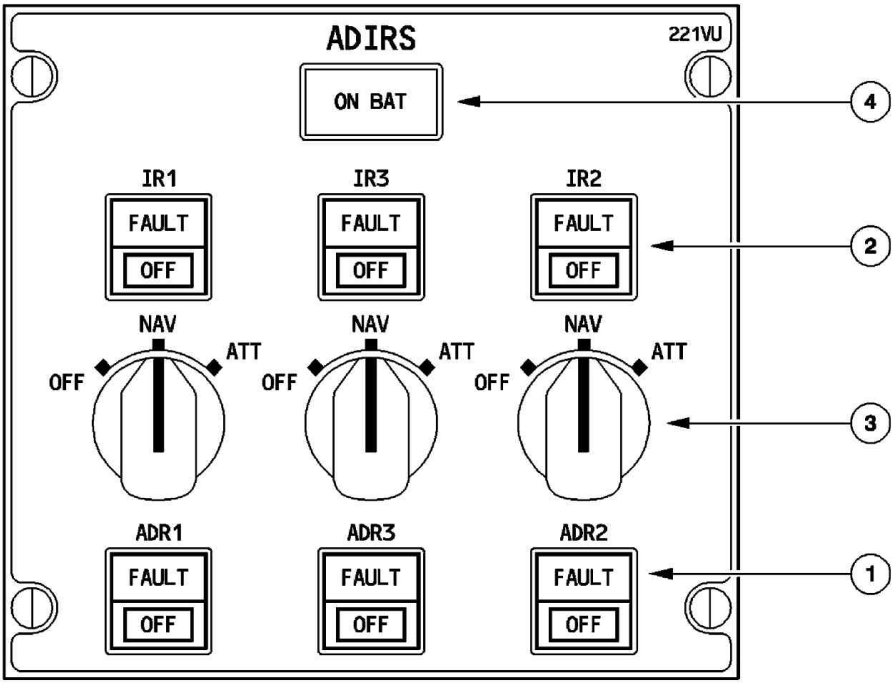
(8) ADR 1 (2) (3) pb (momentary action)

OFF Air data output disconnected.

FAULT This amber light comes on with an ECAM caution, if a fault is detected in the air data reference part.

OVERHEAD PANEL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) ADR 1 (2) (3) pushbutton

OFF : Air data output disconnected.

FAULT light : This amber light comes on with an ECAM caution if a fault is detected in the air data reference part.

(2) IR 1 (2) (3) pushbutton

OFF : Inertial data output disconnected.

FAULT light : This amber light comes on with an ECAM caution when a fault affects the respective IR.
Steady The respective IR is lost.
Flashing The attitude and heading information may be recovered in ATT mode.

(3) IR 1 (2) (3) mode rotary selector

OFF : The ADIRU is not energized.
ADR and IR data are not available.

NAV : Normal mode of operation.
Supplies full inertial data to aircraft systems.

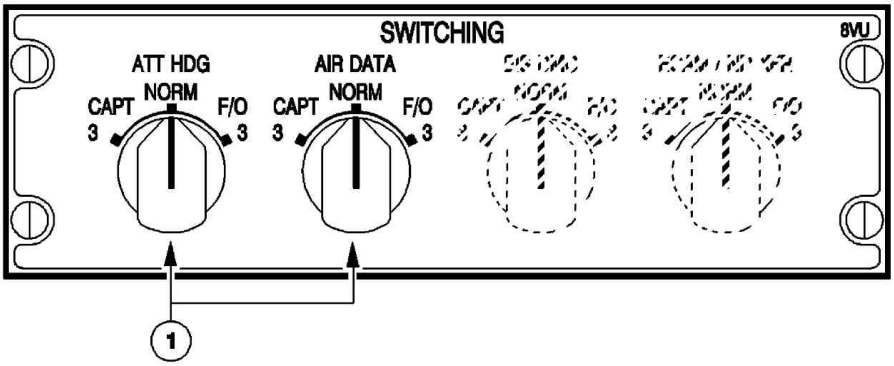
ATT : IR mode supplying only attitude and heading information if the system loses its ability to navigate.
The heading must be entered through the MCDU and has to be reset frequently (about every 10 min).

(4) ON BAT light

The ON BAT light come on in amber when the aircraft battery supplies at least one IRS. The ON BAT light also comes on for a few seconds at the beginning of a complete IRS alignment. Its does not come on in the case of a fast alignment.

PEDESTAL

Applicable to: ALL



(1) ATT HDG and AIR DATA sel

NORM : ADIRU 1 supplies data to PFD 1, ND 1, RMI and VOR/DME.
ADIRU 2 supplies data to PFD 2, and ND2.

CAPT 3 : ADR 3 or IR 3 replaces ADR 1 or IR 1.

F/O 3 : ADR 3 or IR 3 replaces ADR 2 or IR 2.

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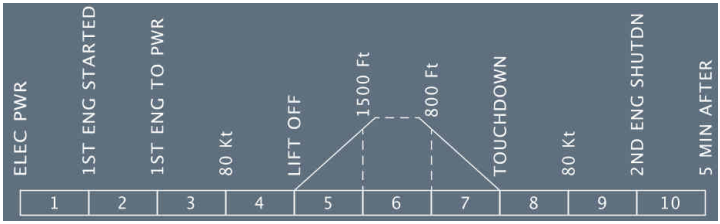
WARNINGS AND CAUTIONS

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
STALL WARNING (No ECAM message) An aural stall warning is triggered when the AOA is greater than a predetermined angle This angle depends on the: - Slats/Flap position - Speed/Mach - F/CTL law (normal, alternate/direct)	CRICKET + STALL (SYNTHETIC VOICE)	MASTER WARN	NIL	NIL	GND
OVERSPEED - VMO/MMO Aircraft speed/mach greater than VMO + 4 kt/MMO + 0.006 - VLE Aircraft speed greater than VLE + 4 kt, with L/G not uplocked, or L/G doors not closed - VFE Aircraft speed greater than VFE + 4 kt, with slats or/and flaps extended	CRC				2, 3, 4, 8, 9, 10
ADR 1 (2) FAULT	SINGLE CHIME	MASTER CAUT		ADR FAULT lt	1, 4, 8, 10
ADR 3 FAULT					1, 4, 5, 7, 8, 10
ADR (1+2) (1+3) (2+3) FAULT					1, 4, 8, 10
ADR 1+2+3 FAULT	CRC	MASTER WARN		NIL	1, 4, 8, 10
IR 1 (2) FAULT	SINGLE CHIME	MASTER CAUT		IR FAULT lt	4, 5, 7, 8
IR 3 FAULT					4, 5, 7, 8
IR (1+3) (2+3) FAULT					4, 8
IR 1+2 FAULT					
CAPT (F/O) (STBY) AOA FAULT	NIL	NIL		NIL	2 to 9
HDG DISCREPANCY Difference between the heading on CAPT and F/O displays is greater than 5 °.	SINGLE CHIME	MASTER CAUT		CHECK HDG (on PFD and ND)	4, 8
ATT DISCREPANCY Difference between roll or pitch angle, displayed on the CAPT and F/O PFD greater than 5 °.				CHECK ATT (on PFD)	3, 4, 8
ALTI DISCREPANCY				CHECK ALT (on PFD)	

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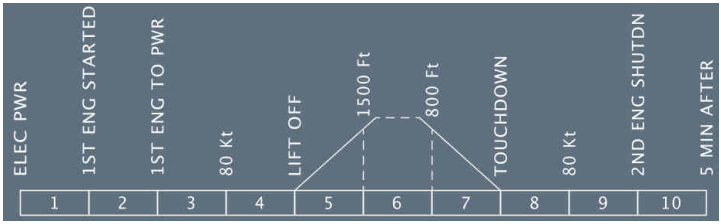
E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
Difference between the altitude displayed on the CAPT and F/O PFD is greater than: - 500 ft, if BARO ref STD is selected - 250 ft, if QNH (or QFE) is selected					
IAS DISCREPANCY Caution activated when there is a discrepancy between the speeds displayed on the PFDs.				NIL	4, 5, 7, 8
ADR DISAGREE One ADR is faulty, or has been rejected by the ELAC, and there is a speed or angle-of-attack disagree between the two remaining ADR.				FAULT lts on ELAC pbs	3, 4, 5, 7
IR DISAGREE Disagree between two IR, with the third one failed.				PFD message	
IR NOT ALIGNED Problem detected during IR alignment				NIL	1, 4, 5, 6, 7, 8, 10

MEMO DISPLAY

- "IRS IN ALIGN X MN"memo appears during phase 1 or 2, during IRS alignment. X MN indicates the number of minutes remaining (1 < X < 10), until NAV mode is reached.
  - Before any engine is started, "IRS IN ALIGN X MN"memo:
    - Appears in green when at least one active IRS is being aligned,
    - Pulses in green if the alignment of one IRS is faulty.
  - When one engine is started, "IRS IN ALIGN X MN"memo appears in amber during IRS alignment. If the alignment of one IRS is faulty, "IRS IN ALIGN X MN"memo is replaced by the "IR NOT ALIGNED" ECAM caution.
- "IR IN ATT ALIGN" appears in green during the IR alignment in Attitude mode.

WARNINGS AND CAUTIONS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
STALL WARNING (No ECAM message) An aural stall warning is triggered when the AOA is greater than a predetermined angle This angle depends on the: - Slats/Flap position - Speed/Mach - F/CTL law (normal, alternate/direct)	CRICKET + STALL (SYNTHETIC VOICE)	MASTER WARN	NIL	NIL	GND
OVERSPEED - VMO/MMO Aircraft speed/mach greater than VMO + 4 kt/MMO + 0.006 - VLE Aircraft speed greater than VLE + 4 kt, with L/G not uplocked, or L/G doors not closed - VFE Aircraft speed greater than VFE + 4 kt, with slats or/and flaps extended	CRC				2, 3, 4, 8, 9, 10
ADR 1 (2) FAULT	SINGLE CHIME	MASTER CAUT		ADR FAULT lt	1, 4, 8, 10
ADR 3 FAULT					1, 4, 5, 7, 8, 10
ADR (1+2) (1+3) (2+3) FAULT					1, 4, 8, 10
IR 1 (2) FAULT				IR FAULT lt	4, 5, 7, 8
IR 3 FAULT					4, 5, 7, 8
IR (1+3) (2+3) FAULT					4, 8
IR 1+2 FAULT					
CAPT (F/O) (STBY) AOA FAULT	NIL	NIL		NIL	2 to 9
HDG DISCREPANCY Difference between the heading on CAPT and F/O displays is greater than 5 °.	SINGLE CHIME	MASTER CAUT		CHECK HDG (on PFD and ND)	4, 8
ATT DISCREPANCY Difference between roll or pitch angle, displayed on the CAPT and F/O PFD greater than 5 °.				CHECK ATT (on PFD)	3, 4, 8
ALTI DISCREPANCY				CHECK ALT (on PFD)	

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
Difference between the altitude displayed on the CAPT and F/O PFD is greater than: - 500 ft, if BARO ref STD is selected - 250 ft, if QNH (or QFE) is selected					
IAS DISCREPANCY Caution activated when there is a discrepancy between the speeds displayed on the PFDs.				NIL	4, 5, 7, 8
ADR DISAGREE One ADR is faulty, or has been rejected by the ELAC, and there is a speed or angle-of-attack disagree between the two remaining ADRs.				FAULT lts on ELAC pbs	3, 4, 5, 7
IR DISAGREE Disagree between two IRs, with the third one failed.				PFD message	

MEMO DISPLAY

- This displays "IRS IN ALIGN X MN"during phase 1 or 2, if:
  - At least one active IRS is in ALIGN submode
  - The time remaining until NAV mode is obtained, is X minutes (1 <x<10).
- "IRS IN ALIGN" appears if one of the 3 IRS is still in alignment

These two messages are displayed:
- In green, if both engines are stopped
- In amber, if one engine is running.

WARNINGS AND CAUTIONS

Applicable to: B-HST, B-HSU

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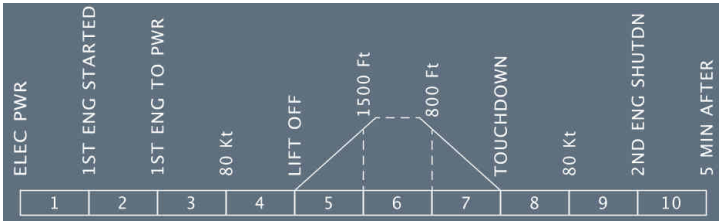

E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
STALL WARNING (No ECAM message) An aural stall warning is triggered when the AOA is greater than a predetermined angle This angle depends on the: - Slats/Flap position - Speed/Mach - F/CTL law (normal, alternate/direct)	CRICKET + STALL (SYNTHETIC VOICE)	MASTER WARN	NIL	NIL	GND
OVERSPEED - VMO/MMO Aircraft speed/mach greater than VMO + 4 kt/MMO + 0.006 - VLE Aircraft speed greater than VLE + 4 kt, with L/G not uplocked, or L/G doors not closed - VFE Aircraft speed greater than VFE + 4 kt, with slats or/and flaps extended	CRC				2, 3, 4, 8, 9, 10
ADR 1 (2) FAULT	SINGLE CHIME	MASTER CAUT		ADR FAULT lt	1, 4, 8, 10
ADR 3 FAULT					1, 4, 5, 7, 8, 10
ADR (1+2) (1+3) (2+3) FAULT					1, 4, 8, 10
ADR 1+2+3 FAULT	CRC	MASTER WARN		NIL	1, 4, 8, 10
IR 1 (2) FAULT	SINGLE CHIME	MASTER CAUT		IR FAULT lt	4, 5, 7, 8
IR 3 FAULT					4, 5, 7, 8
IR (1+3) (2+3) FAULT					4, 8
IR 1+2 FAULT					
CAPT (F/O) (STBY) AOA FAULT	NIL	NIL		NIL	2 to 9
HDG DISCREPANCY Difference between the heading on CAPT and F/O displays is greater than 5 °.	SINGLE CHIME	MASTER CAUT		CHECK HDG (on PFD and ND)	4, 8
ATT DISCREPANCY Difference between roll or pitch angle, displayed on the CAPT and F/O PFD greater than 5 °.				CHECK ATT (on PFD)	3, 4, 8
ALTI DISCREPANCY				CHECK ALT (on PFD)	

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
Difference between the altitude displayed on the CAPT and F/O PFD is greater than: - 500 ft, if BARO ref STD is selected - 250 ft, if QNH (or QFE) is selected					
ADR DISAGREE One ADR is faulty or has been rejected by the ELAC and there is a speed or angle-of-attack disagree between the two remaining ADR.				FAULT lts on ELAC pbs	3, 4, 5, 7
IR DISAGREE Disagree between two IR, with the third one failed.				PFD message	
IR NOT ALIGNED Problem detected during IR alignment				NIL	1, 4, 5, 6, 7, 8, 10

MEMO DISPLAY

- "IRS IN ALIGN X MN"memo appears during phase 1 or 2, during IRS alignment. X MN indicates the number of minutes remaining (1 < X < 10), until NAV mode is reached.
  - Before any engine is started, "IRS IN ALIGN X MN"memo:
    - Appears in green when at least one active IRS is being aligned,
    - Pulses in green if the alignment of one IRS is faulty.
  - When one engine is started, "IRS IN ALIGN X MN"memo appears in amber during IRS alignment. If the alignment of one IRS is faulty, "IRS IN ALIGN X MN"memo is replaced by the "IR NOT ALIGNED" ECAM caution.
- "IR IN ATT ALIGN" appears in green during the IR alignment in Attitude mode.

BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
ADIRU	ADIRU 1			X		HOT 2 (1)
	AOA RESOLVER 1			X		
	ADIRU 2	AC2				HOT 2 (2) during5 min
	AOA RESOLVER 2	AC2				
	ADIRU 3	AC1				HOT 1 (3)
	AOA RESOLVER 3	AC1				

(1) *Backup supply.*

(2) *Backup supply for 5 min.*

(3) *Backup supply, when ATT HDG is in the CAPT 3 position.*
Backup supply for 5 min, when the ATT HDG is in the NORM or F/03 position.

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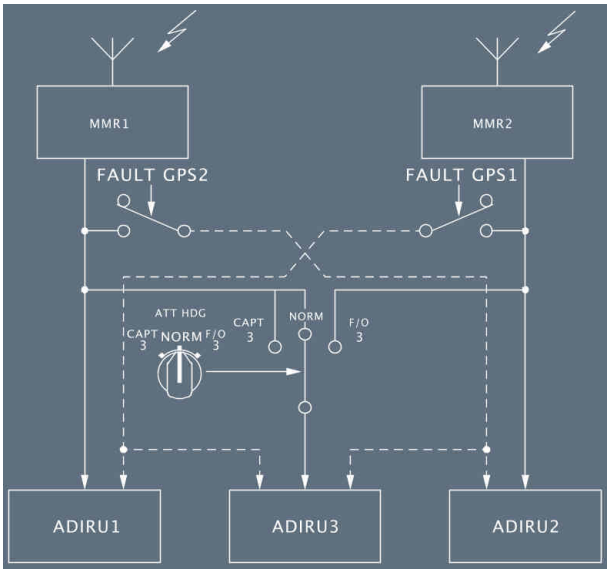
DESCRIPTION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The Global Positioning System (GPS) is a satellite-based radio navigation aid.
Worldwide, 24 satellites broadcast accurate navigation data that aircraft can use for precise determination of its position.
The aircraft has two independent GPS receivers. Each GPS receiver is integrated in a modular avionics unit called MMR (Multi Mode Receiver) (GPS 1 receiver in MMR 1, GPS 2 receiver in MMR 2).
The MMR processes the data received and transfers them to the ADIRUs, which then perform a GP-IRS hybrid position calculation. The FMGCs use the hybrid position. The GPS MONITOR page on MCDU 1 or MCDU 2 can display pure GPS position, true track, ground speed, estimated position, accuracy level, and mode of operation for the information and use of the flight crew.

Note: The flight crew can use the MCDU SELECTED NAVAID page to deselect the use of GPS data for calculating position (Refer to DSC-22_20-50-10).



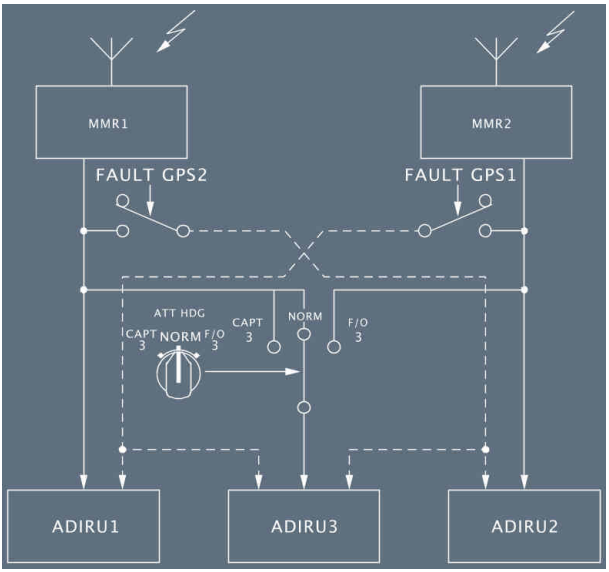
DESCRIPTION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The Global Positioning System (GPS) is a satellite-based radio navigation aid.

Worldwide, 24 satellites broadcast accurate navigation data that aircraft can use for precise determination of its position.
The aircraft has two independent GPS receivers. Each GPS receiver is integrated in a modular avionics unit called MMR (Multi Mode Receiver) (GPS 1 receiver in MMR 1, GPS 2 receiver in MMR 2).
The MMR processes the data received and transfers them to the ADIRUs, which then perform a GP-IRS hybrid position calculation. The FMGCs use the hybrid position. The GPS MONITOR page on MCDU 1 or MCDU 2 can display pure GPS position, true track, ground speed, estimated position, accuracy level, and mode of operation for the information and use of the flight crew.

Note: *Flight crew can use the MCDU NAVAID page to deselect the use of GPS data for calculating position (Refer to DSC-22_20-50-10-25 Selected NAVAIDS Page).*

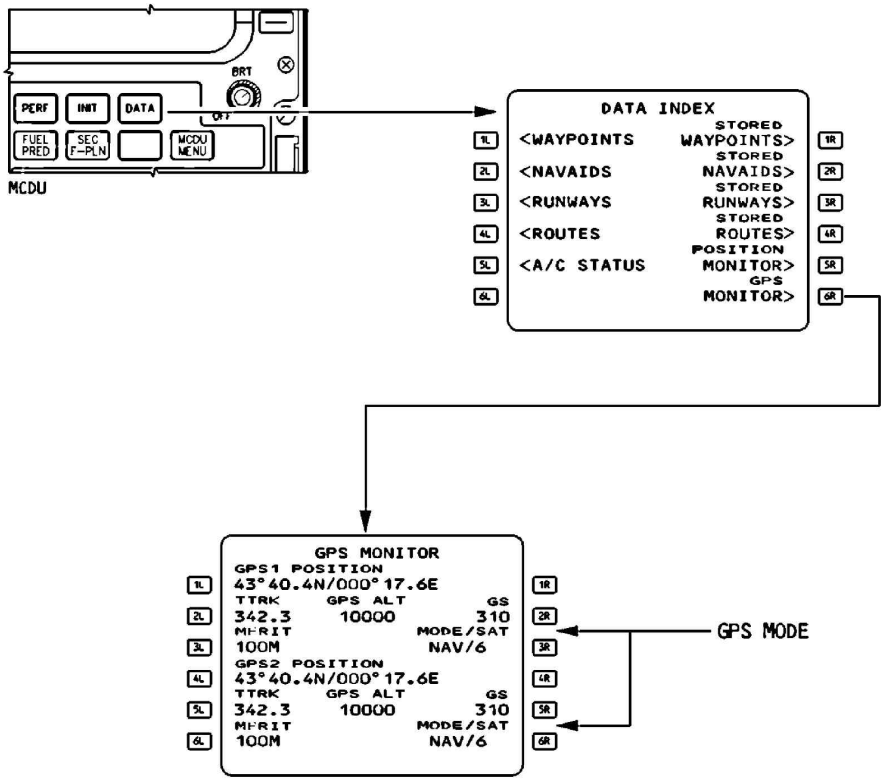


NORMAL OPERATION

Applicable to: ALL

In normal operation, the GPS receiver 1 supplies ADIRU 1 and ADIRU 3, the GPS receiver 2 supplies ADIRU 2.

The MMR operates in different modes which are indicated on the GPS MONITOR page:



INITIALIZATION MODE (INIT)

When this mode is entered, the GPS hardware and software are initialized.

ACQUISITION MODE (ACQ)

The MMR enters in this mode after power-up or during long periods of lost satellite signal.

It remains in this mode until it is able to track at least 4 satellites, then transfers to NAV mode. To enter navigation mode more quickly, MMR uses initial position, time and altitude from IRS.

NAVIGATION MODE (NAV)

When the MMR can track 4 or more satellites, it enters NAV mode and continuously supplies data to the ADIRUs.

ALTITUDE AIDING (ALTAID)

If the MMR can track at least 4 satellites, it uses the GPS altitude and the IR altitude to calculate an altitude bias.
If the number of satellites drops to three, the altitude bias is frozen, and the MMR enters ALTAID mode, using the IR altitude (corrected with the bias).

FAULT MODE (FAULT)

The fault mode is entered when a failure, which may prevent the MMR from transmitting valid data, has been detected.

OPERATION IN CASE OF FAILURE

Applicable to: ALL

If one GPS receiver fails, the three ADIRUs automatically select the only operative GPS receiver.
If ADIRU 1 fails, ADIRU 3 is supplied by MMR 1, and ADIRU 2 by MMR 2.
To maintain Side 1 and Side 2 segregation, in case ADIRU 2 fails, the ATT HDG selector has to be set to F/O 3, so that ADIRU 3 will be supplied with MMR 2 data.
If two ADIRUs fail, the remaining ADIRU is supplied by its own side GPS receiver.

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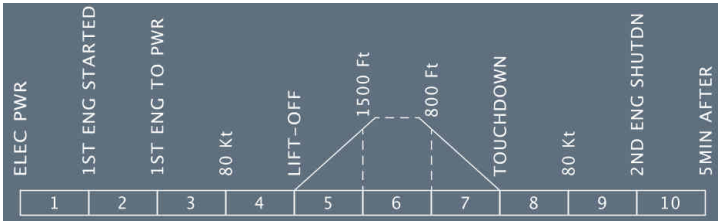
WARNINGS AND CAUTIONS

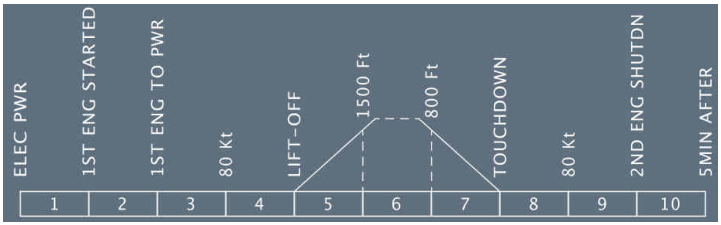
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
GPS 1 (2) FAULT	SINGLE CHIME	MASTER CAUTION	NIL	NIL	4, 5, 7, 8
FM/GPS POS DISAGREE					1, 3, 4, 10
GPS PRIMARY LOST (No ECAM warning)	TRIPLE CLICK During non ILS approach only	NIL			2, 3, 4, 5, 8, 9, 10

WARNINGS AND CAUTIONS

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
GPS 1 (2) FAULT	SINGLE CHIME	MASTER CAUTION	NIL	NIL	4, 5, 7, 8
FM/GPS POS DISAGREE					1, 3, 4, 10

Intentionally left blank

BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
NAVAIDS	MMR 1			X		
	MMR 2	AC 2				

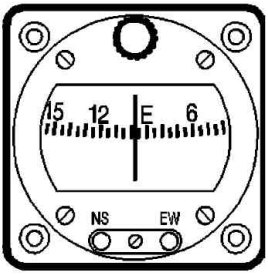
Intentionally left blank

COMPASS

Applicable to: ALL

There is a compass located on top of the windshield center post.
The deviation card is located above the compass.

Note: *Because of the location of the APU power on contactor in the cockpit, the APU start sequence may disturb the compass reading.*

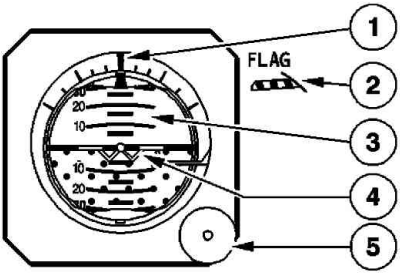


HORIZON

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

The electric standby horizon is powered by the DC ESS BUS. Backup power is supplied by the HOT BUS 1.

Note: *When leveling the wings, after performing a small turn of a small bank angle, the displayed roll attitude may temporarily be incorrect by a few degrees.*



(1) Roll scale
The roll scale indicates the bank angle. It has bank angle graduations up to 60 °. There is no rotation limit.

(2) Flag
The flag appears if the instrument fails or if power supply fails.

(3) Pitch scale
The pitch scale indicates the pitch attitude. It can show pitch angle up to ±85 °.

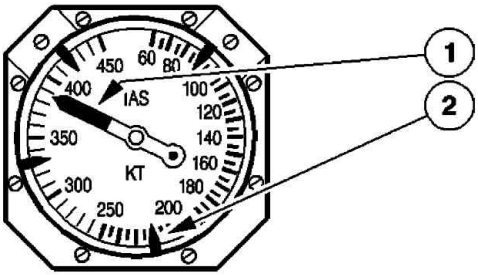
(4) Aircraft reference
Fixed symbol.

(5) Caging knob
The flight crew pulls it out to reinitialize the gyro, and to level and center the horizon. (The airplane should be level during this procedure).

Note: After low-rate turns, the standby horizon may not give accurate indications. To correct this behavior, use the caging knob when the aircraft is level.

AIRSPEED INDICATOR

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

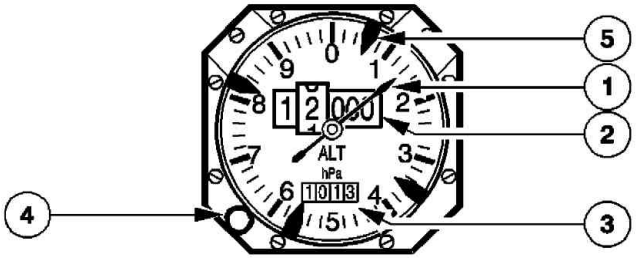


(1) Airspeed pointer

(2) Airspeed bugs (4)
For marking airspeed references.

ALTIMETER

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



(1) Altitude pointer

(2) Altitude counter (feet)

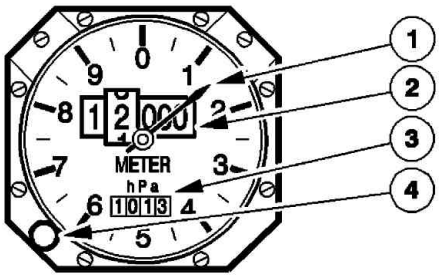
(3) Altimeter setting
Displays the pressure setting in HPA.

(4) Altimeter setting knob

(5) Altitude bugs (4)
For marking of altitude references.

ALTIMETER (IN METER)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG



(1) Altitude pointer

(2) Altitude counter (meter)

(3) Altimeter setting
Display pressure setting in HPA.

(4) Altimeter setting knob

BUS EQUIPMENT LIST

Applicable to: ALL

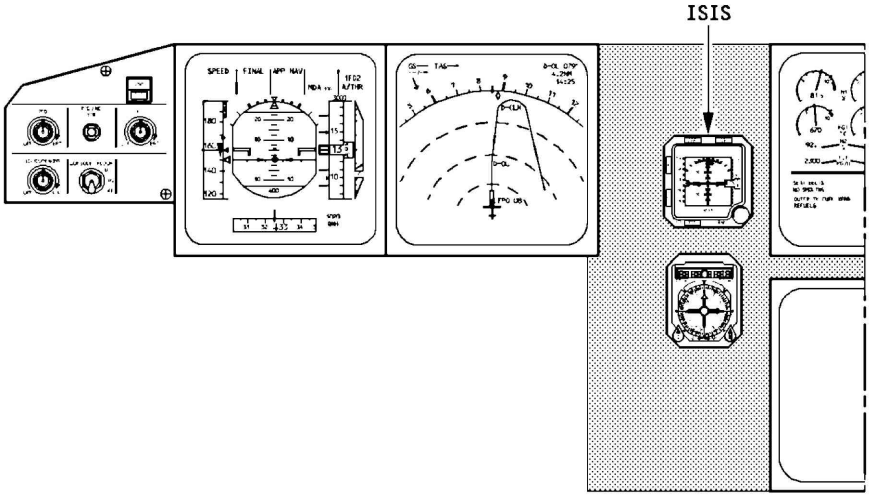
		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
STD BY INST	HORIZON				X	HOT 1 (1)
	ALTIMETER				SHED	
	COMPASS				X	

(1) Backup supply.

INTRODUCTION

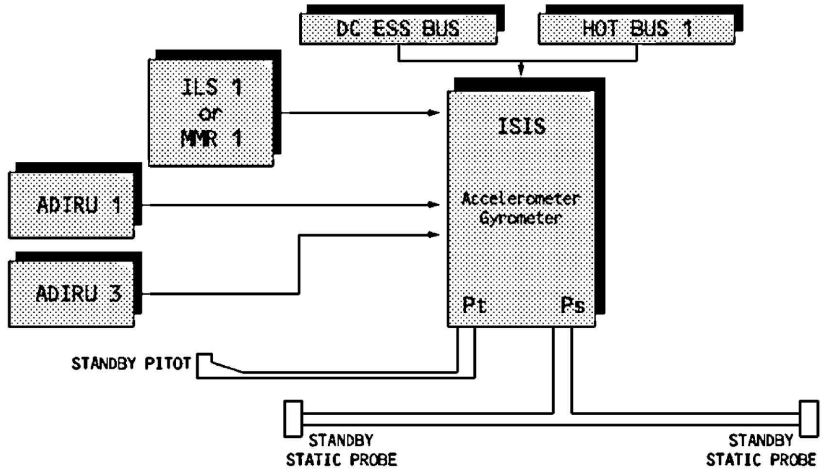
Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The Integrated Standby Instrument System (ISIS) provides a third source of information and display to the crew. It is mounted in the center of the instrument panel.



ARCHITECTURE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



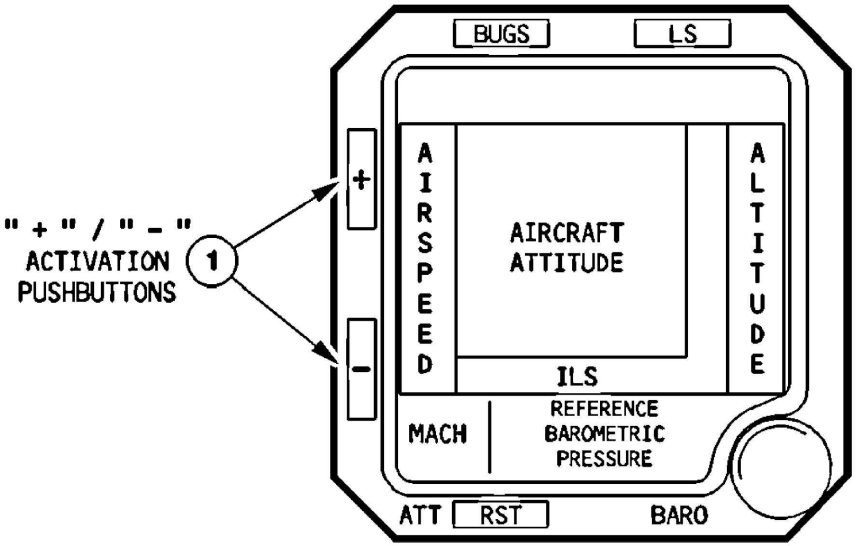
GENERAL

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The ISIS system displays the following information:

- Attitude
- Airspeed and mach
- Altitude
- Barometric pressure
- LS function
- Bugs

Note: *When leveling the wings after performing a small turn of a small bank angle, the displayed roll attitude may temporarily be incorrect by a few degrees.*

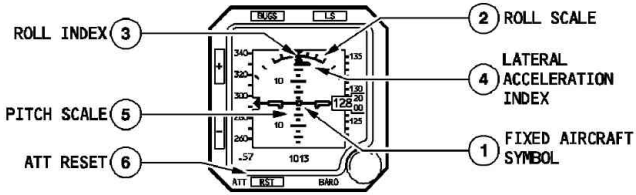


(1) "+"/ "-" activation pushbuttons

Two pushbuttons labelled "+" and "–" are used to adjust the level of brightness.
The brightness of the screen automatically adjusts after power-up tests.
This is because of the photosensitive cell located on the surface of the ISIS system display.
The "+" and "–" pushbuttons then allow this initial brightness to be manually adjusted and changed.

ATTITUDE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) Fixed aircraft symbol
The fixed aircraft symbol is in black, and outlined in yellow.

(2) Roll scale
The roll scale is in white.
The markers are at 0 (small yellow triangle), 10, 20, 30, 45, 60 ° of bank.

(3) Roll index
The roll index indicates the bank angle. It is in black, and outlined in white.

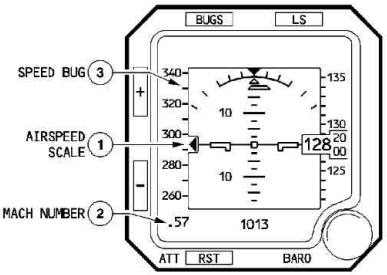
(4) Lateral acceleration index
Lateral acceleration index indicates the aircraft's lateral acceleration. It is represented by a trapezoidal index that moves beneath the roll index.

(5) Pitch scale
The pitch scale indicates the aircraft attitude, and it is in white. The scale has markers every 2.5 °, between 30 ° nose up and 30 ° nose down. If the pitch exceeds 30 °, large (V-shaped) red arrowheads indicate that the attitude is excessive. They also indicate the direction to follow, to resume normal attitude. The minimum displayed pitch scale is -17.5 ° +15 ° at 0 ° pitch.

(6) ATT RST pushbutton
Attitude indication is reset, by pressing "ATT RST" for at least 2 s. The aircraft must be level during this procedure. During the reset time (approx. 10 s), the "ATT 10 s"message is displayed on the screen. "ATT RST" is also used to realign the system, if excessive aircraft movement is detected during the alignment phase, or after 350 h of continuous electrical supply.

AIRSPEED

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



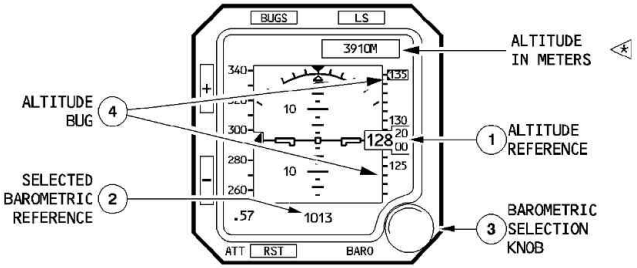
(1) Airspeed scale
A white scale moves in front of a yellow triangle indicating the airspeed. The scale ranges from 5 to 250 kt, with a mark every 5 kt, and from 250 to 520 kt, with a mark every 10 kt.

(2) Mach Number
The Mach number is displayed in green, when greater than 0.5, but disappears only when it goes lower than 0.45.

(3) Speed bug
When a speed bug is entered via the BUGS function, the corresponding speed mark is indicated by a cyan dash.

ALTITUDE

Applicable to: B-HSL, B-HSM, B-HSQ, B-HSR



(1) Altitude indication
The altitude indication is given as a white moving scale, and a green digital readout on a gray background.
The altitude scale ranges from -2 000 to 50 000 ft every 100 ft, with altitude digital indications every 500 ft. “NEG” appears in white in the negative altitudes window.
If the option is installed, the altitude is also given in meters.
The altitude box changes to cyan, when it also corresponds to a bug value.

(2) Barometric reference
The barometric reference pressure is displayed in cyan, in hectoPascal (hPa). It corresponds to either the selected barometric pressure, or the standard pressure. The barometric pressure ranges from 745 to 1 100 hPa.

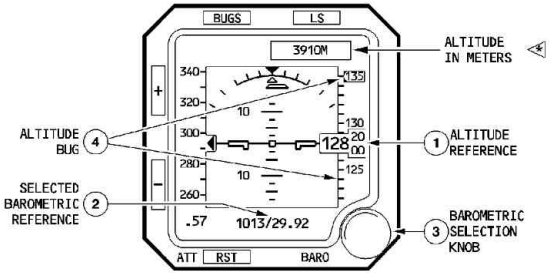
(3) Barometric selection knob
It enables the selection of a barometric pressure, setting a variation of 10 hPa per rotation of the knob.
The standard barometric pressure can be selected by pressing the barometric knob. “STD”is then displayed in place of the pressure value.
Pressing the knob again will display the selected barometric pressure.

(4) Altitude bug

When an altitude bug is entered through the bugs function, the corresponding altitude mark is indicated by a cyan dash, or a cyan box, when the dash covers the digital indication on the scale.

ALTITUDE

Applicable to: B-HSN, B-HSO, B-HSP, B-HST, B-HSU



(1) Altitude indication

The altitude indication is given as a white moving scale, and a green digital readout on a grey background.

The altitude scale ranges from -2 000 to 50 000 ft every 100 ft, with altitude digital indications every 500 ft. “NEG” appears in white, in the negative altitudes window.

If the option is installed, the altitude is also given in meters.

The altitude box changes to cyan, when it also corresponds to a bug value.

(2) Barometric reference

The barometric reference pressure is displayed in cyan. It is indicated in both hectoPascal (hPa) and inches of mercury (Hg).

(3) Barometric selection knob

It enables the selection of a barometric pressure, setting a variation of 10 hPa per rotation of the knob.

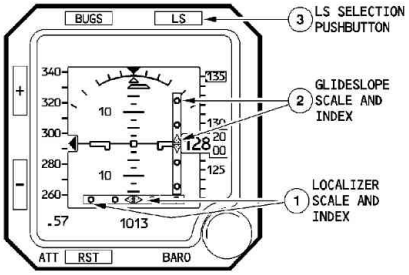
The standard barometric pressure can be selected by pressing the barometric knob. “STD”is then displayed in place of the pressure value.

Pressing the knob again will display the selected barometric pressure.

(4) Altitude bug
When an altitude bug is entered through the bugs function, the corresponding altitude mark is indicated by a cyan dash, or a cyan box, when the dash covers the digital indication on the scale.

LANDING SYSTEM FUNCTION

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) Localizer scale and index

(2) Glideslope scale and index
The deviation scales appear when the LS pushbutton is pressed. The indexes appear when the Glideslope and Localizer signals are valid and deviation scales are displayed.

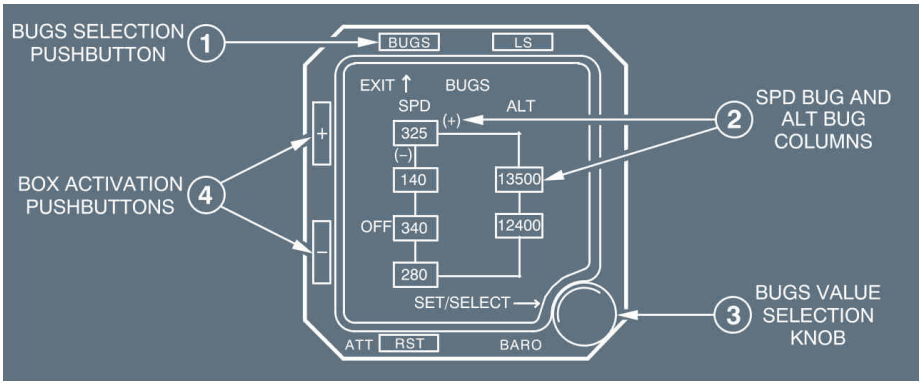
(3) LS selection pushbutton
Pressing the LS pushbutton will display the ILS scales. Pressing it again will de-select the ILS scales.

CAUTION	Do not use the ISIS LS for takeoff using the localizer of the opposite runway, or for a back-course localizer approach. The LOC deviations are given in the wrong sense.

BUGS FUNCTION

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

1



(1) BUGS function selection pushbutton
Pressing the BUGS pushbutton will activate the BUGS function and display the bug values to be selected.

(2) SPD BUG and ALT BUG columns
The SPD BUG column gives four speed values (in knots) that can be selected by the crew.
The ALT BUG column gives two altitude values (feet) to be selected by the crew.

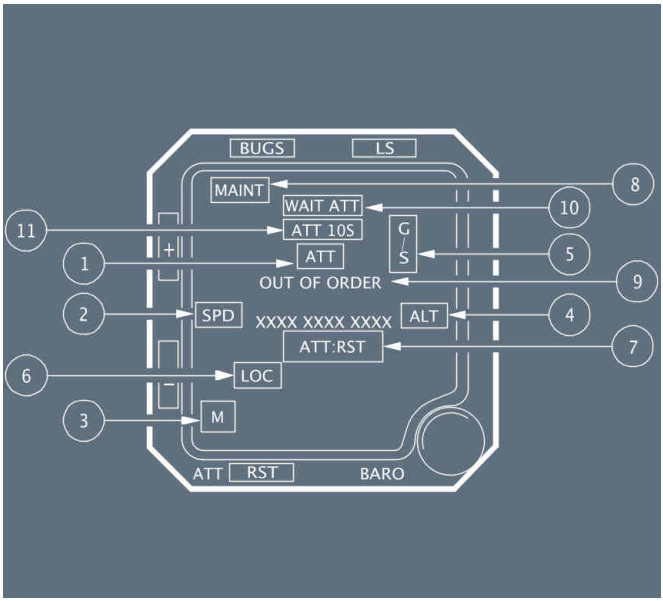
(3) BUGS value selection knob
It allows the bug value to be set by rotating the BARO knob. This value cannot be lower than 30 kt for a speed bug, or a negative value for an altitude bug.
Pressing the BARO setting knob, once a bug value box is activated, will deselect the bug value.
The "OFF" label comes on close to the activated box.
The entered values are memorized by the system, when exiting the screen, by pressing the BUGS pushbutton (1), or after 15 s without any pilot action.

(4) "+"/"-" box activation buttons
Access from one box to another is obtained by pressing the "+" or "–" pushbutton.
When a bug value is entered, access to the next box is obtained by pressing the "–" pushbutton. The box becomes active and flashes.
The "+" pushbutton can be used to return to a previous box.

Note: *Use of the ISIS bugs function is not recommended because, in the event that both PFDs are lost in flight, when the ISIS bugs were previously set for takeoff, then for the approach, the bugs would remain at the takeoff characteristic speed settings.*

FLAGS

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) ATT flag (red)
When attitude data is lost, the red ATT flag appears.

(2) SPD flag (red)
When airspeed data is lost, the red SPD flag appears.

(3) M flag (red)
When mach number is lost, the red M flag appears.

(4) ALT flag (red)
When altitude data is lost, the red ALT flag appears.

(5) G/S flag (red)
When glideslope information is lost, the red G/S flag appears.

(6) LOC flag (red)
When localizer data is lost, the red LOC flag appears.

(7) ATT: RST (yellow)

The “ATT: RST” flag appears:
- When excessive aircraft movement is detected during the alignment phase, or
- After 350 h of continuous electrical supply, or
- When the “WAIT ATT”flag is displayed during more than 10 s .

In both cases, press the ATT RST pb to reset/realign and recover the attitude indication.

(8) MAINT flag (white)
Failure not affecting ISIS operation. Service ISIS, when convenient.

(9) OUT OF ORDER (white)
When an internal failure of the ISIS indicator occurs, the “OUT OF ORDER” message appears, accompagnied by a fault code.

(10) WAIT ATT flag (yellow)

If the ISIS looses attitude data, its entire sphere is cleared to display the: “WAIT ATT”flag.
- If the “WAIT ATT”flag is displayed during less than 10 s, a normal operation is recovered.
- If attitude data are lost for more than 10 s, the “WAIT ATT”flag is then replaced by the “ATT: RST” flag.

(11) ATT 10 s flag (yellow)
This count down flag appears, when the flight crew press the ATT RST pb, in order to indicate that the attitude reset function is in progress.

GENERAL

Applicable to: ALL

The FMGC is the basic means for tuning navaids.
Three modes of tuning are available.

AUTOMATIC TUNING

Applicable to: ALL

In normal operation, the FMGC tunes navaids automatically, with each FMGC controlling its own receivers.
If one FMGC fails, the remaining one controls both sides receivers.

MANUAL TUNING

Applicable to: ALL

The crew can use the MCDU to override the FMGC's automatic selection and tuning of navaids and select a specific navaid for visual display.
This does not affect the automatic function of the FMGC. Any entry on one MCDU is sent to both FMGC in dual mode, or the remaining FMGC in single.

BACK UP TUNING

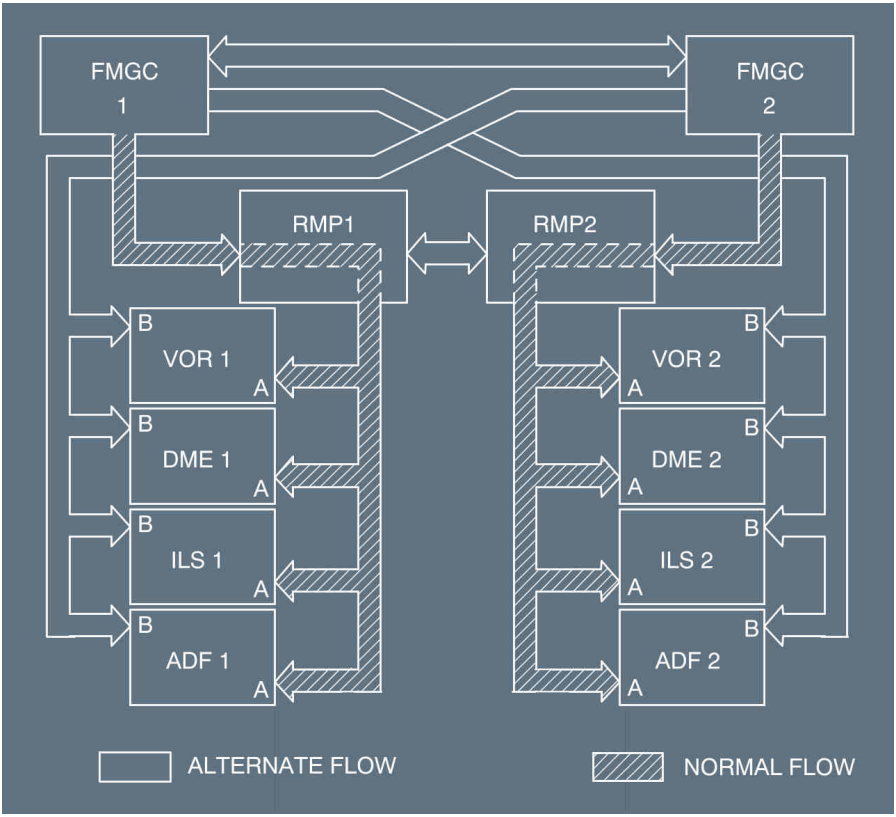
Applicable to: ALL

If both FMGCs fail, the flight crew can use the RMPs (Radio Management Panels 1 and 2) on the pedestal for back up tuning.
The CAPT RMP controls VOR 1 and ADF 1 ◁✲ .
The F/O RMP controls VOR 2 and ADF 2 ◁✲ .
Either RMP controls both ILSs (provided NAV back up is selected on RMP 1 and RMP 2). RMP 3 ◁✲ is not used for navaids tuning.

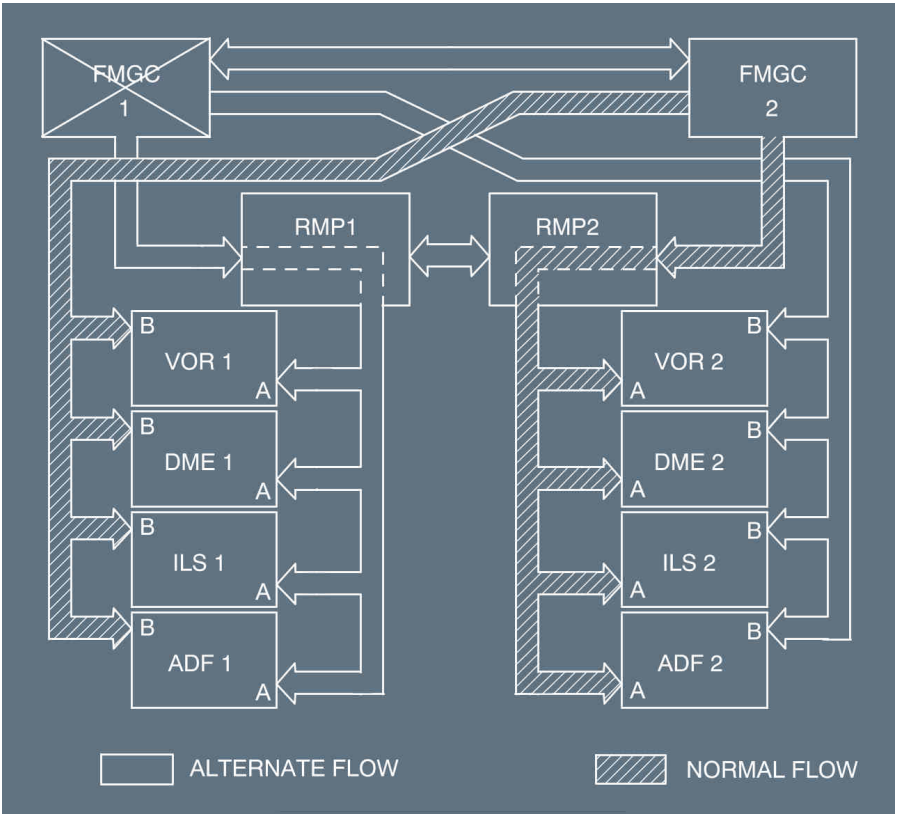
ARCHITECTURE

Applicable to: ALL

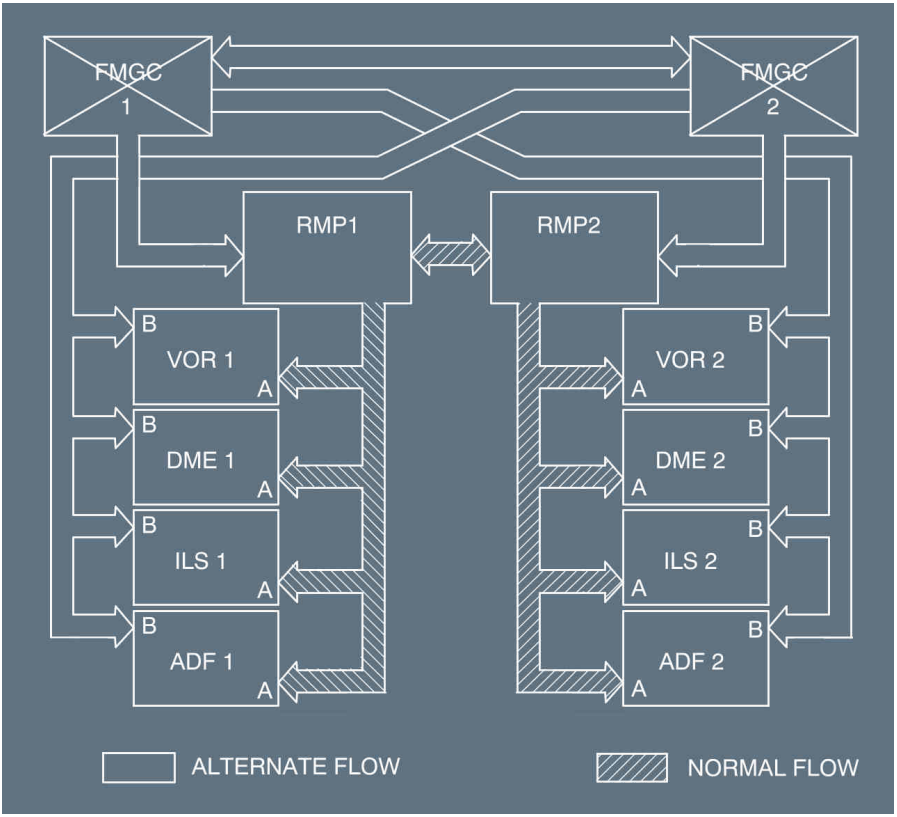
1 NORMAL OPERATION



2 **FMGC 1 FAILURE**



3 **BACK UP TUNING**



VOR

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The aircraft has two VOR receivers.
(For tuning instructions, *Refer to DSC-34-30-10 General*).

- The Navigation Displays (NDs) show VOR1 and VOR2 information, in accordance with the position of the ADF/VOR selectors on the EFIS control panel (*Refer to DSC-31-45 ROSE Modes*).
- The DDRMI on the center panel also displays VOR1 and VOR2 bearings, if the heading signal is valid.

VOR

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The aircraft has two VOR receivers.
(For tuning instructions, *Refer to DSC-34-30-10 General*).
The Navigation Displays (NDs) show VOR1 and VOR2 information, in accordance with the position of the ADF/VOR selectors on the EFIS control panel (*Refer to DSC-31-45 ROSE Modes*).

ILS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The aircraft has two ILS receivers. Each ILS receiver is integrated in a modular avionics unit called MMR (Multi Mode Receiver) (ILS1 receiver in MMR1, ILS2 receiver in MMR2).
(For tuning instructions, *Refer to DSC-34-30-10 General*).

- PFD1 and ND2 display ILS1 information.
- PFD2 and ND1 display ILS2 information.
- The flight crew can display the same ILS information on each PFD by pressing the ILS pb on the onside EFIS control panel (deviation scales and deviation indexes come on).
- The NDs display ILS information, if the flight crew selects the ROSE ILS mode on the EFIS control panel (*Refer to DSC-31-50 EFIS Control Panel*).

ILS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The aircraft has two ILS receivers. Each ILS receiver is integrated in a modular avionics unit called MMR (Multi Mode Receiver) (ILS1 receiver in MMR1, ILS2 receiver in MMR2).
(For tuning instructions, *Refer to DSC-34-30-10 General*).

- PFD1 and ND2 display ILS1 information.
- PFD2 and ND1 display ILS2 information.

- The flight crew can put the same ILS information on each PFD by pressing the LS button on the EFIS control panel (the green bars come on).
- The NDs display ILS information, if the flight crew selects the ROSE LS mode on the EFIS control panel (*Refer to DSC-31-50 EFIS Control Panel*).

ADF

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The aircraft has two ADF systems.
(For tuning instructions, *Refer to DSC-34-30-10 General*).
The NDs display ADF information, depending on the position of the ADF/VOR selectors on the EFIS control panel (*Refer to DSC-31-45 ROSE Modes*).
The DDRMI also displays ADF 1 and ADF 2 bearings, depending on the position of the ADF/VOR selector (on the DDRMI).

ADF

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

The aircraft has 1 ADF system.
(For tuning instructions, *Refer to DSC-34-30-10 General*).
The NDs display ADF information, depending on the position of the ADF/VOR selectors on the EFIS control panel (*Refer to DSC-31-45 ROSE Modes*).

ADF

Applicable to: B-HSO, B-HSP

The aircraft has two ADF systems.
(For tuning instructions, *Refer to DSC-34-30-10 General*).
The NDs display ADF information, depending on the position of the ADF/VOR selectors on the EFIS control panel (*Refer to DSC-31-45 ROSE Modes*).

DME

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The aircraft has two DMEs.
The frequency that is automatically set on the DME corresponds to the one that is set on the VOR or ILS.
The NDs and the DDRMI can display VOR DME information, and the PFDs can display ILS DME information (*Refer to DSC-31-40 Trajectory Deviation - ILS Approach*).

DME

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The aircraft has two DMEs.

The frequency that is automatically set on the DME corresponds to the one that is set on the VOR or ILS.

The NDs can display VOR DME information, and the PFDs can display ILS/MLS DME information (*Refer to DSC-31-40 Trajectory Deviation - ILS Approach*).

MARKER BEACON

Applicable to: ALL

One marker beacon system is included in VOR receiver 1.

The PFD displays the outer, middle, and inner marker signals (*Refer to DSC-31-40 Trajectory Deviation - ILS Approach*).

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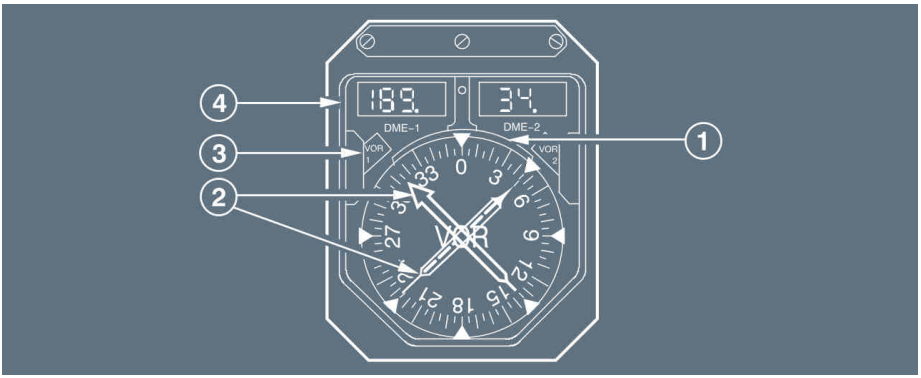
DIGITAL DISTANCE AND RADIO MAGNETIC INDICATOR (DDRMI)

Applicable to: B-HTF

1



(1) Compass card
ADIRU 1 normally supplies the signal that positions the compass card. ADIRU 3 supplies it, when selected by the ATT HDG SWITCHING selector.

(2) Bearings pointers
Indicate the magnetic bearing to the station received by VOR 1 (dashed pointer) and VOR 2 (double pointer).

Note: Depending on the quality of the VOR beacon's signal, and mainly at distances greater than 25 nm from the station, the processing of the signal, on aircraft equipped with COLLINS or BENDIX VOR may lead to bearing pointer oscillations.

(3) VOR 1(2) flags

The indicators display these flags, if the:
- VOR receiver fails
- RMI has an internal failure
- Heading signal from ADIRS is not valid
- Power supply fails.

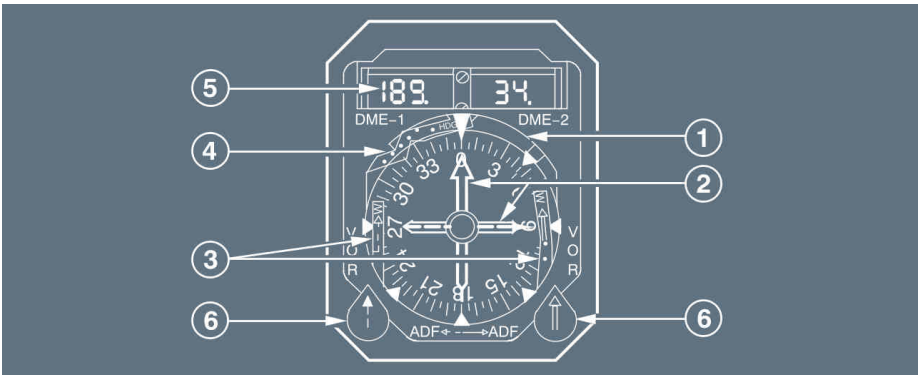
As long as the flag appears, the relevant pointer remains at the last valid position.

(4) DME 1(2) counters
The counters indicate distances in NM, and 1/10th at less than 20 nm.
At less than 1 nm, 0 is shown.

DIGITAL DISTANCE AND RADIO MAGNETIC INDICATOR (DDRMI)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

2



(1) Compass card

ADIRU 1 normally supplies the signal that positions the compass card. ADIRU 3 supplies it when selected by the ATT HDG SWITCHING selector.

(2) Bearings pointers

Indicate the magnetic bearing to the station received by VOR 1 or ADF 1 (dashed pointer) and VOR 2 or ADF 2 ◁ (double pointer).

Note: Depending on the quality of the VOR beacon's signal, and mainly at distances greater than 25 nm from the station, the processing of the signal, on aircraft equipped with COLLINS or BENDIX VOR may lead to bearing pointer oscillations.

(3) VOR/ADF flags

The indicators display these flags if:
- the VOR or ADF receiver fails (VOR/ADF selector position indicates the failed receiver)
- the RMI has an internal failure
- the heading signal from ADIRS is not valid
- the power supply fails.

As long as the flag shows, the relevant pointer remains at the last valid position.

(4) HDG flag

Appears, along with an associated VOR/ADF flags display, when:

- The heading signal from the supplying ADIRS is not valid;
- The RMI has an internal failure;
- The power supply fails.

(5) DME 1(2) counters
The counters indicate distances in NM and 1/10th at less than 20 nm.
At less than 1 nm, 0 is shown.

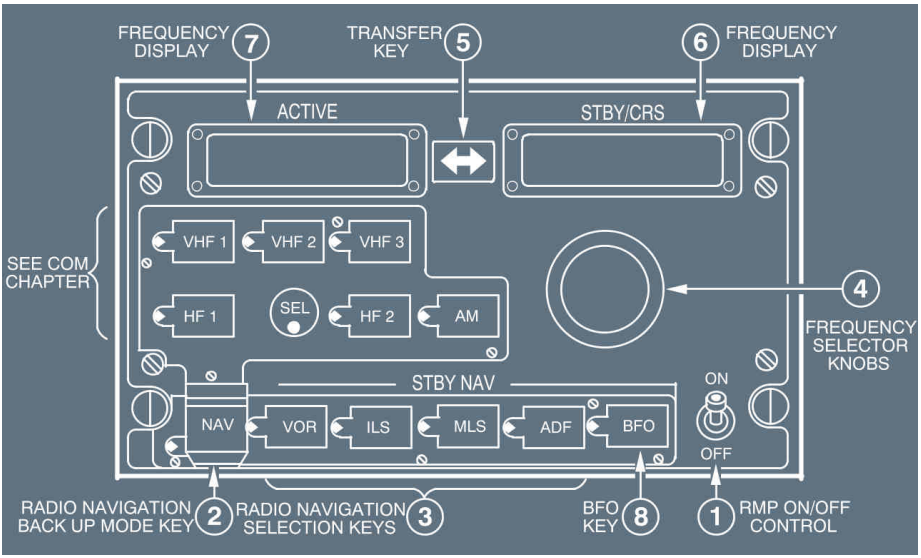
(6) VOR/ADF sel

- VOR 1 or ADF 1 on the dashed pointer.
- VOR 2 or ADF 2 ◁ (if not installed, then ADF 1) on the double pointer.

RADIO MANAGEMENT PANEL (RMP)

Applicable to: ALL

3



(1) ON/OFF sw
This switch controls the power supply to the panel.

(2) NAV key (transparent switchguard)

- Pressing this key engages the radio navigation backup mode. It takes control of the VOR, ILS, MLS, and ADF receivers away from the FMGC and gives it to the RMP.
- The green monitor light comes on.
- Pressing the NAV key a second time returns control of the navigation radios to the FMGC.

Note:
- *The flight crew must select this backup tuning mode on both RMP1 and RMP2 if both FMGCs or both MCDUs fail. In the emergency electrical configuration, only RMP1 receives power*
- *Pressing the NAV key on RMP3 has no effect*
- *In the NAV backup mode, the flight crew can select radio communication systems as it would in the normal mode.*
  Setting one RMP to NAV backup mode removes navaids tuning from both FMGCs.
- *When the flight crew uses an RMP to turn an ILS/DME, the PFDs do not display the DME distance.*

(3) STBY NAV keys

When the NAV key is on and the flight crew presses one of these STBY NAV keys, the ACTIVE window displays the frequency to which that receiver is tuned. The green monitor light on the selected key comes on, and the one on the previously selected STBY NAV or COM key goes out.

(4) Frequency selector knob

Two concentric knobs allow the flight crew to preselect frequencies for communication radios and stand-by navigation systems and select courses for VOR and ILS.

The desired frequency or course is set in the STBY/CRS window.

- Setting frequency :
  The outer knob controls the most significant digits, the inner knob controls the least significant digits. A rate multiplier speeds up the tuning when the knob is rotated rapidly.
- Setting course :
  Selected by inner knob only.

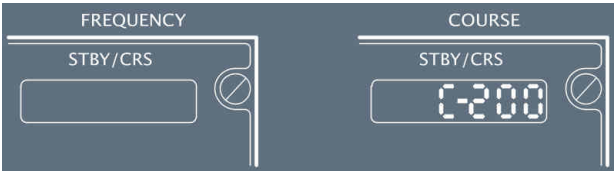
(5) Transfer key

The flight crew presses this key to interchange ACTIVE and STBY frequencies. This action tunes the selected receiver to the new ACTIVE frequency.

(6) STBY/CRS window

The flight crew can make the frequency displayed in this window become the active frequency by pressing the transfer key, or change it by rotating the tuning knob.
If this window displays a course, then the ACTIVE window displays the associated frequency.

Note: *If the STBY/CRS window is displaying a course, then pressing the transfer key displays the active frequency in both windows.*

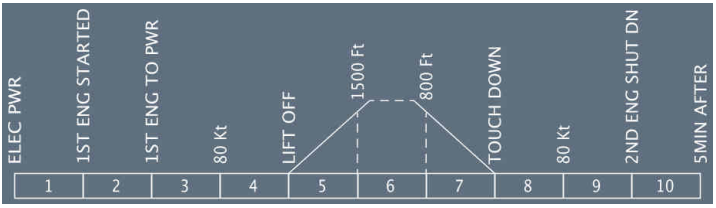


(7) ACTIVE window
This window displays the frequency of the selected navaid, which is identified by a green monitor light on the selection key.

(8) BFO key
Pressing this key activates the BFO (Beat Frequency Oscillator), if the ADF receiver is selected.
The green monitor light comes on.
For most ADF, with BFO activated, the audio identification is heard. However there are some ADF where the BFO must be deactivated in order to hear the audio identification.

WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ILS 1(2)(1+2) FAULT	SINGLE CHIME	MASTER CAUT	NIL	Flag on PFD and ND	3, 4, 5
MLS 1(2) FAULT					

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BUS EQUIPMENT LIST

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
NAVAIDS	VOR 1			X		
	VOR 2	AC 2				
	MMR 1			X		
	MMR 2	AC 2				
	ADF 1			SHED		
	ADF 2 ◁	AC 2				
	DDRMI			X		
	DME 1			SHED		
	DME 2	AC 2				

BUS EQUIPMENT LIST

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
NAVAIDS	VOR 1			X		
	VOR 2	AC 2				
	MMR 1			X		
	MMR 2	AC 2				
	ADF 1			SHED		
	ADF 2 ◁	AC 2				
	DME 1			SHED		
	DME 2	AC 2				

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GENERAL

Applicable to: ALL

The aircraft has two radio altimeters.
Normally, CAPT's PFD displays the RA1 height, and the F/O's PFD displays the RA2 height. If either radio altimeter fails, both PFDs display the height from the remaining one.

INDICATIONS ON PFD

Applicable to: ALL

(*Refer to DSC-31-40 General*).

AUTOMATIC CALL OUT

Applicable to: ALL

GENERAL

The FWC generates a synthetic voice for radio height announcement below 2 500 ft. These announcements come through the cockpit loudspeakers, even if the speakers are turned off.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

PREDETERMINED CALL OUT

The altitude call out uses the following predetermined threshold:

Height (ft)	Call out
2 500	TWO THOUSAND FIVE HUNDRED OR TWENTY FIVE HUNDRED
2 000	TWO THOUSAND
1 000	ONE THOUSAND
500	FIVE HUNDRED
400	FOUR HUNDRED
300	THREE HUNDRED
200	TWO HUNDRED
100	ONE HUNDRED
50	FIFTY
40	FORTY
30	THIRTY
20	TWENTY
10	TEN
5	FIVE
DH + 100	HUNDRED ABOVE
DH	MINIMUM

Pin programming enables Operators to select the required callouts. If the aircraft remains at a height that is in the detection zone for a height callout, the corresponding message is repeated at regular intervals.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

PREDETERMINED CALL OUT

The altitude call out uses the following predetermined threshold:

Height (ft)	Callout
2 500	TWO THOUSAND FIVE HUNDRED OR TWENTY FIVE HUNDRED
2 000	TWO THOUSAND
1 000	ONE THOUSAND
500	FIVE HUNDRED
400	FOUR HUNDRED
300	THREE HUNDRED
200	TWO HUNDRED
100	ONE HUNDRED
50	FIFTY
40	FORTY
30	THIRTY
20	TWENTY
10	TEN
5	FIVE
DH (or MDA/MDH) + 100	HUNDRED ABOVE
DH (or MDA/MDH)	MINIMUM

Note: The reference altitude for callouts is the radio altitude for precision approaches (DH), and baro altitude (MDA/MDH) for non precision approaches.

Pin programming enables Operators to select the required callouts. If the aircraft remains at a height that is in the detection zone for a height callout, the corresponding message is repeated at regular intervals.

Applicable to: ALL

INTERMEDIATE CALL OUT

If time between two consecutive predetermined call outs exceeds a certain threshold, the present height is repeated at regular intervals.

The threshold is : 11 s above 50 ft
4 s below 50 ft

The repeating interval is 4 s.

Applicable to: ALL

RETARD ANNOUNCEMENT

The loudspeaker announces RETARD at 20 ft or at 10 ft if autothrust is active and one autopilot is in LAND mode.

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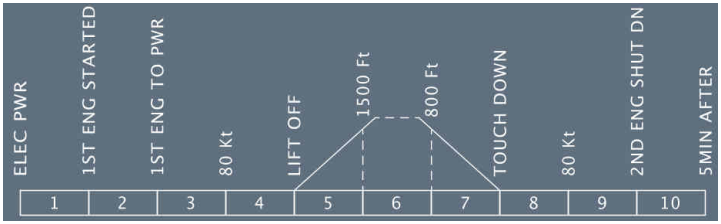
WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
RA 1(2) FAULT	SINGLE CHIME	MASTER CAUT	NIL	NIL	3, 4, 5, 8
RA DEGRADED In case a significant discrepancy occurs in flight between the two radio-altimeters.	NIL	NIL			2 to 8

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BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
RADIO ALTIMETER	RA 1	AC1				
	RA 2	AC2				

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DESCRIPTION

Applicable to: ALL

The aircraft has two ATC transponders which are controlled by a dual control box on the center pedestal.

Only the selected ATC transponder operates.

The associated ADIRS (1 for transponder 1, etc ...) provides altitude information for altitude reporting. In case of a failure, ADIRS 3 can provides altitude information, when selected via the AIR DATA SWITCHING selector.

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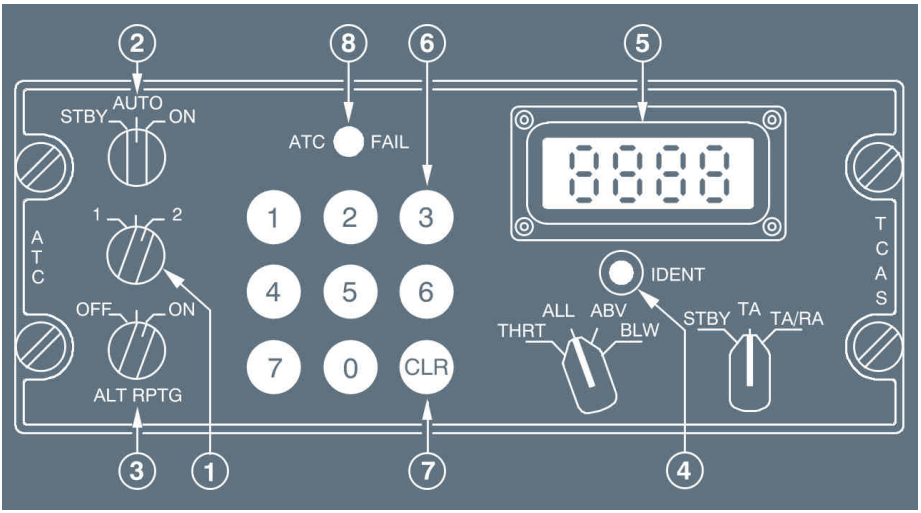
CONTROL PANEL

Applicable to: ALL 321, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

1



(1) ATC selector
This switch selects transponder 1 or 2.

(2) Mode sel

STBY	:	BOTH ATC transponders are electrically supplied but do not operate.
ON	:	Selected transponder operates.
AUTO: In flight	:	Selected transponder operates.
AUTO: On ground	:	Selected transponder only operates in mode S (Selective aircraft interrogation mode).

(3) ALT RPTG sw

ON	:	The transponder sends barometric standard altitude data.
OFF	:	No altitude data transmission. If the TCAS is installed, the upper ECAM displays "TCAS STBY"in green.

(4) IDENT sw
The flight crew presses this button to send the aircraft identification signal.

(5) Code display
The window displays the selected code.

(6) Keyboard
The flight crew uses these pushbuttons to set the code assigned by ATC.

(7) CLR pb
The flight crew uses this pushbutton to clear the code display.

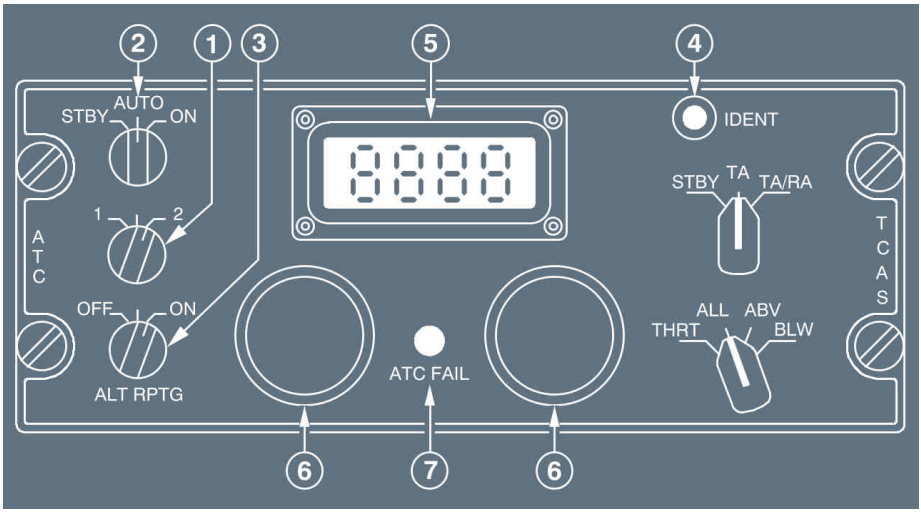
Note: As long as the four figures of the new code are not entirely written, the previous code remains.

(8) ATC FAIL
This light comes on if the selected transponder fails.

CONTROL PANEL

Applicable to: B-HSD, B-HSE, B-HSG

2



(1) ATC selector
This switch Selects transponder 1 or 2.

(2) Mode sel

STBY	:	BOTH ATC transponders are electrically supplied but do not operate.
ON	:	Selected transponder operates.

AUTO: In flight : Selected transponder operates.

AUTO: On ground : Selected transponder only operates in mode S (Selective aircraft interrogation mode).

(3) ALT RPTG sw

ON : The transponder sends barometric standard altitude data.

OFF : No altitude data transmission. If the TCAS is installed, the upper ECAM displays "TCAS STBY"in green.

(4) IDENT sw
The flight crew presses this button to send the aircraft identification signal.

(5) Display
The window displays the code selected.

(6) Knobs
The flight crew uses these knobs to set the code assigned by ATC.

(7) ATC FAIL light
This light comes on if the selected transponder fails.

AUTOMATIC DEPENDENT SURVEILLANCE - BROADCAST (ADS-B)

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

3

Automatic Dependent Surveillance - Broadcast (ADS-B) is a new application to transmit surveillance data from aircraft to Air Traffic Control ground stations.

ADS-B OUT

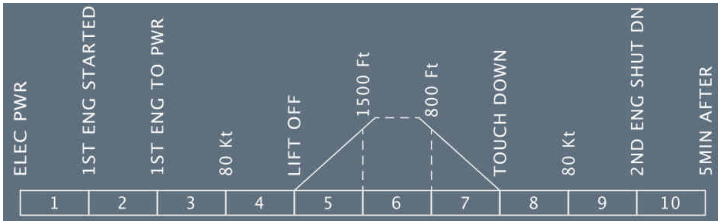
With the ADS-B OUT capability, the Mode S ATC transponders automatically and continuously transmit surveillance data to the ATC ground station without preliminary ground interrogation.

The ADS-B OUT surveillance data, that are automatically and continuously transmitted, are:

- In flight:
  - Latitude and Longitude from the GPS
  - Horizontal Integrity Limit (HIL) of the GPS
  - Barometric Altitude
  - Difference between Barometric Altitude and Geometric Altitude (Given by the GPS)
  - Ground Speed and Track
  - Vertical Speed
  - Flight Number (Flight number registered on the ATC flight plan and entered in the FMS during cockpit preparation)
  - Emergency Situation Indicator.
- On the ground:
  - Latitude and Longitude from the GPS
  - Ground Speed and Track
  - Flight Number (Flight number registered on the ATC flight plan and entered in the FMS during cockpit preparation).

WARNINGS AND CAUTIONS

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ATC/XPDR 1(2) FAULT	SINGLE CHIME	MASTER CAUT	NIL	NIL	3, 4, 5, 7, 8
ATC/XPDR 1+2 FAULT					
ATC/XPDR STBY					1 to 5, 7 to 10

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BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
ATC	ATC 1			SHED		
	ATC 2	AC 2				

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DESCRIPTION

Applicable to: ALL

The aircraft has two weather radar systems. Only one receiver in working at a time.
It can display the weather image on the ND, in any ND mode except PLAN.
Each pilot may remove the weather image from their ND by setting the associated brightness control to the minimum (*Refer to DSC-31-50 Other EFIS Controls*).

Note: *Some aircraft may be fitted with one weather radar only.*

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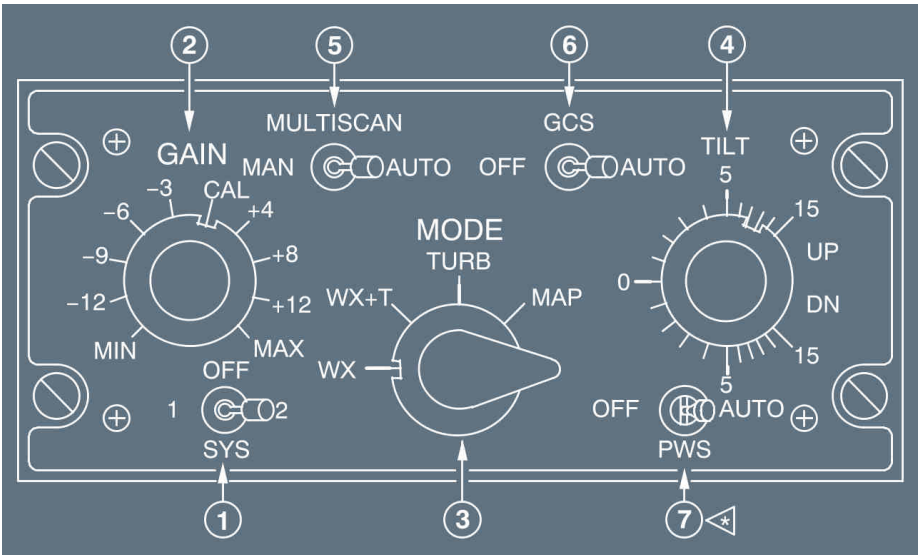
CONTROL PANEL

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

1



(1) SYS toggle switch
This switch selects one radar, or turns OFF both radars.

(2) GAIN knob
It adjusts the receiver's sensitivity in weather mode (WX), or in ground mapping mode (MAP). CAL is the normal position of the knob. It adjusts the gain to a calibrated setting.

(3) Mode selector

WX	:	Weather mode: Weather mode: colors indicate the density of precipitation (black for the lowest intensity, green, amber and red indicating progressively for higher intensities).
WX + T	:	The screen only displays turbulence areas (in precipitation areas) in magenta (within 40 nm).
TURB	:	The screen only shows turbulence areas.
MAP	:	Radar operates in ground mapping mode: black indicates water, green indicates the ground, and amber indicates cities and mountains.

(4) TILT knob

This knob controls the antenna tilt.
Radar 1 depends on ADIRS 1. Radar 2 depends on ADIRS 2. ADIRS 3 replaces either one of the ADIRS, if ATT HDG selector is set to CAPT 3 or F/O 3.
Zero represents the horizon, as seen by the ADIRS.

(5) MULTISCAN toggle switch

AUTO : Automatically activates tilt to optimize weather detection and minimize ground clutter.

MAN : When set to MAN, the crew can then manually adjust the tilt by using the TILT knob.

(6) GCS toggle switch

The Ground Clutter Suppression (GCS) toggle switch is spring-loaded to the AUTO position.

AUTO :
- If MULTISCAN toggle switch is set to AUTO, the radar is in normal use. Ground clutter is not displayed on the screen
- If MULTISCAN toggle switch is set to MAN, the GCS switch has no utility. Ground clutter is displayed on the screen.

OFF : Ground clutter is displayed on the screen.

(7) PWS toggle switch ⋖ (only operative, if the predictive windshear function is installed)

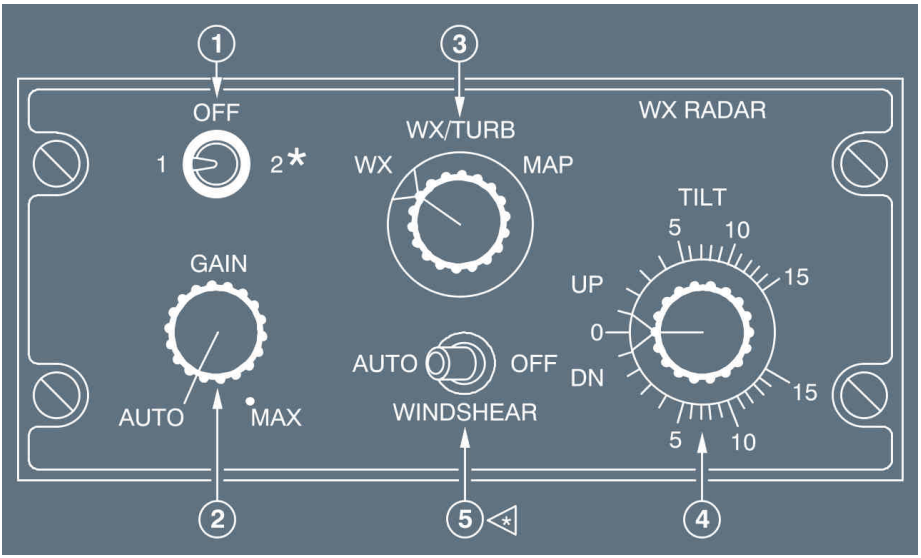
AUTO : Activates the predictive windshear function: windshear areas are detected by antenna scanning below 2 300 ft RA, even if the SYS switch is set to OFF. They are displayed on the ND, if below 1 500 ft.

OFF : The predictive windshear function is off.

CONTROL PANEL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

2



(*) If only one radar system is installed, "2" is replaced by an "INOP"sticker.

(1) Transceiver 1-2 switch
This switch allow to select one radar or to turn both radars to off.

Note: *If there is only one radar on the aircraft, no weather image is displayed when system 2 is switched on.*

(2) GAIN knob
This knob adjusts the sensitivity of the receiver in all modes.

AUTO : Automatically adjusts the gain to the optimum setting.

(3) Mode selector

WX : Weather mode: Weather mode: colors indicate the density of precipitation (black for the lowest intensity, green, amber and red indicating progressively for higher intensities).

WX + TURB: The screen shows turbulence areas (in precipitation areas) in magenta (within 40 nm).

MAP : Radar operates in ground mapping mode: black indicates water, green indicates the ground, and amber indicates cities and mountains.

(4) TILT knob

This knob controls antenna tilt.

Radar 1 depends on ADIRS 1, radar 2 ◁ on ADIRS 2. ADIRS 3 replaces either ADIRS if ATT HDG selector is used.

Zero represents the horizon as seen by ADIRS.

(5) WINDSHEAR switch ◁ (operative only if the predictive windshear function is embodied)

AUTO : Activates the predictive windshear function. Windshear areas are detected by antenna scanning below 2 300 ft RA, even if the transceiver 1-2 selector is set to OFF. They are displayed on the ND, if below 1 500 ft.

OFF : The predictive windshear function is off.

GENERAL

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The weather radars have a Predictive Windshear System (PWS) that operates when:
- The PWS switch is in the AUTO position (Even if the weather radar is OFF), and
- The aircraft is below 2 300 ft AGL, and
- The ATC is switched to the ON, or AUTO, or XPDR, or XPNDR, position (depending on the ATC panel), and
- Either engine is running.

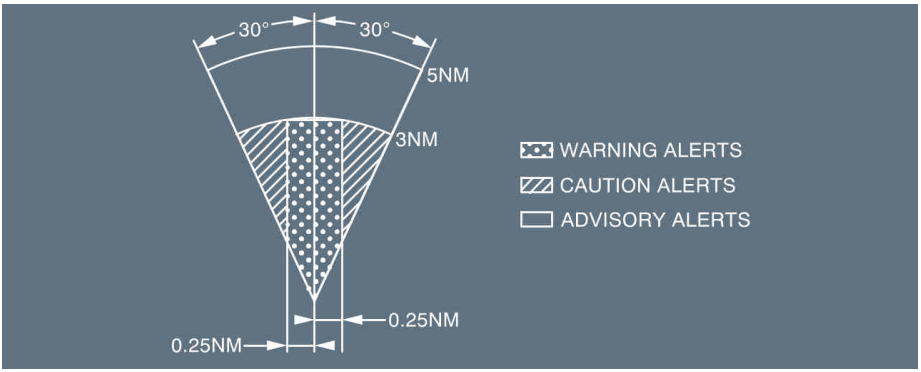
Note: When two weather radars are installed, if the selected weather radar fails, the PWS function is recovered by selecting the non-failed weather radar on the control panel.

The system scans the airspace, within a range of 5 nm ahead of the aircraft, for windshears. Below 1 500 ft, when the system detects windshear, depending on the range selected on the ND, a warning, caution, or advisory message appears on the ND. Predictive windshear warnings and cautions are associated with an aural warning.

WINDSHEAR ALERTS DURING TAKEOFF ROLL, UP TO 100 KNOTS

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

1

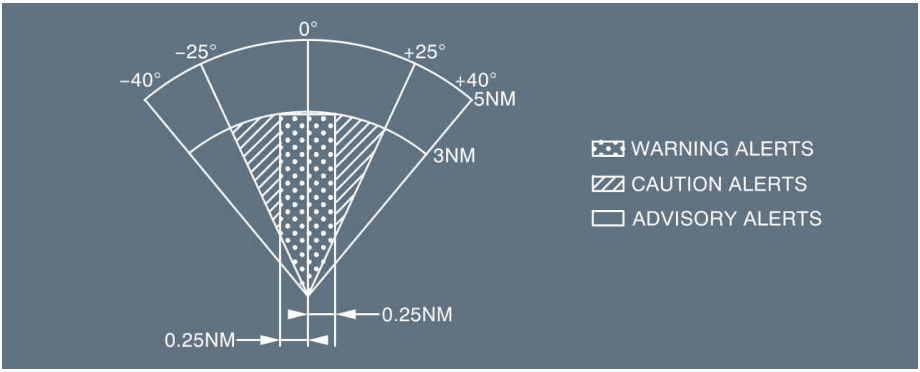


During the takeoff roll, up to 100 kt, both warnings and cautions are available within a range of 3 nm.

WINDSHEAR ALERTS DURING TAKEOFF ROLL, UP TO 100 KNOTS

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

WINDSHEAR ALERTS during takeoff roll, up to 100 knots

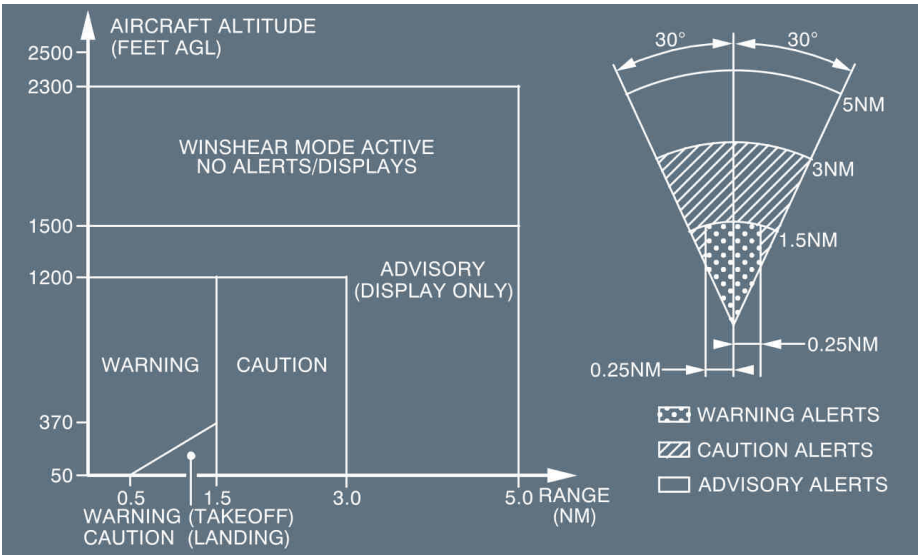


During the takeoff roll, up to 100 kt, both warnings and cautions are available within a range of 3 nm.

WINDSHEAR ALERTS ABOVE 50 FEET

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

2

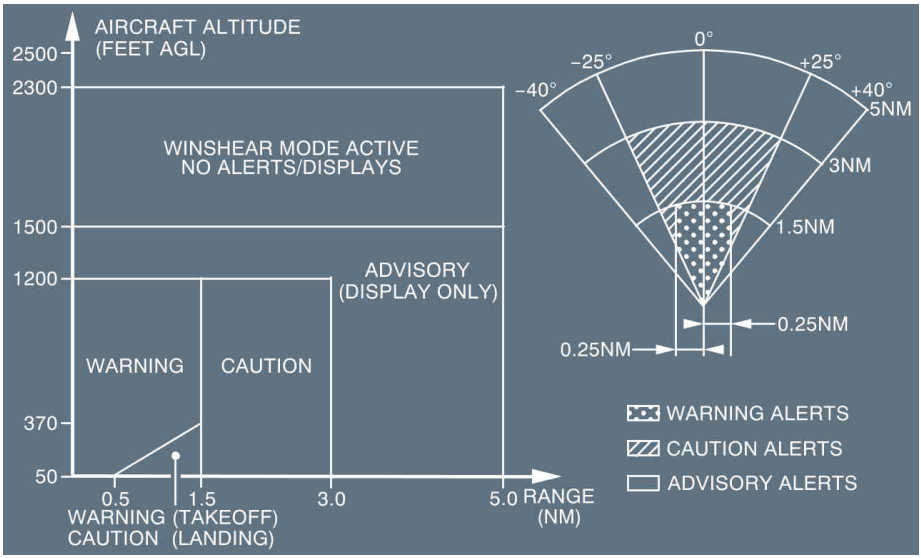


During final approach, the visual and aural warning alerts are downgraded to caution alerts between 370 ft AGL and 50 ft AGL, and range between 1.5 nm and 0.5 nm.

WINDSHEAR ALERTS ABOVE 50 FEET

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

3



During final approach, the visual and aural warning alerts are downgraded to caution alerts between 370 ft AGL and 50 ft AGL, and range between 1.5 nm and 0.5 nm.

WINDSHEAR ALERTS INHIBITION

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

At takeoff, alerts are inhibited above 100 kt and up to 50 ft. During landing, alerts are inhibited below 50 ft.

Alert Level	Aural Warning	PFD	ND (*Refer to DSC-31-45 Predictive Windshear System*)
Warning (Approach)	«GO AROUND WINDSHEAR AHEAD»	W/S AHEAD (red)	Windshear icon
Warning (Takeoff)	«WINDSHEAR AHEAD» (twice)	W/S AHEAD (red)	Windshear icon
Caution	«MONITOR RADAR DISPLAY»	W/S AHEAD (amber)	Windshear icon
Advisory	Nil	Nil	Windshear icon

The aural alerts of the Predictive Windshear System (PWS):

- Have priority over TCAS, GPWS, and other FWC aural warnings
- Are inhibited by windshear detection, via the FAC, stall warnings and aural messages.

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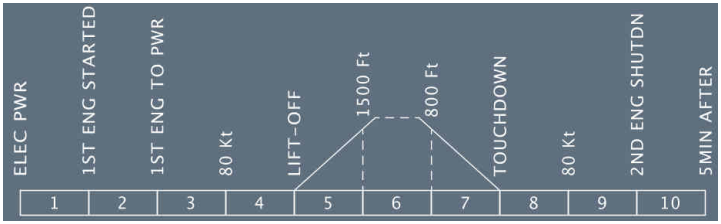
WARNINGS AND CAUTIONS

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



E/WD: FAILURE TITLE Conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
PRED. W/S DET FAULT	SINGLE CHIME	MASTER CAUTION	NIL	NIL	3, 4, 5, 8

MEMO DISPLAY

The “PRED W/S OFF” message appears, when windshear is set to OFF on the weather radar panel.
The “PRED W/S OFF”, message appears in green during flight phases 2 and 6.

It appears in amber:
- In flight phases 3, 4, 5, 7, 8, and 9
- When the T.O. CONFIG pb is pressed during phase 2.

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BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
WEATHER RADAR	WX 1	AC1				
	WX 2 ◁✻	AC2				

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DESCRIPTION

Applicable to: ALL

The Ground Proximity Warning System (GPWS) generates aural and visual warnings, when one of the following conditions occurs between radio altitudes 30 ft and 2 450 ft.

- Mode 1: Excessive rate of descent.
- Mode 2: Excessive terrain closure rate.
- Mode 3: Altitude loss after takeoff, or go-around.
- Mode 4: Unsafe terrain clearance when not in landing configuration.
- Mode 5: Too far below glideslope.

In addition to the basic GPWS functions, the GPWS has an enhanced function (EGPWS) which provides, based on a worldwide terrain database:

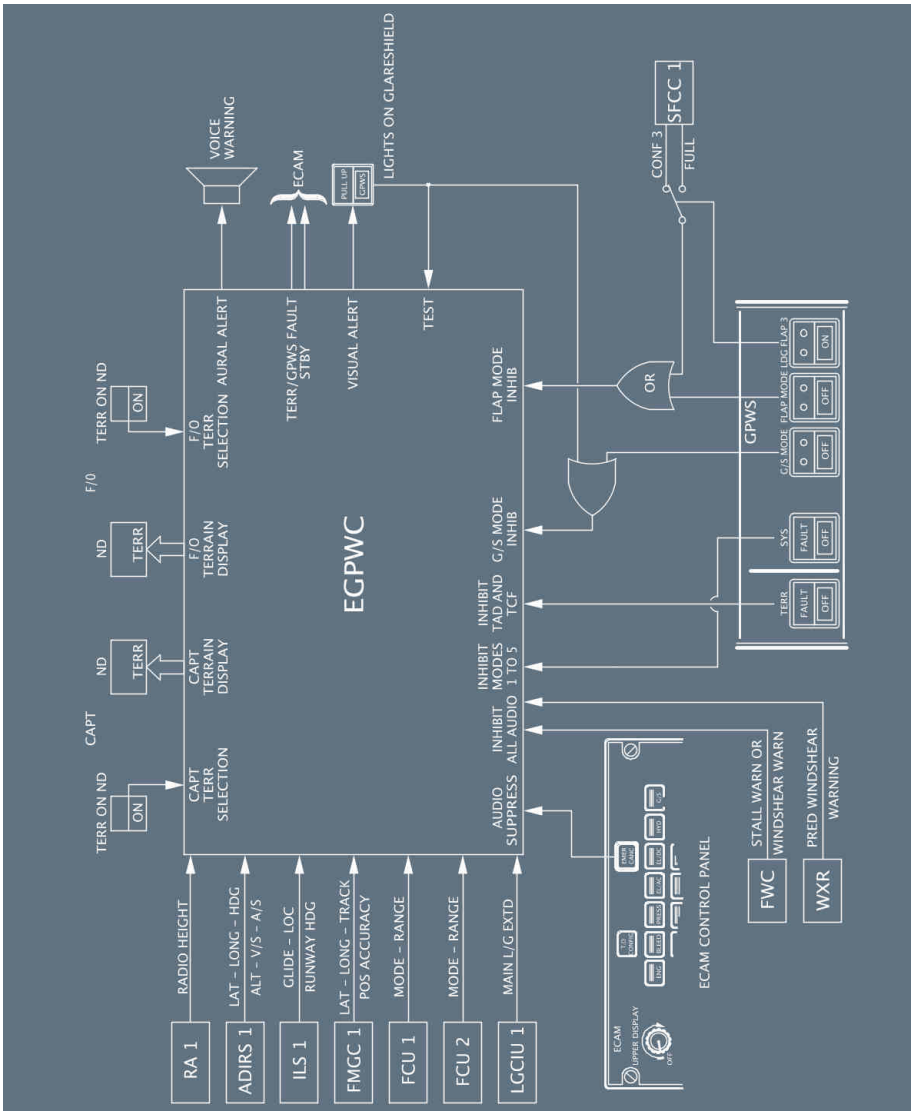
- A Terrain Awareness Display (TAD), which predicts the terrain conflict, and displays the terrain on the ND.
- A Terrain Clearance Floor (TCF), which improves the low terrain warning during landing.

The EGPWS uses the geometric altitude. The geometric altitude is calculated by means of a specific algorithm that uses the following as inputs: The pressure altitude, GPS altitude, radio altitude, and data from the terrain database.
The cockpit loudspeakers broadcast, even if turned off, the aural warning or caution messages associated with each mode. The audio volume of these messages is not controlled by the loudspeaker volume knobs. (These knobs only allow volume adjustment for radio communication).
PULL UP or GPWS lights, on the Captain and First Officer instrument panels, come on to give a visual indication depending on the engaged GPWS mode.

Note: *A number of airports throughout the world have approaches or departures that are not entirely compatible with standard GPWS operation. These airports are identified in the envelope modulation database, in such a way that, when the GPWS recognizes such an airport, it modifies the profile to avoid nuisance warnings.*

SCHEMATIC

Applicable to: ALL


EGPWC
RA 1
ADIRS 1
ILS 1
FMGC 1
FCU 1
FCU 2
LGCIU 1
RADIO HEIGHT
LAT – LONG – HDG
ALT – V/S – A/S
GLIDE – LOC
RUNWAY HDG
LAT – LONG – TRACK
POS ACCURACY
MODE – RANGE
MODE – RANGE
MAIN L/G EXTD
CAPT TERR ON ND
ON
CAPT TERR SELECTION
CAPT ND TERR
CAPT TERRAIN DISPLAY
F/O TERR ON ND
ON
F/O TERR SELECTION
F/O ND TERR
F/O TERRAIN DISPLAY
AUDIO SUPPRESS
INHIBIT ALL AUDIO
INHIBIT MODES 1 TO 5
INHIBIT TAD AND TCF
G/S MODE INHIB
FLAP MODE INHIB
AURAL ALERT
VOICE WARNING
TERR/GPWS FAULT STBY
ECAM
VISUAL ALERT
PULL UP
GPWS
LIGHTS ON GLARESHIELD
TEST
ECAM CONTROL PANEL
ECAM UPPER DISPLAY
FWC
STALL WARN OR WINDSHEAR WARN
WXR
PRED WINDSHEAR WARNING
OR
CONF 3
SFCC 1
FULL
GPWS
TERR
SYS
G/S MODE
FLAP MODE
LDG FLAP 3
FAULT
OFF
ON

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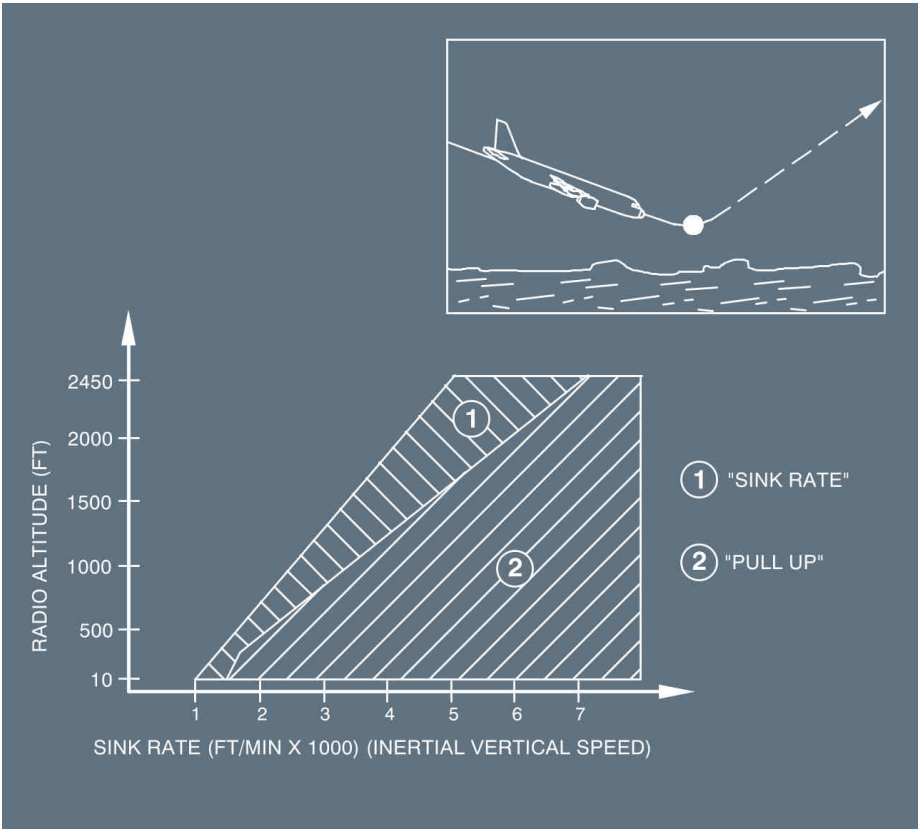
MODE 1 : EXCESSIVE RATE OF DESCENT

Applicable to: ALL

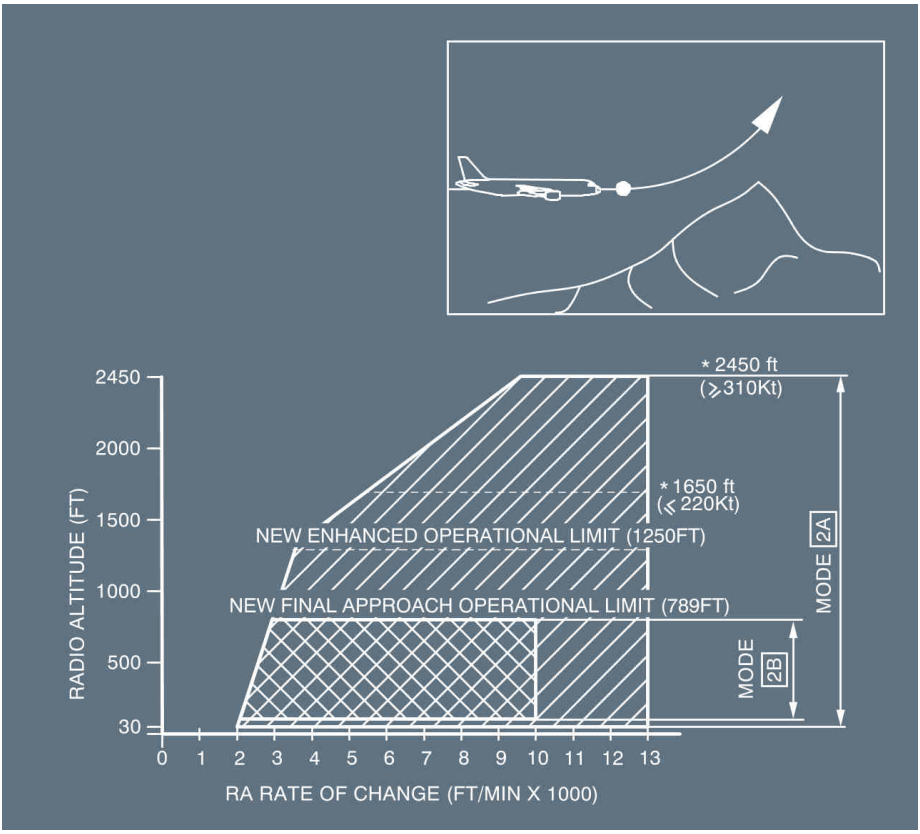


Mode 1 has two boundaries. Penetration of the first boundary generates a repeated aural alert “SINK RATE” and causes the GPWS lights to come on. Penetration of the second boundary generates a repetitive “PULL UP” and illuminates both PULL UP lights.
The upper cut-off limit is 2 450 ft radio altitude.
The lower cut-off limit is 10 ft radio altitude.

MODE 2 : EXCESSIVE TERRAIN CLOSURE RATE

Applicable to: ALL

1



(*) The upper cut-off limit varies from 1 650 to 2 450 ft radio altitude, depending on speed (between 220 to 310 kt). At certain airports, the upper boundary may be lowered down to 1 250 ft to reduce the warning sensitivity and minimize the nuisance warnings.

2A — FLAPS NOT IN LANDING CONFIGURATION, AND AIRCRAFT NOT ON THE GLIDESLOPE BEAM

Penetration of the boundary causes the GPWS lights to come on, and generates the repeated aural alert: “TERRAIN”.

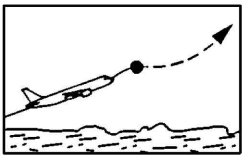
After "TERRAIN" has sounded twice, the warning switches to "PULL UP", and is continually repeated until the aircraft leaves the warning envelope. In addition, the PULL UP lights come on. After the aircraft leaves the boundary, the GPWS lights stay on and the "TERRAIN" aural message persists. These alerts stop when the aircraft increases either the barometric or inertial altitude by 300 ft. If it enters another alert region during this altitude-gain time, then the whole process begins again with a new reference altitude for the 300 ft altitude gain.
The new enhanced operational upper limit is reduced to 1 250 ft and to 789 ft in final approach, when the enhanced functions and the Geometric Altitude are of high integrity.

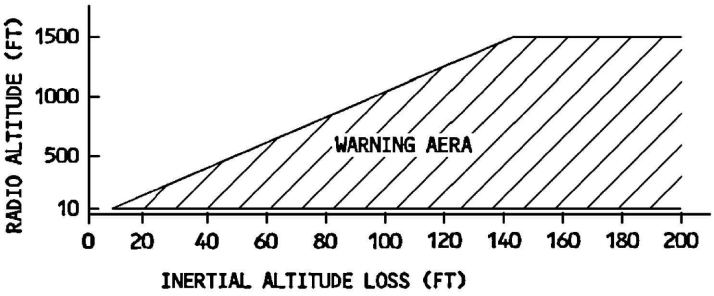
2B — FLAPS ARE IN LANDING CONFIGURATION

Lowering the flaps to the landing position automatically switches GPWS to Mode 2B. In this case lower boundary varies between 200 ft and 600 ft depending on radio altitude rate of change. In ILS approach (glide slope deviation < ± 2 dots) the lower boundary is fixed at 30 ft .
When the aircraft enters the envelope, the alert is the same as for mode 2A. When gear and flaps are in the landing configuration, the aural message is "TERRAIN " only and is not followed by "PULL UP" if the aircraft remains within the envelope.

MODE 3 : ALTITUDE LOSS AFTER TAKEOFF

Applicable to: ALL





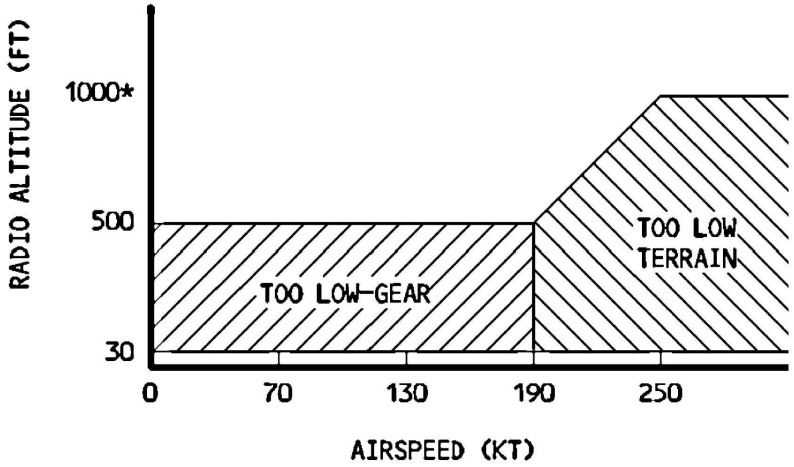
If the aircraft descends during the initial takeoff climb or during a go around, the PULL UP light come on and the aural alert "DON'T SINK" sounds repeatedly.
The lower cut-off limit is 10 ft radio altitude.

Mode 3 is desensitized in accordance with the time accumulated after departure and the radio altitude.

MODE 4 : UNSAFE TERRAIN CLEARANCE WHEN NOT IN LANDING CONFIGURATION

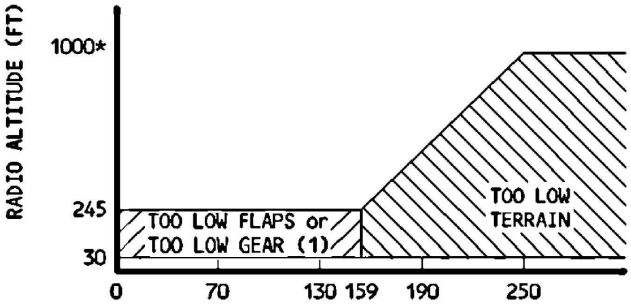
Applicable to: ALL

4A - LANDING GEAR UP AND FLAPS NOT IN LANDING CONFIGURATION.



Two aural warnings may be triggered, depending on the area: “TOO LOW-GEAR” or “TOO LOW-TERRAIN”. In addition, the GPWS lights come on.

4B - LANDING GEAR DOWN, AND FLAPS NOT IN LANDING CONFIGURATION OR, LANDING GEAR UP, AND FLAPS IN LANDING CONFIGURATION.

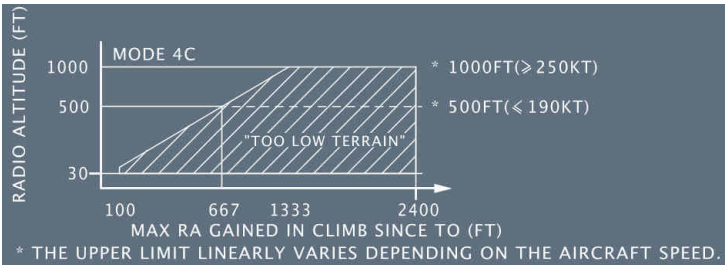


* : OTHER MAXIMUMS ARE USED AT CERTAIN AIRPORTS TO MINIMIZE NUISANCE WARNING.
(1) "TOO LOW FLAPS" (If flaps not in landing configuration)
or
"TOO LOW GEAR" (If GEAR not extended)

Three aural warnings may be generated, depending on the area and configuration: “TOO LOW-GEAR”, “TOO LOW-FLAPS”, or “TOO LOW-TERRAIN”. In addition, the GPWS lights come on.

If the enhanced GPWS functions and the geometric altitude are of high integrity, the upper operational limit is reduced to 500 ft. If not, it is only reduced to 800 ft when an overflight is detected.

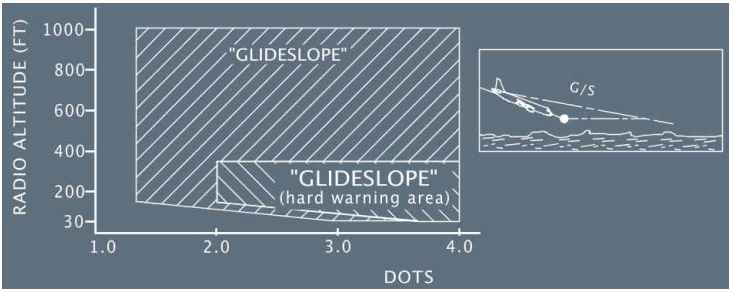
4C — LANDING GEAR UP, OR FLAPS NOT IN LANDING CONFIGURATION.



If the aircraft starts an inadvertent controlled flight into the ground, during takeoff and climb, and penetrates the boundary, then the GPWS lights come on, and the “TOO LOW TERRAIN” aural alert sounds repeatedly.

MODE 5 : DESCENT BELOW GLIDESLOPE

Applicable to: ALL



Note: *Normally, the glideslope alert is only triggered with the gear down. For a few airports, the gear down logic requirement is deleted and other upper limits are used to increase the warning envelope.*

In both areas, the alert is a repeated “GLIDESLOPE” aural message, and the GPWS lights come on. The loudness of the aural message increases, when the aircraft enters the hard warning areas.
The mode is armed, when ILS 1 receives a valid signal.
Pressing the GPWS pushbutton cancels the warning. This is temporary; the mode is automatically reactivated for a new envelope.
The upper cut-off limit is 1 000 ft radio altitude.
The lower cut-off limit is 30 ft radio altitude.

TERRAIN AWARENESS AND DISPLAY

Applicable to: B-HSD, B-HSE, B-HSG, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

The Terrain Awareness and Display (TAD) function computes a caution and a warning envelope in front of the aircraft, depending on the aircraft altitude, the nearest runway altitude, the distance to the nearest runway threshold, the ground speed, and the turn rate. When the boundary of these envelopes conflicts with the terrain, or with an obstacle memorized in the database, the system generates the relevant alert:

Alert Level	Aural Warning	ND (*Refer to DSC-31-45 Flags and Messages Displayed on ND*)	Local Warning
Warning	**TERRAIN AHEAD, PULL UP**	- Automatic terrain display See * - Solid red areas - TERR AHEAD (red)	On each pilot's instrument panel, The pushbutton light comes on.
	OBSTACLE AHEAD, PULL UP	- Automatic terrain display See * - Solid red areas - OBST AHEAD (red)	
Caution	**TERRAIN AHEAD**	- Automatic terrain display See * - Solid yellow areas - TERR AHEAD (amber)	
	OBSTACLE AHEAD	- Automatic terrain display See * - Solid yellow areas - OBST AHEAD (amber)	

* When the TERR pb-sw ON ND is set to ON, and ARC or ROSE mode is selected, the ND displays the terrain and the obstacles memorized in the database, depending on the aircraft's position. The terrain is displayed in various densities of green, yellow, red, or magenta, depending on the threat (*Refer to DSC-31-45 Flags and Messages Displayed on ND*). If an alert is generated (caution or warning), and TERR pb-sw ON ND is not selected, the terrain and the obstacles are automatically displayed, and the ON light of the TERR pb-sw ON ND comes on.

Note: *1. When TERR pb-sw ON ND is selected, the weather radar image is not displayed.*
2. The Geometric Altitude function can protect against certain BARO setting errors, provided the components used to compute the Geometric Altitude are valid and accurate enough.
3. The TAD and Terrain Clearance Floor (TCF) functions operate using the pure lateral GPS position and, the FMS1 position as backup.

In case of low accuracy of the aircraft position computed by the EGPWS, the enhanced modes of the EGPWS are automatically deactivated. The five GPWS modes remain active.

TERRAIN AWARENESS AND DISPLAY

Applicable to: B-HTF

The Terrain Awareness and Display (TAD) function computes a caution and a warning envelope in front of the aircraft, depending on the aircraft altitude, the nearest runway altitude, the distance to the nearest runway threshold, the ground speed, and the turn rate. When the boundary of these envelopes conflicts with the terrain, or with an obstacle memorized in the database, the system generates the relevant alert:

Alert Level	Aural Warning	ND (*Refer to DSC-31-45 Flags and Messages Displayed on ND*)	Local Warning
Warning	**TERRAIN TERRAIN PULL UP**	- Automatic terrain display See * - Solid red areas - TERRAIN (red)	On each pilot's instrument panel, The pushbutton light comes on.
	OBSTACLE OBSTACLE, PULL UP	- Automatic terrain display See * - Solid red areas - OBST (red)	
Caution	**CAUTION TERRAIN**	- Automatic terrain displaySee * - Solid yellow areas - TERRAIN (amber)	
	CAUTION OBSTACLE	- Automatic terrain display See * - Solid yellow areas - OBST (amber)	

* When the TERR pb-sw ON ND is set to ON, and ARC or ROSE mode is selected, the ND displays the terrain and the obstacles memorized in the database, depending on the aircraft's position. The terrain is displayed in various densities of green, yellow, red, or magenta, depending on the threat (*Refer to DSC-31-45 Flags and Messages Displayed on ND*). If an alert is generated (caution or warning), and TERR pb-sw ON ND is not selected, the terrain and the obstacles are automatically displayed, and the ON light of the TERR pb-sw ON ND comes on.

Note:
1. *When TERR pb-sw ON ND is selected, the weather radar image is not displayed.*
2. *The Geometric Altitude function can protect against certain BARO setting errors, provided the components used to compute the Geometric Altitude are valid and accurate enough.*
3. *The TAD and Terrain Clearance Floor (TCF) functions operate using the pure lateral GPS position and, the FMS1 position as backup.*

In case of low accuracy of the aircraft position computed by the EGPWS, the enhanced modes of the EGPWS are automatically deactivated. The five GPWS modes remain active.

TERRAIN AWARENESS AND DISPLAY

Applicable to: B-HSI

The Terrain Awareness and Display (TAD) function computes a caution and a warning envelope in front of the aircraft, which varies according to aircraft altitude, nearest runway altitude, distance to the nearest runway threshold, ground speed, and turn rate. When the boundary of these envelopes conflicts with the terrain, memorized in the database, the system generates the relevant alert:

Alert Level	Aural Warning	ND (*Refer to DSC-31-45 Flags and Messages Displayed on ND*)	Local Warning
Warning	**TERRAIN AHEAD, PULL UP**	- Automatic terrain display See * - Solid red areas - TERR AHEAD (red)	On each pilot's instrument panel, the pushbutton light comes on.
	OBSTACLE AHEAD, PULL UP		
Caution	**TERRAIN AHEAD**	- Automatic terrain display See * - Solid yellow areas - TERR AHEAD (amber)	
	OBSTACLE AHEAD		

* When the TERR pb-sw ON ND is set to ON, and ARC or ROSE mode is selected, the ND displays the terrain and the obstacles memorized in the database, depending on the aircraft's position. The terrain is displayed in various densities of green, yellow, red, or magenta, depending on the threat (*Refer to DSC-31-45 Flags and Messages Displayed on ND*). If an alert is generated (caution or

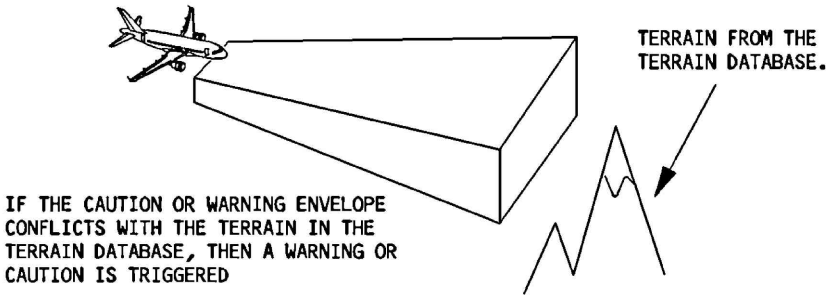
warning), and TERR pb-sw ON ND is not selected, the terrain and the obstacles are automatically displayed, and the ON light of the TERR pb-sw ON ND comes on.

Note: *1. When TERR pb-sw ON ND is selected, the weather radar image is not displayed.*
2. The Geometric Altitude function can protect against certain BARO setting errors, provided the components used to compute the Geometric Altitude are valid and accurate enough.
3. The TAD and Terrain Clearance Floor (TCF) functions operate using the pure lateral GPS position and, the FMS1 position as backup.

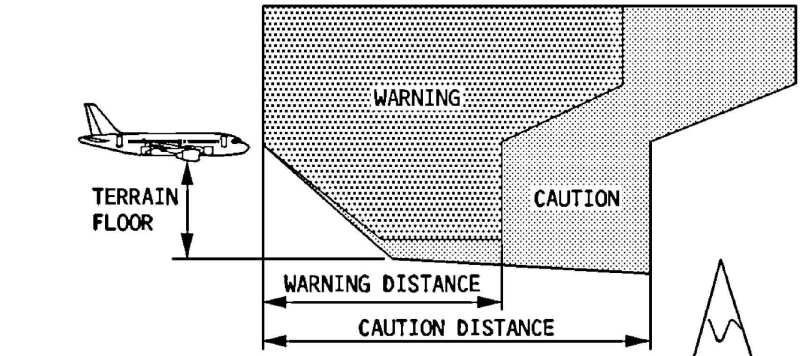
In case of low accuracy of the aircraft position computed by the EGPWS, the enhanced modes of the EGPWS are automatically deactivated. The five GPWS modes remain active.

TERRAIN CAUTION AND WARNING ENVELOPE

Applicable to: ALL

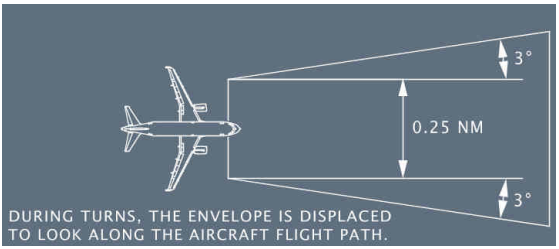


VERTICAL ENVELOPE



TERRAIN FLOOR VARIES WITH DISTANCE AND ALTITUDE TO NEAREST AIRPORT.
WARNING AND CAUTION DISTANCES VARY WITH GROUND SPEED AND TURN RATE. WARNING DISTANCE IS APPROX. 30 SECONDS. CAUTION DISTANCE IS APPROX. 60 SECONDS.

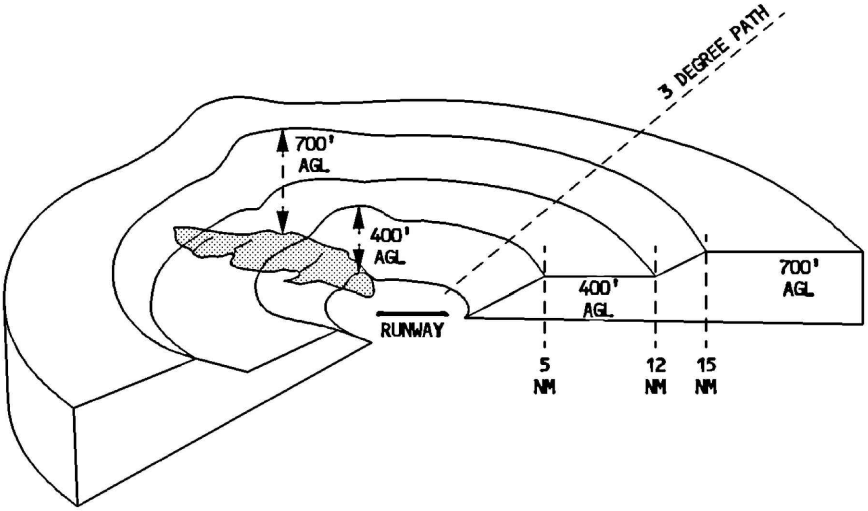
HORIZONTAL ENVELOPE



TERRAIN CLEARANCE FLOOR

Applicable to: ALL

A terrain clearance floor envelope is stored in the database for each runway for which terrain data exist. The Terrain Clearance Floor (TCF) function warns of a premature descent below this floor, regardless of aircraft configuration.

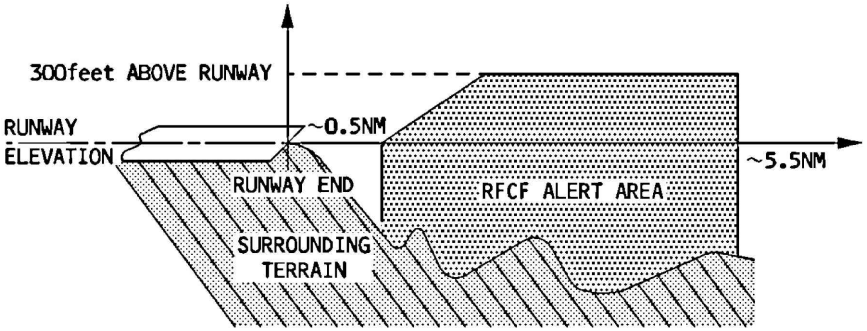


If the airplane descends below this floor, a TOO LOW TERRAIN aural warning is announciated, and the pushbutton light comes on, on the glareshield.

RUNWAY FIELD CLEARANCE FLOOR

Applicable to: ALL

The Runway Field Clearance Floor (RFCF) provides an additional envelope protection, for runways that are significantly higher than the surrounding terrain. It is contained in a circle within the 5.5 nm of the runway threshold and it is based on the geometric altitude and the runway elevation.

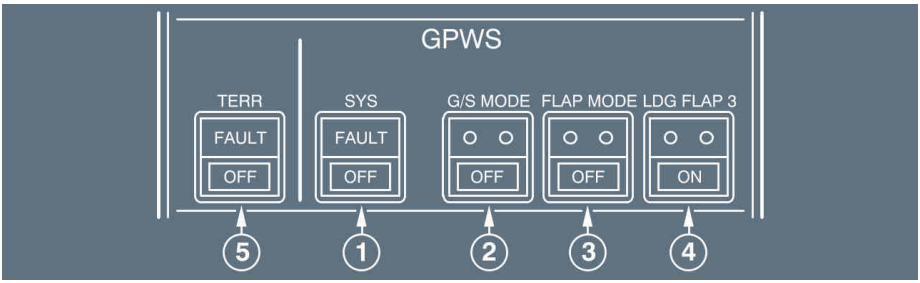

300feet ABOVE RUNWAY
RUNWAY
ELEVATION
~0.5NM
~5.5NM
RUNWAY END
RFCF ALERT AREA
SURROUNDING
TERRAIN

Intentionally left blank

OVERHEAD PANEL

Applicable to: ALL

1



(1) SYS pushbutton

OFF : All basic GPWS alerts (Mode 1 to 5) are inhibited.

FAULT light : This amber light comes on, along with an ECAM caution, if the basic GPWS mode 1 to 5 malfunction.

Note: If ILS 1 fails, only mode 5 is inhibited. Consequently, the FAULT light does not come on and the GPWS FAULT warning is not triggered.

(2) G / S MODE pushbutton

OFF : Glideslope mode (mode 5) is inhibited.

(3) FLAP MODE pusbutton

OFF : Flap mode (“TOO LOW FLAPS” mode 4) is inhibited.
(To avoid nuisance warning in case of landing with flaps setting reduced).

(4) LDG FLAP 3 pushbutton

ON : Flap mode is inhibited when FLAPS CONF 3 is selected (to avoid nuisance warning in case of landing in CONF 3).
In this case, LDG MEMO displays "FLAPS ... 3" instead of “CONF ... FULL”.

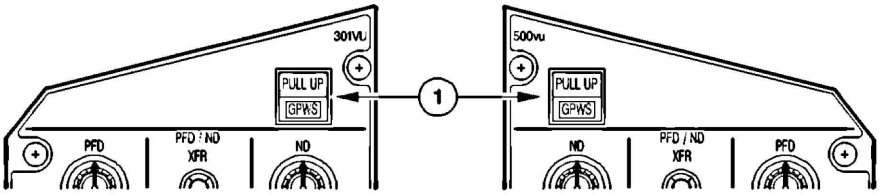
(5) TERR pushbutton

OFF : Inhibits the Terrain Awareness Display (TAD) and Terrain Clearance Floor (TCF) modes, and does not affect the basic GPWS mode 1 to 5. If OFF is selected the ECAM caution NAV GPWS TERR DET FAULT is displayed.

FAULT light : This amber light comes on, along with an ECAM caution, if the TAD or TCF mode fails. The terrain is not shown on the ND. The basic GPWS mode 1 to mode 5 are still operative if the SYS pushbutton OFF or FAULT lights are not illuminated.

INSTRUMENT PANELS

Applicable to: ALL



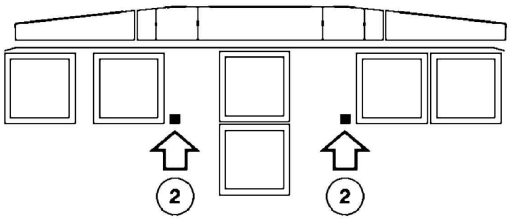
(1) PULL UP – GPWS pb

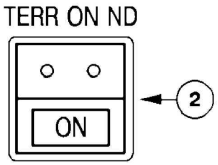
PULL UP : Comes on to give a visual indication, when a PULL UP warning is triggered in Modes 1, 2, and TAD. The corresponding aural warning sounds.

GPWS : Comes on amber, when any other mode is activated. The corresponding aural warning sounds.

Note: *1. If the flight crew briefly presses this button when one of these modes is activated, the GPWS light goes out and the voice warning stops.*

2. On ground, the GPWS can be tested by pressing this pushbutton. If the pushbutton is pressed briefly, some of the aural warnings sound and pushbutton captions, related to the GPWS, come on. If the pushbutton is pressed continuously, then all the aural warnings sound.





(2) TERR ON ND pb

These pushbutton are located on either side of the ECAM. Each pushbutton controls the onside terrain display.

ON : The terrain is displayed on the ND if the:
- TERR pb-sw is selected ON, and
- TERR FAULT light is not on.

The ON light comes on.

OFF : The terrain data is not displayed on the ND.

Note:
- *If the Terrain Awareness Display (TAD) mode generates a caution, or a warning while the TERR ON ND is not switched ON, the terrain data is automatically displayed on the NDs (see EGPWS specific caution and warning due to TAD mode) and the ON light of the, TERR ON ND pushbutton comes on.*
- *To differenciate between the terrain and the weather display, the terrain display sweeps from the center outward to both sides of the ND.*

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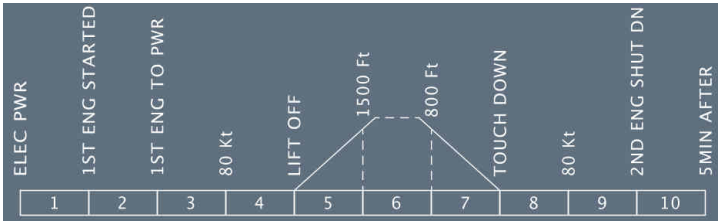
WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
GPWS FAULT	SINGLE CHIME	MASTER CAUT	NIL	GPWS SYS FAULT lt	1, 3, 4, 5, 8, 9, 10
GPWS TERR DET FAULT The enhanced terrain detection function is inoperative. The basic GPWS mode 1 to 5 are still operative.				GPWS TERR FAULT lt	1, 3, 4, 5 8,10

MEMO DISPLAY

GPWS FLAP 3 is displayed in green when GPWS LDG FLAP 3 pb-sw is ON.
GPWS FLAP MODE OFF is displayed in green when GPWS FLAP MODE pb-sw is OFF.
Airborne TERR STBY appears in green when the aircraft position accuracy (computed by the EGPWS) is not sufficient to allow the enhanced TCF and TAD modes to operate. These modes are not available until the TERR STBY memo disappears. If selected, the terrain data display on ND is automatically deselected when the TERR STBY memo is triggered."

TERR OFF is displayed when the TERR pb-sw is switched OFF:

- It appears in green in flight phase 2, before the Take Off Configuration test is launched, and in flight phase 6.
- It appears in amber in flight phase 2, after the Take Off Configuration test, and in flight phases 3, 4, 5, 7, 8 and 9.

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BUS EQUIPMENT LIST

Applicable to: ALL

	NORM		EMER ELEC		
	AC	DC	AC ESS	DC ESS	HOT
GPWS	AC1				

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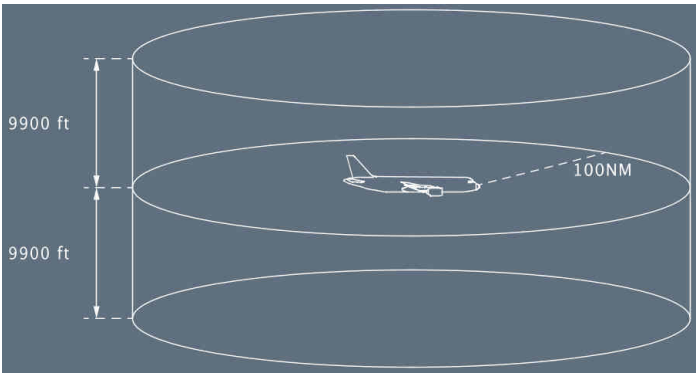
GENERAL

Applicable to: B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The Traffic alert and Collision Avoidance System (TCAS):
- Detects any aircraft, that is equipped with transponders and is flying in the vicinity
- Displays potential and predicted collision targets
- Issues vertical orders to avoid conflict.

The TCAS is normally independent of the ground-based air traffic control system.
The TCAS detection capability is limited to intruders flying within a maximum range of 100 nm (depending on aircraft configuration and external conditions), and within a maximum altitude range of 9 900 ft (above and below the threatened aircraft).

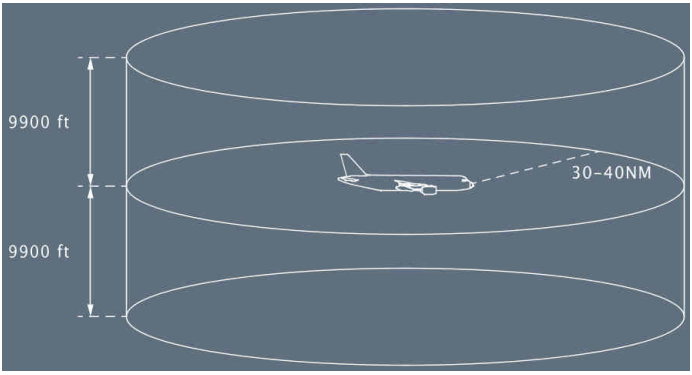


GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM

The TCAS (Traffic alert and Collision Avoidance System):
- Detects any aircraft, equipped with transponders, flying in its vicinity;
- Displays potential and predicted collision targets;
- Issues vertical orders to avoid conflict.

The TCAS is normally independent of the ground-based air traffic control system.
The TCAS detection capability is limited to intruders flying within a maximum range of 30-40 nm (depending on aircraft configuration and external conditions), and within a maximum altitude range of 9 900 ft (above and below the threatened aircraft).



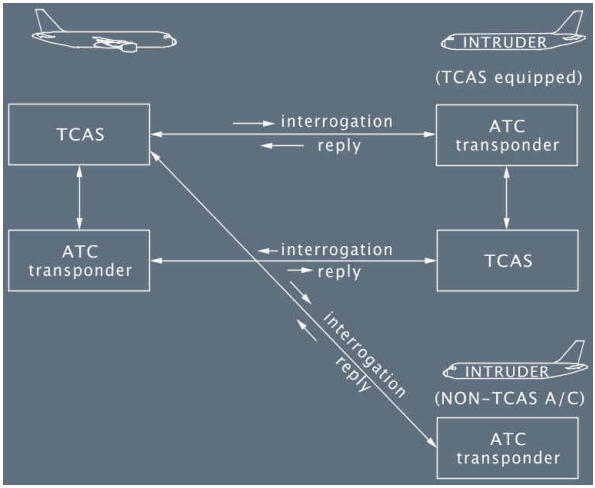
MAIN COMPONENTS

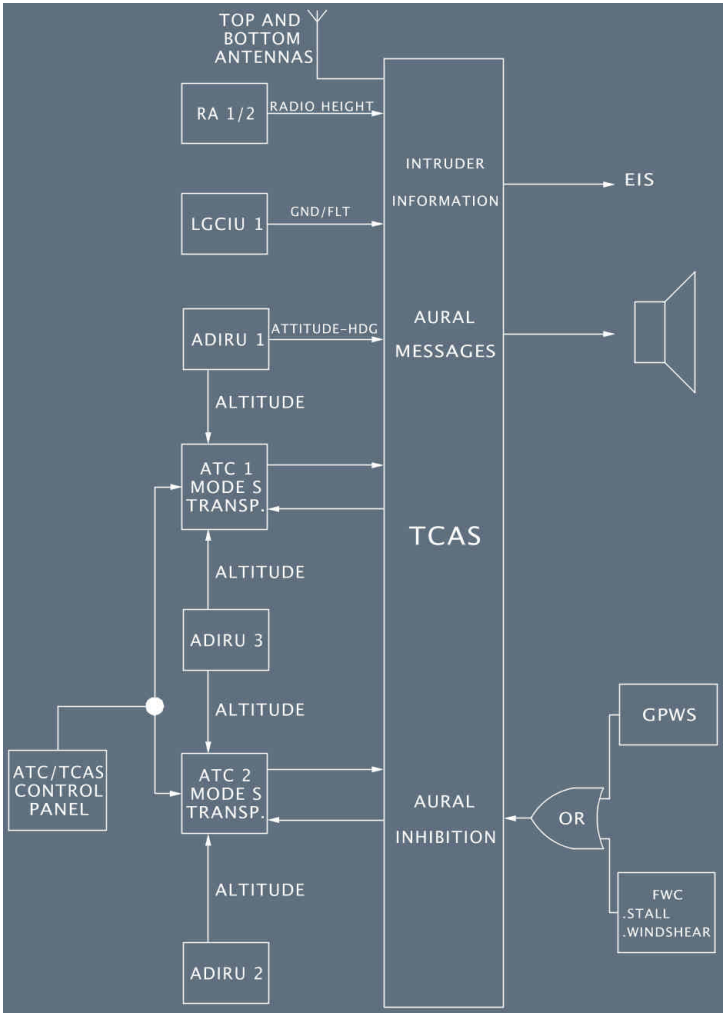
Applicable to: ALL

The system includes:

- A single channel TCAS computer
- Two TCAS antennas
- Two mode S ATC transponders, one active the other in standby.

  These transponders allow:
  - Interface between the ATC/TCAS control panel and the TCAS computer
  - Communication between the aircraft and intruders equipped with a TCAS system
- An ATC/TCAS control panel.


INTRUDER
(TCAS equipped)
TCAS
interrogation
reply
ATC
transponder
ATC
transponder
interrogation
reply
TCAS
interrogation
reply
INTRUDER
(NON-TCAS A/C)
ATC
transponder


TOP AND
BOTTOM
ANTENNAS
RA 1/2
RADIO HEIGHT
INTRUDER
INFORMATION
EIS
LGCIU 1
GND/FLT
ADIRU 1
ATTITUDE-HDG
AURAL
MESSAGES
ALTITUDE
ATC 1
MODE S
TRANSP.
TCAS
ALTITUDE
ADIRU 3
ALTITUDE
GPWS
ATC/TCAS
CONTROL
PANEL
ATC 2
MODE S
TRANSP.
AURAL
INHIBITION
OR
ALTITUDE
FWC
.STALL
.WINDSHEAR
ADIRU 2

PRINCIPLE

Applicable to: ALL

The TCAS interrogates transponder of intruders. From the transponder replies, the TCAS determines for each intruder:

- Its relative bearing
- Its range and closure rate
- Its relative altitude if available (ATC mode C or S)

Then the TCAS computes the intruder trajectory, the Closest Point of Approach (CPA) and the estimated time (TAU) before reaching the CPA.
Each time the relative position of the intruder presents a collision threat, aural and visual advisories are triggered.
TCAS optimizes vertical orders to ensure a sufficient trajectory separation and a minimal vertical speed variation considering all intruders.

INTRUDER CLASSIFICATION

Applicable to: ALL

The intruders are classified in four levels:

LEVEL	INTRUDER POSITION	DISPLAYED INFORMATION
Proximate	- No collision threat - Intruder in the vicinity of the A/C (closer than 6 nm laterally and ±1200 ft vertically)	- ND: intruder position
Traffic Advisory (TA)	- Potential collision threat - TAU is about 40 s	- ND: intruder position - Aural messages

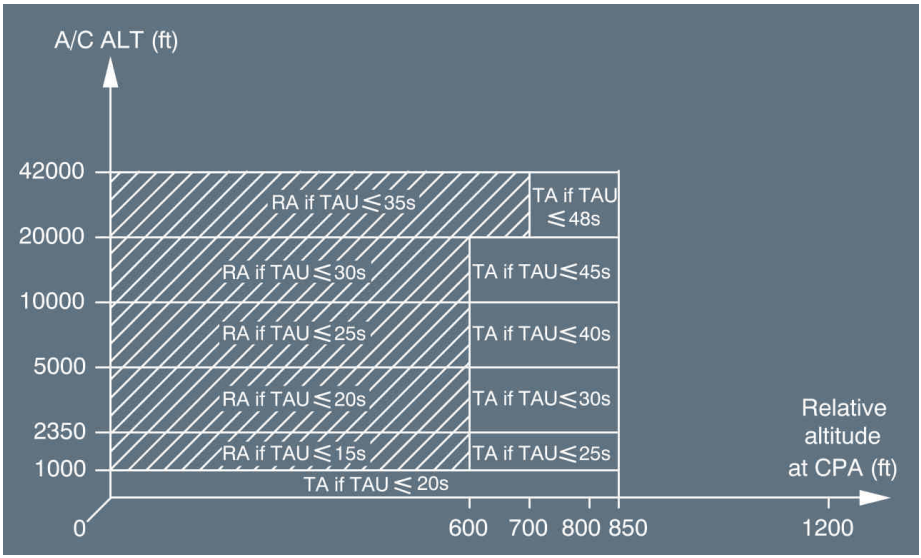
Continued on the following page

Continued from the previous page

LEVEL	INTRUDER POSITION	DISPLAYED INFORMATION
Resolution Advisory (RA)	- Real collision threat - TAU is about 25 s	- ND: intruder position - Aural messages - PFD: vertical orders • Maintain actual V/S (Preventive Advisory) or • Modify V/S (Corrective Advisory)
Other intruders	- No collision threat - Any non proximate, TA, RA within the surveillance envelope (lateral range: closer than 30 nm. vertical range: *Refer to DSC-34-80-20 ATC/TCAS Panel*)	- ND: Intruder position

TA/RA THRESHOLDS

Applicable to: ALL



TCAS MODES

Applicable to: ALL

The TCAS has two modes of operation:

- TA/RA : This mode allows the display of all intruders
- TA : Can be selected by:
  - The crew, on the ATC/TCAS panel, in case of aircraft degraded performance (engine failure, landing gear extended), or when operating near closely-spaced parallel runways, or
  - Automatically, if TA/RA is previously selected, and:
    - The windshear message is triggered
    - The stall message is triggered
    - GPWS messages are triggered
    - Aircraft is below 1 000 ft AGL.

  Consequently:
  - All RAs are inhibited and converted into TAs
  - TA threshold is set to TAU ≤20 s, irrespective of the aircraft's altitude
  - No vertical speed advisories are indicated on the PFDs
  - "TA ONLY" is displayed on the NDs.

If windshear, stall, or GPWS messages are triggered, or aircraft below 500 ft AGL, all the TCAS aural messages are suppressed.

ADVISORY INHIBITION

Applicable to: ALL

Some advisories are inhibited depending on the aircraft altitude:

- All intruders flying below 380 ft AGL when the own aircraft altitude is below 1 700 ft AGL.
- All RA below 1 100 ft in climb and 900 ft in descent. In this case, the RAs are converted into TAs.
- "Descend" type advisory below 1 200 ft AGL at takeoff or 1 000 ft AGL in approach.
- "Increase Descent" RA below 1 450 ft.
- All TA aural messages below 600 ft AGL in climb and below 400 ft AGL in descent.

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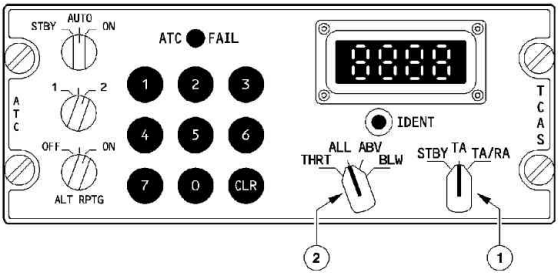
ATC/TCAS PANEL

Applicable to: ALL 321, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) Mode sel

TA/RA : Normal position.
The RAs, TAs and proximate intruders are displayed if the ALT RPTG switch is ON and the transponder is not on STBY.

TA : The TCAS does not generate any vertical orders. This mode should be used, in case of degraded aircraft performance (engine failure, landing gear extended, or approach on parallel runways).
All RAs are converted into TAs. TAs, proximate and intruders are displayed if the ALT RPTG switch is ON and the transponder is not on STBY
The "TA ONLY" white memo is displayed on the NDs.

STBY : The TCAS is on standby.

(2) TRAFFIC sel

THRT : Proximate and other intruders are displayed only if a TA or RA is present, and they are within 2 700 ft above and 2 700 ft below the aircraft.

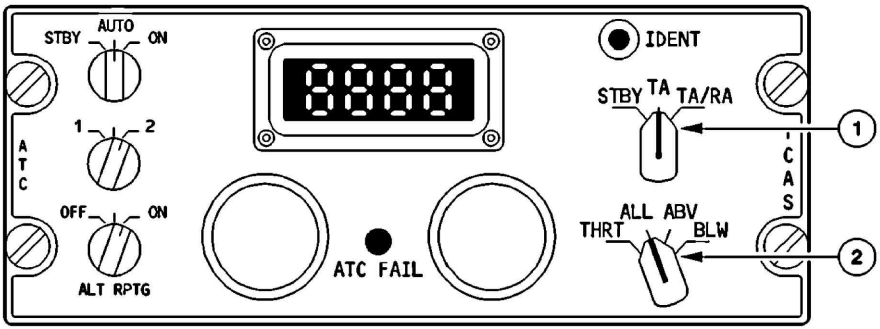
ALL : Proximate and other intruders are displayed even if no TA or RA is present (full time function). The altitude range is –2700 ft to +2 700 ft.

ABV : The same as ALL, except that the other intruders are displayed if within 9 900 ft above the aircraft and 2 700 ft below.

BLW : The same as ALL, except that the other intruders are displayed if within 9 900 ft below the aircraft and 2 700 ft above.

ATC/TCAS PANEL

Applicable to: B-HSD, B-HSE, B-HSG



(1) TCAS mode selector

TA/RA : Normal position.
The RAs, TAs and proximate intruders are displayed if the ALT RPTG switch is ON and the transponder is not on STBY.

TA : The TCAS does not generate any vertical orders. This mode should be used, in case of degraded aircraft performance (engine failure, landing gear extended, or approach on parallel runways).
All RAs are converted into TAs. TAs, proximate and intruders are displayed if the ALT RPTG switch is ON and the transponder is not on STBY
The "TA ONLY" white memo is displayed on the NDs.

STBY : The TCAS is in standby.

(2) TRAFFIC sel

THRT : Proximate and other intruders are displayed only if a TA or a RA is present at the same time.

ALL : The other and proximate intruders are displayed even if no TA or RA is present at the same time (full time function)

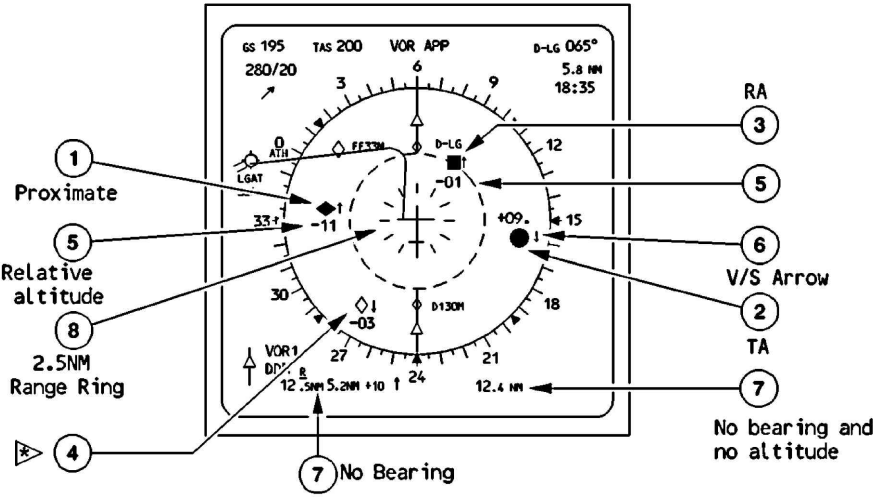
ABV : The other intruders are displayed within 9 900 ft above the aircraft and 2 700 ft below

BLW : The other intruders are displayed within 9 900 ft below the aircraft and 2 700 ft above

ND INDICATIONS

Applicable to: B-HSI

The traffic is displayed in all ROSE modes and ARC mode when 10, 20 or 40 nm range is selected. Only the 8 most threatening intruders are displayed.



(1) Proximate intruder
Indicated by a white filled diamond.

(2) TA intruder
Indicated by an amber circle.
Associated with the TRAFFIC-TRAFFIC aural message.

(3) RA intruder
Indicated by a red square.
Associated with vertical orders displayed on the PFD and aural messages.

(4) Other intruders
Indicated by a white empty diamond.

Note: If the range of an intruder is not available, the intruder is not displayed. An intruder may be partially displayed when its range is out of scale.

(5) Relative altitude
Indicated in hundred of feet above or below the symbol depending on the intruder position.

(6) Vertical speed arrow

Displayed only if the intruder V/S >500 ft/min

Relative altitude and vertical speed arrow are displayed in the same color as the associated intruder symbol.

Note: If the altitude of an intruder is not available, neither altitude nor vertical speed indications are displayed.

(7) No bearing intruder

If the bearing of TA or RA intruder is not available the following data is presented in digital form at the bottom of the ND:

- range
- relative altitude and vertical speed arrow if available.

Displayed amber or red according to threat level.

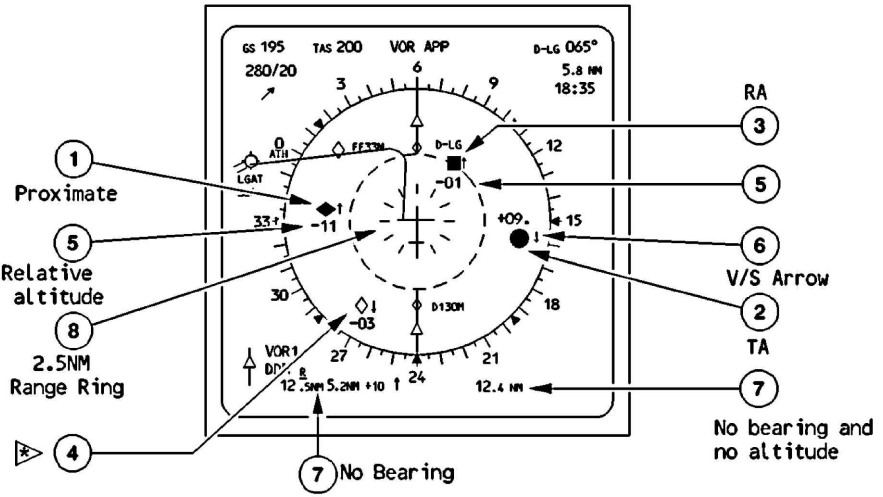
(8) Range ring

A 2.5 nm white range ring is displayed when a 10 nm or 20 nm range is selected.

ND INDICATIONS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The traffic is displayed in all ROSE modes and ARC mode. Only the 8 most threatening intruders are displayed.



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Indicated by a white empty diamond.

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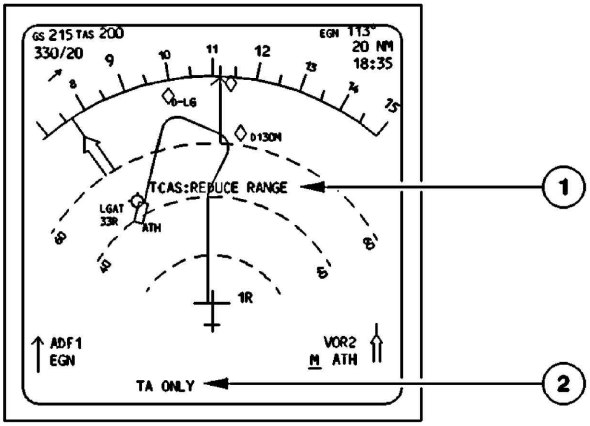
- range
- relative altitude and vertical speed arrow if available.

Displayed amber or red according to threat level.

(8) Range ring
A 2.5 nm white range ring is displayed when a 10 nm or 20 nm range is selected.

TCAS MESSAGES

Applicable to: B-HSI



(1) Mode and range messages

Following messages can be displayed to draw pilot's attention:

TCAS : REDUCE RANGE : Displayed when a TA or RA is detected and ND range above 40 nm

TCAS : CHANGE MODE : Displayed when a TA or RA is detected and ND mode is PLAN.

Displayed amber or red depending on the advisory level (TA or RA).

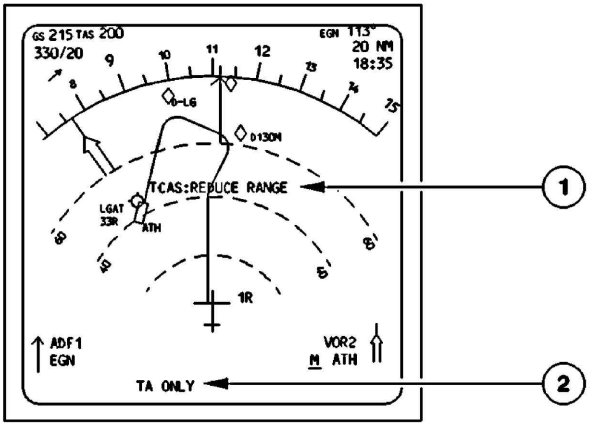
(2) TCAS operation messages

TCAS : Displayed red in case of TCAS internal failure.

TA ONLY : Displayed white when the TA mode is selected automatically, or manually by the flight crew.

TCAS MESSAGES

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



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Displayed amber or red depending on the advisory level (TA or RA).

(2) TCAS operation messages

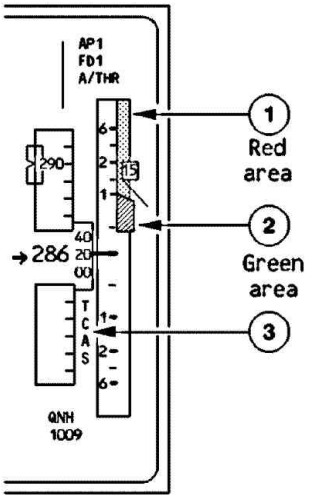
TCAS : Displayed in amber in case of TCAS internal failure.

TA ONLY : Displayed white when the TA mode is selected automatically, or manually by the flight crew.

PFD INDICATIONS

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

In case of RA detection, the vertical speed scale becomes rectangular and the PFD presents vertical orders on the vertical speed scale. The vertical speed scale background is normally grey, but may be partially replaced by green and/or red areas.



(1) Red area
Indicates the vertical speed range, when there is a high risk of conflict.

(2) Green area
Indicates the recommended vertical speed range. It is wider than the red area.

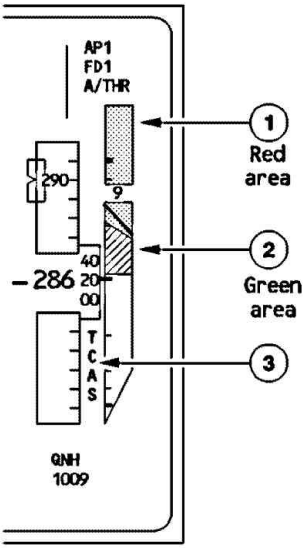
Note:
- *The aircraft can also fly in the grey vertical speed range, without the risk of conflict (preventive RA)*
- *The color of the digits corresponds to the appropriate area*
- *In case of RA detection, the vertical speed needle that is normally green, becomes white.*

(3) TCAS message
Appears in amber provided that the TCAS is not in standby, when the TCAS cannot deliver RA data, or in case of an internal TCAS failure.

PFD INDICATIONS

Applicable to: B-HSI

In case of RA detection, the PFD presents vertical orders on the vertical speed scale. The vertical speed scale background is normally grey, but may be partially replaced by green and/or red areas.



(1) Red area
Indicates the vertical speed range, when there is a high risk of conflict.

(2) Green area
Indicates the recommended vertical speed range.

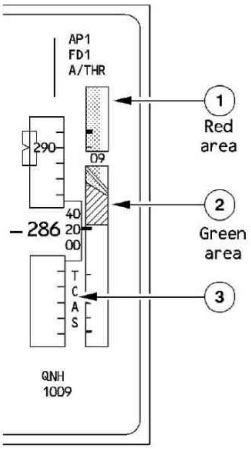
Note: - *The aircraft can also fly in the grey vertical speed range, without the risk of conflict (preventive RA).*
- *The color of the vertical speed needle and the digits corresponds to the appropriate area.*

(3) TCAS message
Appears in red provided that the TCAS is not in standby, when TCAS cannot deliver RA data, or in case of TCAS internal failure.

PFD INDICATIONS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSJ, B-HSK

In case of RA detection, the PFD presents vertical orders on the vertical speed scale. The vertical speed scale background is normally grey, but may be partially replaced by green and/or red areas.



(1) Red area
Indicates the vertical speed range, when there is a high risk of conflict.

(2) Green area
Indicates the recommended vertical speed range. It is wider than the red area.

Note:
- *The aircraft can also fly in the grey vertical speed range, without the risk of conflict (preventive RA)*
- *The color of the digits corresponds to the appropriate area*
- *In case of RA detection, the vertical speed needle that is normally green, becomes white.*

(3) TCAS message
Appears in amber provided that the TCAS is not in standby, when the TCAS cannot deliver RA data, or in case of an internal TCAS failure.

AURAL MESSAGES

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

TA/RA detection is associated with the following messages:

"TRAFFIC TRAFFIC"	:	Only in case of TA detection.
"CLIMB CLIMB"	:	Climb at the vertical speed indicated by the green area on the PFD.
"CLIMB, CROSSING CLIMB" (twice)	:	Same as above. Indicates that you will cross through the intruder altitude.

"INCREASE CLIMB" (twice)	:	Triggered after the CLIMB message, if vertical speed is insufficient to achieve safe vertical separation.
"DESCEND DESCEND"	:	Descend at the vertical speed indicated by the green area on the PFD.
"DESCEND, CROSSING DESCEND" (twice)	:	Same as above. Indicates that you will cross through the intruder altitude.
"INCREASE DESCEND" (twice)	:	Triggered after the DESCEND message, if the vertical speed is insufficient to achieve safe vertical separation.
"ADJUST VERTICAL SPEED, ADJUST":		Adjust the vertical speed to that indicated on the green area of the PFD, reducing climb vertical speed or descent vertical speed, as appropriate.
"CLIMB CLIMB NOW" (twice)	:	Triggered after the DESCEND message, if the intruder trajectory has changed.
"DESCEND DESCEND NOW" (twice)	:	Triggered after the CLIMB message, if the intruder trajectory has changed.
"MONITOR VERTICAL SPEED"	:	Ensure that the vertical speed remains outside the red area. Triggered only once, in case of preventive RA.
"MAINTAIN VERTICAL SPEED, MAINTAIN"	:	Maintain the vertical speed indicated on the green area of the PFD.
"MAINTAIN VERTICAL SPEED, CROSSING MAINTAIN"	:	Maintain the vertical speed indicated on the green area of the PFD. Indicates that you will cross through the intruder altitude.
"CLEAR OF CONFLICT"	:	The range increases and separation is adequate. Return to assigned clearance.

AURAL MESSAGES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

1

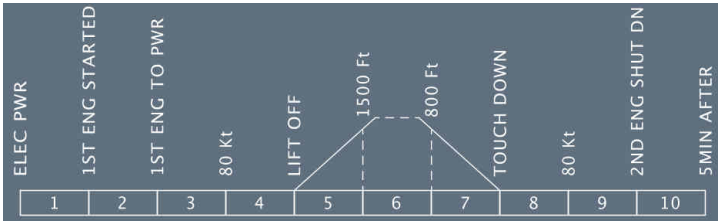
TA/RA detection is associated with the following messages:

"TRAFFIC TRAFFIC"	:	Only in case of TA detection.
"CLIMB CLIMB"	:	Climb at the vertical speed indicated by the green area on the PFD.
"CLIMB, CROSSING CLIMB" (twice)	:	Same as above. Indicates that you will cross through the intruder altitude.
"INCREASE CLIMB" (twice)	:	Triggered after the CLIMB message, if vertical speed is insufficient to achieve safe vertical separation.

"DESCEND DESCEND"	:	Descend at the vertical speed indicated by the green area on the PFD.
"DESCEND, CROSSING DESCEND" (twice)	:	Same as above. Indicates that you will cross through the intruder altitude.
"INCREASE DESCEND" (twice)	:	Triggered after the DESCEND message, if the vertical speed is insufficient to achieve safe vertical separation.
"LEVEL OFF"	:	Set the Vertical Speed to 0.
"CLIMB CLIMB NOW" (twice)	:	Triggered after the DESCEND message, if the intruder trajectory has changed.
"DESCEND DESCEND NOW" (twice)	:	Triggered after the CLIMB message, if the intruder trajectory has changed.
"MONITOR VERTICAL SPEED"	:	Ensure that the vertical speed remains outside the red area. Triggered only once, in case of preventive RA.
"MAINTAIN VERTICAL SPEED, MAINTAIN"	:	Maintain the vertical speed indicated on the green area of the PFD.
"MAINTAIN VERTICAL SPEED, CROSSING MAINTAIN"	:	Maintain the vertical speed indicated on the green area of the PFD. Indicates that you will cross through the intruder altitude.
"CLEAR OF CONFLICT"	:	The range increases and separation is adequate. Return to assigned clearance.

WARNINGS AND CAUTIONS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
TCAS FAULT in case of TCAS internal failure	SINGLE CHIME	MASTER CAUT	NIL	Flag on PFD and ND	3, 4, 5, 7
TCAS STBY in the case where the flight crew sets the TCAS on STBY in flight.	SINGLE CHIME	MASTER CAUT		NIL	ALL, except 6

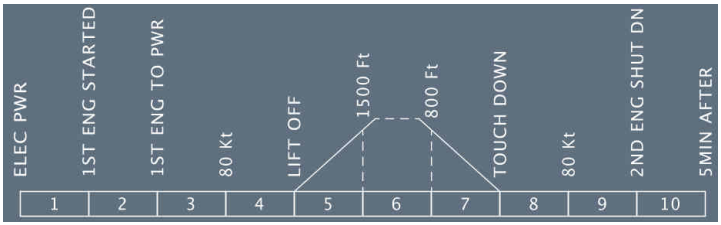
MEMO DISPLAY

TCAS STBY is displayed in green, when:
- ATC STBY is selected by the crew, or
- TCAS STBY is selected by the crew during flight phases other than 6, or
- ALT RPTG is selected at off, or
- both ATC or both RA are failed.

TCAS STBY is displayed in amber, when the flight crew sets the TCAS on STBY in flight phase 6.

WARNINGS AND CAUTIONS

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
TCAS FAULT in case of TCAS internal failure	SINGLE CHIME	MASTER CAUT	NIL	Flag on PFD and ND	3, 4, 5, 7
TCAS STBY in the case where the flight crew sets the TCAS on STBY in flight.	SINGLE CHIME	MASTER CAUT		NIL	ALL, except 6

MEMO DISPLAY

TCAS STBY is displayed in green, when:
- ATC STBY is selected by the crew, or
- TCAS STBY is selected by the crew during flight phases other than 6, or
- ALT RPTG is selected at off, or
- both ATC or both RA are failed.
- In the case of a triple ADR failure.

TCAS STBY is displayed in amber, when the flight crew sets the TCAS on STBY in flight phase 6.

BUS EQUIPMENT LIST

Applicable to: ALL

	NORM		EMER ELEC		
	AC	DC	AC ESS	DC ESS	HOT
TCAS ⋘	AC1				

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AIRCRAFT SYSTEMS

OXYGEN

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DSC-35-PLP PRELIMINARY PAGES

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DSC-35-30 Fixed Oxygen System for Cabin

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DSC-35-40 Portable Oxygen System

DSC-35-40-10 Description

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Using the Hood ..... B

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Localization Title	Toc Index	ID	Reason
DSC-35-20-10 Mask Setting	D	1	Improvement of illustration quality.
DSC-35-20-10 MASK STOWAGE	E	2	DU updated to set oxygen selector to 100% and to add the 'Caution'
DSC-35-20-20 Stowage Box	B	1	Improvement of illustration quality.
DSC-35-20-20 Pressure Regulator	D	2	Improvement of illustration quality.
DSC-35-30-10 Operation	B	1	Revision of the content to reflect the possible absence of the automatic broadcast system IPRAM.
DSC-35-30-10 Operation	B	2	Revision of the content to reflect the possible absence of the automatic broadcast system IPRAM.
DSC-35-30-10 Schematic	C	3	Revision of the content to reflect the possible absence of the automatic broadcast system IPRAM.
DSC-35-40-10 Using the Hood	B	1	Improvement of illustration quality.

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DESCRIPTION

Applicable to: ALL

The oxygen system consists of:

- A cockpit-fixed oxygen system, which supplies adequate breathing oxygen to the cockpit occupants in case of depressurization, or emission of smoke and noxious gases.
- A cabin-fixed oxygen system, which supplies oxygen for cabin occupants (passengers and cabin crew) in case of depressurization.
- A portable oxygen system, which is provided in both the cockpit and cabin and is to be used:
  - As PROTECTION for the crew during on board emergencies.
  - For FIRST AID purposes.

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GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The cockpit's fixed oxygen system consists of :
- A high-pressure cylinder, in the left-hand lower fuselage.
- A pressure regulator, connected directly to the cylinder that delivers oxygen, at a pressure suitable for users.
- Two overpressure safety systems to vent oxygen overboard, through a safety port, if the pressure gets too high.
- A supply solenoid valve that allows the crew to shut off the distribution system.
- Three full-face quick-donning masks, stowed in readily-accessible boxes adjacent to the crewmembers' seats (one at each seat).

GENERAL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The cockpit's fixed oxygen system consists of :
- A high-pressure cylinder, in the left-hand lower fuselage.
- A pressure regulator, connected directly to the cylinder that delivers oxygen, at a pressure suitable for users.
- Two overpressure safety systems to vent oxygen overboard, through a safety port, if the pressure gets too high.
- A supply solenoid valve that allows the crew to shut off the distribution system.
- Four full-face quick-donning masks, stowed in readily-accessible boxes adjacent to the crewmembers' seats (one at each seat).

OPERATION

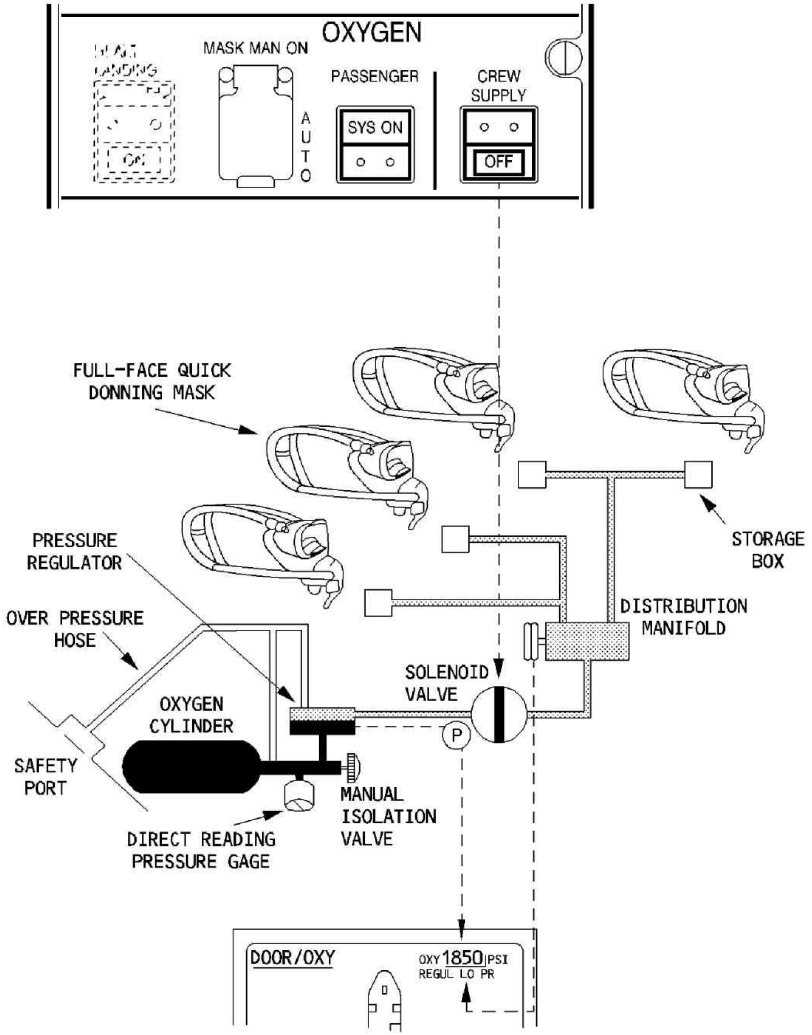
Applicable to: ALL

The crewmember squeezes the red grips to pull the mask out of its box, and this action causes the mask harness to inflate.
A mask-mounted regulator supplies a mixture of air and oxygen or pure oxygen, or performs emergency pressure control. With the regulator set to NORMAL, the user breathes a mixture of cabin air and oxygen up to the cabin altitude at which the regulator supplies 100 % oxygen. The user can select 100 %, in which case the regulator supplies pure oxygen at all cabin altitudes.
If the situation calls for it, the user can use the emergency overpressure rotating knob and receive pure oxygen at positive pressure.
The storage box contains a microphone lead, with a quick-disconnect, for connection to the appropriate mask microphone cable.

Note: *Each mask may have a removable film that protects the visor against scratches. This strip is optional and may be removed from the mask at any time.*

SCHEMATIC

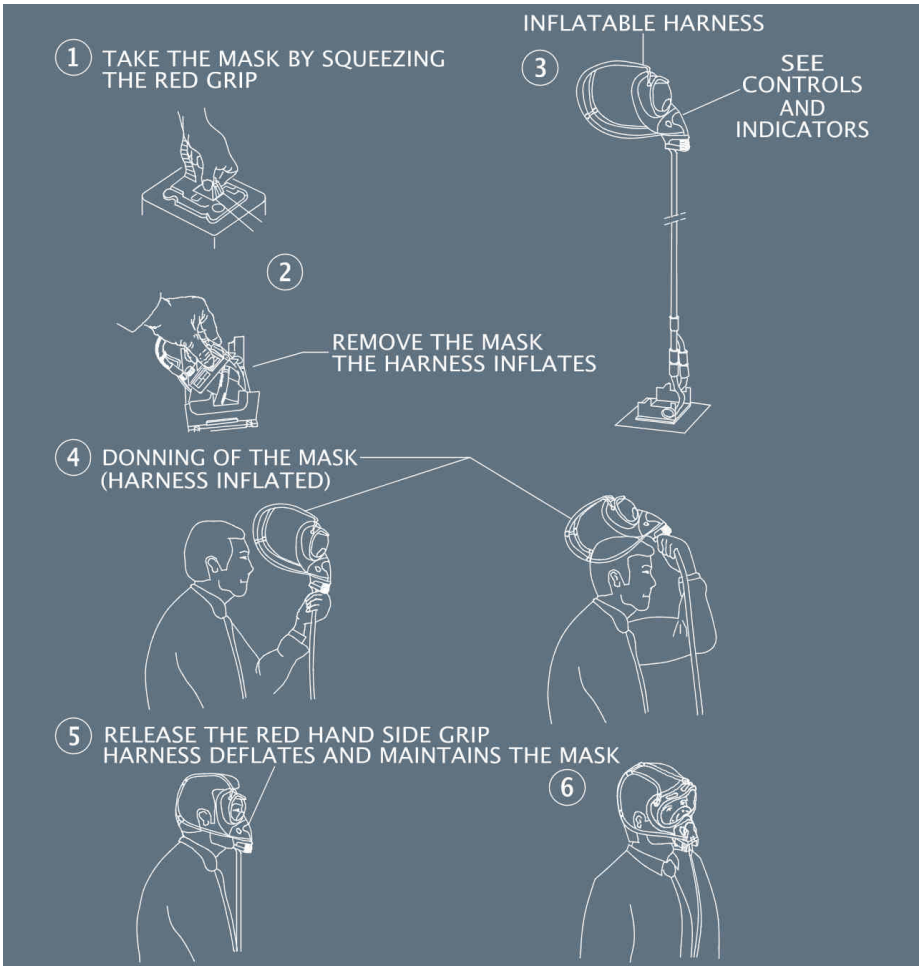
Applicable to: ALL



MASK SETTING

Applicable to: ALL

1



MASK STOWAGE

Applicable to: ALL

2

1 – COIL THE HOSE, AND PLACE IT IN THE BOTTOM OF THE STOWAGE BOX.



2 – POSITION THE REMAINING HOSE IN THE MIDDLE OF THE MASK.
– FOLD THE TWO HARNESS PORTIONS TOGETHER.



3 – PLACE THE MASK IN THE STOWAGE BOX.
– MAKE SURE THE MASK REGULATOR IS FULLY SEATED AGAINST THE STOP IN THE STOWAGE BOX.



4 – CLOSE THE DOORS, THEN FULLY PRESS THE "RESET TEST" BUTTON.
– ONCE THE "RESET TEST" BUTTON IS RELEASED, CHECK THAT THE "OXY ON" FLAG COMPLETELY DISAPPEARS.
– PRESS THE EMERGENCY PRESSURE SELECTOR, AND CHECK THAT THE BLINKER REMAINS BLACK.
– THEN, RETURN THE N/100% SELECTOR AT THE 100% POSITION.

CAUTION: Maintaining the pressure selector in the "EMERGENCY" position can deplete the crew oxygen cylinder.



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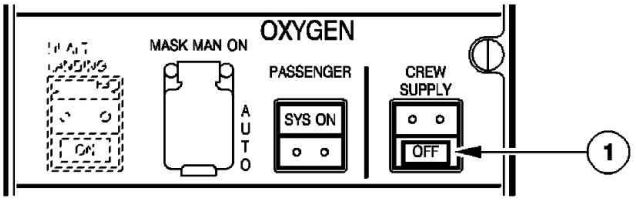
OVERHEAD PANEL

Applicable to: ALL



(1) CREW SUPPLY pb

This pushbutton controls the solenoid valve.

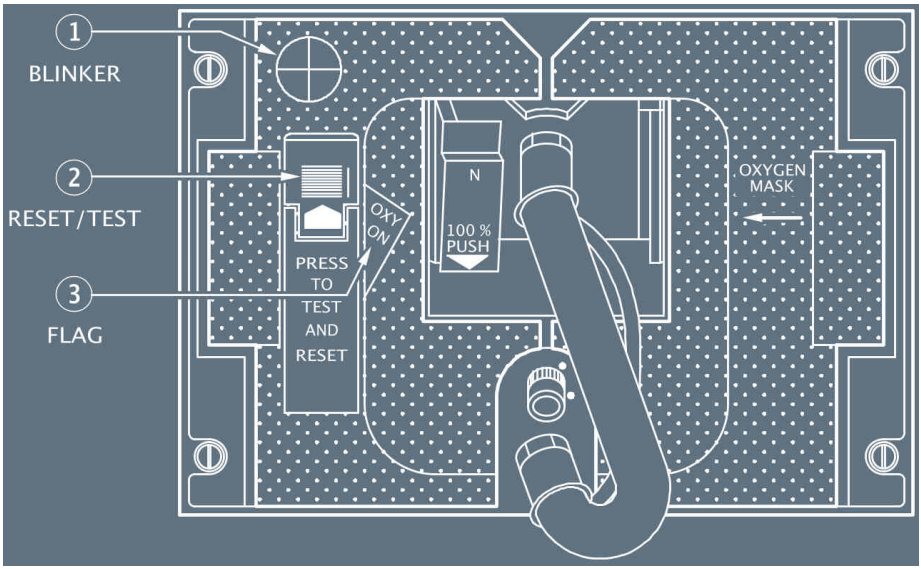
On : The valve is open, and supplies low pressure oxygen to the masks (normal position in flight).

OFF: The valve is closed, and the white light comes on.

STOWAGE BOX

Applicable to: ALL

1



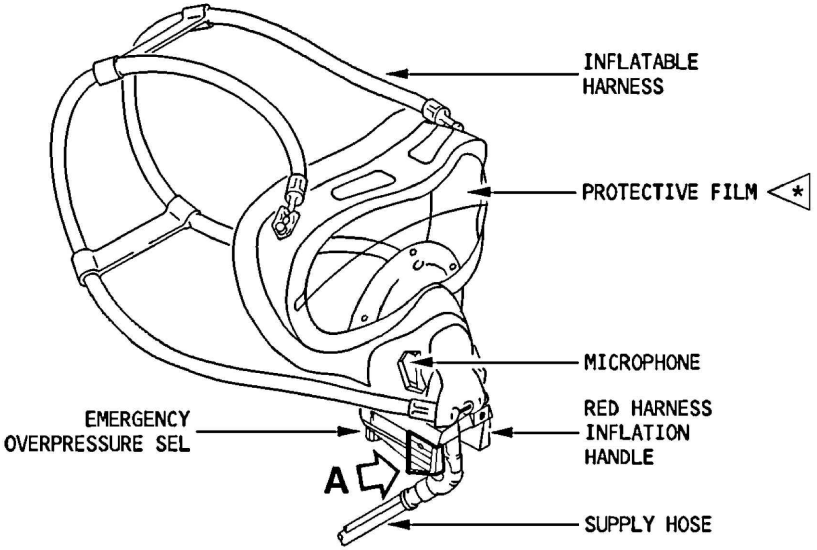
(1) Blinker flowmeter (yellow)
This indicator flashes when oxygen is flowing.

(2) RESET/TEST control slide
The crewmember presses the slide, and pushes it in the direction of the arrow to test: the operation of the blinker; the regulator supply; system sealing downstream of the valve; and the regulator sealing and system operation. Pressing the RESET control slide, after the oxygen mask has been used, cuts off the oxygen, and the mask microphone.

(3) OXY ON flag
As soon as the left flap door opens, the mask is supplied with oxygen and, once it closes (mask still supplied with oxygen), the “OXY ON” flag appears.

CREW OXYGEN MASK

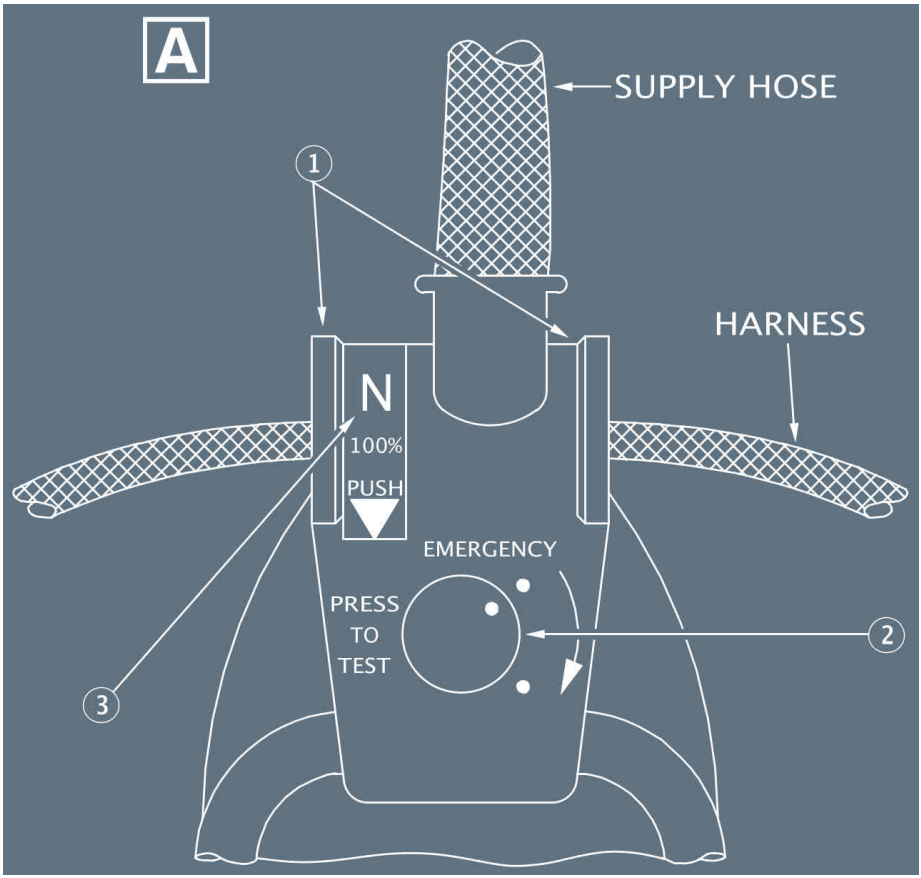
Applicable to: ALL



PRESSURE REGULATOR

Applicable to: ALL

2



(1) Red grips
Squeezing the right-hand side grip unlocks the two-flap door, and permits the harness to inflate.

(2) EMERGENCY pressure selector

Use of this selector creates on overpressure which eliminates condensation or fogging of the mask, and prevents smoke, smell or ashes from entering the mask.

- Pressing this knob generates an overpressure for a few seconds.
- Turning the knob, in the direction of the arrow, generates a permanent overpressure.

Note: *1. Overpressure supply is automatically started, when cabin altitude exceeds 30 000 ft.*

2. Overpressure supply is available only when the N/100% selector is set on the on the 100 % position.

(3) N/100 % selector

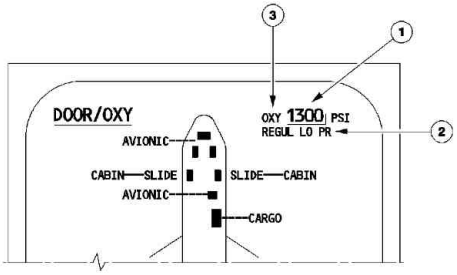
Pushing the button up from underneath releases it, and it pops up to the N (normal) position. Pressing it again returns it to 100 %.

100 % : The mask delivers 100 % oxygen.

N : The mask delivers a mixture of air and oxygen, the content of which varies with cabin altitude. When cabin altitude goes above 35 000 ft, the air inlet closes and the wearer breathes 100 % oxygen.

DOOR/OXY ECAM PAGE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



(1) OXY high pressure indication

It is in green, when the pressure is ≥ 400 PSI.
It is in amber, when the pressure is < 400 PSI.
On ground, an amber half frame appears when oxygen pressure is < 1 500 PSI.
In this case, the flight crew must check that the remaining quantity is not below the minimum (*Refer to LIM-35 Cockpit Fixed Oxygen System*).

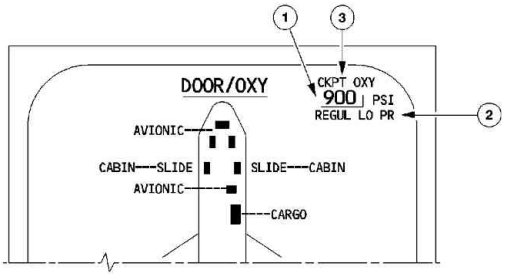
(2) REGUL LO PR indication
It is in amber, if oxygen pressure on the low-pressure circuit is low (50 PSI).

(3) OXY indication
It is normally in green.

It becomes amber, when:
- Pressure goes below 400 PSI
- Low oxygen pressure is detected
- The OXYGEN CREW SUPPLY pushbutton switch on the overhead panel is OFF.

DOOR/OXY ECAM PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) OXY high pressure indication
It is in green, when the pressure is ≥ 600 PSI.
It pulses in green, when the pressure is < 600 PSI (the DOOR/OXY SD page is automatically displayed).
It is in amber, when the pressure is < 300 PSI.
On ground, an amber half frame appears when oxygen pressure is < 1 000 PSI.
In this case, the flight crew must check that the remaining quantity is not below the minimum (*Refer to LIM-35 Cockpit Fixed Oxygen System*).

(2) REGUL LO PR indication
It is in amber, if oxygen pressure on the low-pressure circuit is low (50 PSI).

(3) CKPT OXY indication
It is normally in white.

It becomes amber, when:

- Pressure goes below 300 PSI
- Low oxygen pressure is detected
- The OXYGEN CREW SUPPLY pb on the overhead panel is OFF.

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BUS EQUIPMENT LIST

Applicable to: ALL

L3

	NORM			EMER ELEC		
	AC	DC	DC BAT	AC ESS	DC ESS	HOT
CREW OXY CTL					SHED	

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GENERAL

Applicable to: ALL

The cabin's fixed oxygen system supplies oxygen to the occupants, in case of cabin depressurization.
Chemical generators produce the oxygen. Each generator feeds a group of 2, 3, or 4 masks.
Generators and masks are in containers above the passenger seats, in the lavatories, in each galley ◁✻ , and at each cabin crew station.

OPERATION

Applicable to: B-HTF

1 Each container has an electrical latching mechanism that opens automatically to allow the masks to drop, if the cabin pressure altitude exceeds 14 000 ft (+ 250, - 750 ft).
Members of the flight crew can override the automatic control.
When the masks are released, the passenger address system automatically broadcasts prerecorded instructions ◁✻ for using them.
The generation of oxygen begins when the passenger pulls the mask towards the passenger seat.
The chemical reaction used for oxygen generation creates heat. Therefore, the smell of burning, smokes and cabin temperature increase may be associated with the normal operation of the oxygen generators. The mask receives pure oxygen under positive pressure for about 13 min, until the generator is exhausted.
A reset is available for the rearming of the system after the masks are restowed. A manual release tool allows crew members to open the doors manually in case of electrical failure.

OPERATION

Applicable to: ALL 320, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

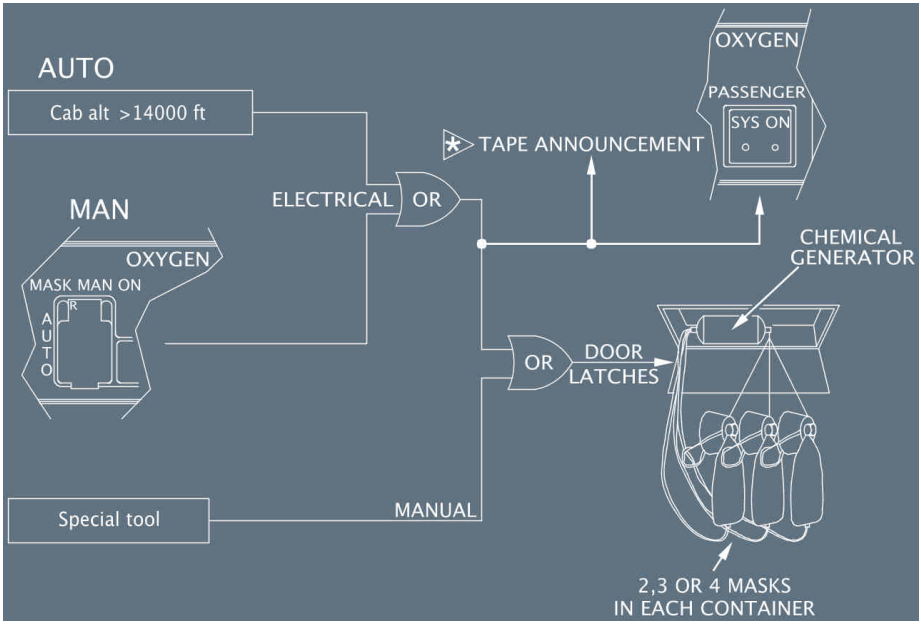
2 Each container has an electrical latching mechanism that opens automatically to allow the masks to drop, if the cabin pressure altitude exceeds 14 000 ft (+ 250, - 750 ft). The flight crew can override the automatic control.
When the masks are released, the passenger address system automatically broadcasts prerecorded instructions ◁✻ for their use.
The generation of oxygen begins when the passenger pulls the mask towards the passenger seat.
The chemical reaction used for oxygen generation creates heat. Therefore, the smell of burning or smoke, and cabin temperature increase, may be associated with the normal operation of the oxygen generators. The mask receives pure oxygen under positive pressure for about 15 min, until the generator is exhausted.

A reset is available for the rearming of the system after the masks are restowed. A manual release tool allows crew members to manually open the doors in case of electrical failure.

SCHEMATIC

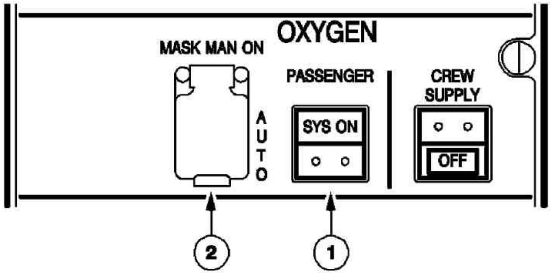
Applicable to: ALL

3



OVERHEAD PANEL

Applicable to: ALL



(1) PASSENGER SYS ON light
This light comes on in white, when the control for the oxygen mask doors is activated, and it remains on until the TMR RESET pushbutton is pressed (*Refer to DSC-35-30-20 Overhead Maintenance Panel*).

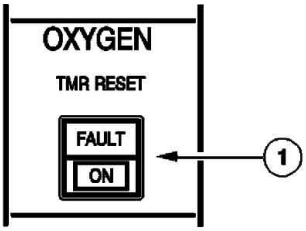
(2) MASK MAN ON pushbutton
The guard keeps this button in the AUTO position.

AUTO : The mask doors open automatically, when the cabin altitude exceeds 14 000 ft.

Pressed : The mask doors open.

OVERHEAD MAINTENANCE PANEL

Applicable to: ALL



(1) TMR RESET pushbutton
The maintenance crew uses this pushbutton to reset the control circuit, after the system has operated.

ON : The PASSENGER SYS ON light goes off.

FAULT : This light comes on in white, when the door latch solenoids are energized for more than 30 s.

BUS EQUIPMENT LIST

Applicable to: ALL

		NORM			EMER ELEC		
		AC	DC	DC BAT	AC ESS	DC ESS	HOT
PAX OXYGEN	ACTUATION				SHED		
	AUTOCONTROL					SHED	

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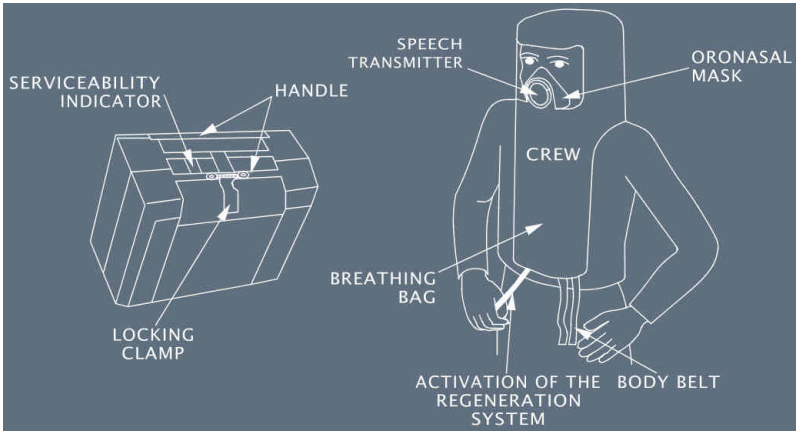
FLIGHT CREWS PORTABLE OXYGEN SYSTEM

Applicable to: B-HSQ, B-HSR, B-HTF

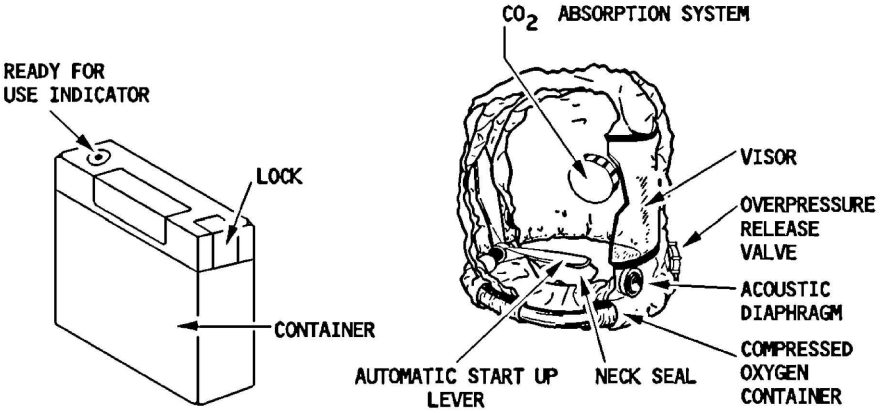
The flight crew smoke hood located on the right back side of the cockpit, ensures the eyes and respiratory system protection of one flight crew member when fighting a fire and in case of smoke or noxious gas emissions or cabin depressurization.
The smoke hood uses a chemical air regeneration system, which is in the breathing key. An oronasal mask allows the hood's wearer to inhale regenerated air, and it returns the exhaled breath to the regeneration system.
The hood is serviceable as long as the yellow indicator on the case is not broken. The hood should work satisfactorily for at least 20 min.



FLIGHT CREWS PORTABLE OXYGEN SYSTEM

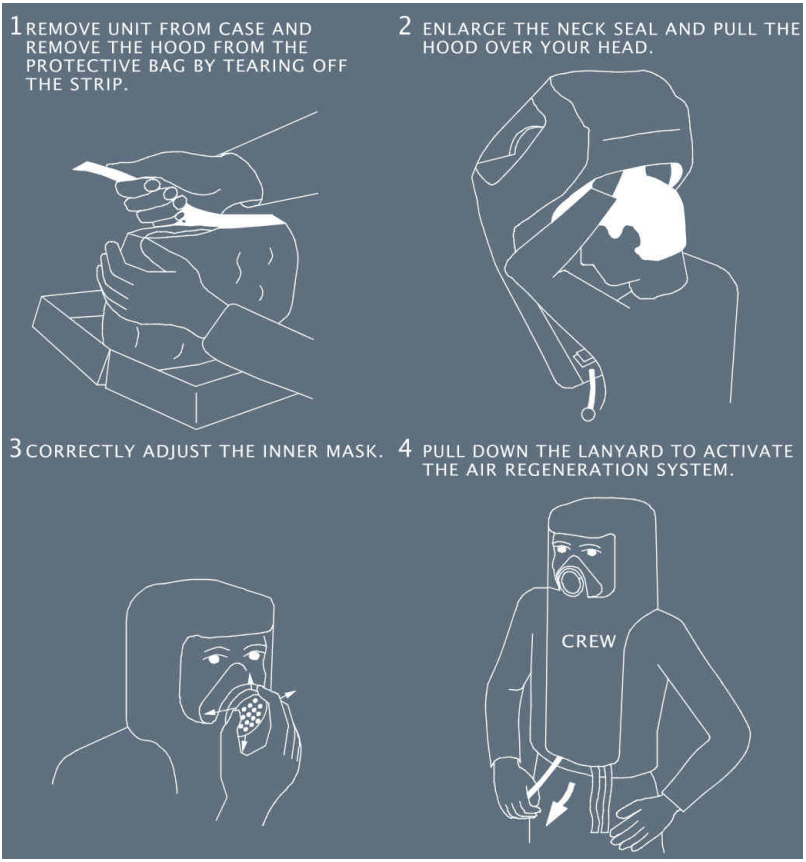
Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

The flight crew smoke hood located on the right back side of the cockpit, ensures the eyes and respiratory system protection of one flight crew member when fighting a fire and in case of smoke or noxious gas emissions or cabin depressurization.
The smoke hood is equipped with one oxygen cylinder and one CO2 absorption system which furnish an effective time of use of 15 min.
A « ready for use » status of the hood is ensured by checking that the indicator mounted on the hood container is not red.


READY FOR
USE INDICATOR
LOCK
CONTAINER
CO_2 ABSORPTION SYSTEM
VISOR
OVERPRESSURE
RELEASE
VALVE
ACOUSTIC
DIAPHRAGM
COMPRESSED
OXYGEN
CONTAINER
AUTOMATIC START UP
LEVER
NECK SEAL

USING THE HOOD

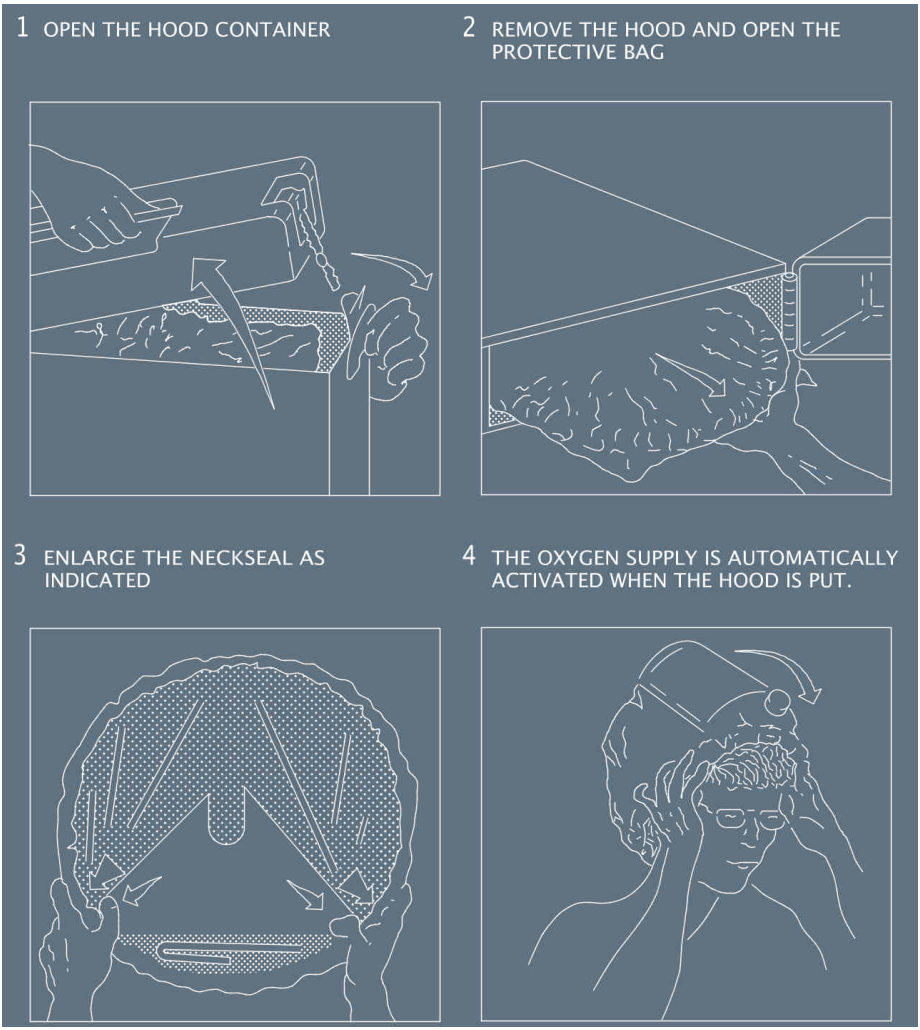
Applicable to: B-HSQ, B-HSR, B-HTF



USING THE HOOD

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

1



AIRCRAFT SYSTEMS

PNEUMATIC

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DSC-36-PLP PRELIMINARY PAGES

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DSC-36-30 Warnings and Cautions

Warnings and Cautions ..... A

DSC-36-40 Electrical Supply

BUS EQUIPMENT LIST ..... A

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GENERAL

Applicable to: ALL

The pneumatic system supplies high-pressure air for :
- air conditioning
- engine starting
- wing anti-icing
- water pressurization
- hydraulic reservoir pressurization

High-pressure air has three sources :
- engine bleed systems
- APU load compressor
- HP ground connection

A crossbleed duct interconnects the engine bleed systems and receives air from the APU and ground sources when appropriate.
A valve mounted on the crossbleed duct allows the left side (engine 1) and right side (engine 2) to be interconnected.
Two Bleed Monitoring Computers (BMC1 and BMC2), the overhead control panel, and the ECAM control and monitor the operation of the pneumatic system.
A leak detection system detects any overheating in the vicinity of hot air ducts.

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GENERAL

Applicable to: ALL

The aircraft has two similar engine bleed air systems.

Each system is designed to :
- select the compressor stage to use as a source of air
- regulate the bleed air temperature
- regulate the bleed air pressure.

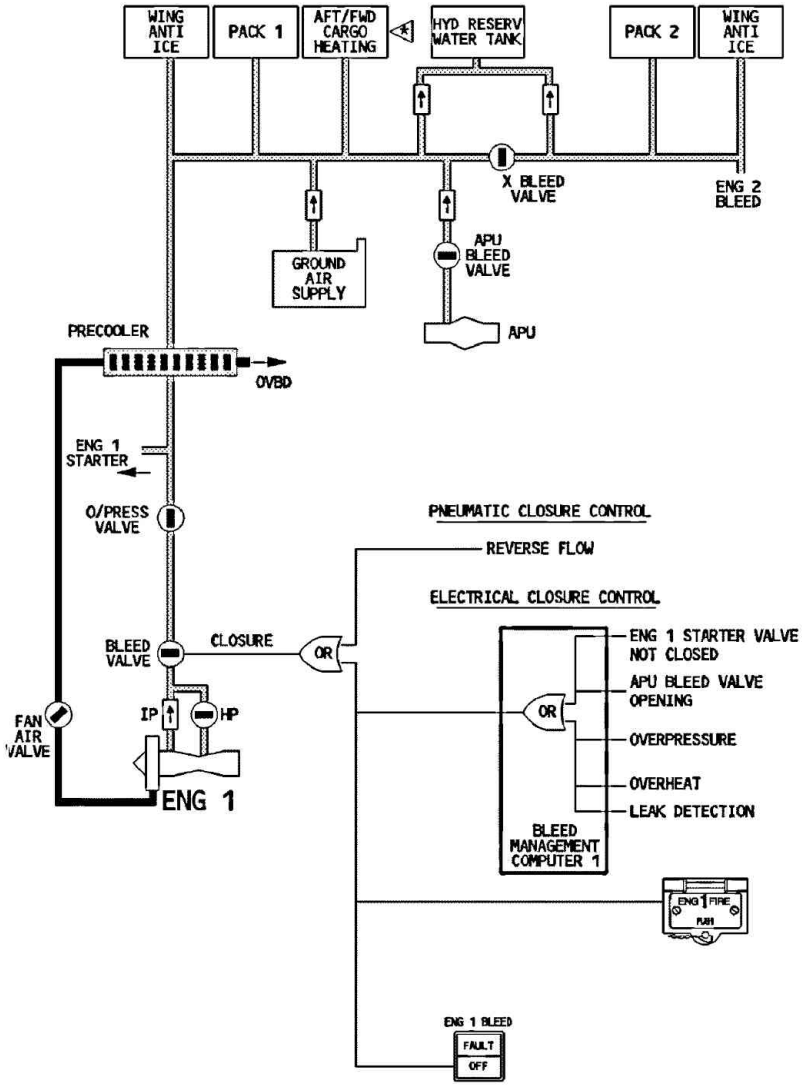
A Bleed Monitoring Computer (BMC) controls and monitors each system.
Each BMC receives information about bleed pressure and temperature and valve position.

Each is connected with :
- other systems using air or information from the bleed system
- the other BMC.

Each supplies indications and warnings to the ECAM and CFDS.
If one BMC fails, the other one takes over most of the monitoring functions.
Each bleed valve is pneumatically operated and controlled electrically by its associated BMC.

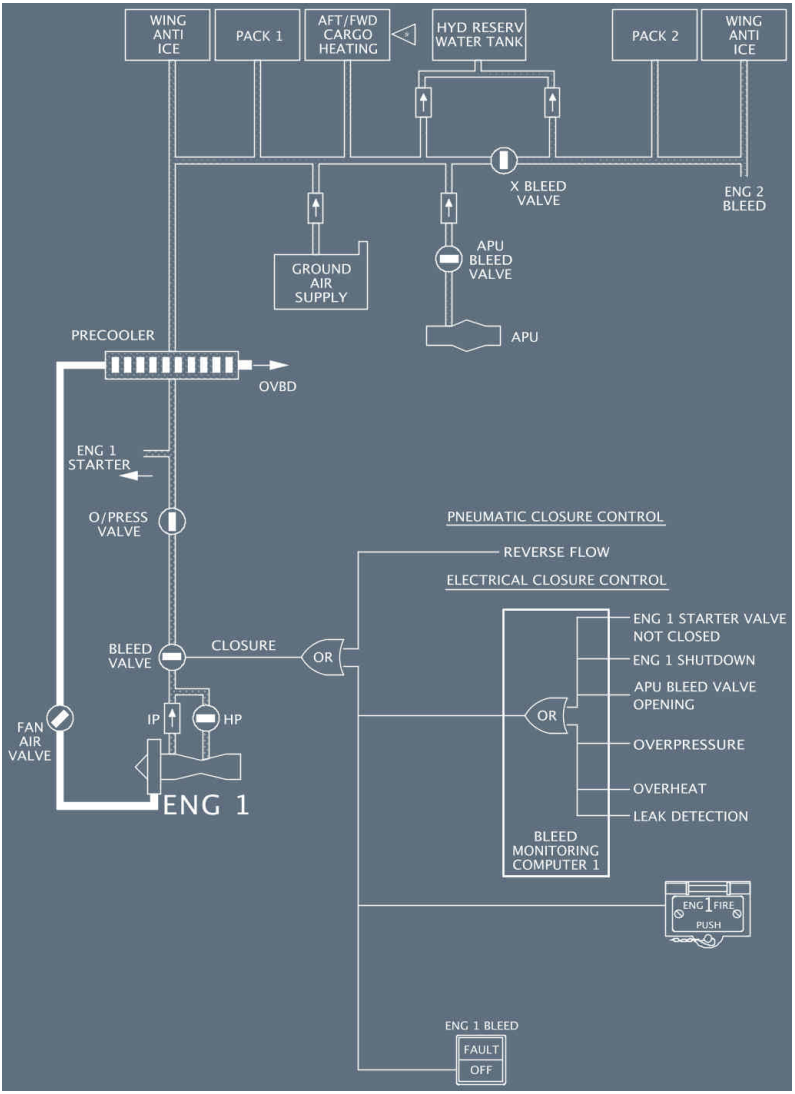
ARCHITECTURE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN


WING ANTI ICE
PACK 1
AFT/FWD CARGO HEATING
HYD RESERV WATER TANK
PACK 2
WING ANTI ICE
X BLEED VALVE
ENG 2 BLEED
GROUND AIR SUPPLY
APU BLEED VALVE
APU
PRECOOLER
OVBD
ENG 1 STARTER
O/PRESS VALVE
PNEUMATIC CLOSURE CONTROL
REVERSE FLOW
ELECTRICAL CLOSURE CONTROL
BLEED VALVE
CLOSURE
OR
ENG 1 STARTER VALVE NOT CLOSED
APU BLEED VALVE OPENING
OVERPRESSURE
OVERHEAT
LEAK DETECTION
BLEED MANAGEMENT COMPUTER 1
FAN AIR VALVE
IP
HP
ENG 1
ENG 1 FIRE
PUSH
ENG 1 BLEED
FAULT
OFF

ARCHITECTURE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



AIR BLEED SELECTION

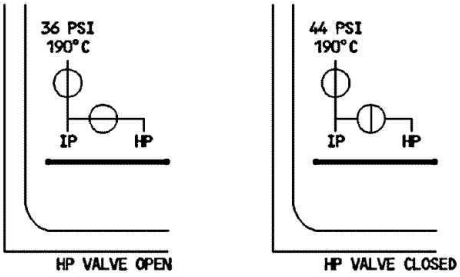
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

Air is normally bled from the intermediate pressure stage (IP) of engine's high-pressure (HP) compressor to minimize fuel penalty.
At low engine speed, when the pressure and temperature of the IP air are too low, the system bleeds air from the HP stage and maintains it at 36 ±4 PSI.
An intermediate pressure check valve downstream of the IP port closes to prevent air from the HP stage from being circulated to the IP stage.

L3 The HP valve closes automatically:

- Pneumatically:
  - In case of low upstream pressure
  - in case of excessive upstream pressure
- Electrically:
  - When the bleed valve is closed electrically
  - In case of overpressure upstream of the HP valve with wing anti-ice off, two packs on and aircraft altitude above 15 000 ft.

ECAM INDICATION



AIR BLEED SELECTION

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

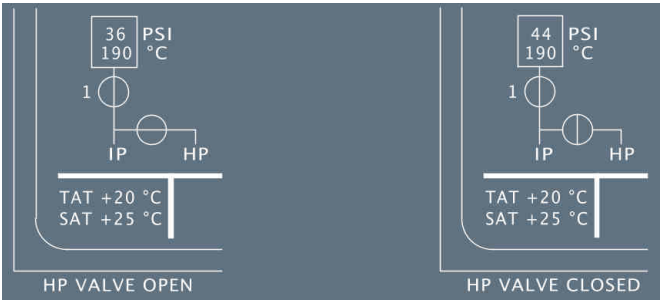
Air is normally bled from the intermediate pressure stage (IP) of engine's high-pressure (HP) compressor to minimize fuel penalty.
At low engine speed, when the pressure and temperature of the IP air are too low, the system bleeds air from the HP stage and maintains it at 36 ±4 PSI.

An intermediate pressure check valve downstream of the IP port closes to prevent air from the HP stage from being circulated to the IP stage.

L3 The HP valve closes automatically

- • In case of low upstream pressure
  • in case of excessive upstream pressure
- electrically :
  • when the bleed valve is closed electrically
  • in case of overpressure upstream of the HP valve with wing anti-ice off, two packs on and aircraft altitude above 15 000 ft.

ECAM INDICATION



PRESSURE REGULATION AND LIMITATION

Applicable to: ALL

The bleed valve, which is downstream of the junction of HP and IP ducting, acts as a shut-off and pressure regulating valve.
It maintains delivery pressure at 45 ±5 PSI.

Note: *Bleed pressure may fluctuate between 38 and 56 PSI (with a maximum peak to peak pressure of 16 PSI) particularly at high engine power (takeoff or climb) up to FL 100.*

The bleed valve is fully closed:
- Pneumatically:
  - If upstream pressure goes below 8 PSI
  - If there is return flow
- Electrically by means of:
  - The BLEED pushbutton switch (switched OFF)
  - The ENG FIRE pushbutton (pushed)
  - The Bleed air Monitoring Computer (BMC) in the following cases:
    - Overtemperature
    - Overpressure
    - Leak
    - Open starter valve
    - APU bleed being ON.

If pressure regulation fails, the overpressure valve closes when the pressure goes over 85 PSI.

Note: If APU Bleed is ON and the crossbleed valve is SHUT, the Engine bleed valve 2, remains open.

TEMPERATURE REGULATION AND LIMITATION

Applicable to: ALL

A precooler downstream of the bleed valve regulates the temperature of the bleed air.
The precooler is an air-to-air heat exchanger that uses cooling air bleed from the engine fan to regulate the temperature to approximately 200 °C.
The fan air valve controls fan air flow.
A spring keeps the fan air valve closed in the absence of pressure.

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GENERAL

Applicable to: B-HSQ, B-HSR

Air from the APU load compressor is available on ground and in flight.
The APU bleed valve operates as a shut-off valve to control APU bleed air. It is electrically controlled and pneumatically operated.
The APU BLEED pb-sw, on the AIR COND panel, controls the APU bleed valve. When the flight crew selects ON with the pushbutton, APU bleed air supplies the pneumatic system, if the APU speed is above 95 %. This opens the crossbleed valve and closes the engine bleed automatically.
A check valve near the crossbleed duct protects the APU, when bleed air comes from another source.

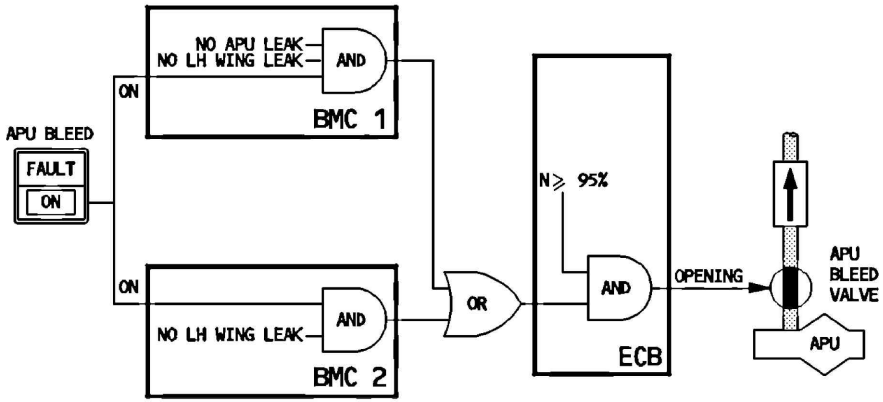
GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

Air from the APU load compressor is available on ground and in flight.
The APU bleed valve operates as a shut-off valve to control APU bleed air. It is electrically-controlled and operated by fuel pressure.
The APU BLEED pb-sw, on the AIR COND panel, controls the APU bleed valve. When the flight crew selects ON with the pushbutton, APU bleed air supplies the pneumatic system, if the APU speed is above 95 %. This opens the crossbleed valve and closes the engine bleed automatically.
A check valve near the crossbleed duct protects the APU, when bleed air comes from another source.

APU BLEED VALVE OPENING LOGIC

Applicable to: ALL



Note: *1. Leak detection is disregarded during an engine start.*
2. APU leak detection is lost, if BMC1 is lost.

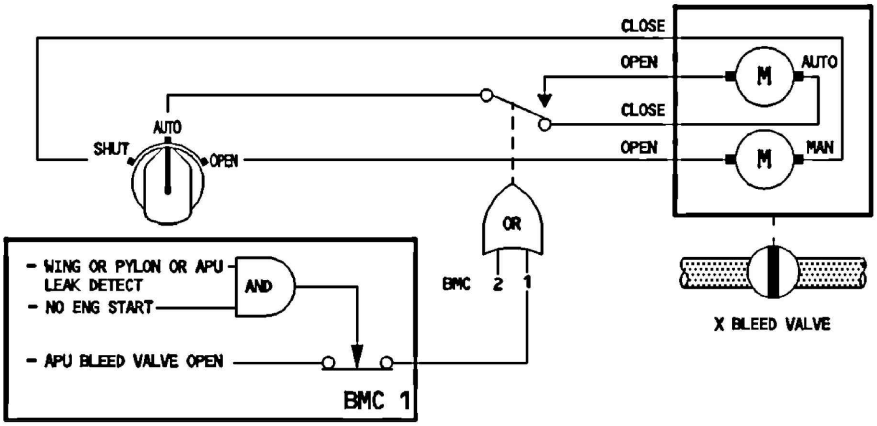
GENERAL

Applicable to: ALL

A crossbleed valve on the crossbleed duct allows the air supply systems of the two engines to be isolated or interconnected.
On the AIR COND panel, a rotary selector controls the crossbleed valve electrically.
Two electric motors, one for automatic mode and one for manual mode, control the valve.
In automatic mode, the crossbleed valve opens when the system uses APU bleed air. It closes, if the system detects an air leak (except during engine start).

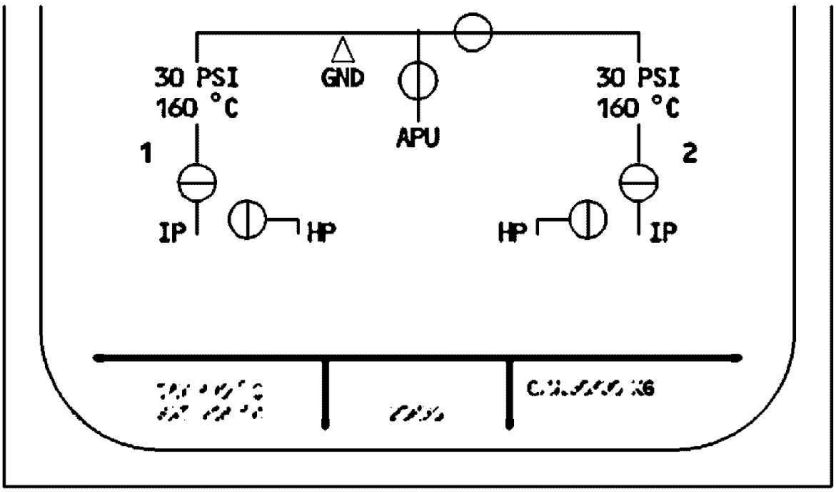
X-BLEED VALVE CONTROL LOGIC

Applicable to: ALL



ECAM INDICATION

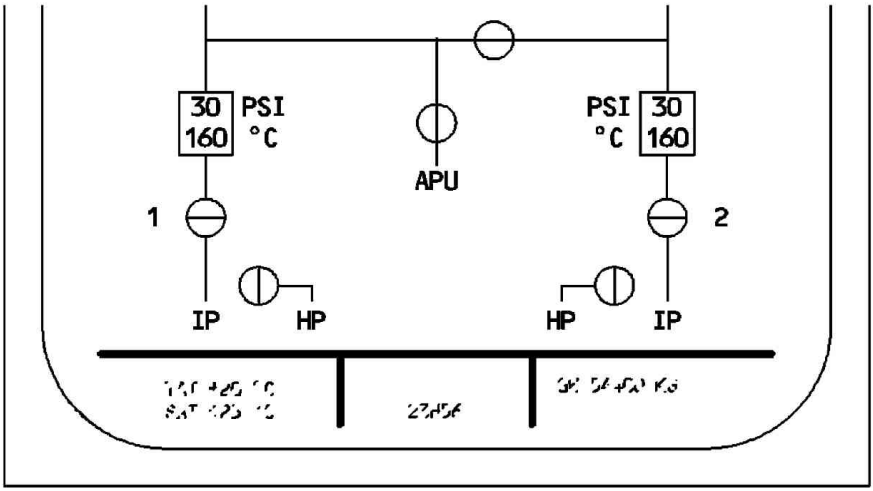
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



X-BLEED VALVE OPEN-AIR SUPPLIED FROM APU

ECAM INDICATION

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



X-BLEED VALVE OPEN.AIR SUPPLIED FROM APU

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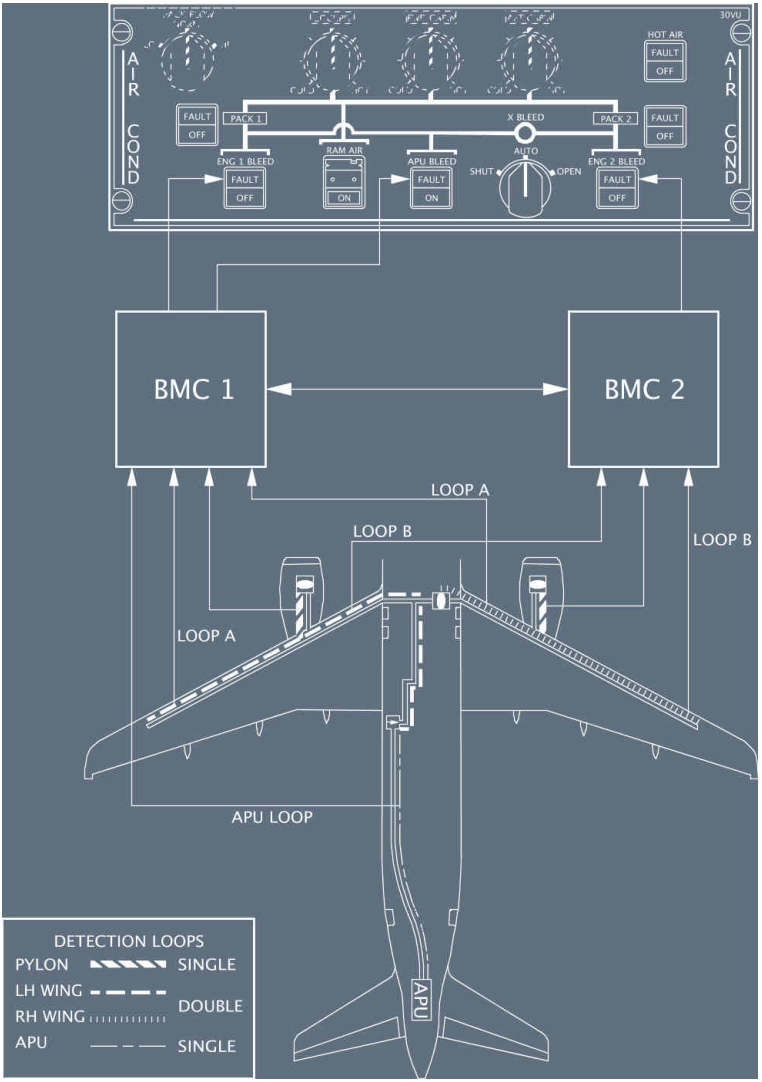
LEAK DETECTION

Applicable to: ALL

Leak detection loops detect any overheating near the hot air ducts in the fuselage, pylons, and wings.
For the pylon and APU, the sensing elements are tied to form a single loop and for the wing, a double loop.
When the two wing loops detect a leak, or when one loop detects the leak and the other one is inoperative, they activate a wing leak signal.
BMC1 and BMC2 each contain identical control logic for the system.

- A wing leak signal causes :
  - the bleed valve on the related side to close automatically
  - the associated FAULT light on the AIR COND panel to come on
  - the x-bleed valve to close automatically (except during an engine start)
  - the APU bleed valve to close automatically (if it is open, and if the leak concerns the left wing) (except during engine start)
- A pylon leak signal causes :
  - the bleed valve on the related side to close automatically
  - the FAULT light for the related engine on the AIR COND panel to come on
  - the x-bleed valve to close automatically (except during an engine start).
- An APU leak signal causes :
  - the APU bleed valve to close automatically (except during engine start).
  - the FAULT light the APU BLEED pushbutton switch on the AIR COND panel to come on
  - the x-bleed valve to close automatically (except during an engine start).


AIR COND
FAULT
OFF
PACK 1
PACK 2
X BLEED
HOT AIR
ENG 1 BLEED
RAM AIR
APU BLEED
AUTO
SHUT
OPEN
ENG 2 BLEED
ON
30VU
BMC 1
BMC 2
LOOP A
LOOP B
APU LOOP
APU
DETECTION LOOPS
PYLON
SINGLE
LH WING
RH WING
DOUBLE
APU
SINGLE

BMC FAILURE

Applicable to: ALL

If one BMC fails, the adjacent BMC takes over the monitoring of the bleed system to issue the following ECAM warnings if necessary :

- overpressure
- overtemperature
- wing leak.

Nevertheless, the associated FAULT light on the AIR COND panel is lost, and the associated bleed valve does not close automatically.
ENG BLEED LEAK warning is lost for the associated engine, as is also the APU BLEED LEAK warning if BMC1 has failed.

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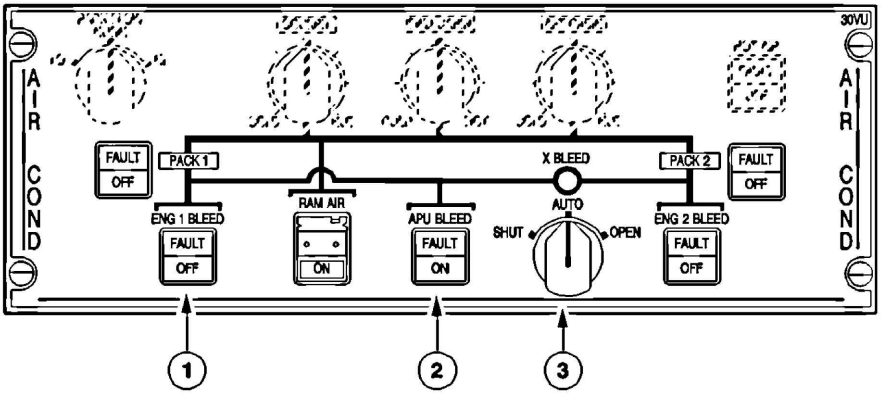
OVERHEAD PANEL

Applicable to: ALL



(1) ENG 1 and ENG 2 BLEED pb sw

On : Bleed valve opens if :
- Upstream pressure is above 8 PSI.
- APU BLEED pushbutton switch is off or APU bleed valve is closed.
- There is no onside wing or pylon leak, and no overpressure or overtemperature has been detected.
- The ENG FIRE pushbutton has not been popped out.
- The engine start valve is closed.

FAULT lt : This amber light comes on, and an ECAM caution appears, if :
- There is an overpressure downstream of the bleed valve.
- There is a bleed air overheat.
- There is a wing or engine leak on the related side.
- The bleed valve is not closed during engine start.
- The bleed valve is not closed with APU bleed ON.

It goes out when the ENG BLEED pushbutton switch is OFF if the fault has disappeared.

OFF : The bleed valve and HP valve close. The white OFF light comes on.

(2) APU BLEED pb sw

ON : The APU valve opens if N > 95 % and there is no leak in the APU or in the left side bleed. (If there is a leak on the right side, the x-bleed valve closes.)
The blue ON light comes on.

Off : The APU valve closes.

FAULT light : This amber light comes on, and an ECAM caution appears, when the system detects an APU leak.

(3) X-BLEED selector sw

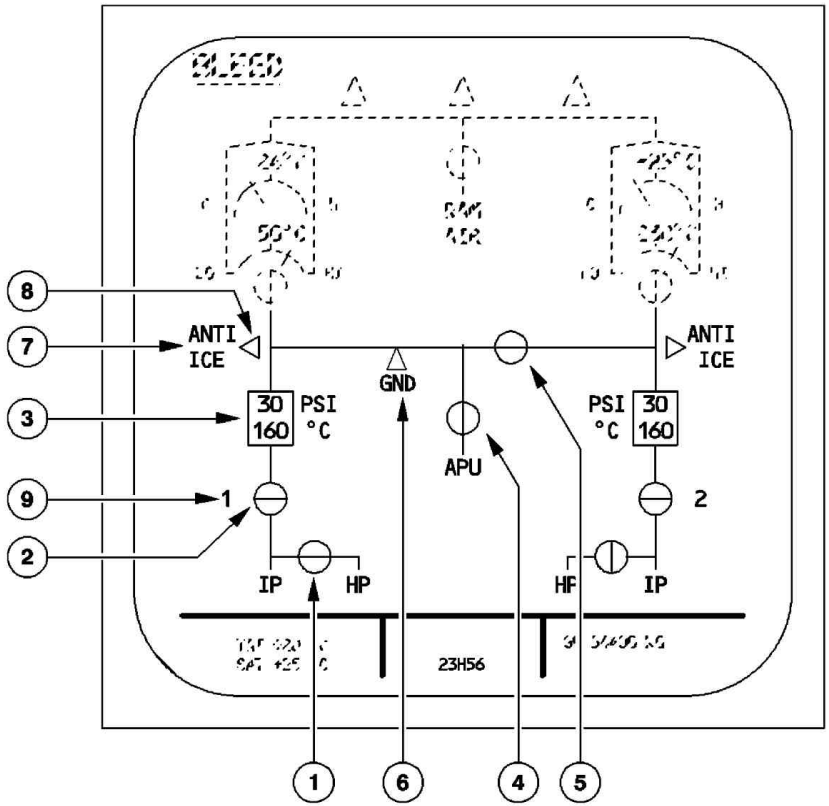
AUTO : The crossbleed valve is open if the APU bleed valve is open.
The crossbleed valve is closed if the APU bleed valve is closed or, in case of a wing, pylon, or APU leak (except during engine start).

OPEN : The crossbleed valve is open.

CLOSE : The crossbleed valve is closed.

ECAM BLEED PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) HP VALVES

Crossline - Green	:	HP valve normally fully closed
In line - Green	:	HP valve not fully closed
Crossline - Amber	:	HP valve not in commanded (closed) position

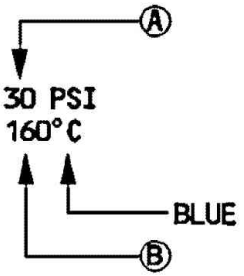
(2) ENGINE BLEED VALVES

In line - Green	:	BLEED valve normally open
Crossline - Green	:	BLEED valve normally fully closed

In line - Amber : BLEED valve not in commanded (open) position

Crossline - Amber : BLEED valve not in commanded (closed) position

(3) ENGINE BLEED INDICATIONS



(A) Precooler inlet pressure
It is normally in green.
It becomes amber, if under 4 PSI, or if overpressure is detected by the BMC (threshold between 57 and 60 PSI).

(B) Precooler outlet temperature
It is normally in green.
It becomes amber, if the BMC detects an overheat or low temperature.

Overheat: Temperature exceeds:
- 290 °C for more than 5 s, or
- 270 °C for more than 15 s, or
- 257 °C for more than 55 s

Low temperature is detected, if the temperature is lower than 150 °C.

Note: When the engines are at idle, and depending on the ambient temperature, the precooler outlet temperature may be below 150 °C (displayed amber).

(4) APU BLEED VALVE

Crossline - Green : The APU valve is not fully open, and the APU master switch is ON.

In line - Green : The APU valve is fully open, and the APU master switch is ON.

Crossline - Amber : The APU valve is fully closed, the APU master switch is ON, and the APU bleed switch is ON for more than 10 s.

(5) CROSSBLEED VALVE

Crossline - Green : The crossbleed valve is normally closed.

In line - Green	:	The crossbleed valve is normally open.
Crossline - Amber	:	The crossbleed valve is not in the commanded (closed) position.
In line - Amber	:	The crossbleed valve is not in the commanded (open) position.
Transit - Amber	:	The crossbleed valve is in transit.

(6) GND HP ground connection indication



: Displayed in white when the aircraft is on ground.

(7) ANTI ICE indication

It is displayed in white, when the WING pushbutton on the ANTI-ICE panel is ON.

(8) Arrow



: - It is normally not displayed, when the corresponding valve is closed.
- It is normally displayed in green, when the corresponding valve is open.
- It becomes amber, when the
  - Valve is open and air pressure is low or high, or
  - Valve is open on ground for more than 10 s.

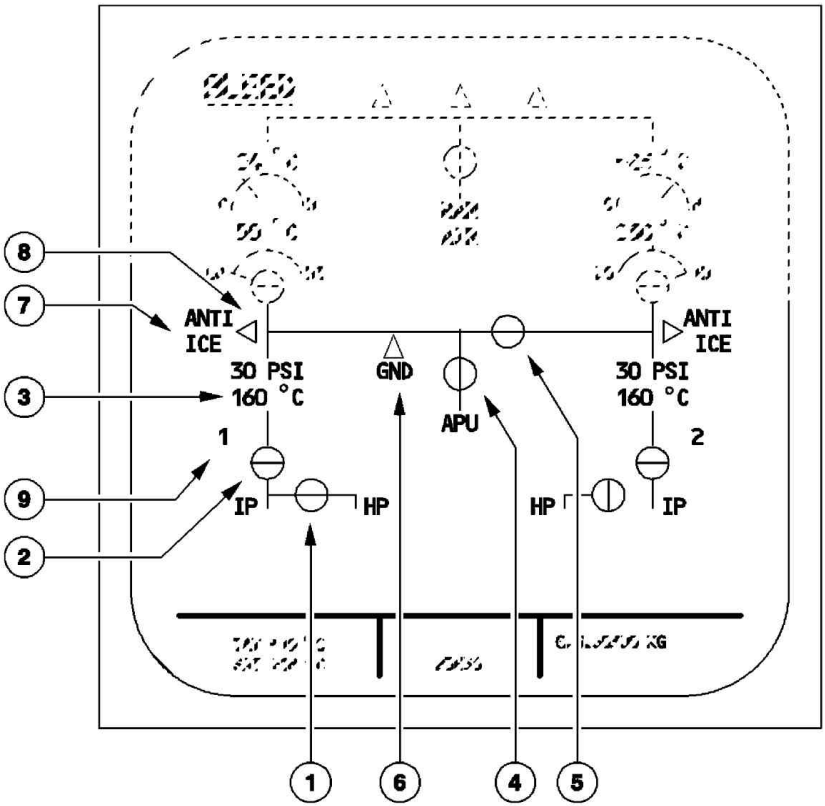
(9) Engine identification (1-2)

It is normally in white.

It becomes amber, when engine N2 is below idle.

ECAM BLEED PAGE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



(1) HP VALVES

Crossline - Green	:	HP valve normally fully closed
In line - Green	:	HP valve not fully closed
Crossline - Amber	:	HP valve not in commanded (closed) position

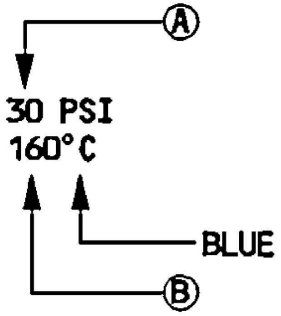
(2) ENGINE BLEED VALVES

In line - Green	:	BLEED valve normally open
Crossline - Green	:	BLEED valve normally fully closed

In line - Amber : BLEED valve not in commanded (open) position

Crossline - Amber : BLEED valve not in commanded (closed) position

(3) ENGINE BLEED INDICATIONS



(A) Precooler inlet pressure
It is normally in green.
It becomes amber, if under 4 PSI, or if overpressure is detected by the BMC (threshold between 57 and 60 PSI).

(B) Precooler outlet temperature
It is normally in green.
It becomes amber, if the BMC detects an overheat or low temperature.

Overheat: Temperature exceeds:
- 290 °C for more than 5 s, or
- 270 °C for more than 15 s, or
- 257 °C for more than 55 s

Low temperature is detected, if the temperature is lower than 150 °C.

Note: When the engines are at idle, and depending on the ambient temperature, the precooler outlet temperature may be below 150 °C (displayed amber).

(4) APU BLEED VALVE

Crossline - Green : The APU valve is not fully open, and the APU master switch is ON.

In line - Green : The APU valve is fully open, and the APU master switch is ON.

Crossline - Amber : The APU valve is fully closed, the APU master switch is ON, and the APU bleed switch is ON for more than 10 s.

(5) CROSSBLEED VALVE

Crossline - Green	:	The crossbleed valve is normally closed.
In line - Green	:	The crossbleed valve is normally open.
Crossline - Amber	:	The crossbleed valve is not in the commanded (closed) position.
In line - Amber	:	The crossbleed valve is not in the commanded (open) position.
Transit - Amber	:	The crossbleed valve is in transit.

(6) GND HP ground connection indication



: On ground, it is displayed in green.

(7) ANTI ICE indication

It is displayed in white, when the WING pushbutton on the ANTI-ICE panel is ON.

(8) Arrow

: - It is normally not displayed, when the corresponding valve is closed.
- It is normally displayed in green, when the corresponding valve is open.
- It becomes amber, when the
  - Valve is open and air pressure is low or high, or
  - Valve is open on ground for more than 10 s.

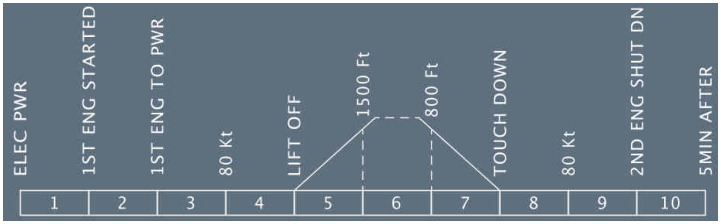
(9) Engine identification (1-2)

It is normally in white.

It becomes amber, when engine N2 is below idle.

WARNINGS AND CAUTIONS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ENG 1 (2) BLEED FAULT engine 1 (2) running and bleed air pressure > 57 PSI (+3/-0) or temperature: >257 °C for more than 55 s or > 270 °C for more than 15 s or > 290 °C for more than 5 s	SINGLE CHIME	MASTER CAUT	BLEED		1, 3, 4, 5, 7, 8, 10
L (R) WING LEAK temperature > 124 °C detected by the loops				ENG BLEED FAULT lt	3, 4, 5, 7, 8
ENG 1 (2) BLEED LEAK temperature > 204 °C detected by the loop and engine 1 (2) running					
ENG 1 (2) BLEED NOT CLSD bleed valve not automatically closed during engine start or with APU bleed selected					
BLEED 1 (2) OFF one engine bleed switched off with no fault				ENG BLEED OFF lt	1, 3, 4, 5, 7, 8, 9, 10
APU BLEED FAULT APU available and APU bleed valve position disagrees with selected position.				NIL	3, 4, 5, 7, 8
APU BLEED LEAK temperature > 124 °C detected by the loop				APU BLEED FAULT lt	
ENG 1 (2) BLEED ABNORM PR regulated pressure is abnormal				NIL	1, 3, 4, 5, 7, 8, 10

Continued on the following page

Continued from the previous page

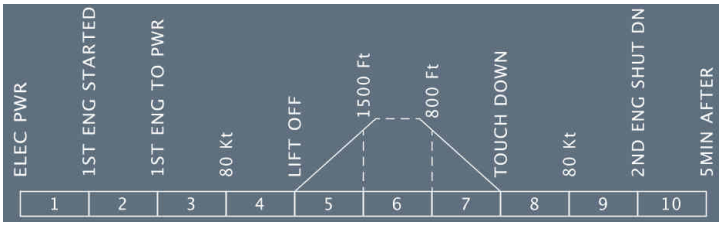
E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ENG 1 (2) (1+2) BLEED LO TEMP one (both) engine bleed below 150 °C in flight with wing anti ice ON	SINGLE CHIME	MASTER CAUT	BLEED	NIL	3, 4, 5, 8
X BLEED FAULT position disagree with selected position					3, 4, 5, 7, 8
ENG 1 (2) HP VALVE FAULT HP valve is abnormally closed	NIL	NIL			
BLEED MONITORING FAULT Both BMC faulty					
L(R) WING LEAK DET FAULT Both detection loops inop in one wing					

MEMO DISPLAY

APU BLEED appears in green if the APU is available and the APU BLEED pb-sw is ON.

WARNINGS AND CAUTIONS

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ENG 1 (2) BLEED FAULT engine 1 (2) running and bleed air pressure > 57 PSI (+3/-0) or temperature: >257 °C for more than 55 s or > 270 °C for more than 15 s or > 290 °C for more than 5 s	SINGLE CHIME	MASTER CAUT	BLEED		1, 3, 4, 5, 7, 8, 10
L (R) WING LEAK temperature > 124 °C detected by the loops				ENG BLEED FAULT lt	3, 4, 5, 7, 8
ENG 1 (2) BLEED LEAK temperature > 204 °C detected by the loop and engine 1 (2) running					
ENG 1 (2) BLEED NOT CLSD bleed valve not automatically closed during engine start or with APU bleed selected					
BLEED 1 (2) OFF one engine bleed switched off with no fault				ENG BLEED OFF lt	1, 3, 4, 5, 7, 8, 9, 10
APU BLEED FAULT APU available and APU bleed valve position disagrees with selected position.				NIL	3, 4, 5, 7, 8
APU BLEED LEAK temperature > 124 °C detected by the loop				APU BLEED FAULT lt	
ENG 1 (2) BLEED ABNORM PR regulated pressure is abnormal				NIL	1, 3, 4, 5, 7, 8, 10
ENG 1 (2) (1+2) BLEED LO TEMP one (both) engine bleed below 150 °C in flight with wing anti ice ON	SINGLE CHIME	MASTER CAUT	BLEED	NIL	3, 4, 5, 8
X BLEED FAULT position disagree with selected position					3, 4, 5, 7, 8
ENG 1 (2) HP VALVE FAULT HP valve is abnormally closed	NIL	NIL			
BLEED MONITORING FAULT Both BMC faulty					
L(R) WING LEAK DET FAULT Both detection loops inop in one wing					
BLEED MONIT SYS 1(2) FAULT One BMC faulty			NIL		3, 4, 5, 6, 7, 8
ENG 1(2) LEAK DET FAULT Detection loop inop in pylon					

MEMO DISPLAY

APU BLEED appears in green if the APU is available and the APU BLEED pb-sw is ON.

BUS EQUIPMENT LIST

Applicable to: ALL

		NORM		EMER ELEC		
		AC	DC	AC ESS	DC ESS	HOT
BMC	1				SHED	
	2		DC2			
BLEED VALVES, HP VALVES AND FAN AIR VALVES	ENG 1				SHED	
	ENG 2		DC2			
X-BLEED VALVE	AUTO CONTROL		DC2			
	MANUAL CONTROL				SHED	

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AIRCRAFT SYSTEMS

WATER / WASTE

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DSC-38-PLP PRELIMINARY PAGES

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Wastewater System....C
Toilet System....D

DSC-38-20 ELECTRICAL SUPPLY

BUS EQUIPMENT LIST....A

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GENERAL

Applicable to: ALL

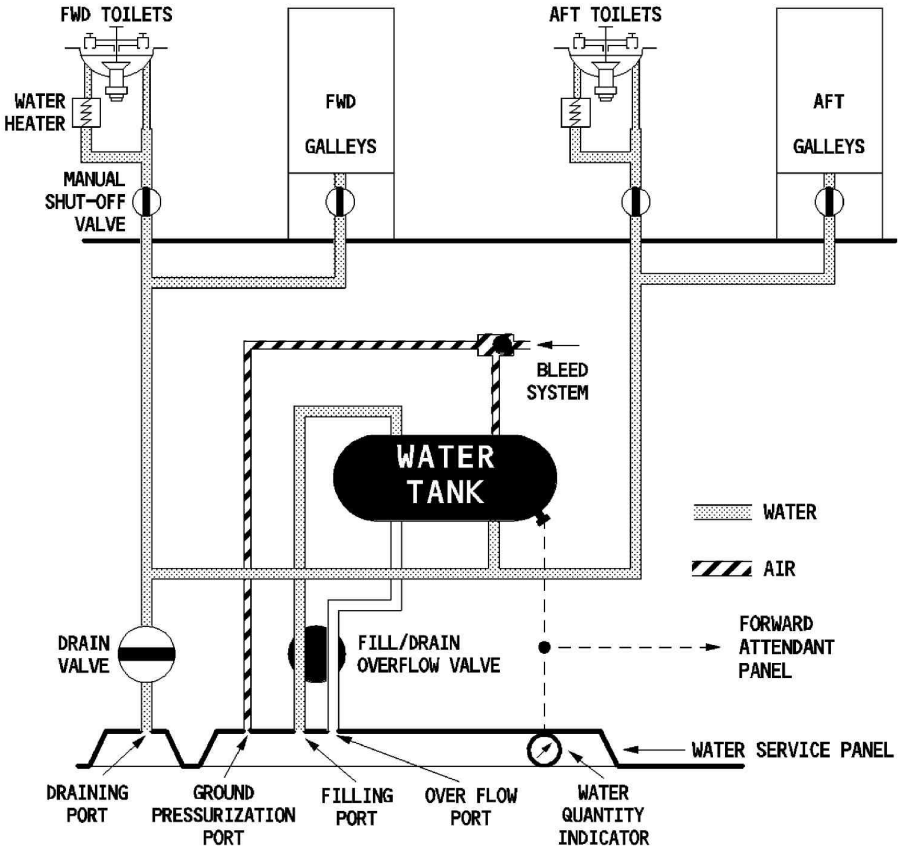
The water and waste system :
- distributes potable water to the toilets and the galleys.
- disposes waste water.
- stores toilet wastes.

The system is insulated to prevent water leaks and ice build up.
The water and waste control panel is on the forward cabin attendant's panel.

POTABLE WATER

Applicable to: B-HTF

Potable water is stored in a 200 l tank (135-litres ◁) in the left hand side wall behind the aft cargo compartment.
While airborne, the aircraft uses bleed air to pressurize the water system ; on the ground, it uses air from the service panel pressure port.
Potable water is piped to the galleys and lavatories. Manual shutoff valves isolate the forward and aft washbasins from the water system. These valves, easily identifiable by OPEN and SHUT legends, are under washbasins or toilet bowls.
The system can be filled or drained from the service panel at the bottom of the fuselage. Indicators on the forward attendant's panel and the aft service panel show how much water the water tank contains.



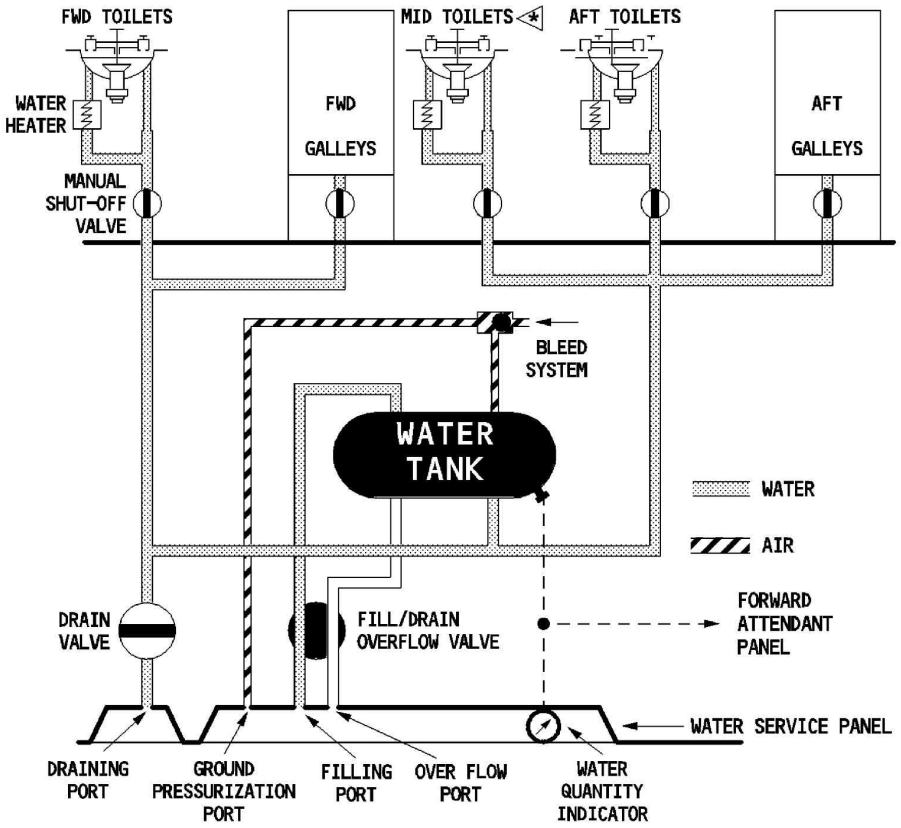
POTABLE WATER

Applicable to: B-HSD, B-HSE, B-HSG

Potable water is stored in a 200 l tank in front of the wing box behind the forward cargo compartment. While airborne, the aircraft uses bleed air to pressurize the water system ; on the ground, it uses air from the service panel pressure port.

Potable water is piped to the galleys and lavatories. Manual shut-off valves isolate the forward mid ◁ and aft washbasins from the water system. These valves, easily identifiable by OPEN and SHUT legends, are under washbasins or toilet bowls.

The system can be filled or drained from the service panel under the fuselage. Indicators on the forward attendant's panel and the aft service panel show how much water is in the water tank.



POTABLE WATER

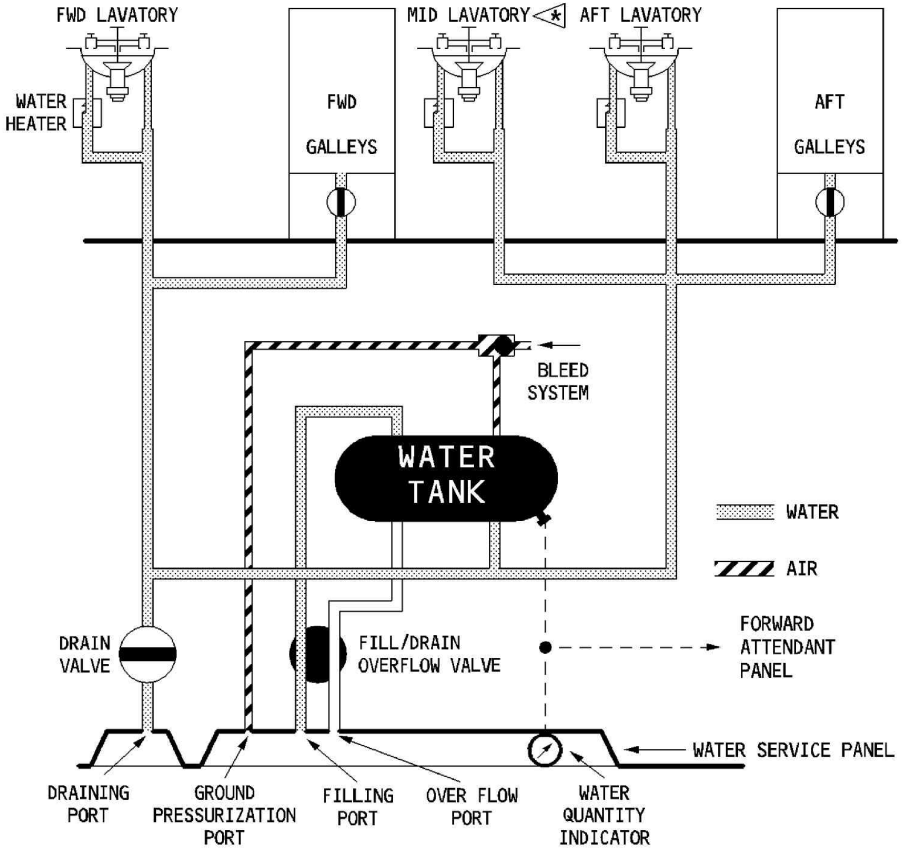
Applicable to: B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

Potable water is stored in a 200 l tank (135 l ✻) in the left hand side wall behind the aft cargo compartment.

While airborne, the aircraft uses bleed air to pressurize the water system ; on the ground, it uses air from the service panel pressure port.

Potable water is piped to the galleys and lavatories.

The system can be filled or drained from the service panel at the bottom of the fuselage. Indicators on the forward attendant's panel and the aft service panel show how much water the water tank contains.



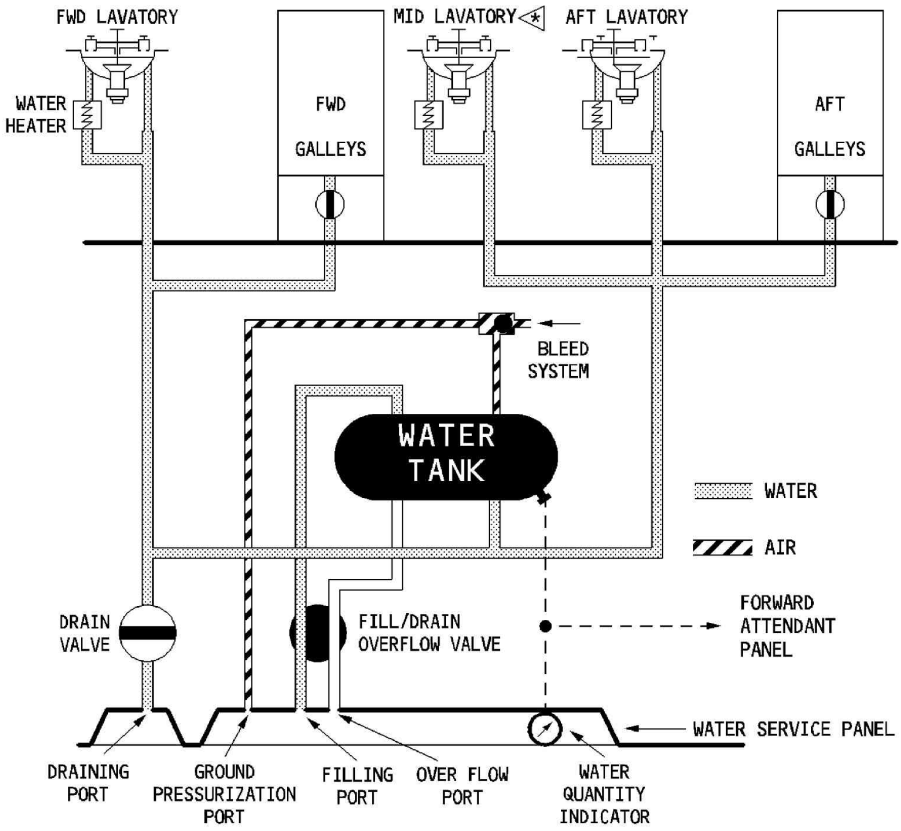
POTABLE WATER

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

Potable water is stored in a 200 l tank in front of the wing box behind the forward cargo compartment. While airborne, the aircraft uses bleed air to pressurize the water system ; on the ground, it uses air from the service panel pressure port.

Potable water is piped to the galleys and lavatories.

The system can be filled or drained from the service panel under the fuselage. Indicators on the forward attendant's panel and the aft service panel show how much water is in the water tank.



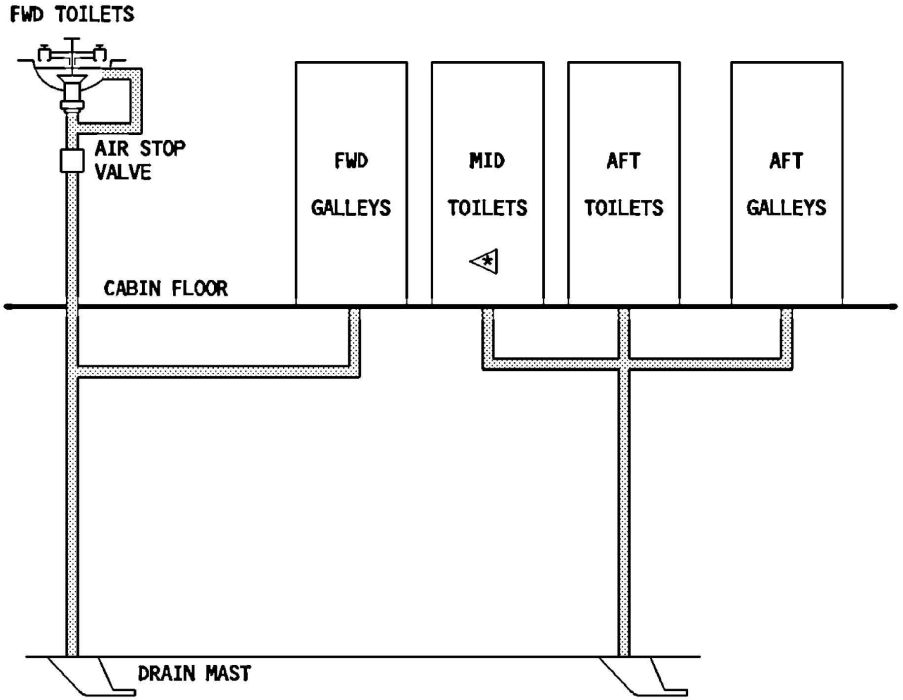
WASTEWATER SYSTEM

Applicable to: ALL

Wastewater from the galleys and from the sinks in the lavatories, drains overboard through two anti-iced drain masts.

The forward mast drains wastewater from the forward cabin; the aft mast drains it from the aft cabin.

Differential pressure discharges the wastewater in flight, and gravity does so on the ground.

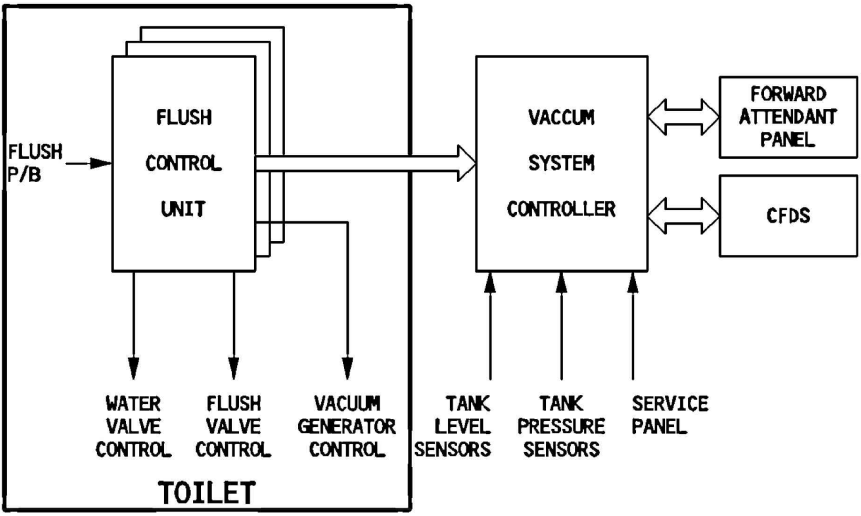


TOILET SYSTEM

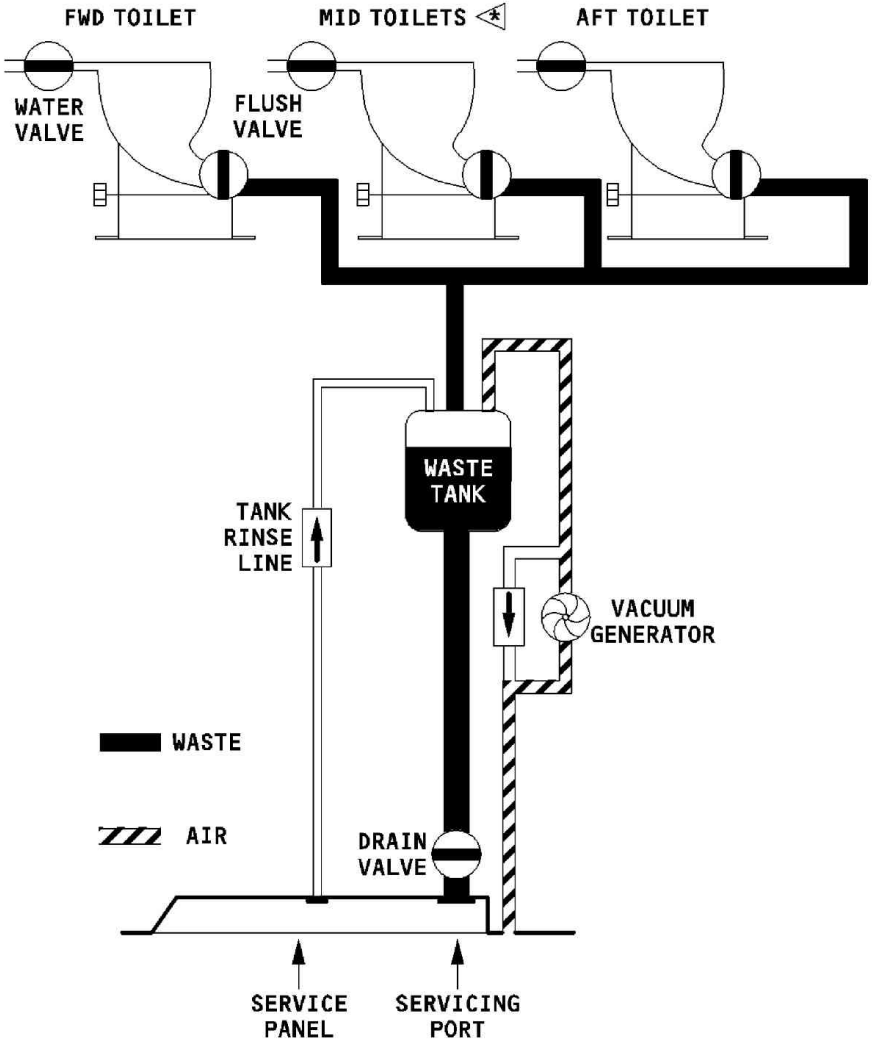
Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

Differential pressure forces waste from the toilet bowls into the waste storage tank. On ground, and at altitudes below 16 000 ft , a vacuum generator produces the necessary pressure differential.
Clear water from the potable water system flushes the toilets.
A flush control unit, within each toilet, controls the flush sequence.
In case of an electrical failure in the flush valve, personnel can use a manual flush control under the toilet bowl.
The Vacuum System Controller (VSC) furnishes operational information, such as the waste level in the storage tank, to the Flight Attendants' panel, and maintenance information and a test program to the Centralized Fault Display System.
The waste tank has a usable capacity of 170 l .
Ground personnel services the waste tank via a single service panel under the fuselage.
A manual shut-off valve isolates an inoperative toilet.

ARCHITECTURE



SCHEMATIC


FWD TOILET
MID TOILETS
AFT TOILET
WATER VALVE
FLUSH VALVE
WASTE TANK
TANK RINSE LINE
VACUUM GENERATOR
WASTE
AIR
DRAIN VALVE
SERVICE PANEL
SERVICING PORT

TOILET SYSTEM

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

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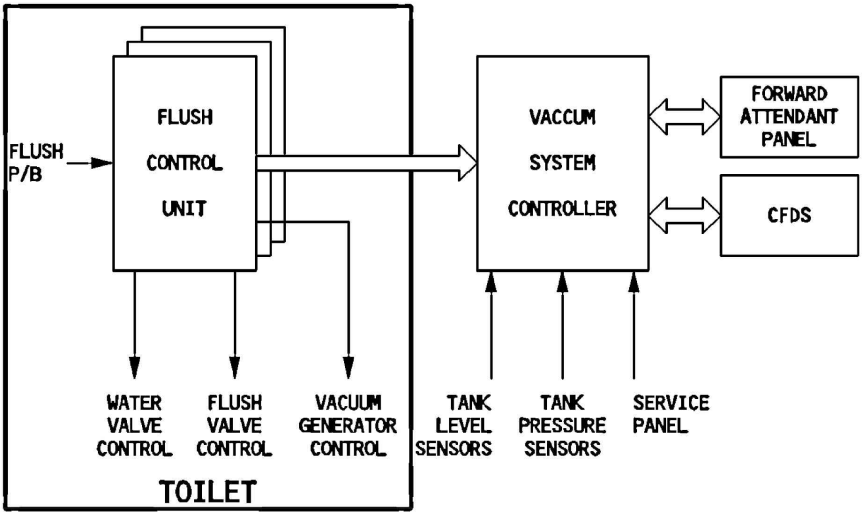
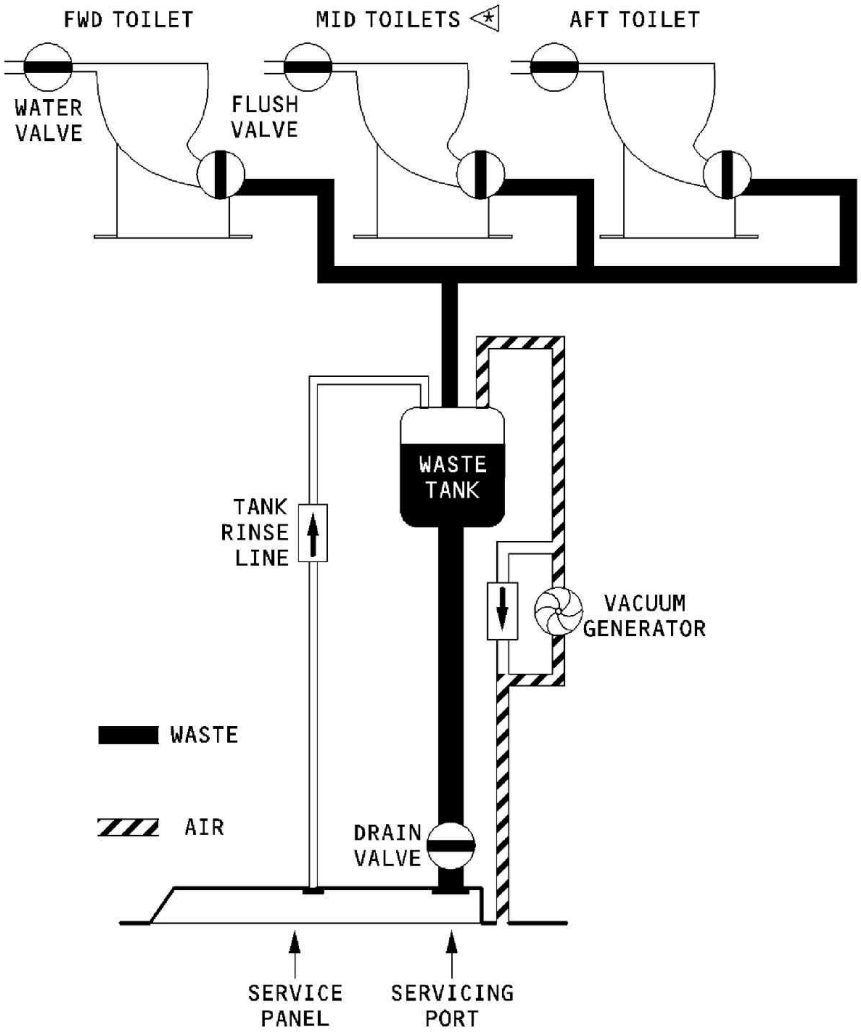
ARCHITECTURE



SCHEMATIC


FWD TOILET
MID TOILETS
AFT TOILET
WATER VALVE
FLUSH VALVE
WASTE TANK
TANK RINSE LINE
VACUUM GENERATOR
WASTE
AIR
DRAIN VALVE
SERVICE PANEL
SERVICING PORT

BUS EQUIPMENT LIST

Applicable to: ALL

	NORM			EMER ELEC		
	AC	DC	DC BAT	AC ESS	DC ESS	HOT
POTABLE WATER SYS		GND/FLT				
WATER HEATER	AC2					
WATER DRAINING		GND/FLT				
VACUUM GENERATOR	AC2					
PRESSURIZED WATER SYS	AC2					
FLUSH CONTROL UNITS		GND/FLT				
VACUUM SYS CONTROLLER		GND/FLT				

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AIRCRAFT SYSTEMS

MAINTENANCE SYSTEM

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Localization Title	Toc Index	ID	Reason
DSC-45-20 Maintenance Menu	A	1	Improvement of Illustration quality
DSC-45-20 Last (or Current) Leg ECAM Report - Post Flight Report Print	C	2	Improvement of illustration quality

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GENERAL

Applicable to: ALL

The purpose of the Centralized Fault Display System (CFDS) is to make the maintenance task easier by displaying fault messages in the cockpit and permitting the flight crew to make some specific tests.

There are two levels of maintenance :

at the line stop : removal and replacement of equipment
at the main base : troubleshooting

COMPONENTS

Applicable to: ALL

The CFDS includes :

- the BITE (Built-In Test Equipment) for each electronic system
- a central computer, the Centralized Fault Display Interface Unit (CFDIU)
- two MCDUs (Multipurpose Control and Display Units), used also for FMGS (Flight Management and Guidance System), AIDS (Aircraft Integrated Data System), and ACARS (Aircraft Communication And Reporting System, if installed), which work with the CFDIU to display information or initiate tests
- one printer.

If a main channel of the CFDIU fails, the backup channel takes over.

MODES OF OPERATION

Applicable to: ALL

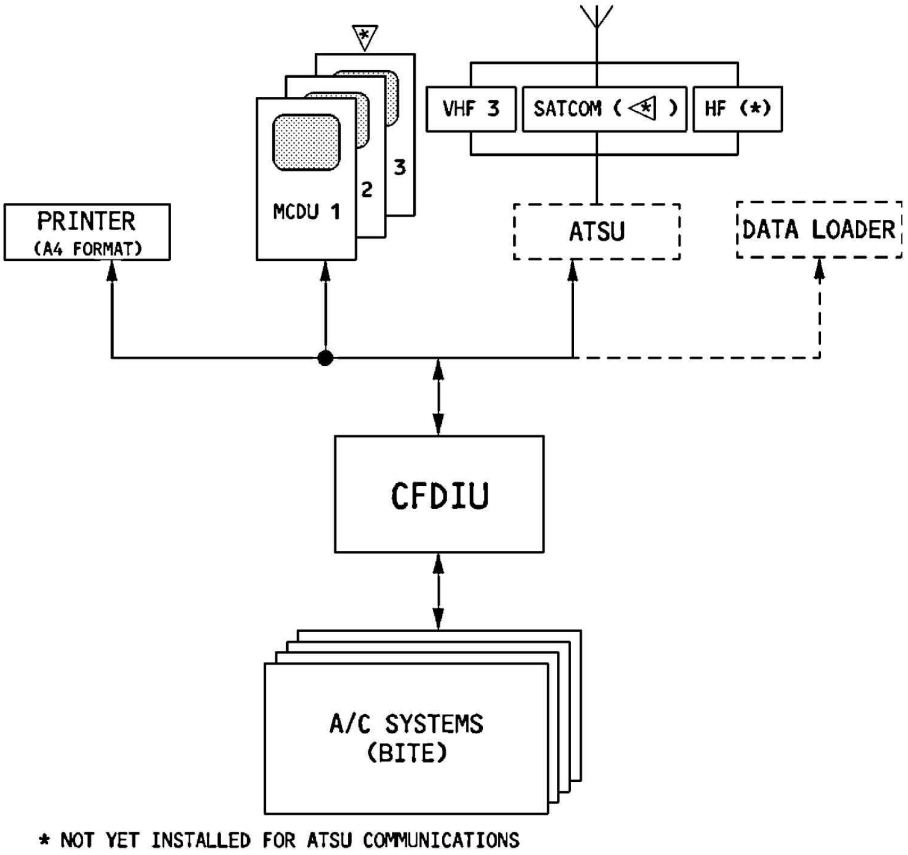
The CFDS operates in two main modes :

- the NORMAL mode or REPORTING mode (in flight)
- the INTERACTIVE mode or MENU mode (on ground).

In NORMAL mode, the CFDS records and displays the failure messages transmitted by each system BITE.
In INTERACTIVE mode, the CFDS allows any BITE to be connected with the MCDU in order to display the maintenance data stored and formatted by the BITE or to initiate a test.

ARCHITECTURE

Applicable to: ALL



FAILURE/FAULT CLASSIFICATION

Applicable to: ALL

The Centralized Fault Display System (CFDS) identifies the faulty system and puts any failures or faults into one of three classes :

Class 1 : Failures indicated to the flight crew by means of the ECAM, or other flight deck effect. They must be repaired or entered in the MEL (Minimum Equipment List) before the aircraft can depart.

Class 2 : Faults indicated to maintenance personnel by the CFDS and which trigger a MAINT status entry on the maintenance part of the ECAM status page. The aircraft can operate with these faults, but they must be rectified within the timescale defined in the Trouble Shooting Manual (TSM).

Class 3 : Faults indicated to maintenance personnel by the CFDS, but which do not trigger a MAINT status. The operator may have these faults corrected at his convenience.

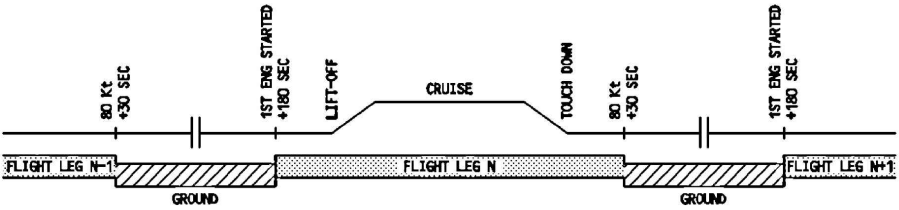
Failure/fault classes	Class 1	Class 2	Class 3
Operational consequences	YES	NO	NO
Indication to the flight crew	YES Automatically displayed - Warning or caution messages on Engine Warning Display - Flag or indication in the flight deck.	YES Available on ECAM status page.	NO
Dispatch consequences	Refer to MEL may be : "GO" "GO IF" "NO GO"	*Refer to MEL/MI-00-08 ECAM and MAINTENANCE STATUS*	MEL not applicable
Indication to the maintenance team	YES Automatically print out at the end of each flight : Fault messages on the CFDS Post Flight Report.		YES Available on request through system report/Test

FUNCTIONS OF THE CENTRALIZED FAULT DISPLAY SYSTEM (CFDS)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HTD, B-HTE, B-HTF

The main functions of the CFDS are :

- obtaining and storing messages transmitted by the connected system BITEs, or by the Flight Warning Computer (Warning and Caution titles)
- Detailing the maintenance phases.



- Presenting maintenance reports :
  - Last leg report
  - Last leg ECAM report
  - Previous leg report
  - Avionics status
  - System report test
  - Post-flight report.

FUNCTIONS OF THE CENTRALIZED FAULT DISPLAY SYSTEM (CFDS)

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

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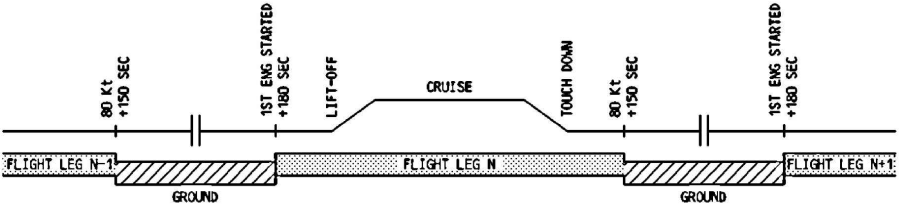
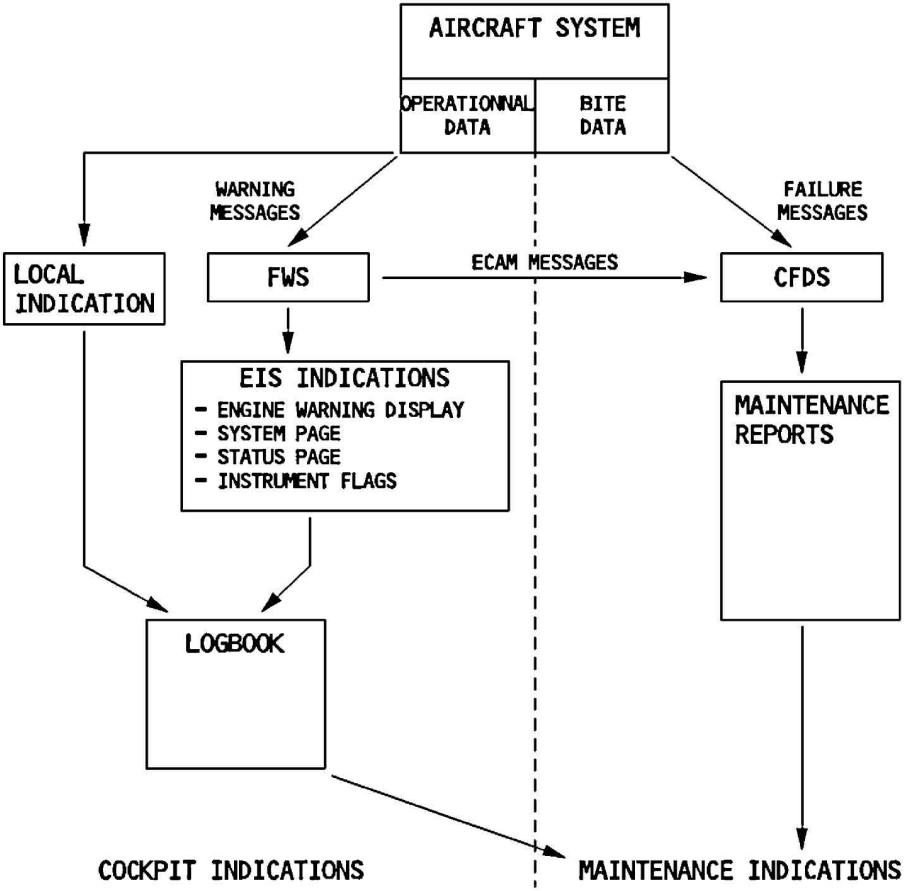


- Presenting maintenance reports :
  - Last leg report
  - Last leg ECAM report
  - Previous leg report
  - Avionics status
  - System report test
  - Post-flight report.

COCKPIT/CFDS INTERFACE

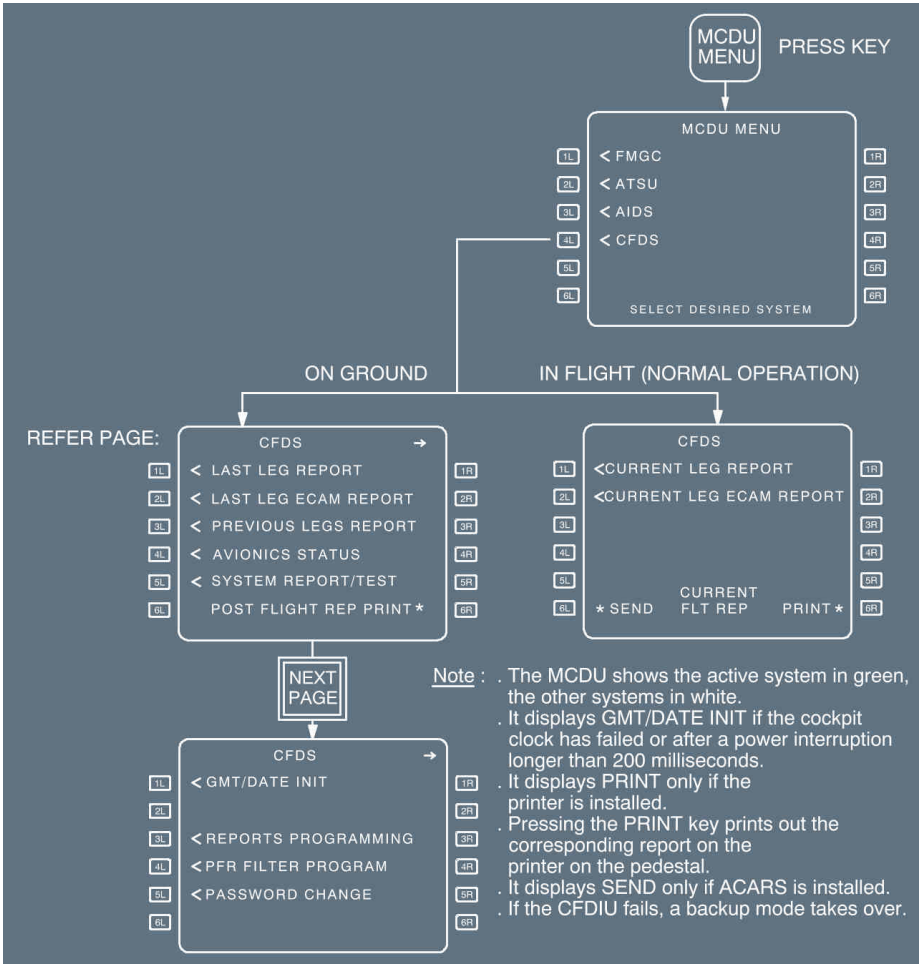
Applicable to: ALL



MAINTENANCE MENU

Applicable to: ALL

1 The CFDS uses menus displayed on the MCDU. The operator selects functions or reports from these menus.
Pressing the MCDU MENU key and then selecting CFDS brings up the MAINTENANCE MENU page (different pages for the aircraft in flight and the aircraft on the ground).

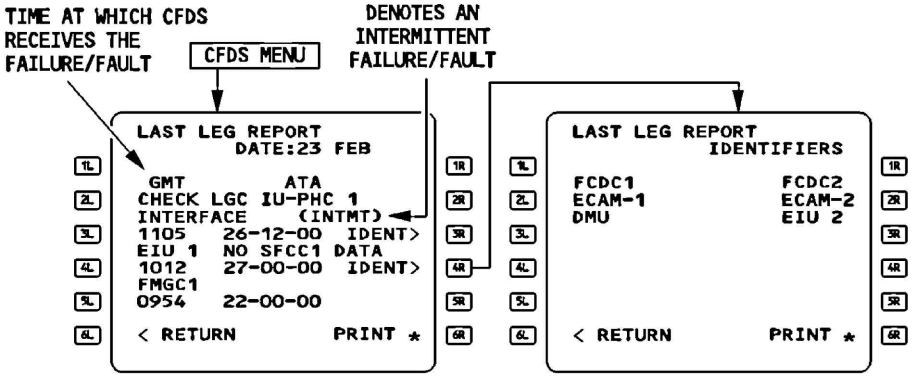


LAST (OR CURRENT) LEG REPORT

Applicable to: ALL

The LAST LEG REPORT (on the ground) or the CURRENT LEG REPORT (in flight), list all class 1 failures and class 2 faults and all system failure and system fault messages received by the CFDS during the last flight leg or the current flight leg. Pressing the IDENT key displays a list of the systems

(called identifiers) affected by the failure or fault, which helps the pilot or maintenance person to identify the failure or fault.



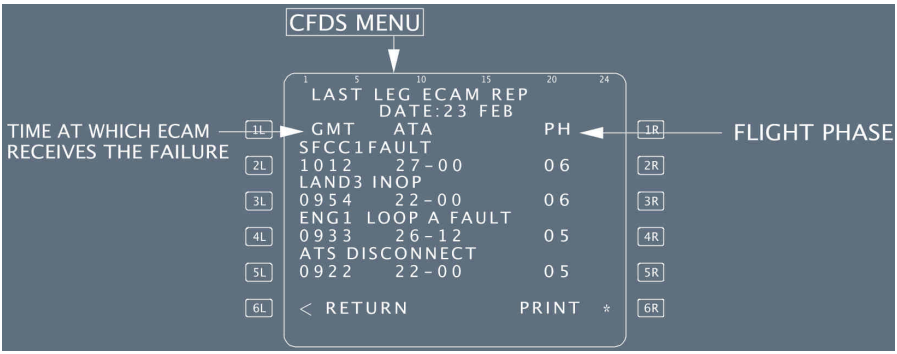
LAST (OR CURRENT) LEG ECAM REPORT

Applicable to: ALL

GENERAL

In flight : The CURRENT LEG ECAM REPORT displays the primary and independent warning (class I) messages and MAINTENANCE STATUS (class II) messages of the current flight leg.

On the ground : The LAST LEG ECAM REPORT displays the primary and independent warning (class I) messages plus MAINTENANCE STATUS (class II) messages of the last flight leg.

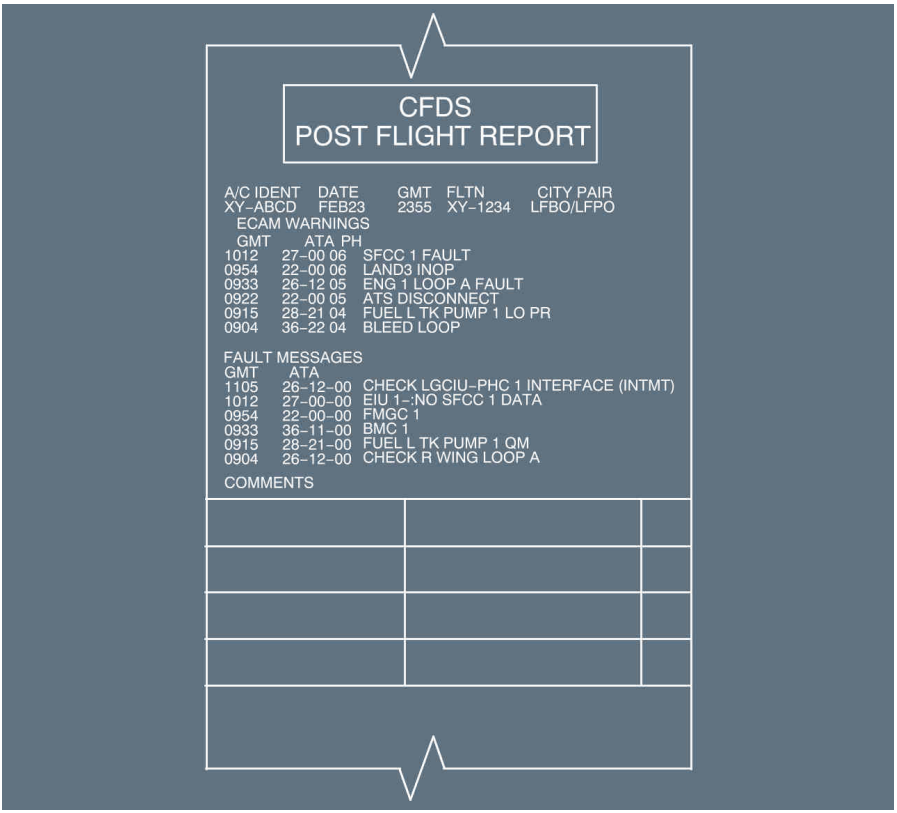


Note: *This screen displays PRINT only if the printer is installed.*

2 **POST FLIGHT REPORT PRINT**

At the end of a flight, LAST LEG and LAST LEG ECAM REPORTS are printed out automatically after the last engine shutdown. The flight or ground crew can also print them out by selecting POST FLIGHT REP PRINT.

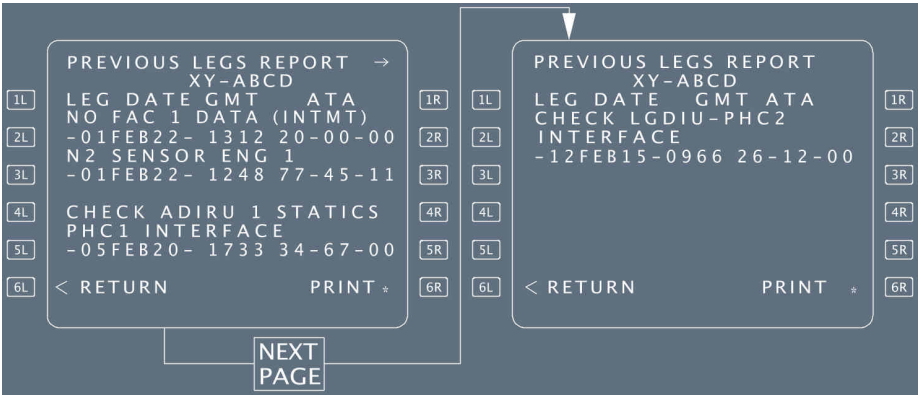
The report first lists the ECAM warnings, then the FAULT messages.



PREVIOUS LEGS REPORT

Applicable to: ALL

This report gives access to the POST FLIGHT REPORTS of the previous 63 flight legs.

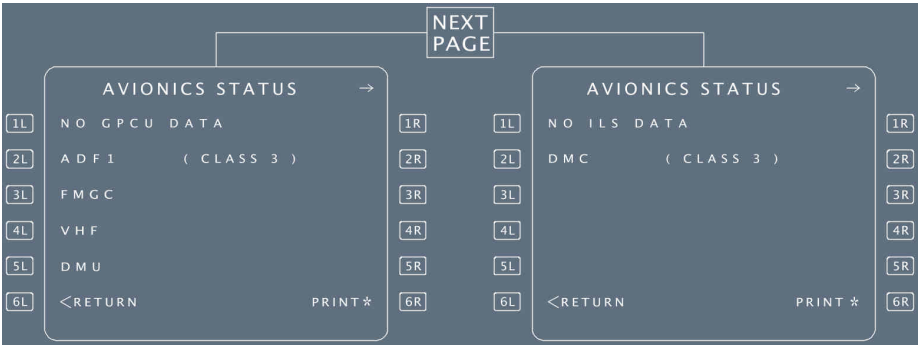


On ground, the Operator can print copies of the screen. If ACARS is installed, the Operator can send the flight report (*Refer to DSC-45-20 Last (or Current) Leg ECAM Report - Post Flight Report Print*).

AVIONICS STATUS

Applicable to: ALL

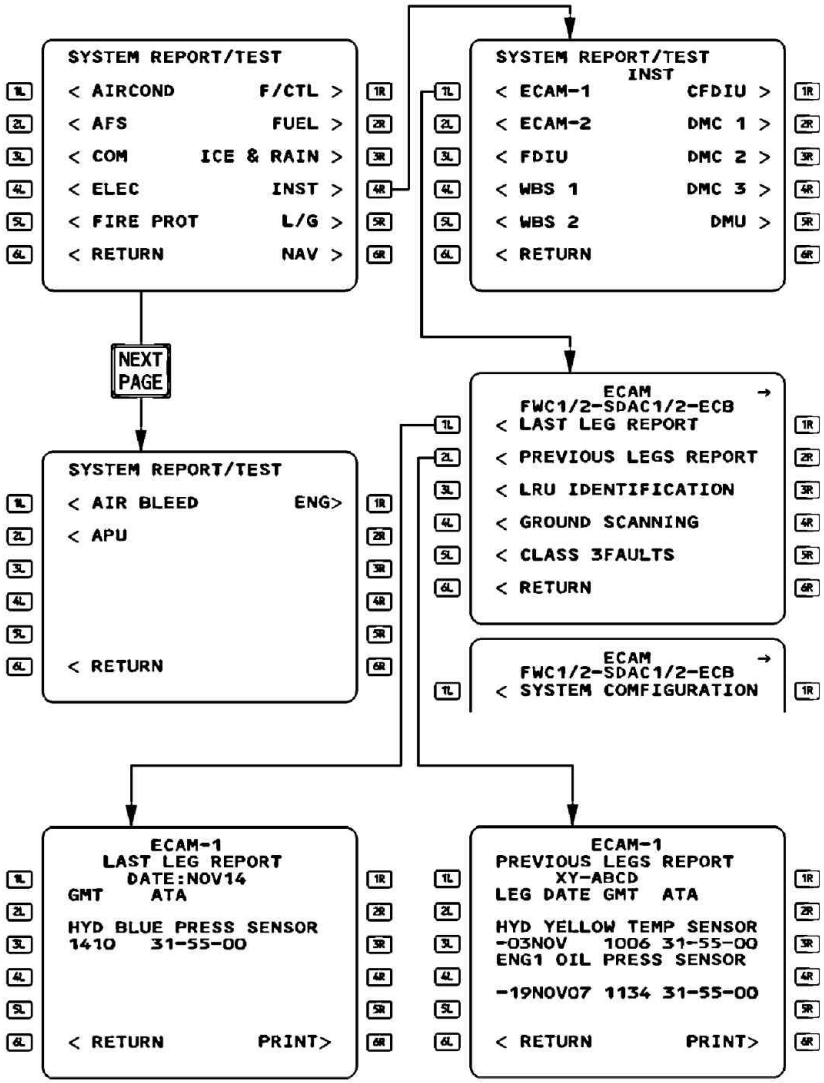
This screen displays the list of systems affected by a failure or fault. If a system is affected by at least a Class 3 fault, CLASS 3 appears beside it. The display is continuously updated.



SYSTEM REPORT/TEST

Applicable to: ALL

This screen gives the operator access to all electronic systems. The CFDIU enters into interactive dialogue with the selected system.


SYSTEM REPORT/TEST
< AIRCOND F/CTL >
< AFS FUEL >
< COM ICE & RAIN >
< ELEC INST >
< FIRE PROT L/G >
< RETURN NAV >
SYSTEM REPORT/TEST
INST
< ECAM-1 CFDIU >
< ECAM-2 DMC 1 >
< FDIU DMC 2 >
< WBS 1 DMC 3 >
< WBS 2 DMU >
< RETURN
NEXT PAGE
SYSTEM REPORT/TEST
< AIR BLEED ENG>
< APU
< RETURN
ECAM
FWC1/2-SDAC1/2-ECB
< LAST LEG REPORT
< PREVIOUS LEGS REPORT
< LRU IDENTIFICATION
< GROUND SCANNING
< CLASS 3FAULTS
< RETURN
ECAM
FWC1/2-SDAC1/2-ECB
< SYSTEM COMFIGURATION
ECAM-1
LAST LEG REPORT
DATE:NOV14
GMT ATA
HYD BLUE PRESS SENSOR
1410 31-55-00
< RETURN PRINT>
ECAM-1
PREVIOUS LEGS REPORT
XY-ABCD
LEG DATE GMT ATA
HYD YELLOW TEMP SENSOR
-03NOV 1006 31-55-00
ENG1 OIL PRESS SENSOR
-19NOV07 1134 31-55-00
< RETURN PRINT>

In the above example, the operator has called up menus of the selected systems :
- LAST or PREVIOUS LEG REPORT presents the list of Line-Replaceable Units (LRUs) affected by a failure.
- LRU IDENTIFICATION contains the part numbers of all LRUs in the system.
- GND SCANNING runs the flight monitoring on the ground and indicates the faulty LRU.
- CLASS 3 FAULTS lists class 3 faults detected by the system during the last flight leg.
- SYSTEM CONFIGURATION presents the system configuration in a digital form.

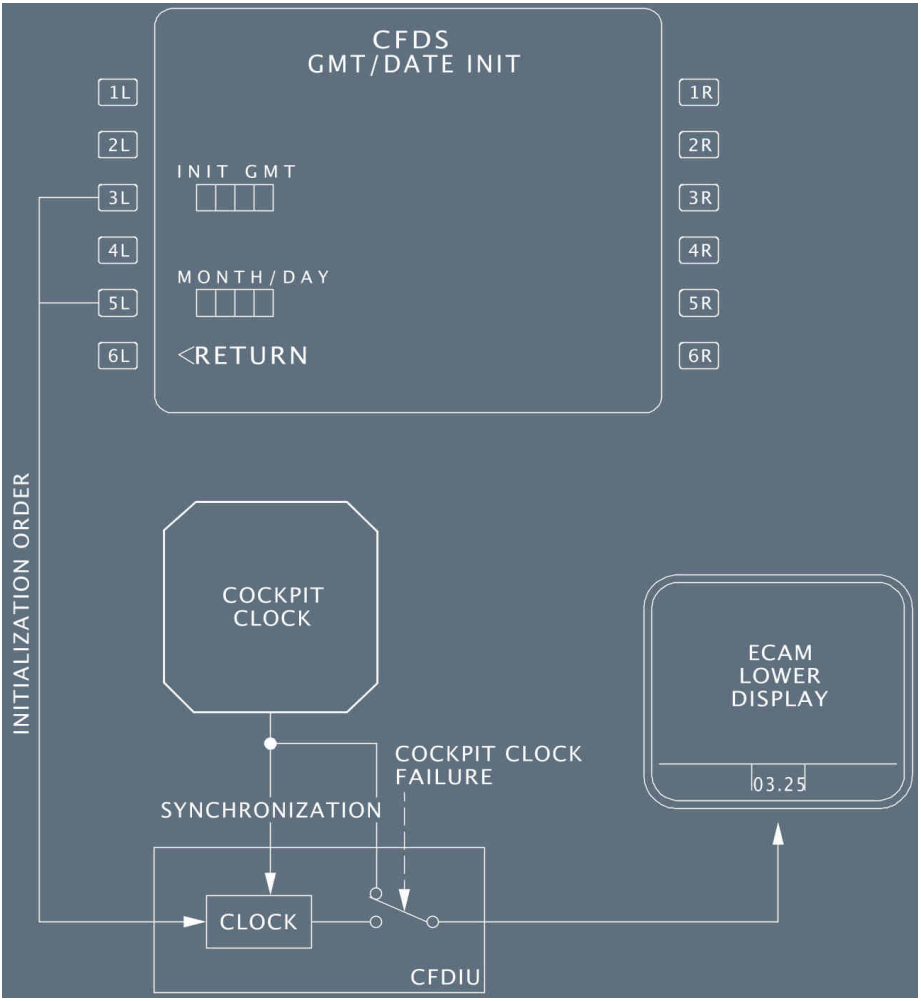
Note: These screens (except LAST or PREVIOUS LEG REPORT) are not shown above.

GMT/DATE INITIALIZATION

Applicable to: ALL

A CFDIU clock is synchronized with the cockpit clock in order to keep GMT (UTC) displayed on the ECAM lower display (except in flight Phases 1 and 2, if the weight and balance system is installed). If the cockpit clock fails, the CFDIU clock continues to display GMT (UTC) on the ECAM lower display.

If electrical power is interrupted for more than 200 ms, the crew initializes GMT (UTC) and the DATE via the MCDU :
- Write GMT (UTC) in the scratchpad, then press the “INIT GMT” key.
- Do the same for the month and day.



BACK UP MODE

Applicable to: ALL

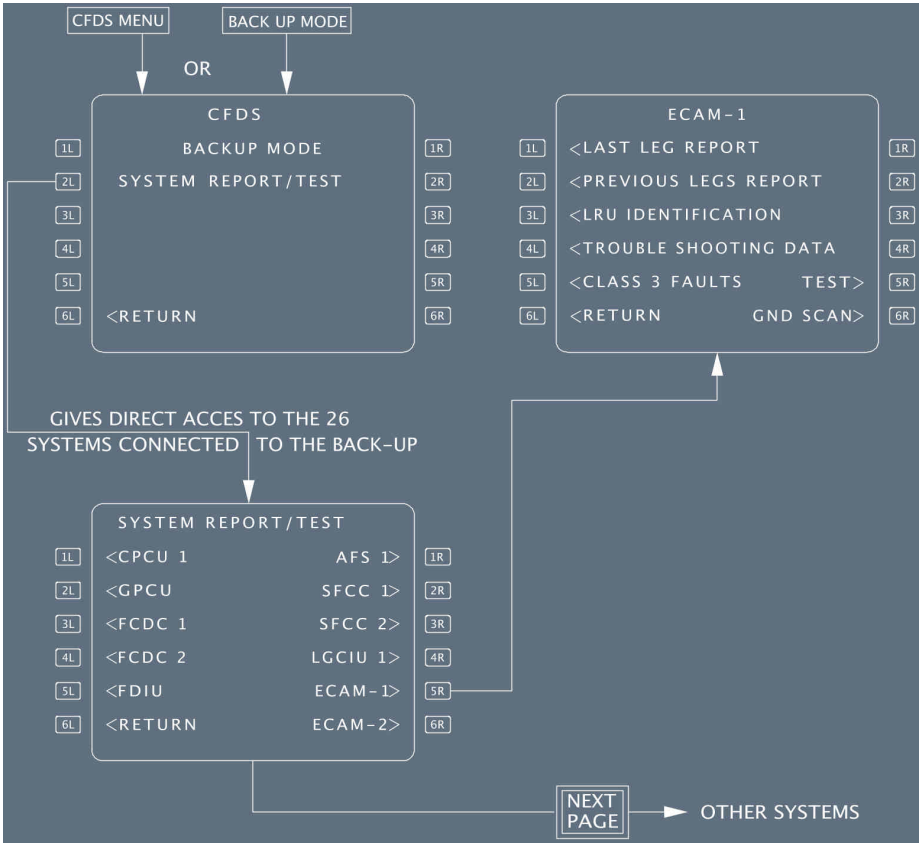
If the CFDIU's main channel fails, the backup channel allows the CFDS to operate in backup mode :

- on the ground only
- through MCDU1

- in one mode of operation only : SYSTEM REPORT/TEST
- without the PRINTER or ACARS.

The system changes over from main channel to backup channel :

- Automatically in case of an important failure (power supply, for example). In this case, when the operator selects CFDS on the MCDU MENU, it displays the BACKUP MODE page.
- Manually if the operator selects BACKUP MODE on the CFDS menu after a minor failure.

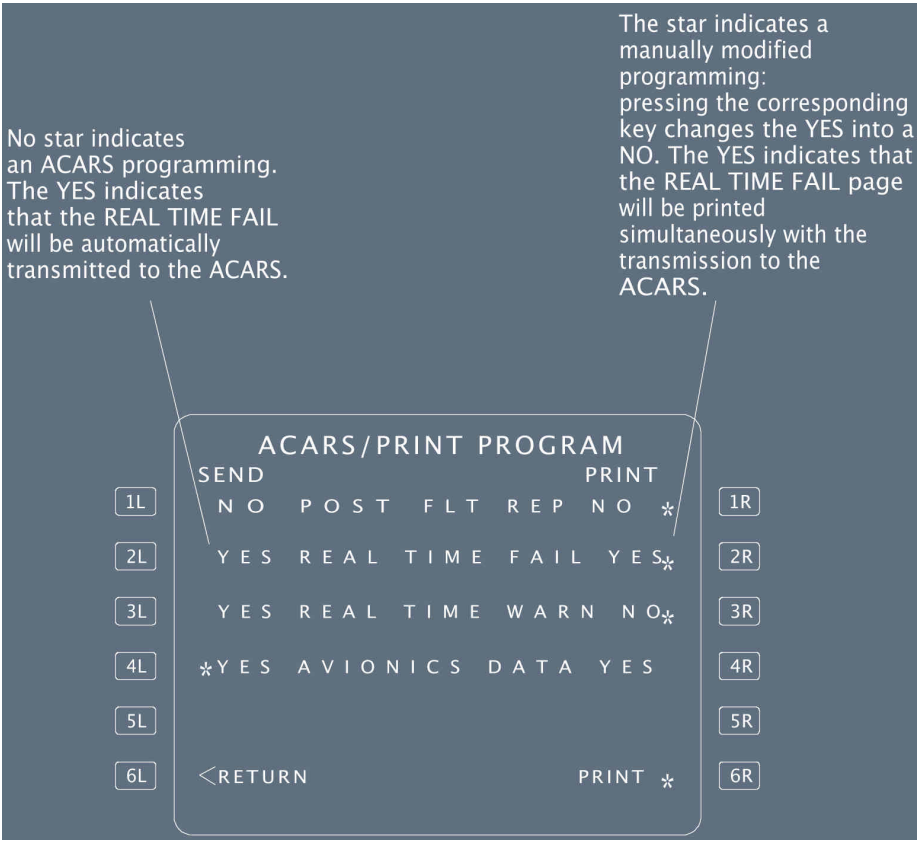


ACARS PRINT PROGRAM

Applicable to: ALL

This function gives access to reprogramming page.

The programming is provided by the ACARS or manually (on the ground or in flight) :



Note: *The CFDIU memorizes all manual programming so that at initialisation the last configuration will be retained.*

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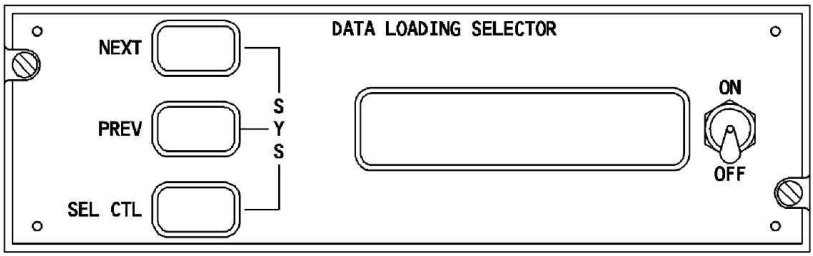
GENERAL

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

With the data loading system, it is possible to upload databases and operational software, or to download system reports from various onboard computers.
The data transfer is performed via 3.5 in disks and a portable data loader, or the aircraft fixed Multipurpose Disk Drive Unit ◁ (MDDU).

DATA LOADING SELECTOR ON THE OVERHEAD PANEL

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



When the data loading selector is ON, the 3 keys (NEXT, PREV, SEL CTRL) enable the display and selection of various applicable aircraft systems (FMGC, TCAS ◁ etc...).

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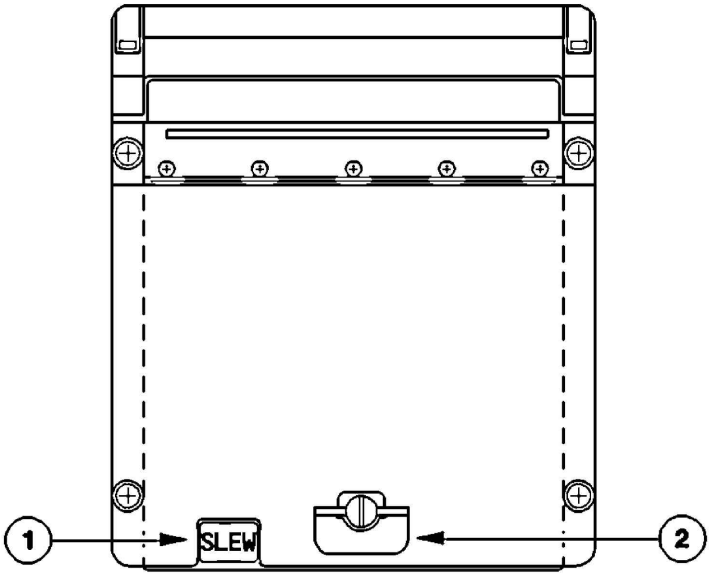
GENERAL

Applicable to: ALL

The printer prints reports from the following systems (if installed) : ACARS, AIDS, FMGC, CFDIU and EVMU. It prints these on paper, and does so either on the ground or in flight.
The printer is installed at the rear of the pedestal on the right side.

SYSTEM DESCRIPTION

Applicable to: ALL



(1) SLEW sw :
The SLEW switch is used to feed paper after having loaded a new roll.

(2) PRINTER DOOR LATCH :
The printer door latch locks the door used for loading paper.

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BUS EQUIPMENT LIST

Applicable to: ALL

	NORM		EMER ELEC		
	AC	DC	AC ESS	DC ESS	HOT
CFDS		DC1			

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AIRCRAFT SYSTEMS

INFORMATION SYSTEMS

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DSC-46-PLP PRELIMINARY PAGES

TABLE OF CONTENTS
SUMMARY OF HIGHLIGHTS

DSC-46-10 General

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System Architecture....B
Cockpit Arrangement....C

DSC-46-20 ATSU Communications Function

Introduction....A
Downlink and Uplink Messages....B
Datalink/Voice Transfer on VHF 3....C
Scratchpad Messages on the COMM Menu....D

DSC-46-30 AOC Applications

Introduction....A
Remote Applications....B

DSC-46-40 CNS/ATM

Introduction....A

DSC-46-60 Warnings and Cautions

Warnings and Cautions....A
Warnings And Cautions....B

[1] DSC-46-70 Electrical Supply

Bus Equipment List....A

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Localization Title	Toc Index	ID	Reason
DSC-46-PLP-TOC Electrical Supply		1	STLS 12-0297
DSC-46-10 Cockpit Arrangement	C	1	Improvement of technical wording.
DSC-46-20 Scratchpad Messages on the COMM Menu	D	1	Revision to correct the internal link to the table foot note.
DSC-46-40 Introduction	A	1	Documentation update: Addition of "Introduction" documentary unit
DSC-46-70 Bus Equipment List	A	1	Documentation update: Addition of "Bus Equipment List" documentary unit

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INTRODUCTION

Applicable to: ALL

The information system manages the datalink communication and provides the flight crew with information coming from the airline and from the Air Traffic Control (ATC).
The information system consists mainly of an Air Traffic Service Unit (ATSU), two Data-link Control and Display Units (DCDU ◁) located on the left and right central panels, and two illuminated pushbuttons ◁ "ATC MSG".

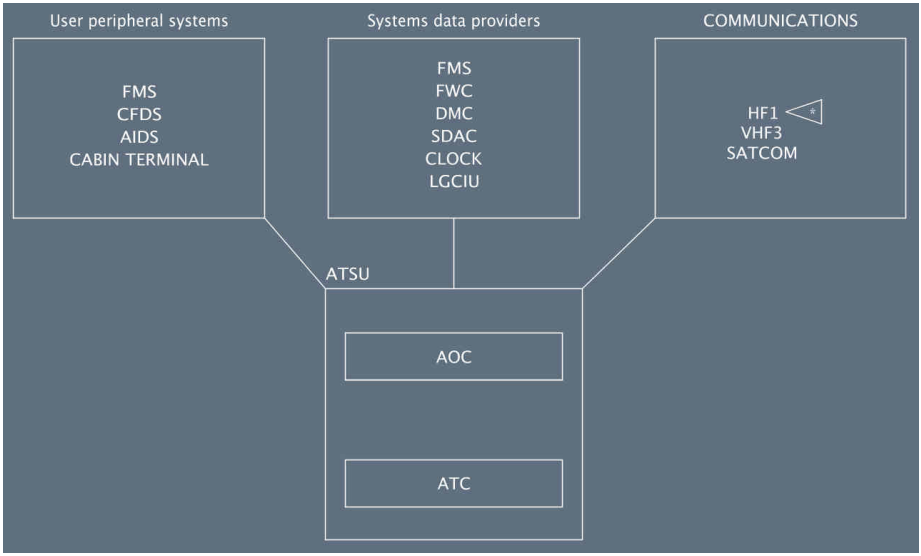
The ATSU manages:
- The Air-Ground communications through the appropriate communication media (SATCOM ◁ or VHF data radio or HF ◁ data radio).
- The exchange of information between the aircraft and:
  - The Operator according to the Airline Operational Control (AOC) applications defined in the ATSU, or
  - The Air Traffic Control.
- The information display via the MCDU and the DCDU ◁ .
- The appropriate warning for flight crew information.

The ACARS functions are included in the ATSU.

SYSTEM ARCHITECTURE

Applicable to: ALL

The ATSU is connected to the following systems:

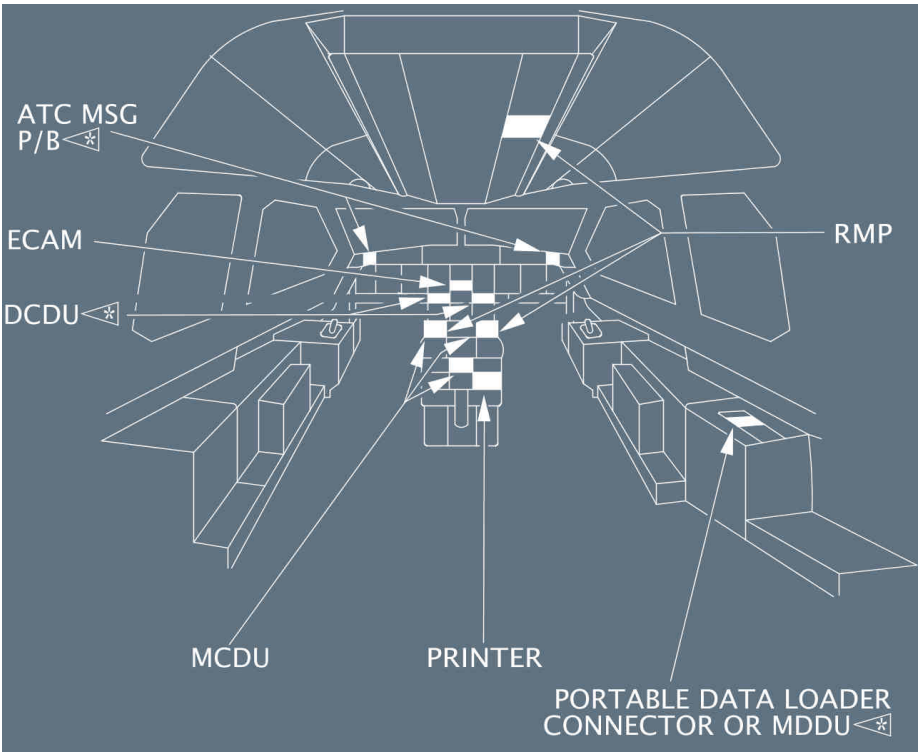


The ATSU supports uplink and downlink messages.
They may be either automatically or manually handled, with or without information to the crew.

COCKPIT ARRANGEMENT

Applicable to: ALL

1



The pilot interface consists of:

- The DCDU ◁ , to display any up and downlink ATC messages.
- The “ATC MSG pb ◁ ”, to alert the crew of any ATC uplink arrivals ◁ , associated with a dedicated chime ◁ .
- The MCDU, to handle the AOC and ATC functions and data transfer with the DCDU ◁ .
- The PRINTER, to print any type of messages.
- The ECAM, for operational information.
- The RMP, to allow frequencies’ tuning.

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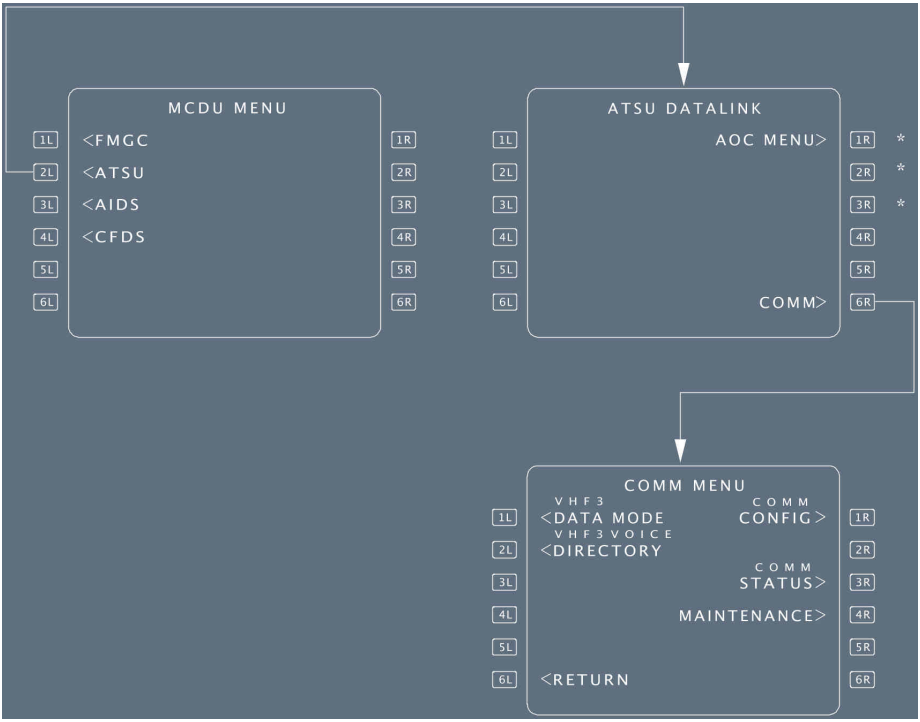
INTRODUCTION

Applicable to: ALL

The Air-Ground communications are managed by the ATSU communication function either:

- automatically without pilot action,
- or manually using MCDU pages and/or RMPs.

The pilot controls the communications through the COMM MENU page on MCDU.



(*) These fields are customized according to the AOC programming.

DOWNLINK AND UPLINK MESSAGES

Applicable to: ALL

DOWNLINK MESSAGES

Aircraft to ground messages (downlink) comprise maintenance, monitoring, operational, performance and cabin data.

Reports generated by a peripheral (CFDS, AIDS, FMS, CABIN TERMINAL) system can be automatically downlinked by the ATSU depending on each airline AOC programming.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTG, B-HTH, B-HTI

UPLINK MESSAGES

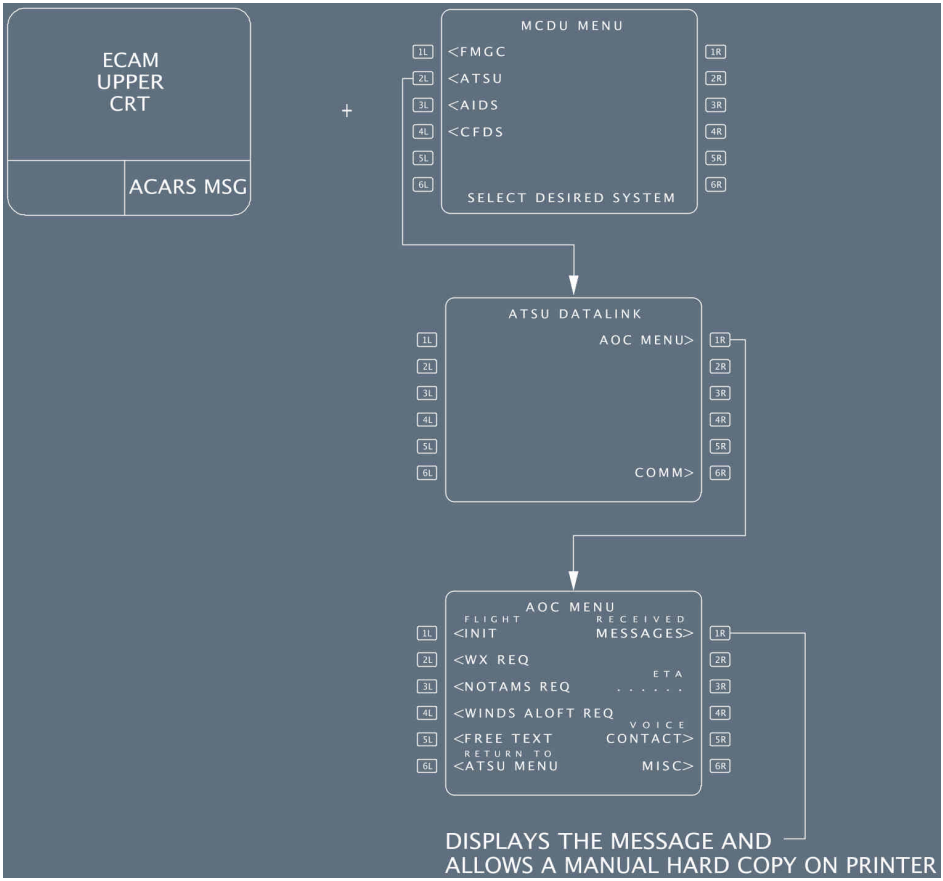
Ground to aircraft messages (uplink) either contain crew information (wind for example) or data to be uploaded into the FMS (Flight plan for example). Uplinks can also contain requests for transmission of specific downlink reports.

Messages are indicated to the crew by:
- "ACARS MSG"memo (in green) on ECAM, or
- "ACARS CALL" memo (in green) on ECAM, or
- The MCDU MENU light comes on, if the MCDU is not in the mode where the uplink message can be displayed, or
- A Hard copy from the cockpit printer, depending on airline AOC programming.

Note: A steady green "ACARS STBY"memo is displayed in case of communication loss between aircraft and ground.

Depending on the memo displayed on the ECAM, the uplink message indications are available, as the following examples:

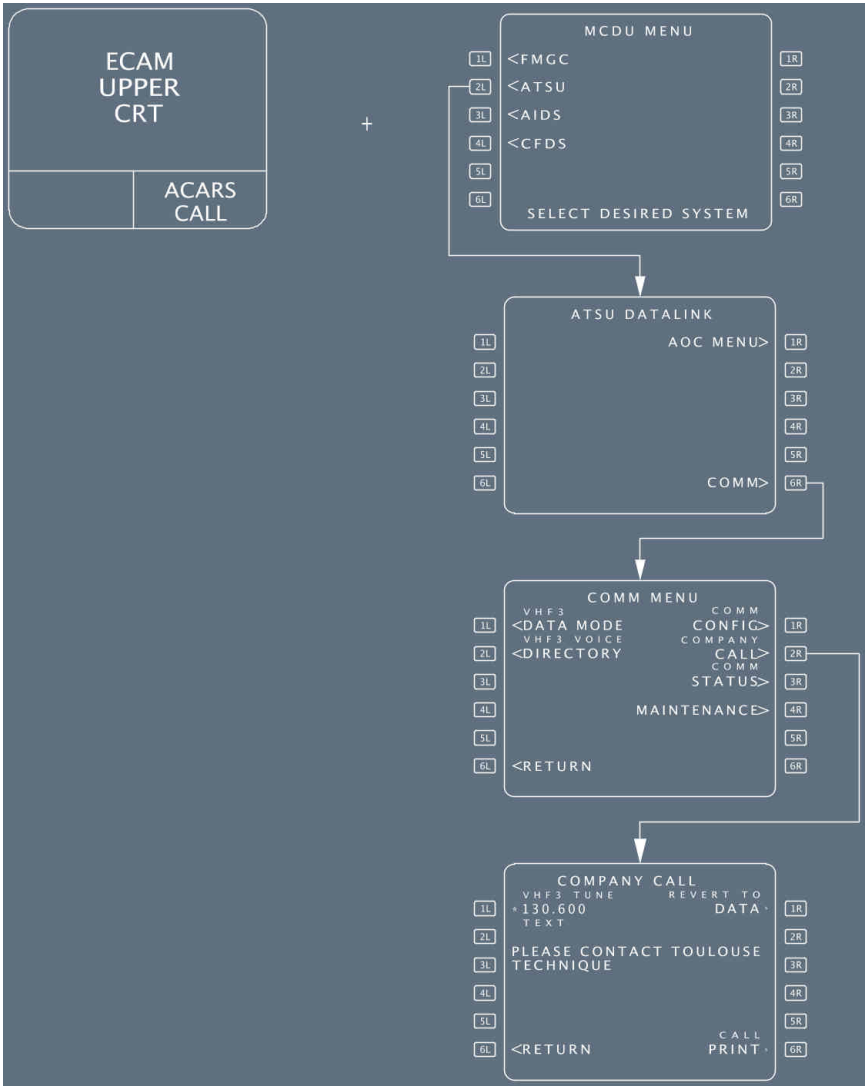
- For a "ACARS MSG"ECAM memo:



On the AOC MENU page, pressing the [1R] key displays the received message and clears the ECAM memo.

Note: *AOC MENU page is customized, according to AOC programming.*

- For a "ACARS CALL" ECAM memo:



On the MCDU's COMPANY CALL page:

Pressing the [1L] key clears the ACARS CALL memo and activates the VHF voice frequency on VHF 3 associated with the memo.

When in VHF 3 voice mode, pressing the [1R] key reverts VHF 3 to DATALINK mode.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTF

UPLINK MESSAGES

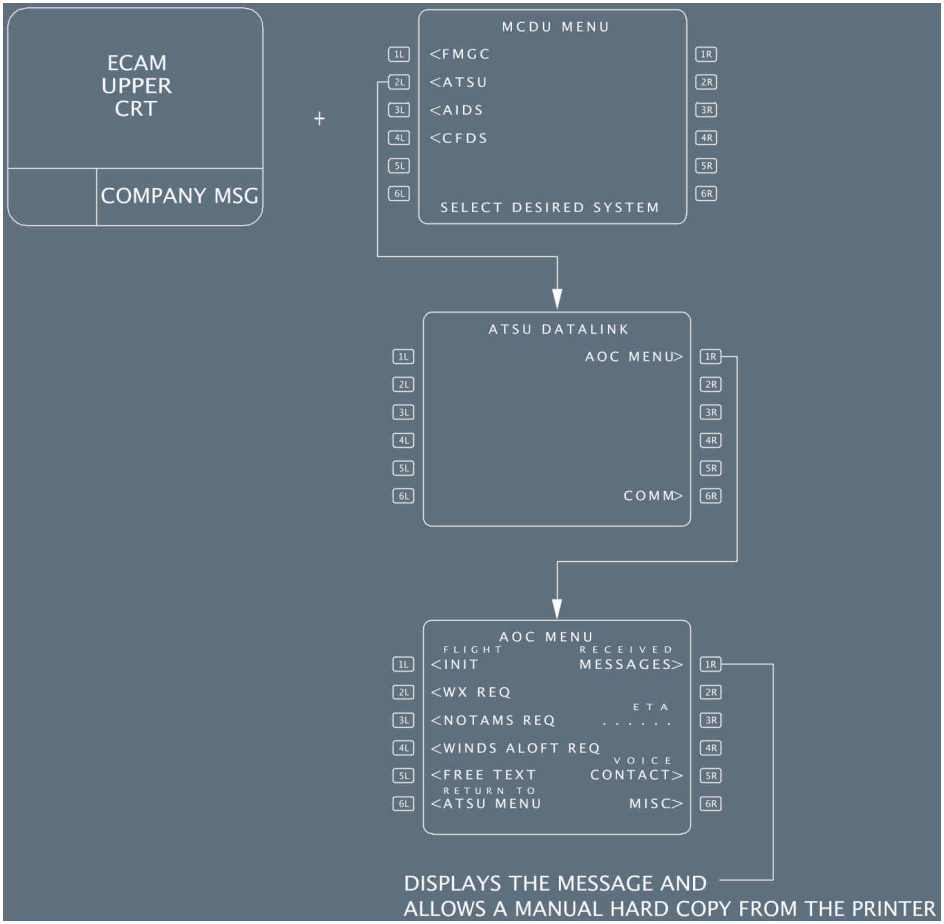
Ground to aircraft messages (uplink) either contain crew information (wind for example) or data to be uploaded into the FMS (Flight plan for example). Uplinks can also contain requests for transmission of specific downlink reports.

Messages are indicated to the crew by:
- "COMPANY MSG"memo (in green) on the ECAM memo, or
- "COMPANY CALL" memo (in green) on the ECAM memo, or
- "COMPANY ALERT" memo (pulses green for around 180 s , then remains steady, and is associated with a buzzer sound for 1 s) on the ECAM memo, or
- The MCDU MENU light comes on, if the MCDU is not in the mode where the uplink message can be displayed, or
- A Hard copy from the cockpit printer, depending on airline's AOC programming.

Note: A steady green "COMPANY DATALINK STBY"memo is displayed, when the AOC datalink air-ground communication is temporarily unavailable, but not lost.

Depending on the memo displayed on the ECAM, the uplink message indications are available, as the following examples:

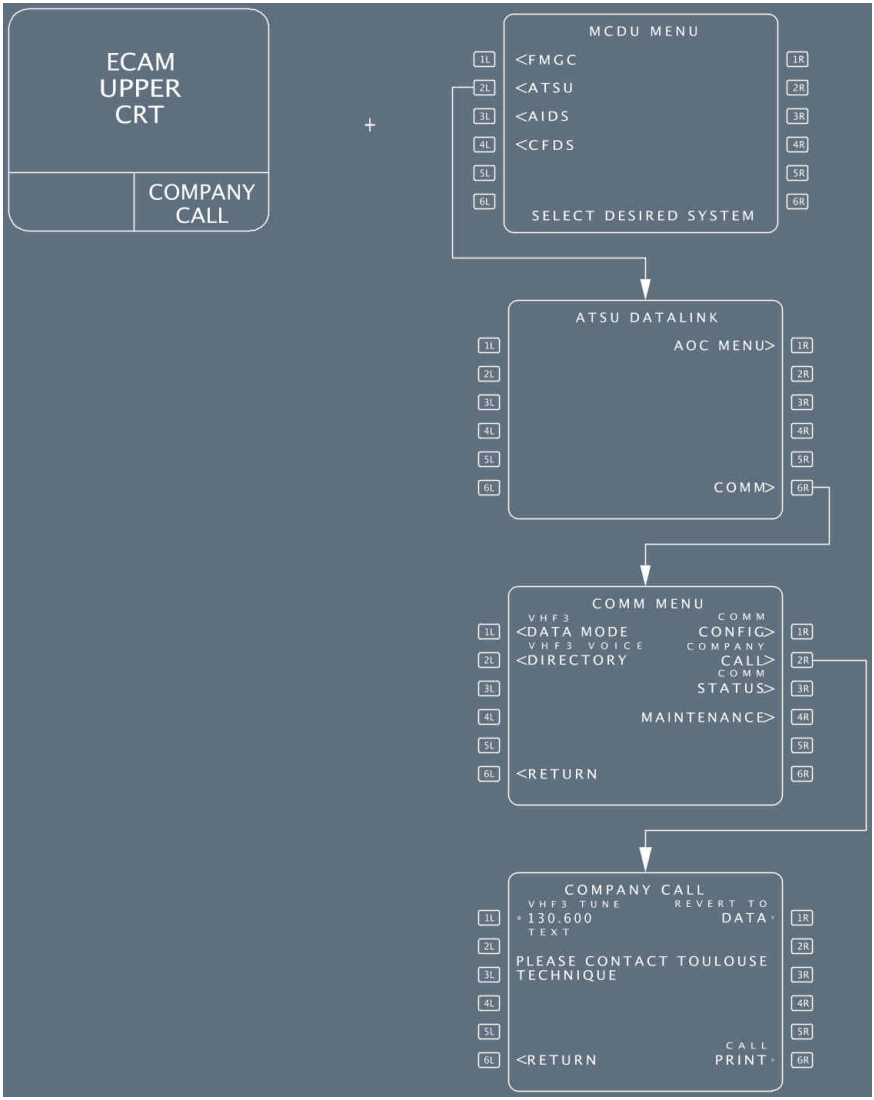
- For a "COMPANY MSG"ECAM memo:



On the AOC MENU page, pressing the [1R] key displays the received message and clears the ECAM memo.

Note: *1. AOC MENU page is customized, according to AOC programming.*
2. A "COMPANY ALERT" ECAM memo is processed in the same way.

- For a "COMPANY CALL" ECAM memo:



On the MCDU's COMPANY CALL page:

Pressing the [1L] key clears the ACARS CALL memo and activates the VHF voice frequency on VHF 3 associated with the memo.

When in VHF 3 voice mode, pressing the [1R] key reverts VHF 3 to DATALINK mode.

DATALINK/VOICE TRANSFER ON VHF 3

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTG, B-HTH, B-HTI

GENERAL

VHF 3 can be used in voice mode in case of:

- VHF 1 or VHF 2 failure
- ACARS CALL

The green “ACARS CALL” memo indicates that a voice contact request has been received from the ground.

The green “VHF 3 VOICE” memo indicates that the VHF 3 tranceiver operates in voice mode, therefore datalink communications are interrupted.

The voice frequency may be either tuned by the ATSU or tuned by the crew through the RMP. The DATALINK/VOICE transfer can be done either from any of the RMPs or from the ATSU through the VHF 3 VOICE DIRECTORY MCDU page.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTF

GENERAL

VHF 3 can be used in voice mode in case of a:

- VHF 1 or VHF 2 failure, or
- COMPANY CALL.

The green “COMPANY CALL” memo indicates that a request for voice contact was received from the ground.

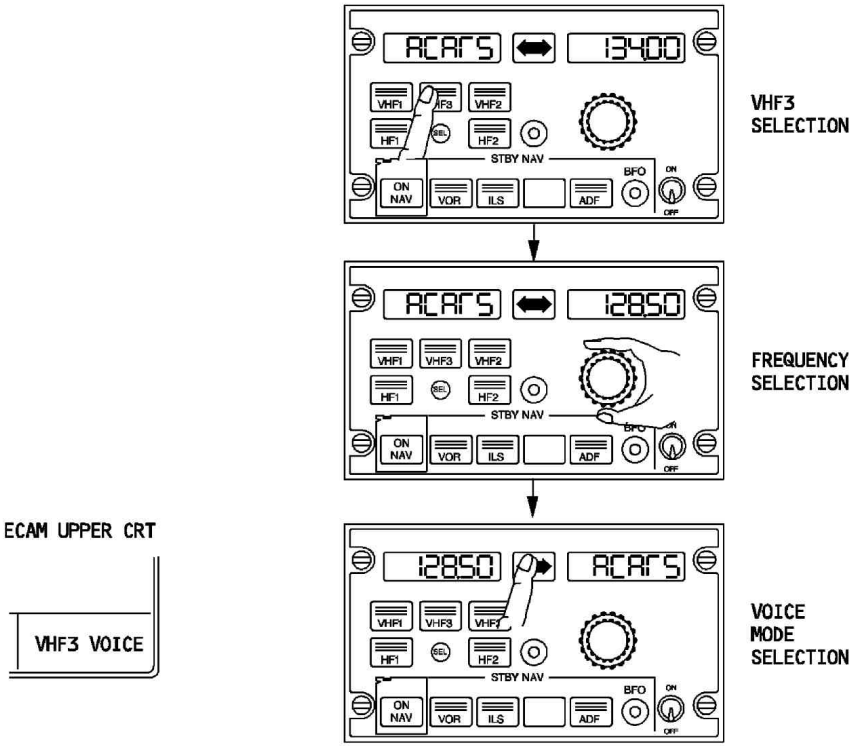
The green “VHF 3 VOICE” memo indicates that the VHF 3 tranceiver operates in voice mode. Therefore, datalink communication is interrupted.

The voice frequency may be either tuned by the ATSU or tuned by the crew through the RMP. The DATALINK/VOICE transfer can be done either from any of the RMPs or from the ATSU through the VHF 3 VOICE DIRECTORY MCDU page.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HTD, B-HTE, B-HTF

RMP

DATALINK/VOICE TRANSFER FROM A RMP

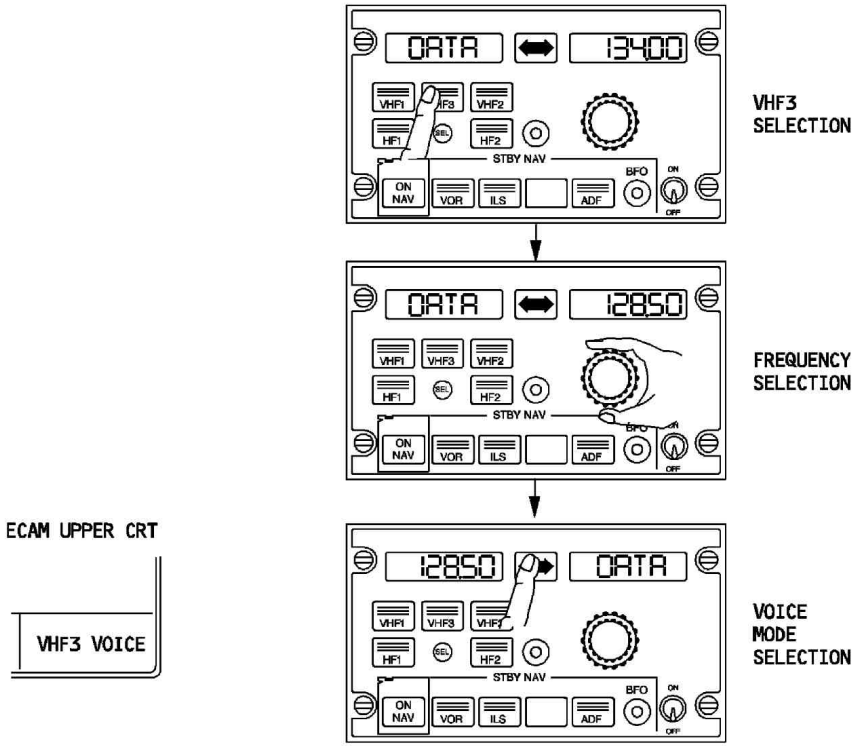


Pressing again the transfer key on RMP returns to DATALINK mode.

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

RMP

DATALINK/VOICE TRANSFER FROM A RMP

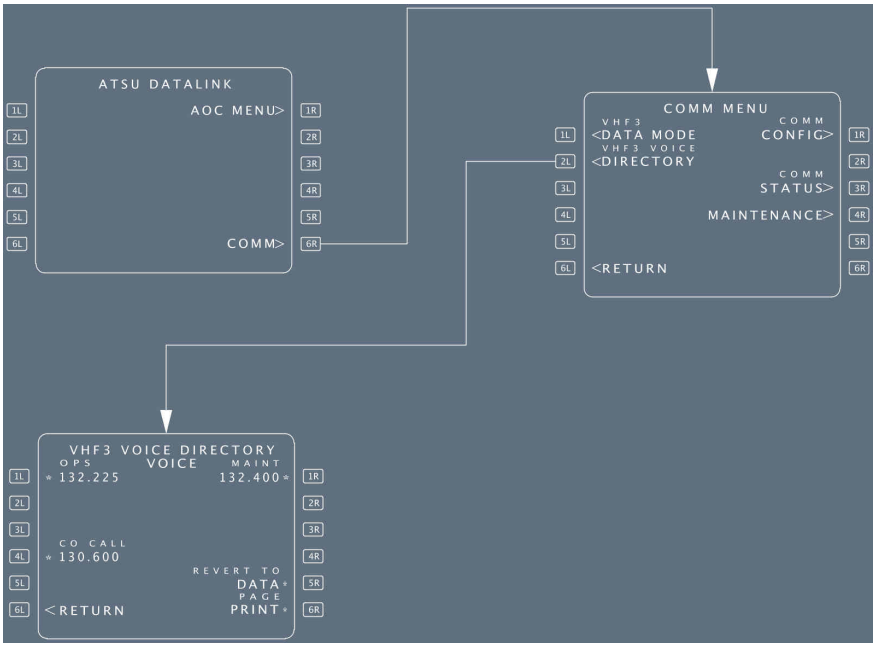


Pressing again the transfer key on RMP returns to DATALINK mode.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTG, B-HTH, B-HTI

ATSU

DATALINK/VOICE TRANSFER FROM THE ATSU THROUGH THE VHF 3 VOICE DIRECTORY PAGE



On the VHF 3 VOICE DIRECTORY MCDU page:

- Below the title, it is indicated whether VHF 3 is in “VOICE”, or “DATA” mode.
- Fields [1L] to [3L] and [1R] to [3R] display the voice frequencies defined in the airline database.
  Pressing one of the adjacent keys activates the corresponding preselected voice frequency.
- Field [4L] displays the voice frequency provided in the last received ACARS CALL message.
  Pressing the adjacent key deletes the adjacent ACARS CALL memo and activates the voice frequency on VHF 3.

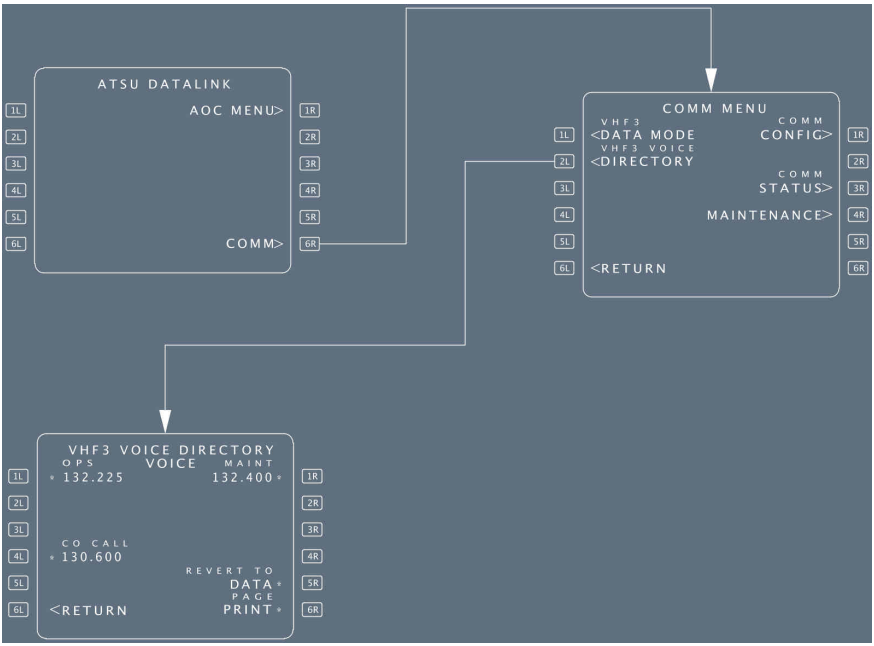
Note: *After the activation of the voice frequency, ACARS remains displayed in the active window of the RMP.*

Pressing the [5R] key returns VHF 3 to DATALINK mode.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

ATSU

DATALINK/VOICE TRANSFER FROM THE ATSU THROUGH THE VHF 3 VOICE DIRECTORY PAGE



On the VHF 3 VOICE DIRECTORY MCDU page:

- Below the title, it is indicated whether VHF 3 is in “VOICE”, or “DATA” mode.
- Fields [1L] to [3L] and [1R] to [3R] display the voice frequencies defined in the airline database.
  Pressing one of the adjacent keys activates the corresponding preselected voice frequency.
- Field [4L] displays the voice frequency provided in the last received COMPANY CALL message. Pressing the adjacent key deletes the adjacent COMPANY CALL memo and activates the voice frequency on VHF 3.

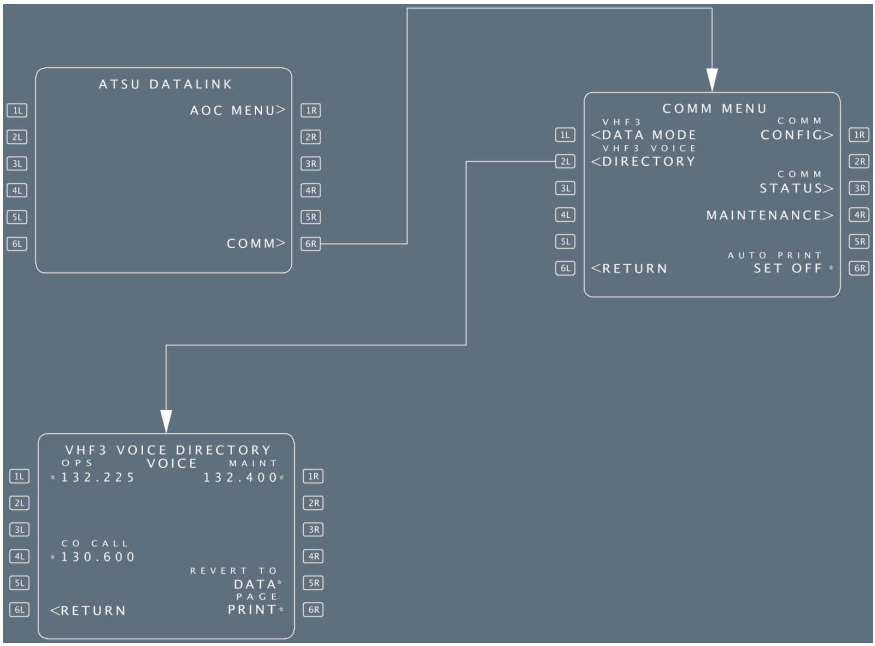
Note: *After the activation of the voice frequency, ACARS remains displayed in the active window of the RMP.*

Pressing the [5R] key returns VHF 3 to DATALINK mode.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

ATSU

DATALINK/VOICE TRANSFER FROM THE ATSU THROUGH THE VHF 3 VOICE DIRECTORY PAGE



On the VHF 3 VOICE DIRECTORY MCDU page:

- Below the title, it is indicated whether VHF 3 is in “VOICE”, or “DATA” mode.
- Fields [1L] to [3L] and [1R] to [3R] display the voice frequencies defined in the airline database.
  Pressing one of the adjacent keys activates the corresponding preselected voice frequency.
- Field [4L] displays the voice frequency provided in the last received COMPANY CALL message. Pressing the adjacent key deletes the adjacent COMPANY CALL memo and activates the voice frequency on VHF 3.

Note: *After the activation of the voice frequency, DATA remains displayed in the active window of the RMP.*

Pressing the [5R] key returns to DATALINK mode.

SCRATCHPAD MESSAGES ON THE COMM MENU

Applicable to: ALL

1

MESSAGE	COLOR	CONDITIONS
NOT ALLOWED	W	It is not permitted to press this key.
ENTER A/C REGISTR	A	The aircraft registration number is not valid. To enter this parameter, *Refer to PRO-SUP-46-10 ATSU Initialization.*
PRINT FAILED	W	A print command is not successful.
FORMAT ERROR	W	The message was entered in an inappropriate format.
VHF 3 SWITCH IMPOSSIBLE	A	It is not possible to switch from VHF 3 voice mode to VHF 3 data mode.
DEFAULT VHF SP LIST *(1)*	A	The new SCAN MASK is not available. The system displays the default SCAN MASK instead.
SYSTEM BUSY-TRY LATER	W	The system is busy. The command, selected by the flight crew, cannot currently be performed.
COMMAND NOT AVAIL	W	The command is not available.
VHF 3 CAN BE SET IN VOICE	A	VHF 3 datalink communications are lost. However, VHF 3 can be used in voice mode.
ENTER VHF 3 SCAN SELECT *(1)*	A	No service provider has been selected. To select a service provider, *Refer to PRO-SUP-46-10 ATSU Initialization.*
ENTER A/L ID	A	The airline identification number is not valid. To enter this parameter, *Refer to PRO-SUP-46-10 ATSU Initialization.*
PRT MSG PRINT FAIL	W	Automatic print of an AOC uplink message was not successful.

(1) Depending on airline customization, access to the SCAN SELECT menu may not be possible. If it is not, the DEFAULT VHF SP LIST and ENTER VHF 3 SCAN SELECT scratchpad messages are not applicable.

INTRODUCTION

Applicable to: ALL

Two kinds of Airline Operational Control (AOC) applications are provided:

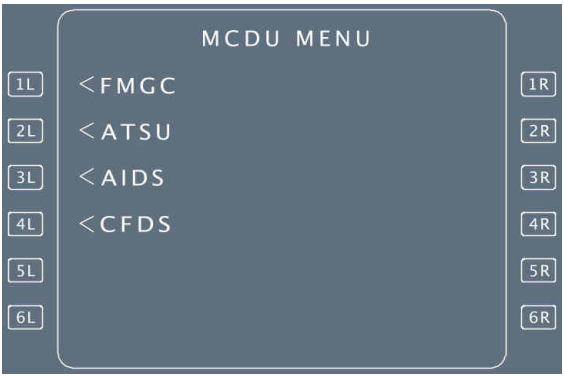
- Remote AOC applications embedded in systems peripheral to ATSU (AIDS, CFDS, FMGC, CABIN TERMINAL)
- Hosted AOC applications uploaded into the ATSU.

Due to the highly customized aspect of the hosted AOC applications, only the remote AOC applications are described in this chapter.

REMOTE APPLICATIONS

Applicable to: ALL

The remote AOC applications are accessible by pressing the related system key on the MCDU MENU page.



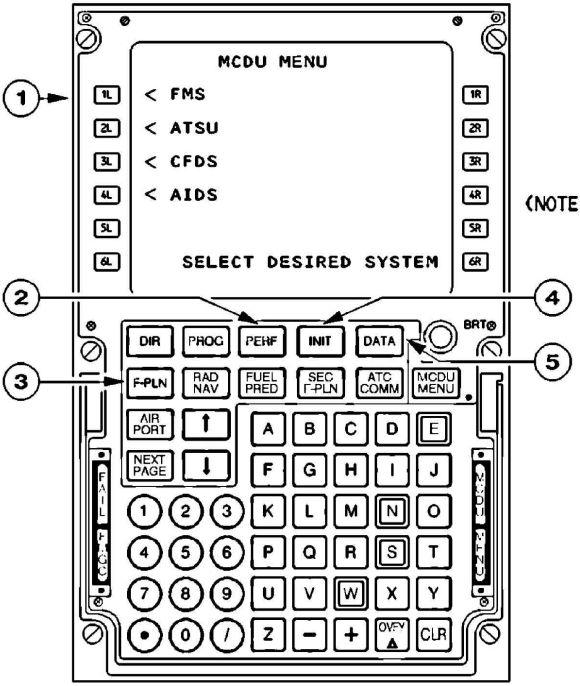
Message/reports are processed by the AOC peripherals (FMGC, AIDS, CFDS) ; the ATSU communication function only routes the request according to the company routing policy.

FLIGHT MANAGEMENT SYSTEM (FMGC)

Refer to DSC-22_45 General

Through the FMGC interface it is possible to access the following data:

- Wind data (F-PLN page)
- Takeoff data (uplink only)
- F-PLN initialization (uplink only)
- Pre-flight, post-flight report and ACARS print/program (downlink only).
  Refer to DSC-22_20-70 Flight Plan Initialization Through ACARS



(NOTE : DEPENDING ON OPTIONS, MCDU FRONT FACE MAY SLIGHTLY DIFFER)

(1) Pressing key selects related system then

(2) Pressing key gives access to takeoff data (Uplink only)

(3) Pressing key gives access to wind data (F-PLN page)

(4) Pressing key gives access to F-PLN initialisation and wind data (Uplink only)

(5) Pressing key gives access to Pre-flight, Post-flight report and ACARS print/program (downlink only).
Refer to DSC-22_20-70 Flight Plan Initialization Through ACARS.

CENTRALIZED FAULT DISPLAY SYSTEM (CFDS)

(*Refer to DSC-45-20 Maintenance Menu*)

Through the CFDS interface it is possible to downlink the following data:
- Post flight report (on the ground) or current flight report (in flight) which includes:
  - All failure messages detected by the BITEs
  - The warnings displayed to the crew during the last or current flight leg.

  Report can be downlinked upon crew action or upon ground request or automatically.
- Previous Flight Report (on the ground)
- Real-time failure and warning messages (in flight)
- Class 3 report (on the ground) containing all class 3 failures detected during the last flight leg. The report can be downlinked upon crew action or automatically.

AIRCRAFT INTEGRATED DATA SYSTEM (AIDS)

The AIDS interface provides ATSU with the data for the following applications:
- Aircraft Performance Monitoring (APM)
- Engine Condition Monitoring (ECM)
- APU Health Monitoring (AHM).

Any of the AIDS DMU reports can be downlinked (through ATSU):
- Manually on the ground or in flight
- Automatically in real-time
- Upon ground request or upon automatic request from the ATSU.

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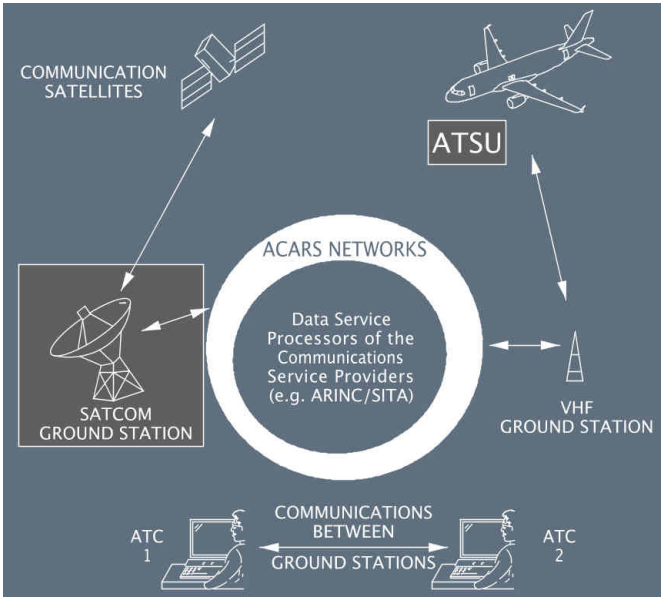
INTRODUCTION

Applicable to: ALL

1

The global Communications Navigation Surveillance/Air Traffic Management (CNS/ATM) system is made up of the C (Communications), N (Navigation) and S (Surveillance) tools, developed to provide efficient Air Traffic Management methods.
Such methods include the introduction of datalink communication between pilots and controllers. This is considered to be the primary means of communication over oceans and in remote areas.
The current CNS/ATM system uses ACARS network: These networks are mainly ARINC, and SITA (*Refer to DSC-23-40-40 World Map ACARS Frequencies*). The related data communications are managed by the Air Traffic System Unit (ATSU), and can be supported by the SATCOM ◁ or the VHF.



The CNS/ATM system includes the following applications:
- The ATS Facilities Notification (AFN)
- The Controller Pilot Data Link Communications (CPDLC)
- The Automatic Dependent Surveillance-Contract (ADS-C).

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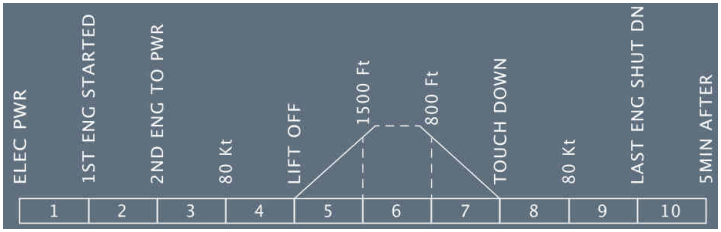
WARNINGS AND CAUTIONS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTG, B-HTH, B-HTI



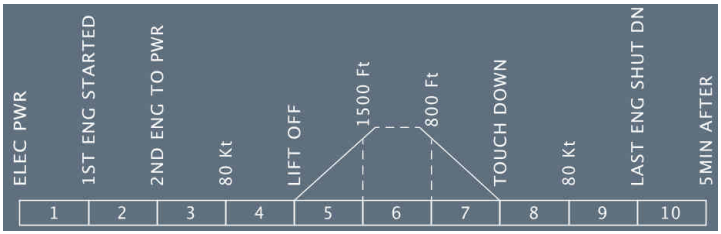
E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ACARS FAULT	SINGLE CHIME	MASTER CAUTION	NIL	NIL	3, 4, 5, 7, 8

MEMO DISPLAY

- ACARS STBY message is displayed in green when communication between aircraft and ground is not available or when a failure occurs at ATSU initialization to indicate to the crew to enter some initialization parameters.
- ACARS CALL message is displayed in green when the aircraft receives a message from the ground requesting voice communication on VHF.
  This message is pulsing green during 60 s then steady.
- ACARS MSG message is displayed in green when the aircraft receives a message from the ground.
  This message is pulsing green during 60 s then steady.

WARNINGS AND CAUTIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTF



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ATSU FAULT (Failure at ATSU initialization, if associated with ATSU INIT FAULT ECAM message).	SINGLE CHIME	MASTER CAUTION	NIL	NIL	3, 4, 5, 7, 8
COMPANY FAULT AOC datalink communications failure.	NIL	NIL			

MEMO DISPLAY

- The COMPANY DATALINK STBY message is displayed in green, when AOC datalink air-ground communication is temporarily unavailable, but not lost.
- The COMPANY CALL message is displayed in green, when the aircraft receives a message from the ground requesting voice communication on VHF.
- The COMPANY MSG message is displayed in green, when the aircraft receives a message from the ground.
- The COMPANY ALERT message is displayed in green, when the aircraft receives an uplink alert message, or when an AOC special condition requires a pilot action on the MCDU (depends on AOC programming). This message pulses green for 180 s, then remains steady. It is associated with a buzzer for 1 s.

BUS EQUIPMENT LIST

Applicable to: ALL

1

		NORM			EMER ELEC		
		AC	DC	DC BAT	AC ESS	DC ESS	HOT
ATSU	ATSU 1	AC1	DC1				

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AIRCRAFT SYSTEMS

APU

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DSC-49-PLP PRELIMINARY PAGES

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DSC-49-10 Description

DSC-49-10-10 General

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AIR INTAKE SYSTEM....C
STARTER....D
FUEL SYSTEM....E
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INLET GUIDE VANES (IGV)....G
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DSC-49-20 Controls and Indicators

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EXTERNAL CONTROLS....B
ECAM APU Page....C

DSC-49-30 Warnings and Cautions

Warnings and Cautions....A

DSC-49-40 Electrical Supply

BUS EQUIPMENT LIST....A

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Localization Title	Toc Index	ID	Reason
DSC-49-20 ECAM APU Page	C	1	Improvement of illustration quality.
DSC-49-20 ECAM APU Page	C	2	Improvement of illustration quality.
DSC-49-20 ECAM APU Page	C	3	Improvement of illustration quality.

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GENERAL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

The Auxiliary Power Unit (APU) is a self-contained unit that makes the aircraft independent of external pneumatic and electrical power supplies.

On the ground

- It supplies bleed air for starting the engines and for the air conditioning system
- It supplies electrical power to the electrical system.

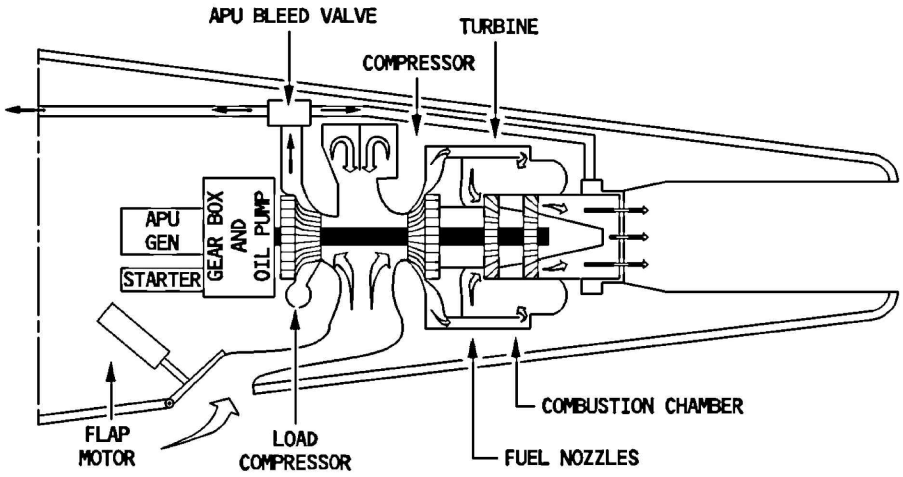
During takeoff

- It supplies bleed air for air conditioning, thus avoiding a reduction in engine thrust caused by the use of engine bleed air for this purpose when optimum aircraft performance is required.

In flight

- It backs up the electrical system
- It backs up the air conditioning
- It can be used to start the engines.

The APU may obtain power for starting from the aircraft's batteries alone or in combination with the external power, or from ground service.
APU starting is permitted throughout the normal flight envelope.
The ECAM displays APU parameters.



GENERAL

Applicable to: B-HSQ, B-HSR

GENERAL

The Auxiliary Power Unit (APU) is a self-contained unit that makes the aircraft independent of external pneumatic and electrical power supplies.

On the ground

- It supplies bleed air for starting the engines and for the air conditioning system
- It supplies electrical power to the electrical system.

During takeoff

- It supplies bleed air for air conditioning, thus avoiding a reduction in engine thrust caused by the use of engine bleed air for this purpose when optimum aircraft performance is required.

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- It backs up the electrical system
- It backs up the air conditioning
- It can be used to start the engines.

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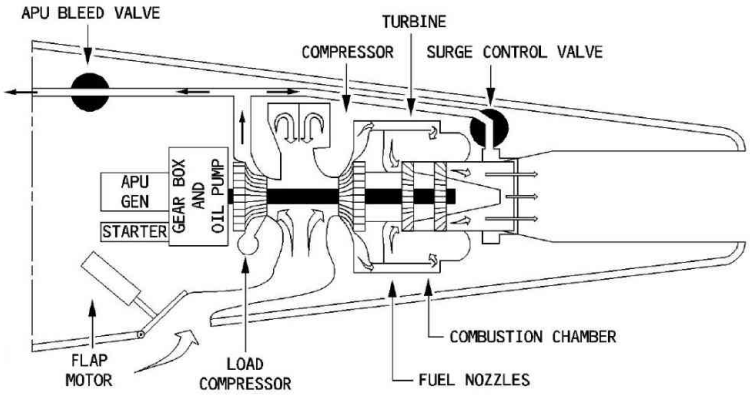
APU starting is permitted throughout the normal flight envelope (*Refer to LIM-49-20 Envelope*).
The ECAM displays APU parameters.



APU ENGINE

Applicable to: ALL

The basic element of the APU is a single-shaft gas turbine that delivers mechanical shaft power for driving the accessory gearbox (electrical generator, starter, etc.) and produces bleed air (engine starting and pneumatic supply).

ELECTRONIC CONTROL BOX

Applicable to: ALL

The Electronic Control Box (ECB) is a full-authority digital electronic controller that performs the bulk of the APU system logic for all modes of engine operation, such as :

- Sequences the start and monitors it.
- Monitors speed and temperature.
- Monitors bleed air.
- Sequences the shutdown.
- Controls the automatic shutdown.

AIR INTAKE SYSTEM

Applicable to: ALL

The air intake and an electrically operated flap allow external air to reach the compressor inlet.

STARTER

Applicable to: ALL

The ECB controls the electric starter. The starter engages if the air intake is fully open and the MASTER SW and the START pushbutton are ON.

FUEL SYSTEM

Applicable to: ALL

The left fuel feed line supplies the APU.
The required pressure is normally available from tank pumps.
If pressure is not available (batteries only or pumps off) the APU FUEL PUMP starts automatically.
The ECB controls the fuel flow.

OIL SYSTEM

Applicable to: ALL

The APU has an integral independent lubrication system (for lubrication and cooling).

INLET GUIDE VANES (IGV)

Applicable to: ALL

The IGVs control bleed air flow, and a fuel-pressure-powered actuator positions the IGVs.
The ECB controls the actuator in response to aircraft demand.

AIR BLEED SYSTEM

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

The air bleed system is fully automatic.
The APU speed is always 100 % whatever the air bleed system demand and the ground/flight configuration are.

AIR BLEED SYSTEM

Applicable to: B-HSQ, B-HSR

The air bleed system is fully automatic.
The ECB always sets the APU speed to 100 % except for air conditioning demand, if the ambient temperature is between -18 °C and 35 °C. In this case, the ECB sets the APU speed to 99 %. For all other ambient temperatures (less than -18 °C or more than 35 °C), the ECB sets the APU speed to 100 %.

CONTROLS

Applicable to: ALL

The flight crew uses the controls on the APU panel for routine shutdown. For emergency shutdown :
- the flight crew can push the APU FIRE handle, or
- the ground crew can push the APU SHUT OFF pushbutton on the interphone panel under the nose fuselage.

GROUND OPERATION SAFETY DEVICES

Applicable to: ALL

The APU may run without cockpit crew supervision when the aircraft is on the ground. In case of fire in the APU compartment :

- APU fire warnings operate in the cockpit.
- A horn in the nose gear bay sounds.
- The AVAIL light goes out.
- The FAULT light in the MASTER SW lights up.
- The APU shuts down.
- The APU fire extinguisher discharges.

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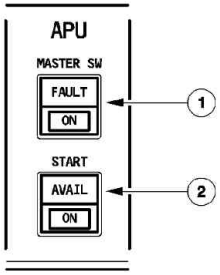
OVERHEAD PANEL

Applicable to: B-HSM, B-HTE



(1) MASTER SW pb-sw

This switch controls the electric power supply for the operation of the APU and its protective features. It also controls the starting and shutdown sequences.

ON : The blue ON light comes on.
Electric power goes to the APU system; the ECB performs a power-up test.
The APU air intake flap opens.
The APU fuel isolation valve opens.
If no fuel tank pump is running, the APU fuel pump operates.
If the aircraft has ground power or main generator power, the APU page appears on the ECAM display.

OFF : Manual shutdown sequence.
- The ON light on the MASTER SW pb-sw, and the AVAIL light on the START pb, go out.
- The APU keeps running for a cooling period of 120 s at N 100 % speed.
- At 7 % the air inlet flap closes.

FAULT lt : This amber light comes on, and a caution appears on ECAM, when an automatic APU shutdown occurs, which happens in case of:
- Fire (on ground only)
- Air inlet flap not open
- Overspeed
- No acceleration
- Slow start
- EGT overtemperature
- No flame
- Underspeed
- Reverse flow
- Low oil pressure
- High oil temperature
- DC power loss. (BAT OFF when aircraft on batteries only)
- ECB failure
- Loss of overspeed protection

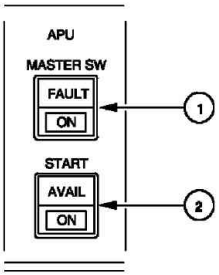
(2) START pb-sw

ON : Blue ON light comes on.
- When the flap is completely open, the APU starter is energized.
- 1.5 s after the starter is energized, the ignition is turned ON.
- When N = 55 %. The APU starter is de-energized. The ignition is turned off.
- 2 s after N reached 95 %, or when N is above 99.5 %:
  The ON light on the START pb goes out.
  The APU may now supply bleed air and electrical power to the aircraft systems.
- 10 s later, the APU page disappears from the ECAM display.

AVAIL lt : This green light comes on when N is above 99.5 % or 2 s after N reaches 95 %.

OVERHEAD PANEL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTD, B-HTF, B-HTG, B-HTH, B-HTI



(1) MASTER SW pb-sw

This switch controls the electrical power supply for the operation of the APU and its protective features. It also controls the starting and shutdown sequences.

ON : The blue ON light comes on.
Electric power goes to the APU system; the ECB performs a power-up test.
The APU air intake flap opens.
The APU fuel isolation valve opens.
If no fuel tank pump is running, the APU fuel pump operates.
If the aircraft has ground power or main generator power, the APU page appears on the ECAM display.

OFF : Manual shutdown sequence.
- The ON light on the MASTER SW pb-sw, and the AVAIL light on the START pb, go out.
- The APU keeps running for a cooling period of 120 s at N 100 % speed.
- At 7 % the air inlet flap closes.

FAULT lt : This amber light comes on, and a caution appears on ECAM, when an automatic APU shutdown occurs, which happens in case of:

- Fire (on ground only)
- Air inlet flap not open
- Overspeed
- No acceleration
- Slow start
- EGT overtemperature
- No flame
- Underspeed
- Reverse flow
- Low oil pressure
- High oil temperature
- DC power loss. (BAT OFF when aircraft on batteries only)
- ECB failure
- Loss of overspeed protection

Note: *In the case of an automatic, non–emergency shutdown, the air inlet flap closes 15 min after the APU speed is lower than 7 %. If an automatic, non-emergency shutdown happens on ground, the 15 min countdown starts after liftoff.*

(2) START pb-sw

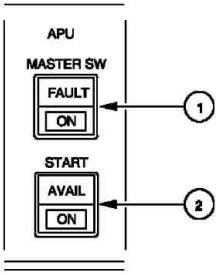
ON : Blue ON light comes on.

- When the flap is completely open, the APU starter is energized.
- 1.5 s after the starter is energized, the ignition is turned ON.
- When N = 55 %. The APU starter is de-energized. The ignition is turned off.
- 2 s after N reached 95 %, or when N is above 99.5 %:
  The ON light on the START pb goes out.
  The APU may now supply bleed air and electrical power to the aircraft systems.
- 10 s later, the APU page disappears from the ECAM display.

AVAIL lt : This green light comes on when N is above 99.5 % or 2 s after N reaches 95 %.

OVERHEAD PANEL

Applicable to: B-HSQ, B-HSR



(1) MASTER SW pb

This switch controls the electric power supply for APU operation, and its protective features. It also controls the starting and shutdown sequences.

ON : The blue ON light comes on.
Electric power goes to the APU system; the ECB performs a power-up test.
The APU air intake flap opens.
The APU fuel isolation valve opens.
If no fuel tank pump is running, the APU fuel pump operates.
If the aircraft has ground power or main generator power, the APU page appears on the ECAM display.

OFF : Manual shutdown sequence.

- The ON light on the MASTER SW pb, and the AVAIL light on the START pb, go off.
- If the aircraft was using APU bleed air, the APU keeps running for a cooling period of 60 s.
- At 7 %, the air inlet flap closes.

FAULT lt : This amber light comes on, and a caution appears on ECAM, when an automatic APU shutdown occurs, which happens in case of:

- Fire (on ground only)
- Air inlet flap closed
- Overspeed
- No acceleration
- No speed
- EGT overtemperature
- No flame
- Underspeed
- Reverse flow
- Low oil pressure
- High oil temperature
- DC power lost (BAT OFF when aircraft on batteries only)
- ECB failure
- Loss of overspeed protection
- Oil system shutdown
- Inlet overheat
- Clogged oil filter
- Loss of EGT thermocouples

Note: *In the case of an automatic, non–emergency shutdown, the air inlet flap closes 15 min after the APU speed is lower than 7 %. If an automatic, non-emergency shutdown happens on ground, the 15 min countdown starts after liftoff.*

(2) START pb-sw

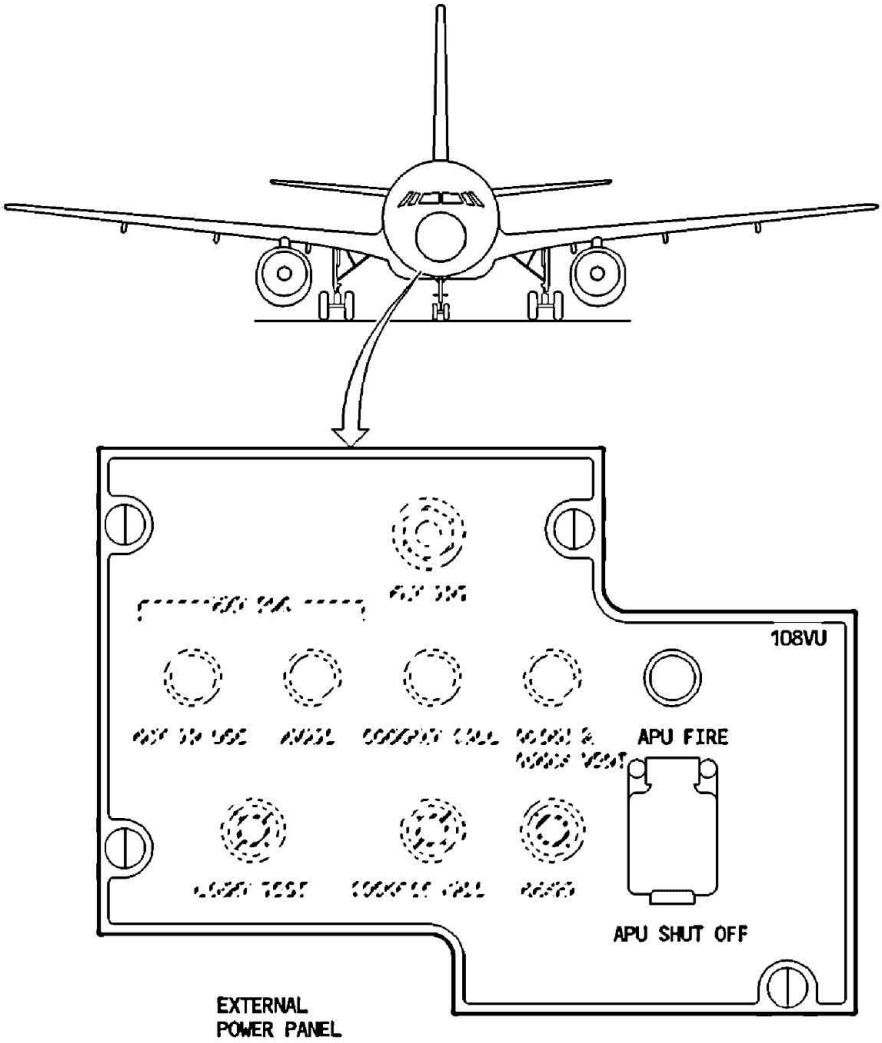
ON : Blue ON light comes on.

- When the flap is completely open, the starter is energized.
- 1.5 s after the starter is energized, the ignition turns on.
- When N = 60 %. The APU starter is de-energized. The ignition is turned off.
- 2 s after N reached 95 %, or when N is above 99.5 %:
  The ON light on the START pb goes out.
  The APU may now supply bleed air and electrical power to the aircraft systems.
- 10 s later, the APU page disappears from the ECAM display.

AVAIL lt : This green light comes on when N is above 99.5 % or 2 s after N reaches 95 %.

EXTERNAL CONTROLS

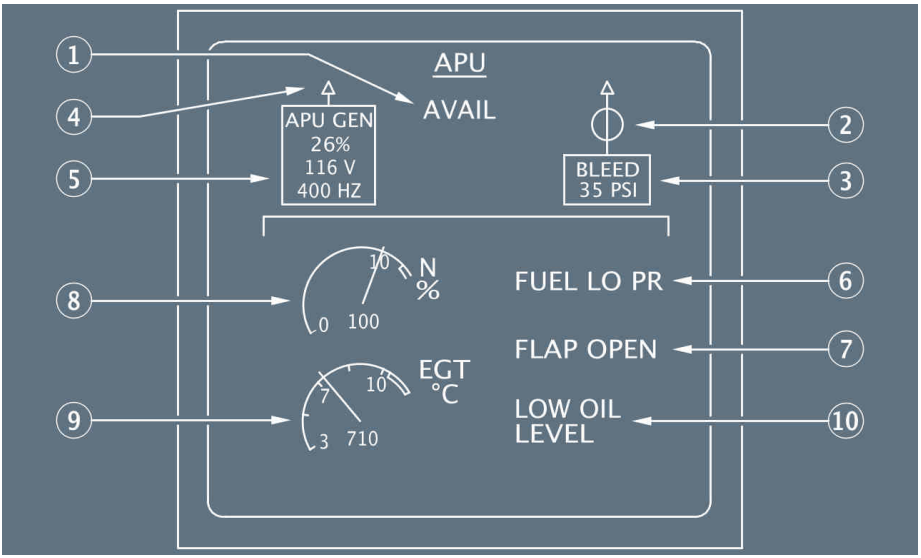
Applicable to: ALL


108VU
APU FIRE
APU SHUT OFF
EXTERNAL
POWER PANEL

ECAM APU PAGE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

1



(1) AVAIL
Displayed in green when APU N is above 99.5 % or 2 s after N is above 95 %.

(2) APU bleed air valve position

Inline-Green	:	The APU bleed air valve is not closed.
Crossline-Green	:	The APU bleed air valve is closed.
Crossline-Amber	:	The APU bleed air valve is closed and the APU bleed is ON.
XX-Amber	:	The APU bleed air valve status information is not available, or the APU BLEED pb status is not available.

(3) APU bleed air pressure
This box displays the relative bleed air pressure in green.
It shows an amber XX when the ADIRS2 is not available or selected OFF or the data from the ECB are invalid or not transmitted.

(4) APU GEN line contactor indication
Displayed in green when the APU GEN line contactor is closed.

(5) APU GEN parameters
Identical to the APU GEN parameters on the ELEC page.

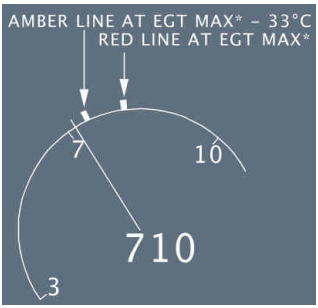
(6) FUEL LO PR
Displayed in amber if APU fuel pressure gets low.

(7) FLAP OPEN
Displayed in green when APU air intake flap is fully open.

(8) APU N

- Displays APU speed in green.
- Becomes amber when N ≥ 102 %.
- Becomes red when N ≥ 107 %.

(9) APU EGT



- Displays APU EGT in green.
- Becomes amber when EGT ≥EGT MAX See * -33 °C.
- Becomes red when EGT ≥EGT MAX See * (automatic shutdown begins).

* ECB calculates EGT MAX and transmits it to the ECAM. It is a function of N during start, and a function of ambient temperature when the APU is running.
Maximum EGT during start: 982 °C.

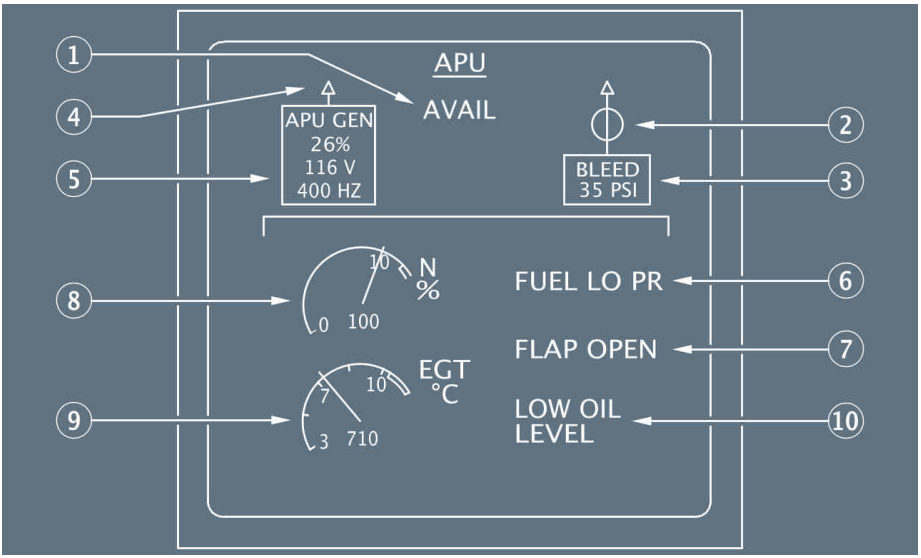
Maximum EGT with APU running:
- 682 °C during at least 5 s.
- or, 700 °C to 742 °C depending on the ambient temperature.

(10) LOW OIL LEVEL
Advisory: Displayed if the ECB detects a low APU oil level when the aircraft is on the ground, and the APU is not running.

ECAM APU PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

2



(1) AVAIL
Displayed in green when APU N is above 99.5 % or 2 s after N is above 95 %.

(2) APU bleed air valve position

Inline-Green	:	The APU bleed air valve is not closed.
Crossline-Green	:	The APU bleed air valve is closed.
Crossline-Amber	:	The APU bleed air valve is closed and the APU bleed is ON.
XX-Amber	:	The APU bleed air valve status information is not available, or the APU BLEED pb status is not available.

(3) APU bleed air pressure
This box displays the relative bleed air pressure in green.
It shows an amber XX when the ADIRS1 is not available or selected OFF or the data from the ECB are invalid or not transmitted.

(4) APU GEN line contactor indication
Displayed in green when the APU GEN contactor is closed.

(5) APU GEN parameters
Identical to the APU GEN parameters on the ELEC page.

(6) FUEL LO PR
Displayed in amber if the APU fuel pressure gets low.

(7) FLAP OPEN
Displayed in green when APU air intake flap is fully open.

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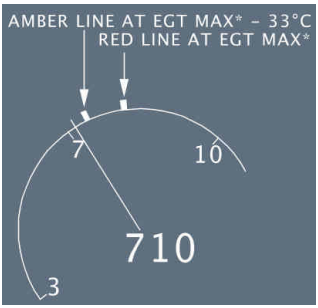
- Displays APU speed in green.
- Becomes amber when N ≥ 102 %.
- Becomes red when N ≥ 107 %.

(9) APU EGT



- Displays APU EGT in green.
- Becomes amber when EGT ≥EGT MAX See * -33 °C.
- Becomes red when EGT ≥EGT MAX See * (automatic shutdown begins).

* ECB calculates EGT MAX and transmits it to the ECAM. It is a function of N during start, and a function of ambient temperature when the APU is running.
Maximum EGT during start: 982 °C.

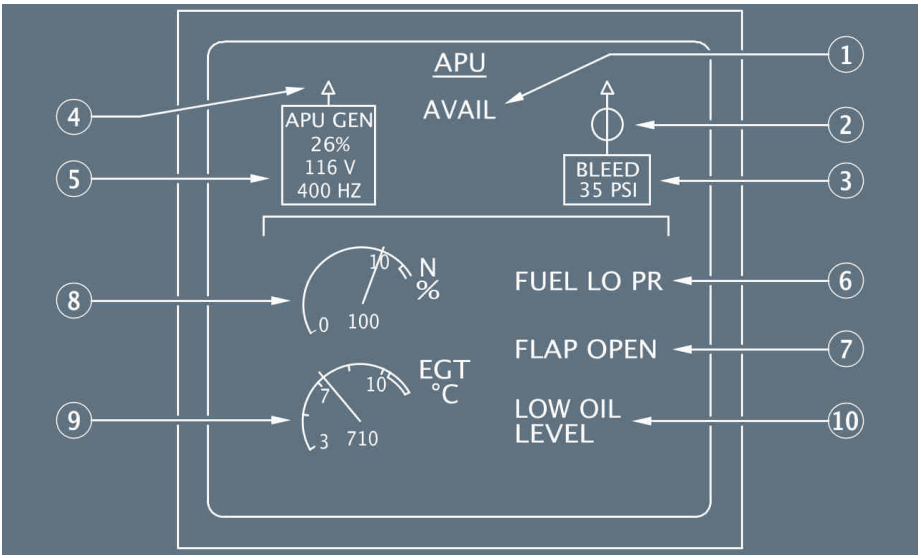
Maximum EGT with APU running:
- 682 °C during at least 5 s.
- or, 700 °C to 742 °C depending on the ambient temperature.

(10) LOW OIL LEVEL
Advisory: Displayed if the ECB detects a low APU oil level when the aircraft is on the ground, and the APU is not running.

ECAM APU PAGE

Applicable to: B-HSQ, B-HSR

3



(1) AVAIL
Displayed in green when APU N is above 95 %.

(2) APU bleed air valve position

Inline-Green	:	The APU bleed air valve is not closed.
Crossline-Green	:	The APU bleed air valve is closed.
Crossline-Amber	:	The APU bleed air valve is closed and the APU bleed is ON.
XX-Amber	:	The APU bleed air valve status information is not available, or the APU BLEED pb status is not available.

(3) APU bleed air pressure
This box displays the relative bleed air pressure in green.
It shows an amber XX when the ADIRS1 is not available or selected OFF or the data from the ECB are invalid or not transmitted.

(4) APU GEN line contactor indication
Displayed in green when the APU GEN line contactor is closed.

(5) APU GEN parameters
Identical to the APU GEN parameters on the ELEC page.

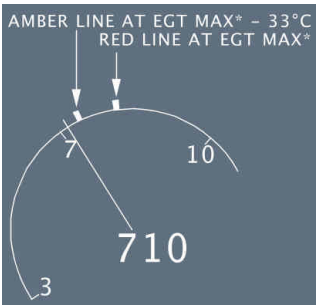
(6) FUEL LO PR
Displayed in amber if APU fuel pressure gets low.

(7) FLAP OPEN
Displayed in green when APU air intake flap is fully open.

(8) APU N

- Displays APU speed in green.
- Becomes amber when N ≥ 102 %.
- Becomes red when N ≥ 107 %.

(9) APU EGT



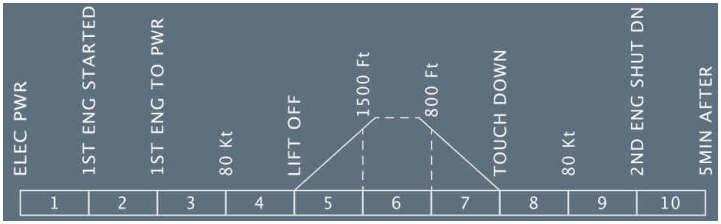
- Displays APU EGT in green.
- Becomes amber when EGT ≥EGT MAX See *-33 °C.
- Becomes red when EGT ≥EGT MAX See * (automatic shutdown begins).

* ECB calculates EGT MAX and transmits it to the ECAM. It is a function of N during start, and a function of ambient temperature when the APU is running.
Maximum EGT during start: 1 090 °C.
Maximum EGT with APU running: 675 °C.

(10) LOW OIL LEVEL
Advisory: Displayed if the ECB detects a low APU oil level when the aircraft is on the ground, and the APU is not running.

WARNINGS AND CAUTIONS

Applicable to: B-HSQ, B-HSR



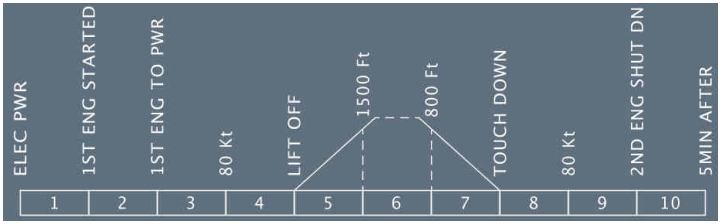
E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
AUTO SHUT DOWN automatic shut down of APU for a reason other than a fire.	SINGLE CHIME	MASTER CAUT	APU	APU MASTER SW FAULT lt	3, 4, 5, 7, 8
EMER SHUT DOWN use of APU shut off pushbutton on external power panel or APU FIRE pushbutton pushed. In case of APU fire on ground, the APU FIRE warning is triggered.					

MEMO DISPLAY

APU AVAIL appears in green when APU N is above 95 %.

WARNINGS AND CAUTIONS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
AUTO SHUT DOWN automatic shut down of APU for a reason other than a fire.	SINGLE CHIME	MASTER CAUT	APU	APU MASTER SW FAULT lt	3, 4, 5, 7, 8
EMER SHUT DOWN use of APU shut off pushbutton on external power panel or APU FIRE pushbutton pushed. In case of APU fire on ground, the APU FIRE warning is triggered.					

MEMO DISPLAY

APU AVAIL appears in green when APU N is above N > 99.5 % or 2 s after N is above 95 %.

BUS EQUIPMENT LIST

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

	NORM			EMER ELEC		
	AC	DC	DC BAT	AC ESS	DC ESS	HOT
ECB SUPPLY			X			
STARTER MOTOR			X			

Note: When the system is in electrical emergency configuration, battery contactors automatically close for a maximum of 3 min when the APU MASTER SW is ON, except when the landing gear is down.
When the aircraft is in flight, and when the system is in electrical emergency configuration, the APU start is inhibited for 45 s.

BUS EQUIPMENT LIST

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

	NORM			EMER ELEC		
	AC	DC	DC BAT	AC ESS	DC ESS	HOT
ECB SUPPLY			X			
STARTER MOTOR			X			

Note: When the system is in electrical emergency configuration, battery contactors automatically close for a maximum of 3 min when the APU MASTER SW is ON.
When the aircraft is in flight, and when the system is in electrical emergency configuration, the APU start is inhibited for 45 s.

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AIRCRAFT SYSTEMS

DOORS

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DSC-52-PLP PRELIMINARY PAGES

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Localization Title	Toc Index	ID	Reason
DSC-52-10-10 Description	A	1	Improvement of illustration quality.
DSC-52-10-10 Description	A	2	Improvement of illustration quality.
DSC-52-10-20 Inside	C	1	Improvement of illustration quality.
DSC-52-10-20 Inside	C	2	Improvement of illustration quality.

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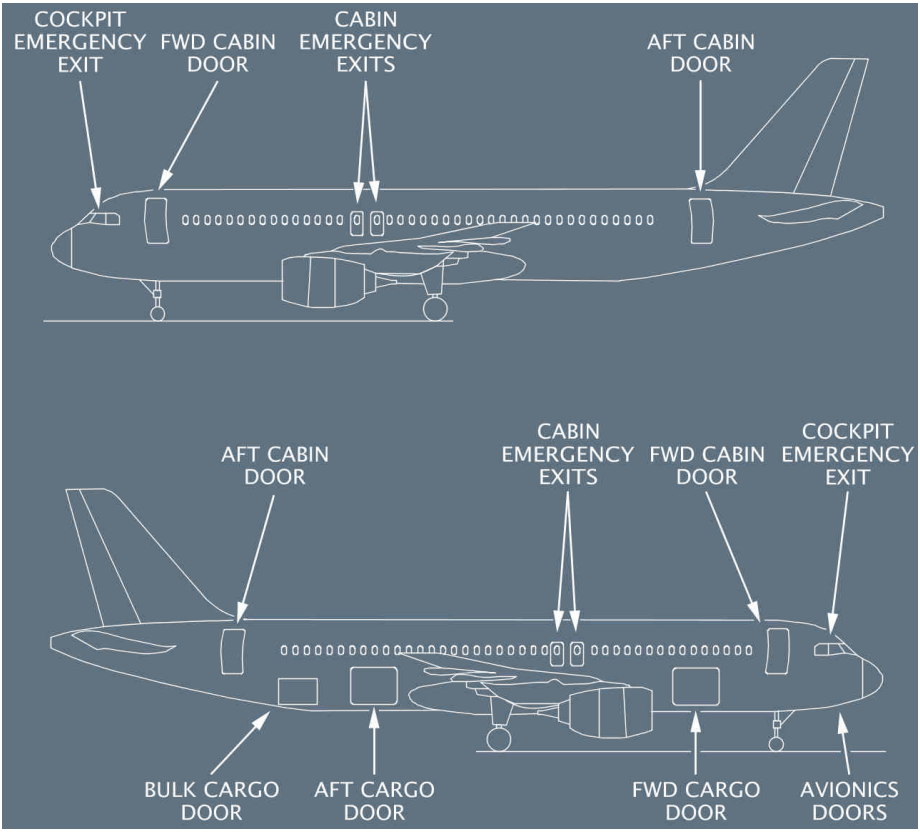
DESCRIPTION

Applicable to: ALL 320

1 The A320's fuselage has:

- Four passenger doors
- Four emergency exits in the cabin
- Cockpit emergency exits (two sliding windows)
- Three cargo compartment doors
- Four avionic compartment access doors.



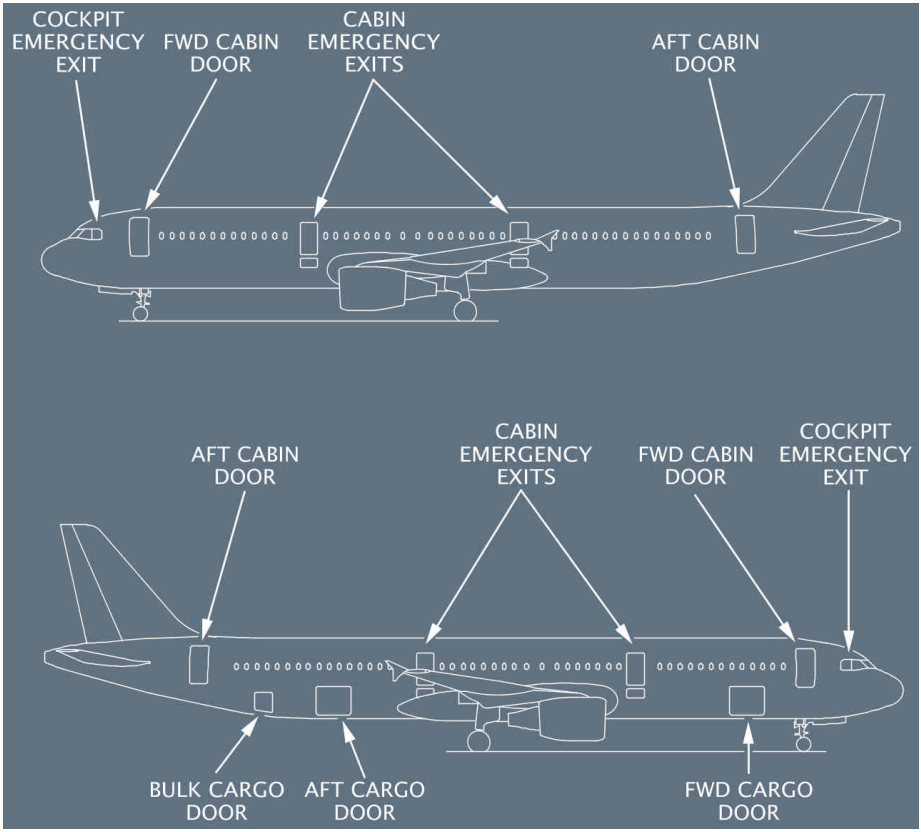
DESCRIPTION

Applicable to: ALL 321

2

The A321's fuselage has :

- Four passenger doors
- Four emergency exits in the cabin
- Cockpit emergency exits (two sliding windows)
- Three cargo compartment doors
- Four avionic compartment access doors.



GENERAL

Applicable to: ALL

The aircraft has four plug-type doors that open outward and forward. There are two of these on each side of the fuselage (two forward, two aft).
They can be operated from inside or outside the aircraft. Normal operation is manual, with hydraulic damping.

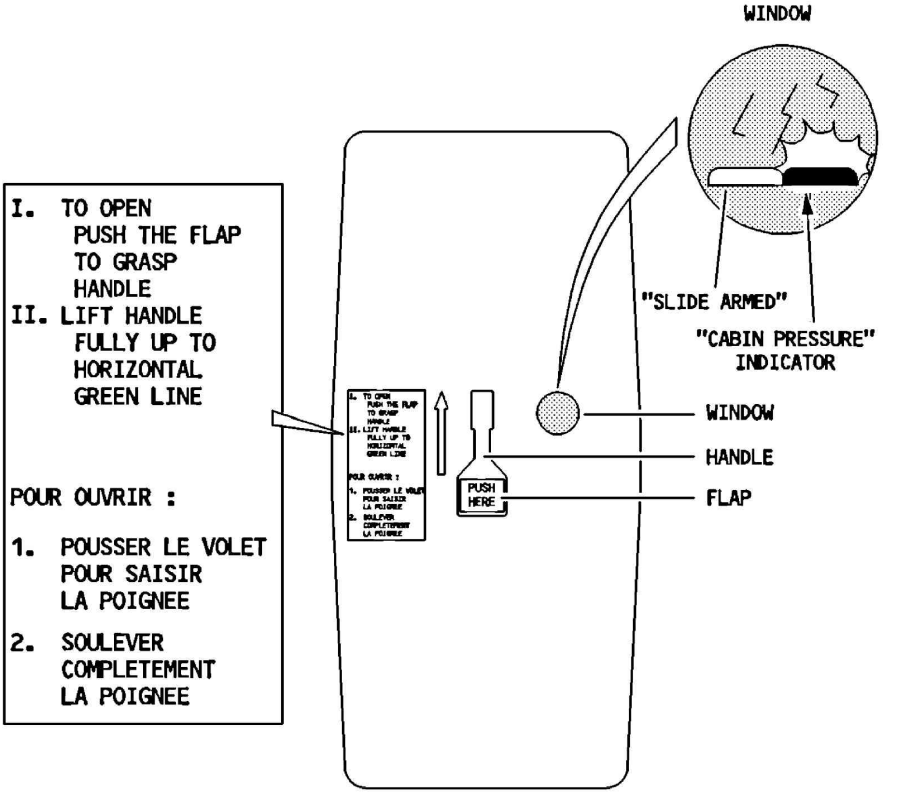
Each door has features that tailor it to emergency situations :
- An escape slide stowed in a container attached to the inboard lower side of the door
- A damper actuator that limits door travel in normal mode, but in an emergency acts as an actuator for automatic door opening
- A slide arming lever.

When the slide arming lever is in the ARMED position, the slide is connected to the floor brackets on both sides of the door. When the door is opened, the slide inflates and deploys automatically. If the inflation bottle fails to discharge automatically, a crew member can open its valve to make it perform its function.
Opening the door from the outside disarms the door and the escape slide.

Each passenger door has :
- A mechanical locking indicator that shows whether the door is locked or unlocked
- One warning light to show whether the escape slide is ARMED or DISARMED
- One CABIN PRESSURE warning light that warns of residual pressure in the cabin.

OUTSIDE

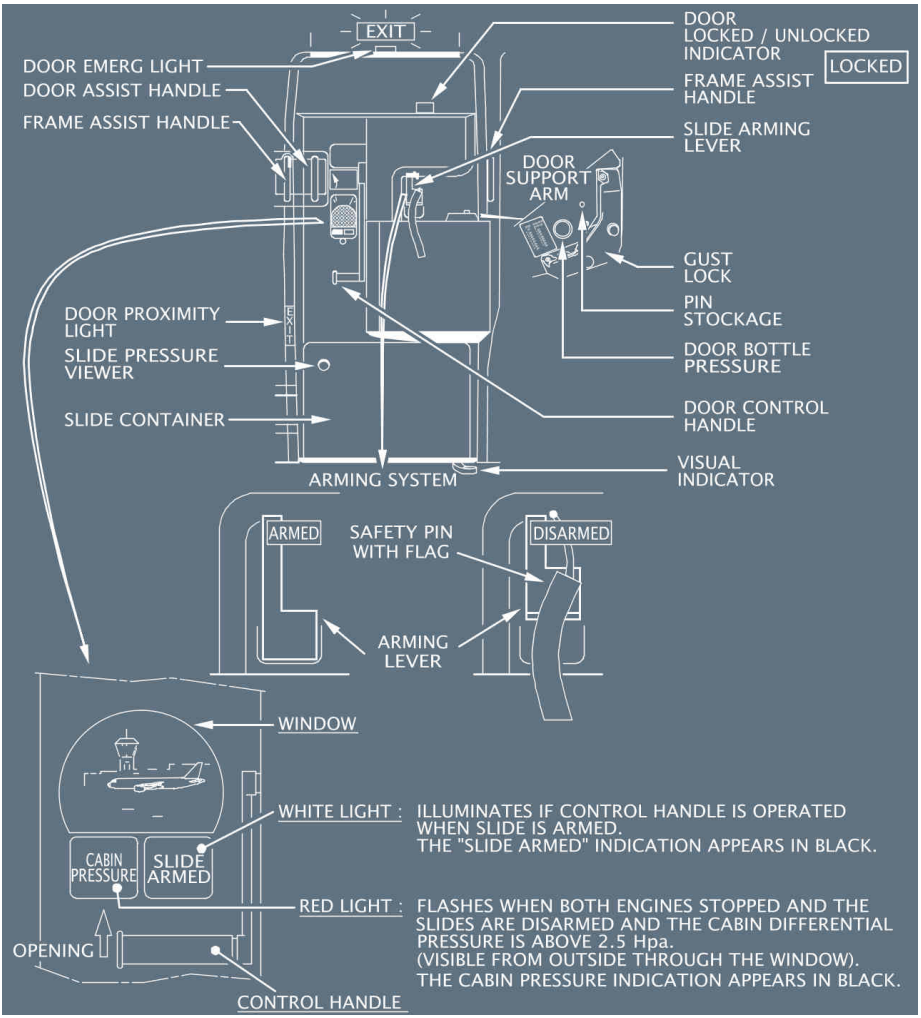
Applicable to: ALL



INSIDE

Applicable to: B-HTF

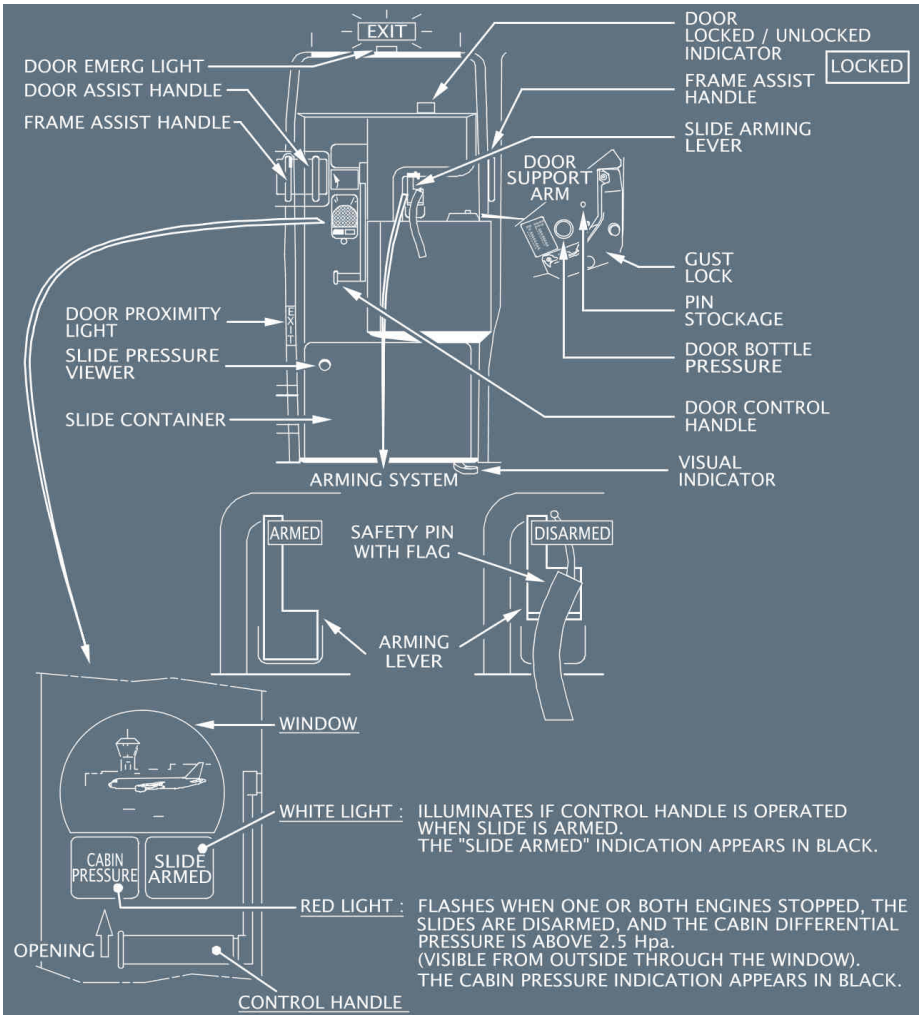
1



INSIDE

Applicable to: ALL 320, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

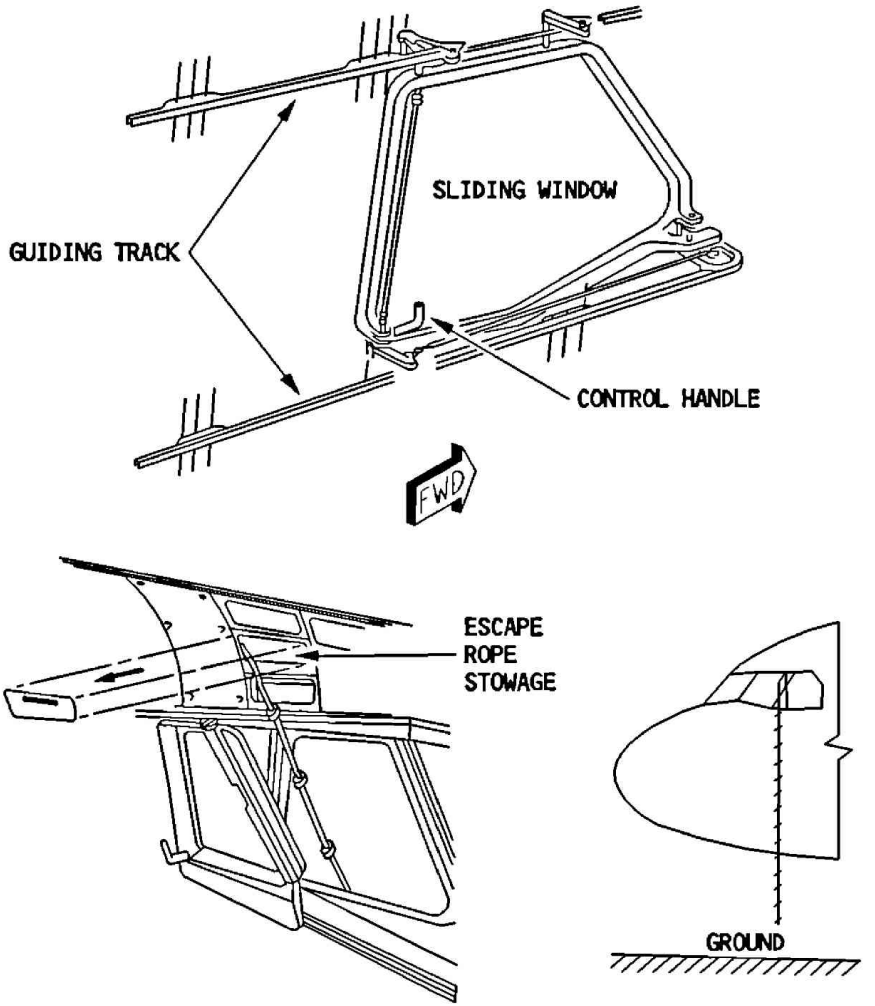
2



COCKPIT

Applicable to: ALL

The two sliding windows in the cockpit are flight crew emergency exits.
A small compartment, located above each window, contains an escape rope that is long enough to reach the ground when lowered through either sliding window.
The cockpit windows can only be opened from the inside.

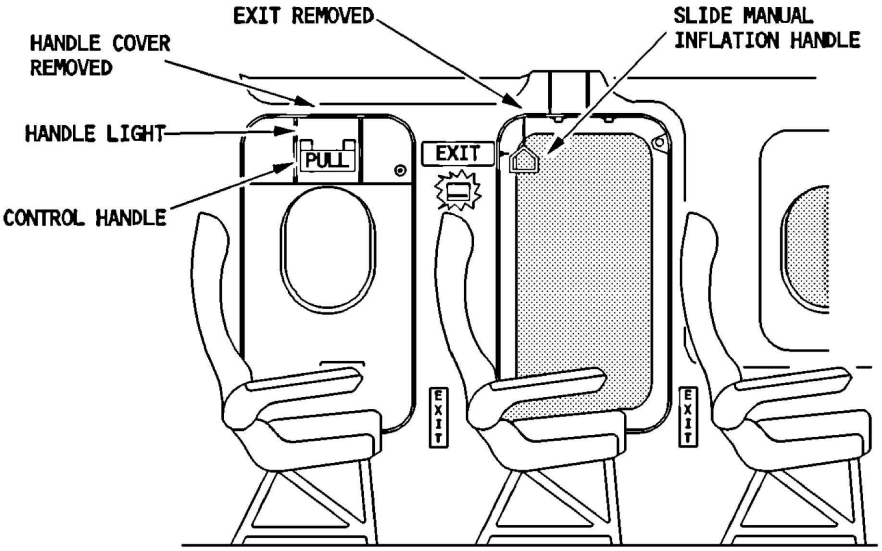


Emergency cockpit evacuation is also possible through the cockpit door escape panel. It is designed to be pushed open in the direction of the cabin after removal of the quick-release pins.

CABIN

Applicable to: ALL 320

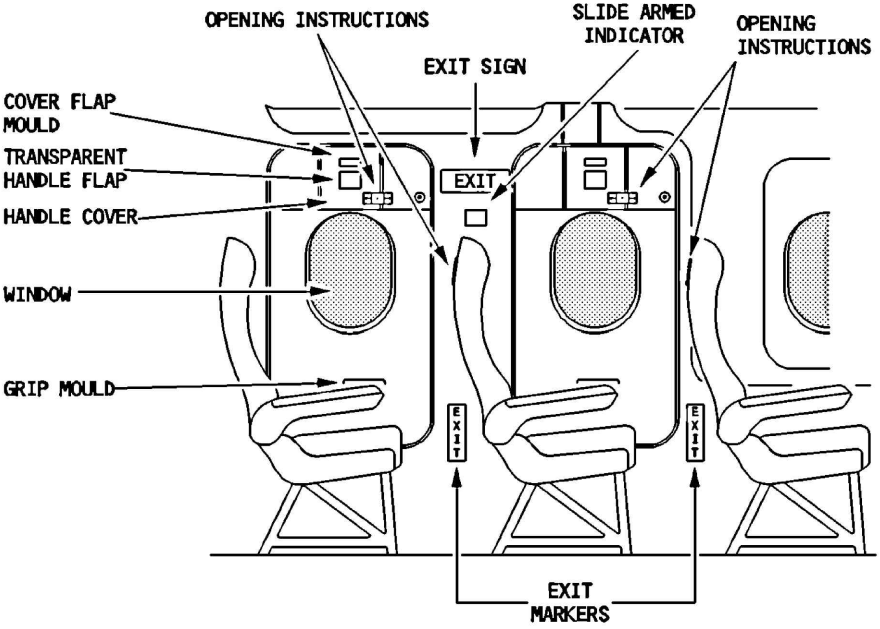
In case of an emergency, two inward opening emergency exits are provided on each side of the cabin, in addition to the regular cabin doors. They are also equipped with an escape slide.



The slides of the overwing emergency exits are always in armed configuration.

To open :

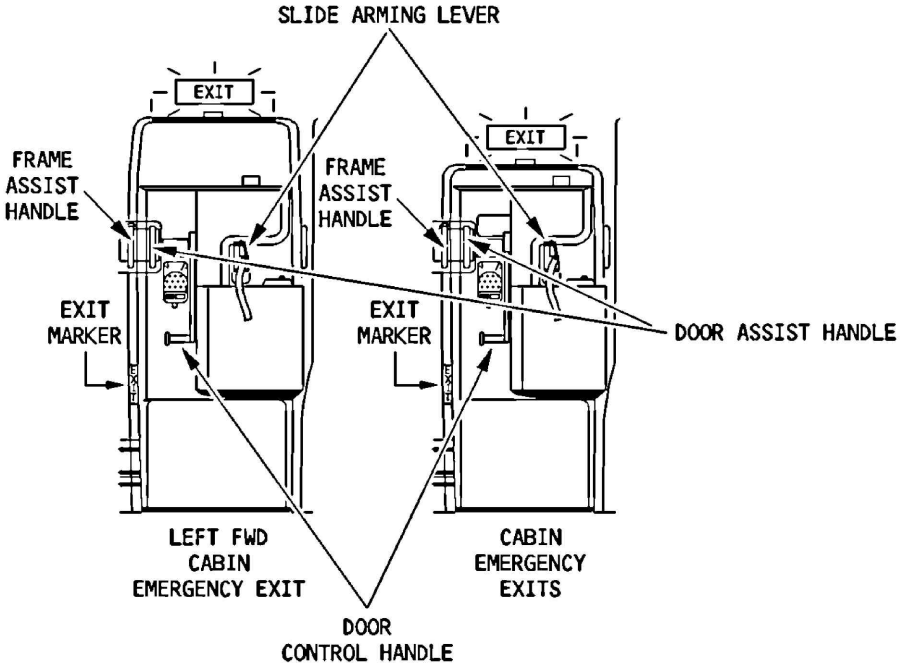
- Remove HANDLE COVER : The HANDLE LIGHT and SLIDE ARMED indicator illuminate.
- Pull CONTROL HANDLE : The EXIT moves inwards.
- Lift EXIT from frame by holding the GRIPMOULD.
- Throw EXIT out.



CABIN

Applicable to: ALL 321

Two plug type doors on each side of the cabin are emergency exits. They open outward and forward and each has an escape slide stowed in a compartment below the cabin floor.
Operation of these exits is similar to that of passenger doors.


SLIDE ARMING LEVER
EXIT
EXIT
FRAME ASSIST HANDLE
FRAME ASSIST HANDLE
EXIT MARKER
EXIT MARKER
DOOR ASSIST HANDLE
LEFT FWD CABIN EMERGENCY EXIT
CABIN EMERGENCY EXITS
DOOR CONTROL HANDLE

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GENERAL

Applicable to: ALL

The aircraft has two cargo doors (three cargo doors ◁) on the right side of the fuselage below the cabin floor.

FWD AND AFT CARGO DOORS

Applicable to: ALL

The yellow hydraulic system opens these doors outward and upward. They lock open or closed mechanically.
If the yellow system's electric pump fails, crewmen can use a hand pump to pressurize the system. This hand pump is on the hydraulic maintenance panel.
The FWD and AFT cargo doors can be opened from the outside only.

Note: *When the electric pump is operating the FWD or AFT cargo doors, the only other yellow system devices that can operate are braking and engine 2 reverse.*

BULK CARGO DOOR (IF INSTALLED)

Applicable to: ALL

The bulk cargo door opens inward and upward. It is a plug-type door that is mechanically locked and manually operated.
This door can be opened from the outside or from the inside.

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AVIONICS COMPARTMENT ACCESS DOOR

Applicable to: ALL

Four inward opening, manually operated, hinged doors give external access to the avionics compartments. These doors are in the lower fuselage, around the nose landing gear bay.

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COCKPIT DOOR

Applicable to: ALL

Refer to DSC-25-11-10 Cockpit Door Description for information about the secured cockpit door.

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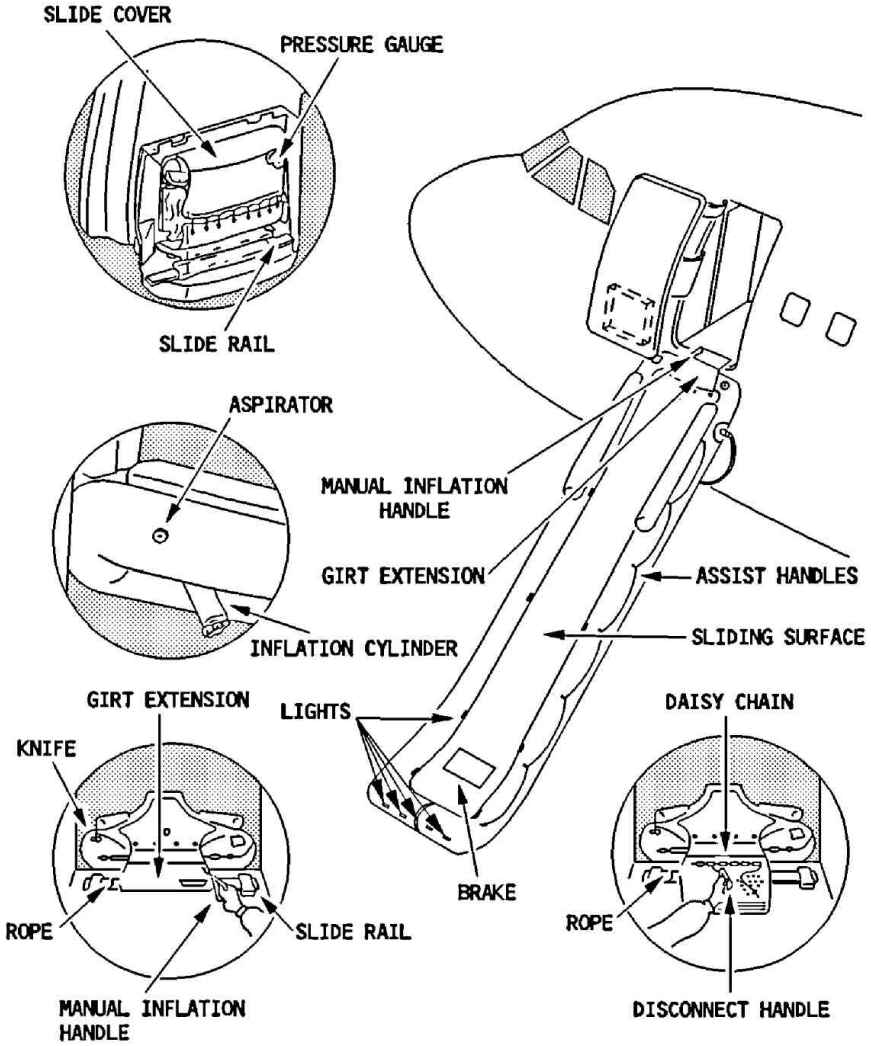
DOOR SLIDES

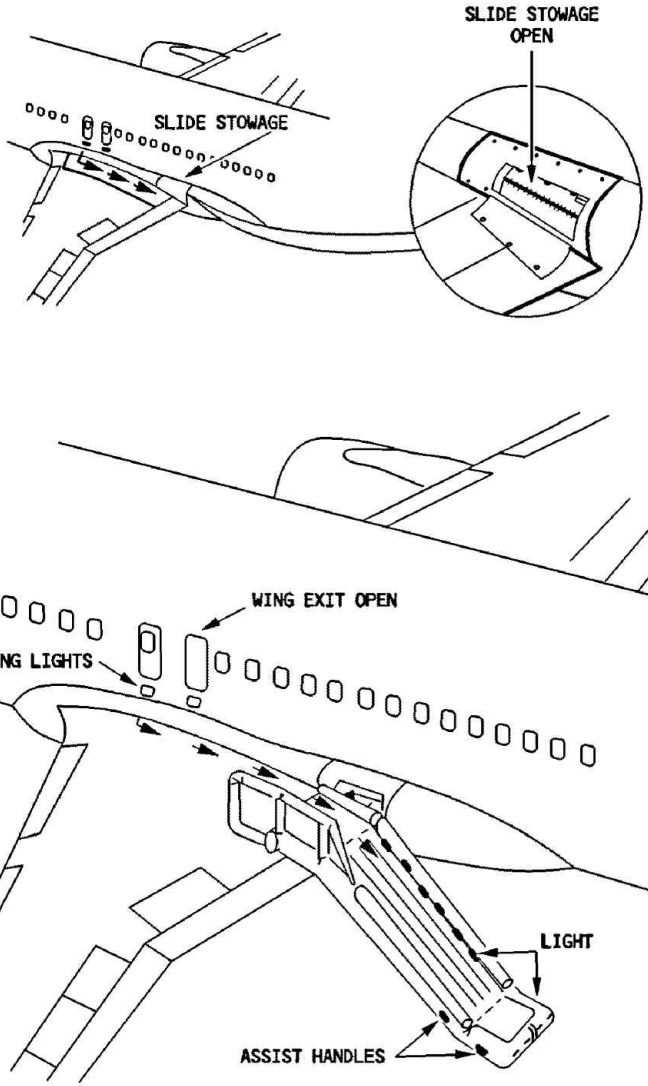
Applicable to: ALL



NOTE : THE ROPE MUST BE CUT AFTER DISCONNECTION

WING SLIDES

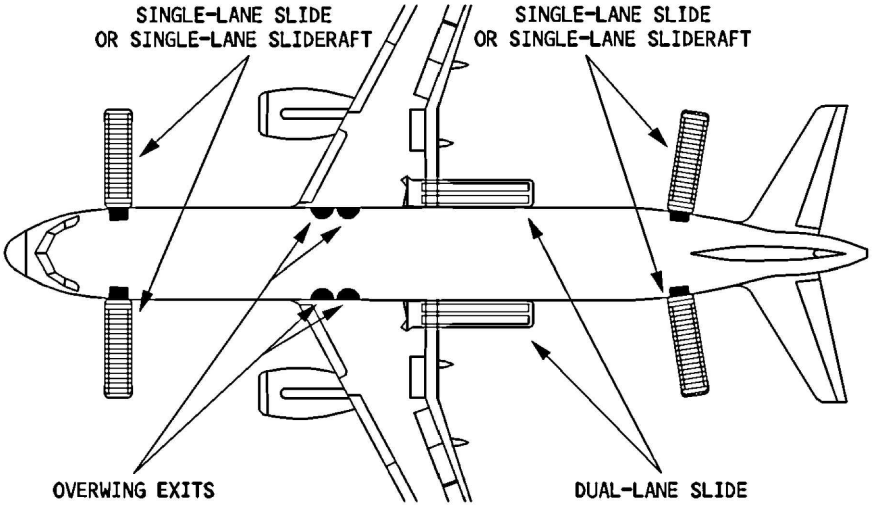
Applicable to: ALL 320


SLIDE STOWAGE
OPEN
SLIDE STOWAGE
WING EXIT OPEN
WING LIGHTS
LIGHT
ASSIST HANDLES

ESCAPE SLIDE ARRANGEMENT

Applicable to: ALL 320

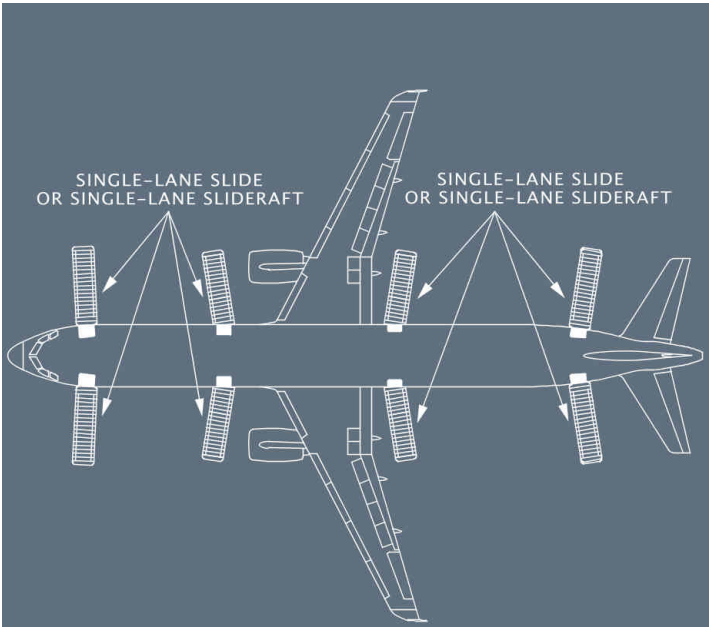
Each passenger door either has a single-lane escape slide, or a single-lane slideraft, and each emergency exit has a dual-lane escape slide.



ESCAPE SLIDE ARRANGEMENT

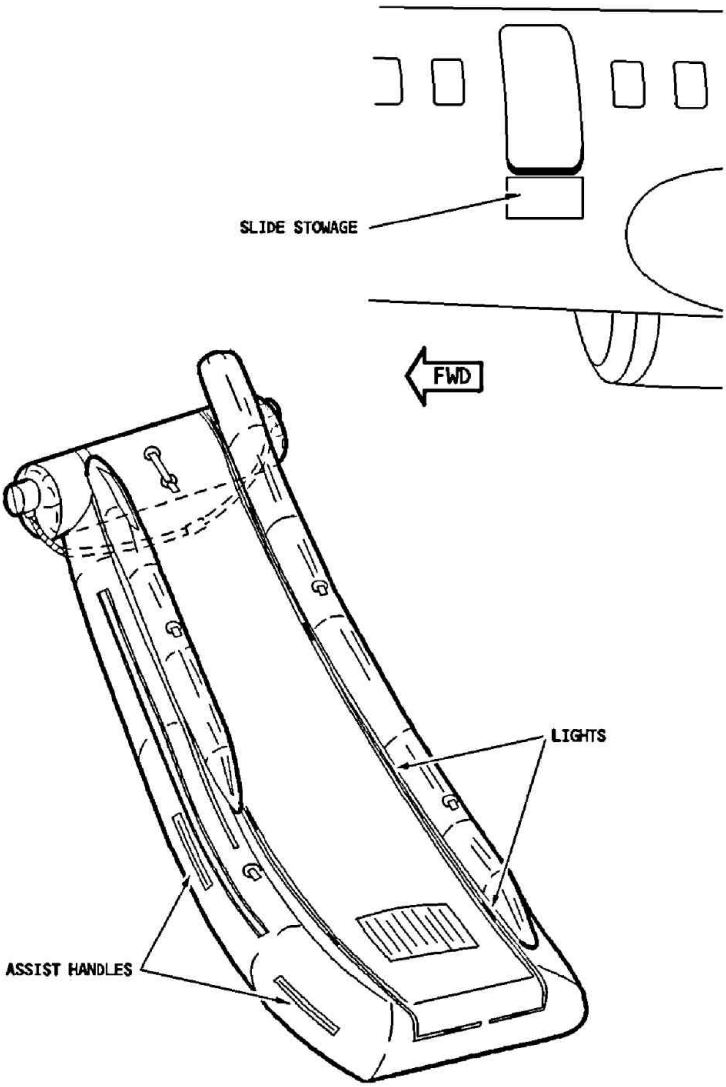
Applicable to: ALL 321

Each passenger door and emergency exit either has a single-lane escape slide, or a single-lane slideraft. In addition, to accommodate high density configurations, additional rafts may be installed in the overhead stowage compartments that are located near the doors.


SINGLE-LANE SLIDE
OR SINGLE-LANE SLIDERAFT
SINGLE-LANE SLIDE
OR SINGLE-LANE SLIDERAFT

CABIN EMERGENCY EXIT SLIDES

Applicable to: ALL 321


SLIDE STOWAGE
FWD
LIGHTS
ASSIST HANDLES

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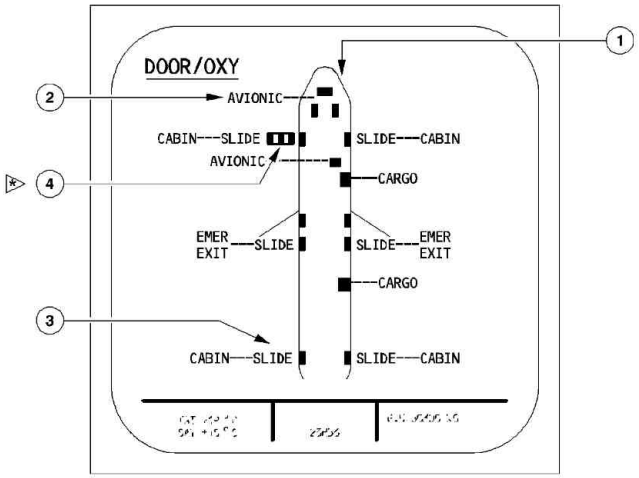
DOOR/OXY SD PAGE

Applicable to: ALL 321



(1) Door Symbol

Green □ : The door is closed and locked.

Amber ■ : The door is not locked.

(2) Door Indication

This appears amber when the door is not locked.

(3) SLIDE Indication

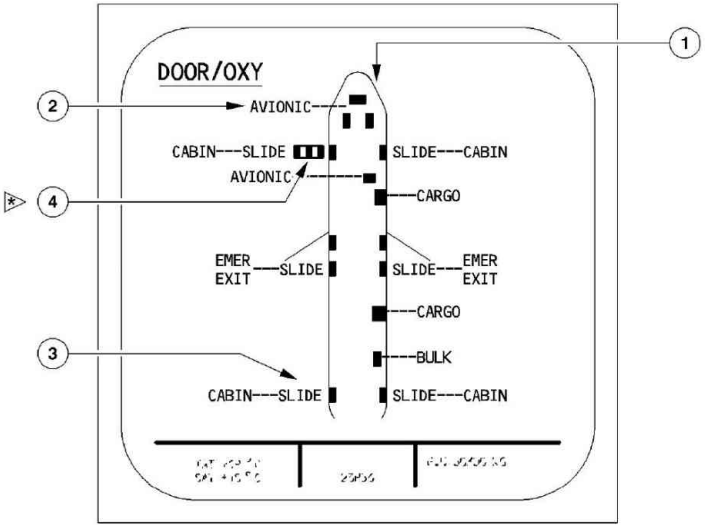
This appears white when the slide is armed.

(4) Stair Symbol

This appears in amber when the stair door is not closed.

DOOR/OXY SD PAGE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK



(1) Door Symbol

Green □ : The door is closed and locked.

Amber ■ : The door is not locked.

(2) Door Indication

This appears amber when the door is not locked.

(3) Slide Indication

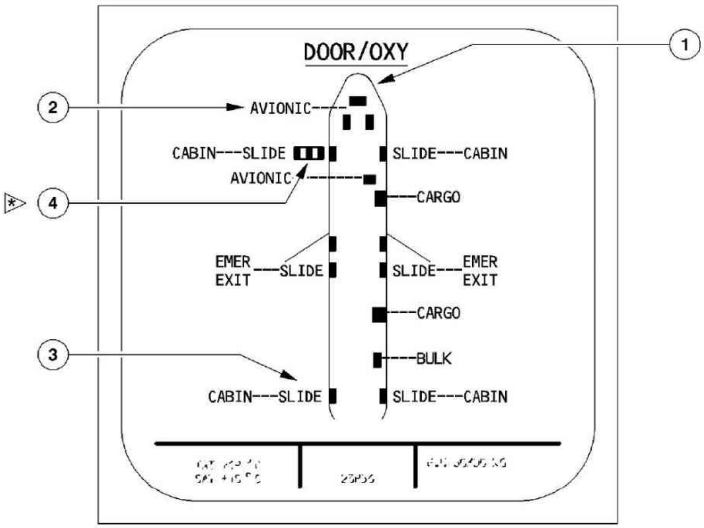
This appears white when the slide is armed.

(4) Stair Symbol

This appears in amber when the stair door is not closed.

DOOR/OXY SD PAGE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU



(1) Door Symbol

Green □ : The door is closed and locked.

Amber ■ : The door is not locked.

(2) Door Indication

This appears in amber, when the door is not locked.

(3) Slide Indication

This appears in white, when the slide is armed.

(4) Stair Symbol

This appears in amber, when the stair door is not closed.

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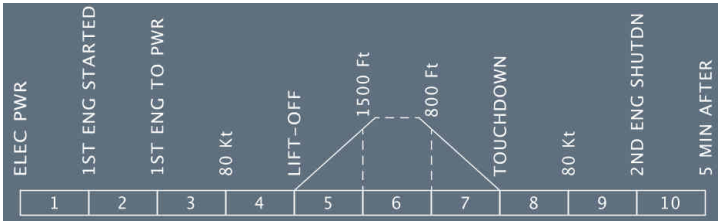
WARNINGS AND CAUTIONS

Applicable to: ALL



E/WD : FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
L(R) FWD (AFT) AVIONICS **L(R) FWD CABIN** **L(R) AFT CABIN** **L(R) FWD EMER EXIT** **L(R) AFT EMER EXIT** **FWD CARGO** **AFT CARGO** **BULK CARGO** ◁ **STAIRS** ◁ Affected door not closed (proximity detectors)	SINGLE CHIME	MASTER CAUT	DOOR	NIL	1, 4, 5, 7, 8, 10

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BUS EQUIPMENT LIST

Applicable to: ALL

	NORM		EMER ELEC		
	AC	DC	AC ESS	DC ESS	HOT
DOORS and SLIDES CTL		DC BAT (1)			HOT2 (1)
CARGO DOORS		DC GRND FLT			
AIR STAIRS		DC2			HOT2 (2)

(1) *STBY supply (normally supplied by the EMER PWR SUPPLY UNIT)*
(2) *STBY supply*

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AIRCRAFT SYSTEMS

POWER PLANT

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DSC-70-PLP PRELIMINARY PAGES

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Power Supply ..... D

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AUTOMATIC MODE ..... B
THRUST CONTROL C

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FUEL PUMP UNIT ..... A

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FUEL OIL HEAT EXCHANGER....A
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IDLE CONTROL....B
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ACTUATION LOGIC....B
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SCHEMATIC....D

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DSC-70-80-30 Ignition System
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AUTOMATIC STARTING....B
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DSC-70-95 Controls and Indicators (IAE)

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Overhead Panel....B
MAINTENANCE PANEL....C
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Warnings and Cautions....E

DSC-70-98 ELECTRICAL SUPPLY

ELECTRICAL SUPPLY....A

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Localization Title	Toc Index	ID	Reason
DSC-70-20 Power Supply	D	1	Improvement of illustration quality.
DSC-70-20 Power Supply	D	2	Improvement of illustration quality.
DSC-70-35-30 Thrust Levers	A	1	Improvement of illustration quality.
DSC-70-45-60 Two Returns to Tank Modes	B	1	Improvement of illustration quality.
DSC-70-80-40 Automatic Starting Sequence	C	1	Improvement of illustration quality.
DSC-70-80-40 Automatic Starting Sequence	C	2	Improvement of illustration quality.
DSC-70-95 Pedestal	A	1	Improvement of illustration quality.
DSC-70-95 ECAM - Primary Parameters	D	2	Enhancement of the N1 and N2 indications description. Enhancement of the N2 indication description. Addition of information relative to the intermittent loss of N2 indication during engine start.
DSC-70-95 ECAM - Primary Parameters	D	3	Enhancement of the N2 indication description. Addition of information relative to the intermittent loss of N2 indication during engine start. Enhancement of the N1 and N2 indications description.
DSC-70-95 ECAM - Primary Parameters	D	4	Enhancement of the N2 indication description. Addition of information relative to the intermittent loss of N2 indication during engine start. Enhancement of the N1 and N2 indications description.
DSC-70-95 ECAM - Primary Parameters	D	5	Enhancement of the N2 indication description. Addition of information relative to the intermittent loss of N2 indication during engine start. Enhancement of the N1 and N2 indications description.
DSC-70-95 ECAM - Primary Parameters	D	6	Enhancement of the N2 indication description. Addition of information relative to the intermittent loss of N2 indication during engine start. Enhancement of the N1 and N2 indications description.
DSC-70-95 ECAM - Secondary Parameters	D	7	Improvement of illustration quality.
DSC-70-95 ECAM - Secondary Parameters	D	8	Improvement of illustration quality.

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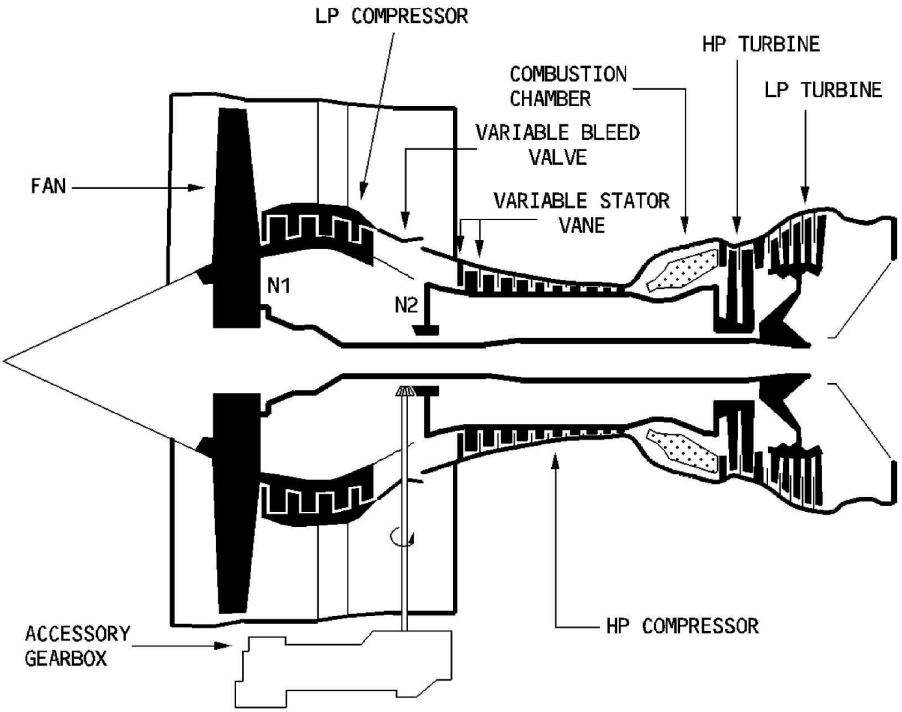
GENERAL

Applicable to: ALL

The V2500-A5 engine is a high bypass ratio turbofan.

DESCRIPTION

Applicable to: ALL



LOW-PRESSURE (LP) COMPRESSOR/TURBINE

The low-speed rotor (N1) consists of a front fan (single-stage) and a four-stage LP compressor connected to a five-stage LP turbine.

HIGH-PRESSURE (HP) COMPRESSOR/TURBINE

The high-speed rotor (N2) consists of a ten-stage HP compressor connected to a two-stage HP turbine.

COMBUSTION CHAMBER

The annular combustion chamber is fitted with 20 fuel nozzles and 2 igniters.

ACCESSORY GEARBOX

The accessory gearbox, located at the bottom of the fan case, receives torque from horizontal HP rotor drive shaft and drives gearbox mounted accessories.

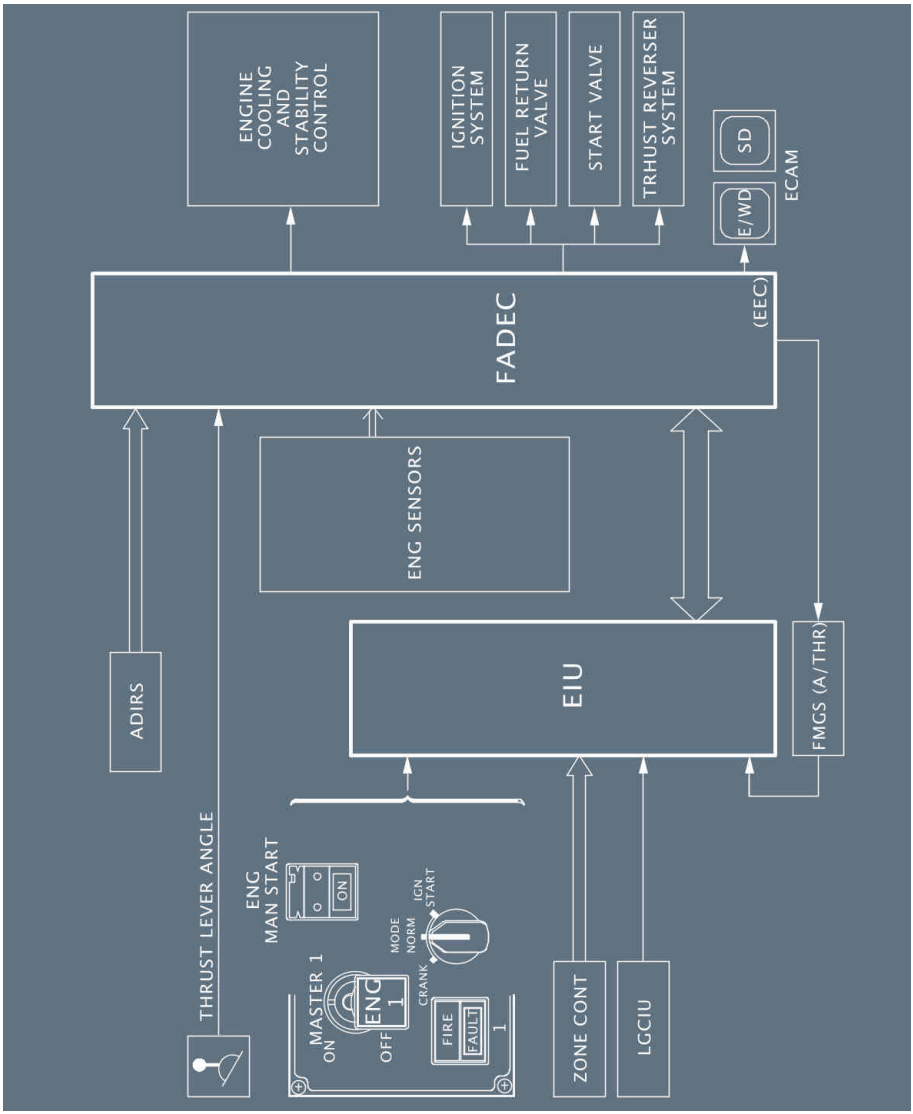
GENERAL

Applicable to: ALL

Each powerplant has a FADEC (Full Authority Digital Engine Control) system.
FADEC, also called the Electronic Engine Control (EEC), is a digital control system that performs complete engine management.
FADEC has two-channel redundancy, with one channel active and one in standby.
If one channel fails, the other automatically takes control.
The system has a magnetic alternator for an internal power source.
FADEC is mounted on the fan case.
The Engine Interface Unit (EIU) transmits to FADEC the data it uses for engine management.

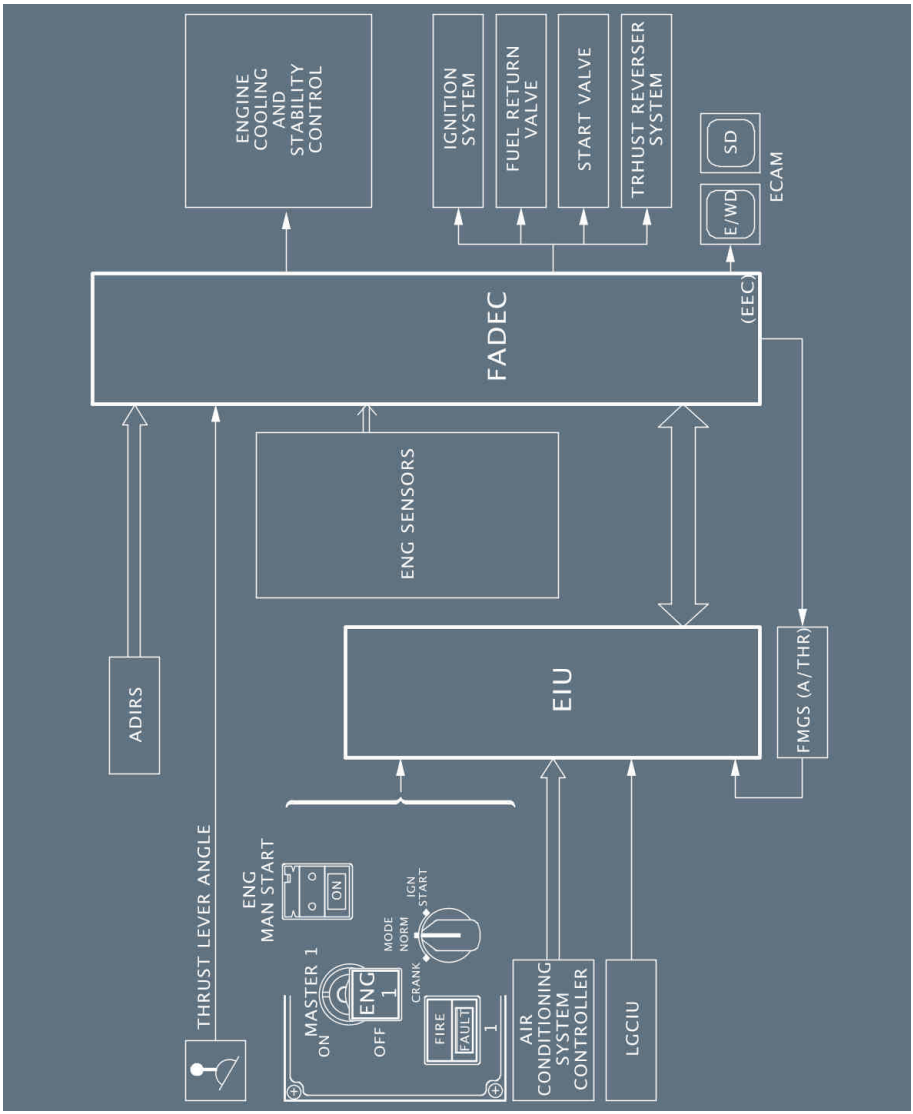
ARCHITECTURE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN


ENGINE COOLING AND STABILITY CONTROL
IGNITION SYSTEM
FUEL RETURN VALVE
START VALVE
THRUST REVERSER SYSTEM
SD
E/WD
ECAM
FADEC
(EEC)
ENG SENSORS
EIU
ADIRS
FMGS (A/THR)
THRUST LEVER ANGLE
ENG MAN START
ON
MODE NORM
IGN START
CRANK
MASTER 1
ON
OFF
ENG 1
FIRE
FAULT
1
ZONE CONT
LGCIU

ARCHITECTURE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU


ENGINE COOLING AND STABILITY CONTROL
IGNITION SYSTEM
FUEL RETURN VALVE
START VALVE
THRUST REVERSER SYSTEM
SD
E/WD
ECAM
FADEC
(EEC)
ENG SENSORS
ADIRS
EIU
FMGS (A/THR)
THRUST LEVER ANGLE
ENG MAN START
ON
MODE NORM
IGN START
CRANK
MASTER 1
ON
OFF
ENG 1
FIRE
FAULT
1
AIR CONDITIONING SYSTEM CONTROLLER
LGCIU

FUNCTIONS

Applicable to: ALL

The FADEC system performs the following functions :

Control of gas generator

- control of fuel flow
- acceleration and deceleration schedules
- variable bleed valve and variable stator vane schedules
- control of turbine clearance
- idle setting

Protection against engine exceeding limits

- protection against N1 and N2 overspeed
- monitoring of EGT during engine start

Power management

- automatic control of engine thrust rating
- computation of thrust parameter limits
- manual management of power as a function of thrust lever position
- automatic management of power (A/THR demand).

Automatic engine starting sequence

- control of:
  - the start valve (ON/OFF)
  - the HP fuel valve
  - the fuel flow
  - the ignition (ON/OFF)
- monitoring of N1, N2, FF and EGT
- initiation of abort and recycle (on the ground only)

Manual engine starting sequence

- passive monitoring of engine
- control of:
  - the start valve
  - the HP fuel valve
  - the ignition

Thrust reverser control

- Actuation of the blocker doors
- Engine setting during reverser operation

Fuel recirculation control

- Recirculation of fuel to the fuel tanks, depending on the engine oil temperature, the fuel system configuration, and the flight phase.

Transmission of engine parameters and engine monitoring information to cockpit indicators:

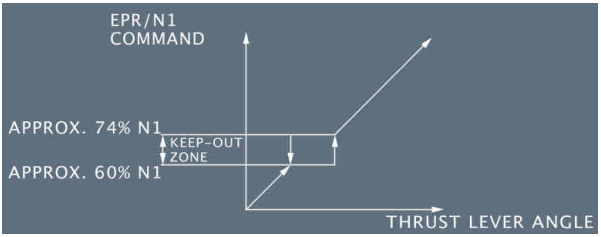
- Primary engine parameters
- Starting system status
- Thrust reverser system status
- FADEC system status

Detection, isolation, and recording of failures

FADEC cooling

Protection against fan flutter

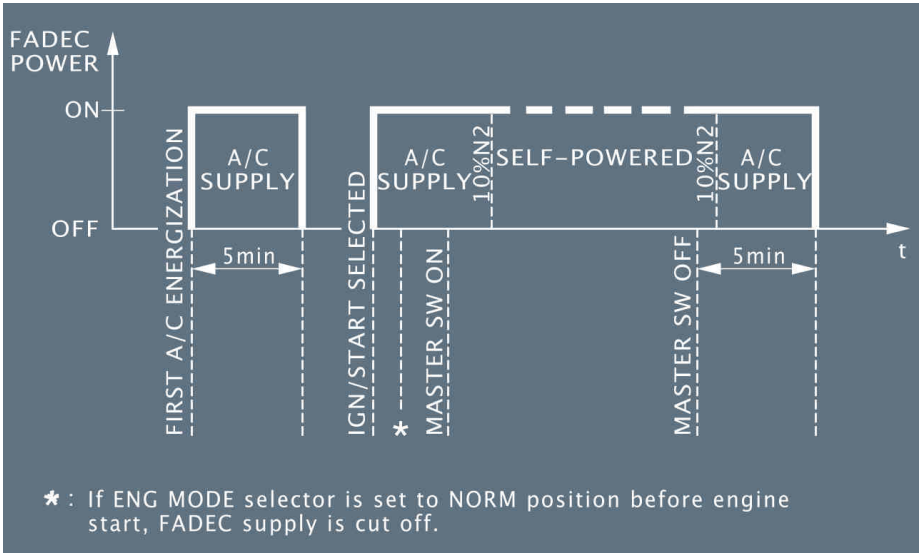
- When on ground at low speed (less than or equal to M 0.1), the Electronic Engine Computer (EEC) protects against fan flutter. In so doing, the EEC prevents the engine from being stabilized between an approximate range of 60 % to 74 % N1 (depending on the outside air temperature). Therefore, during engine acceleration on ground, the pilot may notice a non-linear thrust response to thrust lever movement.



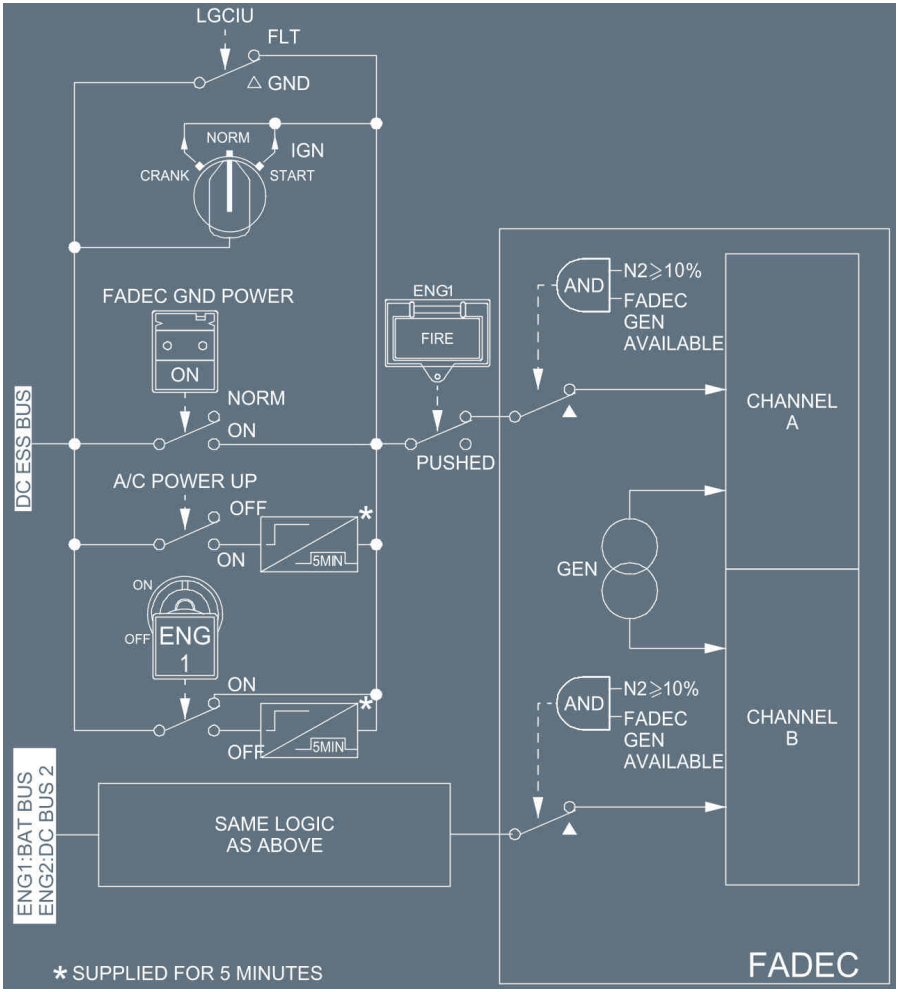
POWER SUPPLY

Applicable to: ALL

1 The FADEC system is self-powered above 10 % N2.
In case of a FADEC self-power loss, the aircraft electrical network automatically supplies the FADEC.


FADEC
POWER
ON
OFF
A/C
SUPPLY
5min
FIRST A/C ENERGIZATION
A/C
SUPPLY
IGN/START SELECTED
10%N2
SELF-POWERED
10%N2
A/C
SUPPLY
MASTER SW ON
MASTER SW OFF
5min
t
* : If ENG MODE selector is set to NORM position before engine start, FADEC supply is cut off.

2 L3 FADEC POWER SUPPLY



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GENERAL

Applicable to: ALL

A FADEC dedicated to each engine controls thrust.
The pilot uses the thrust levers to set the thrust in manual mode, and the FMGS sets the thrust in automatic mode.
The FADEC prevents the thrust from exceeding the limit for the thrust lever position in both manual and automatic modes.
The engine thrust setting is made through control of the Engine Pressure Ratio (EPR).

EPR = Low Pressure Turbine exhaust pressure (P5)/Engine inlet pressure (P2)

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GENERAL

Applicable to: ALL

The FADEC has two mode of power setting, EPR and N1 modes.

EPR MODE

Applicable to: ALL

EPR mode is the normal mode to control the thrust.
The required EPR is set by controlling the fuel flow.

The FADEC computes the command EPR as a function of :
- Thrust Lever Angle (TLA)
- Altitude
- Mach number
- Ambient temperature
- Air inlet total temperature (T2)
- Service bleed.

N1 MODES

Applicable to: ALL

If no EPR is available (either sensed or computed) the affected FADEC will automatically revert to N1 mode.
At the reversion to N1 mode (rated or unrated) an equivalent thrust to that achieved in EPR mode is provided until a thrust lever position change.
Autothrust control is lost. Alpha-floor protection is lost.
Depending on the failure case leading to EPR mode loss, the FADEC will revert to either rated or unrated mode.

RATED N1 MODE

An automatic reversion to rated N1 mode occurs in the event of loss of sensed EPR. This occurs when P2 (engine inlet total pressure) and/or P5 (LP turbine exit total pressure) engine parameters are not available.
The FADEC will determine N1 power setting as a function of TLA, altitude and engine inlet total temperature.
The rated N1 mode can also be manually selected through the ENG N1 MODE pb-sw on the overhead panel.

UNRATED N1 MODE

An automatic reversion to unrated N1 mode occurs in the event of loss of computed EPR due to the loss of T2 (engine inlet total air temperature) or ambient pressure (ambient pressure engine sensor) engine parameters.
The N1 is defined as a function of TLA only and is limited by the FADEC to either the smaller of maximum N1 or N1 redline (if T2 is available) or N1 redline (if T2 is not available).
The N1 rating limit, N1 TLA and maximum N1 indications on ECAM E/WD are lost.
The N1 DEGRADED MODE that can be displayed in some ECAM procedures is an N1 unrated mode.
In electrical emergency configuration, the EPR mode is lost on both engines, and each FADEC reverts to an N1 unrated mode.

Note: An overboost can occur during reversion in the unrated N1 mode, with thrust lever at full forward position.

EPR RECOVERY LOGIC

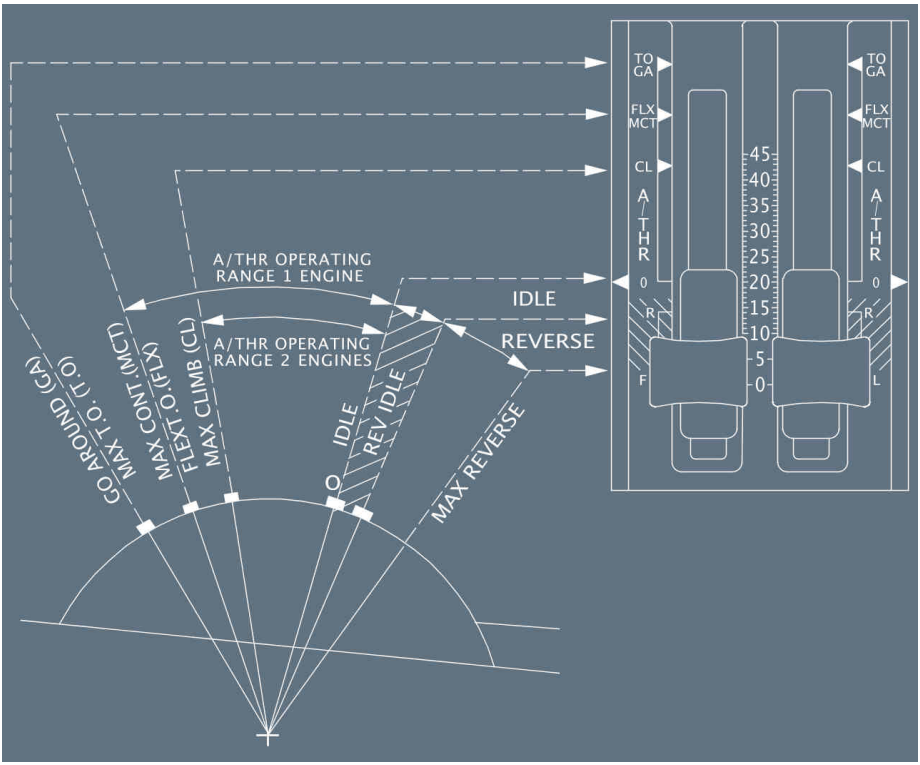
Applicable to: ALL

With the FADEC in either rated or unrated N1 mode, switching OFF the ENG N1 MODE pushbutton on the overhead panel will permit to return to the EPR mode if the failure has disappeared.

THRUST LEVERS

Applicable to: ALL

1



The thrust levers can only be moved manually.
They move over a sector that is divided into four operating segments.
The sector has five positions defined by detents or stops.
Thrust lever position is transmitted to the FADEC, which computes and displays the thrust rating limit and the N1 for that Thrust Lever Angle (TLA).

Note: *There is no reverse idle detent. When the pilot moves the lever out of the idle stop by pulling up the reverse lever on the front of the thrust lever, he selects reverse idle.*

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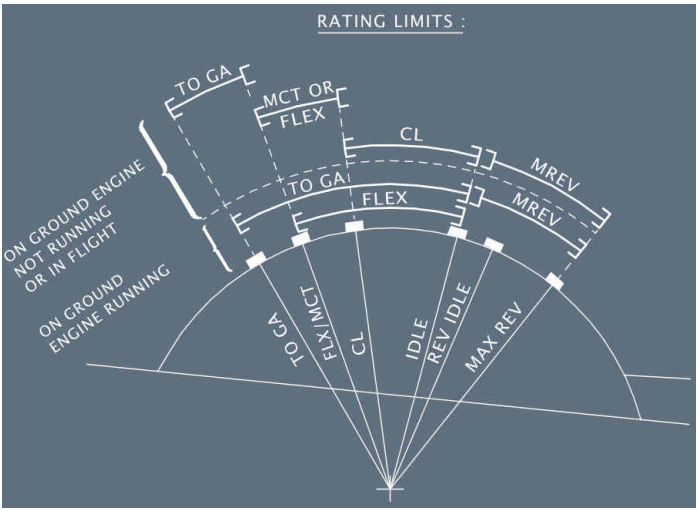
THRUST RATING LIMIT

Applicable to: ALL

The FADEC computes the thrust rating limit for each thrust lever position, as shown below.
If the thrust lever is set in a detent, the FADEC selects the rating limit corresponding to this detent.
If the thrust lever is set between two detents, the FADEC selects the rating limit corresponding to the higher detent.



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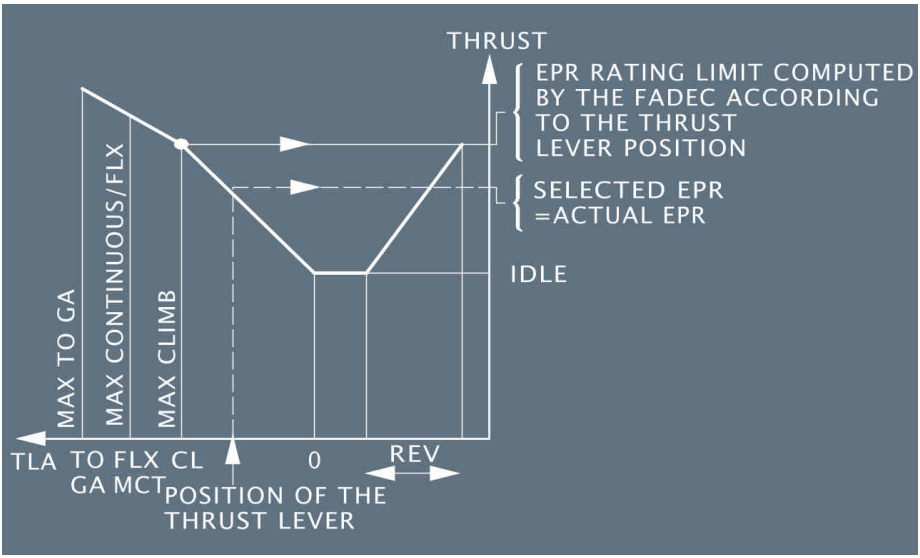
MANUAL MODE

Applicable to: ALL

The engines are in the manual mode provided the A/THR function is :

- not armed or
- armed and not active (thrust lever not in the A/THR operating range and no alpha floor).

In these conditions, each engine is controlled by the position of its thrust lever.
The pilot controls thrust by moving the thrust lever between IDLE and TOGA positions. Each position of the thrust lever within these limits corresponds to an EPR.
When the thrust lever is in a detent, the corresponding EPR is equal to the EPR rating limit computed by the FADEC for that engine.



When the thrust lever is in the FLX/MCT detent :

- **On the ground**
  The engine runs at the flex takeoff thrust rating if the crew has selected a flex takeoff temperature on the MCDU that is higher than the current Total Air Temperature (TAT).
  Otherwise the engine produces Maximum Continuous Thrust (MCT).

  Note: A change in FLEX TEMP during the takeoff has no effect on the thrust.

- **After takeoff**
  The pilot can change from FLX to MCT by moving the thrust lever to TOGA or CL, then back to MCT. After that, he cannot use the FLX rating.

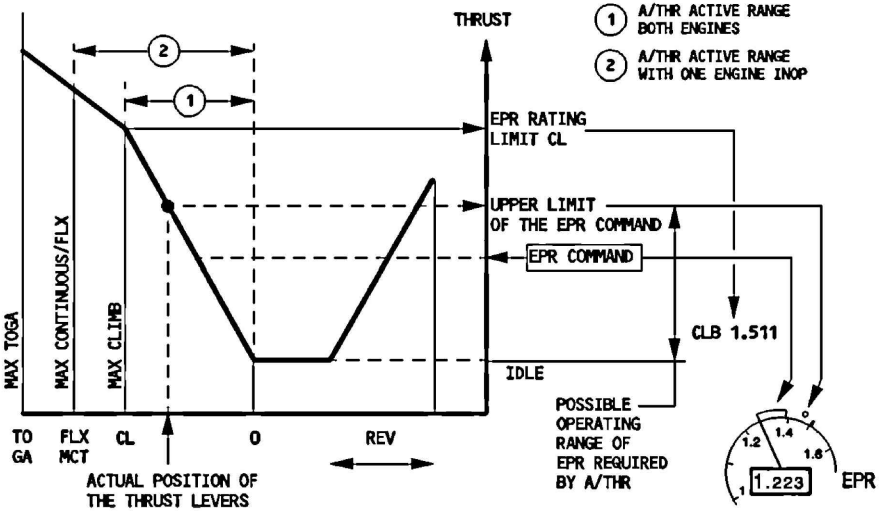
The pilot can always get MAX TO thrust by pushing the thrust lever all the way forward.

Note: Setting the thrust lever out of FLX/MCT detent without reaching TOGA or CL detent has no effect.

AUTOMATIC MODE

Applicable to: ALL

In the autothrust mode (A/THR function active), the FMGC computes the thrust, which is limited to the value corresponding to the thrust lever position (unless the alpha-floor mode is activated).



INDICATIONS ON FMA

The FADECs monitor the positions of the thrust levers, and trigger appropriate indications on the FMA.

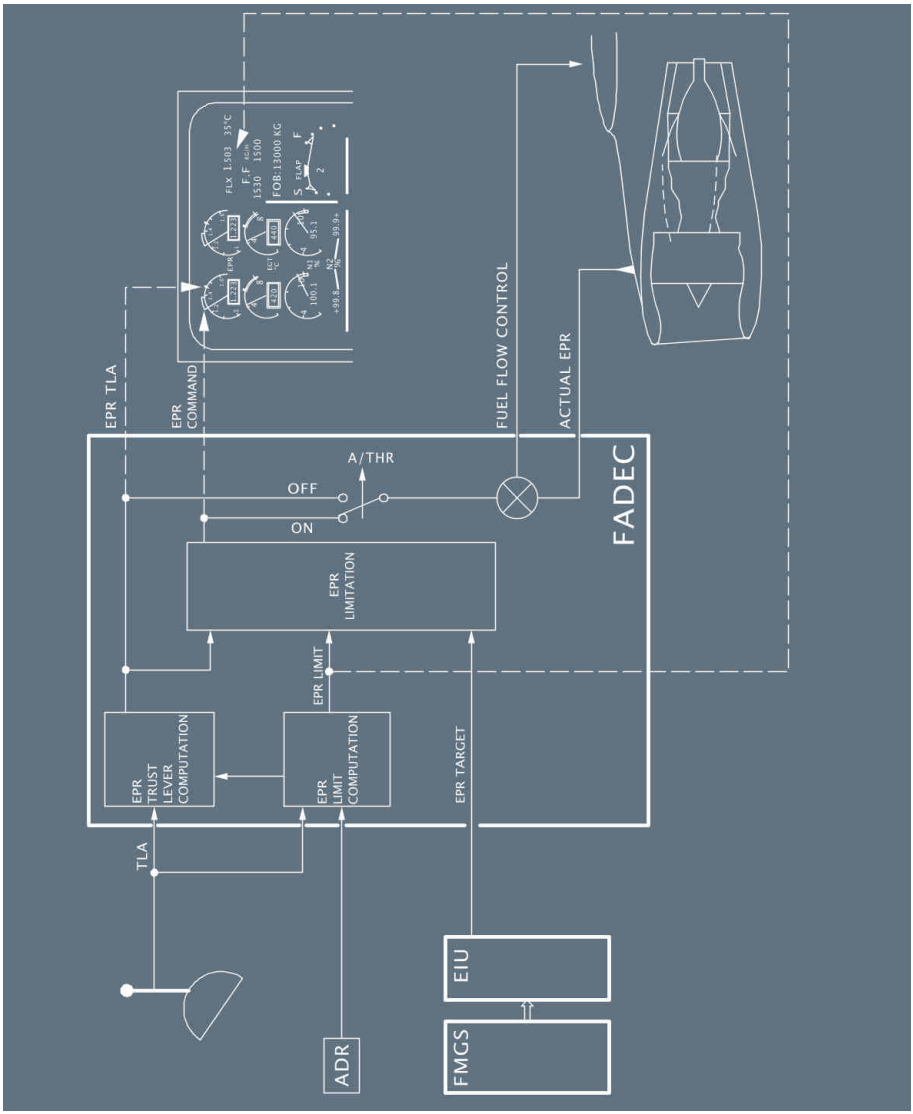
LVR ASYM : appears in amber (3rd line on the FMA) if, with A/THR active and both engines running, one thrust lever is set out of the CLB detent.

LVR CLB : flashes white (3rd line on the FMA) if the thrust levers are not in CL position while the aircraft is above the altitude of thrust reduction with both engines running.

LVR MCT : flashes white (3rd line on the FMA) if the thrust levers are not in MCT position after an engine failure (with speed above green dot).

THRUST CONTROL

Applicable to: ALL


EPR TLA
EPR COMMAND
FUEL FLOW CONTROL
ACTUAL EPR
A/THR
OFF
ON
FADEC
EPR LIMITATION
EPR LIMIT
EPR TRUST LEVER COMPUTATION
EPR LIMIT COMPUTATION
EPR TARGET
TLA
EIU
FMGS
ADR

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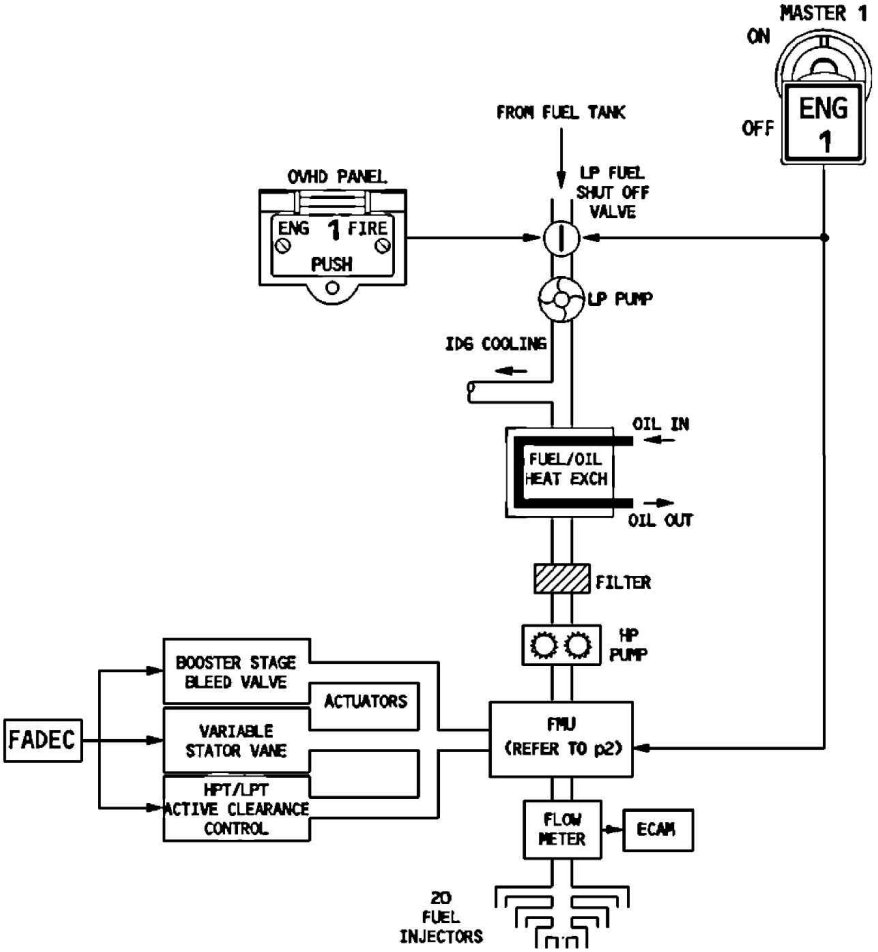
GENERAL

Applicable to: ALL

The fuel system enables the combustion of fuel under appropriate conditions of flow rate and pressure. The FADEC controls the fuel supply via the Fuel Metering Unit (FMU).
High pressure fuel is also used to provide pressure for some actuators.

The major components are :
- High and low pressure fuel pumps (dual unit)
- Fuel/oil heat exchanger
- Low pressure fuel filter
- Fuel Metering Unit (FMU)
- Fuel distribution valve
- 20 fuel injectors
- Diverter and return to tank valve
- IDG fuel/oil heat exchanger.


MASTER 1
ON
OFF
ENG 1
FROM FUEL TANK
OVHD PANEL
ENG 1 FIRE
PUSH
LP FUEL SHUT OFF VALVE
LP PUMP
IDG COOLING
OIL IN
FUEL/OIL HEAT EXCH
OIL OUT
FILTER
HP PUMP
BOOSTER STAGE BLEED VALVE
ACTUATORS
FADEC
VARIABLE STATOR VANE
HPT/LPT ACTIVE CLEARANCE CONTROL
FMU (REFER TO p2)
FLOW METER
ECAM
20 FUEL INJECTORS

FUEL PUMP UNIT

Applicable to: ALL

Consists of the low and high pressure stages which are driven from a common gearbox output shaft.

- The LP stage increases the pressure to :
  - suppress the cavitation
  - account for the pressure losses of the fuel oil heat exchanger and the low pressure fuel filter
  - provide enough pressure at the inlet of the HP stage
- The HP stage increases the pressure to the appropriate level for optimum fuel flow and atomization at all engine operating conditions.

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FUEL OIL HEAT EXCHANGER

Applicable to: ALL

Enables fuel to be heated by the oil, to reduce temperature of the oil, and prevent fuel icing.

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GENERAL

Applicable to: ALL

The FADEC controls the Fuel Metering Valve (FMV) which transforms its orders through three torque motors/servo valves.

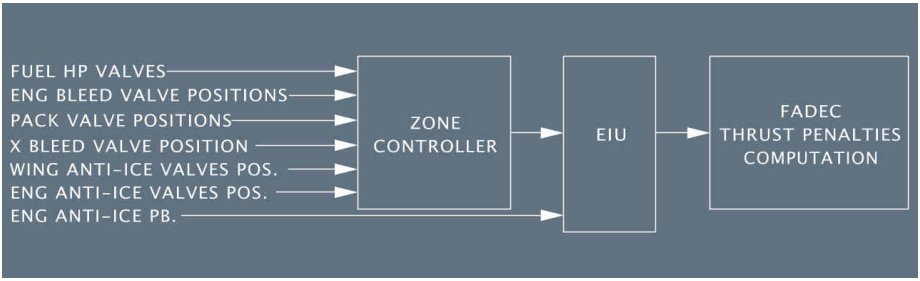
The FMV :
- controls the fuel flow
- protects against overspeeding (by reducing down to the minimum fuel flow).
- controls the shut off valve (to start or stop the engine)
- supplies high pressure fuel to the various actuators.

The three FADEC controlled torque motors are used to direct fuel servo pressure to open/close three valves :
- the fuel metering valve meters the fuel supply.
- The overspeed valve reduces the fuel flow in case of a FADEC detected overspeed. This reduction is made according to a preset value.
  Once this valve is operated it remains in the minimum fuel flow position until the engine is shutdown.
- The shut off valve opens/closes to isolate fuel supplies for starting or stopping the engine.

The servo pressure regulator regulates the pressure for FMU internal use.
The FADEC computes the fuel flow that will maintain the target EPR.
As the FADEC maintains this EPR, it allows N2 to vary while remaining between minimum N2 and maximum N2.

The FADEC also controls the engine parameters to :
- Limit acceleration and deceleration ;
- Avoid engine stall or flameout ;
- Limit maximum N1 and N2 ;
- Maintain air bleed pressure requirement.

The FADEC computes an N2 correction according to the bleed configuration.



IDLE CONTROL

Applicable to: ALL

The FADEC has the following three idle modes :

Modulated idle

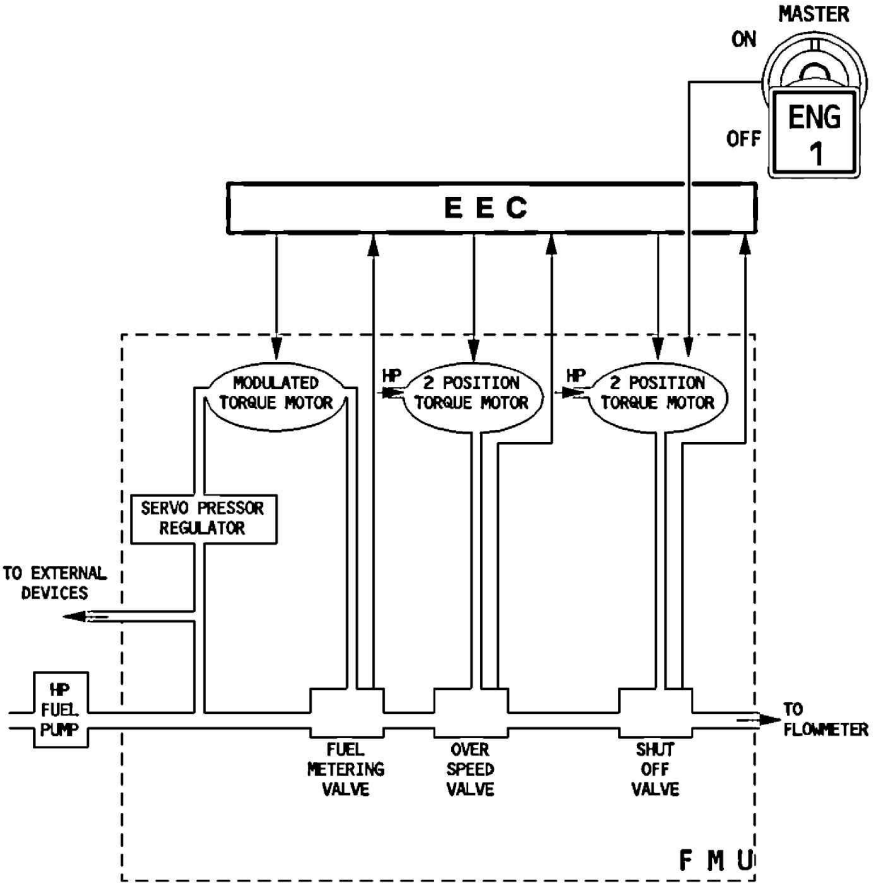
- Is regulated according to :
  - bleed system demand
  - ambient conditions
- Is selected :
  - In flight, when the flaps are retracted (FLAPS lever at zero position)
  - On ground, provided reverse is not selected.

Approach idle

- Is regulated according to aircraft altitude, regardless of bleed system demand.
- Is selected in flight, when the flaps are extended (FLAPS lever not at zero position)
- Allows the engine to accelerate rapidly from idle to go-around thrust.

Reverse idle

- Is selected on ground, when the thrust lever is in REV IDLE position.
- Is slightly higher than forward idle thrust.


MASTER
ON
OFF
ENG
1
E E C
MODULATED
TORQUE MOTOR
HP
2 POSITION
TORQUE MOTOR
HP
2 POSITION
TORQUE MOTOR
SERVO PRESSOR
REGULATOR
TO EXTERNAL
DEVICES
HP
FUEL
PUMP
FUEL
METERING
VALVE
OVER
SPEED
VALVE
SHUT
OFF
VALVE
TO
FLOWMETER
F M U

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FUEL FILTER

Applicable to: ALL

Cockpit indication is provided by a differential pressure switch.

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GENERAL

Applicable to: ALL

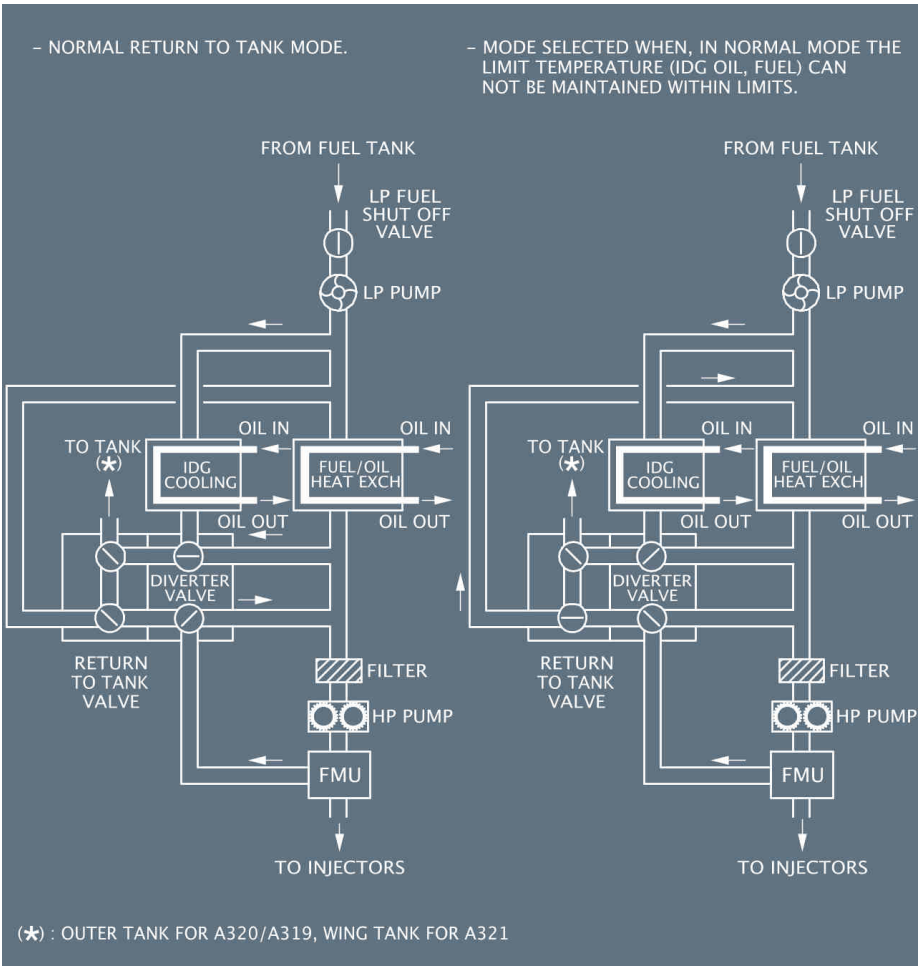
Cooling of IDG oil and engine oil are accomplished respectively by the IDG cooler and by the Fuel/Oil heat exchanger.

Fuel, IDG oil and engine oil temperatures are regulated by the EEC commanding the fuel diverter valve and the return to tank valve in four operation modes.

TWO RETURNS TO TANK MODES

Applicable to: ALL

1

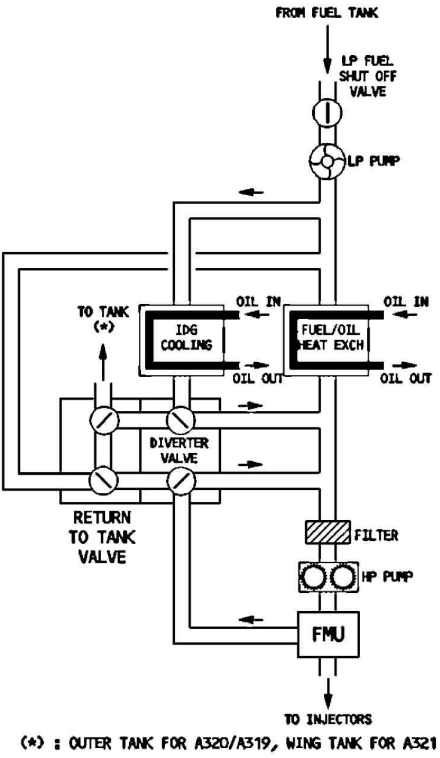


TWO NO-RETURNS TO TANK MODES

Applicable to: ALL

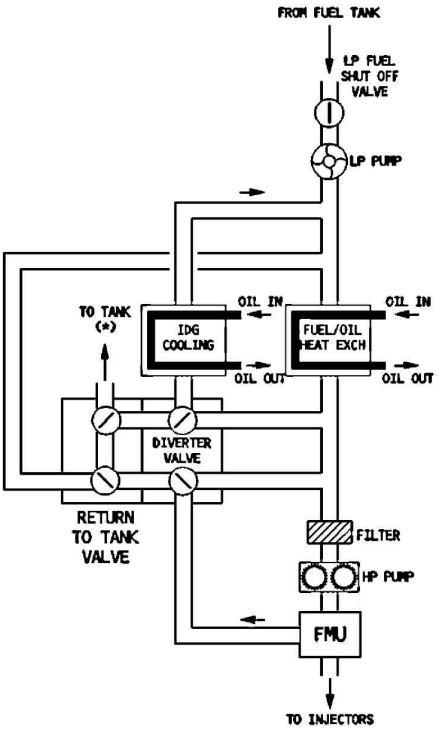
L3 Modes selected when return to tank is not allowed, in particular in case of high fuel flow or high tank fuel temperature.

- HIGH ENGINE SPEED



(*) : OUTER TANK FOR A320/A319, WING TANK FOR A321

- LOW ENGINE SPEED AND HIGH IDG OIL TEMP
- COLD FUEL
- FAIL-SAFE MODE



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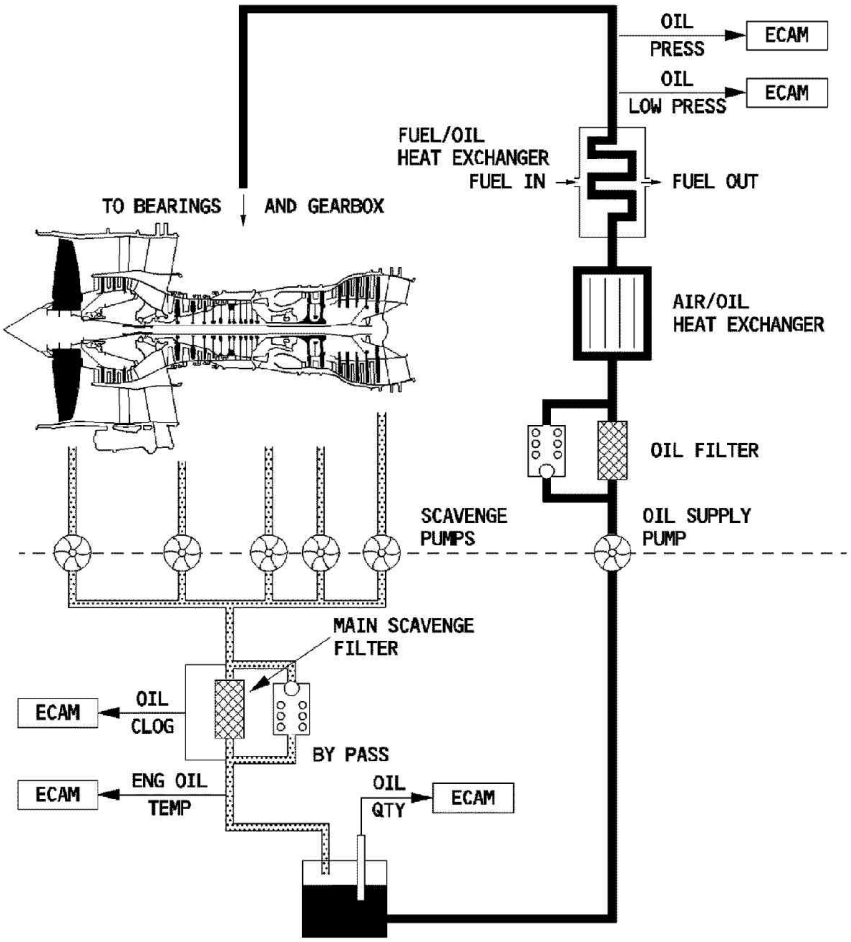
GENERAL

Applicable to: ALL

The oil system lubricates the engine components.

It contains :

- the oil tank
- the lube and scavenge pump modules
- the fuel/oil heat and air/oil heat exchangers
- the filters, chip detectors, pressure relief and bypass valves.


OIL
PRESS
ECAM
OIL
LOW PRESS
ECAM
FUEL/OIL
HEAT EXCHANGER
FUEL IN
FUEL OUT
TO BEARINGS
AND GEARBOX
AIR/OIL
HEAT EXCHANGER
OIL FILTER
SCAVENGE
PUMPS
OIL SUPPLY
PUMP
MAIN SCAVENGE
FILTER
ECAM
OIL
CLOG
BY PASS
ECAM
ENG OIL
TEMP
OIL
QTY
ECAM

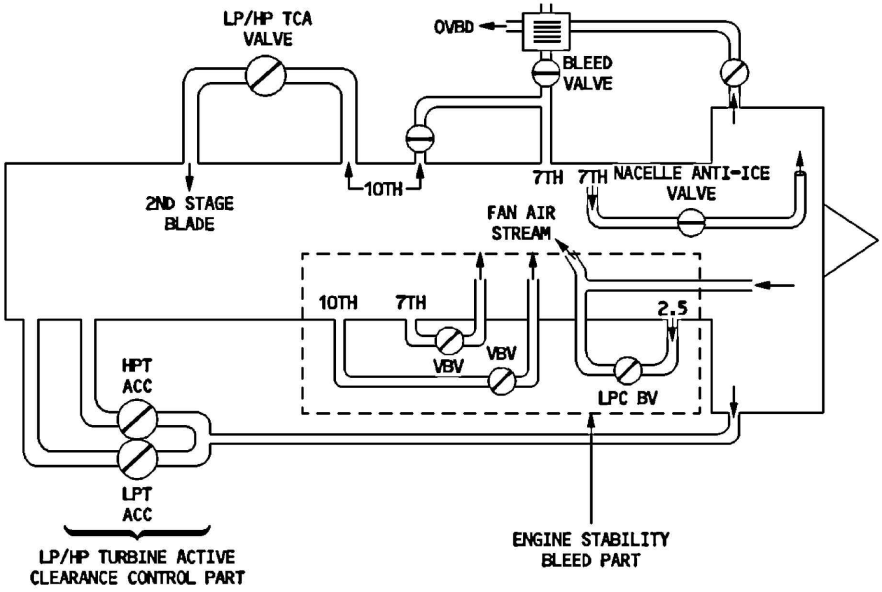
GENERAL

Applicable to: ALL

The air bleed system supplies the aircraft with compressed air.

It uses the air for:

- Pneumatic system (*Refer to DSC-36-10-10 General*)
- Cooling the engine compartment and the turbines
- Engine stability.



COOLING

Applicable to: ALL

- Active clearance control for the high and low pressure turbines is to optimize the turbine blade tip clearance by cooling the related turbine cases.
  This control is made by the FADEC through the FMU as a function of the high pressure rotor speed, and altitude.
  In case of failures the system is designed to failsafe to the closed position.
  Should this happen, fuel consumption would be slightly higher.
- LP/HP turbine cooling air.
  Under FADEC control as a function of N2 and altitude, cooling air is taken from the 10th stage of the HPC to cool the HPT second stage blade. The control valve is either fully open or closed and is normally (failsafe) open.

ENGINE STABILITY

Applicable to: ALL

Two air bleed systems (station 2.5 of the LPC and stages 7th and 10th) provide greater compressor stability in the different flight phases.

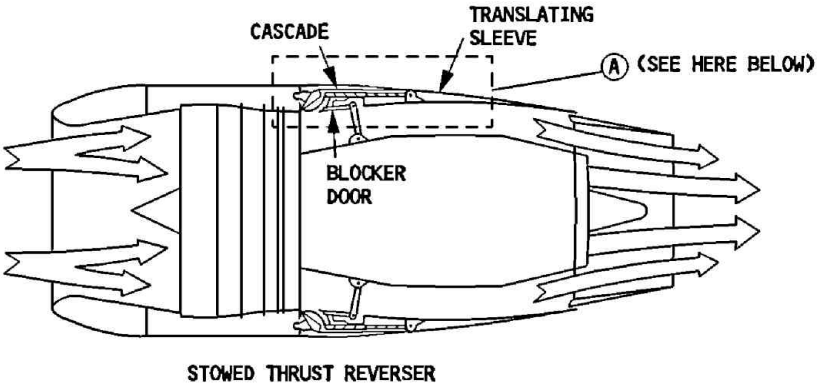
- The LPC 2.5 bleed valve moves under FADEC control as a function of the low rotor speed, altitude and Mach and is dedicated to improve stall margin during starting, low power or transient operation. The failsafe position of this valve is open.
- The 7th and 10th stage bleed valves are normally closed for most engine operation but fully open for engine starting. Their failsafe position is open. Theses valves are controlled by FADEC through FMU.

In the two cases, the air is vented to the fan air stream.

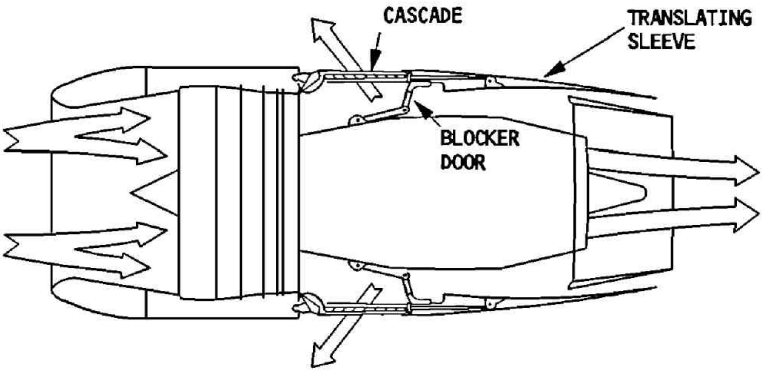
GENERAL

Applicable to: ALL

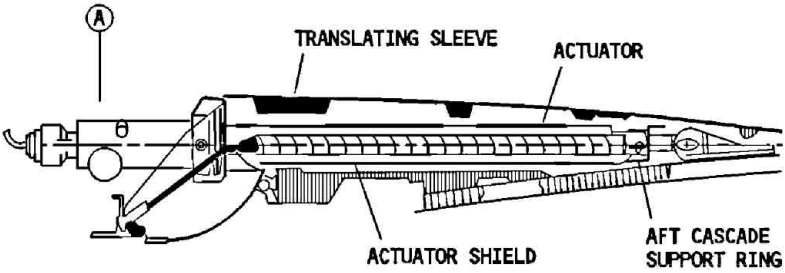
The reverse thrust is obtained by deflecting the fan airstream. This is done when the translating sleeves are fully deployed rearward, thus enabling the pivoting blocker doors to forward divert the fan flow through the cascades.



STOWED THRUST REVERSER



DEPLOYED THRUST REVERSER



The translating sleeves are hydraulically-actuated (ENG 1 : Green circuit, ENG 2 : Yellow circuit). The associated FADEC controls the thrust reverser system. Each FADEC channel performs control and monitoring functions. The systems for the two engines are independent of each other.

The thrust reverser system on each engine has :
- A Hydraulic Control Unit (HCU), which controls the hydraulic fluid flow to the thrust reverser actuators ;
- A hydraulic shutoff valve, which allows hydraulic pressure to the HCU.
- 4 hydraulic actuators ;
- 1 flexible shaft (divided into 3 parts, each of which are connected to the actuators) to synchronize the operation speed of the actuators ;
- 2 linear variable differential transducers, which monitor and transmit the reverser position to the EEC ;
- 2 proximity switches, to monitor whether the sleeves are locked or not.

ACTUATION LOGIC

Applicable to: ALL

Deployment requires :
- One FADEC channel, operating with its associated throttle reverse signal ;
- Right and left main gear compressed signal from the corresponding LGCIUs ;
- A Thrust Lever Angle (TLA) reverse signals from at least one Spoiler Elevator Computer (SEC).

Before deployment is completed, the FADEC sets reverse idle thrust on the engine that is having its thrust reversed.

PROTECTION

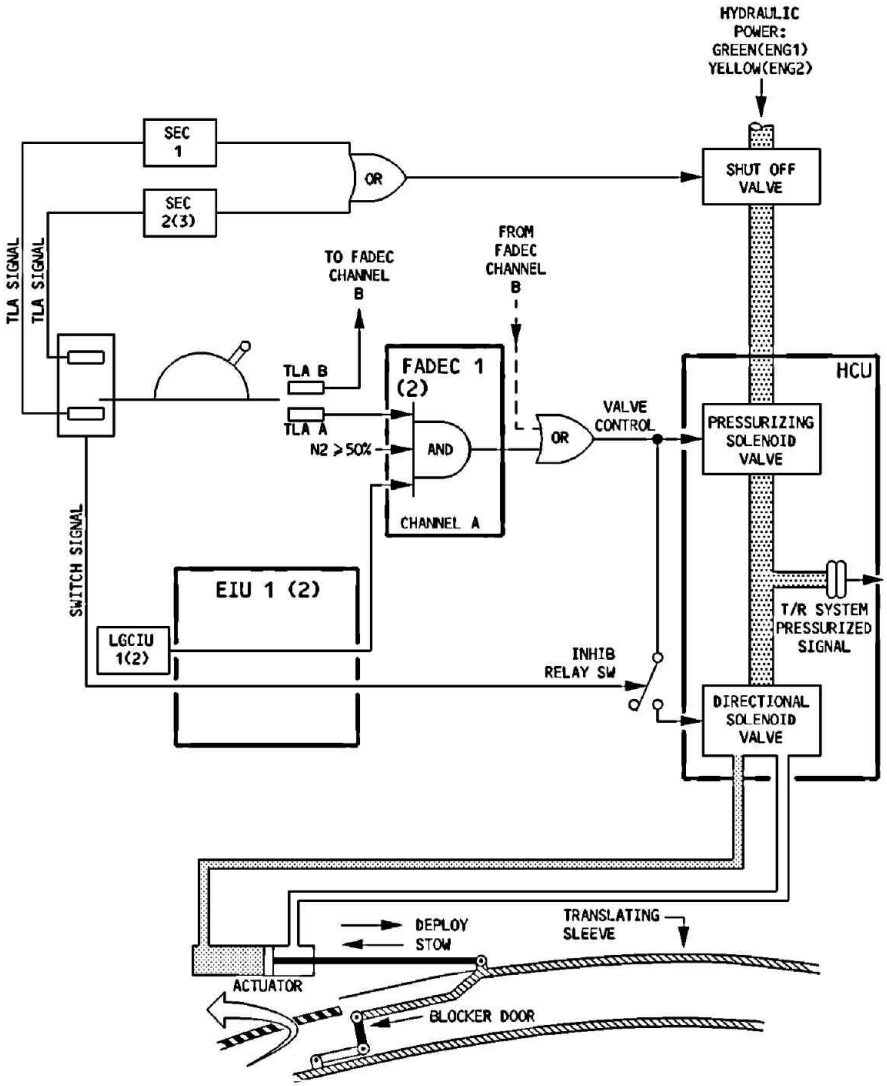
Applicable to: ALL

- IDLE PROTECTION

The FADEC will automatically select the thrust to idle :
- In case of inadvertent thrust reverser deployment (while thrust reversers are commanded stowed), as soon as the thrust reverser feedback position is above 15 % deployed (thrust decreasing toward idle, when the detected position is between 10 % and 15 %).
- In case of inadvertent thrust reverser stowage (while thrust reversers are commanded deployed), as soon as the thrust reverser feedback position is below 78 % deployed (thrust decreasing toward idle between 90 % and 78 %).

SCHEMATIC

Applicable to: ALL


HYDRAULIC
POWER:
GREEN(ENG1)
YELLOW(ENG2)
SEC
1
SEC
2(3)
OR
SHUT OFF
VALVE
TLA SIGNAL
TLA SIGNAL
TO FADEC
CHANNEL
B
FROM
FADEC
CHANNEL
B
TLA B
TLA A
FADEC 1
(2)
N2 > 50%
AND
OR
VALVE
CONTROL
HCU
PRESSURIZING
SOLENOID
VALVE
CHANNEL A
SWITCH SIGNAL
EIU 1 (2)
LGCIU
1(2)
T/R SYSTEM
PRESSURIZED
SIGNAL
INHIB
RELAY SW
DIRECTIONAL
SOLENOID
VALVE
DEPLOY
STOW
TRANSLATING
SLEEVE
ACTUATOR
BLOCKER DOOR

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GENERAL

Applicable to: ALL

The FADEC controls the ignition and starting system according to :

- the position of the engine start selector
- the position of the ENG MASTER switch
- the position of the ENG MAN START pushbutton switch
- the position of the ENG 1(2) ANTI ICE pushbutton switch
- the aircraft status (flight or ground).

The FADEC receives its inputs from the Engine Interface Unit (EIU).

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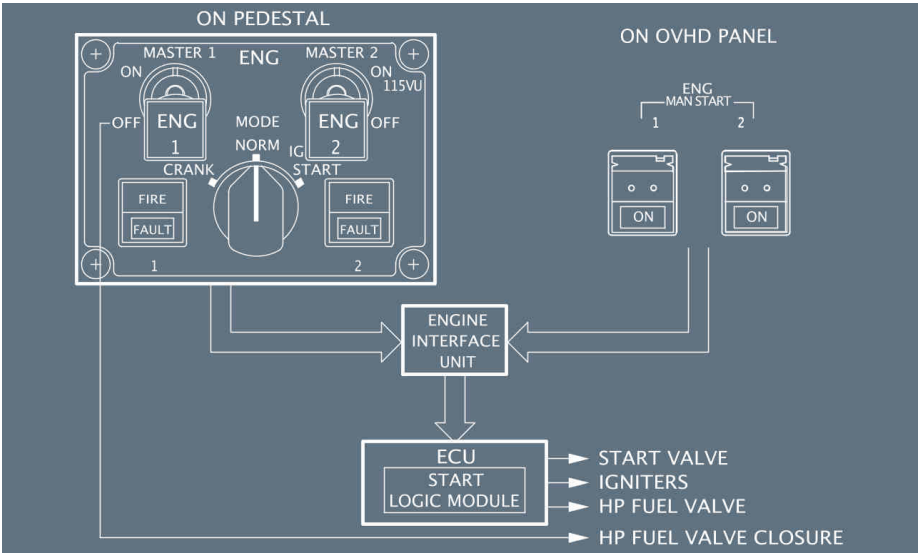
ARCHITECTURE

Applicable to: ALL



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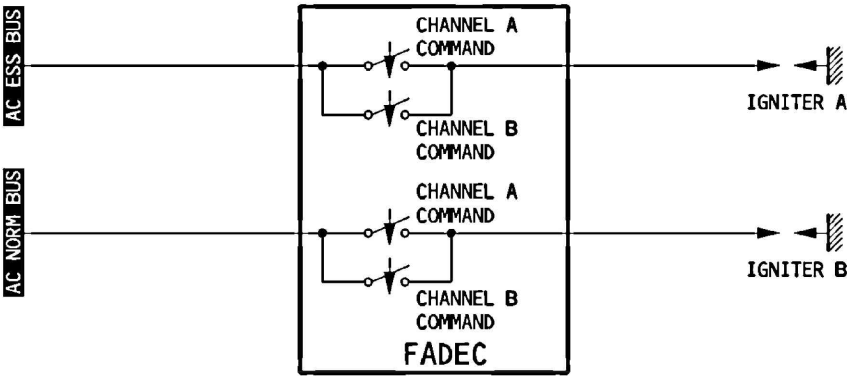
GENERAL

Applicable to: ALL

The ignition system is for engine starting on the ground and restarting in flight. It consists of two identical independent circuits for each engine, normally controlled by the FADEC channel A and channel B. Each FADEC channel can control both igniters.



Note: *Supply for igniter A switches to the STAT INV BUS BAR as soon as the static inverter is operative.*

IGNITION FOR STARTING

Applicable to: ALL

ON THE GROUND

- Automatic start:
  - Only one igniter is supplied.
  - The FADEC automatically alternates the use of igniters for the engine start of successive flights.
  - The ignition comes on automatically after the dry crank sequence, and cuts off automatically when N2 reaches 43 %.
    If the automatic start fails, the FADEC energizes both igniters at the same time during the second attempt at an engine start.
- Manual start:
  - Both igniters are supplied when the ENG MASTER sw is set to ON.
  - Both igniters are cut off when N2 reaches 43 %.

IN FLIGHT

Both igniters are supplied when the ENG MASTER sw is set to ON.

CONTINUOUS IGNITION

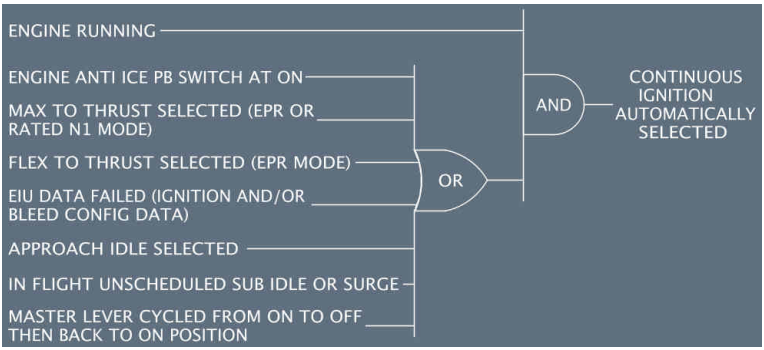
Applicable to: ALL

Continuous ignition may be selected either manually or automatically to maintain engine combustion.

MANUAL SELECTION

In flight, continuous ignition is on when the ENG START selector is on IGN/START, if the corresponding engine is running.
On the ground after the engine is started, because ignition cuts off automatically, the flight crew must switch the ENG MODE selector to NORM then back to IGN/START to turn on continuous ignition.
It must be noted that the igniters should be turned off to conserve the life of the ignition system components whenever ignition is not needed on the ground or in flight (mode selector on NORM position).

AUTOMATIC SELECTION



GENERAL

Applicable to: ALL

The engine starting system consists of an air turbine starter and a start valve.
The start valve admits air supplied by the pneumatic system to operate the starter.
The FADEC controls the start valve electrically. If electrical control fails when the aircraft is on the ground, a handle allows the start valve to be operated manually.

AUTOMATIC STARTING

Applicable to: ALL

This sequence is under the full authority of the FADEC, which controls:
- the start valve
- the igniters
- the fuel HP valves

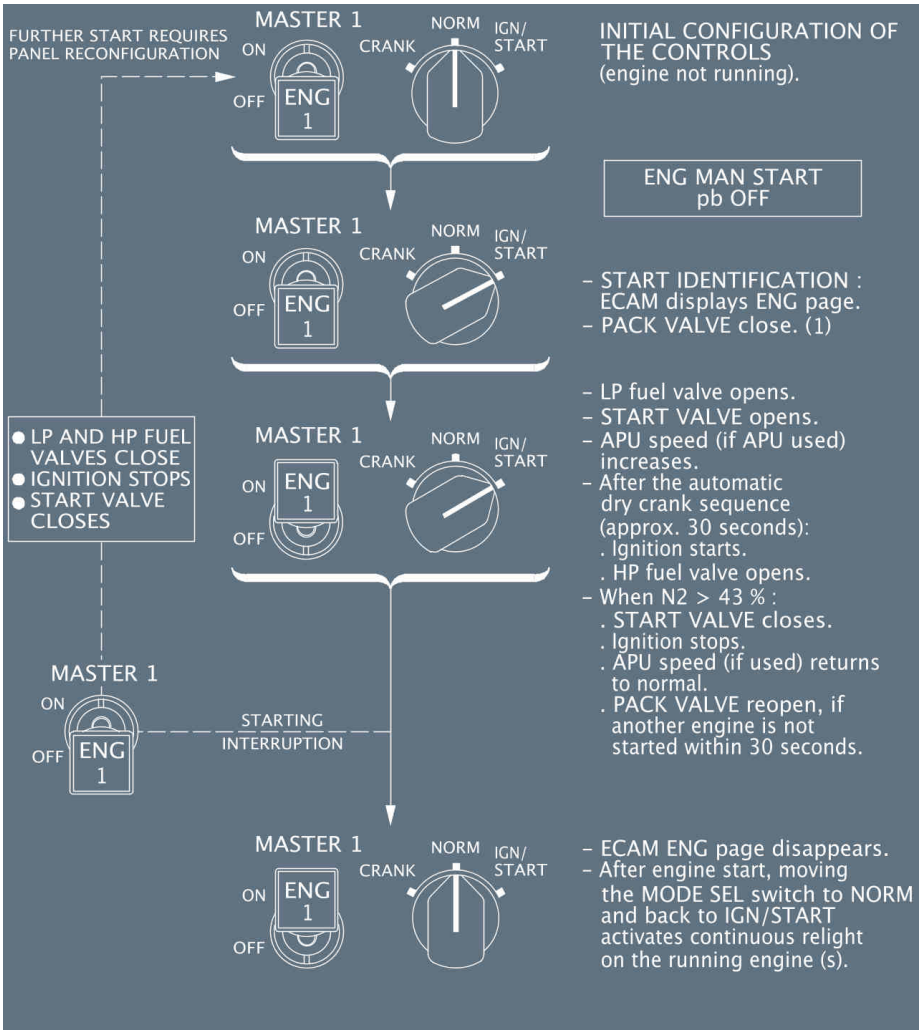
The FADEC :
- detects a hot start, a hung start, a stall, or no light up
- announces FAULT and identifies the fault in an ECAM message
- runs an abort sequence if a start aborts on the ground when N2 < 50 %
  - closes the HP valve
  - closes the start valve
  - turns off ignition
  - cranks the engine crank after the start abort in order to clear out fuel vapors
- ensures an automatic dry crank sequence of 30 s at maximum motoring speed.

During engine start with residual EGT > 250 °C, an auto-crank function motors the engine until EGT decreases below 250 °C.
There is no crew awareness message to indicate the reason for the extended motoring.
This auto-crank function may be activated in very hot condition (typically ISA + 40 °C) or short turn-around times (< 20 min).
For an inflight start, the FADEC decides whether the engine is windmilling fast enough or needs assistance from the starter in view of current engine parameters and flight environment parameters.
Flight crew may interrupt this start sequence by moving the MASTER switch to OFF.

AUTOMATIC STARTING SEQUENCE

Applicable to: B-HSQ, B-HSR

1



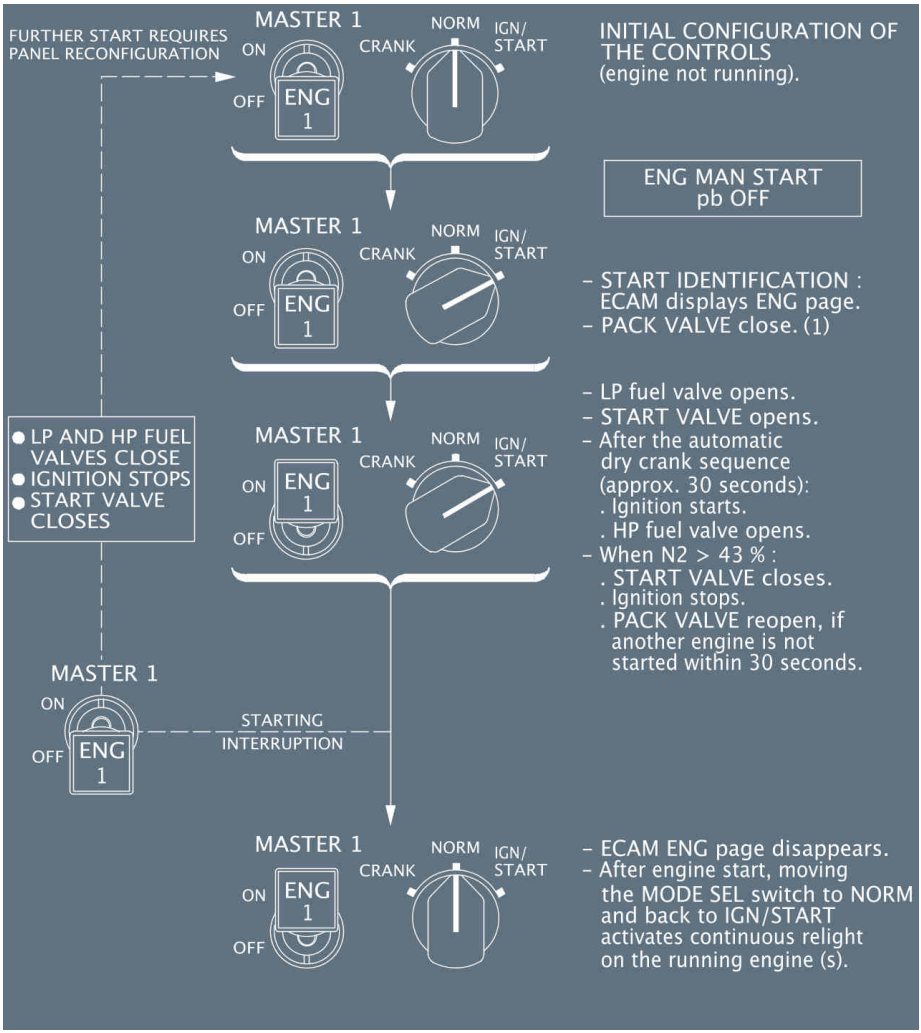
(1)

Note: *Refer to DSC-21-10-20 Pack Flow Control Valve*

AUTOMATIC STARTING SEQUENCE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

2



(1)

Note: *Refer to DSC-21-10-20 Pack Flow Control Valve*

MANUAL STARTING

Applicable to: ALL

The FADEC has limited authority over manual starting controlling :

- the opening of the start valve when the ENG MODE selector is set to IGN/START and the MAN START pushbutton switch is pressed.
- the position of the HP fuel valve and the operation of both igniters, when the master switch is turned ON
- the closing of the start valve at approximately 43 % N2, and, on the ground, the cutting off of ignition.

The FADEC makes a passive survey of the engine during the starting sequence (up to 50 % N2) : the flight crew is made aware of an abnormal start by a proper ECAM warning and has to interrupt the start sequence. The FADEC has not the authority to abort the manual start :

Flight crew may interrupt the starting sequence :

- before the MASTER switch is set to ON, by switching the MAN START pushbutton switch to OFF
- after the MASTER switch set to ON, by switching the MAN START pushbutton and the MASTER switch to OFF (flight crew must perform a dry cranking cycle).

In flight, the FADEC always commands a starter-assisted air start.

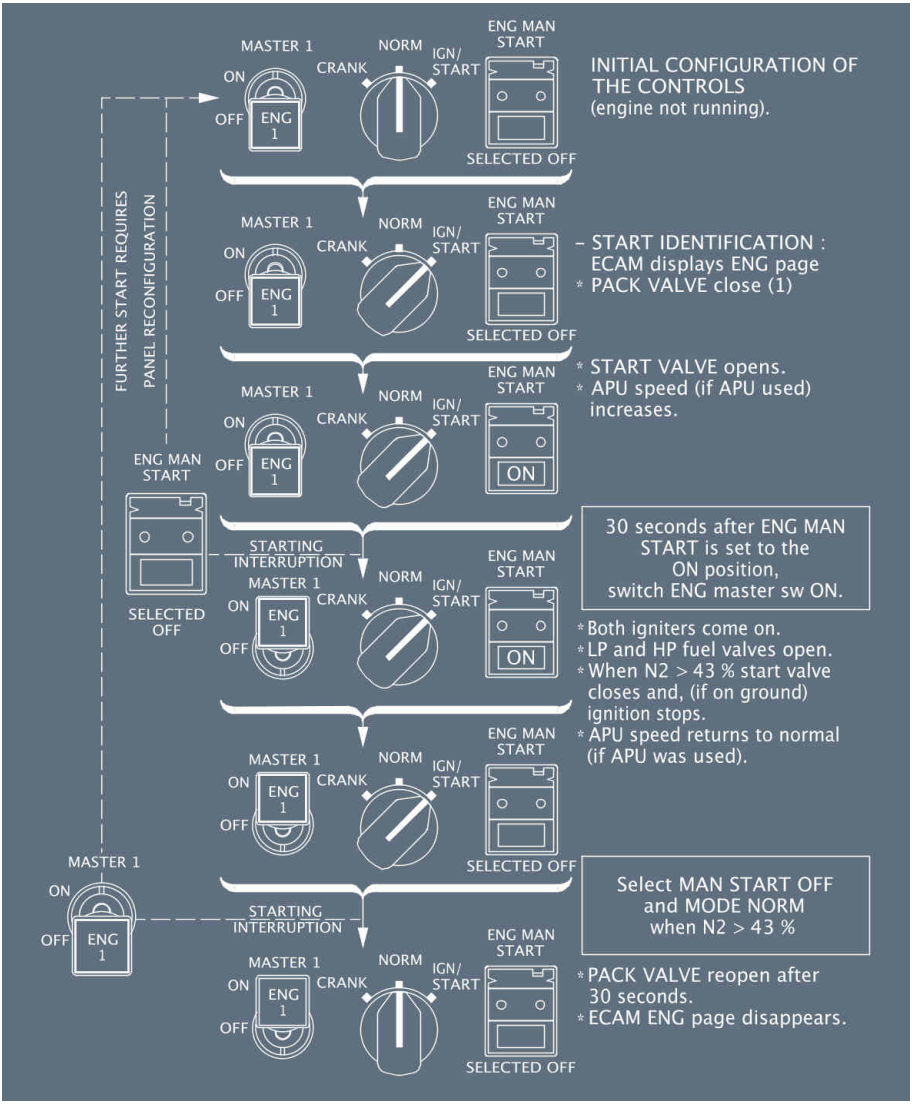
ENGINE VENTILATION (DRY CRANKING)

Applicable to: ALL

A dry cranking cycle ventilates the engine to remove fuel vapors after an unsuccessful start attempt on the ground.
The flight crew can manually select cranking by setting the ENG MODE selector to CRANK and the MAN START pushbutton switch to ON (MASTER switch OFF). Flight crew can stop the cranking by setting the MAN START pushbutton switch to OFF.

MANUAL STARTING SEQUENCE

Applicable to: B-HSQ, B-HSR

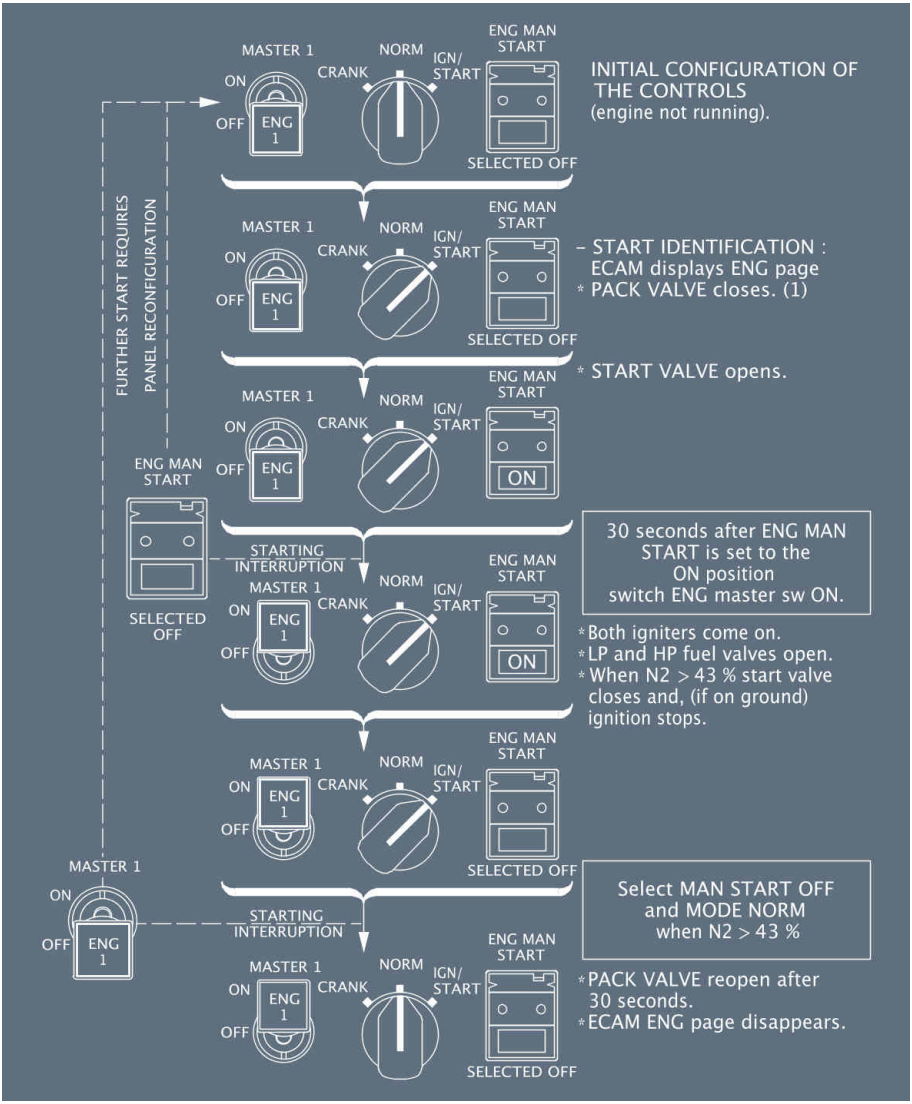


(1)

Note: *Refer to DSC-21-10-20 Pack Flow Control Valve*

MANUAL STARTING SEQUENCE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU



(1)

Note: *Refer to DSC-21-10-20 Pack Flow Control Valve*

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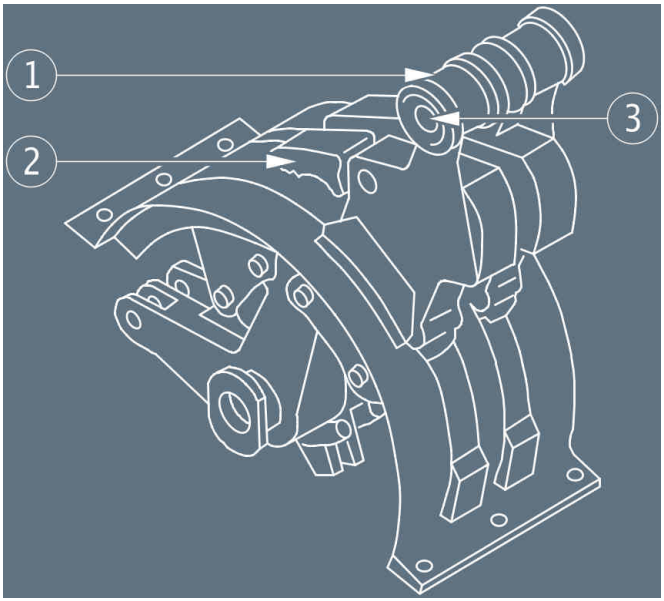
PEDESTAL

Applicable to: ALL

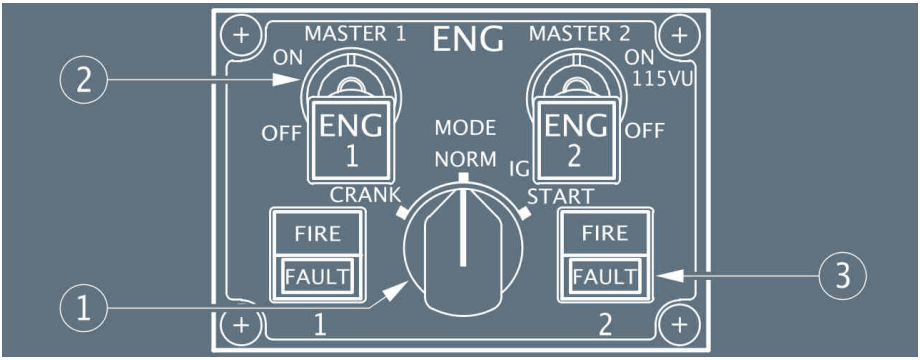
1



(1) Thrust levers
Refer to DSC-70-35-30 Thrust Levers

(2) Reverser latching levers
These permit the pilot to override the stop at the forward idle position to select reverse thrust. This stop resets when the pilot moves the lever back into the forward thrust area.

(3) Autothrust instinctive disconnect pb
(*Refer to DSC-22_30-90 A/THR Disconnection Caution*).



(1) ENG MODE selector

CRANK : The start valve opens, if the MAN START pb is ON, and N2 <10 %. Ignition does not fire.

NORM : This turns on continuous ignition (A and B) when the engine is running and:

- The ENG 1(2) ANTI ICE pb is ON, or
- The aircraft is in the takeoff phase, or
- Approach idle is selected, or
- In flight, an unscheduled sub idle or surge is detected.

IGN START : If the MASTER sw is ON, and N2 ≥idle, this position selects continuous ignition (A and B).

- During an automatic start:
  After the dry crank sequence, ignition switches to A or B.
- During a manual start, ignition (A and B) commences when the MASTER sw is turned ON.

Pack valve closes automatically during the start sequence. (*Refer to DSC-21-10-20 Pack Flow Control Valve*).

Note: On ground, the ignition automatically cuts off at the end of the start sequence (N2 >43 %).

(2) ENG MASTER 1 (2) sw

ON : LP fuel valve opens (if the ENG FIRE pb is in).

- During an automatic start, the HP fuel valve opens if:
  - The ENG MODE selector is at IGN/START.
  - 10 %≤N2 ≤16 %
- During a manual start, the HP FUEL valve opens if:
  - The ENG MODE selector is at IGN/START.
  - The MAN START pb-sw is ON.

OFF : Close signals go directly to the HP fuel valve and the LP fuel valve. These signals cause both channels of the FADEC to be reset.

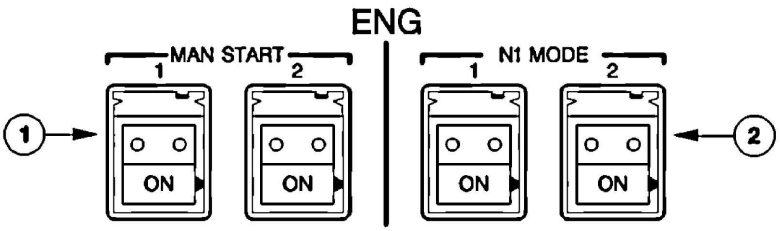
(3) ENG 1 (2) FAULT light

FAULT light : This amber light comes on, and a caution appears on ECAM, if there is:

- An automatic start abort.
- A start valve fault.
- A disagreement between the HP fuel valve position and its commanded position.

OVERHEAD PANEL

Applicable to: ALL



(1) ENG MAN START 1 (2) pb-sw

ON : The start valve opens if the ENG MODE selector is set to CRANK or IGN/START and N2 <10 %.
Both pack valves close during the start sequence.
The blue ON light comes on.

Off : start valve closed unless a start cycle is in progress.

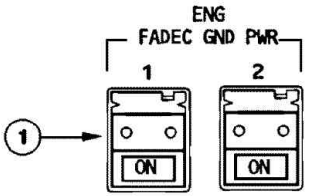
(2) ENG N1 MODE 1 (2) pb-sw

ON : - Thrust control reverts from EPR mode to N1 rated mode.
Following an automatic reversion to N1, rated or unrated mode, pressing the pushbutton switch confirms the mode.
- The blue ON light comes on.

Off : If available, EPR mode is selected.

MAINTENANCE PANEL

Applicable to: ALL



(1) FADEC GND PWR pb sw

ON : FADEC has electrical power on the ground if the ENG FIRE pushbutton is not released.

ECAM

Applicable to: ALL

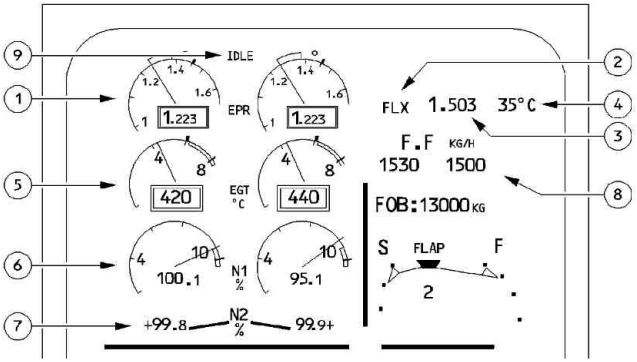
GENERAL

The ECAM's upper E/WD permanently displays the engines' primary parameters. The ECAM's lower SD displays the secondary parameters, either when they are automatically selected by the system, or manually selected by the flight crew.

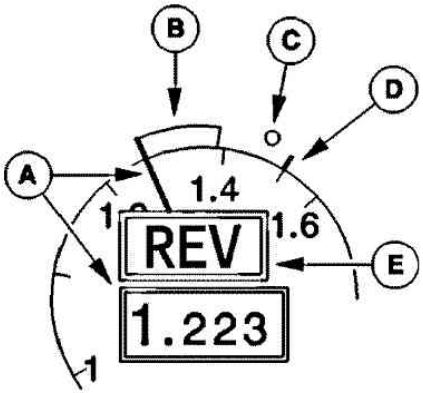
Applicable to: B-HSI, B-HSK

2 PRIMARY PARAMETER

EPR MODE ACTIVE



(1) Engine Pressure Ratio (EPR)



(A) Actual EPR
Actual EPR is green.

(B) EPR command arc (transient)
From current EPR pointer to EPR command value. This blue arc is only displayed with A/THR engaged.

(C) EPR TLA
This small white circle shows the EPR corresponding to the thrust lever position.

(D) EPR MAX
This amber index shows the EPR the engine would produce with the thrust lever all the way forward.

(E) REV indication
Appears in amber when a reverser door is unstowed or unlocked.
It changes to green when the doors are fully deployed.
(If a door unlocks in flight, the indication first flashes for 9 s and then remains steady).

(2) Thrust limit mode
The limit mode (TOGA, FLX, MCT, CL, or MREV), selected by the FADEC is displayed in green.

(3) EPR rating limit
The EPR rating limit, associated to the thrust limit mode, is displayed in blue.

In flight (or on ground with engines stopped)

- The selected mode corresponds to the detent of the most advanced thrust lever position.
- The rating limit is computed by the FADEC receiving the highest actual EPR value (except on ground with engines stopped, where it is computed by the FADEC receiving the most advanced thrust lever position).

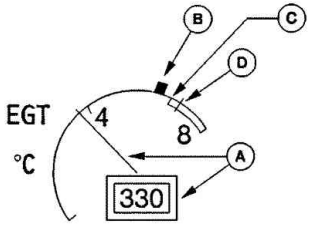
Note: *1. When a thrust lever is set between two positions, the FADEC selects the rating limit corresponding to the highest mode.*
2. When idle is selected, the FADEC selects CL.
3. When MREV is selected, the EPR rating limit value is replaced by amber crosses (MREV mode is limited by N1).

On ground (with engines running)

- With engines running, on ground, whatever the lever position, this limit corresponds to the TOGA thrust limit.
- With engines running, on ground, and if FLEX mode is selected, FLEX EPR is displayed, whatever the thrust lever position between idle and FLEX/MCT.

(4) FLEX temperature
If FLX mode is selected, the flexible takeoff temperature selected through the MCDUs is displayed in blue.

(5) EGT indicator



(A) Actual EGT

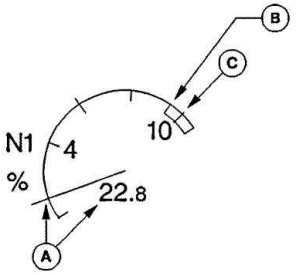
- It is normally green.
- It pulses amber, when EGT above 610 °C during the start sequence, or for high power operation (FLEX takeoff or thrust lever above MCT or at maximum REV, or activation of alpha-floor).
- It pulses red, when EGT is above 635 °C.

(B) Max EGT
The amber index appears at 610 °C. It is not displayed during takeoff.

(C) Max permissible EGT
EGT redline is at 635 °C. A red arc is displayed from 635 °C to the end of the scale.

(D) EGT exceedance
If EGT goes over 635 °C, a red mark appears at its maximum value. It disappears after a new takeoff, or after maintenance action through the MCDU.

(6) LP rotor speed (N1)



(A) Actual N1
It is normally in green.
It pulses amber, when N1 is above N1 rating limit.
It pulses red, when N1 is above 100 %.

(B) Max permissible N1
N1 redline is at 100 %. A red arc is displayed from 100 % to the end of the scale.

(C) N1 Exceedance
If N1 exceeds 100 % during a flight, this red mark appears and remains at the highest N1 attained. It will disappear after a new takeoff, or after maintenance action through the MCDU.

(7) HP rotor speed N2
It is normally in green.
It is green on a grey background during the start sequence.
It may intermittently show amber crosses at low N2 during the start sequence.
It turns red and a red cross appears next to it when N2 is above 100 %. The red cross will disappear after a new takeoff or after maintenance action.

Note: Amber crosses XX are displayed until N1 and N2 respectively reach approximately 4.5 % and 3.5 % during engine start.

(8) Fuel flow
It is indicated in green.
At engine shutdown, the FF indication is replaced by amber crosses for about 15 s, prior to going to zero.

Note: If case of a discrepancy between the real and displayed EGT, N1, N2, or FF values, an amber CHECK message is displayed near the affected parameter indication.

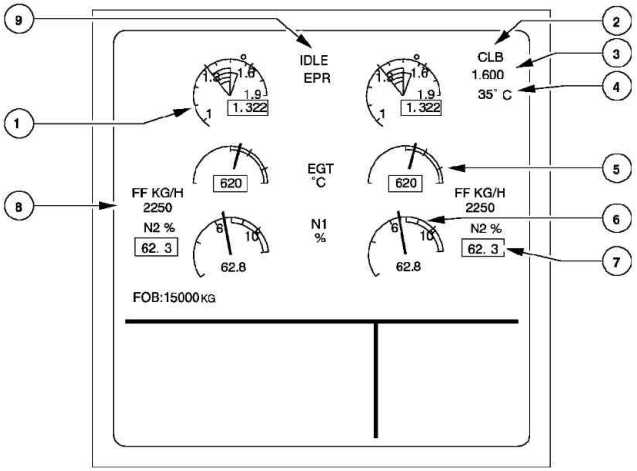
(9) IDLE indication

In flight, this legend appears in green when both engines are at idle. It flashes for 10 s, then remains steady.

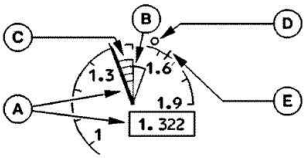
Applicable to: B-HSM

3 **PRIMARY PARAMETER**

EPR MODE ACTIVE



(1) Engine Pressure Ratio (EPR)



(A) Actual EPR
The EPR needle and EPR digital indication are in green.

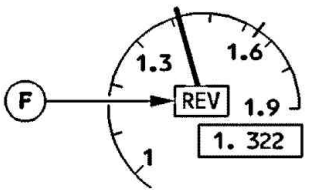
(B) EPR Command (EPR trend)
The green needle corresponds to the EPR demanded by the FADEC. In addition, next to the EPR command needle, a green triangle indicates the direction of EPR tendency.
These symbols are displayed when A/THR is active.

(C) Transient EPR
Symbolizes the difference between the EPR command and the actual EPR. It is only displayed when A/THR is active.

(D) EPR TLA (blue circle)
EPR corresponding to the thrust lever position.

(E) EPR MAX
The EPR MAX amber is the EPR limit value corresponding to the full forward position of the thrust levers.

(F) REV indication
It is displayed in amber, when at least one reverser cowl is unstowed or unlocked. It becomes green, when the reverser cowls are fully deployed and reverse mode is selected. (If unlocked in flight, the indication first flashes for 9 s and then remains steady).



(2) Thrust limit mode
The limit mode (TOGA, FLX, MCT, CL, or MREV), selected by the FADEC is displayed in green.

(3) EPR rating limit
The EPR rating limit, associated to the thrust limit mode, is displayed in blue.

In flight (or on ground with engines stopped)

- The selected mode corresponds to the detent of the most advanced thrust lever position.
- The rating limit is computed by the FADEC receiving the highest actual EPR value (except on ground with engines stopped, where it is computed by the FADEC receiving the most advanced thrust lever position).

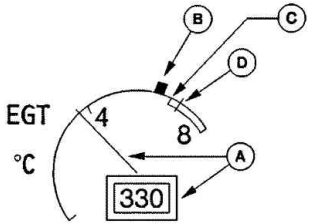
Note: *1. When a thrust lever is set between two positions, the FADEC selects the rating limit corresponding to the highest mode.*
2. When idle is selected, the FADEC selects CL.
3. When MREV is selected, the EPR rating limit value is replaced by amber crosses (MREV mode is limited by N1).

On ground (with engines running)

- With engines running, on ground, whatever the lever position, this limit corresponds to the TOGA thrust limit.
- With engines running, on ground, and if FLEX mode is selected, FLEX EPR is displayed, whatever the thrust lever position between idle and FLEX/MCT.

(4) FLEX temperature
If FLX mode is selected, the flexible takeoff temperature selected through the MCDUs is displayed in blue.

(5) EGT indicator



(A) Actual EGT

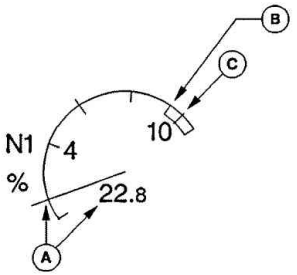
- It is normally green.
- It pulses amber, when EGT above 610 °C during the start sequence, or for high power operation (FLEX takeoff or thrust lever above MCT or at maximum REV, or activation of alpha-floor).
- It pulses red, when EGT is above 635 °C.

(B) Max EGT
The amber index appears at 610 °C. It is not displayed during takeoff.

(C) Max permissible EGT
EGT redline is at 635 °C. A red arc is displayed from 635 °C to the end of the scale.

(D) EGT exceedance
If EGT goes over 635 °C, a red mark appears at its maximum value. It disappears after a new takeoff, or after maintenance action through the MCDU.

(6) LP rotor speed (N1)



(A) Actual N1
It is normally in green.
It pulses amber, when N1 is above N1 rating limit.
It pulses red, when N1 is above 100 %.

(B) Max permissible N1
N1 redline is at 100 %. A red arc is displayed from 100 % to the end of the scale.

(C) N1 Exceedance
If N1 exceeds 100 % during a flight, this red mark appears and remains at the highest N1 attained. It will disappear after a new takeoff, or after maintenance action through the MCDU.

(7) HP rotor speed N2

It is normally in green.
It is green on a grey background during the start sequence.
It may intermittently show amber crosses at low N2 during the start sequence.
It turns red and a red cross appears next to it when N2 is above 100 %. The red cross will disappear after a new takeoff or after maintenance action.

Note: Amber crosses XX are displayed until N1 and N2 respectively reach approximately 4.5 % and 3.5 % during engine start.

(8) Fuel flow

It is indicated in green.
At engine shutdown, the FF indication is replaced by amber crosses for about 15 s, prior to going to zero.

Note: If case of a discrepancy between the real and displayed EGT, N1, N2, or FF values, an amber CHECK message is displayed near the affected parameter indication.

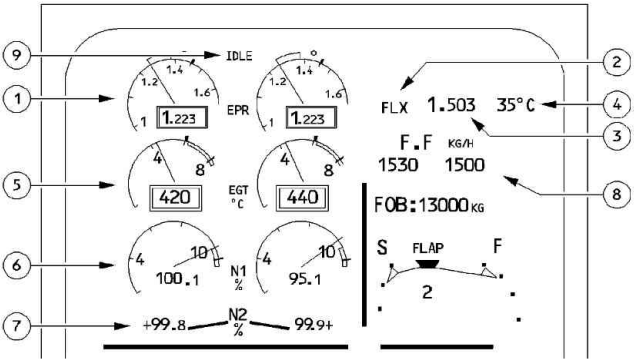
(9) IDLE indication

In flight, this legend appears in green when both engines are at idle. It flashes for 10 s, then remains steady.

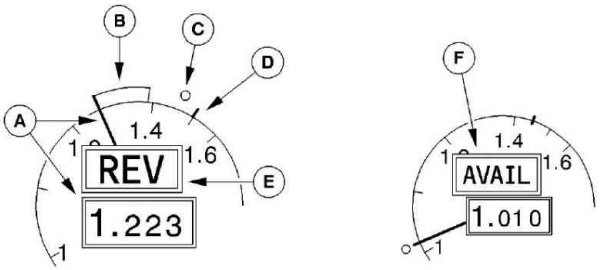
Applicable to: ALL 321

4 **PRIMARY PARAMETER**

EPR MODE ACTIVE



(1) Engine Pressure Ratio (EPR)



(A) Actual EPR
Actual EPR is green.

(B) EPR command arc (transient)
From current EPR pointer to EPR command value. This blue arc is only displayed with A/THR engaged.

(C) EPR TLA
This small white circle shows the EPR corresponding to the thrust lever position.

(D) EPR MAX
This amber index shows the EPR the engine would produce with the thrust lever all the way forward.

(E) REV indication
Appears in amber when a reverser door is unstowed or unlocked.
It changes to green when the doors are fully deployed.
(If a door unlocks in flight, the indication first flashes for 9 s and then remains steady).

(F) AVAIL indication
Displayed in green to indicate a successful engine start on ground. It pulses in green to indicate a successful engine relight in flight. It is triggered when the engine is at, or above, idle.

(2) Thrust limit mode
The limit mode (TOGA, FLX, MCT, CL, or MREV), selected by the FADEC is displayed in green.

(3) EPR rating limit
The EPR rating limit, associated to the thrust limit mode, is displayed in blue.

In flight (or on ground with engines stopped)

- The selected mode corresponds to the detent of the most advanced thrust lever position.
- The rating limit is computed by the FADEC receiving the highest actual EPR value (except on ground with engines stopped, where it is computed by the FADEC receiving the most advanced thrust lever position).

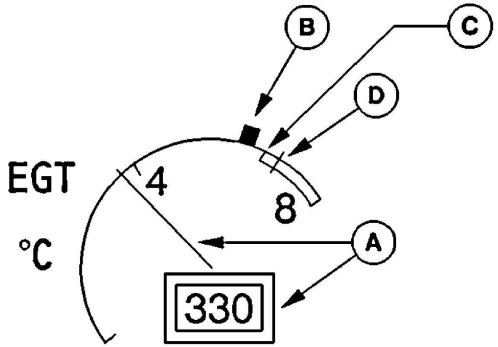
Note:
1. *When a thrust lever is set between two positions, the FADEC selects the rating limit corresponding to the highest mode.*
2. *When idle is selected, the FADEC selects CL.*
3. *When MREV is selected, the EPR rating limit value is replaced by amber crosses (MREV mode is limited by N1).*

On ground (with engines running)

- With engines running, on ground, whatever the lever position, this limit corresponds to the TOGA thrust limit.
- With engines running, on ground, and if FLEX mode is selected, FLEX EPR is displayed, whatever the thrust lever position between idle and FLEX/MCT.

(4) FLEX temperature
If FLX mode is selected, the flexible takeoff temperature selected through the MCDUs is displayed in blue.

(5) EGT indicator



(A) Actual EGT

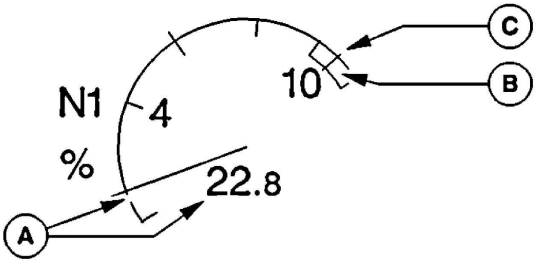
- It is normally green.
- It pulses amber, when EGT above 610 °C, except during the start sequence, or for high power operation (FLEX takeoff or thrust lever above MCT or at maximum REV, or activation of alpha-floor).
- It pulses amber, when EGT is above 635 °C during start sequence.
- It pulses red, when EGT is above 650 °C.

(B) Max EGT:
The amber index appears at 635 °C during the start sequence, then at 610 °C.
Not displayed during takeoff.

(C) Max permissible EGT:
EGT redline is at 650 °C. A red arc is displayed from 650 °C to the end of the scale.

(D) EGT exceedance:
If EGT goes over 650 °C, a red mark appears at its maximum value. It disappears after a new takeoff, or after maintenance action through the MCDU.

(6) LP rotor speed (N1)



(A) Actual N1
It is normally in green.
It pulses amber, when N1 is above N1 rating limit.
It pulses red, when N1 is above 100 %.

(B) Max permissible N1
N1 redline is at 100 %. A red arc is displayed from 100 % to the end of the scale.

(C) N1 Exceedance
If N1 exceeds 100 % during a flight, this red mark appears and remains at the highest N1 attained. It will disappear after a new takeoff, or after maintenance action through the MCDU.

(7) HP rotor speed N2
It is normally in green.
It is green on a grey background during the start sequence.
It may intermittently show amber crosses at low N2 during the start sequence.
It turns red and a red cross appears next to it when N2 is above 100 %. The red cross will disappear after a new takeoff or after maintenance action.

Note: Amber crosses XX are displayed until N1 and N2 respectively reach approximately 4.5 % and 3.5 % during engine start.

(8) Fuel flow
It is indicated in green.
At engine shutdown, the FF indication is replaced by amber crosses for about 15 s, prior to going to zero.

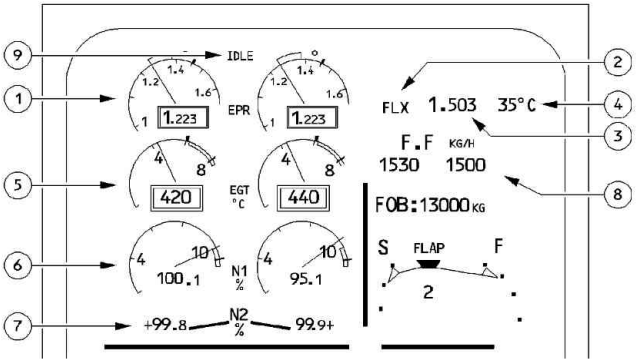
Note: If case of a discrepancy between the real and displayed EGT, N1, N2, or FF values, an amber CHECK message is displayed near the affected parameter indication.

(9) IDLE indication
In flight, this legend appears in green when both engines are at idle. It flashes for 10 s, then remains steady.

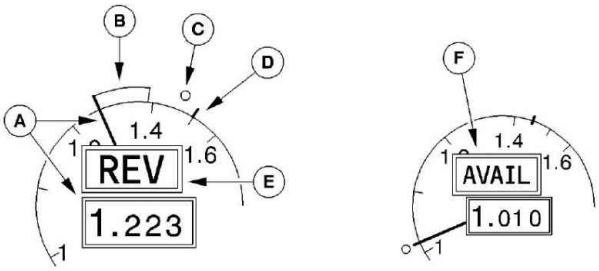
Applicable to: B-HSD, B-HSE, B-HSG, B-HSJ

5 **PRIMARY PARAMETER**

EPR MODE ACTIVE



(1) Engine Pressure Ratio (EPR)



(A) Actual EPR
Actual EPR is green.

(B) EPR command arc (transient)
From current EPR pointer to EPR command value. This blue arc is only displayed with A/THR engaged.

(C) EPR TLA
This small white circle shows the EPR corresponding to the thrust lever position.

(D) EPR MAX
This amber index shows the EPR the engine would produce with the thrust lever all the way forward.

(E) REV indication
Appears in amber when a reverser door is unstowed or unlocked.
It changes to green when the doors are fully deployed.
(If a door unlocks in flight, the indication first flashes for 9 s and then remains steady).

(F) AVAIL indication
Displayed in green to indicate a successful engine start on ground. It pulses in green to indicate a successful engine relight in flight. It is triggered when the engine is at, or above, idle.

(2) Thrust limit mode
The limit mode (TOGA, FLX, MCT, CL, or MREV), selected by the FADEC is displayed in green.

(3) EPR rating limit
The EPR rating limit, associated to the thrust limit mode, is displayed in blue.

In flight (or on ground with engines stopped)

- The selected mode corresponds to the detent of the most advanced thrust lever position.
- The rating limit is computed by the FADEC receiving the highest actual EPR value (except on ground with engines stopped, where it is computed by the FADEC receiving the most advanced thrust lever position).

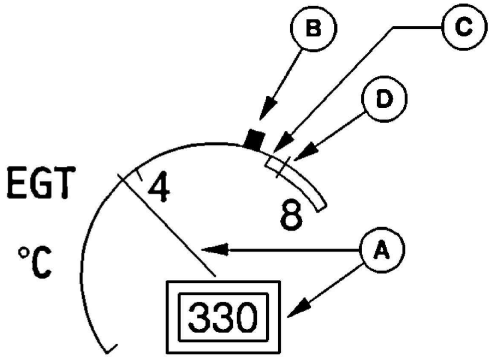
Note: *1. When a thrust lever is set between two positions, the FADEC selects the rating limit corresponding to the highest mode.*
2. When idle is selected, the FADEC selects CL.
3. When MREV is selected, the EPR rating limit value is replaced by amber crosses (MREV mode is limited by N1).

On ground (with engines running)

- With engines running, on ground, whatever the lever position, this limit corresponds to the TOGA thrust limit.
- With engines running, on ground, and if FLEX mode is selected, FLEX EPR is displayed, whatever the thrust lever position between idle and FLEX/MCT.

(4) FLEX temperature
If FLX mode is selected, the flexible takeoff temperature selected through the MCDUs is displayed in blue.

(5) EGT indicator



(A) Actual EGT

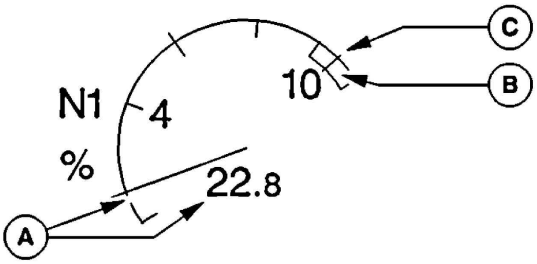
- It is normally green.
- It pulses amber, when EGT above 610 °C during the start sequence, or for high power operation (FLEX takeoff or thrust lever above MCT or at maximum REV, or activation of alpha-floor).
- It pulses red, when EGT is above 635 °C.

(B) Max EGT:
The amber index appears at 610 °C. It is not displayed during takeoff.

(C) Max permissible EGT:
EGT redline is at 635 °C. A red arc is displayed from 635 °C to the end of the scale.

(D) EGT exceedance:
If EGT goes over 635 °C, a red mark appears at its maximum value. It disappears after a new takeoff, or after maintenance action through the MCDU.

(6) LP rotor speed (N1)



(A) Actual N1
It is normally in green.
It pulses amber, when N1 is above N1 rating limit.
It pulses red, when N1 is above 100 %.

(B) Max permissible N1
N1 redline is at 100 %. A red arc is displayed from 100 % to the end of the scale.

(C) N1 Exceedance
If N1 exceeds 100 % during a flight, this red mark appears and remains at the highest N1 attained. It will disappear after a new takeoff, or after maintenance action through the MCDU.

(7) HP rotor speed N2

It is normally in green.
It is green on a grey background during the start sequence.
It may intermittently show amber crosses at low N2 during the start sequence.
It turns red and a red cross appears next to it when N2 is above 100 %. The red cross will disappear after a new takeoff or after maintenance action.

Note: Amber crosses XX are displayed until N1 and N2 respectively reach approximately 4.5 % and 3.5 % during engine start.

(8) Fuel flow

It is indicated in green.
At engine shutdown, the FF indication is replaced by amber crosses for about 15 s, prior to going to zero.

Note: If case of a discrepancy between the real and displayed EGT, N1, N2, or FF values, an amber CHECK message is displayed near the affected parameter indication.

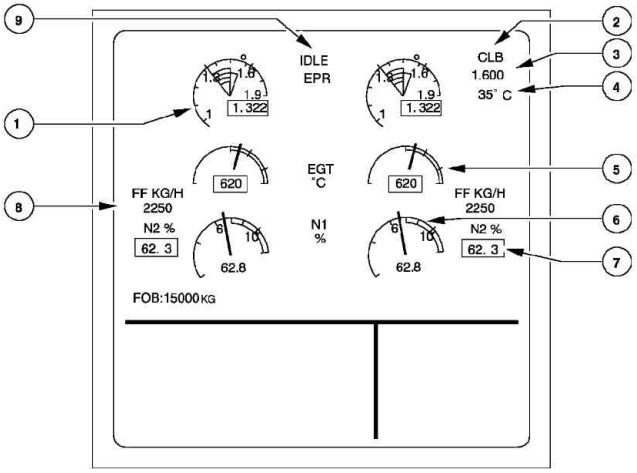
(9) IDLE indication

In flight, this legend appears in green when both engines are at idle. It flashes for 10 s, then remains steady.

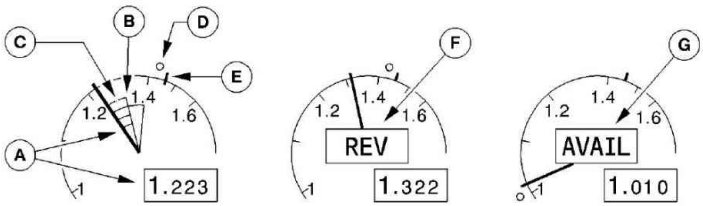
Applicable to: B-HSL, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

6 **PRIMARY PARAMETER**

EPR MODE ACTIVE



(1) Engine Pressure Ratio (EPR)



(A) Actual EPR
The EPR needle and EPR digital indication are in green.

(B) EPR Command (EPR trend)
The green needle corresponds to the EPR demanded by the FADEC. In addition, next to the EPR command needle, a green triangle indicates the direction of EPR tendency.
These symbols are displayed when A/THR is active.

(C) Transient EPR
Symbolizes the difference between the EPR command and the actual EPR. It is only displayed when A/THR is active.

(D) EPR TLA (blue circle)
EPR corresponding to the thrust lever position.

(E) EPR MAX
The EPR MAX amber is the EPR limit value corresponding to the full forward position of the thrust levers.

(F) REV indication
It is displayed in amber, when at least one reverser cowl is unstowed or unlocked. It becomes green, when the reverser cowls are fully deployed and reverse mode is selected. (If unlocked in flight, the indication first flashes for 9 s and then remains steady).

(G) AVAIL indication
Displayed in green to indicate a successful engine start on ground. It pulses in green to indicate a successful engine relight in flight. It is triggered when the engine is at, or above, idle.

(2) Thrust limit mode
The limit mode (TOGA, FLX, MCT, CL, or MREV), selected by the FADEC is displayed in green.

(3) EPR rating limit
The EPR rating limit, associated to the thrust limit mode, is displayed in blue.

In flight (or on ground with engines stopped)

- The selected mode corresponds to the detent of the most advanced thrust lever position.
- The rating limit is computed by the FADEC receiving the highest actual EPR value (except on ground with engines stopped, where it is computed by the FADEC receiving the most advanced thrust lever position).

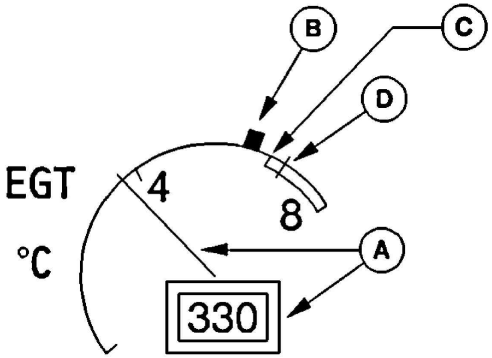
Note: *1. When a thrust lever is set between two positions, the FADEC selects the rating limit corresponding to the highest mode.*
2. When idle is selected, the FADEC selects CL.
3. When MREV is selected, the EPR rating limit value is replaced by amber crosses (MREV mode is limited by N1).

On ground (with engines running)

- With engines running, on ground, whatever the lever position, this limit corresponds to the TOGA thrust limit.
- With engines running, on ground, and if FLEX mode is selected, FLEX EPR is displayed, whatever the thrust lever position between idle and FLEX/MCT.

(4) FLEX temperature
If FLX mode is selected, the flexible takeoff temperature selected through the MCDUs is displayed in blue.

(5) EGT indicator



(A) Actual EGT

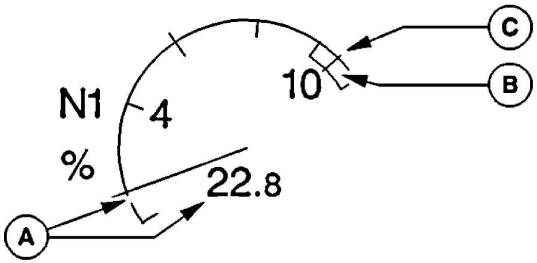
- It is normally green.
- It pulses amber, when EGT above 610 °C during the start sequence, or for high power operation (FLEX takeoff or thrust lever above MCT or at maximum REV, or activation of alpha-floor).
- It pulses red, when EGT is above 635 °C.

(B) Max EGT:
The amber index appears at 610 °C. It is not displayed during takeoff.

(C) Max permissible EGT:
EGT redline is at 635 °C. A red arc is displayed from 635 °C to the end of the scale.

(D) EGT exceedance:
If EGT goes over 635 °C, a red mark appears at its maximum value. It disappears after a new takeoff, or after maintenance action through the MCDU.

(6) LP rotor speed (N1)



(A) Actual N1
It is normally in green.
It pulses amber, when N1 is above N1 rating limit.
It pulses red, when N1 is above 100 %.

(B) Max permissible N1
N1 redline is at 100 %. A red arc is displayed from 100 % to the end of the scale.

(C) N1 Exceedance
If N1 exceeds 100 % during a flight, this red mark appears and remains at the highest N1 attained. It will disappear after a new takeoff, or after maintenance action through the MCDU.

(7) HP rotor speed N2

It is normally in green.
It is green on a grey background during the start sequence.
It may intermittently show amber crosses at low N2 during the start sequence.
It turns red and a red cross appears next to it when N2 is above 100 %. The red cross will disappear after a new takeoff or after maintenance action.

Note: Amber crosses XX are displayed until N1 and N2 respectively reach approximately 4.5 % and 3.5 % during engine start.

(8) Fuel flow

It is indicated in green.
At engine shutdown, the FF indication is replaced by amber crosses for about 15 s, prior to going to zero.

Note: If case of a discrepancy between the real and displayed EGT, N1, N2, or FF values, an amber CHECK message is displayed near the affected parameter indication.

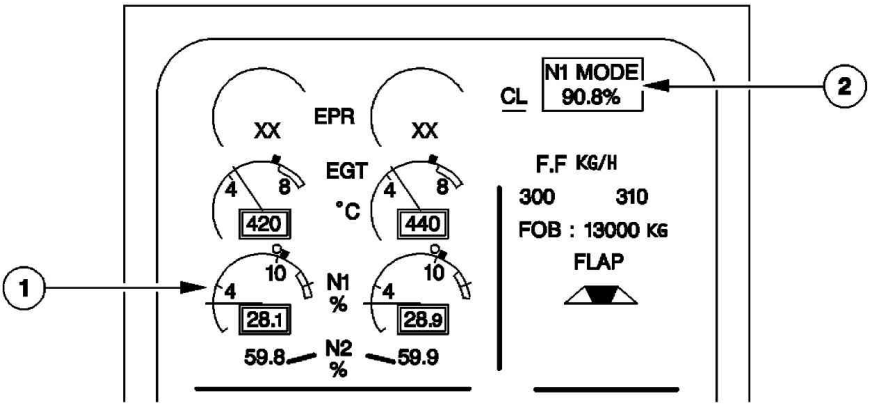
(9) IDLE indication

In flight, this legend appears in green when both engines are at idle. It flashes for 10 s, then remains steady.

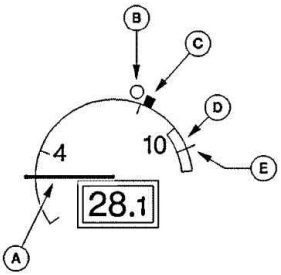
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

REVERSION TO N1 MODE

If the FADEC is unable to sense or to calculate EPR, an automatic reversion to N1 control mode is provided.
The rotor speed reference depends on the thrust lever angle, T2, and altitude.



(1) LP rotor speed N1



(A) Actual N1
It is normally in green.
The index and numeric values pulse red, when N1 >100 %.

(B) N1 TLA
This small white circle shows the N1 corresponding to the thrust lever position. It is not displayed in unrated N1 mode.

(C) MAX N1

This amber index shows the N1 the engine would produce, with the thrust lever all the way forward. It is not displayed in unrated N1 mode.

(D) MAX permissible N1

N1 redline is at 100 %. A red arc is displayed from 100 % to the end of the scale.

(E) N1 Exceedance

If N1 exceeds 100 % during a flight, this red mark appears and remains at the highest N1 attained. It disappears after a new takeoff, or after maintenance action via the MCDU.

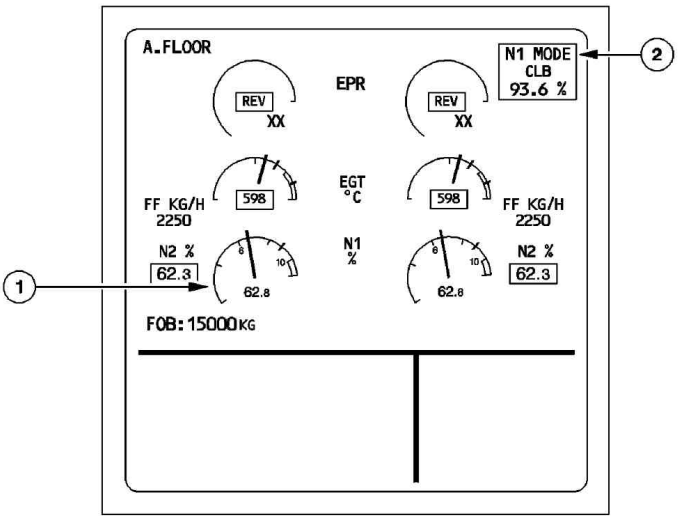
(2) N1 MODE and N1 rating limit

- The N1 MODE indication is displayed in blue.
- The N1 rating limit, corresponding to the thrust lever position, is displayed in blue. They are not displayed in unrated N1 mode.

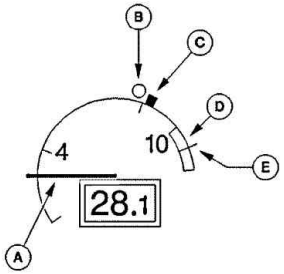
Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

REVERSION TO N1 MODE

If the FADEC is unable to sense or to calculate EPR, an automatic reversion to N1 control mode is provided.
The rotor speed reference depends on the thrust lever angle, T2, and altitude.



(1) LP rotor speed N1



(A) Actual N1
It is normally in green.
The index and numeric values pulse red, when N1 >100 %.

(B) N1 TLA
This small white circle shows the N1 corresponding to the thrust lever position. It is not displayed in unrated N1 mode.

(C) MAX N1
This amber index shows the N1 the engine would produce, with the thrust lever all the way forward. It is not displayed in unrated N1 mode.

(D) MAX permissible N1
N1 redline is at 100 %. A red arc is displayed from 100 % to the end of the scale.

(E) N1 Exceedance
If N1 exceeds 100 % during a flight, this red mark appears and remains at the highest N1 attained. It disappears after a new takeoff, or after maintenance action via the MCDU.

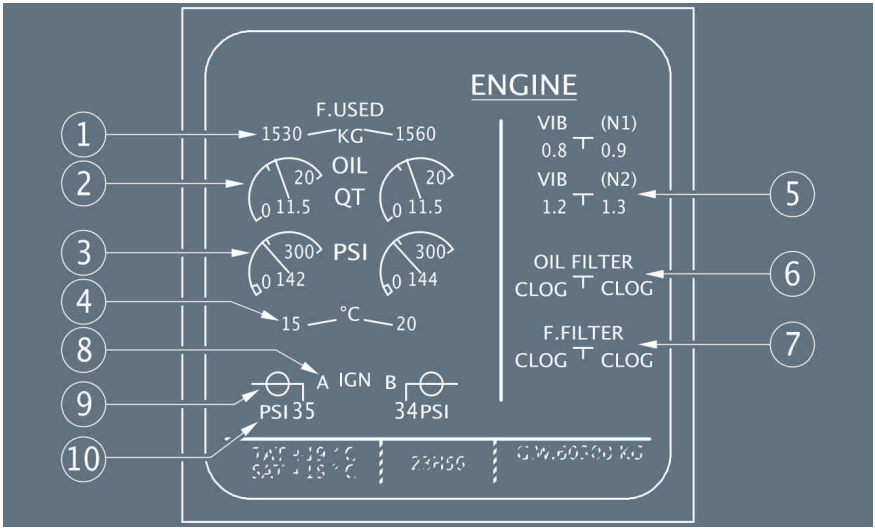
(2) N1 MODE and N1 rating limit

- The N1 MODE indication is displayed in blue.
- The N1 rating limit, corresponding to the thrust lever position, and the N1 thrust limit mode are displayed in blue.
  They are not displayed in unrated N1 mode.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

7 **SECONDARY PARAMETERS**

START CONFIGURATION



(1) Fuel used

The green number is the fuel used as computed by the FADEC.
It resets when the engine starts (MASTER sw ON) on the ground.
It is frozen at its last value (until the next engine start) when the engine shuts down (It is also displayed on the ECAM CRUISE page).
The last two digits are dashed if the fuel-used indication is inaccurate due to the loss of fuel flow data for more than one minute.

(2) Oil quantity

The needle and the numbers are normally in green.
The indication pulses when oil quantity goes below 5 quarts (decreasing), or above 7 quarts (increasing).

(3) Oil pressure

The needle and the numbers are normally in green.
The digital indication pulses, if the oil pressure exceeds 390 PSI (increasing), or 385 PSI (decreasing).
The needle and digital indication become amber if the oil pressure drops below 80 PSI, then red if below 60 PSI.

(4) Oil temperature
These numbers are normally in green.
They pulse above 156 °C (increasing), or 150 °C (decreasing).

They turn amber and a warning appears on ECAM if the temperature exceeds:
- 156 °C for more than 15 min, or
- 165 °C without delay.

(5) VIB
The legend is green.
It pulses above 5.
(These numbers also appear on the ECAM CRUISE page).

(6) Oil filter clog
CLOG appears in amber, if there is excessive pressure loss across the main oil scavenge filter.

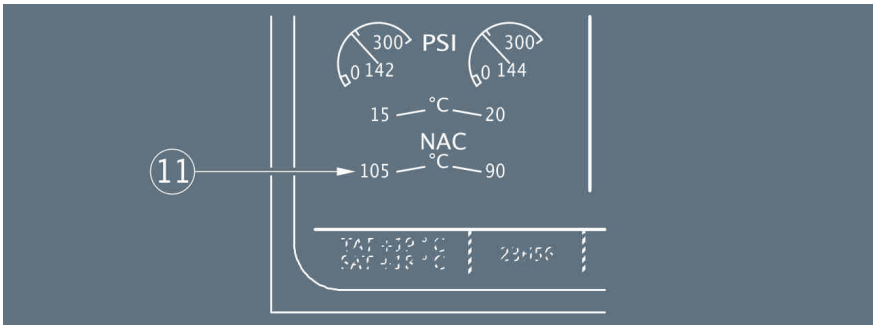
(7) Fuel filter clog
CLOG appears in amber, if there is excessive pressure loss accross the fuel filter.

(8) Ignition
IGN appears in white during the start sequence.
The letters A, B, or AB appear in green when the respective igniters are firing.

(9) Start valve position
ΘGreen : valve fully open.
ΦGreen : valve fully closed.

(10) Engine bleed pressure
The green numbers indicate the bleed pressure upstream of the precooler.
They become amber, when the pressure drops below 21 PSI with N2 ≥ 10 % with the start valve not closed, or if there is an overpressure.

AFTER START CONFIGURATION

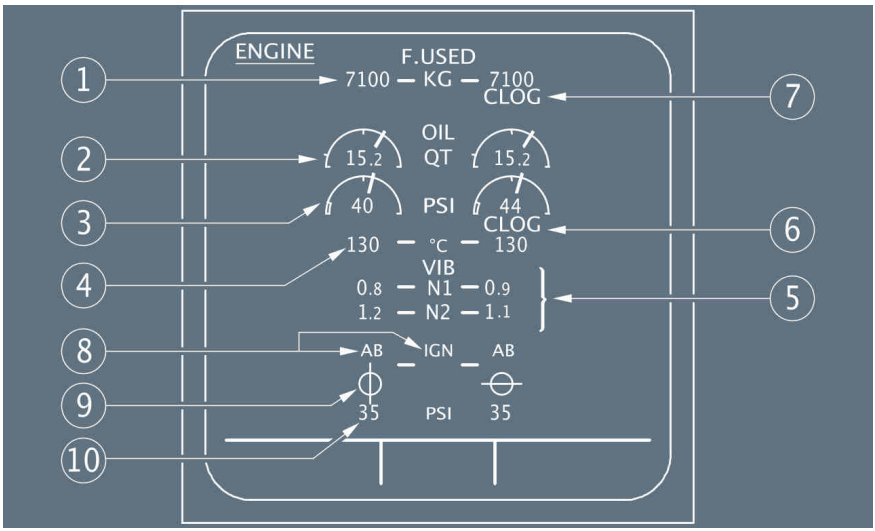


(11) Nacelle temperature indication
Both nacelle temperature indications are displayed if at least one nacelle temperature is above 320 °C.
Nacelle temperature above 320 °C pulses green.
During start sequence, it is replaced by ignition indication.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

8 SECONDARY PARAMETERS

START CONFIGURATION



(1) Fuel used
The green number is the fuel used, as computed by the FADEC.
It resets when the engine starts (MASTER sw ON) on the ground.
It is frozen at its last value (until the next engine start), when the engine shuts down. (It is also displayed on the CRUISE SD page).
The last two digits are dashed, if the fuel-used indication is inaccurate due to the loss of fuel flow data for more than one minute.

(2) Oil quantity
The needle and the numbers are normally in green.
The indication pulses, when oil quantity goes below 5 quarts (decreasing), or above 7 quarts (increasing).

(3) Oil pressure
The needle and the numbers are normally in green.
The digital indication pulses, if the oil pressure exceeds 390 PSI (increasing), or 386 PSI (decreasing).
The needle and digital indication become amber if the oil pressure drops below 80 PSI, then red if below 60 PSI.

(4) Oil temperature
These numbers are normally in green.
They pulse above 155 °C (increasing), or 150 °C (decreasing).

They become amber, and an associated warning appears on the ECAM, if the temperature:
- Exceeds 165 °C
- Exceeds 155 °C for more than 15 min
- Is below -10 °C.

(5) VIB
It pulses above 5. (These numbers also appear on the CRUISE SD page).

(6) Oil filter clog
CLOG appears in amber, if there is excessive pressure loss across the main oil scavenge filter, and oil temperature exceeds 32 °C.

(7) Fuel filter clog
CLOG appears in amber if there is excessive pressure loss accross the fuel filter.

(8) Ignition
IGN appears in white during the start sequence.
The letters A, B or AB appear in green when the respective igniters are firing.

(9) Start valve position

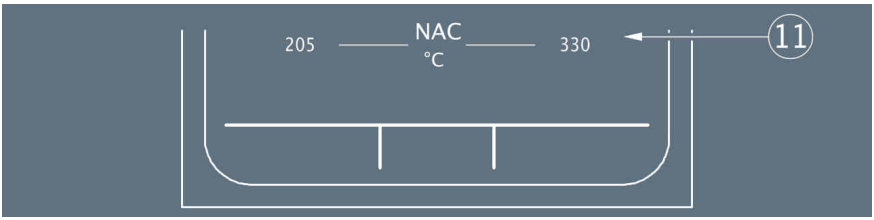
ΘGreen : valve fully open.

ΦGreen : valve fully closed.

(10) Engine bleed pressure

The green numbers indicate the bleed pressure upstream of the precooler.
They become amber when the pressure drops below 21 PSI with N2 ≥ 10 % with the start valve not closed or if there is an overpressure.

AFTER START CONFIGURATION

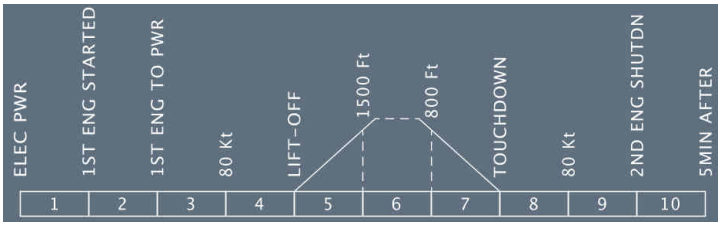


(11) Nacelle temperature indication

The values in green indicate the nacelle temperature. These values are displayed if not during start sequence, and if one nacelle temperature is at, or above, the advisory threshold.
The advisory threshold is 320 °C (with nacelle temperature increasing), or 300 °C (with nacelle temperature decreasing).
The nacelle temperature pulses in green at, or above, the advisory threshold.

WARNINGS AND CAUTIONS

Applicable to: ALL 320



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ENG DUAL FAILURE	CRC	MASTER WARN	ENG	Associated with GEN FAULT lts and PACK FAULT lt	NIL
ENG 1(2) OIL LO PR Oil pressure below 60 PSI (pressure switch)				NIL	1, 10
ENG 1(2) THR LEVER ABV IDLE - One thrust lever is above idle while the other thrust lever is in the reverse detent at landing. - One thrust lever is above idle while the other thrust lever is at idle, at reverser deselection during landing roll.	RETARD		NIL		1, 2, 3, 4, 5, 6, 7, 10
ENG 1(2) OIL LO PR Oil pressure below 80 PSI (pressure transmitter)	NIL	NIL	ENG		1, 3, 4, 5, 8, 9
ENG STALL	SINGLE CHIME	MASTER CAUT			3, 4, 5, 7, 8
ENG THR LEVERS NOT SET The levers position does not correspond to T.O power mode.			NIL		1, 4, 5, 6, 7, 8, 10
ENG THRUST LOCKED Thrust levers are not moved for 5 s following an involuntary disconnection of the A/THR (or disconnection through the FCU pb).	SINGLE CHIME every 5 s	MASTER CAUT every 5 s			1, 2, 3, 4, 8, 9, 10

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ENG 1(2) FUEL VALVE FAULT HP fuel valve failed closed, or failed open.	SINGLE CHIME	MASTER CAUT	ENG	Associated FAULT lt on ENG panel on pedestal	3, 4, 5, 7, 8
ENG 1 (2) START FAULT start fault due to: - No light up, or - ENG stall or overtemp, or - Hung start, or - EEC not capable to open start valve.					
ENG 1(2) START FAULT Start fault due to no N1 rotation.					1, 4, 5, 7, 8, 9, 10
ENG 1(2) START VALVE FAULT Position disagree.					3, 4, 5, 7, 8
ENG 1 (2) THR LEVER DISAGREE Disagree between both resolvers of a thrust lever.				NIL	4, 5 (1)
ENG 1 (2) THR LEVER FAULT Both resolvers on one thrust lever failed.			NIL		4, 5 (1)

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ENG 1(2) OIL HI TEMP Oil TEMP between 155 and 165 °C for more than 15 min, or oil TEMP above 165 °C.	SINGLE CHIME	MASTER CAUT	ENG	NIL	4, 5, 7, 8
ENG TYPE DISAGREE Rating discrepancy between the two engines.			NIL		3 to 10
ENG 1(2) OIL LO TEMP oil TEMP low					1, 4, 5, 6, 7, 8, 9, 10
ENG 1(2) FADEC FAULT both channels failed			ENG		1, 3, 4, 5, 7, 8, 10
ENG 1(2) FADEC OVHT			NIL		3, 4, 5, 7, 8
ENG 1(2) FAIL ENG core speed below idle with master sw ON and fire pb not pushed.					1, 10
ENG 1(2) SHUT DOWN ENG master sw at off in phases 3 to 8 or ENG fire pb pushed in phases 1, 2, 9 and 10			NIL		NIL
ENG 1(2) REVERSE UNLOCKED one reverser not locked in stowed position in flight or on ground with no deploy order					4, 8 (2)
ENG 1(2) REV PRESSURIZED reverser system is pressurized while rev are stowed and locked with no deploy order					4, 5, 8
ENG 1(2) REV SWITCH FAULT failure of reverser permission switch			ENG		3, 4, 5, 6, 7, 8
ENG 1(2) N1 or N2 or EGT OVER LIMIT N1 above 100 % N2 above 100 % EGT above 635 °C			NIL		4, 8
ENG 1(2) IGN A + B FAULT both ignition circuits are failed					3, 4, 5, 7, 8
ENG 1(2) COMPRESSOR VANE low pressure compressor bleed valve SYS failure or stator vane angle disagree					4, 5
ENG 1(2) EPR MODE FAULT FADEC has reverted to back up control mode (N1 mode)					
ENG 1(2) CTL VALVE FAULT					4, 5, 7, 8

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
burn stag valve failure or HPTC or RAC system failure					
ENG 1(2) FUEL CTL FAULT Fuel Metering Valve position disagree or, failure of FMV command or of FMV position feedback					
ENG 1(2) HOT FUEL FADEC fuel overheat			ENG		3, 4, 5, 7, 8
ENG 1(2) SENSOR FAULT Engine parameters sensor failed					4, 5, 7, 8
ENG 1(2) EPR (N1, N2, EGT, FF) DISCREPANCY Discrepancy between real and displayed values			NIL		3, 4, 5, 8
ENG 1(2) EGT EXCEEDED DURING AIR START					3, 4, 5, 6, 7, 8

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ENG 1(2) A/C FADEC SUPPLY	SINGLE CHIME	MASTER CAUT	NIL	NIL	3, 4, 5, 7, 8
ENG 1(2) SYSTEM FAULT failure of internal engine bleed or failure of engine probe heat					
ENG 1(2) REV ISOL FAULT					3 to 7
ENG 1(2) EIU FAULT Data bus between EIU and FADEC failed			ENG		1, 3, 4, 5, 7, 8, 10
ENG 1(2) FUEL FILTER CLOG	NIL	NIL			3, 4, 5, 7, 8
ENG 1(2) OIL FILTER CLOG					3, 4, 5, 7, 8
ENG COMPRESSOR VANE ENG 1 and 2 bleed valve or stator vane angle fault			NIL		3, 4, 5, 7, 8
ENG 1(2) FUEL HEAT SYS Failure of fuel diverter valve or fuel or oil TEMP sensors, or fuel return valve in open position.					3, 4, 5, 6, 7, 8
ENG 1(2) BEARING 4 OIL SYS scavenge valve position disagree or high pressure detection					3, 4, 5, 7, 8
ENG VIB SYS FAULT failure of vibration detection system					3, 4, 5, 6, 7, 8, 9
ENG 1(2) OVSPD PROT FAULT loss of overspeed protection					4, 5, 6, 7, 8
ENG 1(2) IGN A(B) FAULT ignition circuit A or B failed					3, 4, 5, 7, 8
ENG 1(2) FADEC A(B) FAULT one FADEC channel failed					3, 4, 5, 7, 8
ENG 1(2) FADEC ALTERNATOR loss of electrical auto supply of FADEC					3, 4, 5, 7, 8
ENG 1(2) FADEC PLUG FAULT					
ENG 1(2) REVERSER FAULT loss of thrust reverser on one engine due to system components, sensors or FADEC fault					3, 4, 5
ENG REV SET Reverse thrust has been selected in flight.					1 to 4 8 to 10
ENG 1(2) AIR EXCHANGR FAULT failure of air/oil heat exchanger valve on ground					3, 4, 5, 6, 7, 8
ENG 1(2) ONE TLA FAULT					

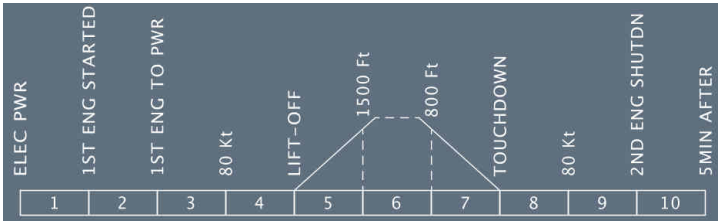
(1) Alert not inhibited in flight phases 4 and 5 if the FADEC automatically selects IDLE thrust.
(2) Alert not inhibited in the flight phase 4 if the engine thrust is automatically set to idle.

MEMO DISPLAY

IGNITION appears in green when the continuous ignition is activated on either engine.

WARNINGS AND CAUTIONS

Applicable to: ALL 321



E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ENG DUAL FAILURE	CRC	MASTER WARN	ENG	Associated with GEN FAULT lts and PACK FAULT lt	NIL
ENG 1(2) OIL LO PR Oil pressure below 60 PSI (pressure switch)				NIL	1, 10
ENG 1(2) THR LEVER ABV IDLE - One thrust lever is above idle while the other thrust lever is in the reverse detent at landing. - One thrust lever is above idle while the other thrust lever is at idle, at reverser deselection during landing roll.	RETARD		NIL		1, 2, 3, 4, 5, 6, 7, 10
ENG 1(2) OIL LO PR Oil pressure below 80 PSI (pressure transmitter)	NIL	NIL	ENG		1, 3, 4, 5, 8, 9
ENG STALL	SINGLE CHIME	MASTER CAUT			3, 4, 5, 7, 8
ENG THR LEVERS NOT SET The levers position does not correspond to T.O power mode.			NIL		1, 4, 5, 6, 7, 8, 10
ENG THRUST LOCKED Thrust levers are not moved for 5 s following an involuntary disconnection of the A/THR (or disconnection through the FCU pb).	SINGLE CHIME every 5 s	MASTER CAUT every 5 s			1, 2, 3, 4, 8, 9, 10

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ENG 1(2) FUEL VALVE FAULT HP fuel valve failed closed, or failed open.	SINGLE CHIME	MASTER CAUT	ENG	Associated FAULT lt on ENG panel on pedestal	3, 4, 5, 7, 8
ENG 1 (2) START FAULT start fault due to: - No light up, or - ENG stall or overtemp, or - Hung start, or - EEC not capable to open start valve.					
ENG 1(2) START FAULT Start fault due to no N1 rotation.					1, 4, 5, 7, 8, 9, 10
ENG 1(2) START VALVE FAULT Position disagree.					3, 4, 5, 7, 8
ENG 1 (2) THR LEVER DISAGREE Disagree between both resolvers of a thrust lever.				NIL	4, 5 (1)
ENG 1 (2) THR LEVER FAULT Both resolvers on one thrust lever failed.			NIL		4, 5 (1)

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ENG 1(2) OIL HI TEMP Oil TEMP between 155 and 165 °C for more than 15 min, or oil TEMP above 165 °C.	SINGLE CHIME	MASTER CAUT	ENG	NIL	4, 5, 7, 8
ENG TYPE DISAGREE Rating discrepancy between the two engines.			NIL		3 to 10
ENG 1(2) OIL LO TEMP oil TEMP low					1, 4, 5, 6, 7, 8, 9, 10
ENG 1(2) FADEC FAULT both channels failed			ENG		1, 3, 4, 5, 7, 8, 10
ENG 1(2) FADEC OVHT			NIL		3, 4, 5, 7, 8
ENG 1(2) FAIL ENG core speed below idle with master sw ON and fire pb not pushed.					1, 10
ENG 1(2) SHUT DOWN ENG master sw at off in phases 3 to 8 or ENG fire pb pushed in phases 1, 2, 9 and 10			NIL		NIL
ENG 1(2) REVERSE UNLOCKED one reverser not locked in stowed position in flight or on ground with no deploy order					4, 8 (2)
ENG 1(2) REV PRESSURIZED reverser system is pressurized while rev are stowed and locked with no deploy order					4, 5, 8
ENG 1(2) REV SWITCH FAULT failure of reverser permission switch			ENG		3, 4, 5, 6, 7, 8
ENG 1(2) N1 or N2 or EGT OVER LIMIT N1 above 100 % N2 above 100 % EGT above 650 °C			NIL		4, 8
ENG 1(2) IGN A + B FAULT both ignition circuits are failed					3, 4, 5, 7, 8
ENG 1(2) COMPRESSOR VANE low pressure compressor bleed valve SYS failure or stator vane angle disagree					4, 5
ENG 1(2) EPR MODE FAULT FADEC has reverted to back up control mode (N1 mode)					
ENG 1(2) CTL VALVE FAULT					4, 5, 7, 8

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
burn stag valve failure or HPTC or RAC system failure					
ENG 1(2) FUEL CTL FAULT Fuel Metering Valve position disagree or, failure of FMV command or of FMV position feedback					
ENG 1(2) HOT FUEL FADEC fuel overheat			ENG		3, 4, 5, 7, 8
ENG 1(2) SENSOR FAULT Engine parameters sensor failed					4, 5, 7, 8
ENG 1(2) EPR (N1, N2, EGT, FF) DISCREPANCY Discrepancy between real and displayed values			NIL		3, 4, 5, 8
ENG 1(2) EGT EXCEEDED DURING AIR START					3, 4, 5, 6, 7, 8

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E/WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNING	FLT PHASE INHIB
ENG 1(2) A/C FADEC SUPPLY	SINGLE CHIME	MASTER CAUT	NIL	NIL	3, 4, 5, 7, 8
ENG 1(2) SYSTEM FAULT failure of internal engine bleed or failure of engine probe heat					
ENG 1(2) REV ISOL FAULT					3 to 7
ENG 1(2) EIU FAULT Data bus between EIU and FADEC failed			ENG		1, 3, 4, 5, 7, 8, 10
ENG 1(2) FUEL FILTER CLOG	NIL	NIL			3, 4, 5, 7, 8
ENG 1(2) OIL FILTER CLOG					3, 4, 5, 7, 8
ENG COMPRESSOR VANE ENG 1 and 2 bleed valve or stator vane angle fault			NIL		3, 4, 5, 7, 8
ENG 1(2) FUEL HEAT SYS Failure of fuel diverter valve or fuel or oil TEMP sensors, or fuel return valve in open position.					3, 4, 5, 6, 7, 8
ENG 1(2) BEARING 4 OIL SYS scavenge valve position disagree or high pressure detection					3, 4, 5, 7, 8
ENG VIB SYS FAULT failure of vibration detection system					3, 4, 5, 6, 7, 8, 9
ENG 1(2) OVSPD PROT FAULT loss of overspeed protection					4, 5, 6, 7, 8
ENG 1(2) IGN A(B) FAULT ignition circuit A or B failed					3, 4, 5, 7, 8
ENG 1(2) FADEC A(B) FAULT one FADEC channel failed					3, 4, 5, 7, 8
ENG 1(2) FADEC ALTERNATOR loss of electrical auto supply of FADEC					3, 4, 5, 7, 8
ENG 1(2) FADEC PLUG FAULT					
ENG 1(2) REVERSER FAULT loss of thrust reverser on one engine due to system components, sensors or FADEC fault					3, 4, 5
ENG REV SET Reverse thrust has been selected in flight.					1 to 4 8 to 10
ENG 1(2) AIR EXCHANGR FAULT failure of air/oil heat exchanger valve on ground					3, 4, 5, 6, 7, 8
ENG 1(2) ONE TLA FAULT					

(1) Alert not inhibited in flight phases 4 and 5 if the FADEC automatically selects IDLE thrust.
(2) Alert not inhibited in the flight phase 4 if the engine thrust is automatically set to idle.

MEMO DISPLAY

IGNITION appears in green when the continuous ignition is activated on either engine.

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ELECTRICAL SUPPLY

Applicable to: ALL

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
FADEC	CHANNEL A	ENG 1 and 2				X	
	CHANNEL B	ENG 1		BAT			
		ENG 2		DC2			
EIU		ENG 1		BAT		X	
		ENG 2				X	
HP VALVES						X	
LP VALVES				DC2		X	
OIL PRESS/QTY		ENG 1		DC1			
		ENG 2		DC2			
IGNITION	A	ENG 1 and 2	AC ESS		AC ESS or AC STAT INV during RAT extension		
	B	ENG 1	AC1				
		ENG 2	AC2				
EVMU		ENG 1 and 2	AC1				

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PROCEDURES

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PRO-PLP PRELIMINARY PAGES

TABLE OF CONTENTS
LIST OF EFFECTIVE TEMPORARY DOCUMENTARY UNITS

PRO-ABN Abnormal and Emergency Procedures

PRO-NOR Normal Procedures

PRO-SPO Special Operations

PRO-SUP Supplementary Procedures

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M(1)	Localization	DU Title	DU identification	DU date
E	PRO-ABN-31	**MULTIPLE UNDUE ECAM ALERTS**	00012928.0001001	30 MAR 12
	Criteria: 31-1276, 31A1220, P8671, P9824			
E	**Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU**			
	Impacted DU: NONE			
	Reason for issue:			
	This Temporary Revision was re-issued to update the list of possible undue ECAM alerts.			
	PRO-ABN-34	**NAV TCAS FAULT (If Installed)**	NG01075	
	PRO-ABN-34	**NAV TCAS ◁✈ FAULT - FWSPAGE**	00013538.0001001	16 NOV 11
	Criteria: P5613, SA			
	Applicable to: B-HSQ, B-HSR			
	Impacted DU: 00012435 NAV TCAS FAULT (If Installed) - FWSPAGE			

R	PRO-ABN-70	**ENG RELIGHT (In Flight)**	00013479.0001001	30 MAY 12
	Criteria: G-V2527-A5			
E	**Applicable to: B-HSI, B-HSK, B-HSM**			
	Impacted DU: 00012594 ENG RELIGHT (In Flight)			
R	PRO-ABN-70	**ENG RELIGHT (In Flight)**	00013479.0002001	30 MAY 12
	Criteria: 31-1331, G-V2527-A5, G-V2533-A5, P8564			
E	**Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSJ, B-HSL, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU**			
	Impacted DU: 00012594 ENG RELIGHT (In Flight)			

R	PRO-NOR-SOP-14	**Climb**	NG00723	
R	PRO-NOR-SOP-14	**Climb - Radar**	00013047.0003001	16 NOV 11
	Criteria: P7754, P7929, P9902, SA			
	Applicable to: B-HSQ, B-HSR, B-HST, B-HSU			
	Impacted DU: 00010259 Climb - Radar			

M(1)	Localization	DU Title	DU identification	DU date
	Reason for issue: *When in the AUTO position, the MultiScan AUTO mode adjusts the tilt according to the altitude of the aircraft.* *In cruise, MULTISCAN function provides a large view of the weather ahead, ie display of weather cells located on and below aircraft path.* *At low altitudes (below FL 200), the tilt is adjusted upward to manage clutter from strong ground targets. In some cases, the weather may be low-lying and therefore may be below the radar beam and not be displayed until the aircraft descends closer to the precipitation level.* *Therefore, this Temporary Revision is issued to indicate that, when the Multiscan is in the AUTO position, the GAIN should be manually set to +4 when the aircraft is below FL 200.* *In addition, the flight crew should temporarily set the MULTISCAN sw to MAN, if:* - *If the weather is good, or no significant, in order to check that the radar is operating correctly: down tilt until displaying ground echoes* - *The weather display is ambiguous or unexpected, in order to better analyze the weather situation using manual tilt according to standard technique* - *In particular below FL 200, for situations with low-level weather, weather with low reflectivity or in front of suspected active cells, the flight crew should switch to Manual mode and adjust the tilt setting downward until the weather is detected or the ground clutter appears on the upper part of the display.* *In addition, the flight crew may increase the manual gain control to display lower reflectivity targets. The manual gain control can be increased in both AUTO and Manual modes to display lower levels of weather. In both cases, ground clutter may also be displayed as a result of low settings and/or increased gain.*		
R	PRO-NOR-SOP-15	**Cruise - Radar Tilt**	00013068.0006001	16 NOV 11
	Criteria: P7929, P9902, SA **Applicable to: B-HSQ, B-HSR, B-HST, B-HSU** *Impacted DU: 00010291 Cruise - Radar Tilt*			

M(1)	Localization	DU Title	DU identification	DU date
	Reason for issue: *When in the AUTO position, the MultiScan AUTO mode adjusts the tilt according to the altitude of the aircraft.* *In cruise, MULTISCAN function provides a large view of the weather ahead, ie display of weather cells located on and below aircraft path.* *At low altitudes (below FL 200), the tilt is adjusted upward to manage clutter from strong ground targets. In some cases, the weather may be low-lying and therefore may be below the radar beam and not be displayed until the aircraft descends closer to the precipitation level.* *Therefore, this Temporary Revision is issued to indicate that, when the Multiscan is in the AUTO position, the GAIN should be manually set to +4 when the aircraft is below FL 200.* *In addition, the flight crew should temporarily set the MULTISCAN sw to MAN, if:* *- The weather is good, or no significant, in order to check that the radar is operating correctly: down tilt until displaying ground echoes* *- The weather display is ambiguous or unexpected, in order to better analyze the weather situation using manual tilt according to standard technique* *- In particular below FL 200, for situations with low-level weather, weather with low reflectivity or in front of suspected active cells, the flight crew should switch to Manual mode and adjust the tilt setting downward until the weather is detected or the ground clutter appears on the upper part of the display.* *In addition, the flight crew may increase the manual gain control to display lower reflectivity targets. The manual gain control can be increased in both AUTO and Manual modes to display lower levels of weather. In both cases, ground clutter may also be displayed as a result of low settings and/or increased gain.*			

R	PRO-NOR-SOP-17	**DESCENT**	NG00915	
E	PRO-NOR-SOP-17	**Descent Adjustment - Radar**	00013353.0003001	07 APR 11
	Criteria: P7929, P9902, SA			
E	**Applicable to: B-HSQ, B-HSR, B-HST, B-HSU**			
	Impacted DU: 00011545 Descent Adjustment - Radar			

M(1)	Localization	DU Title	DU identification	DU date
	Reason for issue: *When in the AUTO position, the MultiScan AUTO mode adjusts the tilt according to the altitude of the aircraft. In cruise, MULTISCAN function provides a large view of the weather ahead, ie display of weather cells located on and below aircraft path.* *At low altitudes (below FL 200), the tilt is adjusted upward to manage clutter from strong ground targets. In some cases, the weather may be low-lying and therefore may be below the radar beam and not be displayed until the aircraft descends closer to the precipitation level.* *Therefore, this Temporary Revision is issued to indicate that, when the Multiscan is in the AUTO position, the GAIN should be manually set to +4 when the aircraft is below FL 200.* *In addition, the flight crew should temporarily set the MULTISCAN sw to MAN, if:* *- If the weather is good, or no significant, in order to check that the radar is operating correctly: down tilt until displaying ground echoes* *- The weather display is ambiguous or unexpected, in order to better analyze the weather situation using manual tilt according to standard technique* *- In particular below FL 200, for situations with low-level weather, weather with low reflectivity or in front of suspected active cells, the flight crew should switch to Manual mode and adjust the tilt setting downward until the weather is detected or the ground clutter appears on the upper part of the display.* *In addition, the flight crew may increase the manual gain control to display lower reflectivity targets. The manual gain control can be increased in both AUTO and Manual modes to display lower levels of weather. In both cases, ground clutter may also be displayed as a result of low settings and/or increased gain.*			

R	PRO-SUP-24	**Computer Reset Table**	NG01118	
R	PRO-SUP-24	**Computer Reset Table - 27 - Flight Controls**	00014180.0001001	30 MAY 12
	Criteria: SA **Applicable to: ALL 321** *Impacted DU: NONE*			
	Reason for issue: *This Temporary Documentary Unit is created to allow flight crew to reset all SECs following a F/CTL SPLR FAULT triggered after the flight control check. This SEC reset covers the AIRBUS recommendations provided in OIT/FOT n°999.0038/11.*			

R	PRO-SUP-24	**Computer Reset Table**	NG01118	
R	PRO-SUP-24	**Computer Reset Table - 27 - Flight Controls**	00014180.0001001	30 MAY 12
	Criteria: SA **Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK** *Impacted DU: NONE*			
	Reason for issue: *This Temporary Documentary Unit is created to allow flight crew to reset all SECs following a F/CTL SPLR FAULT triggered after the flight control check. This SEC reset covers the AIRBUS recommendations provided in OIT/FOT n°999.0038/11.*			

M(1)	Localization	DU Title	DU identification	DU date
R	PRO-SUP-24	**Computer Reset Table**	NG01118	
R	PRO-SUP-24	**Computer Reset Table - 27 - Flight Controls**	00014180.0001001	30 MAY 12
	Criteria: SA **Applicable to: B-HSL, B-HSM** *Impacted DU: NONE*			
	Reason for issue: *This Temporary Documentary Unit is created to allow flight crew to reset all SECs following a F/CTL SPLR FAULT triggered after the flight control check. This SEC reset covers the AIRBUS recommendations provided in OIT/FOT n°999.0038/11.*			

R	PRO-SUP-24	**Computer Reset Table**	NG01118	
R	PRO-SUP-24	**Computer Reset Table - 27 - Flight Controls**	00014180.0001001	30 MAY 12
	Criteria: SA **Applicable to: B-HSN** *Impacted DU: NONE*			
	Reason for issue: *This Temporary Documentary Unit is created to allow flight crew to reset all SECs following a F/CTL SPLR FAULT triggered after the flight control check. This SEC reset covers the AIRBUS recommendations provided in OIT/FOT n°999.0038/11.*			

R	PRO-SUP-24	**Computer Reset Table**	NG01118	
	PRO-SUP-24	**Computer Reset Table - 21 - Air Conditioning/Ventilation/Pressurization**	00014123.0004001	14 NOV 11
	Criteria: K10463, K6443, K9458			
E	**Applicable to: B-HSO, B-HSP** *Impacted DU: 00012647 Computer Reset Table - 21 - Air Conditioning/Ventilation/Pressurization*			
	Reason for issue: *The TDU is issued to provide the ACSC C/B reset procedure to apply in the case of "PACK 1(2) REGUL FAULT" triggered on ground for aircraft equipped with ACSC 1803B0000-02.*			
R	PRO-SUP-24	**Computer Reset Table - 27 - Flight Controls**	00014180.0001001	30 MAY 12
	Criteria: SA **Applicable to: B-HSO, B-HSP** *Impacted DU: NONE*			
	Reason for issue: *This Temporary Documentary Unit is created to allow flight crew to reset all SECs following a F/CTL SPLR FAULT triggered after the flight control check. This SEC reset covers the AIRBUS recommendations provided in OIT/FOT n°999.0038/11.*			

R	PRO-SUP-24	**Computer Reset Table**	NG01118	
	PRO-SUP-24	**Computer Reset Table - 21 - Air Conditioning/Ventilation/Pressurization**	00014123.0004001	14 NOV 11
	Criteria: K10463, K6443, K9458			
E	**Applicable to: B-HSQ, B-HSR, B-HST, B-HSU** *Impacted DU: 00012647 Computer Reset Table - 21 - Air Conditioning/Ventilation/Pressurization*			

M(1)	Localization	DU Title	DU identification	DU date
	Reason for issue: *The TDU is issued to provide the ACSC C/B reset procedure to apply in the case of "PACK 1(2) REGUL FAULT" triggered on ground for aircraft equipped with ACSC 1803B0000-02.*			
	PRO-SUP-24	**Computer Reset Table - 23 - Communications**	00013849.0024001	01 JUL 11
E	Criteria: K12824, K12825, K3901, K8400, K9009, SA **Applicable to: B-HSQ, B-HSR, B-HST, B-HSU** *Impacted DU: 00012649 Computer Reset Table - 23 - Communications*			
	Reason for issue: *CIDS Director Hardware 333B and On Board Replacement Module (OBRM) 33A are sensitive to short power supply interruptions. These power supply interruptions occur when the aircraft is supplied by external power. As a consequence, ECAM caution "COM CIDS 1+2 FAULT" or CIDS Maintenance status 'CIDS 1' or 'CIDS 2' could be spuriously triggered.* *In such event, the flight crew should verify that the CIDS is functioning normally by checking the PA, Cabin Interphone and Cabin lighting function. If the ECAM caution is spurious, it can be removed by resetting the CIDS when the aircraft is powered by the APU.*			
R	PRO-SUP-24	**Computer Reset Table - 27 - Flight Controls**	00014180.0001001	30 MAY 12
	Criteria: SA **Applicable to: B-HSQ, B-HSR, B-HST, B-HSU** *Impacted DU: NONE*			
	Reason for issue: *This Temporary Documentary Unit is created to allow flight crew to reset all SECs following a F/CTL SPLR FAULT triggered after the flight control check. This SEC reset covers the AIRBUS recommendations provided in OIT/FOT n°999.0038/11.*			
E	PRO-SUP-32	**BSCU Reset - On Ground**	00014191.0001001	17 NOV 11
E	Criteria: 32-1336 **Applicable to: B-HSD, B-HSK, B-HTH, B-HTI** *Impacted DU: 00002184 BSCU Reset - On Ground*			

(1) Evolution code : N=New, R=Revised, E=Effectivity

PROCEDURES

ABNORMAL AND EMERGENCY PROCEDURES

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PRO-ABN-29 Hydraulic

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HYD B ELEC PUMP LO PR or OVHT..... B
HYD B RSVR LO LVL..... C
HYD B RSVR OVHT..... D
HYD G ENG 1 PUMP LO PR (PTU Operative)..... E
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HYD G RSVR LO LVL..... H
HYD G RSVR OVHT..... I
HYD Y ELEC PUMP LO PR or OVHT..... J
HYD Y ENG 2 PUMP LO PR (PTU Operative)..... K
HYD Y ENG 2 PUMP LO PR (PTU Inoperative)..... L
HYD Y RSVR LO AIR PR..... M
HYD Y RSVR LO LVL..... N
HYD Y RSVR OVHT..... O
[redacted] HYD B+Y SYS LO PR [redacted]..... P
[redacted] HYD G+B SYS LO PR [redacted]..... Q
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ANTI ICE F/O PROBES....K
ANTI ICE L + R WINDSHIELD....L
ANTI ICE L(R) WINDOW....M
ANTI ICE L(R) WINDSHIELD....N
ANTI ICE STBY PITOT or L(R) STAT or AOA....O
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BRAKES RELEASED ..... N
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RESIDUAL BRAKING PROC ..... R
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[redacted] L/G GEAR NOT DOWN [redacted] ..... U
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L/G GEAR NOT UPLOCKED ..... W
L/G GEAR UPLOCK FAULT X
L/G LGCIU 1 FAULT ..... Y
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L/G LGCIU 2 FAULT ..... AA
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L/G GRAVITY EXTENSION ..... AE
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WHEEL N/W STRG FAULT ..... AH

PRO-ABN-34 Navigation

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NAV ADR 1+2 (1+3) (2+3) FAULT ..... G
[redacted] NAV ADR 1+2+3 FAULT [redacted] ..... H
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NAV ATC/XPDR 1(2) FAULT ..... J
NAV ATC/XPDR 1+2 FAULT ..... K
NAV ATC/XPDR STBY L
NAV ATT DISCREPANCY ..... M
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NAV GPWS TERR DET FAULT ..... R
NAV HDG DISCREPANCY ..... S
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[redacted] TCAS WARNINGS [redacted] ..... AI
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PRO-ABN-36 Pneumatic

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PRO-ABN-70 Power Plant

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ENG 1(2) BEARING 4 OIL SYS....C
ENG 1(2) COMPRESSOR VANE....D
ENG 1(2) EGT EXCEEDED DURING AIR START....E
ENG 1(2) EIU FAULT....F
ENG 1(2) EPR MODE FAULT....G
ENG 1(2) EPR or N1 or N2 or EGT or FF DISCREPANCY....H

ENG 1(2) FADEC A(B) FAULT I
ENG 1(2) FADEC ALTERNATOR ..... J
ENG 1(2) FADEC FAULT ..... K
ENG 1(2) FADEC OVHT L
ENG 1(2) FADEC PLUG FAULT ..... M
ENG 1(2) FAIL ..... N
ENG 1(2) FUEL CTL FAULT ..... O
ENG 1(2) FUEL FILTER CLOG ..... P
ENG 1(2) FUEL HEAT SYS ..... Q
ENG 1(2) FUEL VALVE FAULT ..... R
ENG 1(2) HOT FUEL ..... S
ENG 1(2) IGN FAULT (IGN A or B Fault) ..... T
ENG 1(2) IGN FAULT (IGN A+B Fault) ..... U
ENG 1(2) N1/N2/EGT OVERLIMIT V
ENG 1(2) OIL FILTER CLOG ..... W
ENG 1(2) OIL HI TEMP X
[redacted] ENG 1(2) OIL LO PR [redacted] ..... Y
ENG 1(2) OIL LO TEMP ..... Z
ENG 1(2) ONE TLA FAULT ..... AA
ENG 1(2) OVSPD PROT FAULT ..... AB
ENG 1(2) REV ISOL FAULT ..... AC
ENG 1(2) REV PRESSURIZED ..... AD
ENG 1(2) REV SWITCH FAULT ..... AE
ENG 1(2) REVERSE UNLOCKED ..... AF
ENG 1(2) REVERSER FAULT ..... AG
ENG 1(2) SENSOR FAULT ..... AH
ENG 1(2) SHUT DOWN ..... AI
ENG 1(2) STALL ..... AJ
ENG 1(2) START FAULT ..... AK
ENG 1(2) START VALVE FAULT ..... AL
ENG 1(2) SYSTEM FAULT ..... AM
[redacted] ENG 1(2) THR LEVER ABV IDLE [redacted] ..... AN
ENG 1(2) THR LEVER DISAGREE ..... AO
ENG 1(2) THR LEVER FAULT ..... AP
[redacted] ENG DUAL FAILURE [redacted] ..... AQ
[redacted] ENG DUAL FAILURE - FUEL REMAINING [redacted] ..... AR
[redacted] ENG DUAL FAILURE - NO FUEL REMAINING [redacted] ..... AS
ENG RELIGHT (In Flight) ..... AT
ENG RELIGHT (In Flight) ..... AU
ENG REV SET ..... AV

ENG TAILPIPE FIRE ..... AW
ENG THR LEVERS NOT SET ..... AX
ENG THRUST LOCKED ..... AY
ENG TYPE DISAGREE ..... AZ
ENG VIB SYS FAULT ..... BA
HIGH ENGINE VIBRATION ..... BB

PRO-ABN-80 Miscellaneous

BOMB ON BOARD ..... A
COCKPIT WINDSHIELD/WINDOW ARCING ..... B
COCKPIT WINDSHIELD/WINDOW CRACKED C
CREW INCAPACITATION ..... D
[redacted] DITCHING [redacted] ..... E
ECAM Advisory Conditions ..... F
[redacted] EMER DESCENT [redacted] ..... G
[redacted] EMERGENCY EVACUATION [redacted] ..... H
[redacted] FORCED LANDING [redacted] I
OVERWEIGHT LANDING ..... J
TAILSTRIKE ..... K
VOLCANIC ASH ENCOUNTER L
[redacted] WINDSHEAR [redacted] ..... M
[redacted] WINDSHEAR AHEAD [redacted] ..... N

PRO-ABN-90 Detailed Cabin / Cockpit Evacuation Procedure

General ..... A
Cockpit-Assigned Duties for Evacuation ..... B
Cabin Crew-Assigned Areas for Evacuation C
Communications ..... D
On Ground Evacuation ..... E
Cockpit Evacuation through Window ..... F
Evacuation on Water ..... G

Localization Title	Toc Index	ID	Reason
PRO-ABN-01 Operational Recommendations	B	1	Update of the technical wording
PRO-ABN-10 Landing with Slats or Flaps Jammed	D	1	Revision of the procedure to provide the correct conditions
PRO-ABN-10 Landing with Slats or Flaps Jammed	D	2	Solution revised to highlight that both tables, ECAM Alert and INOP SYS Tables, should be referred to in order to find the applicable Fuel Penalty Factor.
PRO-ABN-10 Landing with Slats or Flaps Jammed	D	3	Revision of the procedure to provide the correct conditions
PRO-ABN-10 Landing with Slats or Flaps Jammed	D	4	Solution revised to highlight that both tables, ECAM Alert and INOP SYS Tables, should be referred to in order to find the applicable Fuel Penalty Factor.
PRO-ABN-10 Rejected Takeoff	E	5	Update of list of amber cautions for which rejected takeoff procedure should be carried out even above 100 kt to include "ENG 1(2) THR LEVER FAULT", since this failure case will lead to reduction to IDLE on affected engine.
PRO-ABN-22 AUTO FLT FAC 1 + 2 FAULT - FWSPAGE	E	2	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-22 AUTO FLT FAC 1 + 2 FAULT - FWSPAGE	E	1	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-22 AUTO FLT YAW DAMPER SYS - FWSPAGE	N	3	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC AC BUS 1 FAULT	B	1	DU solution revised to remove the "VENT EXTRACT FAULT" ECAM associated procedure: the failure of the ventilation system equipment is not related to the “AC BUS 1 FAULT”.
PRO-ABN-24 ELEC AC BUS 1 FAULT - FWSPAGE	B	2	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC AC BUS 1 FAULT - FWSPAGE	B	4	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC DC BUS 2 FAULT - FWSPAGE	N	6	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC DC BUS 2 FAULT - FWSPAGE	N	5	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC DC BUS 2 FAULT - FWSPAGE	N	7	Content revised to Delete the reference to the landing distance factors because they are no longer applicable

Localization Title	Toc Index	ID	Reason
PRO-ABN-24 ELEC DC BUS 1 + 2 FAULT - FWSPAGE	O	9	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC DC BUS 1 + 2 FAULT - FWSPAGE	O	8	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC DC BUS 1 + 2 FAULT - FWSPAGE	O	10	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC DC EMER CONFIG - FWSPAGE	P	12	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC DC EMER CONFIG - FWSPAGE	P	13	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC DC EMER CONFIG - FWSPAGE	P	11	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC DC EMER CONFIG - FWSPAGE	P	14	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC DC ESS BUS FAULT - FWSPAGE	Q	15	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-24 ELEC DC ESS BUS SHED - FWSPAGE	R	16	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC DC ESS BUS SHED - FWSPAGE	R	17	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC EMER CONFIG - FWSPAGE	S	20	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC EMER CONFIG - FWSPAGE	S	19	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC EMER CONFIG - FWSPAGE	S	18	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-24 ELEC EMER CONFIG SYS REMAINING - 36 - PNEUMATIC	T	21	Documentation update: Addition of "ELEC EMER CONFIG SYS REMAINING - 36 - PNEUMATIC" documentary unit
PRO-ABN-26 SMOKE/FUMES/AVNCS SMOKE - ELEC EMER CONFIG	J	1	Revision of the note to delete "and normal flight Control law".

Localization Title	Toc Index	ID	Reason
PRO-ABN-26 SMOKE/FUMES/AVNCS SMOKE - ELEC EMER CONFIG	J	3	Revision of the note to delete "and normal flight Control law". Text indentation modification.
PRO-ABN-26 SMOKE/FUMES/AVNCS SMOKE - ELEC EMER CONFIG - FWSPAGE	J	4	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-26 SMOKE/FUMES/AVNCS SMOKE - ELEC EMER CONFIG - FWSPAGE	J	2	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL ALTN LAW	G	1	Documentation update: Addition of "F/CTL ALTN LAW" documentary unit
PRO-ABN-27 F/CTL F/CTL ALTN LAW - FWSPAGE	G	2	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL DIRECT LAW - FWSPAGE	H	4	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-27 F/CTL ELAC 1 (2) FAULT - FWSPAGE (Both Computers Failed)	J	5	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL FLAPS FAULT/LOCKED - FWSPAGE	R	6	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL FLAPS/SLATS FAULT/LOCKED	S	7	Solution revised to highlight that both tables, ECAM Alert and INOP SYS Tables, should be referred to in order to find the applicable Fuel Penalty Factor.
PRO-ABN-27 F/CTL FLAPS/SLATS FAULT/LOCKED	S	8	Solution revised to highlight that both tables, ECAM Alert and INOP SYS Tables, should be referred to in order to find the applicable Fuel Penalty Factor.
PRO-ABN-27 F/CTL GND SPLR / 1+2 / 3+4 / FAULT - FWSPAGE	T	9	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL F/CTL L (R) ELEV FAULT - FWSPAGE	V	10	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL L+R ELEV FAULT - FWSPAGE	W	11	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-27 F/CTL L+R ELEV FAULT - FWSPAGE	W	12	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-27 F/CTL SEC 1 (2) (3) FAULT - FWSPAGE	Y	13	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.

Localization Title	Toc Index	ID	Reason
PRO-ABN-27 F/CTL SEC 1 (2) (3) FAULT - FWSPAGE	Y	15	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL SLATS AND FLAPS FAULT IN CONF 0 - FWSPAGE	AC	16	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL SLATS AND FLAPS FAULT IN CONF 0 - FWSPAGE	AC	17	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL SLATS FAULT/LOCKED - FWSPAGE	AD	19	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL SLATS FAULT/LOCKED - FWSPAGE	AD	18	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL SPD BRK 2 (3+4) FAULT - FWSPAGE	AE	20	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL SPD BRK FAULT - FWSPAGE	AH	21	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL SPLR FAULT - FWSPAGE	AJ	22	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-27 F/CTL STABILIZER JAM - FWSPAGE	AK	23	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-27 F/CTL RUDDER JAM	AO	24	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-29 HYD B RSVR LO AIR PR - FWSPAGE	A	1	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-29 HYD B ELEC PUMP LO PR or OVHT - FWSPAGE	B	2	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD B RSVR LO LVL - FWSPAGE	C	3	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-29 HYD B RSVR OVHT - FWSPAGE	D	4	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-29 HYD G ENG 1 PUMP LO PR - FWSPAGE (PTU Inoperative)	F	5	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.

Localization Title	Toc Index	ID	Reason
PRO-ABN-29 HYD G ENG 1 PUMP LO PR - FWSPAGE (PTU Inoperative)	F	6	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD G RSVR LO AIR PR - FWSPAGE	G	7	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-29 HYD G RSVR LO AIR PR - FWSPAGE	G	8	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-29 HYD G RSVR LO LVL - FWSPAGE	H	9	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-29 HYD G RSVR LO LVL - FWSPAGE	H	10	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-29 HYD G RSVR OVHT - FWSPAGE	I	11	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-29 HYD G RSVR OVHT - FWSPAGE	I	12	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-29 HYD Y ELEC PUMP LO PR or OVHT - FWSPAGE	J	13	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD Y ELEC PUMP LO PR or OVHT - FWSPAGE	J	14	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD Y ENG 2 PUMP LO PR - FWSPAGE (PTU Inoperative)	L	15	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD Y ENG 2 PUMP LO PR - FWSPAGE (PTU Inoperative)	L	16	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD Y RSVR LO AIR PR - FWSPAGE	M	17	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-29 HYD Y RSVR LO AIR PR - FWSPAGE	M	18	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-29 HYD Y RSVR LO LVL - FWSPAGE	N	19	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD Y RSVR LO LVL - FWSPAGE	N	20	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD Y RSVR OVHT - FWSPAGE	O	21	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD Y RSVR OVHT - FWSPAGE	O	22	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.

Localization Title	Toc Index	ID	Reason
PRO-ABN-29 HYD B+Y SYS LO PR - FWSPAGE	P	24	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD B+Y SYS LO PR - FWSPAGE	P	25	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD B+Y SYS LO PR - FWSPAGE	P	23	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD G+B SYS LO PR - FWSPAGE	Q	26	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD G+B SYS LO PR - FWSPAGE	Q	27	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD G+Y SYS LO PR - FWSPAGE	R	29	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD G+Y SYS LO PR - FWSPAGE	R	30	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-29 HYD G+Y SYS LO PR - FWSPAGE	R	28	Documentation update: Addition of "HYD G+Y SYS LO PR - FWSPAGE" documentary unit
PRO-ABN-30 WING ANTI ICE SYS FAULT - FWSPAGE (One Wing Valve Remains Closed when the Wing Anti-Ice Is Turned on)	V	1	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-32 BRAKES A/SKID NWS FAULT or ANTI SKID/NWS OFF - FWSPAGE	B	1	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-32 BRAKES ALTN L(R) RELEASED - FWSPAGE	D	2	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-32 BRAKES AUTO BRK FAULT - FWSPAGE	E	3	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-32 BRAKES NORM + ALTN FAULT - FWSPAGE	H	4	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-32 BRAKES NORM BRK FAULT - FWSPAGE	I	5	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-32 BRAKES RELEASED - FWSPAGE	N	7	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-32 ASYMMETRIC BRAKING	P	8	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-32 L/G DOORS NOT CLOSED - FWSPAGE	T	9	Solution revised to highlight that both tables, ECAM Alert and INOP SYS Tables, should be referred to in order to find the applicable Fuel Penalty Factor.

Localization Title	Toc Index	ID	Reason
PRO-ABN-32 L/G GEAR NOT UPLOCKED	W	10	Documentation update: Addition of "L/G GEAR NOT UPLOCKED" documentary unit
PRO-ABN-32 L/G GEAR NOT UPLOCKED - FWSPAGE	W	11	Solution revised to highlight that both tables, ECAM Alert and INOP SYS Tables, should be referred to in order to find the applicable Fuel Penalty Factor.
PRO-ABN-32 L/G GEAR UPLOCK FAULT - FWSPAGE	X	12	Solution revised to highlight that both tables, ECAM Alert and INOP SYS Tables, should be referred to in order to find the applicable Fuel Penalty Factor.
PRO-ABN-32 L/G SHOCK ABSORBER FAULT - FWSPAGE (Shock Absorber not Extended after Liftoff)	AC	13	Solution revised to highlight that both tables, ECAM Alert and INOP SYS Tables, should be referred to in order to find the applicable Fuel Penalty Factor.
PRO-ABN-32 LDG WITH ABNORMAL L/G	AF	14	Procedure updated to remove the instruction regarding which doors are to be used for evacuation, as cabin crew may be in a better position to assess which door should be used. Instead, a comment is provided to instruct the flight crew that a short and precious instruction should be announced to initiate evacuation.
PRO-ABN-32 LDG WITH ABNORMAL L/G	AF	15	Procedure updated to remove the instruction regarding which doors are to be used for evacuation, as cabin crew may be in a better position to assess which door should be used. Instead, a comment is provided to instruct the flight crew that a short and precious instruction should be announced to initiate evacuation.
PRO-ABN-34 ADR 1+2+3 FAULT - FWSPAGE	A	1	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-34 ALL ADR OFF	B	2	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-34 NAV ADR DISAGREE - FWSPAGE	D	4	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-34 NAV ADR 1+2 (1+3) (2+3) FAULT - FWSPAGE	G	5	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-34 NAV ADR 1+2 (1+3) (2+3) FAULT - FWSPAGE	G	6	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-34 NAV ADR 1+2 (1+3) (2+3) FAULT - FWSPAGE	G	7	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-34 NAV ADR 1+2+3 FAULT	H	8	Improvement of technical wording.
PRO-ABN-34 NAV IR 1+2(1+3)(2+3) FAULT - FWSPAGE	X	9	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.

Localization Title	Toc Index	ID	Reason
PRO-ABN-34 NAV IR 1+2(1+3)(2+3) FAULT - FWSPAGE	X	10	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-34 NAV IR DISAGREE - FWSPAGE	Y	11	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-34 TCAS WARNINGS	AI	13	Documentation update: Addition of "TCAS WARNINGS" documentary unit
PRO-ABN-34 UNRELIABLE SPEED INDICATION/ADR CHECK PROC	AK	14	Revision of the UNRELIABLE SPEED INDICATION/ADR CHECK PROC procedure, in order to specify that: In the case of go-around with flaps FULL, the flight crew must retract the flaps to CONF 3 and maintain the flaps at CONF 3.
PRO-ABN-34 UNRELIABLE SPEED INDICATION/ADR CHECK PROC - LEVEL-OFF (TROUBLESHOOTING)	AK	15	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-36 AIR DUAL BLEED FAULT	D	1	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-36 AIR DUAL BLEED FAULT	D	2	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-36 AIR ENG 1(2) BLEED LO TEMP - FWSPAGE (Opposite Bleed not Available)	H	3	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-36 AIR ENG 1 + 2 BLEED LO TEMP - FWSPAGE	I	4	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-36 AIR L(R) WING or ENG 1(2) BLEED LEAK - FWSPAGE	M	5	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-36 AIR X BLEED FAULT - FWSPAGE	O	6	Content revised to Delete the reference to the landing distance factors because they are no longer applicable.
PRO-ABN-70 ENG 1(2) COMPRESSOR VANE	D	1	Update of the ENG 1(2) COMPRESSOR VANE procedure layout in order to reflect the FWC definition.
PRO-ABN-70 ENG 1(2) SHUT DOWN - FWSPAGE	AI	3	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-70 ENG 1(2) SHUT DOWN - FWSPAGE	AI	2	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-70 ENG 1(2) START FAULT	AK	6	Procedure updated to highlight that after ENG 1(2) START FAULT ECAM alert, the flight crew must perform a manual engine start for any subsequent attempt to start the engine.
			Following an aborted start on ground, a manual start is recommended for any subsequent start in accordance with IAE Operating Instructions.

Localization Title	Toc Index	ID	Reason
PRO-ABN-70 ENG DUAL FAILURE	AQ	9	Update of the “refer to” wording. Deletion of: - ENGINE RELIGHT ATTEMPT
			Update of the “refer to” wording. Deletion of: - SECURE CABIN AND COCKPIT
PRO-ABN-70 ENG DUAL FAILURE	AQ	7	Update of the “refer to” wording. Deletion of: - ENGINE RELIGHT ATTEMPT
			Update of the “refer to” wording. Deletion of: - SECURE CABIN AND COCKPIT
PRO-ABN-70 ENG DUAL FAILURE - FWSPAGE	AQ	12	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-70 ENG DUAL FAILURE - FWSPAGE	AQ	8	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-70 ENG DUAL FAILURE - FWSPAGE	AQ	10	Content revised to Delete the reference to the landing distance factors because they are no longer applicable
PRO-ABN-70 ENG DUAL FAILURE - FUEL REMAINING - DITCHING	AR	13	Addition of title "If ditching anticipated" for emergency paper procedure "engine dual failure - fuel remaining - ditching".
PRO-ABN-70 ENG DUAL FAILURE - FUEL REMAINING - DITCHING	AR	14	Addition of title "If ditching anticipated" for emergency paper procedure "engine dual failure - fuel remaining - ditching".
PRO-ABN-70 ENG THR LEVERS NOT SET	AX	19	Update of the procedure for clarification purposes.
PRO-ABN-70 ENG THR LEVERS NOT SET	AX	20	Update of the procedure for clarification purposes.
PRO-ABN-70 HIGH ENGINE VIBRATION	BB	21	Update of the high engine vibration content.
PRO-ABN-80 BOMB ON BOARD	A	1	Improvement of illustration quality.
			Procedure updated to remove the instruction regarding which doors are to be used for evacuation, as cabin crew may be in a better position to assess which door should be used. Instead, a comment is provided to instruct the flight crew that a short and precious instruction should be announced to initiate evacuation.
PRO-ABN-80 BOMB ON BOARD	A	2	Improvement of illustration quality.
PRO-ABN-80 BOMB ON BOARD	A	3	Procedure updated to remove the instruction regarding which doors are to be used for evacuation, as cabin crew may be in a better position to assess which door should be used. Instead, a comment is provided to instruct the flight crew that a short and precious instruction should be announced to initiate evacuation.
			Improvement of illustration quality.
PRO-ABN-80 BOMB ON BOARD	A	4	Improvement of illustration quality.

Localization Title	Toc Index	ID	Reason
PRO-ABN-80 BOMB ON BOARD	A	5	Improvement of illustration quality.
			Procedure updated to remove the instruction regarding which doors are to be used for evacuation, as cabin crew may be in a better position to assess which door should be used. Instead, a comment is provided to instruct the flight crew that a short and precious instruction should be announced to initiate evacuation.
PRO-ABN-80 BOMB ON BOARD	A	6	Improvement of illustration quality.
PRO-ABN-80 COCKPIT WINDSHIELD/WINDOW ARCING	B	7	Clarification of location of burning smell or smoke coming from the bottom right corner of CAPT windshield or bottom left corner of the F/O windshield.
PRO-ABN-80 EMER DESCENT	G	8	DU revised to change must to should to allow the flight crew greater flexibility
			Introduction of the instruction to initiate the Emergency Descent in the section of the immediate actions. This aims at standardizing the paper procedure with the ECAM action lines of the CAB PR EXCESS CAB ALT alert.
PRO-ABN-80 VOLCANIC ASH ENCOUNTER	L	9	Addition of a reminder of the "COCKPIT WINDOW OPEN" speed limitation.
PRO-ABN-80 VOLCANIC ASH ENCOUNTER	L	10	Addition of a reminder of the "COCKPIT WINDOW OPEN" speed limitation.
PRO-ABN-90 Communications	D	1	Update of the technical wording

FCOM PROCEDURE LAYOUT

Applicable to: ALL

INTRODUCTION

The presentation of procedures is, as far as practicable, identical to the presentation on ECAM.
The abbreviations are identical to those used on the cockpit panels.
All actions and information displayed on ECAM are provided in large letters. Other information, not on ECAM, is provided in small letters.

Expanded information is as far as practicable provided in layer 2. This information:
- Identifies the particular failures
- Explains actions for which the reason is not self-evident
- Furnishes additional background.

PROCEDURE TITLE

The title of an abnormal or emergency procedure, that appears on the ECAM, is on a white background.
Abnormal procedure displayed on ECAM (amber caution) :



Emergency procedure displayed on ECAM (red warning) :



The title of an abnormal or emergency procedure, that does not appear on the ECAM is on a grey background.
Abnormal procedure not displayed on ECAM :



Emergency procedure not displayed on ECAM :



SEVERAL ALERTS UNDER THE SAME TITLE

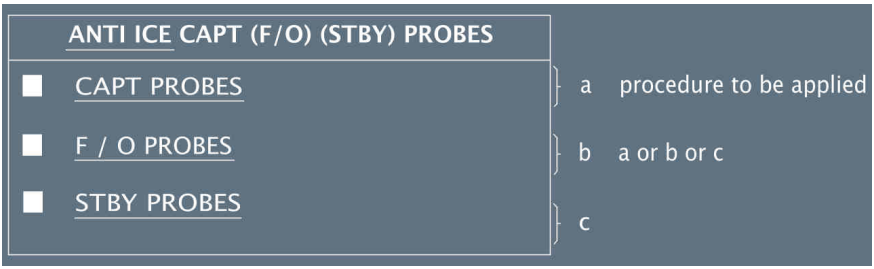
When applicable, several alerts may be grouped under the same procedure title. However, depending on the failure, the actions that the flight crew should perform may differ.

Note: Alerts that have the same procedure title may be differentiated by a subtitle (e.g. ENG FIRE (On Ground) versus ENG FIRE (In Flight)).

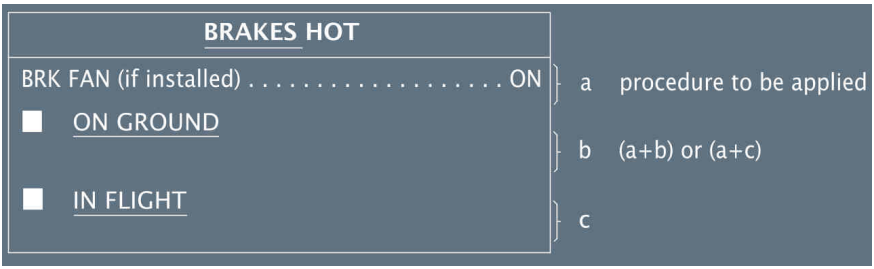
CONDITIONS

BLACK SQUARE

When several procedures appear under the same title, a black square marks the starting point of each procedure.
For example:



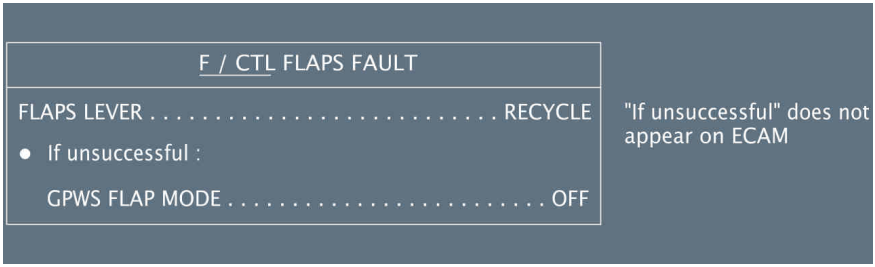
Black squares also indicate parts of a procedure among which only one is applicable.
For example:



The ECAM does not display black squares.

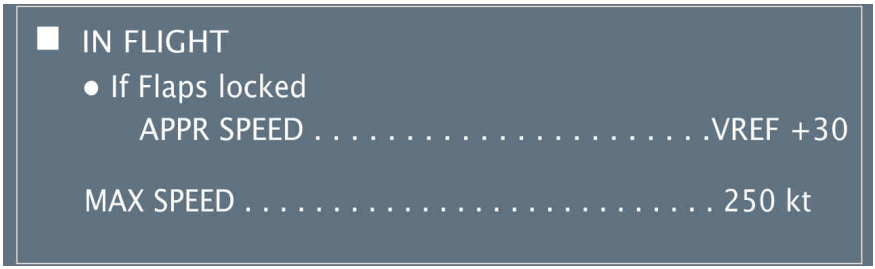
BLACK DOT

If an action depends on a precondition, a black dot identifies the precondition. If the precondition appears on ECAM, it appears in LARGE LETTERS. If not, it appears in small letters.
For example:



INDENTATION

Indentation is used in order to identify when an action depends on a precondition/flight phase/procedure.
For example:



- The APPR SPEED is equal to VREF +30 kt only if the flaps are locked, because "APPR SPEED.....VREF +30" is indented below "• If flaps locked".
- The MAX SPEED of 250 kt does not depend on the flaps locked condition because it is aligned with "• If Flaps locked". Therefore, MAX SPEED has to be respected whether the flaps are locked or not.

OPERATIONAL RECOMMENDATIONS

Applicable to: ALL

OVERVIEW

Abnormal and Emergency procedures involve actions that the flight crew must perform in order to ensure adequate safety, and help to make the remainder of the flight easier.

Abnormal and Emergency procedures are actions that the flight crew performs:
- After failures, that the ECAM detects, or
- After failures or situation, that the flight crew detects or encounters (e.g. CKPT WINDOW CRACKED, OVERWEIGHT LANDING), or
- After an aural alert (e.g. OBSTACLE AHEAD, PULL UP).

When the flight crew performs procedures, the flight crew uses the “READ” and “DO” principle (oral reading).

1 **TASKSHARING**

The general tasksharing shown below applies to all procedures.
The pilot's flying remains the pilot flying throughout the procedure.

The Pilot Flying (PF), is responsible for the:
- Thrust levers (for flight path and airspeed control)
- Control of flight path and airspeed
- Aircraft configuration (request configuration change)
- Navigation
- Communications
- Monitoring of all actions associated with ECAM or paper checklists.

The Pilot monitoring (PM), is responsible for:
- Monitoring and reading aloud the ECAM and checklists
- Performing required actions, or actions requested by the PF, if applicable

Note: *Under no circumstances shall the PM manipulate thrust lever, engine master switch, fire switch, IR/ADR, hydraulic pump switches (electric and engine driven), PTU, any guarded switch or pushbutton or pull/reset cockpit CB’s without confirmation by the PF.*

MEMORY ITEMS

The following procedures are to be applied without referring to paper:
- CREW INCAPACITATION
- EGPWS ◁✻ ,
- Immediate actions of EMER DESCENT
- Immediate actions of UNRELIABLE SPEED INDICATION/ADR CHECK PROC
- LOSS OF BRAKING
- STALL RECOVERY
- STALL WARNING AT LIFT-OFF
- TCAS ◁✻
- WINDSHEAR ◁✻
- WINDSHEAR AHEAD ◁✻

USE OF AUTOPILOT (AP)

The AP has not been certified in all configurations, and its performance cannot be guaranteed. If the pilot chooses to use the AP in such circumstances, extra vigilance is required, and the AP must be disconnected, if the aircraft deviates from desired or safe flight path.
For additional information, *Refer to FCOM Limitations section (Auto Flight)*.

INITIATION OF PROCEDURES

Procedures are initiated on the Pilot Flying's command.

No action is taken (apart from cancelling audio warnings, through the MASTER WARN light) until:
- The appropriate flight path is established, and
- The aircraft is at least 400 ft above the runway, if a failure occurs during takeoff, approach, or go-around.

A height of 400 ft is recommended, because it is a good compromise between the necessary time for stabilization and excessive delay in procedure initiation.
In some emergency cases, provided that the appropriate flight path is established, the Pilot Flying may initiate actions before this height.
If an emergency causes LAND ASAP to appear in red on the ECAM, the flight crew must land as soon as possible at the nearest suitable airport at which a safe approach and landing can be made.
If an abnormal procedure causes LAND ASAP to appear in amber on the ECAM, the flight crew should consider landing at the nearest suitable airport.

LANDING DISTANCE

Any increase in landing distance, resulting from an emergency or abnormality, must be based on the Actual Landing Distance without Autobrake - CONF FULL (*Refer to FCOM Abnormal and Emergency section (Miscellaneous)*).

ECAM

WARNING INHIBITION DURING TAKEOFF

Some Warnings (non-inhibited) appear when the situation that prompts them occurs. Other warnings (inhibited) do not appear immediately, when the situation that prompts them occurs during takeoff.

CREW COORDINATION

When carrying out a procedure displayed on ECAM, both pilots must be aware of the present display. Before any "CLEAR" action, the pilots should crosscheck to confirm that there remains no blue message (except in case of no action feedback) that they can eliminate by a direct action.
NO CLEAR ACTION BEFORE CROSS-CONFIRMATION
Exampleof crew coordination and cross confirmation :

WARNING DISPLAY (Example, not for operational use)	PILOT FLYING	PILOT NOT FLYING
HYD B RSVR OVHT BLUE ELEC PUMP.....OFF	READ FAILURE TAKE ATC RADIO CTL – REQUEST ECAM ACTION (1)	READ FAILURE – READ ACTION (full line) – PERFORM ECAM ACTION OR REQUEST EXECUTION BY THE PF (thrust levers)
HYD B RSVR OVHT * F/CTL B SYS LO PR	– CHECK ECAM ACTION COMPLETED – CONFIRM CLEAR	– REQUEST CLEAR
SEAT BELTS * F/CTL	– CONFIRM CLEAR	– REVIEW ALL AFFECTED EQUIPMENT SHOWN IN AMBER ON F/CTL PAGE – REQUEST CLEAR
STATUS APPR PROC HYD LO PR INOP SYS IF BLUE OVHT OUT: CAT 3 BLUE ELEC PUMP .... ON BLUE HYD SPLR 3 CAT 2 ONLY SLATS SLOW	– CONFIRM REMOVE STATUS	– READ STATUS LINE BY LINE – REQUEST REMOVE STATUS

(1) Although it is the responsibility of the pilot flying to request ECAM actions, this does not preclude the captain from either taking control of the aircraft or ordering ECAM actions he (she) considers to be necessary

Note: *ECAM procedures and STATUS, supplemented by a PFD/ND check suffice for handling the fault. However, before applying the ECAM procedures, the fault should be confirmed on the system display.*
When ECAM actions have been performed, and ECAM STATUS has been reviewed, the flight crew may refer to FCOM procedure (FCOM/PRO/ABN) for supplementary information, if time permits.

USE OF SUMMARIES

Applicable to: ALL

GENERAL

The summaries consist of QRH procedures.
They have been created to help the flight crew to handle the actions in the event of an ELEC EMER CONFIG or a dual HYD failure.
In any case, the ECAM should be applied first. This includes both the procedure and the STATUS page review.

SITUATION ASSESSMENT

The CRUISE section highlights the remaining systems, the main limitations and the flight capability of the aircraft.
This section may help the flight crew to assess the situation and to choose an appropriate landing runway.
The flight crew refers, in the meantime, to the corresponding chapters of the QRH for:

- The evaluation of an increased fuel consumption (FPE-FPF),
- The VAPP computation at the selected airport (FPE-IFL),
- The In-Flight Landing Distance computation (FPE-IFL).

APPROACH PREPARATION

As always, the approach preparation begins by the review of the STATUS page.
Then, the APPROACH, LANDING and GO AROUND sections of the summary should be used to prepare and conduct the approach briefing, cross-checking, as usual, the associated FMS pages.
When appropriate, these sections include, among others, the LANDING WITH SLATS or FLAPS JAMMED procedure and the L/G GRAVITY EXTENSION procedure.

APPROACH

The APPR PROC actions given by the STATUS page should be performed by reading the APPROACH section of the summary (PNF), avoiding then to refer to other paper procedures.
Once the aircraft is in final configuration, the LANDING and the GO AROUND sections may be shortly commented, as a reminder (braking, NWS, reversers and L/G retraction in case of go-around).
Before the final approach, the PNF should review the STATUS page and check that all the APPR PROC actions have been completed.

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ENG FAILURE AFTER V1 - CONTINUED TAKEOFF

Applicable to: ALL

If an engine fails after the aircraft passes V1, the takeoff must be continued.
Use rudder conventionally to stay on the runway centerline.
At VR, rotate the aircraft smoothly using a continuous pitch rate to a pitch attitude of 12.5 °. After lift-off, follow the Speed Reference System (SRS).
When airborne with a positive rate of climb, select the landing gear up.
Use rudder to prevent yaw. Shortly after lift-off, β target will appear. Adjust rudder position to zero the β target. Control heading conventionally with bank, keeping the β target at zero with rudder.
Consider the use of TOGA thrust.
Consider the use of autopilot.
At 400 ft minimum, apply the ECAM procedure.
At acceleration height, level off and allow the speed to increase.

- *At F speed select CONF 1.*
- *At S speed select CONF 0.*

- **When the FLAPS lever is at zero, β target reverts to sideslip indication:** Center the sideslip indication conventionally.
- **At green dot speed (engine-out operating speed in clean configuration):**
  Resume the climb using maximum continuous thrust and maintain green dot speed.
  (If already in the FLX/MCT gate, move to CL and back to MCT).

MAXIMUM TAKEOFF THRUST IS ONLY ALLOWED FOR 10 min.

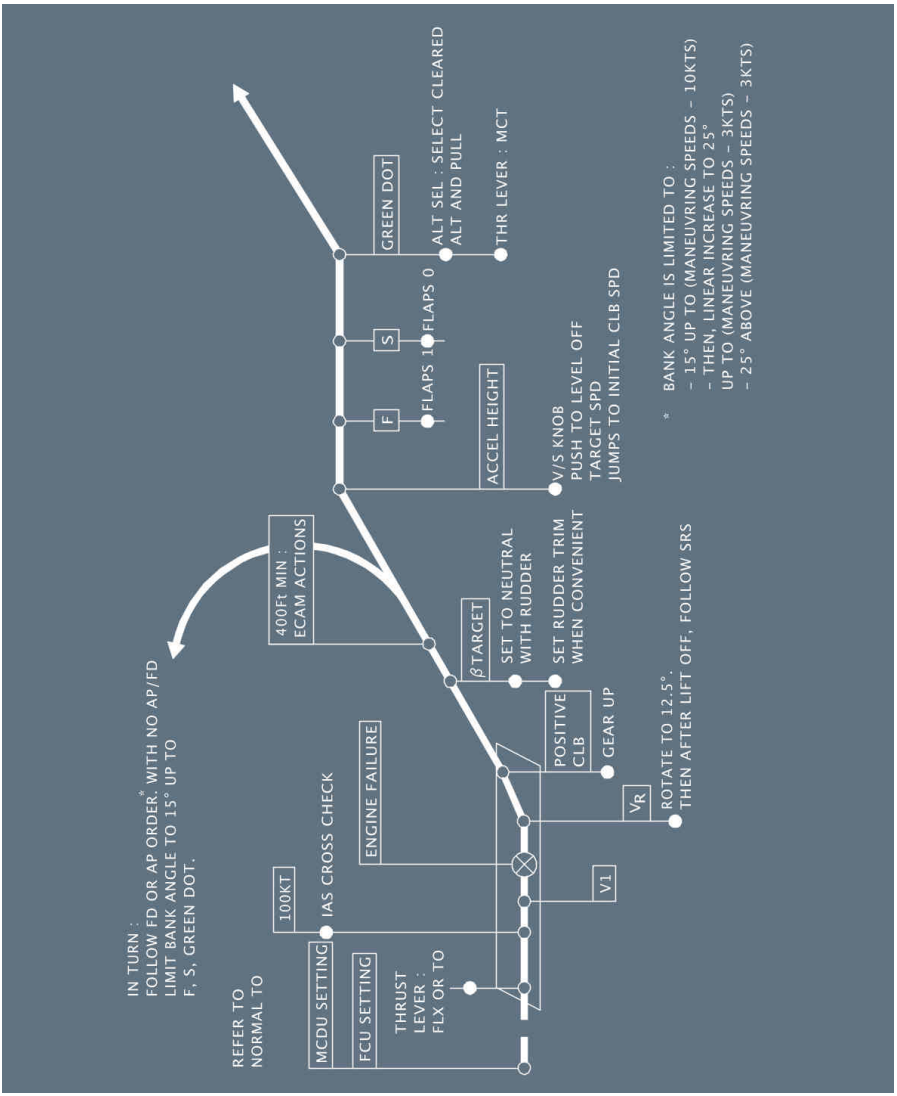
ENGINE FAILURE DURING INITIAL CLIMB-OUT

Proceed as above. However, if the failure occurs above V2 maintain the SRS commanded attitude (or the speed reached after recovery). In any case, the minimum speed must be equal to V2.

ENGINE OPERATION AT MAX T.O. THRUST IS LIMITED TO 10 min

Continued on the following page

ENG FAILURE AFTER V1 - CONTINUED TAKEOFF (Cont'd)

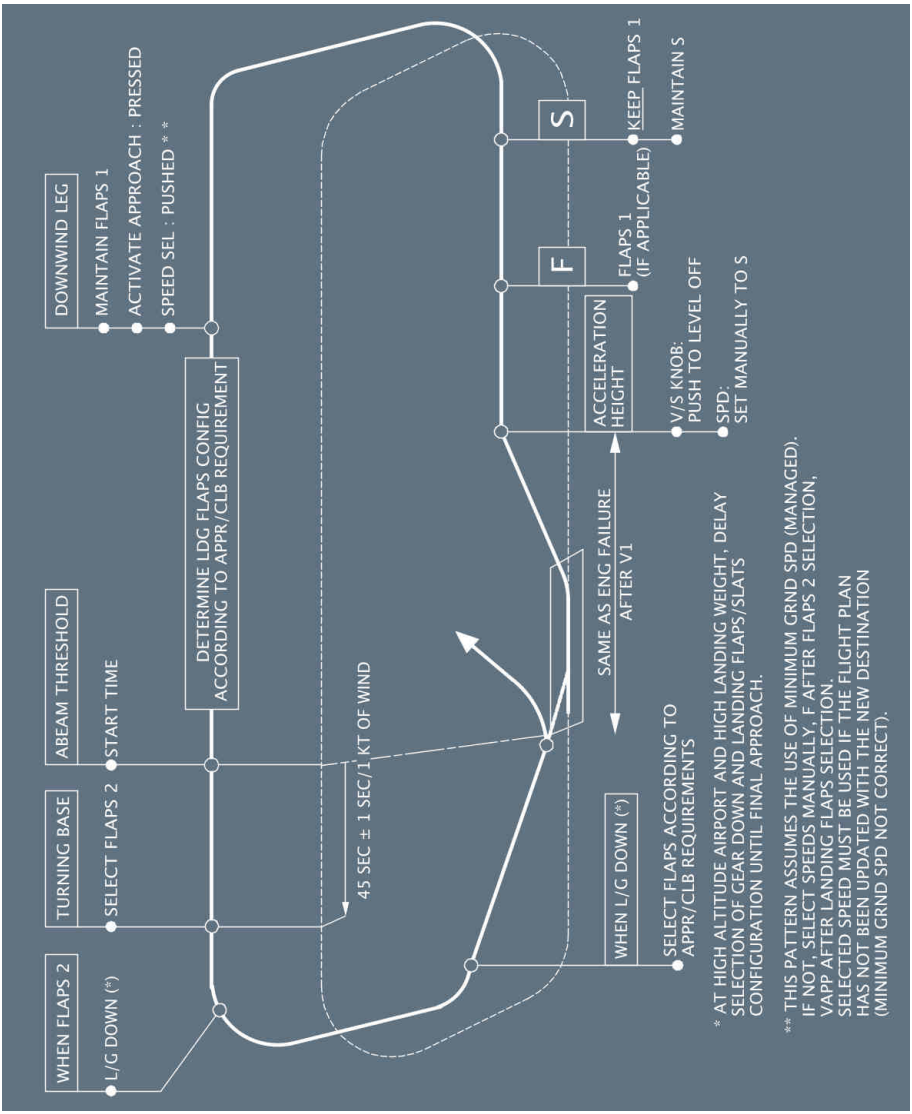


IMMEDIATE VMC LDG FOLLOWING ENG FAILURE ON TO

Applicable to: ALL

Continued on the following page

IMMEDIATE VMC LDG FOLLOWING ENG FAILURE ON TO (Cont'd)



Continued on the following page

IMMEDIATE VMC LDG FOLLOWING ENG FAILURE ON TO (Cont'd)

CIRCLING APPROACH WITH ONE ENGINE INOPERATIVE

Applicable to: ALL 320

LANDING WEIGHT.....CHECK

- **If the aircraft weight is above the maximum weight for circling in CONF 3 (given in the table below):**

  The aircraft cannot maintain flight level with CONF 3 and the landing gear down.

  FOR LDG.....USE FLAP 3

  CONF 3 is preferred, to minimize a configuration change in short final.

  GPWS LDG FLAP 3.....ON

  Delay gear extension.

  Note: - *If the approach is flown at less than 750 ft RA, the "L/G NOT DOWN"warning will be triggered. The pilot can cancel the aural warning by pressing the EMER CANC pb, located on the ECAM control panel.*
  - *A "TOO LOW GEAR" warning is to be expected, if the landing gear is not downlocked at 500 ft RA.*

OAT (°C)	AIRPORT ELEVATION (feet)							
	0	2 000	4 000	6 000	8 000	10 000	12 000	14 000
0	70	69	68	67	65	64	62	57
5	70	69	68	67	65	64	60	55
10	70	69	68	67	65	61	57	52
15	70	69	68	66	63	59	54	50
20	70	69	66	64	61	56	52	48
25	70	67	64	62	58	54	50	46
30	67	65	63	60	56	51	47	
35	65	62	60	57	53	49		
40	62	60	58	54				
45	59	57	55					
50	56	54						
55	53							

MAXIMUM WEIGHT FOR CIRCLING IN CONF 3 (1000 KG)

CIRCLING APPROACH WITH ONE ENGINE INOPERATIVE

Applicable to: ALL 321

LANDING WEIGHT.....CHECK

- **If the aircraft weight is above the maximum weight for circling in CONF 3 (given in the table below):**
  The aircraft cannot maintain flight level with CONF 3 and the landing gear down.

  FOR LDG.....USE FLAP 3

  CONF 3 is preferred, to minimize a configuration change in short final.

  GPWS LDG FLAP 3.....ON

  Delay gear extension.

  Note: - *If the approach is flown at less than 750 ft RA, the "L/G NOT DOWN"warning will be triggered. The pilot can cancel the aural warning by pressing the EMER CANC pb, located on the ECAM control panel.*
  - *A "TOO LOW GEAR" warning is to be expected, if the landing gear is not downlocked at 500 ft RA.*

OAT	AIRPORT ELEVATION (feet)							
(°C)	0	2 000	4 000	6 000	8 000	10 000	12 000	14 000
0	76	74	71	68	64	61	58	54
5	76	74	71	68	64	61	56	52
10	76	74	71	68	64	59	54	
15	76	74	71	67	61	57	52	
20	76	74	69	64	59	54		
25	76	71	66	61	56			
30	73	68	64	59	54			
35	69	65	61	57	52			
40	66	62	59	55				
45	63	60	57					
50	60	57						
55	57							

MAXIMUM WEIGHT FOR CIRCLING IN CONF 3 (1000 KG)

LANDING WITH SLATS OR FLAPS JAMMED

Applicable to: ALL 320

1 LANDING CONF.....CONF 3

■ **Repeat the following until landing configuration is reached:**

SPEED SEL..... VFE NEXT - 5 kt

Decelerate towards VFE NEXT - 5 kt but not below VLS. In case of turbulence, to avoid VFE exceedance, the pilot may decide to decelerate to a lower speed, but not below VLS.

Note:
- *The autopilot may be used down to 500 ft AGL. As it is not tuned for abnormal configurations, its behavior can be less than optimum and must be monitored*
- *Approach with selected speed is recommended*
- *A/THR is recommended, except in the case of a G+B SYS LO PR warning*
- *OVERSPEED warning and VLS, displayed on the PFD, are computed according to the actual flaps/slats position*
- *VFE and VFE NEXT are displayed on the PFD according to the FLAPS lever position. If not displayed, use the placard speeds*
- *If VLS is greater than VFE NEXT (overweight landing case), the FLAPS lever can be set in the required next position, while the speed is reduced to follow VLS reduction as surfaces extend. The VFE warning threshold should not be triggered. In this case, disconnect the A/THR. A/THR can be re-engaged when the landing configuration is established.*

As speed reduces through VFE NEXT:

FLAPS LEVER.....ONE STEP DOWN

■ **When landing configuration is established:**

DECELERATE TO CALCULATED APPROACH SPEED IN FINAL APPROACH

2 **FOR GO AROUND**

The table (See below) provides the MAX SPEEDS for the abnormal configurations.

■ **IF SLATS FAULT:**

● **FOR CIRCUIT:**

MAINTAIN SLATS/FLAPS CONFIGURATION

Recommended speed: MAX SPEED - 10 kt

● **FOR DIVERSION:**

SELECT CLEAN CONFIGURATION

Continued on the following page

LANDING WITH SLATS OR FLAPS JAMMED (Cont'd)

Recommended flaps retraction speed is between MAX SPEED - 10 kt and MAX SPEED.

Recommended diversion speed: MAX SPEED - 10 kt.

■ **IF FLAPS FAULT:**

● **FOR CIRCUIT:**

MAINTAIN SLATS/FLAPS CONFIGURATION

Recommended speed: MAX SPEED - 10 kt

● **FOR DIVERSION:**

■ **If FLAPS jammed at 0:**

SELECT CLEAN CONFIGURATION

Note: - *Recommended speed for slats retraction is between MAX SPEED - 10 kt and MAX SPEED of actual slat/flap position.*

Normal operating speeds

■ **If FLAPS jammed > 0:**

MAINTAIN SLAT/FLAP CONFIGURATION

Recommended speed for diversion: MAX SPEED - 10 kt

Note:
- *In the majority of cases, VFE on PFD is equal to the MAX SPEED. In this case, VFE can be used as MAX SPEED. In case the SPD LIM flag is displayed on the PFD, use the MAX SPEED displayed on the ECAM status page*
- *In some cases, MAX SPEED - 10 kt may be a few knots higher than the VFE. In this situation, pilot may follow the VFE*
- *In case of a go-around with CONF FULL selected, the L/G NOT DOWN warning is triggered at landing gear retraction.*

Flaps / Slats	F = 0	0 < F ≤ 1	1< F ≤ 2	2< F ≤ 3	F > 3
S = 0	NO LIMITATION	215 kt	200 kt	185 kt	Not allowed (177 kt)
0 < S ≤ 1	230 kt				
1 < S ≤ 3	200 kt		200 kt	185 kt	177 kt
S > 3	177 kt		177 kt	177 kt	177 kt

MAX SPEED

CAUTION For flight with SLATS or FLAPS extended, fuel consumption is increased. Refer to the fuel flow indication. As a guideline, determine the fuel consumption in

Continued on the following page

LANDING WITH SLATS OR FLAPS JAMMED (Cont'd)

	clean configuration at the same altitude without airspeed limitation (e.g. From ALTERNATE FLIGHT PLANNING tables, *Refer to PER-FPL-FLP-ALN-20 ALTERNATE PLANNING ISA*) and multiply this result by the applicable Fuel Penalty Factor provided in the QRH *Refer to QRH/FPE-FPF Fuel Penalty Factors Tables*, to obtain the fuel penalty required to reach the destination in the current configuration.

LANDING WITH SLATS OR FLAPS JAMMED

Applicable to: ALL 321

3 LANDING CONF.....CONF 3

■ **Repeat the following until landing configuration is reached:**

SPEED SEL..... VFE NEXT - 5 kt

Decelerate towards VFE NEXT - 5 kt but not below VLS. In case of turbulence, to avoid VFE exceedance, the pilot may decide to decelerate to a lower speed, but not below VLS.

Note:
- *The autopilot may be used down to 500 ft AGL. As it is not tuned for abnormal configurations, its behavior can be less than optimum and must be monitored*
- *Approach with selected speed is recommended*
- *A/THR is recommended, except in the case of a G+B SYS LO PR warning*
- *OVERSPEED warning and VLS, displayed on the PFD, are computed according to the actual flaps/slats position*
- *VFE and VFE NEXT are displayed on the PFD according to the FLAPS lever position. If not displayed, use the placard speeds*
- *If VLS is greater than VFE NEXT (overweight landing case), the FLAPS lever can be set in the required next position, while the speed is reduced to follow VLS reduction as surfaces extend. The VFE warning threshold should not be triggered. In this case, disconnect the A/THR. A/THR can be re-engaged when the landing configuration is established.*

As speed reduces through VFE NEXT:

FLAPS LEVER.....ONE STEP DOWN

■ **When landing configuration is established:**

DECELERATE TO CALCULATED APPROACH SPEED IN FINAL APPROACH

4 **FOR GO AROUND**

The table (See below) provides the MAX SPEEDS for the abnormal configurations.

■ **IF SLATS FAULT:**

● **FOR CIRCUIT:**

MAINTAIN SLATS/FLAPS CONFIGURATION

Recommended speed: MAX SPEED - 10 kt

● **FOR DIVERSION:**

SELECT CLEAN CONFIGURATION

Continued on the following page

LANDING WITH SLATS OR FLAPS JAMMED (Cont'd)

Recommended flaps retraction speed is between MAX SPEED - 10 kt and MAX SPEED.

Recommended diversion speed: MAX SPEED - 10 kt.

■ **IF FLAPS FAULT:**

● **FOR CIRCUIT:**

MAINTAIN SLATS/FLAPS CONFIGURATION

Recommended speed: MAX SPEED - 10 kt

● **FOR DIVERSION:**

■ **If FLAPS jammed at 0:**

SELECT CLEAN CONFIGURATION

Note: - *Recommended speed for slats retraction is between MAX SPEED - 10 kt and MAX SPEED of actual slat/flap position.*

Normal operating speeds

■ **If FLAPS jammed > 0:**

MAINTAIN SLAT/FLAP CONFIGURATION

Recommended speed for diversion: MAX SPEED - 10 kt

Note: - *In the majority of cases, VFE on PFD is equal to the MAX SPEED. In this case, VFE can be used as MAX SPEED. In case the SPD LIM flag is displayed on the PFD, use the MAX SPEED displayed on the ECAM status page*
- *In some cases, MAX SPEED - 10 kt may be a few knots higher than the VFE. In this situation, pilot may follow the VFE*
- *In case of a go-around with CONF FULL selected, the L/G NOT DOWN warning is triggered at landing gear retraction.*

Flaps / Slats	F = 0	0 < F ≤ 1	1 < F ≤ 2	2 < F ≤ 3	F > 3
S = 0	NO LIMITATION	215 kt	215 kt	195 kt	Not allowed (190 kt)
0 < S ≤ 1	230 kt				
1 < S ≤ 3	215 kt		215 kt	195 kt	190 kt
S > 3	190 kt		190 kt	190 kt	190 kt

MAX SPEED

CAUTION For flight with SLATS or FLAPS extended, fuel consumption is increased. Refer to the fuel flow indication. As a guideline, determine the fuel consumption in

Continued on the following page

LANDING WITH SLATS OR FLAPS JAMMED (Cont'd)

	clean configuration at the same altitude without airspeed limitation (e.g. From ALTERNATE FLIGHT PLANNING tables, *Refer to PER-FPL-FLP-ALN-20 ALTERNATE PLANNING ISA*) and multiply this result by the applicable Fuel Penalty Factor provided in the QRH *Refer to QRH/FPE-FPF Fuel Penalty Factors Tables*, to obtain the fuel penalty required to reach the destination in the current configuration.

REJECTED TAKEOFF

Applicable to: ALL

GENERAL

The decision to reject the takeoff and the stop action is made by the Captain.
It is therefore recommended that the Captain keeps his hand on the thrust levers until the aircraft reaches V1, whether he is Pilot Flying (PF) or Pilot Monitoring (PM). As soon as he decides to abort, he calls "stop", takes over control of the aircraft and performs the stop actions.
It is not possible to list all the factors that could lead to the decision to reject the takeoff.
However, in order to help the Captain to make a decision, the ECAM inhibits the warnings that are not essential from 80 kt to 1 500 ft (or 2 min after lift-off, whichever occurs first).
Experience has shown that rejected takeoffs can be hazardous even if the performance is correctly calculated, based on flight tests.

This may be due to the following factors:
- Delay in Performing the stopping procedure.
- Damaged tires.
- Brakes worn, brakes not working correctly, or higher than normal initial brakes temperature.
- The brakes not being fully applied.
- A runway friction coefficient lower than assumed in computations.
- An error in gross weight calculation.
- Runway line up not considered.

When the aircraft speed is at or above 100 kt, it may become hazardous to reject a takeoff.
Therefore, when the aircraft speed approaches V1, the Captain should be "Go-minded" if none of the main failures quoted below ("Above 100 kt and below V1") have occurred.

5 ## DECISION MANAGEMENT

■ Below 100 kt:

The decision to reject the takeoff may be taken at the Captain's discretion, depending on the circumstances.

Although we cannot list all the causes, the Captain should seriously consider discontinuing the takeoff, if any ECAM warning/caution is activated.

Note: *The speed of 100 kt is not critical: It was chosen in order to help the Captain make his decision, and to avoid unnecessary stops from high speed.*

Continued on the following page

REJECTED TAKEOFF (Cont'd)

■ **Above 100 kt and below V1:**

Rejecting the takeoff at these speeds is a more serious matter, particularly on slippery runways. It could lead to a hazardous situation, if the speed is approaching V1. At these speeds the Captain should be "go-minded" and very few situations should lead to the decision to reject the takeoff:

1. Fire warning or severe damage.
2. Sudden loss of engine thrust.
3. Malfunctions or conditions that give unambiguous indications that the aircraft will not fly safely.
4. Any red ECAM warning.
5. Any amber ECAM caution listed below:
   - F/CTL SIDESTICK FAULT
   - ENG FAIL
   - ENG REVERSER FAULT
   - ENG REVERSE UNLOCKED
   - ENG 1(2) THR LEVER FAULT

Exceeding the EGT red line or nose gear vibration should not result in the decision to reject takeoff above 100 kt.

In case of tire failure between V1 minus 20 kt and V1:

Unless debris from the tires has caused serious engine anomalies, it is far better to get airborne, reduce the fuel load, and land with a full runway length available.

The V1 call has precedence over any other call.

■ **Above V1:**

Takeoff must be continued, because it may not be possible to stop the aircraft on the remaining runway.

PROCEDURE DURING A REJECTED TAKEOFF

CAPT	F/O
"STOP"..... ANNOUNCE	
Simultaneously:	
THRUST LEVERS..... IDLE	
REVERSE THRUST..... MAX AVAIL.	REVERSERS..... CHECK/ANNOUNCE
	DECELERATION.....CHECK/ANNOUNCE
	ANY AUDIO..... CANCEL
Aircraft stopped	
Consider positioning the aircraft to keep any possible fire away from the fuselage.	
REVERSERS..... STOWED	ATC..... NOTIFY

Continued on the following page

REJECTED TAKEOFF (Cont'd)

CAPT	F/O
PARKING BRAKE..... ON	EMER EVAC Procedure (QRH).....LOCATE
CABIN CREW..... ALERT	
ECAM ACTIONS..... ORDER	ECAM ACTIONS..... PERFORM
The aircraft should remain stationary while the crew evaluates the situation.	
EVACUATION PHASE:	
•If required:	
EMER EVAC Procedure..... APPLY	ATC..... NOTIFY
For more information on the EMER EVAC procedure, Refer to PRO-ABN-80 EMERGENCY EVACUATION *Except if the emergency evacuation procedure is within the ECAM procedure of the failure, the flight crew should apply the non-sensed emergency evacuation procedure on the ECAM or the QRH procedure, as appropriate.*	*Inform ATC of the intention and the required assistance.*

REVERSERS : Full reverse may be used until coming to a complete stop. But, if there is enough runway available at the end of the deceleration, it is preferable to reduce reverse thrust when passing 70 kt. The use of full reverse until complete stop must be reported in the logbook for maintenance action.

Note:

1. *If the brake response does not seem appropriate for the runway condition, FULL manual braking should be applied and maintained. If IN DOUBT, TAKE OVER MANUALLY. Do not attempt to clear the runway, until it is absolutely clear that an evacuation is not necessary and that it is safe to do so.*
2. *If the autobrake is unserviceable, the Captain simultaneously reduces thrust and applies maximum pressure on both pedals.*
   The aircraft will stop in the minimum distance, only if the brake pedals are maintained fully pressed until the aircraft comes to a stop.
3. *If normal braking is inoperative, immediately apply the Loss of Braking procedure (Refer to PRO-ABN-32 LOSS OF BRAKING)*
4. *After a rejected takeoff, if the aircraft comes to a complete stop using autobrake MAX, release brakes prior to taxi by disarming spoilers.*

STALL RECOVERY

Applicable to: ALL

As soon as any stall indication (could be aural warning, buffet...) is recognized, apply the immediate actions:

NOSE DOWN PITCH CONTROL.....APPLY

This will reduce angle of attack

Note: In case of lack of pitch down authority, reducing thrust may be necessary.

BANK.....WINGS LEVEL

- **When out of stall (no longer stall indications) :**

  THRUST.....INCREASE SMOOTHLY AS NEEDED

  Note: In case of one engine inoperative, progressively compensate the thrust asymmetry with rudder.

  SPEEDBRAKES.....CHECK RETRACTED

  FLIGHT PATH.....RECOVER SMOOTHLY

  - **If in clean configuration and below 20 000 ft :**

    FLAP1.....SELECT

    Note: If a risk of ground contact exists, once clearly out of stall (no longer stall indications), establish smoothly a positive climb gradient.

STALL WARNING AT LIFT-OFF

Applicable to: ALL

Spurious stall warning may sound in NORMAL law, if an angle of attack probe is damaged. In this case, apply immediately the following actions:

THRUST..... TOGA

At the same time:

PITCH ATTITUDE..... 15 °

BANK.....WINGS LEVEL

Note: When a safe flight path and speed are achieved and maintained, if stall warning continues, consider it as spurious.

STRAIGHT-IN APPROACH WITH ONE ENGINE INOPERATIVE

Applicable to: ALL

For performance reasons, do not extend flaps full until established on a final descent to landing.
If a level off is expected during the final approach, perform the approach and landing in CONF 3.

Intentionally left blank

AIR AFT CRG VENT FAULT

Applicable to: ALL 321

L2 Failure of ventilation fan.

Crew awareness

STATUS	
	INOP SYS
	AFT CRG VENT

AIR COND CTL 1(2) - A(B) FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 Informs pilots of which air conditioning system controller (1 or 2) lane (A or B) is faulty.

Crew awareness

STATUS	
	INOP SYS
	COND CTL 1(2)-A(B)

AIR PACK 1(2) FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

PACK (AFFECTED)..... OFF

Continued on the following page

AIR PACK 1(2) FAULT (Cont'd)

STATUS

INOP SYS
PACK 1(2)

AIR PACK 1(2) FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

PACK (AFFECTED)..... OFF

STATUS

- **If ACSC 1 failed:**
  CKPT AT FIXED TEMP
- **If ACSC 2 failed:**
  CAB AT FIXED TEMP

INOP SYS
PACK 1(2) COND CTL 1(2) FWD CRG HEAT (If ACSC 1 failed)

AIR PACK 1 + 2 FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

PACK (AFFECTED)..... OFF

L2 *The fault light goes off, when the failure disappears.*

L1 DESCENT TO FL 100/MEA.

L2 *Descend to FL 100, or MEA, whichever is higher.*

L1 ● **WHEN DIFF PR < 1 PSI AND FL BELOW 100:**
RAM AIR.....ON
MAX FL..... 100/MEA

● **If FAULT was due to an overheat:**

ASSOCIATED PROCEDURES

AIR PACK 1 (2) OVHT

● **WHEN PACK OVHT OUT:**
PACK (AFFECTED)..... ON

STATUS

	INOP SYS
• **If packs not recovered:** MAX FL.....100/MEA ● **If FAULT was due to an overheat:** ● **WHEN PACK OVHT OUT:** PACK (AFFECTED)..... ON	PACK 1 + 2

AIR PACK 1 + 2 FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

PACK (AFFECTED)..... OFF

L2 *The fault light goes off, when the failure disappears.*

L1 DESCENT TO FL 100/MEA.

L2 *Descend to FL 100, or MEA, whichever is higher.*

L1 ● **WHEN DIFF PR < 1 PSI AND FL BELOW 100:**
RAM AIR.....ON
MAX FL..... 100/MEA

● **If FAULT was due to an overheat:**

ASSOCIATED PROCEDURES

AIR PACK 1 (2) OVHT

● **WHEN PACK OVHT OUT:**
PACK (AFFECTED)..... ON

STATUS

• **If packs not recovered:**
MAX FL.....100/MEA
CKPT AT FIXED TEMP
CAB AT FIXED TEMP

● **If FAULT was due to an overheat:**

● **WHEN PACK OVHT OUT:**
PACK (AFFECTED)..... ON

INOP SYS

PACK 1 + 2
COND CTL 1
COND CTL 2
FWD CRG HEAT

AIR PACK 1(2) OFF

Applicable to: ALL

L2 One pack is abnormally selected off

Crew awareness.

Continued on the following page

AIR PACK 1(2) OFF (Cont'd)

STATUS
INOP SYS
PACK 1(2)

AIR PACK 1(2) OVHT

Applicable to: ALL

PACK (AFFECTED)..... OFF

L2 *High flow is automatically selected on the remaining pack.*
Fault light goes out when the overheat disappears.

L1 ● **WHEN PACK OVHT OUT:**
PACK (AFFECTED).....ON

STATUS	
● **WHEN PACK OVHT OUT:** PACK (AFFECTED).....ON	INOP SYS PACK 1(2) (1)

(1) *(If pack not recovered)*

AIR PACK 1(2) REGUL FAULT

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

L2 Pack primary channel, or pack primary and secondary channels fault.

Crew awareness.

Continued on the following page

AIR PACK 1(2) REGUL FAULT (Cont'd)

L12

STATUS

	INOP SYS
■ **If the primary channel fails:** The pack air inlet and outlet flaps fully open; pack flow is fixed at the previous setting.	PACK 1(2) REGUL
■ **If the primary and secondary channels fail:** PACK 1(2) AT FIXED TEMP *The pack outlet temperature is controlled by the pack anti-ice valve and is stabilized to a temperature between 5 °C (41 °F) and 30 °C (86 °F) within a maximum of 6 min.*	

AIR PACK 1(2) REGUL FAULT

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

L2 Pack primary channel, or pack primary and secondary channels fault.

Crew awareness.

L12

STATUS

	INOP SYS
■ **If the primary channel fails:** The pack air inlet flap fully opens; pack flow is fixed at the previous setting.	PACK 1(2) REGUL
■ **If the primary and secondary channels fail:** PACK 1(2) AT FIXED TEMP *The pack outlet temperature is controlled by the pack anti-ice valve and is stabilized to a temperature between 5 °C (41 °F) and 30 °C (86 °F) within a maximum of 6 min.*	

AIR PACK 1(2) REGUL FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 The temperature regulation performance is degraded.

Crew awareness.

STATUS
INOP SYS
PACK 1(2) REGUL (1)
HOT AIR (2)

(1) *(In case of By Pass Valve or RAM Air Inlet failure)*
(2) *(In case of Flow Control Valve in backup mode)*

CABIN OVERPRESSURE

Applicable to: ALL

Apply the following procedure (not displayed on ECAM) in case of total loss of cabin pressure control leading to overpressure.

PACK 1 or 2.....OFF
BLOWER + EXTRACT.....OVRD
Cabin air is extracted overboard
ΔP.....FREQUENTLY MONITOR

- **If ΔP > 9 PSI:**
  PACK 1 + 2.....OFF

LAND ASAP

Before 10 min from landing:
PACK 1 + 2.....OFF
BLOWER + EXTRACT.....AUTO

CAUTION	*Check that ΔP is zero before opening the doors.*

CAB PR EXCESS CAB ALT

Applicable to: ALL

L2 Rely on the CAB PR EXCESS CAB ALT warning even if not confirmed on the CAB PRESS SD page. The warning can be triggered by a cabin pressure sensor different from the one used to control the pressure and display the cabin altitude on the SD.

L1 CREW OXY MASK (IF ABOVE FL100)..... ON

■ **If above FL 100, and under FL 160:**

DESCENT.....INITIATE
MAX FL..... 100/MEA

■ **If above FL 160:**

SIGNS.....ON

EMER DESCENT
DESCENT.....INITIATE
THR LEVERS (IF A/THR NOT ENGAGED).....IDLE
SPD BRK.....FULL

L2 *Extension of speedbrakes will significantly increase VLS.*
In order to avoid autopilot disconnection and automatic retraction of speedbrakes due to possible activation of angle of attack protection, allow the speed to increase before starting to use speedbrakes.

L1 SPD.....MAX/APPROPRIATE

L2 *Descend at maximum appropriate speed. However, if structural damage is suspected use the flight controls with care and reduce speed as appropriate. Landing gear may be extended below 25 000 ft. In this case, speed must be reduced to VLO/VLE.*

L1 ENG MODE SEL.....IGN
ATC.....NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intention. If not in contact with ATC, transmit a distress message on one of the following frequencies: (VHF) 121.5 MHz, or (HF) 2.182 kHz, or 8 364 kHz.*
Squawk 77000 unless otherwise specified by ATC.
To save oxygen, set the oxygen diluter selector to N position.
With the oxygen diluter left to 100 %, oxygen quantity may not be sufficient for the entire descent profile.
Ensure that the flight crew can communicate wearing oxygen masks. Avoid the continuous use of the interphone position to minimize the interference from the noise of the oxygen mask.

L1 MAX FL..... 100/MEA

Continued on the following page

CAB PR EXCESS CAB ALT (Cont'd)

● **IF CAB ALT > 14 000 FT:**

PAX OXY MASKS.....MAN ON

L2 *This action confirms that the passenger oxygen masks are released.*

Note:
- *When descent is established and if time permits, check that the OUTFLOW VALVE is closed on the CAB PRESS SD page. If it is not closed and ΔP is positive, select the other CPC. If the OUTFLOW VALVE is still not closing set the cabin pressure MODE SEL pb to MAN and the V/S CTL sw to full down.*
- *Notify the cabin crew when the aircraft reaches a safe flight level, and when cabin oxygen is no more necessary.*

MAX FL..... 100/MEA

CAB PR EXCESS RESIDUAL PR

Applicable to: ALL

PACK 1.....OFF
PACK 2.....OFF
CABIN CREW..... ALERT

CAB PR LDG ELEV FAULT

Applicable to: ALL

LDG ELEV..... ADJUST

L2 *Landing field elevation from FMGC is not available. Landing elevation must be manually selected with LDG ELEV selector. Refer to the LDG ELEV indication on the CRUISE page on the CAB PRESS SD page to adjust the required landing elevation.*

Note: If the landing is performed on QFE, set 0 ft on LDG ELEV selector.

CAB PR LO DIFF PR

Applicable to: ALL

EXPECT HI CAB RATE
A/C V/S.....REDUCE

L2 *This line is not displayed in case of Emergency Descent due to Excessive Cabin Altitude.*

CAB PR OFV NOT OPEN (ON GROUND)

Applicable to: ALL

MODE SEL.....MAN
MAN V/S CTL.....FULL UP

L2 *It may take 10 s in manual mode before the crew notices a change of the outflow valve position.*

L1 ● **IF UNSUCCESSFUL:**
PACK 1.....OFF
PACK 2.....OFF

CAB PR SAFETY VALVE OPEN

Applicable to: ALL

L2 The safety valve has opened due to cabin overpressure, or negative differential pressure.

L1 ■ **IF DIFF PR ABV 8 PSI:**
MODE SEL.....MAN
MAN V/S CTL.....AS RQRD

L2 *If overpressure is confirmed, reduce cabin ΔP.*
It may take 10 s in manual mode before the crew notices a change of the outflow valve position.

L1 ● **IF UNSUCCESSFUL:**
A/C FL.....REDUCE

■ **IF DIFF PR BELOW 0 PSI:**
EXPECT HI CAB RATE
A/C V/S.....REDUCE

Continued on the following page

CAB PR SAFETY VALVE OPEN (Cont'd)

MAN CAB PR CTL
TGT V/S: CLIMB..... 500 FT/MIN
TGT V/S: DESC..... 300 FT/MIN

A/C FL	CAB ALT TGT
390	8 000
350	7 000
300	5 500
250	3 000
<200	0

- **DURING FINAL APPR:**
  MAN V/S CTL..... FULL UP

CAUTION	Check that ΔP is zero before opening the doors.

CAB PR SYS 1(2) FAULT

Applicable to: ALL

L2 Crew awareness.

STATUS

INOP SYS

CAB PR 1 (2)

CAB PR SYS 1+2 FAULT

Applicable to: ALL

L2 Due to the slow closure of the outflow valve in manual pressurization mode and depending on the failure, the following procedure may not avoid the depressurization.

L1 MODE SEL..... MAN
MAN V/S CTL..... AS RQRD

L2 - *It may take 10 s in manual mode before the crew notices a change of the outflow valve position. Use the cabin V/S indication to confirm the outflow valve operation.*
- *Monitor cabin V/S and CAB ALT frequently and adjust as necessary. Maintain aircraft altitude at or above cabin altitude.*
- *The two safety valves limit ΔP to 8.6 PSI.*

STATUS

MAN CAB PR CTL
TGT V/S: CLIMB..... 500 FT/MIN
TGT V/S: DESC..... 300 FT/MIN

A/C FL	*CAB ALT TGT*
390	*8 000*
350	*7 000*
300	*5 500*
250	*3 000*
<200	*0*

● **DURING FINAL APPR:**
MAN V/S CTL..... FULL UP

CAUTION	Check that ΔP is zero before opening the doors.

INOP SYS

CAB PR 1 + 2

COND AFT CRG ISOL VALVE

Applicable to: ALL 321

L2 Crew awareness

Continued on the following page

COND AFT CRG ISOL VALVE (Cont'd)

STATUS
INOP SYS
AFT CRG VENT

COND FWD CAB/AFT CAB/CKPT DUCT OVHT

Applicable to: ALL

● **WHEN DUCT TEMP < 70 DEG C:**
HOT AIR.....OFF THEN ON

L2 *Hot air pressure regulating valve reopens.*

L12

STATUS

• **If system not recovered:** CAB TEMP BY PACK ONLY *Basic temperature regulation is by packs only (remains automatic).*	**INOP SYS** HOT AIR

COND HOT AIR FAULT

Applicable to: ALL

HOT AIR (IF NOT CLOSED).....OFF

● **IF HOT AIR STILL OPEN and DUCT OVHT persists:**
PACK 1.....OFF
PACK 2.....OFF
DESCENT TO FL 100/MEA

L2 *Descend to FL 100, or MEA, whichever is higher.*

L1 ● **WHEN DIFF PR < 1 PSI AND FL BELOW 100:**
RAM AIR.....ON
MAX FL.....100/MEA

Continued on the following page

COND HOT AIR FAULT (Cont'd)

L12

STATUS

	INOP SYS
• **if HOT AIR closed only:** CAB TEMP BY PACK ONLY *Basic temperature regulation by packs only (remains automatic).*	PACK 1 + 2 (if PACKS closed) HOT AIR

COND L + R CAB FAN FAULT

Applicable to: ALL 321

L2 Both cabin fan motors overheat. Cabin fans stop.

L1 ECON FLOW.....NORM

STATUS

INOP SYS
L + R CAB FAN

COND L + R CAB FAN FAULT

Applicable to: ALL 320

L2 Both cabin fan motors overheat. Cabin fans stop.

L1 PACK FLOW.....HI

STATUS

INOP SYS
L + R CAB FAN

COND LAV + GALLEY FAN FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

L2 Cabin zone temperature sensors are normally ventilated by the air extracted by the fan. Therefore, cabin zone temperature regulation is lost.

Crew awareness.

L12

STATUS	
	INOP SYS
CAB ZONE AT FIXED TEMP *See* (1)	GALLEY FAN

(1)
- *Cabin zone inlet duct temperature is constant (15 °C or 59 °F).*
- *Cockpit temperature regulation is normal.*

COND LAV + GALLEY FAN FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 Cabin zone temperature sensors are normally ventilated by the air extracted by the fan. Therefore, cabin zone temperature regulation is lost.

Crew awareness.

Continued on the following page

COND LAV + GALLEY FAN FAULT (Cont'd)

L12

STATUS

- **If ACSC 2 is operative:**
  CAB TEMP CKPT CTL ONLY

- *To adjust the cabin zone temperature, use the FWD CABIN and AFT CABIN zone temperature selectors (overhead panel). The selectors control the cabin duct temperature directly.*
- *Cockpit temperature regulation is normal.*

- **If ACSC 2 is inoperative:**
  CAB AT FIXED TEMP

- *FWD CABIN and AFT CABIN zone temperature selectors are inoperative.*
- *To adjust the cabin zone temperature, use the COCKPIT zone temperature selector (overhead panel). Cabin duct temperature is the same as cockpit duct temperature.*
- *Cockpit temperature regulation is normal.*

INOP SYS

GALLEY FAN
PACK 2 (1)
COND CTL 2 (1)

(1) *(If ACSC 2 is inoperative)*

COND TRIM AIR SYS FAULT

Applicable to: ALL

■ **One trim valve failed:**

A message corresponding to the affected valve is displayed:

AFT CAB TRIM VALVE
FWD CAB TRIM VALVE
CKPT TRIM VALVE

■ **High pressure detected downstream of the hot air pressure regulating valve:**
TRIM AIR HI PR

L2 Note: *If the warning and the TRIM AIR HI PR message are triggered when all trim air valves are closed (during the first 30 s after the packs are selected on, or in flight, if all zone heating demands are fulfilled), disregard them.*

COND ZONE REGUL FAULT
(PRIMARY CHANNEL FAILED)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

L2 The hot air pressure regulating valve and trim air valves close.

Crew awareness.

L12

	STATUS
CAB ZONE AT FIXED TEMP *See* (1)	

(1) *Zones are controlled to 24 °C (75 °F) by the packs through the zone controller secondary channel:*
- *Pack 1 controls the cockpit*
- *Pack 2 controls the cabin.*

COND ZONE REGUL FAULT
(PRIMARY AND SECONDARY CHANNELS FAILED)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

L2 The hot air pressure regulating valve and trim air valves close.

Crew awareness.

L12

STATUS

	INOP SYS
ENG 1 APPR IDLE ONLY ENG 2 APPR IDLE ONLY *See* (1) PACKS AT FIXED TEMP *See* (2)	ZONE REGUL

(1) *As the FADEC no longer receives a bleed demand correction, only approach idle can be selected.*
(2) *The packs are controlled to deliver a fixed temperature of 20 °C (68 °F) for pack 1, and 10 °C (50 °F) for pack 2.*

VENT AVNCS SYS FAULT

Applicable to: ALL

L2 Triggered when the AEVC is not supplied, or when the valve position disagrees with the commanded position, or when the power-up test is not satisfactory.

Crew awareness.

STATUS

INOP SYS
AVNCS VENT VENT BLOWER (1) VENT EXTRACT (1)

(1) *(If AEVC not supplied)*

VENT BLOWER FAULT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HTD, B-HTE, B-HTF

BLOWER..... OVRD

L2 *The ventilation system is in closed circuit configuration and air from air conditioning is added to the ventilation air.*

STATUS

INOP SYS
VENT BLOWER

VENT BLOWER FAULT

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

■ **If NO DC ESS BUS FAULT:**

BLOWER.....OVRD

L2 *The ventilation system is in closed circuit configuration and air from air conditioning is added to the ventilation air.*

L1 ■ **If DC ESS BUS FAULT:**

LAND ASAP

STATUS

INOP SYS
VENT BLOWER (1)

(1) *(If DC ESS BUS FAULT)*

VENT EXTRACT FAULT

Applicable to: ALL

EXTRACT.....OVRD

L2 *The ventilation system is in closed circuit configuration and air from air conditioning is added to the ventilation air.*

STATUS

INOP SYS
VENT EXTRACT

VENT SKIN VALVE FAULT

Applicable to: ALL

● **If INLET valve not fully closed in flight:**

Crew awareness

L2 No action is required, since there is a non return valve at the air inlet.

L1 ● **If EXTRACT valve affected:**

BLOWER.....OVRD
EXTRACT.....OVRD

L2 *These actions send additional closure signals to the inlet and extract valves.*
The weather radar image on both NDs may be lost, in case of insufficient ventilation.

L1 ● **IF UNSUCCESSFUL:**

MAX FL.....100/MEA
CAB PR MODE SEL.....MAN
MAN V/S CTL.....FULL UP

L2 *The aircraft is manually depressurized.*
It may take 10 s in manual mode before the crew notices a change of the outflow valve position.

Continued on the following page

VENT SKIN VALVE FAULT (Cont'd)

STATUS

	INOP SYS
MAX FL: 100/MEA (or minimum obstacle clearance altitude)	AVNCS VALVE

Intentionally left blank

AUTO FLT A/THR LIMITED

Applicable to: ALL

L2 This warning is displayed when A/THR is active and the thrust lever are below the CL detent (or the MCT detent when one engine is out). The caution is repeated every 5 s as long as the thrust lever are not moved.

L1 THR LEVERS.....MOVE

L2 *Thrust lever must be set in the relevant detent.*

AUTO FLT A/THR OFF

Applicable to: ALL

L2 In case of involuntary disconnection, amber "A/THR OFF" and "ENG THRUST LOCKED" messages are displayed in the left lower part of ECAM upper DU.
For voluntary disconnection, an amber A/THR OFF message is displayed on the right lower part of ECAM upper DU.
If the A/THR is failed, the flight crew may recover it by engaging the other AP, and then trying to re-engage the A/THR.

Note: If the A/THR is recovered with AP 2, A/THR will be lost again at AP 2 disengagement.

L1 THR LEVERS.....MOVE

L2 *If the thrust levers are not moved within 5 s, the "ENG THRUST LOCKED" warning is displayed (Refer to PRO-ABN-70 ENG THRUST LOCKED).*

STATUS	
CAT 2 ONLY	**INOP SYS** A/THR CAT 3

AUTO FLT AP OFF

Applicable to: ALL

L2 This warning is displayed only for involuntary disconnection. For voluntary disconnection a red AP OFF message is displayed in the right lower part of ECAM upper DU.

Crew awareness

STATUS	INOP SYS
	AP (Affected) CAT 2 (If both AP lost)

AUTO FLT FAC 1(2) FAULT

Applicable to: ALL

FAC (AFFECTED)..... OFF THEN ON

- **IF UNSUCCESSFUL:**
  FAC (AFFECTED)..... OFF

L2 *All functions are performed by the remaining FAC.*

L12

STATUS	INOP SYS
BOTH PFD ON SAME FAC *See* (1) CAT 3 SINGLE ONLY	CAT 3 DUAL FAC 1(2)

(1) *Characteristic speeds, displayed on the two PFDs, are computed by the same FAC.*

AUTO FLT FAC 1 + 2 FAULT

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

RUD WITH CARE ABV 160 KT

L2 *Depending on when the failure occurs, the rudder travel limiter system may not be in the correct position for the flight speed. Therefore, to prevent damage to the aircraft structure, use the rudder with care, when the speed is above 160 kt.*
At slats' extension, full rudder travel authority is recovered.

L1 FAC 1 ..... OFF THEN ON
FAC 2..... OFF THEN ON

- **IF UNSUCCESSFUL:**

FAC 1 + 2..... OFF

L2 *With FAC 1 + 2 inoperative, the rudder travel limit system, rudder trim control, yaw damper and PFD characteristic speeds are lost.*

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

F/CTL normal laws are lost. All protections, except maneuver protections, are lost.

L1 MAX SPEED ..... 320 KT

L2 *Speed is limited, due to the loss of high-speed protections.*

Continued on the following page

AUTO FLT FAC 1 + 2 FAULT (Cont'd)

L12

1

STATUS

MAX SPEED..... 320 KT
RUD WITH CARE ABV 160 KT

APPR PROC

FOR LDG.....USE FLAP 3
This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
GPWS LDG FLAP 3..... ON
Displayed, when flaps in CONF 3.
APPR SPD.....VREF + 10 KT
LDG DIST PROC.....APPLY

ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
See (1)

INOP SYS

REAC W/S DET
F/CTL PROT
FAC 1 + 2
AP 1 + 2
A/THR
CAT 2

(1) *At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to PRO-ABN 27 F/CTL DIRECT LAW procedure).*

AUTO FLT FAC 1 + 2 FAULT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

RUD WITH CARE ABV 160 KT

L2 *Depending on when the failure occurs, the rudder travel limiter system may not be in the correct position for the flight speed. Therefore, to prevent damage to the aircraft structure, use the rudder with care, when the speed is above 160 kt.*
At slats' extension, full rudder travel authority is recovered.

L1 FAC 1 ..... OFF THEN ON
FAC 2 ..... OFF THEN ON

- **IF UNSUCCESSFUL:**

FAC 1 + 2 ..... OFF

L2 *With FAC 1 + 2 inoperative, the rudder travel limit system, rudder trim control, yaw damper and PFD characteristic speeds are lost.*

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

F/CTL normal laws are lost. All protections, except maneuver protections, are lost.

L1 MAX SPEED ..... 320 KT

L2 *Speed is limited, due to the loss of high-speed protections.*

Continued on the following page

AUTO FLT FAC 1 + 2 FAULT (Cont'd)

L12
2

STATUS

MAX SPEED..... 320 KT
RUD WITH CARE ABV 160 KT

APPR PROC

FOR LDG.....USE FLAP 3
This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
GPWS LDG FLAP 3..... ON
Displayed, when flaps in CONF 3.
APPR SPD.....VREF + 10 KT
LDG DIST PROC.....APPLY

ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
See (1)

INOP SYS

WNDSHEAR DET
F/CTL PROT
FAC 1 + 2
AP 1 + 2
A/THR
CAT 2

(1) *At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to PRO-ABN 27 F/CTL DIRECT LAW procedure).*

AUTO FLT FCU 1(2) FAULT

Applicable to: ALL

BARO REF.....X CHECK

L2 *One FCU channel is lost:*
Therefore, crosscheck the barometric reference settings on the FCU and PFDs.

Continued on the following page

AUTO FLT FCU 1(2) FAULT (Cont'd)

STATUS	INOP SYS
	FCU 1(2)

AUTO FLT FCU 1 + 2 FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

PFD BARO REF: STD ONLY

L2 *With both FCU channels failed, the barometer reference automatically goes to 1 013 hPa.*
Use standby altimeter, and change this to the actual barometer setting.
Do not insert the MDA (MDH) value on the MCDU PERF APPR Page (because the PFD altitude is referenced to STD, and not to the correct barometric value).
The PNF must then perform the standard callouts ("HUNDRED ABOVE"and "MINIMUM"), using the STBY altimeter.

In addition:
- *All FCU controls are inoperative.*
- *A/THR, AP 1 + 2, and FD 1 + 2 are not available.*
  (Except in LAND or GO AROUND mode where only A/THR is lost).
- *On PFD:*
  - *Altitude alert is inoperative.*
  - *ILS deviation scales are displayed.*
  - *Flight path vector is displayed.*
  - *Mach indication is inoperative.*
  - *FMA is lost except in LAND or GA mode.*
- *On ND:*
  - *ROSE NAV mode with map (80 nm range) is displayed.*
  - *VOR/ADF needles:*
    Needle 1 is related to VOR1 only.
    Needle 2 is related to ADF2 only (ADF1 if ADF2 not installed).
    (VOR selection on DDRMI is not affected)
    (ADF selection on DDRMI (if available) is not affected).
  - *The weather radar image may be lost. If the image remains displayed it must be disregarded.*
    In all cases, red "WXR RNG" message is displayed.

Continued on the following page

AUTO FLT FCU 1 + 2 FAULT (Cont'd)

STATUS

PFD BARO REF : STD ONLY
- **If in LAND or GA:**
  CAT 2 ONLY

INOP SYS

FCU 1 + 2
AP 1 + 2 (1)
A/THR
CAT 3 (2)
GPWS TERR
CAT 2 (1)

(1) *(If not LAND or GA)*
(2) *(If in LAND or GA mode)*

AUTO FLT FCU 1 + 2 FAULT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

PFD BARO REF: STD ONLY

L2 *With both FCU channels failed, the barometer reference automatically goes to 1 013 hPa.*
Use standby altimeter, and change this to the actual barometer setting.
Do not insert the MDA (MDH) value on the MCDU PERF APPR Page (because the PFD altitude is referenced to STD, and not to the correct barometric value).
The PNF must then perform the standard callouts ("HUNDRED ABOVE"and "MINIMUM"), using the STBY altimeter.

In addition:
- *All FCU controls are inoperative.*
- *A/THR, AP 1 + 2, and FD 1 + 2 are not available.*
  (Except in LAND or GO AROUND mode where only A/THR is lost).
- *On PFD:*
  - *Altitude alert is inoperative.*
  - *ILS deviation scales are displayed.*
  - *Flight path vector is displayed.*
  - *Mach indication is inoperative.*
  - *FMA is lost except in LAND or GA mode.*
- *On ND:*
  - *ROSE NAV mode with map (80 nm range) is displayed.*
  - *VOR/ADF needles:*
    Needle 1 is related to VOR1 only.
    Needle 2 is related to ADF2 only (ADF1 if ADF2 not installed).
  - *The weather radar image may be lost. If the image remains displayed it must be disregarded.*
    In all cases, red "WXR RNG" message is displayed.

Continued on the following page

AUTO FLT FCU 1 + 2 FAULT (Cont'd)

STATUS

PFD BARO REF : STD ONLY
- **If in LAND or GA:**
  CAT 2 ONLY

INOP SYS

FCU 1 + 2
AP 1 + 2 (1)
A/THR
CAT 3 (2)
GPWS TERR
CAT 2 (1)

(1) *(If not LAND or GA)*
(2) *(If in LAND or GA mode)*

AUTO FLT REAC W/S DET FAULT

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 Crew awareness.

L12

STATUS

INOP SYS

REAC W/S DET

Note: *On ground, this warning may appear spuriously. This warning is cancelled by resetting both FACs, one after the other.*
- *FAC 1: Pull then push AUTO FLT/FAC 1/26VAC and 28VDC circuit breakers BO3 and B04 on 49VU.*
- *FAC 2: Pull then push AUTO FLT/FAC 2/26VAC and 28VDC circuit breakers M18 and M19 on 121VU.*

AUTO FLT RUD TRIM 1(2) FAULT

Applicable to: ALL

L2 Crew awareness.

STATUS	INOP SYS
CAT 3 SINGLE ONLY	CAT 3 DUAL RUD TRIM 1(2)

AUTO FLT RUD TRIM SYS

Applicable to: ALL

FAC 1..... OFF THEN ON
FAC 2..... OFF THEN ON

STATUS	INOP SYS
	RUD TRIM AP 1 + 2 CAT 2

AUTO FLT RUD TRV LIM 1(2)

Applicable to: ALL

L2 Crew awareness.

Continued on the following page

AUTO FLT RUD TRV LIM 1(2) (Cont'd)

STATUS	
	INOP SYS
	RUD TRV LIM 1(2)

AUTO FLT RUD TRV LIM SYS

Applicable to: ALL

RUD WITH CARE ABV 160 KT

L2 *Depending on when the failure occurs, the rudder travel limiter system may not be in the correct position for the flight speed. Therefore, to prevent damage to the aircraft structure, use the rudder with care, when the speed is greater than 160 kt.*
At slats' extension, full rudder travel authority can be recovered.

L1 FAC 1..... OFF THEN ON
FAC 2..... OFF THEN ON

- **If TLU (rudder or pedals) remains locked at high speed after slat extension:**

  MAX X WIND FOR LDG 15 KT
  AUTO BRK.....DO NOT USE

L2 *Do not use the autobrake, so as not to delay the application of differential braking at landing roll.*

L1 - **AT LDG ROLL:**

  DIFF BRAKING..... AS RQRD

Continued on the following page

AUTO FLT RUD TRV LIM SYS (Cont'd)

L12

STATUS

RUD WITH CARE ABV 160 KT

- **If TLU (rudder or pedals) remains locked at high speed after slat extension:**
  MAX X WIND FOR LDG 15 KT
  AUTO BRK..... DO NOT USE
  Do not use the autobrake, so as not to delay the application of differential braking at landing roll.
  - **AT LDG ROLL:**
    DIFF BRAKING..... AS RQRD

CAT 3 SINGLE ONLY

INOP SYS

RUD TRV LIM
CAT 3 DUAL

Note: *An autoland must not be performed with a crosswind greater than 12 kt.*

AUTO FLT YAW DAMPER 1(2)

Applicable to: ALL

L2 Crew awareness.

STATUS

CAT 3 SINGLE ONLY

INOP SYS

CAT 3 DUAL
YAW DAMPER 1(2)

AUTO FLT YAW DAMPER SYS

Applicable to: ALL

L2 Loss of yaw dampers 1 + 2.

L1 FAC 1..... OFF THEN ON
FAC 2..... OFF THEN ON

- **If fault remains:**

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

L2 *F/CTL normal laws are lost. All protections, except maneuver protections, are lost.*

L1 MAX SPEED..... 320 KT

Continued on the following page

AUTO FLT YAW DAMPER SYS (Cont'd)

L12
3

STATUS

MAX SPEED..... 320 KT

Speed is limited, due to the loss of high-speed protections.

APPR PROC

FOR LDG.....USE FLAP 3

This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.

GPWS LDG FLAP 3..... ON

Will be displayed, when flaps in CONF 3.

APPR SPD.....VREF + 10 KT

LDG DIST PROC.....APPLY

ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
See (1)

INOP SYS

F/CTL PROT
YAW DAMPER
AP 1 + 2
CAT 2

(1) *At landing gear extension, control reverts to direct law in pitch,as well as in roll*
Refer to FCOM-PRO-ABN-27 F/CTL DIRECT LAW.

LOSS OF FMS DATA IN DESCENT/APPROACH (SEVERE RESET)

Applicable to: ALL

AP/FD lateral and vertical selected modes, and A/THR, are available immediately after the reset. If necessary, the pilot may perform the FCU selections for short-term navigation.

When the FMS has automatically recovered:
- The database cycle may have changed
- The FMGS does not autotune the ILS and ADF
- The FMS position bias is lost
- Lateral and vertical managed modes cannot re-engage
- The "CAB PR LDG ELEV FAULT" message is displayed on the ECAM
- A "MAP NOT AVAIL" message may be displayed on one ND.

Depending on the flight phase, apply the following procedure(s) as appropriate:

■ **INITIAL APPROACH OR CLOSE TO ILS INTERCEPTION:**

● **When the system has recovered:**

Access the RAD NAV Page, and manually tune the ILS (preferably using Ident). Enter the ILS course, if a frequency has been entered.

Fly in selected speed.

Note:
- *LOC and G/S guidance modes are available*
- *VLS speed is still available and displayed on the PFD*
- *Missed approach trajectory is not available.*

■ **DESCENT (IF TIME PERMITS) :**

● **When the system has recovered:**

Select the initial database

Perform DIR TO a downpath waypoint. Select heading, if required.

Perform a LAT REV at the downpath waypoint and redefine the DESTINATION in the NEW DEST field.

Redefine the arrival and/or the approach procedure.

Select the FUEL PRED Page, and enter the GW.

Activate the APPROACH phase.

Enter destination data on the PERF APPR Page, as required. Managed speed is available.

LOW ENERGY WARNING

Applicable to: ALL

The "SPEED SPEED SPEED"synthetic voice sounds every 5 s whenever the aircraft energy goes below a threshold under which thrust must be increased.

"SPEED SPEED SPEED"

Increase the thrust until the warning stops and, depending on the circumstances, adjust the pitch accordingly.

WINDSHEAR DET FAULT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

L2 Crew awareness

L12

STATUS	INOP SYS
	WNDSHEAR DET

Note: On the ground, this warning may appear spuriously. Flight crew can cancel it by resetting both FACs one after the other:

- *FAC 1: Pull then push AUTO FLT/FAC 1/26VAC and 28VDC circuit breakers BO3 and B04 on overhead panel.*
- *FAC 2: Pull then push AUTO FLT/FAC 2/26VAC and 28VDC circuit breakers M18 and M19 on rear panel.*

COM ACARS ◁ FAULT

Applicable to: ALL

No crew action required.

STATUS

INOP SYS
ACARS

COM CIDS 1 + 2 FAULT

Applicable to: ALL

L2 Passenger address, cabin and service interphone, and passenger signs are inoperative.

L1 Crew awareness

STATUS

INOP SYS
CIDS

COM HF 1(2) DATA ◁ FAULT

Applicable to: ALL

L2 Triggered to indicate the loss of the HFs' DATA mode.

L1 Crew awareness.

Continued on the following page

COM HF 1(2) DATA ◁ FAULT (Cont'd)

STATUS

INOP SYS
HF 1(2) DATA

COM SATCOM DATA ◁ FAULT

Applicable to: ALL

Crew awareness.

STATUS

INOP SYS
SATCOM DATA

COM SATCOM ◁ FAULT

Applicable to: ALL

L2 ACARS ◁ and telephone communications are inoperative.

L1 Crew awareness.

STATUS

INOP SYS
SATCOM

COM VHF 1(2)(3)/HF 1(2) ◁ EMITTING

Applicable to: ALL

L2 1. If any Push To Talk (PTT) transmission selector (sidestick radio selector ◁ , hand mike selector ◁ , or PTT switch ◁) is jammed in the transmit position, try to release it in order to remove the caution.

2. If unsuccessful, deselect the identified failed VHF/HF transmission keys on the associated Audio Control Panel (ACP) to remove the caution. This ACP should only be used in reception mode. The associated PTT transmission selectors must not be used.

   Note: In this case, the ACP of the unaffected side may be used to recover the deselected VHF/HF channel.

3. If no transmission key on the ACP is found in the "transmit" position, pull the affected VHF/HF C/B associated to the ECAM message : COM\HF1 C/B HA 14 on 49 VU, COM NAV\HF2 C/B L13 on 121 VU, COM\VHF\1 C/B G09 on 49 VU, COM NAV\VHF\2 C/B L04 on 121 VU, COM \VHF\3 C/B L05 on 121 VU.

COM VHF 3 DATA ◁ FAULT

Applicable to: ALL

Crew awareness.

STATUS

INOP SYS
VHF 3 DATA

Intentionally left blank

C/B TRIPPED

Applicable to: ALL

L2 Crew awareness.

L1 ● **If one green circuit breaker (C/B) is tripped, one of the following messages appears after one minute, depending on the location of the affected C/B:**
C/B TRIPPED ON OVHD PNL
C/B TRIPPED ON L(R) ELEC BAY
C/B TRIPPED REAR PNL J-M OR N-R OR S-V OR W-Z

L2 *Note:* *In flight, do not reengage a C/B that has tripped by itself, unless the Captain judges it necessary to do so for the safe continuation of the flight. This procedure should be adopted only as a last resort, and only one reengagement should be attempted. On ground, do not reengage the C/B of the fuel pump(s) of any tank. For all other C/Bs, if the flight crew coordinates the action with maintenance, the flight crew may reengage a tripped C/B, provided that the cause of the tripped C/B is identified.*

ELEC AC BUS 1 FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

L2 AC BUS 1 normally supplies the AC ESS BUS, and, via the TR1, the DC ESS BUS. In the case of an AC BUS 1 FAULT, the AC ESS BUS and the DC ESS BUS will automatically recover, due to the fact that the AC BUS 2 will automatically supply the AC ESS BUS.
If AC BUS 2 does not automatically supply the AC ESS BUS, the flight crew can recover the AC ESS BUS and the DC ESS BUS by setting the AC ESS FEED pb-sw to ALTN, as requested by the AC ESS BUS FAULT ECAM procedure.

1 L1 BLOWER..... OVRD

L2 *The avionics ventilation system is in the closed circuit configuration.*
Air conditioning is added to the ventilation air.

L1

ASSOCIATED PROCEDURES

WHEEL N.W. STEER FAULT

L12

ASSOCIATED PROCEDURES

ENG 1 EPR MODE FAULT

Refer to PRO-ABN-70 ENG 1(2) EPR MODE FAULT

SECONDARY FAILURES

* AVNCS VENT
* HYD
* FUEL
* F/CTL

Continued on the following page

ELEC AC BUS 1 FAULT (Cont'd)

L12

2

STATUS

LDG DIST PROC.....APPLY

CAB ZONE AT FIXED TEMP
See (1)
SLATS SLOW
CAT 2 ONLY

INOP SYS

See below

INOP SYS

BLUE HYD	SPLR 3	ADR 3
RA 1	CAPT TAT	L WSHLD HEAT
L WNDW HEAT	CAT 3	L+R TK PUMP 1
CTR TK PUMP 1 ◁✻	VENT BLOWER	GALLEY FAN
CRG HEAT (if both FWD and aft crg heat installed) ◁✻	CRG vent (if both FWD and aft crg heat installed) ◁✻	AFT CRG HEAT ◁✻
FWD CRG HEAT ◁✻	AFT CRG VENT ◁✻	FWD CRG VENT ◁✻
GND COOL ◁✻	N.W. STEER	MAIN GALLEY
B ELEC PUMP	BRK SYS 1/BSCU CH 1	DMC 3
GPWS	LAV DET	PACK 1 REGUL
REVERSER 1		

Other INOP SYS

Left cabin fan	ADF 1 ◁✻	Radar 1
Stby Pitot/AOA	ACARS ◁✻ /ATSU ◁✻	Brake fans 5, 6, 7 and 8 ◁✻
HUD ◁✻	MCDU 3 ◁✻	Engine 1 ignition B
EVMU eng 1 and eng 2	Printer	Zone controller prim channel
Hydraulic quantity indication	Partial galley	PVI ◁✻
TCAS ◁✻		

Note: *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

Continued on the following page

ELEC AC BUS 1 FAULT (Cont'd)

(1) *Due to the loss of the galley fan, the Pack 1 controller, and the primary zone controller channel. (See associated procedures).*

ELEC AC BUS 1 FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 AC BUS 1 normally supplies the AC ESS BUS, and, via the TR1, the DC ESS BUS. In the case of an AC BUS 1 FAULT, the AC ESS BUS and the DC ESS BUS will automatically recover, due to the fact that the AC BUS 2 will automatically supply the AC ESS BUS.
If AC BUS 2 does not automatically supply the AC ESS BUS, the flight crew can recover the AC ESS BUS and the DC ESS BUS by setting the AC ESS FEED pb-sw to ALTN, as requested by the AC ESS BUS FAULT ECAM procedure.

3 L1 BLOWER..... OVRD

L2 *The avionics ventilation system is in the closed circuit configuration.*
Air conditioning is added to the ventilation air.

L1

ASSOCIATED PROCEDURES

WHEEL N.W. STEER FAULT

L12

ASSOCIATED PROCEDURES

ENG 1 EPR MODE FAULT

Refer to PRO-ABN-70 ENG 1(2) EPR MODE FAULT

SECONDARY FAILURES

* AVNCS VENT
* HYD
* FUEL
* F/CTL

Continued on the following page

ELEC AC BUS 1 FAULT (Cont'd)

L12
4

STATUS

LDG DIST PROC.....APPLY

SLATS SLOW
CAT 2 ONLY

INOP SYS

See below

INOP SYS

BLUE HYD	SPLR 3	ADR 3
RA 1	CAPT TAT	L WSHLD HEAT
L WNDW HEAT	CAT 3	L+R TK PUMP 1
CTR TK PUMP 1 ✻	VENT BLOWER	GALLEY FAN
CRG HEAT (if both FWD and aft crg heat installed) ✻	CRG vent (if both FWD and aft crg heat installed) ✻	AFT CRG HEAT ✻
FWD CRG HEAT ✻	AFT CRG VENT ✻	FWD CRG VENT ✻
GND COOL ✻	N.W. STEER	MAIN GALLEY
B ELEC PUMP	BRK SYS 1/BSCU CH 1	DMC 3
GPWS	LAV DET	

Other INOP SYS

Left cabin fan	ADF 1 ✻	Radar 1
Stby Pitot/AOA	ACARS ✻ /ATSU ✻	Brake fans 5, 6, 7 and 8 ✻
HUD ✻	MCDU 3 ✻	Engine 1 ignition B
EVMU eng 1 and eng 2	Printer	COND Controller Lane A
Hydraulic quantity indication	Partial galley	PVI ✻
TCAS ✻		

Note: The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC AC BUS 2 FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

EXTRACT..... OVRD

L2 *The avionics ventilation system is in the closed circuit configuration.*
Air conditioning is added to the ventilation air.

L1

ASSOCIATED PROCEDURES

L/G LGCIU 2 FAULT

L12

ASSOCIATED PROCEDURES

ENG 2 EPR MODE FAULT

L2 *Refer to PRO-ABN-70 ENG 1(2) EPR MODE FAULT*

L1

SECONDARY FAILURES

* AVNCS VENT
* FUEL

Continued on the following page

ELEC AC BUS 2 FAULT (Cont'd)

L12

STATUS

PACK 2 AT FIXED TEMP *See* (1)	**INOP SYS** *See below*

INOP SYS

ADR 2	Y ELEC PUMP	SDAC 2
FWC 2	DMC 2	RECORDER SYS (OR FDIU)
R WSHLD HEAT	LGCIU 2	RA 2
F/O PITOT	F/O AOA	F/O TAT
R WNDW HEAT	L+R TK PUMP 2	RUD TRV LIM 2
REVERSER 2	VENT EXTRACT	GND COOL ✲
PACK 2 REGUL	MAIN GALLEY	YAW DAMPER 2
RUD TRIM 2	FAC 2	VHF 2
CAT 2	CTR TK PUMP 2 ✲	ACT PUMP ✲
BRK SYS 2 OR (BSCU CH 2)	ILS 2 (OR LS 2 for aircraft with MLS/GLS/FLS)	GPS 2

Other INOP SYS

Right cabin fan	Brake fans 1, 2, 3 and 4 ✲	ADF 2 ✲
DME 2	WXR 2 ✲	MCDU 2
ENG 2 ignition B	VOR 2	F/O PFD and ND
QAR	ECAM lower DU	HF 2 ✲
ATC 2		

Note: *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

(1) *Due to the loss of Pack 2 controller, the pack outlet temperature is controlled by the pack anti-ice valve and is stabilized to a temperature between 5 °C (41 °F) and 30 °C (86 °F) within a maximum of 6 min.*

ELEC AC BUS 2 FAULT

Applicable to: B-HSO, B-HSP

EXTRACT..... OVRD

L2 *The avionics ventilation system is in the closed circuit configuration.*
Air conditioning is added to the ventilation air.

L1

ASSOCIATED PROCEDURES

L/G LGCIU 2 FAULT

L12

ASSOCIATED PROCEDURES

ENG 2 EPR MODE FAULT

L2 *Refer to PRO-ABN-70 ENG 1(2) EPR MODE FAULT*

L1

SECONDARY FAILURES

* AVNCS VENT
* FUEL

Continued on the following page

ELEC AC BUS 2 FAULT (Cont'd)

L12

STATUS

INOP SYS

See below

INOP SYS

ADR 2	Y ELEC PUMP	SDAC 2
FWC 2	DMC 2	RECORDER SYS (OR FDIU)
R WSHLD HEAT	LGCIU 2	RA 2
F/O PITOT	F/O AOA	F/O TAT
R WNDW HEAT	L+R TK PUMP 2	RUD TRV LIM 2
REVERSER 2	VENT EXTRACT	GND COOL ◁✻
PACK 2 REGUL	MAIN GALLEY	YAW DAMPER 2
RUD TRIM 2	FAC 2	VHF 2
CAT 2	CTR TK PUMP 2 ◁✻	ACT PUMP ◁✻
RBK SYS 2 OR (BSCU CH 2)	ILS 2 (OR LS 2 for aircraft with MLS/GLS/FLS)	GPS 2

Other INOP SYS

Right cabin fan	Brake fans 1, 2, 3 and 4 ◁✻	ADF 2 ◁✻
DME 2	WXR 2 ◁✻	MCDU 2
ENG 2 ignition B	VOR 2	F/O PFD and ND
QAR	ECAM lower DU	HF 2 ◁✻
ATC 2		

Note: *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

ELEC AC BUS 2 FAULT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

EXTRACT..... OVRD

L2 *The avionics ventilation system is in the closed circuit configuration.*
Air conditioning is added to the ventilation air.

L1 ATC/XPDR..... SYS 1

ASSOCIATED PROCEDURES

L/G LGCIU 2 FAULT

L12

ASSOCIATED PROCEDURES

ENG 2 EPR MODE FAULT

L2 *Refer to PRO-ABN-70 ENG 1(2) EPR MODE FAULT*

L1

SECONDARY FAILURES

* AVNCS VENT
* FUEL

Continued on the following page

ELEC AC BUS 2 FAULT (Cont'd)

L12

STATUS

INOP SYS

See below

INOP SYS

ADR 2	Y ELEC PUMP	SDAC 2
FWC 2	DMC 2	RECORDER SYS (OR FDIU)
R WSHLD HEAT	LGCIU 2	RA 2
F/O PITOT	F/O AOA	F/O TAT
R WNDW HEAT	L+R TK PUMP 2	RUD TRV LIM 2
REVERSER 2	VENT EXTRACT	GND COOL ◁✻
PACK 2 REGUL	MAIN GALLEY	YAW DAMPER 2
RUD TRIM 2	FAC 2	VHF 2
CAT 2	CTR TK PUMP 2 ◁✻	ACT PUMP ◁✻
BRK SYS 2 (OR BCSU CH 2)	ILS 2 (OR LS 2 for aircraft with MLS/GLS/FLS)	GPS 2
ATC/XPDR 2		

Other INOP SYS

Right cabin fan	Brake fans 1, 2, 3 and 4 ◁✻	ADF 2 ◁✻
DME 2	RADAR 2 ◁✻	WXR 2 ◁✻
MCDU 2	ENG 2 ignition B	VOR 2
F/O PFD and ND	QAR	ECAM lower DU
HF 2 ◁✻		

Note: The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC AC ESS BUS ALTN (ON GROUND)

Applicable to: ALL

L2 The AC ESS BUS is supplied from the AC BUS 2 although the AC ESS FEED pb-sw switch is set to normal.

Crew awareness.

ELEC AC ESS BUS FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

AC ESS FEED..... ALTN

L2 *AC BUS 2 supplies AC ESS BUS.*

L1 ATC..... SYS 2

ASSOCIATED PROCEDURES

AUTO FLT YAW DAMPER 1

ASSOCIATED PROCEDURES

AUTO FLT RUD TRIM 1 FAULT

ASSOCIATED PROCEDURES

AUTO FLT RUD TRV LIM 1

Continued on the following page

ELEC AC ESS BUS FAULT (Cont'd)

L12

STATUS

INOP SYS

See below

INOP SYS

ADR 1	ILS 1	GPS 1
RUD TRIM 1	RUD TRV LIM 1	CAT 2
SDAC 1	CAPT PITOT	CAPT AOA
GPWS	GPWS terr	YAW DAMPER 1
FWC 1	DMC 1	

Other INOP SYS

RMP's lighting (RMP's still operative)	VOR 1	MCDU 1
CAPT ND	CVR	ECAM upper display
CAPT PFD	ATC 1	DME 1
HF 1	DDRMI	APU fuel pump
Passenger oxygen masks (auto + manual)	ADF 1 ◁✻	

Note: *The warning may be caused by a sub BUS failure. As a result, only a part of the above-listed systems may be lost.*

ELEC AC ESS BUS FAULT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

AC ESS FEED..... ALTN

L2 *AC BUS 2 supplies AC ESS BUS.*

L1 ATC/XPDR..... SYS 2

Continued on the following page

ELEC AC ESS BUS FAULT (Cont'd)

L12

STATUS

INOP SYS

See below

INOP SYS

ADR 1	ILS 1	GPS 1
RUD TRIM 1	RUD TRV LIM 1	CAT 2
SDAC 1	CAPT PITOT	CAPT AOA
GPWS terr	GPWS	YAW DAMPER 1
FWC 1	DMC 1	ATC/XPDR 1

Other INOP SYS

RMP's lighting (RMP's still operative)	VOR 1	MCDU 1
CAPT ND	CVR	ECAM upper display
CAPT PFD	DME 1	HF 1
APU fuel pump	Passenger oxygen masks (auto + manual)	ADF 1

Note: The warning may be caused by a sub BUS failure. As a result, only a part of the above-listed systems may be lost.

ELEC AC ESS BUS SHED

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

ATC..... SYS 2

Continued on the following page

ELEC AC ESS BUS SHED (Cont'd)

L12

STATUS

	INOP SYS
	CAPT AOA See below
	Other INOP SYS
	MCDU 1 CAPT ND CAPT AOA heat ADF 1 ◁ ATC 1 DME 1 CVR APU fuel pump Passenger oxygen masks (auto + manual) HF 1

Note: *The warning may be caused by a failure in a sub BUS. Consequently only a part of the systems listed above may be lost.*

ELEC ELEC AC ESS BUS SHED

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

ATC/XPDR..... SYS 2

Continued on the following page

ELEC ELEC AC ESS BUS SHED (Cont'd)

L12

STATUS

INOP SYS

CAPT AOA
ATC/XPDR 1
See below

Other INOP SYS

MCDU 1
CAPT AOA heat
DME 1
CVR
APU fuel pump
CAPT ND
ADF 1
Passenger oxygen masks (auto + manual)
HF 1

Note: The warning may be caused by a failure in a sub BUS. Consequently only a part of the systems listed above may be lost.

ELEC APU GEN FAULT

Applicable to: ALL 320, B-HTD, B-HTE, B-HTF

APU GEN..... OFF THEN ON

- **IF UNSUCCESSFUL:**
  APU GEN.....OFF

Continued on the following page

ELEC APU GEN FAULT (Cont'd)

STATUS	INOP SYS
	MAIN GALLEY (1) APU GEN

(1) *(When only one GEN operating)*

ELEC APU GEN FAULT

Applicable to: B-HTG, B-HTH, B-HTI

APU GEN..... OFF THEN ON

- **IF UNSUCCESSFUL:**
  APU GEN.....OFF

STATUS	INOP SYS
	MAIN GALLEY (1) APU GEN

(1) *(when only one GEN operating, all the galleys are shed)*

ELEC BAT 1(2) FAULT

Applicable to: ALL

L2 Battery contactor is opened automatically by battery charge limiter.

Crew awareness

Continued on the following page

ELEC BAT 1(2) FAULT (Cont'd)

STATUS	
APU BAT START NOT AVAIL	**INOP SYS** BAT 1(2)

ELEC BAT 1(2) OFF

Applicable to: ALL

L2 Battery is abnormally selected off.

Crew awareness

STATUS
APU BAT START NOT AVAIL

ELEC BCL 1(2) FAULT

Applicable to: ALL

L2 Crew awareness

STATUS	
APU BAT START NOT AVAIL	**INOP SYS** BCL 1(2)

ELEC DC BAT BUS FAULT

Applicable to: ALL 321

L2 Crew awareness.

Continued on the following page

ELEC DC BAT BUS FAULT (Cont'd)

L12

STATUS

APU BAT START NOT AVAIL
ECB is no longer supplied

INOP SYS

APU FIRE DET

Other INOP SYS

APU ECB
Stick and rudder pedals lock
(by AP)
Fwd (aft) cargo fire ext
Fwd (aft) cargo heat controller
Fwd cargo isol valves
APU fuel LP valve
Manual pressure control

Note: The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC DC BAT BUS FAULT

Applicable to: ALL 320

L2 Crew awareness.

Continued on the following page

ELEC DC BAT BUS FAULT (Cont'd)

L12

STATUS

APU BAT START NOT AVAIL
ECB is no longer supplied

INOP SYS

APU FIRE DET

Other INOP SYS

APU ECB
Stick and rudder pedals lock
(by AP)
Fwd (aft) cargo fire ext ◁
Fwd (aft) cargo heat controller ◁
Fwd (aft) cargo isol valves ◁
APU fuel LP valve
Manual pressure control

Note: The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC DC BUS 1 FAULT

Applicable to: ALL 321

BLOWER..... OVRD
EXTRACT..... OVRD

L2 *The Air conditioning system provides ventilation to the avionics. This ventilation air is exhausted overboard.*

L1

SECONDARY FAILURES

*AVNCS VENT
*FUEL

Continued on the following page

ELEC DC BUS 1 FAULT (Cont'd)

L12

STATUS

CAB ZONE AT FIXED TEMP *See* (1) CAT 3 SINGLE ONLY	**INOP SYS** *See below*

INOP SYS

ACP 3	CAPT STAT heat	STBY STAT heat
L. WSHLD HEAT	REVERSER 1	AVNCS VENT
GALLEY FAN	GND COOL ❄	BRAKES SYS 1
LAV DET	PACK 1 REGUL	L. WNDW HEAT
CAT 3 DUAL		

Other INOP SYS

Left cab fan	Zone controller primary channel	Sel cal
CFDIU	VHF 3 ❄	RMP 3 ❄
L CTR TK XFR valve	Hot air	Capt wiper
Eng 1 oil press and qty ind.	TPIS ❄	Brake temps ind.

Note: The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

(1) *Due to the loss of the galley fan, the Pack 1 controller, and the primary zone controller channel. (See associated procedures).*

ELEC DC BUS 1 FAULT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

BLOWER..... OVRD
EXTRACT..... OVRD

L2 *The Air conditioning system provides ventilation to the avionics. This ventilation air is exhausted overboard.*

L1

SECONDARY FAILURES

*AVNCS VENT
*FUEL

Continued on the following page

ELEC DC BUS 1 FAULT (Cont'd)

L12

STATUS

CAB ZONE AT FIXED TEMP *See* (1) CAT 3 SINGLE ONLY	**INOP SYS** *See below*

INOP SYS

ACP 3	CAPT STAT heat	STBY STAT heat
L.WSHLD HEAT	REVERSER 1	CTR TK PUMP 1
AVNCS VENT	GALLEY FAN	GND COOL ≪
BRAKES SYS 1	LAV DET	PACK 1 REGUL
L. WNDW HEAT	CAT 3 DUAL	

Other INOP SYS

Left cab fan	Zone controller primary channel	Sel cal
CFDIU	VHF 3 ≪	RMP 3 ≪
Hot air	Capt wiper	Eng 1 oil press and qty ind.
TPIS ≪	Brake temps ind.	

Note: The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

(1) *Due to the loss of the galley fan, the Pack 1 controller, and the primary zone controller channel. (See associated procedures).*

ELEC DC BUS 1 FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

BLOWER..... OVRD
EXTRACT..... OVRD

L2 *The Air conditioning system provides ventilation to the avionics. This ventilation air is exhausted overboard.*

L1

SECONDARY FAILURES

*AVNCS VENT
*FUEL

L12

STATUS

CAT 3 SINGLE ONLY

INOP SYS

See below

INOP SYS

ACP 3	CAPT STAT heat	STBY STAT heat
L. WSHLD HEAT	L. WNDW HEAT	CTR TK PUMP 1
AVNCS VENT	GALLEY FAN	GND COOL ❄
REVERSER 1	BRAKES SYS 1	LAV DET
CAT 3 DUAL		

Other INOP SYS

Left cab fan	COND controller lane A	Sel cal
CFDIU	VHF 3 ❄	RMP 3 ❄
Hot air	Capt wiper	Eng 1 oil press and qty ind.
TPIS ❄	Brake temps ind.	

Note: *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

ELEC DC BUS 2 FAULT

Applicable to: ALL 321

AIR DATA SWTG.....F/O3
BARO REF.....CHECK

L2 *Since one FCU channel is lost, crosscheck the barometer reference settings on the FCU and PFD.*

L1

SECONDARY FAILURES

* CAB PRESS
* FUEL
* WHEEL
* F/CTL

Continued on the following page

ELEC DC BUS 2 FAULT (Cont'd)

L12

5

STATUS

LDG DIST PROC.....APPLY

ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
PACK 2 AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

See below

INOP SYS

SPLR 1+2+5	ELAC 2(1)	SEC 2+3
VHF 2	LGCIU 2	REVERSER 2
CAB PR 2	CAT 3 DUAL	FAC 2
L TK PUMP 2	R TK PUMP 2	ENG 1 LOOP B
ENG 2 LOOP A	PACK 2 REGUL	FCDC 2
MAIN GALLEY	Y ELEC PUMP (if selected ON)	BRAKES SYS 2
F/O STAT	R WSLHD HEAT	R WNDW HEAT
AP 2	FCU 2	

Other INOP SYS

SFCC 2	R cabin fan	F/O wiper
F/O rain rplnt	Eng 1 and 2 fire ext btl 2	Autobrake (due to loss of 2 SECs)
BMC 2	Bleed X feed auto control	RMP 2
FQI channel 2	zone controller sec channel	CTR TK XFR valve R
Brake fan ◁❄	Eng 2 oil low press and qty ind	R loudspeaker
rudder trim ind	FMGC 2	CDLS ◁❄
SDCU 2		

Note: The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

(1) *Lost after 30 s, but recovered at landing gear extension.*

ELEC DC BUS 2 FAULT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

AIR DATA SWTG.....F/O3
BARO REF.....CHECK

L2 *Since one FCU channel is lost, crosscheck the barometer reference settings on the FCU and PFD.*

L1

SECONDARY FAILURES

* CAB PRESS
* FUEL
* WHEEL
* F/CTL

Continued on the following page

ELEC DC BUS 2 FAULT (Cont'd)

L12

6

STATUS

LDG DIST PROC.....APPLY

ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
PACK 2 AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

See below

INOP SYS

SPLR 1+2+5	ELAC 2(1)	SEC 2+3
VHF 2	CTR TK PUMP 2	LGCIU 2
REVERSER 2	CAB PR 2	CAT 3 DUAL
FAC 2	L TK PUMP 2	R TK PUMP 2
ENG 1 LOOP B	ENG 2 LOOP A	PACK 2 REGUL
FCDC 2	MAIN GALLEY	Y ELEC PUMP (if selected ON)
BRAKES SYS 2	F/O STAT	R WSLHD HEAT
R WNDW HEAT	AP 2	FCU 2

Other INOP SYS

SFCC 2	R cabin fan	F/O wiper
F/O rain rplnt	Eng 1 and 2 fire ext btl 2	Autobrake (due to loss of 2 SECs)
BMC 2	Bleed X feed auto control	RMP 2
FQI channel 2	zone controller sec channel	SDCU 2
Brake fan ◁	Eng 2 oil low press and qty ind	R loudspeaker
rudder trim ind	FMGC 2	CDLS ◁

Note: The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

(1) *Lost after 30 s, but recovered at landing gear extension.*

ELEC DC BUS 2 FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

AIR DATA SWTG.....F/O3
BARO REF.....CHECK

L2 *Since one FCU channel is lost, crosscheck the barometer reference settings on the FCU and PFD.*

L1

SECONDARY FAILURES

* CAB PRESS
* FUEL
* WHEEL
* F/CTL

Continued on the following page

ELEC DC BUS 2 FAULT (Cont'd)

L12

7

STATUS

LDG DIST PROC.....APPLY

ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

See below

INOP SYS

SPLR 1+2+5	ELAC 2(1)	SEC 2+3
VHF 2	CTR TK PUMP 2	LGCIU 2
REVERSER 2	FCDC 2	CAT 3 DUAL
FAC 2	L TK PUMP 2	R TK PUMP 2
ENG 1 LOOP B	ENG 2 LOOP A	AP 2
FCU 2	MAIN GALLEY	Y ELEC PUMP (if selected ON)
BRAKES SYS 2	F/O STAT	R WSLHD HEAT
R WNDW HEAT	CAB PR 2	

Other INOP SYS

SFCC 2	R cabin fan	F/O wiper
F/O rain rplnt	Eng 1 and 2 fire ext btl 2	FMGC 2
CDLS	BMC 2	Bleed X feed auto control
RMP 2	FQI channel 2	Autobrake (due to loss of 2 SECs)
Brake fan	Eng 2 oil low press and qty ind	R loudspeaker
rudder trim ind	CIDS 2 SMOKE DETECT	

Note: The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

(1) Lost after 30 s, but recovered at landing gear extension.

ELEC DC BUS 1+2 FAULT

Applicable to: ALL 321

BLOWER..... OVRD
EXTRACT..... OVRD
BARO REF.....CHECK

L2 *Crosscheck the barometer reference settings on the FCU and PFDs.*

L1 MAX BRK PR.....1 000 PSI

L2 *Brake pressure must be limited to approximately 1 000 PSI, since antiskid is lost.*

L1

ASSOCIATED PROCEDURES

ELEC DC BAT BUS FAULT

SECONDARY FAILURES

* CAB PRESS
* FUEL
* AIR COND
* BRAKES
* F/CTL

Continued on the following page

ELEC DC BUS 1+2 FAULT (Cont'd)

L12
8

STATUS

MAX BRK PR.....1000 PSI

LDG DIST PROC.....APPLY

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
CTR TK FUEL USABLE BY GRAVITY
CTR TK FUEL: 2 T unUSABLE
APU BAT START NOT AVAIL
CAB ZONE AT FIXED TEMP
PACKS AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

See below

INOP SYS

SPLR 1+2+5	ELAC 2(1)	SEC 2+3
VHF 2	ACP 3	CAPT STAT heat
F/O STAT heat	STBY STAT heat	WSHLD HEAT
WNDW HEAT	AP 2	FCU 2
FCDC 2	CAT 3 DUAL	FAC 2
ANTI SKID	N/W STRG	NORM BRK
AUTO BRK	LGCIU 2	REVERSER 1+2
CAB PRESS 2	AVNCS VENT	L+R CAB FAN
GALLEY FAN	GND COOL ◁	MAIN GALLEY
Y ELEC PUMP	BRAKES SYS 1	BRAKES SYS 2
APU FIRE DET	LAV DET	ENG 1 LOOP B
ENG 2 LOOP A	PACK 1 REGUL	PACK 2 REGUL
L TK PUMP 2	R TK PUMP 2	

Other INOP SYS

Selcal	Brake temp indication	Brake fans ◁

Continued on the following page

ELEC DC BUS 1+2 FAULT (Cont'd)

TPIS	Capt and F/O wipers	Eng 1 and 2 oil pressure and quantity indication
Autobrake	Stick and rudder pedals lock (by AP)	VHF 3
RMP 2	RMP 3	CFDIU
Right loudspeakers	SFCC 2	CDLS
APU ECB	Manual pressure control	FMGC 2
Rudder trim indication	BMC 2	FQI channel 2
Eng 1 and 2 fire ext btl 2	X Bleed auto control	CTR TK XFR valves
SDCU 2		

Note: The warning may be caused by a failure in a sub BUS. Consequently, only a part of the above-listed systems may be lost.

(1) Lost after 30 s, but is recovered at landing gear extension.

ELEC DC BUS 1+2 FAULT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

BLOWER.....OVRD
EXTRACT.....OVRD
BARO REF.....CHECK

L2 *Crosscheck the barometer reference settings on the FCU and PFDs.*

L1 MAX BRK PR.....1 000 PSI

L2 *Brake pressure must be limited to approximately 1 000 PSI, since antiskid is lost.*

L1

ASSOCIATED PROCEDURES

ELEC DC BAT BUS FAULT

SECONDARY FAILURES

* CAB PRESS
* FUEL
* AIR COND
* BRAKES
* F/CTL

Continued on the following page

ELEC DC BUS 1+2 FAULT (Cont'd)

L12
9

STATUS

MAX BRK PR.....1000 PSI
LDG DIST PROC.....APPLY

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
CTR TK FUEL UNUSABLE
APU BAT START NOT AVAIL
CAB ZONE AT FIXED TEMP
PACKS AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

See below

INOP SYS

SPLR 1+2+5	ELAC 2(1)	SEC 2+3
VHF 2	ACP 3	CAPT STAT heat
F/O STAT heat	STBY STAT heat	WSHLD HEAT
WNDW HEAT	AP 2	FCU 2
FCDC 2	CAT 3 DUAL	FAC 2
ANTI SKID	N/W STRG	NORM BRK
AUTO BRK	LGCIU 2	REVERSER 1+2
CAB PRESS 2	AVNCS VENT	L+R CAB FAN
GALLEY FAN	GND COOL ◁	MAIN GALLEY
Y ELEC PUMP	BRAKES SYS 1	BRAKES SYS 2
APU FIRE DET	LAV DET	ENG 1 LOOP B
ENG 2 LOOP A	PACK 1 REGUL	PACK 2 REGUL
L TK PUMP 2	R TK PUMP 2	CTR TK PUMPS

Other INOP SYS

Selcal	Brake temp indication	Brake fans ◁
TPIS ◁	Capt and F/O wipers	Eng 1 and 2 oil pressure and quantity indication

Continued on the following page

ELEC DC BUS 1+2 FAULT (Cont'd)

Autobrake	Stick and rudder pedals lock (by AP)	VHF 3 ◁
RMP 2	RMP 3 ◁	CFDIU
Right loudspeakers	SFCC 2	CDLS ◁
APU ECB	Manual pressure control	FMGC 2
Rudder trim indication	BMC 2	FQI channel 2
Eng 1 and 2 fire ext btl 2	X Bleed auto control	SDCU 2

Note: The warning may be caused by a failure in a sub BUS. Consequently, only a part of the above-listed systems may be lost.

(1) Lost after 30 s, but is recovered at landing gear extension.

ELEC DC BUS 1+2 FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

BLOWER.....OVRD
EXTRACT.....OVRD
BARO REF.....CHECK

L2 *Crosscheck the barometer reference settings on the FCU and PFDs.*

L1 MAX BRK PR.....1 000 PSI

L2 *Brake pressure must be limited to approximately 1 000 PSI, since antiskid is lost.*

L1

ASSOCIATED PROCEDURES

ELEC DC BAT BUS FAULT

SECONDARY FAILURES

* CAB PRESS
* FUEL
* AIR COND
* BRAKES
* F/CTL

Continued on the following page

ELEC DC BUS 1+2 FAULT (Cont'd)

L12

10

STATUS

MAX BRK PR.....1000 PSI

LDG DIST PROC.....APPLY

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
CTR TK FUEL UNUSABLE
APU BAT START NOT AVAIL
CAB AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

See below

INOP SYS

SPLR 1+2+5	ELAC 2(1)	SEC 2+3
VHF 2	ACP 3	CAPT STAT heat
F/O STAT heat	STBY STAT heat	WSHLD HEAT
WNDW HEAT	AP 2	FCU 2
FCDC 2	CAT 3 DUAL	FAC 2
ANTI SKID	N.W. STEER	NORM BRK
AUTO BRK	LGCIU 2	REV 1+2
CAB PRESS 2	AVNCS VENT	L+R CAB FAN
GALLEY FAN	GND COOL ◁✻	MAIN GALLEY
Y ELEC PUMP	BRAKE SYS 1	BRAKE SYS 2
APU FIRE DET	LAV DET	ENG 1 LOOP B
ENG 2 LOOP A	PACK 2	COND CTL 2
L TK PUMP 2	R TK PUMP 2	CTR TK PUMPS

Other INOP SYS

Selcal	Brake temp indication	Brake fans ◁✻
TPIS ◁✻	Capt and F/O wipers	Eng 1 and 2 oil pressure and quantity indication
Autobrake	Stick and rudder pedals lock (by AP)	VHF 3 ◁✻

Continued on the following page

ELEC DC BUS 1+2 FAULT (Cont'd)

RMP 2	RMP 3 ◁	CFDIU
Right loudspeakers	SFCC 2	CDLS
APU ECB	Manual pressure control	FMGC 2
Rudder trim indication	BMC 2	FQI channel 2
Eng 1 and 2 fire ext btl 2	X Bleed auto control	CIDS 2 SMOKE DETECT

Note: *The warning may be caused by a failure in a sub BUS. Consequently, only a part of the above-listed systems may be lost.*

(1) *Lost after 30 s, but is recovered at landing gear extension.*

ELEC DC EMER CONFIG

Applicable to: ALL 321

LAND ASAP (AMBER)

L2 Triggered, if DC BUS 1, DC BUS 2 and DC ESS BUS are lost. In addition, DC BAT BUS is lost.

L1 EMER ELEC PWR.....MAN ON

L2 *The emergency generator supplies DC ESS BUS.*
But, DC BUS 1, DC BUS 2, and DC BAT BUS are still not supplied.

L1

ASSOCIATED PROCEDURES

ELEC DC BUS 1 + 2 FAULT

BLOWER.....OVRD
EXTRACT.....OVRD
BARO REF.....CHECK

L2 *Crosscheck the barometer reference settings on the FCU and PFDs.*

L1 MAX BRK PR.....1 000 PSI

L2 *Brake pressure must be limited to approximately 1 000 PSI, since antiskid is lost.*

L1

ASSOCIATED PROCEDURES

ELEC DC BAT BUS FAULT

SECONDARY FAILURES

* CAB PRESS
* HYD
* FUEL
* AIR COND
* BRAKES
* WHEEL
* F/CTL

Continued on the following page

ELEC DC EMER CONFIG (Cont'd)

L12
11

STATUS

MIN RAT SPEED..... 140 KT PROC: GRVTY FUEL FEEDING MAX BRK PR..... 1 000 PSI FUEL GRVTY FEED LDG DIST PROC.....APPLY ENG 1 APPR IDLE ONLY ENG 2 APPR IDLE ONLY BOTH PFD ON SAME FAC APU BAT START NOT AVAIL CAB ZONE AT FIXED TEMP PACKS AT FIXED TEMP SLATS/FLAPS SLOW CAT 2 ONLY	**INOP SYS** *See below*

Note: To verify the other INOP SYS not displayed on the ECAM, Refer to PRO-ABN-24-ELEC DC BUS 1+2 FAULT-FWSPAGE, Refer to PRO-ABN-24-ELEC DC BAT BUS FAULT-FWSPAGE.

INOP SYS

FCU 2	CAT 3	FAC 2
FUEL PUMPS	ANTI SKID	NORM BRK
AUTO BRK	Y ELEC PUMP	BRAKE SYS 1
BRAKE SYS 2	APU FIRE DET	LAV DET
ENG 1 LOOP B	L+R CAB FAN	FCDC 2
GALLEY FAN	CRG HEAT ◁❄	GND COOL ◁❄
MAIN GALLEY	ACP 3	CAPT STAT
F/O STAT	STBY STAT	WSHLD HEAT
WNDW HEAT	PACK 1 REGUL	PACK 2 REGUL
GPS 1+2 ◁❄	SPLR 1+2+5	ELAC 2
SEC 2+3	VHF 2	N/W STRG
LGCIU 2	REVERSER 2	CAB PRESS 2
AVNCS VENT	VENT BLOWER	ENG 2 LOOP A

Continued on the following page

ELEC DC EMER CONFIG (Cont'd)

AP 2

ELEC DC EMER CONFIG

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

LAND ASAP (AMBER)

L2 Triggered, if DC BUS 1, DC BUS 2 and DC ESS BUS are lost. In addition, DC BAT BUS is lost.

L1 EMER ELEC PWR.....MAN ON

L2 *The emergency generator supplies DC ESS BUS, as long as the landing gear is up.*
But, DC BUS 1, DC BUS 2, and DC BAT BUS are still not supplied.

L1

ASSOCIATED PROCEDURES

ELEC DC BUS 1 + 2 FAULT

BLOWER..... OVRD
EXTRACT..... OVRD
BARO REF.....CHECK

L2 *Crosscheck the barometer reference settings on the FCU and PFDs.*

L1 MAX BRK PR.....1 000 PSI

L2 *Brake pressure must be limited to approximately 1 000 PSI, since antiskid is lost.*

L1

ASSOCIATED PROCEDURES

ELEC DC BAT BUS FAULT

SECONDARY FAILURES

* CAB PRESS
* HYD
* FUEL
* AIR COND
* BRAKES
* WHEEL
* F/CTL

Continued on the following page

ELEC DC EMER CONFIG (Cont'd)

L12
12

STATUS

MIN RAT SPEED..... 140 KT
PROC: GRVTY FUEL FEEDING
MAX BRK PR..... 1 000 PSI
FUEL GRVTY FEED

LDG DIST PROC.....APPLY

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
CTR TK ◁✻ FUEL UNUSABLE
APU BAT START NOT AVAIL
CAB ZONE AT FIXED TEMP
PACKS AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 2 ONLY
See (1)

INOP SYS

See below

Note: *To verify the other INOP SYS not displayed on the ECAM, Refer to PRO-ABN-24-ELEC DC BUS 1+2 FAULT-FWSPAGE, Refer to PRO-ABN-24-ELEC DC BAT BUS FAULT-FWSPAGE and after L/G extension also to the DC ESS BUS procedures.*

INOP SYS

FCU 2	CAT 3	FAC 2
FUEL PUMPS	ANTI SKID	NORM BRK
AUTO BRK	Y ELEC PUMP	BRAKE SYS 1
BRAKE SYS 2	APU FIRE DET	LAV DET
ENG 1 LOOP B	L+R CAB FAN	GALLEY FAN
CRG HEAT ◁✻	GND COOL ◁✻	MAIN GALLEY
ACP 3	CAPT STAT	F/O STAT
STBY STAT	WSHLD HEAT	WNDW HEAT
PACK 1 REGUL	PACK 2 REGUL	FCDC 2
GPS 1+2 ◁✻	SPLR 1+2+5	ELAC 2

Continued on the following page

ELEC DC EMER CONFIG (Cont'd)

SEC 2+3	VHF 2	N/W STRG
LGCIU 2	REVERSER 2	CAB PRESS 2
AVNCS VENT	VENT BLOWER	ENG 2 LOOP A
AP 2		

AFTER L/G EXTENSION (DC ESS BUS LOST)

BLUE HYD	SPLR 3	SPLR 1+2+5
ELAC 2	SEC 2+3	VHF 1
VHF 2	ACP 1+2+3	LGCIU 2
REVERSER 2	ENG 2 START	CAB PRESS 1
CAB PRESS 2	AVNCS VENT	VENT BLOWER
PACK 1 REGUL	PACK 2 REGUL	FCDC 1
FCDC 2	GPS 1+2 ◁	FCU 1
FCU 2	CAT 3	FAC 1
FAC 2	FUEL PUMPS	ANTI SKID
N.W. STEER	NORM BRK	AUTO BRK
GPWS	APU FIRE DET	LAV DET
ENG 1 LOOP A	ENG 1 LOOP B	ENG 2 LOOP A
ENG 2 LOOP B	AP 1+2	A/THR
GALLEY FAN	CRG HEAT ◁	GND COOL ◁
MAIN GALLEY	B ELEC PUMP	Y ELEC PUMP
BSCU CH 1	BSCU CH 2	CAPT STAT
F/O STAT	STBY STAT	WING A. ICE
WSHLD HEAT	WNDW HEAT	VENT EXTRACT
L+R CAB FAN		

(1)

Note: *DC ESS BUS is lost at landing gear extension.*
Consequently, all means of communications are lost since all ACPs are lost.

ELEC DC EMER CONFIG

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

LAND ASAP (AMBER)

L2 Triggered, if DC BUS 1, DC BUS 2 and DC ESS BUS are lost. In addition, DC BAT BUS is lost.

L1 EMER ELEC PWR.....MAN ON

L2 *The emergency generator supplies DC ESS BUS.*
But, DC BUS 1, DC BUS 2, and DC BAT BUS are still not supplied.

L1

ASSOCIATED PROCEDURES

ELEC DC BUS 1 + 2 FAULT

BLOWER.....OVRD
EXTRACT.....OVRD
BARO REF.....CHECK

L2 *Crosscheck the barometer reference settings on the FCU and PFDs.*

L1 MAX BRK PR.....1 000 PSI

L2 *Brake pressure must be limited to approximately 1 000 PSI, since antiskid is lost.*

L1

ASSOCIATED PROCEDURES

ELEC DC BAT BUS FAULT

SECONDARY FAILURES

* CAB PRESS
* HYD
* FUEL
* AIR COND
* BRAKES
* WHEEL
* F/CTL

Continued on the following page

ELEC DC EMER CONFIG (Cont'd)

L12
13

STATUS

MIN RAT SPEED..... 140 KT
PROC: GRVTY FUEL FEEDING
MAX BRK PR..... 1 000 PSI
FUEL GRVTY FEED

LDG DIST PROC.....APPLY

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
CTR TK ✻ FUEL UNUSABLE
APU BAT START NOT AVAIL
CAB ZONE AT FIXED TEMP
PACKS AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 2 ONLY

INOP SYS

See below

Note: To verify the other INOP SYS not displayed on the ECAM, Refer to PRO-ABN-24-ELEC DC BUS 1+2 FAULT-FWSPAGE, Refer to PRO-ABN-24-ELEC DC BAT BUS FAULT-FWSPAGE.

INOP SYS

FCU 2	CAT 3	FAC 2
FUEL PUMPS	ANTI SKID	NORM BRK
AUTO BRK	Y ELEC PUMP	BRAKE SYS 1
BRAKE SYS 2	APU FIRE DET	LAV DET
ENG 1 LOOP B	L+R CAB FAN	FCDC 2
GALLEY FAN	CRG HEAT ✻	GND COOL ✻
MAIN GALLEY	ACP 3	CAPT STAT
F/O STAT	STBY STAT	WSHLD HEAT
WNDW HEAT	PACK 1 REGUL	PACK 2 REGUL
GPS 1+2 ✻	SPLR 1+2+5	ELAC 2
SEC 2+3	VHF 2	N/W STRG
LGCIU 2	REVERSER 2	CAB PRESS 2

Continued on the following page

ELEC DC EMER CONFIG (Cont'd)

AVNCS VENT AP 2	VENT BLOWER	ENG 2 LOOP A

ELEC DC EMER CONFIG

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

LAND ASAP (AMBER)

L2 Triggered, if DC BUS 1, DC BUS 2 and DC ESS BUS are lost. In addition, DC BAT BUS is lost.

L1 EMER ELEC PWR.....MAN ON

L2 *The emergency generator supplies DC ESS BUS.*
But, DC BUS 1, DC BUS 2, and DC BAT BUS are still not supplied.

L1

ASSOCIATED PROCEDURES

ELEC DC BUS 1 + 2 FAULT

BLOWER.....OVRD
EXTRACT.....OVRD
BARO REF.....CHECK

L2 *Crosscheck the barometer reference settings on the FCU and PFDs.*

L1 MAX BRK PR.....1 000 PSI

L2 *Brake pressure must be limited to approximately 1 000 PSI, since antiskid is lost.*

L1

ASSOCIATED PROCEDURES

ELEC DC BAT BUS FAULT

SECONDARY FAILURES

* CAB PRESS
* HYD
* FUEL
* AIR COND
* BRAKES
* WHEEL
* F/CTL

Continued on the following page

ELEC DC EMER CONFIG (Cont'd)

L12
14

STATUS

MIN RAT SPEED..... 140 KT
PROC: GRVTY FUEL FEEDING
MAX BRK PR..... 1 000 PSI
FUEL GRVTY FEED

LDG DIST PROC.....APPLY

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
CTR TK FUEL UNUSABLE
APU BAT START NOT AVAIL
CAB AT FIXED TEMP
COCKPIT AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 2 ONLY

INOP SYS

See below

Note: To verify the other INOP SYS not displayed on the ECAM, Refer to PRO-ABN-24-ELEC DC BUS 1+2 FAULT-FWSPAGE, Refer to PRO-ABN-24-ELEC DC BAT BUS FAULT-FWSPAGE.

INOP SYS

FCU 2	CAT 3	FAC 2
FUEL PUMPS	ANTI SKID	NORM BRK
AUTO BRK	Y ELEC PUMP	BRAKES SYS 1
BRAKES SYS 2	APU FIRE DET	LAV DET
ENG 1 LOOP B	L+R CAB FAN	FCDC 2
GALLEY FAN	CRG HEAT ◁❄	GND COOL ◁❄
MAIN GALLEY	ACP 3	CAPT STAT
F/O STAT	STBY STAT	WSHLD HEAT
WNDW HEAT	PACK 1	PACK 2
COND CTL 1	SPLR 1+2+5	ELAC 2
SEC 2+3	VHF 2	N.W. STEER
LGCIU 2	REVERSER 2	CAB PRESS 2

Continued on the following page

ELEC DC EMER CONFIG (Cont'd)

AVNCS VENT AP 2	VENT BLOWER COND CTL 2	ENG 2 LOOP A

ELEC DC ESS BUS FAULT

Applicable to: ALL

VHF 2 OR 3.....USE
AUDIO SWTG.....SELECT

L2 *ACP 1 and 2 are lost. Therefore, set the AUDIO SWTG rotary selector to CAPT 3 or F/O 3 to recover communications.*

L1 BARO REF.....CHECK

L2 *Crosscheck the barometer reference settings on the FCU and the PFD.*

L1 GPWS.....OFF

ASSOCIATED PROCEDURES

NAV GPWS FAULT

GPWS.....OFF

L2 *Note: To shut down the engines on ground, use the ENG FIRE pb-sw.*

L1

SECONDARY FAILURES

* CAB PRESS
* HYD
* F/CTL

Continued on the following page

ELEC DC ESS BUS FAULT (Cont'd)

L12

15

STATUS

LDG DIST PROC.....APPLY

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
SLATS/FLAPS SLOW
CAT 2 ONLY (1)

INOP SYS

See below

INOP SYS

B HYD	SPLR 3	VHF 1
ACP 1+2	WING A. ICE	AP 1
A/THR	FCU 1	L TK PUMP 1
R TK PUMP 1	FAC 1	REV 2
ENG 2 START	CAB PR 1	VENT EXTRACT
B ELEC PUMP	GPWS	ENG 1 LOOP A
ENG 2 LOOP B	FCDC 1	CAT 3

Other INOP SYS

BRK PRESS indicator	Flight interphone	EIU 2 (1)
Capt rain repellent	Avionics air cond valve	Standby compass light
HP fuel shutoff valves	SFCC 1	RMP 1
Hyd fire valves Eng 1 and 2	Ram air inlet	ECAM Control Panel
Left loudspeaker	DC SHED ESS BUS	

Note: *1. Before arming the approach mode, the ECAM STATUS displays "CAT 3 SINGLE". However, the real landing capability is CAT 2, and is correctly displayed on the FMA when the approach mode is armed.*

2. The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

(1) *Autothrust, eng start and reverser inop.*

ELEC DC ESS BUS SHED

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

EXTRACT..... OVRD

L2 *Cooling air is supplied by the air conditioning system, without overboard extraction.*

L1 AVOID ICING CONDITIONS

SECONDARY FAILURES

*AVNCS VENT

Continued on the following page

ELEC DC ESS BUS SHED (Cont'd)

L12
16

STATUS

AVOID ICING CONDITIONS

- **IF SEVERE ICE ACCRETION**
  MIN SPD.....VLS + 10/G DOT
  MANEUVER WITH CARE

  LDG DIST PROC.....APPLY

BOTH PFD ON SAME FAC
CAT 3 SINGLE ONLY

INOP SYS

WING A. ICE
AP 1
CAT 3 DUAL
FAC 1
VENT EXTRACT
AFT CRG HEAT
FWD CRG HEAT
AFT CRG VENT
FWD CRG VENT
FCDC 1

See below

Other INOP SYS

Passenger oxygen mask (auto drop out)
X BLEED valve man ctl
FQ1 channel 1
STBY ALTI vib
FMGC 1
BMC 1
SDCU 1

Note: The warning may be caused by a failure in a sub BUS. Consequently only a part of the systems listed above may be lost.

ELEC DC ESS BUS SHED

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

EXTRACT.....OVRD

L2 *Cooling air is supplied by the air conditioning system, without overboard extraction.*

L1 AVOID ICING CONDITIONS

SECONDARY FAILURES

*AVNCS VENT

Continued on the following page

ELEC DC ESS BUS SHED (Cont'd)

L12
17

STATUS

AVOID ICING CONDITIONS

- **IF SEVERE ICE ACCRETION**
  MIN SPD.....VLS + 10/G DOT
  MANEUVER WITH CARE

  LDG DIST PROC.....APPLY

BOTH PFD ON SAME FAC
CAT 3 SINGLE ONLY

INOP SYS

WING A. ICE
AP 1
CAT 3 DUAL
FAC 1
VENT EXTRACT
AFT CRG HEAT
FWD CRG HEAT
AFT CRG VENT
FWD CRG VENT
FCDC 1

See below

Other INOP SYS

Passenger oxygen mask (auto drop out)
X BLEED valve man ctl
CIDS 1 SMOKE DETECT
STBY ALTI vib
FMGC 1
BMC 1
FQ1 channel 1

Note: The warning may be caused by a failure in a sub BUS. Consequently only a part of the systems listed above may be lost.

ELEC EMER CONFIG

Applicable to: ALL 321

LAND ASAP

MIN RAT SPEED.....140 KT

CAUTION	*The RAT is capable of supplying the EMER GEN down to 125 kt, except during flare.*

GEN 1 + 2.....OFF THEN ON

- **IF UNSUCCESSFUL:**

BUS TIE.....OFF

L2 *Setting BUS TIE pb-sw to OFF segregates both generator channels.*

L1 GEN 1 + 2.....OFF THEN ON

L2 *Note: If any generator reset is successful, reset both FAC's.*

L1 EMER ELEC PWR (IF EMER GEN NOT IN LINE)..... MAN ON
ENG MODE SEL.....IGN

L2 *Engines are fed by gravity only.*

L1 VHF1/HF1 ◁ /ATC1/.....USE

L2 *Only VHF 1, HF 1 and ATC 1 are supplied in the electrical emergency configuration.*

Note: FMGC 1, which is lost temporarily, can be regained by flight crew passing through the MCDU MENU page.

L1 FUEL GRVTY FEED

L2 *Engines are fed by gravity only. Avoid negative Gs.*

L1 PROC: GRVTY FUEL FEEDING

L2 *Apply GRVTY FUEL FEEDING procedure (Refer to PRO-ABN-28 GRVTY FUEL FEEDING).*

L1 FAC 1..... OFF THEN ON

L2 *The rudder trim is recovered, although no indication is available.*

L1 BUS TIE.....AUTO

L2 *Setting BUS TIE pb-sw to AUTO enables the APU to take an available electrical channel.*

L1 APU (IF AVAIL)..... START

L2 *APU start is not available for 45 s after the loss of both engine generators. This 45 s delay prevents any interference with emergency generator coupling.*
If the APU is available, the APU may be started when below FL 250.

Continued on the following page

ELEC EMER CONFIG (Cont'd)

L1 BLOWER + EXTRACT.....OVRD

L2 *Cooling air is supplied by the air conditioning system and exhausted overboard through the extract valve.*

L1 L2 *Note: On IAE powered aircraft, the warning "EPR MODE FAULT N1 DEGRADED MODE" is displayed.*

L1

ASSOCIATED PROCEDURES

FLT CTL ALTN LAW
(PROT LOST)
MAX SPEED.....320 KT

L2 *Speed limited due to loss of flight control normal laws.*

Continued on the following page

ELEC EMER CONFIG (Cont'd)

L2 ECAM lower display is not available. STATUS page is displayed on the upper ECAM display, as long as the STS pb is pressed.

L12

18

STATUS

MIN RAT SPEED..... 140 KT
MAX SPEED..... 320 KT
MAX BRK PR.....1000 PSI
FUEL GRVTY FEED
AVOID NEGATIVE G FACTOR

Note: If there are discrepancies between airspeed indications on the Captain's PFD and on the STBY indicator, disregard the STBY indication (probe not deiced).

APPR PROC

FOR LDG.....USE FLAP 3

This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.

APPR SPD.....VREF +10/140 KT

Approach speed must be at least minimum RAT speed (140 kt).

LDG DIST PROC.....APPLY

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
SLATS/FLAPS SLOW
See (2)

INOP SYS

F/CTL PROT
REVERSER 1+2
ADR 2+3
IR 2
RA 1+2
SPLR 1+2+5
ELAC 2
SEC 2+3
A/CALL OUT
AP 1+2
A/THR
FUEL PUMPS
ANTI SKID
N/W STRG
CAT 2
See (1)

(1) For other systems' status: Refer to the "ELEC EMER CONFIG SYS REMAINING" table.

(2)

Note: In ELEC EMER configuration, the center tank fuel can be transferred to the wing tanks through the jet pumps by gravity, except the last two tons.

ELEC EMER CONFIG

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

LAND ASAP

MIN RAT SPEED.....140 KT

CAUTION	*At a speed below 140 kt the RAT will stall, and the aircraft electrical supply will be from batteries only.*

GEN 1 + 2.....OFF THEN ON

- **IF UNSUCCESSFUL:**

BUS TIE.....OFF

L2 *Setting BUS TIE pb-sw to OFF segregates both generator channels.*

L1 GEN 1 + 2.....OFF THEN ON

L2 *Note: If any generator reset is successful, reset both FAC's. DC and AC ESS BUSES are still supplied by EMER GEN. After landing gear extension emergency generator is no longer powered; DC and AC ESS BUSES are supplied by normal electrical network. If landing gear is reselected up, essential bus bars remain supplied by the restored generator(s).*

L1 EMER ELEC PWR (IF EMER GEN NOT IN LINE)..... MAN ON

CAUTION	*In case of simultaneous engine generator failure, the probability of a successful APU GEN coupling is low. Therefore APU start attempts should be avoided, as this will consequently reduce the flight time on batteries only (by about 3.5 min for one start attempt).*

ENG MODE SEL.....IGN

L2 *Engines are fed by gravity only.*

L1 VHF1/HF1 ◁ /ATC1.....USE

L2 *Only VHF 1, HF 1 and ATC 1 are supplied in the electrical emergency configuration.*

Note: FMGC 1, which is lost temporarily, can be regained by flight crew passing through the MCDU MENU page.

L1 APPR NAVAID.....ON RMP 1
IR 2 + 3 (IF IR 1 OK)..... OFF

L2 *ADIRS 2 and 3 will be lost 5 min after the loss of both engine generators. Therefore switching them off will save battery charge.*

Continued on the following page

ELEC EMER CONFIG (Cont'd)

L1 FUEL GRVTY FEED

L2 *Engines are fed by gravity only. Avoid negative Gs.*

L1 PROC: GRVTY FUEL FEEDING

L2 *Apply GRVTY FUEL FEEDING procedure (Refer to PRO-ABN-28 GRVTY FUEL FEEDING).*

L1 ● **IF TIME TO LDG > 5 MN and L/G is down:**

L2 With landing gear down, batteries only supply the aircraft. If landing cannot be made within 5 min, emergency generator must be connected to avoid excessive batteries discharge.

L1 L/G.....UP

L2 *Select landing gear up to allow EMER GEN operation.*

L1 EMER ELEC PWR.....MAN ON

L2 *Depress the EMER ELEC PWR MAN ON pb to reset the emergency generator*

L1 APU MASTER SW (IF APU NOT RUNNING)..... CHECK OFF

L2 *Make sure that the APU MASTER SW pb-sw is off.*
With the APU MASTER SW pb-sw ON, batteries supply the DC BAT BUS for 3 min.

L1 FAC 1..... OFF THEN ON

L2 *The rudder trim is recovered, although no indication is available.*

L1 BLOWER + EXTRACT.....OVRD

L2 *Cooling air is supplied by the air conditioning system and exhausted overboard through the extract valve.*

L1 LDG ELEV.....MAN ADJUST

L2 *Landing elevation has to be manually set since no FMGC is supplied after landing gear extension.*

L1
L2 *Note: On IAE powered aircraft, the warning "EPR MODE FAULT N1 DEGRADED MODE" is displayed.*

L1

ASSOCIATED PROCEDURES

FLT CTL ALTN LAW
(PROT LOST)
MAX SPEED.....320 KT

L2 *Speed limited due to loss of flight control normal laws.*

Continued on the following page

ELEC EMER CONFIG (Cont'd)

L2 ECAM lower display is not available. STATUS page is displayed on the upper ECAM display, as long as the STS pb is pressed.

L12

19

STATUS

MIN RAT SPEED..... 140 KT
MAX SPEED..... 320 KT
MAX BRK PR.....1000 PSI
FUEL GRVTY FEED
AVOID NEGATIVE G FACTOR

Note: If there are discrepancies between airspeed indications on the Captain's PFD and on the STBY indicator, disregard the STBY indication (probe not deiced).

APPR PROC

FOR LDG.....USE FLAP 3

This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.

- **AT 1000 FT AGL:**
  L/G..... DN

  Note: 1. With the landing gear down, electrical power is supplied by batteries only. Battery endurance time is approximately 22 min.
  2. Both FACs are not supplied after landing gear extension. Check the approach speed on the QRH.

APPR SPD.....VREF +10/140 KT

Approach speed must be at least minimum RAT speed (140 kt).

LDG DIST PROC.....APPLY

INOP SYS

F/CTL PROT
REVERSER 1+2
ADR 2+3
IR 2
RA 1+2
SPLR 1+2+5
ELAC 2
SEC 2+3
A/CALL OUT
AP 1+2
A/THR
FUEL PUMPS
ANTI SKID
N/W STRG
CAT 2
See (1)

Continued on the following page

ELEC EMER CONFIG (Cont'd)

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
BAT ONLY
SLATS/FLAPS SLOW
See (2)

(1) *For other systems' status: Refer to the "ELEC EMER CONFIG SYS REMAINING" table.*

Note: For go-around procedure, Refer to PRO-ABN-24 ELEC ESS BUSES ON BAT.

(2) *Note: In ELEC EMER configuration, the center tank fuel is unusable.*

ELEC EMER CONFIG

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

LAND ASAP

MIN RAT SPEED.....140 KT

CAUTION	*The RAT is capable of supplying the EMER GEN down to 125 kt, except during flare.*

GEN 1 + 2.....OFF THEN ON

● **IF UNSUCCESSFUL:**

BUS TIE.....OFF

L2 *Setting BUS TIE pb-sw to OFF segregates both generator channels.*

L1 GEN 1 + 2.....OFF THEN ON

L2 *Note: If any generator reset is successful, reset both FAC's.*

L1 EMER ELEC PWR (IF EMER GEN NOT IN LINE)..... MAN ON
ENG MODE SEL.....IGN

L2 *Engines are fed by gravity only.*

L1 VHF1/HF1 ◁✻ /ATC1/.....USE

L2 *Only VHF 1, HF 1 and ATC 1 are supplied in the electrical emergency configuration.*

Note: FMGC 1, which is lost temporarily, can be regained by flight crew passing through the MCDU MENU page.

L1 FUEL GRVTY FEED

L2 *Engines are fed by gravity only. Avoid negative Gs.*

L1 PROC: GRVTY FUEL FEEDING

L2 *Apply GRVTY FUEL FEEDING procedure (Refer to PRO-ABN-28 GRVTY FUEL FEEDING).*

L1 FAC 1..... OFF THEN ON

L2 *The rudder trim is recovered, although no indication is available.*

L1 BUS TIE.....AUTO

L2 *Setting BUS TIE pb-sw to AUTO enables the APU to take an available electrical channel.*

L1 APU (IF AVAIL)..... START

L2 *APU start is not available for 45 s after the loss of both engine generators. This 45 s delay prevents any interference with emergency generator coupling.*
If the APU is available, the APU may be started when below FL 250.

Continued on the following page

ELEC EMER CONFIG (Cont'd)

L1 BLOWER + EXTRACT.....OVRD

L2 *Cooling air is supplied by the air conditioning system and exhausted overboard through the extract valve.*

L1
L2 *Note: On IAE powered aircraft, the warning "EPR MODE FAULT N1 DEGRADED MODE" is displayed.*

L1

ASSOCIATED PROCEDURES

FLT CTL ALTN LAW
(PROT LOST)
MAX SPEED.....320 KT

L2 *Speed limited due to loss of flight control normal laws.*

Continued on the following page

ELEC EMER CONFIG (Cont'd)

L2 ECAM lower display is not available. STATUS page is displayed on the upper ECAM display, as long as the STS pb is pressed.

L12

20

STATUS

MIN RAT SPEED..... 140 KT
MAX SPEED..... 320 KT
MAX BRK PR..... 1 000 PSI
FUEL GRVTY FEED
AVOID NEGATIVE G FACTOR

Note: If there are discrepancies between airspeed indications on the Captain's PFD and on the STBY indicator, disregard the STBY indication (probe not deiced).

APPR PROC

FOR LDG.....USE FLAP 3

This line is replaced by "FOR LDG: USE FLAP 3" when CONF 3 is selected, as a reminder.

APPR SPD.....VREF +10/140 KT

Approach speed must be at least minimum RAT speed (140 kt).

LDG DIST PROC.....APPLY

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
SLATS/FLAPS SLOW
See (1)

INOP SYS

F/CTL PROT
REVERSER 1 + 2
ADR 2+3
IR 2
RA 1+2
SPLR 1+2+5
ELAC 2
SEC 2+3
A/CALL OUT
AP 1+2
A/THR
FUEL PUMPS
ANTI SKID
N/W STRG
CAT 2

For other systems' status: Refer to the "ELEC EMER CONFIG SYS REMAINING" table.

(1) *Note: In ELEC EMER configuration, the center tank fuel is unusable.*

ELEC EMER CONFIG SYS REMAINING

Applicable to: ALL 321

ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
AIR COND PRESS	PRESS AUTO SYS 1	NORM	NORM	NORM
	MAN PRESS CTL	INOP	INOP	INOP (a)
	RAM AIR	NORM	NORM	NORM
	PACK VALVE 1	NORM	Closure INOP	Closure Inop
	PACK VALVE 2	Closure Inop	Closure Inop	Closure Inop (a)
	AVIONIC VENT	NORM	NORM	Partial
	AFT CRG ISOL VALVES	NORM	INOP	INOP
FMGS	FMGC (NAV FUNCTION)	N°1 only	Inop	Inop
	MCDU	N°1 only	Inop	Inop
	FAC	N°1 only	Inop	Inop
	FCU	ch 1 only	ch 1 only	ch 1 only
COM	VHF 1	NORM	NORM	NORM
	HF 1	NORM	INOP	INOP
	RMP 1	NORM	NORM	NORM
	ACP (CAPT, F/O)	NORM	NORM	NORM
	CIDS	NORM	NORM	NORM
	INTERPHONE	NORM	NORM	NORM
	CVR	NORM	INOP	INOP
	LOUDSPEAKER 1	NORM	NORM	NORM
EMER EQPT	CREW OXY	NORM	NORM (b)	NORM (b)
	PAX OXY mask release (auto + man)	NORM	INOP	INOP
	SLIDES ARM/WARN	NORM	NORM	NORM
FIRE	ENG 1 LOOP	A only	A only	A only
	ENG 2 LOOP	B only	B only	B only
	APU LOOP	INOP	INOP	INOP (a)
	CARGO SMOKE DET	Channel 1	INOP	INOP
	ENG FIRE EXT.	Bottle 1 only	Bottle 1 only	Bottle 1 only
	APU FIRE EXT.	Squib A only	Squib A only	Squib A only
	CARGO FIRE EXT.	INOP	INOP	INOP (a)
	APU AUTO EXT.	INOP	INOP	INOP (a)

Continued on the following page

Continued from the previous page

L1

ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
FLT CTL	ELAC	N°1 only	N°1 + 2	N°1 + 2 (d)
	SEC	N°1 only	N°1	N°1 (d)
	FCDC	N°1 only	INOP	INOP
	SFCC	N°1 only	N°1 only	N°1 only
	Flaps pos ind	NORM	NORM	NORM (c)
FUEL	LP VALVE	NORM	NORM	NORM
	FQI channel 1	NORM	INOP	INOP
	X FEED VALVE	NORM	INOP	INOP
	TRANSFER VALVE	NORM	INOP	INOP
HYD	FIRE VALVES	NORM	NORM	NORM
ICE-RAIN	WING A.ICE	NORM	INOP	INOP
	ENG A.ICE VALVE	OPEN	OPEN	OPEN
	CAPT PITOT	NORM	NORM	NORM (e)
	CAPT AOA	NORM	INOP	INOP
	RAIN REPELLENT (CAPT)	NORM	NORM	NORM
EIS	PFD 1	NORM	NORM	NORM (c)
	ND 1	NORM	INOP	INOP
	ECAM upper disp.	NORM	NORM	NORM (c)
	DMC 1 or 3	NORM	NORM	NORM (c)
	SDAC 1, FWC 1	NORM	NORM	NORM (c)
	ECAM CONT. panel	NORM	NORM	NORM
FLT INS	CLOCKS	NORM	NORM	NORM
L/G	LGCIU SYS 1	NORM	NORM	NORM
	BRK PRESS IND	NORM	NORM	NORM
	PARK BRK	NORM	NORM	NORM
LIGHTS	EMER CKPT	NORM	NORM	NORM
	EMER CAB	NORM	NORM	NORM

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Continued from the previous page

L1

ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
NAV	IR	N°1 only *(f)*	N°1 only *(f)*	N°1 only *(f)*
	ADR	N°1 only	N°1 only	N°1 only
	ADF	N°1 only	INOP	INOP
	VOR/MMR	N°1 only	N°1 only	N°1 only *(e)*
	DME	N°1 only	INOP	INOP
	VOR/DDRMI	NORM	NORM	NORM *(e)*
	ATC	N°1 only	INOP	INOP
	STBY HORIZON	NORM	NORM	NORM
	STBY COMP (LT)	NORM	NORM	NORM
	STBY ALTI (VIB)	NORM	INOP	INOP
PNEU	ENG 1 BLEED	Norm	BMC 1 INOP	BMC 1 inop
	ENG 2 BLEED	BMC 2 inop	BMC 2 inop	BMC 2 inop
	APU BLEED	Inop	Inop	Inop *(g)*
	X BLEED (MAN CTL)	Norm	Inop	Inop
APU	ECB-STARTER	NORM *(h)*	INOP	INOP *(a)*
	FUEL LP VALVE	NORM	NORM	NORM
	FUEL PUMP	NORM	NORM	NORM
PWR PLT	FADEC	A+B *(i)*	A+B *(i)*	A+B *(i)*
	IGNITION	A only	A only	A only
	HP FUEL VALVE closure	NORM	NORM	NORM
MISC	MECH HORN	NORM	NORM	NORM

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(a) Restored, when speed is below 100 kt.
(b) Crew oxygen valve inoperative.
(c) Lost, when the speed is below 50 kt.
(d) Lost, 30 s after the last engine shutdown.
(e) lost when speed below 50 kt
(f) IR 2 and IR 3 are lost 5 min after failure of main generators but if IR 3 replaces IR 1 (ATT-HDG selector at CAPT 3), IR 3 remains supplied.
(g) Restored when speed below 100 kt
(h) For APU start only.
(i) channels A and B self powered above 10 % N2. If N2 below 10 % only channel A is powered.

ELEC EMER CONFIG SYS REMAINING

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
AIR COND PRESS	PRESS AUTO SYS 1	NORM	NORM	NORM
	MAN PRESS CTL	INOP	INOP	INOP (a)
	RAM AIR	NORM	NORM	NORM
	PACK VALVE 1	NORM	Closure INOP	Closure INOP
	PACK VALVE 2	Closure INOP	Closure INOP	Closure INOP(a)
	AVIONIC VENT	NORM	NORM	Partial
FMGS	FMGC (NAV FUNCTION)	N°1 only	Inop	Inop
	MCDU	N°1 only	Inop	Inop
	FAC	N°1 only	Inop	Inop
	FCU	ch 1 only	ch 1 only	ch 1 only
COM	VHF 1	NORM	NORM	NORM
	HF 1	NORM	INOP	INOP
	RMP 1	NORM	NORM	NORM
	ACP (CAPT, F/O)	NORM	NORM	NORM
	CIDS	NORM	NORM	NORM
	INTERPHONE	NORM	NORM	NORM
	CVR	NORM	INOP	INOP
	LOUDSPEAKER 1	NORM	NORM	NORM
EMER EQPT	CREW OXY	NORM	NORM (b)	NORM (b)
	PAX OXY mask release (auto + man)	NORM	INOP	INOP
	SLIDES ARM/WARN	NORM	NORM	NORM
FIRE	ENG 1 LOOP	A only	A only	A only
	ENG 2 LOOP	B only	B only	B only
	APU LOOP	INOP	INOP	INOP (a)
	CARGO SMOKE DET	Channel 1	INOP	INOP
	ENG FIRE EXT.	Bottle 1 only	Bottle 1 only	Bottle 1 only
	APU FIRE EXT.	Squib A only	Squib A only	Squib A only
	CARGO FIRE EXT.	INOP	INOP	INOP (a)
	APU AUTO EXT.	INOP	INOP	INOP (a)

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ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
FLT CTL	ELAC	N°1 only	N°1 + 2	N°1 + 2 (d)
	SEC	N°1 only	N°1	N°1 (d)
	FCDC	N°1 only	INOP	INOP
	SFCC	N°1 only	N°1 only	N°1 only
	Flaps pos ind	NORM	NORM	NORM (c)
FUEL	LP VALVE	NORM	NORM	NORM
	FQI channel 1	NORM	INOP	INOP
	X FEED VALVE	NORM	INOP	INOP
	TRANSFER VALVE	NORM	INOP	INOP
HYD	FIRE VALVES	NORM	NORM	NORM
ICE-RAIN	WING A.ICE	NORM	INOP	INOP
	ENG A.ICE VALVE	OPEN	OPEN	OPEN
	CAPT PITOT	NORM	NORM	NORM (e)
	CAPT AOA	NORM	INOP	INOP
	RAIN REPELLENT (CAPT)	NORM	NORM	NORM
EIS	PFD 1	NORM	NORM	NORM (c)
	ND 1	NORM	INOP	INOP
	ECAM upper disp.	NORM	NORM	NORM (c)
	DMC 1 or 3	NORM	NORM	NORM (c)
	SDAC 1, FWC 1	NORM	NORM	NORM (c)
	ECAM CONT. panel	NORM	NORM	NORM
FLT INS	CLOCKS	NORM	NORM	NORM
L/G	LGCIU SYS 1	NORM	NORM	NORM
	BRK PRESS IND	NORM	NORM	NORM
	PARK BRK	NORM	NORM	NORM
LIGHTS	EMER CKPT	NORM	NORM	NORM
	EMER CAB	NORM	NORM	NORM

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ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
NAV	IR	N°1 only (f)	N°1 only (f)	N°1 only (f)
	ADR	N°1 only	N°1 only	N°1 only
	ADF	N°1 only	INOP	INOP
	VOR/MMR	N°1 only	N°1 only	N°1 only (e)
	DME	N°1 only	INOP	INOP
	VOR/DDRMI	NORM	NORM	NORM (e)
	ATC	N°1 only	INOP	INOP
	STBY HORIZON	NORM	NORM	NORM
	STBY COMP (LT)	NORM	NORM	NORM
	STBY ALTI (VIB)	NORM	INOP	INOP
PNEU	ENG 1 BLEED	Norm	BMC 1 INOP	BMC 1 inop
	ENG 2 BLEED	BMC 2 inop	BMC 2 inop	BMC 2 inop
	APU BLEED	Inop	Inop	Inop(g)
	X BLEED (MAN CTL)	Norm	Inop	Inop
APU	ECB-STARTER	NORM (h)	INOP	INOP (a)
	FUEL LP VALVE	NORM	NORM	NORM
	FUEL PUMP	NORM	NORM	NORM
PWR PLT	FADEC	A+B (i)	A+B (i)	A+B (i)
	IGNITION	A only	A only	A only
	HP FUEL VALVE closure	NORM	NORM	NORM
MISC	MECH HORN	NORM	NORM	NORM

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(a) *Restored, when speed is below 100 kt.*
(b) *Crew oxygen valve inoperative.*
(c) *Lost, when the speed is below 50 kt.*
(d) *Lost, 30 s after the last engine shutdown.*
(e) *lost when speed below 50 kt*
(f) *IR 2 and IR 3 are lost 5 min after failure of main generators but if IR 3 replaces IR 1 (ATT-HDG selector at CAPT 3), IR 3 remains supplied.*
(g) *Restored when speed below 100 kt*
(h) *For APU start only.*
(i) *channels A and B self powered above 10 % N2. If N2 below 10 % only channel A is powered.*

ELEC EMER CONFIG SYS REMAINING

Applicable to: B-HSL, B-HSM, B-HSN

ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
AIR COND PRESS	PRESS AUTO SYS 1	NORM	NORM	NORM
	MAN PRESS CTL	INOP	INOP	INOP (a)
	RAM AIR	NORM	NORM	NORM
	PACK VALVE 1	NORM	Closure INOP	Closure INOP
	PACK VALVE 2	Closure INOP	Closure INOP	Closure INOP(a)
	AVIONIC VENT	NORM	NORM	Partial
FMGS	FMGC (NAV FUNCTION)	N°1 only	Inop	Inop
	MCDU	N°1 only	Inop	Inop
	FAC	N°1 only	Inop	Inop
	FCU	ch 1 only	ch 1 only	ch 1 only
COM	VHF 1	NORM	NORM	NORM
	HF 1	NORM	INOP	INOP
	RMP 1	NORM	NORM	NORM
	ACP (CAPT, F/O)	NORM	NORM	NORM
	CIDS	NORM	NORM	NORM
	INTERPHONE	NORM	NORM	NORM
	CVR	NORM	INOP	INOP
	LOUDSPEAKER 1	NORM	NORM	NORM
EMER EQPT	CREW OXY	NORM	NORM (b)	NORM (b)
	PAX OXY mask release (auto + man)	NORM	INOP	INOP
	SLIDES ARM/WARN	NORM	NORM	NORM
FIRE	ENG 1 LOOP	A only	A only	A only
	ENG 2 LOOP	B only	B only	B only
	APU LOOP	INOP	INOP	INOP (a)
	CARGO SMOKE DET	Channel 1	INOP	INOP
	ENG FIRE EXT.	Bottle 1 only	Bottle 1 only	Bottle 1 only
	APU FIRE EXT.	Squib A only	Squib A only	Squib A only
	CARGO FIRE EXT.	INOP	INOP	INOP (a)
	APU AUTO EXT.	INOP	INOP	INOP (a)

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ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
FLT CTL	ELAC	N°1 only	N°1 + 2	N°1 + 2 (d)
	SEC	N°1 only	N°1	N°1 (d)
	FCDC	N°1 only	INOP	INOP
	SFCC	N°1 only	N°1 only	N°1 only
	Flaps pos ind	NORM	NORM	NORM (c)
FUEL	LP VALVE	NORM	NORM	NORM
	FQI channel 1	NORM	INOP	INOP
	X FEED VALVE	NORM	INOP	INOP
	TRANSFER VALVE	NORM	INOP	INOP
HYD	FIRE VALVES	NORM	NORM	NORM
ICE-RAIN	WING A.ICE	NORM	INOP	INOP
	ENG A.ICE VALVE	OPEN	OPEN	OPEN
	CAPT PITOT	NORM	NORM	NORM (e)
	CAPT AOA	NORM	INOP	INOP
	RAIN REPELLENT (CAPT)	NORM	NORM	NORM
EIS	PFD 1	NORM	NORM	NORM (c)
	ND 1	NORM	INOP	INOP
	ECAM upper disp.	NORM	NORM	NORM (c)
	DMC 1 or 3	NORM	NORM	NORM (c)
	SDAC 1, FWC 1	NORM	NORM	NORM (c)
	ECAM CONT. panel	NORM	NORM	NORM
FLT INS	CLOCKS	NORM	NORM	NORM
L/G	LGCIU SYS 1	NORM	NORM	NORM
	BRK PRESS IND	NORM	NORM	NORM
	PARK BRK	NORM	NORM	NORM
LIGHTS	EMER CKPT	NORM	NORM	NORM
	EMER CAB	NORM	NORM	NORM
NAV	IR	N°1 only (f)	N°1 only (f)	N°1 only (f)
	ADR	N°1 only	N°1 only	N°1 only
	ADF	N°1 only	INOP	INOP
	VOR-MMR	N°1 only	N°1 only	N°1 only (e)
	DME	N°1 only	INOP	INOP
	VOR/DDRMI	NORM	NORM	NORM (e)
	ATC	N°1 only	INOP	INOP
	ISIS	NORM	NORM	NORM

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ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
PNEU	ENG 1 BLEED	Norm	BMC 1 INOP	BMC 1 inop
	ENG 2 BLEED	BMC 2 inop	BMC 2 inop	BMC 2 inop
	APU BLEED	Inop	Inop	Inop *(g)*
	X BLEED (MAN CTL)	Norm	Inop	Inop
APU	ECB-STARTER	NORM *(h)*	INOP	INOP *(a)*
	FUEL LP VALVE	NORM	NORM	NORM
	FUEL PUMP	NORM	NORM	NORM
PWR PLT	FADEC	A+B *(i)*	A+B *(i)*	A+B *(i)*
	IGNITION	A only	A only	A only
	HP FUEL VALVE closure	NORM	NORM	NORM
MISC	MECH HORN	NORM	NORM	NORM

(a) Restored, when speed is below 100 kt.
(b) Crew oxygen valve inoperative.
(c) Lost, when the speed is below 50 kt.
(d) Lost, 30 s after the last engine shutdown.
(e) lost when speed below 50 kt
(f) IR 2 and IR 3 are lost 5 min after failure of main generators but if IR 3 replaces IR 1 (ATT-HDG selector at CAPT 3), IR 3 remains supplied.
(g) Restored when speed below 100 kt
(h) For APU start only.
(i) channels A and B self powered above 10 % N2. If N2 below 10 % only channel A is powered.

ELEC EMER CONFIG SYS REMAINING

Applicable to: B-HSO, B-HSP

ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
AIR COND PRESS	PRESS AUTO SYS 1	NORM	NORM	NORM
	MAN PRESS CTL	INOP	INOP	INOP (a)
	RAM AIR	NORM	NORM	NORM
	PACK VALVE 1	NORM	Closure INOP	Closure INOP
	PACK VALVE 2	Closure INOP	Closure INOP	Closure INOP(a)
	AVIONIC VENT	NORM	NORM	Partial
FMGS	FMGC (NAV FUNCTION)	N°1 only	Inop	Inop
	MCDU	N°1 only	Inop	Inop
	FAC	N°1 only	Inop	Inop
	FCU	ch 1 only	ch 1 only	ch 1 only
COM	VHF 1	NORM	NORM	NORM
	HF 1	NORM	INOP	INOP
	RMP 1	NORM	NORM	NORM
	ACP (CAPT, F/O)	NORM	NORM	NORM
	CIDS	NORM	NORM	NORM
	INTERPHONE	NORM	NORM	NORM
	CVR	NORM	INOP	INOP
	LOUDSPEAKER 1	NORM	NORM	NORM
EMER EQPT	CREW OXY	NORM	NORM (b)	NORM (b)
	PAX OXY mask release (auto + man)	NORM	INOP	INOP
	SLIDES ARM/WARN	NORM	NORM	NORM
FIRE	ENG 1 LOOP	A only	A only	A only
	ENG 2 LOOP	B only	B only	B only
	APU LOOP	INOP	INOP	INOP (a)
	CARGO SMOKE DET	Channel 1	INOP	INOP
	ENG FIRE EXT.	Bottle 1 only	Bottle 1 only	Bottle 1 only
	APU FIRE EXT.	Squib A only	Squib A only	Squib A only
	CARGO FIRE EXT.	INOP	INOP	INOP (a)
	APU AUTO EXT.	INOP	INOP	INOP (a)

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ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
FLT CTL	ELAC	N°1 only	N°1 + 2	N°1 + 2 (d)
	SEC	N°1 only	N°1	N°1 (d)
	FCDC	N°1 only	INOP	INOP
	SFCC	N°1 only	N°1 only	N°1 only
	Flaps pos ind	NORM	NORM	NORM (c)
FUEL	LP VALVE	NORM	NORM	NORM
	FQI channel 1	NORM	INOP	INOP
	X FEED VALVE	NORM	INOP	INOP
	TRANSFER VALVE	NORM	INOP	INOP
HYD	FIRE VALVES	NORM	NORM	NORM
ICE-RAIN	WING A.ICE	NORM	INOP	INOP
	ENG A.ICE VALVE	OPEN	OPEN	OPEN
	CAPT PITOT	NORM	NORM	NORM (e)
	CAPT AOA	NORM	INOP	INOP
	RAIN REPELLENT (CAPT)	NORM	NORM	NORM
EIS	PFD 1	NORM	NORM	NORM (c)
	ND 1	NORM	INOP	INOP
	ECAM upper disp.	NORM	NORM	NORM (c)
	DMC 1 or 3	NORM	NORM	NORM (c)
	SDAC 1, FWC 1	NORM	NORM	NORM (c)
	ECAM CONT. panel	NORM	NORM	NORM
FLT INS	CLOCKS	NORM	NORM	NORM
L/G	LGCIU SYS 1	NORM	NORM	NORM
	BRK PRESS IND	NORM	NORM	NORM
	PARK BRK	NORM	NORM	NORM
	ABCU	NORM	NORM	NORM
LIGHTS	EMER CKPT	NORM	NORM	NORM
	EMER CAB	NORM	NORM	NORM

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ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
NAV	IR	N°1 only (f)	N°1 only (f)	N°1 only (f)
	ADR	N°1 only	N°1 only	N°1 only
	ADF	N°1 only	INOP	INOP
	VOR-MMR	N°1 only	N°1 only	N°1 only (e)
	DME	N°1 only	INOP	INOP
	VOR/DDRMI	NORM	NORM	NORM (e)
	ATC	N°1 only	INOP	INOP
	ISIS	NORM	NORM	NORM
PNEU	ENG 1 BLEED	Norm	BMC 1 INOP	BMC 1 inop
	ENG 2 BLEED	BMC 2 inop	BMC 2 inop	BMC 2 inop
	APU BLEED	Inop	Inop	Inop(g)
	X BLEED (MAN CTL)	Norm	Inop	Inop
APU	ECB-STARTER	NORM (h)	INOP	INOP (a)
	FUEL LP VALVE	NORM	NORM	NORM
	FUEL PUMP	NORM	NORM	NORM
PWR PLT	FADEC	A+B (i)	A+B (i)	A+B (i)
	IGNITION	A only	A only	A only
	HP FUEL VALVE closure	NORM	NORM	NORM
MISC	MECH HORN	NORM	NORM	NORM

(a) Restored, when speed is below 100 kt.
(b) Crew oxygen valve inoperative.
(c) Lost, when the speed is below 50 kt.
(d) Lost, 30 s after the last engine shutdown.
(e) lost when speed below 50 kt
(f) IR 2 and IR 3 are lost 5 min after failure of main generators but if IR 3 replaces IR 1 (ATT-HDG selector at CAPT 3), IR 3 remains supplied.
(g) Restored when speed below 100 kt
(h) For APU start only.
(i) channels A and B self powered above 10 % N2. If N2 below 10 % only channel A is powered.

ELEC EMER CONFIG SYS REMAINING

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
AIR COND PRESS	PRESS AUTO SYS 1	NORM	NORM	NORM
	MAN PRESS CTL	INOP	INOP	INOP (a)
	RAM AIR	NORM	NORM	NORM
	PACK VALVE 1	NORM	Closure INOP	Closure INOP
	PACK VALVE 2	Closure INOP	Closure INOP	Closure INOP(a)
	AVIONIC VENT	NORM	NORM	Partial
FMGS	FMGC (NAV FUNCTION)	N°1 only	Inop	Inop
	MCDU	N°1 only	Inop	Inop
	FAC	N°1 only	Inop	Inop
	FCU	ch 1 only	ch 1 only	ch 1 only
COM	VHF 1	NORM	NORM	NORM
	HF 1	NORM	INOP	INOP
	RMP 1	NORM	NORM	NORM
	ACP (CAPT, F/O)	NORM	NORM	NORM
	CIDS	NORM	NORM	NORM
	INTERPHONE	NORM	NORM	NORM
	CVR	NORM	INOP	INOP
	LOUDSPEAKER 1	NORM	NORM	NORM
EMER EQPT	CREW OXY	NORM	NORM (b)	NORM (b)
	PAX OXY mask release (auto + man)	NORM	INOP	INOP
	SLIDES ARM/WARN	NORM	NORM	NORM
FIRE	ENG 1 LOOP	A only	A only	A only
	ENG 2 LOOP	B only	B only	B only
	APU LOOP	INOP	INOP	INOP (a)
	CARGO SMOKE DET	Channel 1	INOP	INOP
	ENG FIRE EXT.	Bottle 1 only	Bottle 1 only	Bottle 1 only
	APU FIRE EXT.	Squib A only	Squib A only	Squib A only
	CARGO FIRE EXT.	INOP	INOP	INOP (a)
	APU AUTO EXT.	INOP	INOP	INOP (a)

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ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
FLT CTL	ELAC	N°1 only	N°1 + 2	N°1 + 2 (d)
	SEC	N°1 only	N°1	N°1 (d)
	FCDC	N°1 only	INOP	INOP
	SFCC	N°1 only	N°1 only	N°1 only
	Flaps pos ind	NORM	NORM	NORM (c)
FUEL	LP VALVE	NORM	NORM	NORM
	FQI channel 1	NORM	INOP	INOP
	X FEED VALVE	NORM	INOP	INOP
	TRANSFER VALVE	NORM	INOP	INOP
HYD	FIRE VALVES	NORM	NORM	NORM
ICE-RAIN	WING A.ICE	NORM	INOP	INOP
	ENG A.ICE VALVE	OPEN	OPEN	OPEN
	CAPT PITOT	NORM	NORM	NORM (e)
	CAPT AOA	NORM	INOP	INOP
	RAIN REPELLENT (CAPT)	NORM	NORM	NORM
EIS	PFD 1	NORM	NORM	NORM (c)
	ND 1	NORM	INOP	INOP
	ECAM upper disp.	NORM	NORM	NORM (c)
	DMC 1 or 3	NORM	NORM	NORM (c)
	SDAC 1, FWC 1	NORM	NORM	NORM (c)
	ECAM CONT. panel	NORM	NORM	NORM
FLT INS	CLOCKS	NORM	NORM	NORM
L/G	LGCIU SYS 1	NORM	NORM	NORM
	BRK PRESS IND	NORM	NORM	NORM
	PARK BRK	NORM	NORM	NORM
	ABCU	NORM	NORM	NORM
LIGHTS	EMER CKPT	NORM	NORM	NORM
	EMER CAB	NORM	NORM	NORM
NAV	IR	N°1 only (f)	N°1 only (f)	N°1 only (f)
	ADR	N°1 only	N°1 only	N°1 only
	ADF	N°1 only	INOP	INOP
	VOR/MMR	N°1 only	N°1 only	N°1 only (f)
	DME	N°1 only	INOP	INOP
	ATC	N°1 only	INOP	INOP
	ISIS	NORM	NORM	NORM

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ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
PNEU	ENG 1 BLEED	Norm	BMC 1 INOP	BMC 1 inop
	ENG 2 BLEED	BMC 2 inop	BMC 2 inop	BMC 2 inop
	APU BLEED	Inop	Inop	Inop *(g)*
	X BLEED (MAN CTL)	Norm	Inop	Inop
APU	ECB-STARTER	NORM *(h)*	INOP	INOP *(a)*
	FUEL LP VALVE	NORM	NORM	NORM
	FUEL PUMP	NORM	NORM	NORM
PWR PLT	FADEC	A+B *(i)*	A+B *(i)*	A+B *(i)*
	IGNITION	A only	A only	A only
	HP FUEL VALVE closure	NORM	NORM	NORM
MISC	MECH HORN	NORM	NORM	NORM

(a) Restored, when speed is below 100 kt.
(b) Crew oxygen valve inoperative.
(c) Lost, when the speed is below 50 kt.
(d) Lost, 30 s after the last engine shutdown.
(e) lost when speed below 50 kt
(f) IR 2 and IR 3 are lost 5 min after failure of main generators but if IR 3 replaces IR 1 (ATT-HDG selector at CAPT 3), IR 3 remains supplied.
(g) Restored when speed below 100 kt
(h) For APU start only.
(i) channels A and B self powered above 10 % N2. If N2 below 10 % only channel A is powered.

ELEC EMER GEN 1 LINE OFF

Applicable to: ALL

L2 With the GEN 1 LINE pb-sw (on the EMER ELEC PWR panel) in the OFF position, the GEN 1 line contactor is open and GEN 2 supplies the AC BUS 1 channel.

Crew awareness.
Set the GEN 1 LINE pb-sw to ON.

ELEC ESS BUSES ON BAT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

L2 DC ESS BUS is supplied by the batteries. AC ESS BUS is also supplied by the batteries, via the STATIC INVERTER.

L1 **LAND ASAP**

■ **WHEN L/G UPLOCKED:**

EMER ELEC PWR.....MAN ON

L2 *ESS BUSES are supplied by the emergency generator.*

L1 ■ **IF L/G RETRACT FAULT:**

L2 If the landing gear fails to retract during a go-around, when in emergency configuration, the emergency generator can be recovered as follows :

L1 MIN RAT SPD.....180 KT

L2 *Accelerate to 180 kt to recover RAT operation, with the landing gear down.*

L1 LGCIU 1 C/B (C09).....PULL

L2 *Pull LGCIU 1 C/B to simulate the landing gear up condition, in order to allow emergency generator operation.*

L1 EMER ELEC PWR.....MAN ON

L2 *Allows coupling of the emergency generator.*
When the emergency generator is in line, reset FAC 1.
During final approach, reset the C/B.

ELEC ESS BUSES ON BAT

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 DC ESS BUS is supplied by the batteries. AC ESS BUS is also supplied by the batteries, via the STATIC INVERTER.

L1 **LAND ASAP**

MIN RAT SPEED.....140 KT

L2 *Displayed, if the RAT is extended.*

L1 EMER ELEC PWR.....MAN ON

L2 *ESS BUSES are supplied by the emergency generator*

ELEC ESS TR FAULT

Applicable to: ALL

L2 Crew awareness.

STATUS	
	INOP SYS
	ESS TR

FLT ON BAT ONLY

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

Flight time on batteries only may be increased to at least 30 min, as follows:

ENG MODE SEL.....NORM
ANTI ICE PITOT 1 C/B (D 02).....PULL
26 V ADIRU 1 C/B (F 07).....PULL

Loss of the CM1 altitude speed, and vertical speed indication on the PFD. Use standby instruments.

- **7 min before landing:**

  ANTI ICE PITOT 1 C/B (D 02).....RESET

  - **After 1 min:**

CAUTION	This time delay is necessary to ensure reliable speed information even in icing conditions, when the ADIRU is reset to ON.

    26 V ADIRU 1 C/B (F 07).....RESET

ELEC GEN 1(2) OR APU GEN OVERLOAD

Applicable to: ALL

GALY/CAB.....OFF

Continued on the following page

ELEC GEN 1(2) OR APU GEN OVERLOAD (Cont'd)

STATUS	INOP SYS
	GALY/CAB

ELEC GEN 1(2) FAULT

Applicable to: ALL 320, B-HTD, B-HTE, B-HTF

GEN (AFFECTED).....OFF THEN ON

- **IF UNSUCCESSFUL:**
  GEN (AFFECTED).....OFF

L12

STATUS	INOP SYS
Note: *If available, the APU may be started, and the APU GEN used.* CAT 3 SINGLE ONLY	MAIN GALLEY (1) GEN 1(2) CAT 3 DUAL

(1) *(only if APU GEN is not online)*

ELEC GEN 1(2) FAULT

Applicable to: B-HTG, B-HTH, B-HTI

GEN (AFFECTED).....OFF THEN ON

- **IF UNSUCCESSFUL:**
  GEN (AFFECTED).....OFF

Continued on the following page

ELEC GEN 1(2) FAULT (Cont'd)

L12

STATUS

Note: *If available, the APU may be started, and the APU GEN used.*

CAT 3 SINGLE ONLY

INOP SYS

MAIN GALLEY (1)
GEN 1(2)
CAT 3 DUAL

(1) *(only if APU GEN is not online: In this case, all the galleys are shed)*

ELEC GEN 1(2) OFF

Applicable to: ALL 320, B-HTD, B-HTE, B-HTF

L2 Turn the affected GEN ON, with the applicable pushbutton.

Crew awareness

STATUS

CAT 3 SINGLE ONLY

INOP SYS

MAIN GALLEY (1)
GEN 1(2)
CAT 3 DUAL

(1) *(only if APU GEN is not online)*

ELEC GEN 1(2) OFF

Applicable to: B-HTG, B-HTH, B-HTI

L2 Turn the affected GEN ON, with the applicable pushbutton.

Crew awareness

Continued on the following page

ELEC GEN 1(2) OFF (Cont'd)

STATUS	INOP SYS
CAT 3 SINGLE ONLY	MAIN GALLEY (1) GEN 1(2) CAT 3 DUAL

(1) *(only if APU GEN is not online: In this case, all the galleys are shed)*

ELEC IDG 1(2) DISCONNECTED
(ON GROUND)

Applicable to: ALL 320, B-HTD, B-HTE, B-HTF

L2 Crew awareness

L12

STATUS	INOP SYS
Note: *If available, the APU may be started, and the APU GEN used.* CAT 3 SINGLE ONLY	MAIN GALLEY (1) GEN 1(2) CAT 3 DUAL

(1) *(only if APU GEN is not online)*

ELEC IDG 1(2) DISCONNECTED
(ON GROUND)

Applicable to: B-HTG, B-HTH, B-HTI

L2 Crew awareness

Continued on the following page

ELEC IDG 1(2) DISCONNECTED (Cont'd)
(ON GROUND)

L12

STATUS

Note: *If available, the APU may be started, and the APU GEN used.*

CAT 3 SINGLE ONLY

INOP SYS
MAIN GALLEY (1)
GEN 1(2)
CAT 3 DUAL

(1) *(only if APU GEN is not online: in this case, all the galleys are shed)*

ELEC IDG 1(2) OIL LO PR/OVHT

Applicable to: ALL 320, B-HTD, B-HTE, B-HTF

IDG (AFFECTED).....OFF

L2 *If the associated engine is running, the IDG (integrated drive generator) must be disconnected from the engine at, or above, idle to prevent damage to the disconnect mechanism.*
Press the IDG pb-sw until the GEN FAULT light comes on. However, do not press for more than 3 s, to avoid damage to the disengage solenoid
The IDG FAULT light goes off, when the IDG is disconnected.

L12

STATUS

Note: *If available, the APU may be started and the APU GEN used.*

CAT 3 SINGLE ONLY

INOP SYS
MAIN GALLEY (1)
GEN 1(2)
CAT 3 DUAL

(1) *(only if APU GEN is not online)*

ELEC IDG 1(2) OIL LO PR/OVHT

Applicable to: B-HTG, B-HTH, B-HTI

IDG (AFFECTED).....OFF

L2 *If the associated engine is running, the IDG (integrated drive generator) must be disconnected from the engine at, or above, idle to prevent damage to the disconnect mechanism.*
Press the IDG pb-sw until the GEN FAULT light comes on. However, do not press for more than 3 s, to avoid damage to the disengage solenoid
The IDG FAULT light goes off, when the IDG is disconnected.

L12

STATUS

Note: *If available, the APU may be started and the APU GEN used.*

CAT 3 SINGLE ONLY

INOP SYS

MAIN GALLEY (1)
GEN 1(2)
CAT 3 DUAL

(1) *(only if APU GEN is not online: In this case, all the galleys are shed)*

ELEC STAT INV FAULT

Applicable to: ALL

L2 Crew awareness.

ELEC TR 1(2) FAULT

Applicable to: ALL

L2 Crew awareness.

Continued on the following page

ELEC TR 1(2) FAULT (Cont'd)

STATUS	
	INOP SYS
CAT 3 SINGLE ONLY	TR 1(2) CAT 3 DUAL

COCKPIT DOOR FAULT

Applicable to: ALL

This procedure should be applied, if the Cockpit Door Locking System (CDLS) fails. This failure is indicated when the FAULT light on the center pedestal's COCKPIT DOOR panel comes on.
In the case of a DC BUS 2 fault, no FAULT indication appears on the center pedestal's COCKPIT DOOR panel. The CDLS is not electrically-supplied, and is inoperative.

CKPT DOOR CONT panel ..... CHECK

This panel is located on the overhead panel. It is used to identify the faulty CDLS item, and to verify the status of the pressure sensors and the three electrical latches (referred to as strikes).

- **If one or more electrical latches (strikes) are faulty:**
  The cockpit door is not intrusion-proof if two or more electrical latches are faulty.

  The system may be recovered by performing the following steps:

  Cockpit door..... OPEN
  COCKPIT DOOR sw..... SET to UNLOCK

  After 30 s:

  COCKPIT DOOR sw..... SET to NORM

- **If two pressure sensors are faulty:**

  Automatic latch release is not available, in case of cockpit decompression.

- **If no LED on the CKPT DOOR CONT panel is on:**

  The CDLS control unit is faulty, therefore, the cockpit door might unlock automatically. If it does not, consider using the mechanical override system to unlock the door.

Intentionally left blank

APU FIRE

Applicable to: ALL

LAND ASAP

APU FIRE P/B..... PUSH

L2 *APU LP valve closes.*
Aural warning stops.
APU FIRE pb-sw remains on, as long as a fire is detected.

L1 AGENT AFTER 10 S..... DISCH

L2 *The 10 s delay allows the airflow to decrease, which increases the effect of the agent.*
Automatic countdown on the ECAM.

L1 MASTER SW..... OFF

L2 *Do not attempt to restart the APU.*

STATUS

INOP SYS
APU

CARGO SMOKE FWD (AFT) BTL SQUIB FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

L2 Fire extinguishing capability is lost in the FWD (AFT) cargo compartment.

Crew awareness.

ENG 1(2) FIRE
(IN FLIGHT)

Applicable to: ALL

LAND ASAP

THR LEVER (AFFECTED)..... IDLE
ENG MASTER (AFFECTED)..... OFF

L2 *LP and HP valves close.*

L1 ENG FIRE P/B (AFFECTED)..... PUSH

L2 *Aural warning stops.*
ENG FIRE pushbutton remains on, as long as a fire is detected.
FADEC is no longer supplied. So, the THR LEVER ... IDLE line reappears, even if the thrust lever is at idle.

L1 AGENT 1 AFTER 10 S..... DISCH

L2 *The 10 s delay allows N1 to decrease, reducing nacelle ventilation, and thereby increasing the effect of the agent.*
Automatic countdown on the ECAM.

L1 ATC..... NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intentions*

L1 ● **IF FIRE AFTER 30 S:**
AGENT 2..... DISCH

L2 *Discharge the second agent, if the fire warning remains 30 s after the discharge of the first agent.*

L12

ASSOCIATED PROCEDURES

ENG 1(2) SHUTDOWN

Do not attempt to restart the engine.
For the ENG SHUTDOWN procedure, see the ENG section. (Refer to PRO-ABN-70 ENG 1(2) SHUT DOWN).

ENG 1(2) FIRE
(ON GROUND)

Applicable to: ALL

THR LEVERS..... IDLE

L2 *Full reverse may be used to stop the aircraft.*

L1 ● **WHEN A/C IS STOPPED:**

PARKING BRK..... ON

ATC (VHF 1).....NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intensions.*
Only VHF 1 is available on batteries.

L1 CABIN CREW (PA)..... ALERT

ENG MASTER (AFFECTED).....OFF

L2 *Associated LP and HP valves close.*

L1 ENG FIRE P/B (AFFECTED).....PUSH

L2 *Aural warning stops.*
ENG FIRE pushbutton remains on, as long as fire is detected.
FADEC is no longer supplied.

L1 AGENT 1+2.....DISCH

EMER EVAC PROC.....APPLY

L2 *Refer to PRO-ABN-80 EMERGENCY EVACUATION or Refer to QRH/ABN-80 EMERGENCY EVACUATION*

ENG 1(2)/APU FIRE DET FAULT

Applicable to: ALL

L2 Loss of both fire detection loops.

Crew awareness.

STATUS

INOP SYS
FIRE DET 1(2) or APU FIRE DET

ENG 1(2)/APU FIRE LOOP A(B) FAULT

Applicable to: ALL

L2 No crew action required in flight.

STATUS	
	INOP SYS
	ENG 1(2) LOOP A(B) or APU LOOP A(B)

SMOKE FWD(AFT) CARGO SMOKE

Applicable to: ALL 321

LAND ASAP

AFT ISOL VALVE (IF NOT AUTOMATICALLY CLOSED AND AFT AFFECTED)..... OFF
CAB FANS.....OFF

- **IF FWD (AFT) CRG CLOSED (displayed on ground only):**

L2 Order the ground crew not to open the door of the affected cargo compartment, unless the passengers have disembarked and fire services are present. Also ensure that the FWD(AFT) cargo door is closed before discharging the extinguishing agent.

L1 AGENT.....DISCH

L2 *Note: Expect the SMOKE warning to remain after agent discharge, even if the smoke source is extinguished. Gases from the smoke source are not evacuated, and smoke detectors are also sensitive to the extinguishing agent.*

L1 - **ON GROUND BEFORE OPEN CRG DOORS:**
PAX..... DISEMBARK

L2 *Note: If the warning has been displayed temporarily, and agent has not been discharged, normal cargo ventilation may be recovered when ventilation is required for livestock transportation:*
C/B of CARGO VENT controller (S20 on 122VU, or C7 on 49VU, as installed) ..... PULL then PUSH

Continued on the following page

SMOKE FWD(AFT) CARGO SMOKE (Cont'd)

STATUS	INOP SYS
● **BEFORE OPEN CRG DOORS (displayed on ground only):** PAX..... DISEMBARK	AFT CRG VENT AFT CRG HEAT ◁ (If aft affected)

SMOKE FWD(AFT) CARGO SMOKE

Applicable to: ALL 320

LAND ASAP

CAB FANS.....OFF

● **IF FWD(AFT) CRG CLOSED (displayed on ground only):**

L2 Order the ground crew not to open the door of the affected cargo compartment, unless the passengers have disembarked and fire services are present. Also ensure that the FWD(AFT) cargo door is closed before discharging the extinguishing agent.

L1 AGENT 1.....DISCH

● **60 min after AGENT 1 discharge:**
AGENT 2.....DISCH

L2 *Note: Expect the SMOKE warning to remain after agent discharge, even if the smoke source is extinguished. Gases from the smoke source are not evacuated, and smoke detectors are also sensitive to the extinguishing agent.*

L1 ● **ON GROUND BEFORE OPEN CRG DOORS:**
PAX..... DISEMBARK

● **BEFORE OPEN CRG DOORS (displayed on ground only):**
PAX..... DISEMBARK

SMOKE FWD(AFT) CRG BTL (1)(2 ◁) FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 If bottle 1 is lost, fire extinguishing capability is lost in the FWD(AFT) cargo compartment.
If bottle 2 is lost, agent concentration will not be ensured after fire extinguishing.

Crew awareness.

SMOKE FWD(AFT) CRG DET FAULT

Applicable to: ALL 321

- **IF NO LIVE STOCK:**
  AFT ISOL VALVE (IF AFT AFFECTED)..... OFF

STATUS	
	INOP SYS
	FWD(AFT) CRG DET

SMOKE FWD(AFT) CRG DET FAULT

Applicable to: ALL 320

L2 Crew awareness.

SMOKE/FUMES/AVNCS SMOKE

Applicable to: B-HTD, B-HTE, B-HTF

This paper procedure includes all the steps of the AVIONICS SMOKE ECAM procedure.

Apply this paper procedure when:
- The flight (cabin) crew suspect that smoke is coming from the avionics, and/or the air conditioning, and/or the cabin equipment.
- The AVIONICS SMOKE ECAM caution is triggered, or, at the latest, after completing the immediate actions of the AVIONICS SMOKE ECAM procedure (before reaching the 5 min countdown procedure line)

There is a smell of smoke/fumes in the cockpit:
- If the smell is similar to that of orange peels, suspect a toxic leak of rain repellent fluid.
- If the smell is similar to that of pine needles, suspect a non-toxic leak.

If any other ECAM SMOKE alert triggers (CARGO, ...), the crew must first apply the ECAM procedure, then consider applying this paper procedure.
Note that these ECAM alerts may be caused by another source, that should usually first be detected by the flight crew/cabin crew/avionics smoke detectors.

The following explains the layout of this paper procedure:
- The procedure lines above the text boxes indicate the actions that the flight crew must immediately perform, if smoke is detected (with or without ECAM activation and regardless of the smoke source). These immediate actions correspond to the most common steps to be taken in smoke cases. In all cases, the flight crew must also be prepared to immediately perform a diversion. However, this diversion may be avoided if the smoke source is obvious, accessible and extinguishable or confirmed isolated (after completion of the immediate actions).
- The text boxes indicate the actions that the flight crew must consider, if at any time during the remainder of the procedure but always after the initial steps:
  - Smoke/fumes become the greatest threat and smoke/fumes removal is required, and/or
  - The situation becomes critical and can no longer be controlled.
- The procedure lines below the text boxes indicate the actions that the flight crew must perform, as soon as they suspect a source of smoke. The actions will depend on whether the smoke is coming from the avionics, and/or air conditioning, and/or cabin equipment.

LAND ASAP

● **IF PERCEPTIBLE SMOKE APPLY IMMEDIATELY:**

If smoke is confirmed, the following procedure must be applied.

BLOWER.....OVRD

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

EXTRACT..... OVRD

Avionics ventilation air is extracted overboard.

CAB FANS..... OFF

To prevent smoke from entering the cockpit and cabin.

GALLEY..... OFF
SIGNS..... ON
CKPT/CABIN COM.....ESTABLISH

Communication must be established with the cabin crew in order to follow up on the smoke origin and dissipation.

- **If required:**

OXY MASK/GOGGLE..... ON/100%/EMERG

Ensure crew communication is established. Avoid continuous use of the interphone to minimize interference from the oxygen mask breathing noise.
Turn the emergency knob to remove condensation or smoke from the mask.

- **If smoke source immediately obvious, accessible, and extinguishable:**

FAULTY EQPT..... ISOLATE

- **If smoke source not immediately isolated:**

DIVERSION.....INITIATE
DESCENT (FL 100, or MEA, or minimum obstacle clearance altitude).....INITIATE

- **At ANY TIME of the remainder of the procedure, if smoke/fumes becomes the GREATEST THREAT:**

SMOKE FUMES REMOVAL.....CONSIDER
ELEC EMER CONFIG.....CONSIDER

Refer to PRO ABN 26 SMOKE/FUMES/AVNCS SMOKE - ELEC EMER CONFIG

- **At ANY TIME of the procedure, if situation becomes critical and can no longer be controlled:**

IMMEDIATE LANDING.....CONSIDER

Guidelines to determine smoke source:

- If smoke initially comes out of the ventilation outlets, the crew may suspect AIR COND SMOKE. In addition, very shortly thereafter, several SMOKE warnings (cargo, lavatory, avionics) will be triggered. The displayed ECAM procedures must be applied.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

- After an ENG or APU failure, smoke may come from the faulty item via the bleed system and be perceived in the cockpit and/or cabin. In such a case, it will be recirculated throughout the aircraft, until it completely disappears from the air conditioning system.
- If only the AVIONICS SMOKE warning is triggered, the crew may suspect avionics smoke.
- If the smoke is detected while an equipment is declared faulty, the crew may suspect that smoke is coming from this equipment.
- Avionics or forward galley smoke may be smelt, or may enter in the cockpit before ECAM warning activation.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

● **IF AIR COND SMOKE SUSPECTED:**

APU BLEED.....OFF
BLOWER and EXTRACT.....AUTO

Note: When both BLOWER and EXTRACT are in the OVRD position, a single pack may not be able to maintain the cabin pressure.

CARGO AFT ISOL VALVE.....OFF

To prevent a cargo smoke warning from being triggered due to cabin smoke.

PACK 1.....OFF

● **If smoke continues:**

PACK 1.....ON
PACK 2.....OFF

● **If smoke still continues:**

PACK 2.....ON

Restore normal configuration if PACK 2 is not suspected to cause smoke

BLOWER and EXTRACT.....OVRD

SMOKE/FUMES REMOVAL.....CONSIDER

● **IF CAB EQUIPMENT SMOKE SUSPECTED:**

● **If smoke continues:**

EMER EXIT LIGHT.....ON
BUS TIE.....OFF
GEN 2.....OFF

AC BUS 2 shedding can be considered in order to isolate most of the cabin equipments. The ECAM lower display, and the F/O's PFD and ND will be lost

SMOKE DISSIPATION.....CHECK
FAULTY EQPT.....SEARCH/ISOLATE

Once the cabin has been secured, try to find the smoke source and isolate it. Cabin lights, reading lights, passenger systems, galleys have dedicated control C/B in the cabin or cockpit.

● **If smoke still continues or if faulty equipment confirmed isolated:**

GEN 2.....ON

All busbars recovered when GEN 2 restored. But, TR 2 remains INOP.

BUS TIE.....AUTO

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

- **If faulty equipment not confirmed isolated, before L/G extension:**
  GEN 2.....ON
  BUS TIE.....AUTO

SMOKE/FUMES REMOVAL.....CONSIDER

- **IF SMOKE SOURCE CANNOT BE DETERMINED AND STILL CONTINUES OR AVNCS/ELECTRICAL SMOKE SUSPECTED:**
  ELEC EMER CONFIG.....CONSIDER
  As a last attempt, the flight crew can set the electrical emergency configuration to possibly isolate or minimize the smoke source.
- **IF SMOKE disappears within 5 min:**
  NORMAL VENTILATION.....RESTORE

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

1 **TO SET EMER ELEC CONFIG**

EMER ELEC GEN 1 LIN..... OFF

GEN 1 LINE contactor opens. GEN 1 remains running and supplies one fuel pump in each wing tank. AC BUS 1 is supplied by GEN 2 through the bus tie contactor.

EMER ELEC PWR.....MAN ON

RAT is extended and the EMER GEN is connected to the aircraft network. Check emergency generator parameters on the ELEC SD page (displayed automatically).

- **WHEN EMER GEN AVAIL:**

APU GEN.....OFF
GEN 2..... OFF

ELEC EMER CONFIG

Two different procedures can be displayed on the ECAM, depending on whether the AVIONICS SMOKE ECAM caution is triggered or not before the flight crew sets the electrical emergency configuration.

- **If AVIONICS SMOKE is not triggered:**

The ECAM displays the ELEC EMER CONFIG procedure described here: *Refer to PRO-ABN-24 ELEC EMER CONFIG.*

The flight crew must apply the ECAM without performing the GEN 1+2 reset.

- **AT 3 MIN OR 2000 FT BEFORE LDG:**

Restore all generators only 3 min before landing or at 2 000 ft AAL to recover normal braking, while minimizing possible reactivation of a smoke source.

GEN 2.....ON
EMER ELEC GEN 1 LINE..... ON

- **WHEN A/C IS STOPPED:**

ALL GEN.....OFF

- **If AVIONICS SMOKE is triggered:**

The ECAM displays a specific ELEC EMER CONFIG procedure. The flight crew must apply the following ECAM procedure.

MIN RAT SPEED.....140 KT

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

Note: *The electrical configuration is the same as for loss of both generators (except that one fuel pump in each wing tank remains supplied).*

VHF 1/HF 1/ATC 1.....USE

Only VHF 1, HF 1 and ATC 1 are supplied in this configuration. Notify the ATC of the nature of the emergency, and state intentions. If there is no contact with the ATC, switch to code A7700, or transmit a distress message on one of the following frequencies: VHF 121.5 MHz, HF 2 182 kHz, or 8 364 kHz.

FAC 1..... OFF THEN ON

Rudder trim is recovered, despite the fact that no indication is available.

- **3MN/2000 FT BEFORE LDG:**

  Restore all generators only 3 min before landing or at 2 000 ft AAL to recover normal braking, while minimizing possible reactivation of a smoke source.

  GEN 2.....ON
  EMER ELEC GEN 1 LIN.....ON

F/CTL ALTN LAW (PROT LOST)

Flight control normal laws and associated protections are lost. Only the load factor limitation, and the high and low speed stability remain (ALTN law with reduced protection).

MAX SPEED.....320 KT

Note: *The "EPR MODE FAULT N1 DEGRADED MODE" warning is triggered.*

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

ECAM lower display is not available. STATUS SD page is displayed on the upper ECAM display, as long as the STATUS pb is pressed.

2

STATUS

MIN RAT SPEED..... 140 KT
MAX SPEED..... 320 KT
MAX BRK PR.....1000 PSI

FOR LDG..... USE FLAPS 3
GPWS LDG FLAP 3..... ON
APPR SPD.....VREF +10 KT
LDG DIST PROC.....APPLY
ENG 1+2 APPR IDLE ONLY
ENG 1+2 N1 DEGRADED MODE
ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
CTR TK FUEL USABLE BY GRAVITY
CTR TK FUEL: 2T UNUSABLE
INCREASED FUEL CONSUMP
SLATS/FLAPS SLOW

- **After recovery of normal electrical supply, the following STATUS will be displayed:**
  MAX SPEED..... 320 KT
  APPR SPD..... VREF +10 KT
  LDG DIST PROC..... APPLY

APPR PROC

- **3 MN/2000 FT BEFORE LDG:**
  GEN 2.....ON
  EMER ELEC GEN 1 LINE.....ON
- **WHEN A/C IS STOPPED:**
  ALL GEN.....OFF

ALTN LAW: PROT LOST
See (1)

INOP SYS

Refer to PRO-ABN-24-ELEC EMER CONFIG SYS REMAINING-21-AIR CONDITIONING/VENTILATION /PRESSURIZATION ELEC EMER CONFIG SYS REMAINING (except for fuel pumps).

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

WHEN L/G DN: DIRECT LAW
See (2)

(1) *Flight controls remain in alternate law, due to the loss of IR 2 and 3.*
(2) *At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to PRO-ABN-F/CTL DIRECT LAW).*

SMOKE/FUMES/AVNCS SMOKE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

This paper procedure includes all the steps of the AVIONICS SMOKE ECAM procedure.

Apply this paper procedure when:
- The flight (cabin) crew suspect that smoke is coming from the avionics, and/or the air conditioning, and/or the cabin equipment.
- The AVIONICS SMOKE ECAM caution is triggered, or, at the latest, after completing the immediate actions of the AVIONICS SMOKE ECAM procedure (before reaching the 5 min countdown procedure line)

There is a smell of smoke/fumes in the cockpit:
- If the smell is similar to that of orange peels, suspect a toxic leak of rain repellent fluid.
- If the smell is similar to that of pine needles, suspect a non-toxic leak.

If any other ECAM SMOKE alert triggers (CARGO, ...), the crew must first apply the ECAM procedure, then consider applying this paper procedure.
Note that these ECAM alerts may be caused by another source, that should usually first be detected by the flight crew/cabin crew/avionics smoke detectors.

The following explains the layout of this paper procedure:
- The procedure lines above the text boxes indicate the actions that the flight crew must immediately perform, if smoke is detected (with or without ECAM activation and regardless of the smoke source). These immediate actions correspond to the most common steps to be taken in smoke cases. In all cases, the flight crew must also be prepared to immediately perform a diversion. However, this diversion may be avoided if the smoke source is obvious, accessible and extinguishable or confirmed isolated (after completion of the immediate actions).
- The text boxes indicate the actions that the flight crew must consider, if at any time during the remainder of the procedure but always after the initial steps:
  - Smoke/fumes become the greatest threat and smoke/fumes removal is required, and/or
  - The situation becomes critical and can no longer be controlled.
- The procedure lines below the text boxes indicate the actions that the flight crew must perform, as soon as they suspect a source of smoke. The actions will depend on whether the smoke is coming from the avionics, and/or air conditioning, and/or cabin equipment.

LAND ASAP

● **IF PERCEPTIBLE SMOKE APPLY IMMEDIATELY:**

If smoke is confirmed, the following procedure must be applied.

BLOWER.....OVRD

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

EXTRACT..... OVRD

Avionics ventilation air is extracted overboard.

CAB FANS..... OFF

To prevent smoke from entering the cockpit and cabin.

GALLEY..... OFF
SIGNS..... ON
CKPT/CABIN COM.....ESTABLISH

Communication must be established with the cabin crew in order to follow up on the smoke origin and dissipation.

- **If required:**

OXY MASK/GOGGLE..... ON/100%/EMERG

Ensure crew communication is established. Avoid continuous use of the interphone to minimize interference from the oxygen mask breathing noise.
Turn the emergency knob to remove condensation or smoke from the mask.

- **If smoke source immediately obvious, accessible, and extinguishable:**

FAULTY EQPT..... ISOLATE

- **If smoke source not immediately isolated:**

DIVERSION.....INITIATE
DESCENT (FL 100, or MEA, or minimum obstacle clearance altitude).....INITIATE

- **At ANY TIME of the remainder of the procedure, if smoke/fumes becomes the GREATEST THREAT:**

SMOKE FUMES REMOVAL.....CONSIDER
ELEC EMER CONFIG.....CONSIDER

Refer to PRO ABN 26 SMOKE/FUMES/AVNCS SMOKE - ELEC EMER CONFIG

- **At ANY TIME of the procedure, if situation becomes critical and can no longer be controlled:**

IMMEDIATE LANDING.....CONSIDER

Guidelines to determine smoke source:

- If smoke initially comes out of the ventilation outlets, the crew may suspect AIR COND SMOKE. In addition, very shortly thereafter, several SMOKE warnings (cargo, lavatory, avionics) will be triggered. The displayed ECAM procedures must be applied.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

- After an ENG or APU failure, smoke may come from the faulty item via the bleed system and be perceived in the cockpit and/or cabin. In such a case, it will be recirculated throughout the aircraft, until it completely disappears from the air conditioning system.
- If only the AVIONICS SMOKE warning is triggered, the crew may suspect avionics smoke.
- If the smoke is detected while an equipment is declared faulty, the crew may suspect that smoke is coming from this equipment.
- Avionics or forward galley smoke may be smelt, or may enter in the cockpit before ECAM warning activation.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

- **IF AIR COND SMOKE SUSPECTED:**

APU BLEED.....OFF
BLOWER and EXTRACT.....AUTO

Note: When both BLOWER and EXTRACT are in the OVRD position, a single pack may not be able to maintain the cabin pressure.

PACK 1..... OFF

- **If smoke continues:**

PACK 1..... ON
PACK 2.....OFF

- **If smoke still continues:**

PACK 2.....ON

Restore normal configuration if PACK 2 is not suspected to cause smoke

BLOWER and EXTRACT..... OVRD

SMOKE/FUMES REMOVAL..... CONSIDER

- **IF CAB EQUIPMENT SMOKE SUSPECTED:**

- **If smoke continues:**

EMER EXIT LIGHT.....ON
BUS TIE..... OFF
GEN 2.....OFF

AC BUS 2 shedding can be considered in order to isolate most of the cabin equipments. The ECAM lower display, and the F/O's PFD and ND will be lost

SMOKE DISSIPATION..... CHECK
FAULTY EQPT..... SEARCH/ISOLATE

Once the cabin has been secured, try to find the smoke source and isolate it.
Cabin lights, reading lights, passenger systems, galleys have dedicated control C/B in the cabin or cockpit.

- **If smoke still continues or if faulty equipment confirmed isolated:**

GEN 2.....ON

All busbars recovered when GEN 2 restored. But, TR 2 remains INOP.

BUS TIE..... AUTO

- **If faulty equipment not confirmed isolated, before L/G extension:**

GEN 2.....ON

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

BUS TIE.....AUTO

SMOKE/FUMES REMOVAL.....CONSIDER

At any time of the procedure, consider applying the SMOKE/FUMES REMOVAL.

- **IF SMOKE SOURCE CANNOT BE DETERMINED AND STILL CONTINUES OR AVNCS/ELECTRICAL SMOKE SUSPECTED:**

  ELEC EMER CONFIG.....CONSIDER

  As a last attempt, the flight crew can set the electrical emergency configuration to possibly isolate or minimize the smoke source.

- **IF SMOKE disappears within 5 min:**

  NORMAL VENTILATION.....RESTORE

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

3 **TO SET EMER ELEC CONFIG**

EMER ELEC GEN 1 LIN..... OFF

GEN 1 LINE contactor opens. GEN 1 remains running and supplies one fuel pump in each wing tank. AC BUS 1 is supplied by GEN 2 through the bus tie contactor.

EMER ELEC PWR.....MAN ON

RAT is extended and the EMER GEN is connected to the aircraft network. Check emergency generator parameters on the ELEC SD page (displayed automatically).

- **WHEN EMER GEN AVAIL:**

  APU GEN.....OFF
  GEN 2..... OFF

  ELEC EMER CONFIG

  Two different procedures can be displayed on the ECAM, depending on whether the AVIONICS SMOKE ECAM caution is triggered or not before the flight crew sets the electrical emergency configuration.

  - **If AVIONICS SMOKE is not triggered:**

    The ECAM displays the ELEC EMER CONFIG procedure described here: *Refer to PRO-ABN-24 ELEC EMER CONFIG.*

    The flight crew must apply the ECAM without performing the GEN 1+2 reset.

    - **AT 3 MIN OR 2000 FT BEFORE LDG:**

      Restore all generators only 3 min before landing or at 2 000 ft AAL to recover normal braking, while minimizing possible reactivation of a smoke source.

      GEN 2.....ON
      EMER ELEC GEN 1 LINE..... ON

    - **WHEN A/C IS STOPPED:**

      ALL GEN.....OFF

  - **If AVIONICS SMOKE is triggered:**

    The ECAM displays a specific ELEC EMER CONFIG procedure. The flight crew must apply the following ECAM procedure.

    MIN RAT SPEED.....140 KT

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

Note: *The electrical configuration is the same as for loss of both generators (except that one fuel pump in each wing tank remains supplied).*

VHF 1/HF 1/ATC 1.....USE

Only VHF 1, HF 1 and ATC 1 are supplied in this configuration. Notify the ATC of the nature of the emergency, and state intentions. If there is no contact with the ATC, switch to code A7700, or transmit a distress message on one of the following frequencies: VHF 121.5 MHz, HF 2 182 kHz, or 8 364 kHz.

APPR NAVAID.....ON RMP1

FMS will be lost after landing gear down. Backup navigation needed for landing.

IR 2 + 3 (IF IR 1 OK)..... OFF

ADIRS 2 and 3 will be lost 5 min after the loss of both engine generators. Therefore switching them off will save battery charge.

- **IF TIME TO LDG >5 MN and L/G is down:**

  With landing gear down, only batteries supply the aircraft. If it is not possible to land within 5 min, the emergency generator has to take over to prevent the batteries from excessively discharging.

  L/G.....UP

  Select landing gear up to allow EMER GEN operation.

  EMER ELEC PWR.....MAN ON

  Press the EMER ELEC PWR MAN ON pb to reset the emergency generator.

APU MASTER switch (if APU not running).....OFF

With the APU master switch pb-sw ON, the DC BAT BUS is supplied by the batteries.

FAC 1..... OFF THEN ON

Rudder trim is recovered, despite the fact that no indication is available.

LDG ELEV.....MAN ADJUST

The LDG ELEV may be manually adjusted since, if the normal electrical supply is not restored before landing gear extension, the FMGC is no longer supplied.

- **3MN/2000 FT BEFORE LDG:**

  Restore all generators only 3 min before landing or at 2 000 ft AAL to recover normal braking, while minimizing possible reactivation of a smoke source.

  GEN 2.....ON

  EMER ELEC GEN 1 LIN.....ON

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

F/CTL ALTN LAW (PROT LOST)

Flight control normal laws and associated protections are lost. Only the load factor limitation, and the high and low speed stability remain (ALTN law with reduced protection).

MAX SPEED.....320 KT

Note: *The "EPR MODE FAULT N1 DEGRADED MODE" warning is triggered.*

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

ECAM lower display is not available. STATUS SD page is displayed on the upper ECAM display, as long as the STATUS pb is pressed.

4

STATUS

MIN RAT SPEED..... 140 KT
MAX SPEED..... 320 KT
MAX BRK PR.....1000 PSI

FOR LDG..... USE FLAPS 3
GPWS LDG FLAP 3..... ON
APPR SPD.....VREF +10 KT
LDG DIST PROC.....APPLY
ENG 1+2 APPR IDLE ONLY
ENG 1+2 N1 DEGRADED MODE
(IAE-powered aircraft ◁)
ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
CTR TK ◁ FUEL UNUSABLE
INCREASED FUEL CONSUMP
SLATS/FLAPS SLOW

- **After recovery of normal electrical supply, the following STATUS will be displayed:**
  MAX SPEED..... 320 KT
  APPR SPD..... VREF +10 KT
  LDG DIST PROC..... APPLY

APPR PROC

- **3 MN/2000 FT BEFORE LDG:**
  GEN 2.....ON
  EMER ELEC GEN 1 LINE.....ON
- **WHEN A/C IS STOPPED:**
  ALL GEN.....OFF

ALTN LAW: PROT LOST
See (1)

INOP SYS

Refer to PRO-ABN-24-ELEC EMER CONFIG SYS REMAINING-21-AIR CONDITIONING/VENTILATION /PRESSURIZATION ELEC EMER CONFIG SYS REMAINING (except for fuel pumps).

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

WHEN L/G DN: DIRECT LAW
See (2)

(1) *Flight controls remain in alternate law, due to the loss of IR 2 and 3.*
(2) *At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to PRO-ABN-F/CTL DIRECT LAW).*

SMOKE/FUMES/AVNCS SMOKE

Applicable to: B-HSJ

This paper procedure includes all the steps of the AVIONICS SMOKE ECAM procedure.

Apply this paper procedure when:
- The flight (cabin) crew suspect that smoke is coming from the avionics, and/or the air conditioning, and/or the cabin equipment.
- The AVIONICS SMOKE ECAM caution is triggered, or, at the latest, after completing the immediate actions of the AVIONICS SMOKE ECAM procedure (before reaching the 5 min countdown procedure line)

There is a smell of smoke/fumes in the cockpit:
- If the smell is similar to that of orange peels, suspect a toxic leak of rain repellent fluid.
- If the smell is similar to that of pine needles, suspect a non-toxic leak.

If any other ECAM SMOKE alert triggers (CARGO, ...), the crew must first apply the ECAM procedure, then consider applying this paper procedure.
Note that these ECAM alerts may be caused by another source, that should usually first be detected by the flight crew/cabin crew/avionics smoke detectors.

The following explains the layout of this paper procedure:
- The procedure lines above the text boxes indicate the actions that the flight crew must immediately perform, if smoke is detected (with or without ECAM activation and regardless of the smoke source). These immediate actions correspond to the most common steps to be taken in smoke cases. In all cases, the flight crew must also be prepared to immediately perform a diversion. However, this diversion may be avoided if the smoke source is obvious, accessible and extinguishable or confirmed isolated (after completion of the immediate actions).
- The text boxes indicate the actions that the flight crew must consider, if at any time during the remainder of the procedure but always after the initial steps:
  - Smoke/fumes become the greatest threat and smoke/fumes removal is required, and/or
  - The situation becomes critical and can no longer be controlled.
- The procedure lines below the text boxes indicate the actions that the flight crew must perform, as soon as they suspect a source of smoke. The actions will depend on whether the smoke is coming from the avionics, and/or air conditioning, and/or cabin equipment.

LAND ASAP

● **IF PERCEPTIBLE SMOKE APPLY IMMEDIATELY:**

If smoke is confirmed, the following procedure must be applied.

BLOWER.....OVRD

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

EXTRACT..... OVRD

Avionics ventilation air is extracted overboard.

CAB FANS..... OFF

To prevent smoke from entering the cockpit and cabin.

GALY & CAB..... OFF
SIGNS..... ON
CKPT/CABIN COM.....ESTABLISH

Communication must be established with the cabin crew in order to follow up on the smoke origin and dissipation.

- **If required:**

  OXY MASK/GOGGLE..... ON/100%/EMERG

  Ensure crew communication is established. Avoid continuous use of the interphone to minimize interference from the oxygen mask breathing noise.
  Turn the emergency knob to remove condensation or smoke from the mask.

- **If smoke source immediately obvious, accessible, and extinguishable:**

  FAULTY EQPT..... ISOLATE

- **If smoke source not immediately isolated:**

  DIVERSION.....INITIATE
  DESCENT (FL 100, or MEA, or minimum obstacle clearance altitude).....INITIATE

- **At ANY TIME of the remainder of the procedure, if smoke/fumes becomes the GREATEST THREAT:**

  SMOKE FUMES REMOVAL.....CONSIDER
  ELEC EMER CONFIG.....CONSIDER

  Refer to PRO ABN 26 SMOKE/FUMES/AVNCS SMOKE - ELEC EMER CONFIG

- **At ANY TIME of the procedure, if situation becomes critical and can no longer be controlled:**

  IMMEDIATE LANDING.....CONSIDER

Guidelines to determine smoke source:

- If smoke initially comes out of the ventilation outlets, the crew may suspect AIR COND SMOKE. In addition, very shortly thereafter, several SMOKE warnings (cargo, lavatory, avionics) will be triggered. The displayed ECAM procedures must be applied.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

- After an ENG or APU failure, smoke may come from the faulty item via the bleed system and be perceived in the cockpit and/or cabin. In such a case, it will be recirculated throughout the aircraft, until it completely disappears from the air conditioning system.
- If only the AVIONICS SMOKE warning is triggered, the crew may suspect avionics smoke.
- If the smoke is detected while an equipment is declared faulty, the crew may suspect that smoke is coming from this equipment.
- Avionics or forward galley smoke may be smelt, or may enter in the cockpit before ECAM warning activation.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

- **IF AIR COND SMOKE SUSPECTED:**

APU BLEED.....OFF
BLOWER and EXTRACT.....AUTO

Note: *When both BLOWER and EXTRACT are in the OVRD position, a single pack may not be able to maintain the cabin pressure.*

PACK 1.....OFF

- **If smoke continues:**

PACK 1.....ON
PACK 2.....OFF

- **If smoke still continues:**

PACK 2.....ON

Restore normal configuration if PACK 2 is not suspected to cause smoke

BLOWER and EXTRACT.....OVRD

SMOKE/FUMES REMOVAL.....CONSIDER

- **IF CAB EQUIPMENT SMOKE SUSPECTED:**

- **If smoke continues:**

EMER EXIT LIGHT.....ON
BUS TIE.....OFF
GEN 2.....OFF

AC BUS 2 shedding can be considered in order to isolate most of the cabin equipments. The ECAM lower display, and the F/O's PFD and ND will be lost

SMOKE DISSIPATION.....CHECK
FAULTY EQPT.....SEARCH/ISOLATE

Once the cabin has been secured, try to find the smoke source and isolate it.
Cabin lights, reading lights, passenger systems, galleys have dedicated control C/B in the cabin or cockpit.

- **If smoke still continues or if faulty equipment confirmed isolated:**

GEN 2.....ON

All busbars recovered when GEN 2 restored. But, TR 2 remains INOP.

BUS TIE.....AUTO

- **If faulty equipment not confirmed isolated, before L/G extension:**

GEN 2.....ON

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

BUS TIE.....AUTO

SMOKE/FUMES REMOVAL.....CONSIDER

At any time of the procedure, consider applying the SMOKE/FUMES REMOVAL.

- **IF SMOKE SOURCE CANNOT BE DETERMINED AND STILL CONTINUES OR AVNCS/ELECTRICAL SMOKE SUSPECTED:**

  ELEC EMER CONFIG.....CONSIDER

  As a last attempt, the flight crew can set the electrical emergency configuration to possibly isolate or minimize the smoke source.

- **IF SMOKE disappears within 5 min:**

  NORMAL VENTILATION.....RESTORE

Continued on the following page

5 **TO SET EMER ELEC CONFIG**

EMER ELEC GEN 1 LIN..... OFF

GEN 1 LINE contactor opens. GEN 1 remains running and supplies one fuel pump in each wing tank. AC BUS 1 is supplied by GEN 2 through the bus tie contactor.

EMER ELEC PWR.....MAN ON

RAT is extended and the EMER GEN is connected to the aircraft network. Check emergency generator parameters on the ELEC SD page (displayed automatically).

- **WHEN EMER GEN AVAIL:**

  APU GEN.....OFF
  GEN 2..... OFF

  ELEC EMER CONFIG

  Two different procedures can be displayed on the ECAM, depending on whether the AVIONICS SMOKE ECAM caution is triggered or not before the flight crew sets the electrical emergency configuration.

  - **If AVIONICS SMOKE is not triggered:**

    The ECAM displays the ELEC EMER CONFIG procedure described here: *Refer to PRO-ABN-24 ELEC EMER CONFIG.*

    The flight crew must apply the ECAM without performing the GEN 1+2 reset.

    - **AT 3 MIN OR 2000 FT BEFORE LDG:**

      Restore all generators only 3 min before landing or at 2 000 ft AAL to recover normal braking, while minimizing possible reactivation of a smoke source.

      GEN 2.....ON
      EMER ELEC GEN 1 LINE..... ON

    - **WHEN A/C IS STOPPED:**

      ALL GEN.....OFF

  - **If AVIONICS SMOKE is triggered:**

    The ECAM displays a specific ELEC EMER CONFIG procedure. The flight crew must apply the following ECAM procedure.

    MIN RAT SPEED.....140 KT

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

Note: The electrical configuration is the same as for loss of both generators (except that one fuel pump in each wing tank remains supplied).

VHF 1/HF 1/ATC 1.....USE

Only VHF 1, HF 1 and ATC 1 are supplied in this configuration. Notify the ATC of the nature of the emergency, and state intentions. If there is no contact with the ATC, switch to code A7700, or transmit a distress message on one of the following frequencies: VHF 121.5 MHz, HF 2 182 kHz, or 8 364 kHz.

FAC 1..... OFF THEN ON

Rudder trim is recovered, despite the fact that no indication is available.

● **3MN/2000 FT BEFORE LDG:**

Restore all generators only 3 min before landing or at 2 000 ft AAL to recover normal braking, while minimizing possible reactivation of a smoke source.

GEN 2.....ON
EMER ELEC GEN 1 LIN.....ON

F/CTL ALTN LAW (PROT LOST)

Flight control normal laws and associated protections are lost. Only the load factor limitation, and the high and low speed stability remain (ALTN law with reduced protection).

MAX SPEED.....320 KT

Note: The "EPR MODE FAULT N1 DEGRADED MODE" warning is triggered.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

ECAM lower display is not available. STATUS SD page is displayed on the upper ECAM display, as long as the STATUS pb is pressed.

6

STATUS

MIN RAT SPEED..... 140 KT
MAX SPEED..... 320 KT
MAX BRK PR.....1000 PSI

FOR LDG..... USE FLAPS 3
GPWS LDG FLAP 3..... ON
APPR SPD.....VREF +10 KT
LDG DIST PROC.....APPLY
ENG 1+2 APPR IDLE ONLY
ENG 1+2 N1 DEGRADED MODE
(IAE-powered aircraft ◁)
ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
CTR TK ◁ FUEL UNUSABLE
INCREASED FUEL CONSUMP
SLATS/FLAPS SLOW

- **After recovery of normal electrical supply, the following STATUS will be displayed:**
  MAX SPEED..... 320 KT
  APPR SPD..... VREF +10 KT
  LDG DIST PROC..... APPLY

APPR PROC

- **3 MN/2000 FT BEFORE LDG:**
  GEN 2.....ON
  EMER ELEC GEN 1 LINE.....ON
- **WHEN A/C IS STOPPED:**
  ALL GEN.....OFF

ALTN LAW: PROT LOST
See (1)

INOP SYS

Refer to PRO-ABN-24-ELEC EMER CONFIG SYS REMAINING-21-AIR CONDITIONING/VENTILATION /PRESSURIZATION ELEC EMER CONFIG SYS REMAINING (except for fuel pumps).

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

WHEN L/G DN: DIRECT LAW
See [2]

(1) *Flight controls remain in alternate law, due to the loss of IR 2 and 3.*
(2) *At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to PRO-ABN-F/CTL DIRECT LAW).*

SMOKE/FUMES/AVNCS SMOKE

Applicable to: B-HTG, B-HTH, B-HTI

This paper procedure includes all the steps of the AVIONICS SMOKE ECAM procedure.

Apply this paper procedure when:
- The flight (cabin) crew suspect that smoke is coming from the avionics, and/or the air conditioning, and/or the cabin equipment.
- The AVIONICS SMOKE ECAM caution is triggered, or, at the latest, after completing the immediate actions of the AVIONICS SMOKE ECAM procedure (before reaching the 5 min countdown procedure line)

There is a smell of smoke/fumes in the cockpit:
- If the smell is similar to that of orange peels, suspect a toxic leak of rain repellent fluid.
- If the smell is similar to that of pine needles, suspect a non-toxic leak.

If any other ECAM SMOKE alert triggers (CARGO, ...), the crew must first apply the ECAM procedure, then consider applying this paper procedure.
Note that these ECAM alerts may be caused by another source, that should usually first be detected by the flight crew/cabin crew/avionics smoke detectors.

The following explains the layout of this paper procedure:
- The procedure lines above the text boxes indicate the actions that the flight crew must immediately perform, if smoke is detected (with or without ECAM activation and regardless of the smoke source). These immediate actions correspond to the most common steps to be taken in smoke cases. In all cases, the flight crew must also be prepared to immediately perform a diversion. However, this diversion may be avoided if the smoke source is obvious, accessible and extinguishable or confirmed isolated (after completion of the immediate actions).
- The text boxes indicate the actions that the flight crew must consider, if at any time during the remainder of the procedure but always after the initial steps:
  - Smoke/fumes become the greatest threat and smoke/fumes removal is required, and/or
  - The situation becomes critical and can no longer be controlled.
- The procedure lines below the text boxes indicate the actions that the flight crew must perform, as soon as they suspect a source of smoke. The actions will depend on whether the smoke is coming from the avionics, and/or air conditioning, and/or cabin equipment.

LAND ASAP

● **IF PERCEPTIBLE SMOKE APPLY IMMEDIATELY:**

If smoke is confirmed, the following procedure must be applied.

BLOWER.....OVRD

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

EXTRACT..... OVRD

Avionics ventilation air is extracted overboard.

CAB FANS..... OFF

To prevent smoke from entering the cockpit and cabin.

GALY & CAB..... OFF
SIGNS..... ON
CKPT/CABIN COM.....ESTABLISH

Communication must be established with the cabin crew in order to follow up on the smoke origin and dissipation.

- **If required:**

OXY MASK/GOGGLE..... ON/100%/EMERG

Ensure crew communication is established. Avoid continuous use of the interphone to minimize interference from the oxygen mask breathing noise.
Turn the emergency knob to remove condensation or smoke from the mask.

- **If smoke source immediately obvious, accessible, and extinguishable:**

FAULTY EQPT..... ISOLATE

- **If smoke source not immediately isolated:**

DIVERSION.....INITIATE
DESCENT (FL 100, or MEA, or minimum obstacle clearance altitude).....INITIATE

- **At ANY TIME of the remainder of the procedure, if smoke/fumes becomes the GREATEST THREAT:**

SMOKE FUMES REMOVAL.....CONSIDER
ELEC EMER CONFIG.....CONSIDER

Refer to PRO ABN 26 SMOKE/FUMES/AVNCS SMOKE - ELEC EMER CONFIG

- **At ANY TIME of the procedure, if situation becomes critical and can no longer be controlled:**

IMMEDIATE LANDING.....CONSIDER

Guidelines to determine smoke source:

- If smoke initially comes out of the ventilation outlets, the crew may suspect AIR COND SMOKE. In addition, very shortly thereafter, several SMOKE warnings (cargo, lavatory, avionics) will be triggered. The displayed ECAM procedures must be applied.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

- After an ENG or APU failure, smoke may come from the faulty item via the bleed system and be perceived in the cockpit and/or cabin. In such a case, it will be recirculated throughout the aircraft, until it completely disappears from the air conditioning system.
- If only the AVIONICS SMOKE warning is triggered, the crew may suspect avionics smoke.
- If the smoke is detected while an equipment is declared faulty, the crew may suspect that smoke is coming from this equipment.
- Avionics or forward galley smoke may be smelt, or may enter in the cockpit before ECAM warning activation.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

● **IF AIR COND SMOKE SUSPECTED:**

APU BLEED.....OFF
BLOWER and EXTRACT.....AUTO

Note: When both BLOWER and EXTRACT are in the OVRD position, a single pack may not be able to maintain the cabin pressure.

CARGO AFT ISOL VALVE.....OFF

To prevent a cargo smoke warning from being triggered due to cabin smoke.

PACK 1.....OFF

● **If smoke continues:**

PACK 1.....ON
PACK 2.....OFF

● **If smoke still continues:**

PACK 2.....ON

Restore normal configuration if PACK 2 is not suspected to cause smoke

BLOWER and EXTRACT.....OVRD

SMOKE/FUMES REMOVAL.....CONSIDER

● **IF CAB EQUIPMENT SMOKE SUSPECTED:**

● **If smoke continues:**

EMER EXIT LIGHT.....ON
COMMERCIAL.....OFF
SMOKE DISSIPATION.....CHECK
FAULTY EQPT.....SEARCH/ISOLATE

Once the cabin has been secured, try to find the smoke source and isolate it.
Cabin lights, reading lights, passenger systems, galleys have dedicated control C/B in the cabin or cockpit.

● **If smoke still continues or if faulty equipment confirmed isolated:**

COMMERCIAL.....NORM

SMOKE/FUMES REMOVAL.....CONSIDER

At any time of the procedure, consider applying the SMOKE/FUMES REMOVAL procedure.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

- **IF SMOKE SOURCE CANNOT BE DETERMINED AND STILL CONTINUES OR AVNCS/ELECTRICAL SMOKE SUSPECTED:**
  ELEC EMER CONFIG..... CONSIDER
  As a last attempt, the flight crew can set the electrical emergency configuration to possibly isolate or minimize the smoke source.
- **IF SMOKE disappears within 5 min:**
  NORMAL VENTILATION..... RESTORE

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

7 **TO SET EMER ELEC CONFIG**

EMER ELEC GEN 1 LIN..... OFF

GEN 1 LINE contactor opens. GEN 1 remains running and supplies one fuel pump in each wing tank. AC BUS 1 is supplied by GEN 2 through the bus tie contactor.

EMER ELEC PWR.....MAN ON

RAT is extended and the EMER GEN is connected to the aircraft network. Check emergency generator parameters on the ELEC SD page (displayed automatically).

- **WHEN EMER GEN AVAIL:**

APU GEN.....OFF
GEN 2..... OFF

ELEC EMER CONFIG

Two different procedures can be displayed on the ECAM, depending on whether the AVIONICS SMOKE ECAM caution is triggered or not before the flight crew sets the electrical emergency configuration.

- **If AVIONICS SMOKE is not triggered:**

The ECAM displays the ELEC EMER CONFIG procedure described here: *Refer to PRO-ABN-24 ELEC EMER CONFIG.*

The flight crew must apply the ECAM without performing the GEN 1+2 reset.

- **AT 3 MIN OR 2000 FT BEFORE LDG:**

Restore all generators only 3 min before landing or at 2 000 ft AAL to recover normal braking, while minimizing possible reactivation of a smoke source.

GEN 2.....ON
EMER ELEC GEN 1 LINE..... ON

- **WHEN A/C IS STOPPED:**

ALL GEN.....OFF

- **If AVIONICS SMOKE is triggered:**

The ECAM displays a specific ELEC EMER CONFIG procedure. The flight crew must apply the following ECAM procedure.

MIN RAT SPEED.....140 KT

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

Note: *The electrical configuration is the same as for loss of both generators (except that one fuel pump in each wing tank remains supplied).*

VHF 1/HF 1/ATC 1.....USE

Only VHF 1, HF 1 and ATC 1 are supplied in this configuration. Notify the ATC of the nature of the emergency, and state intentions. If there is no contact with the ATC, switch to code A7700, or transmit a distress message on one of the following frequencies: VHF 121.5 MHz, HF 2 182 kHz, or 8 364 kHz.

FAC 1..... OFF THEN ON

Rudder trim is recovered, despite the fact that no indication is available.

- **3MN/2000 FT BEFORE LDG:**

  Restore all generators only 3 min before landing or at 2 000 ft AAL to recover normal braking, while minimizing possible reactivation of a smoke source.

  GEN 2.....ON
  EMER ELEC GEN 1 LIN.....ON

F/CTL ALTN LAW (PROT LOST)

Flight control normal laws and associated protections are lost. Only the load factor limitation, and the high and low speed stability remain (ALTN law with reduced protection).

MAX SPEED.....320 KT

Note: *The "EPR MODE FAULT N1 DEGRADED MODE" warning is triggered.*

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

ECAM lower display is not available. STATUS SD page is displayed on the upper ECAM display, as long as the STATUS pb is pressed.

8

STATUS

MIN RAT SPEED..... 140 KT
MAX SPEED..... 320 KT
MAX BRK PR.....1000 PSI

FOR LDG..... USE FLAPS 3
GPWS LDG FLAP 3..... ON
APPR SPD.....VREF +10 KT
LDG DIST PROC.....APPLY
ENG 1+2 APPR IDLE ONLY
ENG 1+2 N1 DEGRADED MODE
ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
CTR TK FUEL USABLE BY GRAVITY
CTR TK FUEL: 2T UNUSABLE
INCREASED FUEL CONSUMP
SLATS/FLAPS SLOW

- **After recovery of normal electrical supply, the following STATUS will be displayed:**
  MAX SPEED..... 320 KT
  APPR SPD..... VREF +10 KT
  LDG DIST PROC..... APPLY

APPR PROC

- **3 MN/2000 FT BEFORE LDG:**
  GEN 2.....ON
  EMER ELEC GEN 1 LINE.....ON
- **WHEN A/C IS STOPPED:**
  ALL GEN.....OFF

ALTN LAW: PROT LOST
See (1)

INOP SYS

Refer to PRO-ABN-24-ELEC EMER CONFIG SYS REMAINING-21-AIR CONDITIONING/VENTILATION /PRESSURIZATION ELEC EMER CONFIG SYS REMAINING (except for fuel pumps).

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

WHEN L/G DN: DIRECT LAW
See (2)

(1) *Flight controls remain in alternate law, due to the loss of IR 2 and 3.*
(2) *At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to PRO-ABN-F/CTL DIRECT LAW).*

SMOKE/FUMES/AVNCS SMOKE

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSQ, B-HSR, B-HST, B-HSU

This paper procedure includes all the steps of the AVIONICS SMOKE ECAM procedure.

Apply this paper procedure when:
- The flight (cabin) crew suspect that smoke is coming from the avionics, and/or the air conditioning, and/or the cabin equipment.
- The AVIONICS SMOKE ECAM caution is triggered, or, at the latest, after completing the immediate actions of the AVIONICS SMOKE ECAM procedure (before reaching the 5 min countdown procedure line)

There is a smell of smoke/fumes in the cockpit:
- If the smell is similar to that of orange peels, suspect a toxic leak of rain repellent fluid.
- If the smell is similar to that of pine needles, suspect a non-toxic leak.

If any other ECAM SMOKE alert triggers (CARGO, ...), the crew must first apply the ECAM procedure, then consider applying this paper procedure.
Note that these ECAM alerts may be caused by another source, that should usually first be detected by the flight crew/cabin crew/avionics smoke detectors.

The following explains the layout of this paper procedure:
- The procedure lines above the text boxes indicate the actions that the flight crew must immediately perform, if smoke is detected (with or without ECAM activation and regardless of the smoke source). These immediate actions correspond to the most common steps to be taken in smoke cases. In all cases, the flight crew must also be prepared to immediately perform a diversion. However, this diversion may be avoided if the smoke source is obvious, accessible and extinguishable or confirmed isolated (after completion of the immediate actions).
- The text boxes indicate the actions that the flight crew must consider, if at any time during the remainder of the procedure but always after the initial steps:
  - Smoke/fumes become the greatest threat and smoke/fumes removal is required, and/or
  - The situation becomes critical and can no longer be controlled.
- The procedure lines below the text boxes indicate the actions that the flight crew must perform, as soon as they suspect a source of smoke. The actions will depend on whether the smoke is coming from the avionics, and/or air conditioning, and/or cabin equipment.

LAND ASAP

● **IF PERCEPTIBLE SMOKE APPLY IMMEDIATELY:**

If smoke is confirmed, the following procedure must be applied.

BLOWER.....OVRD

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

EXTRACT..... OVRD

Avionics ventilation air is extracted overboard.

CAB FANS..... OFF

To prevent smoke from entering the cockpit and cabin.

GALY & CAB..... OFF
SIGNS..... ON
CKPT/CABIN COM.....ESTABLISH

Communication must be established with the cabin crew in order to follow up on the smoke origin and dissipation.

- **If required:**

OXY MASK/GOGGLE..... ON/100%/EMERG

Ensure crew communication is established. Avoid continuous use of the interphone to minimize interference from the oxygen mask breathing noise.
Turn the emergency knob to remove condensation or smoke from the mask.

- **If smoke source immediately obvious, accessible, and extinguishable:**

FAULTY EQPT..... ISOLATE

- **If smoke source not immediately isolated:**

DIVERSION.....INITIATE
DESCENT (FL 100, or MEA, or minimum obstacle clearance altitude).....INITIATE

- **At ANY TIME of the remainder of the procedure, if smoke/fumes becomes the GREATEST THREAT:**

SMOKE FUMES REMOVAL.....CONSIDER
ELEC EMER CONFIG.....CONSIDER

Refer to PRO ABN 26 SMOKE/FUMES/AVNCS SMOKE - ELEC EMER CONFIG

- **At ANY TIME of the procedure, if situation becomes critical and can no longer be controlled:**

IMMEDIATE LANDING.....CONSIDER

Guidelines to determine smoke source:

- If smoke initially comes out of the ventilation outlets, the crew may suspect AIR COND SMOKE. In addition, very shortly thereafter, several SMOKE warnings (cargo, lavatory, avionics) will be triggered. The displayed ECAM procedures must be applied.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

- After an ENG or APU failure, smoke may come from the faulty item via the bleed system and be perceived in the cockpit and/or cabin. In such a case, it will be recirculated throughout the aircraft, until it completely disappears from the air conditioning system.
- If only the AVIONICS SMOKE warning is triggered, the crew may suspect avionics smoke.
- If the smoke is detected while an equipment is declared faulty, the crew may suspect that smoke is coming from this equipment.
- Avionics or forward galley smoke may be smelt, or may enter in the cockpit before ECAM warning activation.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

- **IF AIR COND SMOKE SUSPECTED:**

  APU BLEED.....OFF
  BLOWER and EXTRACT.....AUTO

  Note: *When both BLOWER and EXTRACT are in the OVRD position, a single pack may not be able to maintain the cabin pressure.*

  PACK 1..... OFF

  - **If smoke continues:**

    PACK 1..... ON
    PACK 2.....OFF

    - **If smoke still continues:**

      PACK 2.....ON

      Restore normal configuration if PACK 2 is not suspected to cause smoke

      BLOWER and EXTRACT..... OVRD

  SMOKE/FUMES REMOVAL..... CONSIDER

- **IF CAB EQUIPMENT SMOKE SUSPECTED:**

  - **If smoke continues:**

    EMER EXIT LIGHT.....ON
    COMMERCIAL.....OFF
    SMOKE DISSIPATION..... CHECK
    FAULTY EQPT.....SEARCH/ISOLATE

    Once the cabin has been secured, try to find the smoke source and isolate it.
    Cabin lights, reading lights, passenger systems, galleys have dedicated control C/B in the cabin or cockpit.

    - **If smoke still continues or if faulty equipment confirmed isolated:**

      COMMERCIAL..... NORM

    SMOKE/FUMES REMOVAL.....CONSIDER

    At any time of the procedure, consider applying the SMOKE/FUMES REMOVAL procedure.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

- **IF SMOKE SOURCE CANNOT BE DETERMINED AND STILL CONTINUES OR AVNCS/ELECTRICAL SMOKE SUSPECTED:**
  ELEC EMER CONFIG..... CONSIDER
  As a last attempt, the flight crew can set the electrical emergency configuration to possibly isolate or minimize the smoke source.
- **IF SMOKE disappears within 5 min:**
  NORMAL VENTILATION..... RESTORE

Continued on the following page

9 **TO SET EMER ELEC CONFIG**

EMER ELEC GEN 1 LIN..... OFF

GEN 1 LINE contactor opens. GEN 1 remains running and supplies one fuel pump in each wing tank. AC BUS 1 is supplied by GEN 2 through the bus tie contactor.

EMER ELEC PWR.....MAN ON

RAT is extended and the EMER GEN is connected to the aircraft network. Check emergency generator parameters on the ELEC SD page (displayed automatically).

- **WHEN EMER GEN AVAIL:**

  APU GEN.....OFF

  GEN 2..... OFF

  ELEC EMER CONFIG

  Two different procedures can be displayed on the ECAM, depending on whether the AVIONICS SMOKE ECAM caution is triggered or not before the flight crew sets the electrical emergency configuration.

  - **If AVIONICS SMOKE is not triggered:**

    The ECAM displays the ELEC EMER CONFIG procedure described here: *Refer to PRO-ABN-24 ELEC EMER CONFIG.*

    The flight crew must apply the ECAM without performing the GEN 1+2 reset.

    - **AT 3 MIN OR 2000 FT BEFORE LDG:**

      Restore all generators only 3 min before landing or at 2 000 ft AAL to recover normal braking, while minimizing possible reactivation of a smoke source.

      GEN 2..... ON

      EMER ELEC GEN 1 LINE..... ON

    - **WHEN A/C IS STOPPED:**

      ALL GEN.....OFF

  - **If AVIONICS SMOKE is triggered:**

    The ECAM displays a specific ELEC EMER CONFIG procedure. The flight crew must apply the following ECAM procedure.

    MIN RAT SPEED.....140 KT

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

Note: The electrical configuration is the same as for loss of both generators (except that one fuel pump in each wing tank remains supplied).

VHF 1/HF 1/ATC 1.....USE

Only VHF 1, HF 1 and ATC 1 are supplied in this configuration. Notify the ATC of the nature of the emergency, and state intentions. If there is no contact with the ATC, switch to code A7700, or transmit a distress message on one of the following frequencies: VHF 121.5 MHz, HF 2 182 kHz, or 8 364 kHz.

FAC 1..... OFF THEN ON

Rudder trim is recovered, despite the fact that no indication is available.

- **3MN/2000 FT BEFORE LDG:**

  Restore all generators only 3 min before landing or at 2 000 ft AAL to recover normal braking, while minimizing possible reactivation of a smoke source.

  GEN 2.....ON
  EMER ELEC GEN 1 LIN.....ON

F/CTL ALTN LAW (PROT LOST)

Flight control normal laws and associated protections are lost. Only the load factor limitation, and the high and low speed stability remain (ALTN law with reduced protection).

MAX SPEED.....320 KT

Note: The "EPR MODE FAULT N1 DEGRADED MODE" warning is triggered.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

ECAM lower display is not available. STATUS SD page is displayed on the upper ECAM display, as long as the STATUS pb is pressed.

10 **STATUS**

MIN RAT SPEED..... 140 KT
MAX SPEED..... 320 KT
MAX BRK PR.....1000 PSI

FOR LDG..... USE FLAPS 3
GPWS LDG FLAP 3..... ON
APPR SPD.....VREF +10 KT
LDG DIST PROC.....APPLY
ENG 1+2 APPR IDLE ONLY
ENG 1+2 N1 DEGRADED MODE
(IAE-powered aircraft ◁)
ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
CTR TK ◁ FUEL UNUSABLE
INCREASED FUEL CONSUMP
SLATS/FLAPS SLOW

- **After recovery of normal electrical supply, the following STATUS will be displayed:**
  MAX SPEED..... 320 KT
  APPR SPD..... VREF +10 KT
  LDG DIST PROC..... APPLY

APPR PROC

- **3 MN/2000 FT BEFORE LDG:**
  GEN 2.....ON
  EMER ELEC GEN 1 LINE.....ON
- **WHEN A/C IS STOPPED:**
  ALL GEN.....OFF

ALTN LAW: PROT LOST
See (1)

INOP SYS

Refer to PRO-ABN-24-ELEC EMER CONFIG SYS REMAINING-21-AIR CONDITIONING/VENTILATION /PRESSURIZATION ELEC EMER CONFIG SYS REMAINING (except for fuel pumps).

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

WHEN L/G DN: DIRECT LAW
See [2]

(1) *Flight controls remain in alternate law, due to the loss of IR 2 and 3.*
(2) *At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to PRO-ABN-F/CTL DIRECT LAW).*

SMOKE/FUMES/AVNCS SMOKE

Applicable to: B-HSO, B-HSP

This paper procedure includes all the steps of the AVIONICS SMOKE ECAM procedure.

Apply this paper procedure when:
- The flight (cabin) crew suspect that smoke is coming from the avionics, and/or the air conditioning, and/or the cabin equipment.
- Requested by the AVIONICS SMOKE ECAM procedure.

There is a smell of smoke/fumes in the cockpit :
- If the smell is similar to that of orange peels, suspect a toxic leak of rain repellent fluid.
- If the smell is similar to that of pine needles, suspect a non-toxic leak.

If any other ECAM SMOKE alert triggers (CARGO, ...), the crew must first apply the ECAM procedure, then consider applying this paper procedure.
Note that these ECAM alerts may be caused by another source, that should usually first be detected by the flight crew/cabin crew/avionics smoke detectors.

The following explains the layout of this paper procedure:
- The procedure lines above the text boxes indicate the actions that the flight crew must immediately perform, if smoke is detected (with or without ECAM activation and regardless of the smoke source). These immediate actions correspond to the most common steps to be taken in smoke cases. In all cases, the flight crew must also be prepared to immediately perform a diversion. However, this diversion may be avoided if the smoke source is obvious, accessible and extinguishable or confirmed isolated (after completion of the immediate actions).
- The text boxes indicate the actions that the flight crew must consider, if at any time during the remainder of the procedure but always after the initial steps:
  - Smoke/fumes become the greatest threat and smoke/fumes removal is required, and/or
  - The situation becomes critical and can no longer be controlled.
- The procedure lines below the text boxes indicate the actions that the flight crew must perform, as soon as they suspect a source of smoke. The actions will depend on whether the smoke is coming from the avionics, and/or air conditioning, and/or cabin equipment.

LAND ASAP

● **IF PERCEPTIBLE SMOKE APPLY IMMEDIATELY:**

If smoke is confirmed, the following procedure must be applied.

BLOWER.....OVRD
EXTRACT..... OVRD

Avionics ventilation air is extracted overboard.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

CAB FANS.....OFF

To prevent smoke from entering the cockpit and cabin.

GALY & CAB.....OFF
SIGNS.....ON
CKPT/CABIN COM.....ESTABLISH

Communication must be established with the cabin crew in order to follow up on the smoke origin and dissipation.

- **If required:**

OXY MASK/GOGGLE.....ON/100%/EMERG

Ensure crew communication is established. Avoid continuous use of the interphone to minimize interference from the oxygen mask breathing noise.
Turn the emergency knob to remove condensation or smoke from the mask.

- **If smoke source immediately obvious, accessible, and extinguishable:**

FAULTY EQPT.....ISOLATE

- **If smoke source not immediately isolated:**

DIVERSION.....INITIATE
DESCENT (FL 100, or MEA, or minimum obstacle clearance altitude).....INITIATE

- **At ANY TIME of the remainder of the procedure, if smoke/fumes becomes the GREATEST THREAT:**

SMOKE FUMES REMOVAL.....CONSIDER
ELEC EMER CONFIG.....CONSIDER

Refer to PRO ABN 26 SMOKE/FUMES/AVNCS SMOKE - ELEC EMER CONFIG

- **At ANY TIME of the procedure, if situation becomes critical and can no longer be controlled:**

IMMEDIATE LANDING.....CONSIDER

Guidelines to determine smoke source:

- If smoke initially comes out of the ventilation outlets, the crew may suspect AIR COND SMOKE. In addition, very shortly thereafter, several SMOKE warnings (cargo, lavatory, avionics) will be triggered. The displayed ECAM procedures must be applied.
- After an ENG or APU failure, smoke may come from the faulty item via the bleed system and be perceived in the cockpit and/or cabin. In such a case, it will be recirculated throughout the aircraft, until it completely disappears from the air conditioning system.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

- If only the AVIONICS SMOKE warning is triggered, the crew may suspect avionics smoke.
- If the smoke is detected while an equipment is declared faulty, the crew may suspect that smoke is coming from this equipment.
- Avionics or forward galley smoke may be smelt, or may enter in the cockpit before ECAM warning activation.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

● **IF AIR COND SMOKE SUSPECTED:**

APU BLEED.....OFF
BLOWER and EXTRACT.....AUTO

Note: When both BLOWER and EXTRACT are in the OVRD position, a single pack may not be able to maintain the cabin pressure.

PACK 1.....OFF

● **If smoke continues:**

PACK 1.....ON
PACK 2.....OFF

● **If smoke still continues:**

PACK 2.....ON

Restore normal configuration if PACK 2 is not suspected to cause smoke

BLOWER and EXTRACT.....OVRD

SMOKE/FUMES REMOVAL.....CONSIDER

● **IF CAB EQUIPMENT SMOKE SUSPECTED:**

● **If smoke continues:**

EMER EXIT LIGHT.....ON
COMMERCIAL.....OFF
SMOKE DISSIPATION.....CHECK
FAULTY EQPT.....SEARCH/ISOLATE

Once the cabin has been secured, try to find the smoke source and isolate it.
Cabin lights, reading lights, passenger systems, galleys have dedicated control C/B in the cabin or cockpit.

● **If smoke still continues or if faulty equipment confirmed isolated:**

COMMERCIAL.....NORM

SMOKE/FUMES REMOVAL.....CONSIDER

At any time of the procedure, consider applying the SMOKE/FUMES REMOVAL procedure.

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

- **IF SMOKE SOURCE CANNOT BE DETERMINED AND STILL CONTINUES OR AVNCS/ELECTRICAL SMOKE SUSPECTED:**
  ELEC EMER CONFIG..... CONSIDER
  As a last attempt, the flight crew can set the electrical emergency configuration to possibly isolate or minimize the smoke source.
- **IF SMOKE disappears within 5 min:**
  NORMAL VENTILATION..... RESTORE

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

11 **TO SET EMER ELEC CONFIG**

EMER ELEC GEN 1 LIN..... OFF

GEN 1 LINE contactor opens. GEN 1 remains running and supplies one fuel pump in each wing tank. AC BUS 1 is supplied by GEN 2 through the bus tie contactor.

EMER ELEC PWR.....MAN ON

RAT is extended and the EMER GEN is connected to the aircraft network. Check emergency generator parameters on the ELEC SD page (displayed automatically).

- **WHEN EMER GEN AVAIL:**

APU GEN.....OFF
GEN 2..... OFF

ELEC EMER CONFIG

Two different procedures can be displayed on the ECAM, depending on whether the AVIONICS SMOKE ECAM caution is triggered or not before the flight crew sets the electrical emergency configuration.

- **If AVIONICS SMOKE is not triggered:**

The ECAM displays the ELEC EMER CONFIG procedure described here: *Refer to PRO-ABN-24 ELEC EMER CONFIG.*

The flight crew must apply the ECAM without performing the GEN 1+2 reset.

- **AT 3 MIN OR 2000 FT BEFORE LDG:**

Restore all generators only 3 min before landing or at 2 000 ft AAL to recover normal braking, while minimizing possible reactivation of a smoke source.

GEN 2.....ON
EMER ELEC GEN 1 LINE..... ON

- **WHEN A/C IS STOPPED:**

ALL GEN.....OFF

- **If AVIONICS SMOKE is triggered:**

The ECAM displays a specific ELEC EMER CONFIG procedure. The flight crew must apply the following ECAM procedure.

MIN RAT SPEED.....140 KT

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

Note: *The electrical configuration is the same as for loss of both generators (except that one fuel pump in each wing tank remains supplied).*

VHF 1/HF 1/ATC 1.....USE

Only VHF 1, HF 1 and ATC 1 are supplied in this configuration. Notify the ATC of the nature of the emergency, and state intentions. If there is no contact with the ATC, switch to code A7700, or transmit a distress message on one of the following frequencies: VHF 121.5 MHz, HF 2 182 kHz, or 8 364 kHz.

FAC 1..... OFF THEN ON

Rudder trim is recovered, despite the fact that no indication is available.

- **3MN/2000 FT BEFORE LDG:**

  Restore all generators only 3 min before landing or at 2 000 ft AAL to recover normal braking, while minimizing possible reactivation of a smoke source.

  GEN 2.....ON
  EMER ELEC GEN 1 LIN.....ON

F/CTL ALTN LAW (PROT LOST)

Flight control normal laws and associated protections are lost. Only the load factor limitation, and the high and low speed stability remain (ALTN law with reduced protection).

MAX SPEED.....320 KT

Note: *The "EPR MODE FAULT N1 DEGRADED MODE" warning is triggered.*

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

ECAM lower display is not available. STATUS SD page is displayed on the upper ECAM display, as long as the STATUS pb is pressed.

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STATUS

MIN RAT SPEED..... 140 KT
MAX SPEED..... 320 KT
MAX BRK PR.....1000 PSI

FOR LDG..... USE FLAPS 3
GPWS LDG FLAP 3..... ON
APPR SPD.....VREF +10 KT
LDG DIST PROC.....APPLY
ENG 1+2 APPR IDLE ONLY
ENG 1+2 N1 DEGRADED MODE
(IAE-powered aircraft ◁)
ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
CTR TK ◁ FUEL UNUSABLE
INCREASED FUEL CONSUMP
SLATS/FLAPS SLOW

- **After recovery of normal electrical supply, the following STATUS will be displayed:**
  MAX SPEED..... 320 KT
  APPR SPD..... VREF +10 KT
  LDG DIST PROC..... APPLY

APPR PROC

- **3 MN/2000 FT BEFORE LDG:**
  GEN 2.....ON
  EMER ELEC GEN 1 LINE.....ON
- **WHEN A/C IS STOPPED:**
  ALL GEN.....OFF

ALTN LAW: PROT LOST
See *(1)*

INOP SYS

Refer to PRO-ABN-24-ELEC EMER CONFIG SYS REMAINING-21-AIR CONDITIONING/VENTILATION /PRESSURIZATION ELEC EMER CONFIG SYS REMAINING (except for fuel pumps).

Continued on the following page

SMOKE/FUMES/AVNCS SMOKE (Cont'd)

WHEN L/G DN: DIRECT LAW
See (2)

(1) *Flight controls remain in alternate law, due to the loss of IR 2 and 3.*
(2) *At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to PRO-ABN-F/CTL DIRECT LAW).*

SMOKE/FUMES REMOVAL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

Apply the SMOKE/FUMES REMOVAL paper procedure, if smoke/fumes become the greatest threat when applying the SMOKE/FUMES/AVNICS SMOKE paper procedure.

EMER EXIT LIGHT.....ON

■ **If fuel vapors:**

CAB FANS.....ON

The recirculating air ventilates the air mixer bay and other fuselage area. This prevents fuel vapors from accumulating and the risk of explosion. Passenger health is not affected.

PACK 1+2.....OFF

■ **If no fuel vapors:**

CAB FANS.....OFF

To prevent smoke from entering the cockpit and cabin.

PACK FLOW.....HI

To provide maximum airflow from the packs.
Do not shut down the air conditioning packs, and do not reduce ventilation in an attempt to smother the fire.
Do not deploy oxygen masks, if fire is suspected in the cabin.

LDG ELEV.....10000 FT/MEA

DESCENT (FL 100, or MEA, or minimum obstacle clearance altitude).....INITIATE

The most effective means of smoke removal is use of ram air. Therefore, descent is initiated to FL 100 or the MEA, or the minimum obstacle clearance altitude, while the cabin altitude is increased to 10 000 ft or the MEA.
The increase in cabin altitude also reduces, at least temporarily, the smoke concentration. Cabin depressurization starts, when descent is initiated.
Passenger oxygen, as required by regulation.

ATC.....NOTIFY

SMOKE/FUMES/AVNCS SMOKE PROC.....CONTINUE

While descending, continue applying the appropriate steps of the SMOKE/FUMES/AVNCS SMOKE procedure depending on the suspected smoke source.

● **At FL 100, or MEA:**

APU MASTER SW (if in ELEC EMER CONFIG).....ON

Continued on the following page

SMOKE/FUMES REMOVAL (Cont'd)

In electrical emergency configuration, when the APU MASTER pb-sw is ON, the battery contactors will automatically close for a maximum of 3 min . This will enable the flight crew to manually control the outflow valve that is powered by the DC BAT BUS.

PACKS 1+2.....OFF

In electrical emergency configuration, the PACK 2 flow control valve cannot close because it is not electrically supplied. Therefore PACK 2 remains operative even when PACK 2 pb is not set to OFF.

MODE SEL.....MAN
MAN V/S CTL.....FULL UP
RAM AIR.....ON

At FL 100, or MEA, or minimum obstacle clearance altitude, it is possible to open the RAM AIR valve when ΔP is 1 PSI or below. Opening the RAM AIR enables flying with both packs OFF.

APU MASTER SW.....OFF

- **If smoke persists, open CKPT window:**

If there is smoke in the cockpit, open the cockpit (CKPT) window to evacuate the smoke.

MAX SPEED.....200 KT
COCKPIT DOOR.....OPEN
HEADSETS.....ON
PNF COCKPIT WINDOW.....OPEN

- **When window is open:**

NON-AFFECTED PACK(s).....ON
VISUAL WARNINGS (noisy CKPT).....MONITOR

Due to the increased noise level, pay particular attention to visual warnings.

SMOKE/FUMES/AVNCS SMOKE PROC.....CONTINUE

Continue applying the appropriate steps of the SMOKE/FUMES/AVNCS SMOKE paper procedure depending on the suspected smoke source.

SMOKE/FUMES REMOVAL

Applicable to: ALL 321

Apply the SMOKE/FUMES REMOVAL paper procedure, if smoke/fumes become the greatest threat when applying the SMOKE/FUMES/AVNICS SMOKE paper procedure.

EMER EXIT LIGHT..... on

■ **If fuel vapors:**

CAB FANS.....ON

The recirculating air ventilates the air mixer bay and other fuselage area. This prevents fuel vapors from accumulating and the risk of explosion. Passenger health is not affected.

PACK 1+2..... OFF

■ **If no fuel vapors:**

CAB FANS..... OFF

To prevent smoke from entering the cockpit and cabin.

ECON FLOW..... OFF

To provide maximum airflow from the packs.
Do not shut down the air conditioning packs, and do not reduce ventilation in an attempt to smother the fire.
Do not deploy oxygen masks, if fire is suspected in the cabin.

LDG ELEV.....10000 FT/MEA

DESCENT (FL 100, or MEA, or minimum obstacle clearance altitude)..... INITIATE

The most effective means of smoke removal is use of ram air. Therefore, descent is initiated to FL 100 or the MEA, or the minimum obstacle clearance altitude, while the cabin altitude is increased to 10 000 ft or the MEA.
The increase in cabin altitude also reduces, at least temporarily, the smoke concentration. Cabin depressurization starts, when descent is initiated.
Passenger oxygen, as required by regulation.

ATC.....NOTIFY

SMOKE/FUMES/AVNCS SMOKE PROC.....CONTINUE

While descending, continue applying the appropriate steps of the SMOKE/FUMES/AVNCS SMOKE procedure depending on the suspected smoke source.

● **At FL100, or MEA:**

APU MASTER SW (if in ELEC EMER CONFIG).....ON

Continued on the following page

SMOKE/FUMES REMOVAL (Cont'd)

In electrical emergency configuration, when the APU MASTER pb-sw is ON, the battery contactors will automatically close for a maximum of 3 min . This will enable the flight crew to manually control the outflow valve that is powered by the DC BAT BUS.

PACKS 1+2.....OFF

In electrical emergency configuration, the PACK 2 flow control valve cannot close because it is not electrically supplied. Therefore PACK 2 remains operative even when PACK 2 pb is not set to OFF.

MODE SEL.....MAN
MAN V/S CTL.....FULL UP
RAM AIR.....ON

At FL 100, or MEA, or minimum obstacle clearance altitude, it is possible to open the RAM AIR valve when ΔP is 1 PSI or below. Opening the RAM AIR enables flying with both packs OFF.

APU MASTER SW.....OFF

- **If smoke persists, open CKPT window:**

If there is smoke in the cockpit, open the cockpit (CKPT) window to evacuate the smoke.

MAX SPEED.....200 KT
COCKPIT DOOR.....OPEN
HEADSETS.....ON
PNF COCKPIT WINDOW.....OPEN

- **When window is open:**

NON-AFFECTED PACK(s).....ON
VISUAL WARNINGS (noisy CKPT).....MONITOR

Due to the increased noise level, pay particular attention to visual warnings.

SMOKE/FUMES/AVNCS SMOKE PROC.....CONTINUE

Continue applying the appropriate steps of the SMOKE/FUMES/AVNCS SMOKE paper procedure depending on the suspected smoke source.

SMOKE/FUMES REMOVAL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

Apply the SMOKE/FUMES REMOVAL paper procedure, if smoke/fumes become the greatest threat when applying the SMOKE/FUMES/AVNICS SMOKE paper procedure.

EMER EXIT LIGHT..... on

■ **If fuel vapors:**

CAB FANS.....ON

The recirculating air ventilates the air mixer bay and other fuselage area. This prevents fuel vapors from accumulating and the risk of explosion. Passenger health is not affected.

PACK 1+2..... OFF

■ **If no fuel vapors:**

CAB FANS.....OFF

To prevent smoke from entering the cockpit and cabin.

PACK FLOW..... HI

To provide maximum airflow from the packs.
Do not shut down the air conditioning packs, and do not reduce ventilation in an attempt to smother the fire.
Do not deploy oxygen masks, if fire is suspected in the cabin.

LDG ELEV.....10000 FT/MEA

DESCENT (FL 100, or MEA, or minimum obstacle clearance altitude)..... INITIATE

The most effective means of smoke removal is use of ram air. Therefore, descent is initiated to FL 100 or the MEA, or the minimum obstacle clearance altitude, while the cabin altitude is increased to 10 000 ft or the MEA.
The increase in cabin altitude also reduces, at least temporarily, the smoke concentration. Cabin depressurization starts, when descent is initiated.
Passenger oxygen, as required by regulation.

ATC.....NOTIFY

SMOKE/FUMES/AVNCS SMOKE PROC.....CONTINUE

While descending, continue applying the appropriate steps of the SMOKE/FUMES/AVNCS SMOKE procedure depending on the suspected smoke source.

● **At FL100, or MEA:**

APU MASTER SW (if in ELEC EMER CONFIG).....ON

Continued on the following page

SMOKE/FUMES REMOVAL (Cont'd)

In electrical emergency configuration, when the APU MASTER pb-sw is ON, the battery contactors will automatically close for a maximum of 3 min . This will enable the flight crew to manually control the outflow valve that is powered by the DC BAT BUS.

PACKS 1+2.....OFF
MODE SEL.....MAN
MAN V/S CTL.....FULL UP
RAM AIR.....ON

At FL 100, or MEA, or minimum obstacle clearance altitude, it is possible to open the RAM AIR valve when ΔP is 1 PSI or below. Opening the RAM AIR enables flying with both packs OFF.

APU MASTER SW.....OFF

● **If smoke persists, open CKPT window:**

If there is smoke in the cockpit, open the cockpit (CKPT) window to evacuate the smoke.

MAX SPEED.....200 KT
COCKPIT DOOR.....OPEN
HEADSETS.....ON
PNF COCKPIT WINDOW.....OPEN

● **When window is open:**

NON-AFFECTED PACK(s).....ON
VISUAL WARNINGS (noisy CKPT).....MONITOR

Due to the increased noise level, pay particular attention to visual warnings.

SMOKE/FUMES/AVNCS SMOKE PROC.....CONTINUE

Continue applying the appropriate steps of the SMOKE/FUMES/AVNCS SMOKE paper procedure depending on the suspected smoke source.

SMOKE DET FAULT

Applicable to: ALL 321

● **IF NO LIVE STOCK:**

AFT ISOL VALVE.....OFF

PAX SYS ◁ .....OFF

Continued on the following page

SMOKE DET FAULT (Cont'd)

STATUS

INOP SYS
SMOKE DET

SMOKE DET FAULT

Applicable to: ALL 320

PAX SYS ⏿ .....OFF

STATUS

INOP SYS
SMOKE DET

SMOKE LAVATORY DET FAULT

Applicable to: ALL

L2 Toilet smoke detection is lost.

L1 Crew awareness.

STATUS

INOP SYS
LAV DET

SMOKE LAVATORY SMOKE

Applicable to: ALL

L2 Communication must be established with the cabin crew in order to follow up on the smoke origin and dissipation.
Consider applying the SMOKE/FUMES/AVNCS SMOKE paper procedure.

L1 CKPT/CAB COM.....ESTABLISH

Intentionally left blank

CONFIG L (R) SIDESTICK FAULT
BY TAKE OVER

Applicable to: ALL

L2 The warning is triggered, when on the ground, if either stick is inoperative (takeover pushbutton pressed more than 30 s).

L1 L (R) TAKEOVER ..... DEPRESS

L2 *The affected stick becomes operative.*

CONFIG PITCH TRIM NOT IN T.O RANGE

Applicable to: ALL

Crew Awareness.

CONFIG RUD TRIM NOT IN T.O RANGE

Applicable to: ALL

L2 Crew awareness

CONFIG SLATS (FLAPS) NOT IN T.O CONFIG

Applicable to: ALL

L2 Crew awareness.

Config SPD BRK NOT RETRACTED

Applicable to: ALL

L2 Crew awareness.

F/CTL AIL SERVO FAULT

Applicable to: ALL 321

L2 LAF is degraded (A320 only).

Crew awareness

F/CTL AIL SERVO FAULT

Applicable to: ALL 320

L2 Crew awareness

F/CTL ALTN LAW

Applicable to: B-HTF

1

L2 *Note:* *ALTN LAW may be triggered during engine start, due to the electrical transient. Switch OFF the G, Y, and B HYD PUMPS (PRK BRK handle at ON), wait 1 min then reset the ELAC 1 and 2. After 8 s (disappearance of ALTN LAW warning), switch the G, Y, and B HYD PUMPS to ON/AUTO.*

Refer to PRO-SUP-27-10 General for flight characteristics.
With autopilot engaged the FMGC (AP mode) controls the aircraft.

L1 (PROT LOST)

L2 *All protections, except maneuver protections, are lost. Depending on the failure, static stability may be introduced. In case of GPWS (EGPWS ◁) alerts, since protections are lost, respect stall warnings when applying the GPWS (EGPWS ◁) procedure.*

L1 MAX SPEED..... 320KT

L2 *(320/.77 if dual hydraulic system low pressure). Speed is limited to 320 /.82 or 320/.77 for dual hydraulic failure, due to the loss of high-speed protection.*

L1 SPD BRK (IF L OR R ELEVATOR FAULT)..... DO NOT USE

Continued on the following page

F/CTL ALTN LAW (Cont'd)

L12

2

STATUS

MAX SPEED..... 320 KT
(320/.77, if dual hydraulic system low pressure).
SPD BRK (IF L OR R ELEVATOR FAULT)..... DO NOT USE

APPR PROC

FOR LDG.....USE FLAP 3
This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
GPWS LDG FLAP 3 ..... ON
APPR SPD .....VREF+10
LDG DIST PROC .....APPLY

- **If no AP engaged:**
  WHEN L/G DN: DIRECT LAW
  At landing gear extension, control reverts to direct law in pitch, as well as in roll. Refer to PRO-ABN-27-F/CTL DIRECT LAW
- **If AP engaged:**
  WHEN L/G DN AND AP OFF: DIRECT LAW

If the autopilot is disengaged:
- *Before landing gear extension, flight control alternate law is active.*
- *After landing gear extension, flight control direct law is active. Refer to PRO-ABN-27-F/CTL DIRECT LAW*

ALTN LAW: PROT LOST

INOP SYS

F/CTL PROT

F/CTL ALTN LAW

Applicable to: ALL 320, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

L2 *Refer to PRO-SUP-27-10 General* for flight characteristics.
With autopilot engaged the FMGC (AP mode) controls the aircraft.

L1 (PROT LOST)

L2 *All protections, except maneuver protections, are lost. Depending on the failure, static stability may be introduced.*

L1 *Note: In case of GPWS (EGPWS ◁) alerts, since protections are lost, respect stall warnings when applying the GPWS (EGPWS ◁) procedure.*

MAX SPEED.....320 KT

L2 *(320/.77 if dual hydraulic system low pressure). Speed is limited to 320 /.82 or 320/.77 for dual hydraulic failure, due to the loss of high-speed protection.*

L1 SPD BRK (IF L OR R ELEVATOR FAULT) .....DO NOT USE

Continued on the following page

F/CTL ALTN LAW (Cont'd)

L12

3

STATUS

MAX SPEED..... 320 KT
(320/.77, if dual hydraulic system low pressure).
SPD BRK (IF L OR R ELEVATOR FAULT)..... DO NOT USE

APPR PROC

FOR LDG.....USE FLAP 3
This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
GPWS LDG FLAP 3 ..... ON
APPR SPD .....VREF+10
LDG DIST PROC .....APPLY

- **If no AP engaged:**
  WHEN L/G DN: DIRECT LAW
  At landing gear extension, control reverts to direct law in pitch, as well as in roll. Refer to PRO-ABN-27-F/CTL DIRECT LAW
- **If AP engaged:**
  WHEN L/G DN AND AP OFF: DIRECT LAW

If the autopilot is disengaged:
- *Before landing gear extension, flight control alternate law is active.*
- *After landing gear extension, flight control direct law is active. Refer to PRO-ABN-27-F/CTL DIRECT LAW*

ALTN LAW: PROT LOST

INOP SYS

F/CTL PROT

F/CTL DIRECT LAW

Applicable to: ALL

L2 PFD displays « USE MAN PITCH TRIM » in amber. *Refer to PRO-SUP-27-50 Aircraft Trimming*

L1 (PROT LOST)

L2 *Note: In case of GPWS (EGPWS ◁) alerts, since protections are lost, respect stall warning when applying the GPWS (EGPWS ◁) procedure.*

L1 MAX SPEED.....320/.77

L2 *Speed is limited, due to the loss of high-speed protection. Do not exceed M 0.77, so as not to degrade handling qualities.*

L1 MAN PITCH TRIM (EXCEPT IF HYD Y + G SYS LO PR)..... USE

L2 *Automatic trim is inoperative in direct law.*

L1 MANEUVER WITH CARE

L2 *Use small control inputs at high speed, since in direct law the controls are powerful. Use of manual thrust is recommended. Avoid large thrust changes.*

L1 USE SPD BRK WITH CARE

L2 *At high Mach numbers, use speed brakes with care to avoid too strong nose up changes.*

Continued on the following page

F/CTL DIRECT LAW (Cont'd)

L12
4

STATUS

MAX SPEED..... 320/.77
MANEUVER WITH CARE
USE SPD BRK WITH CARE

APPR PROC

FOR LDG..... USE FLAPS 3

This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.

GPWS LDG FLAP 3..... ON
MAN PITCH TRIM..... USE
APPR SPD.....VREF+10
LDG DIST PROC.....APPLY

DIRECT LAW

INOP SYS

F/CTL PROT

F/CTL ELAC 1(2) FAULT
(ONE COMPUTER FAILED)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HTD, B-HTE, B-HTF

CAUTION	Do not reset ELAC, if uncommanded maneuvers occurred during the flight.

ELAC (AFFECTED)..... OFF THEN ON

Note:
1. *In some sidestick transducer failure cases, ELAC 1(2) FAULT is triggered without the proc, and FAULT lt on associated pb does not come on.*
2. *ELAC FAULT may be triggered during engine start, due to the electrical transient. To recover the affected ELAC on the ground, if the reset was unsuccessful, switch OFF the G,Y and B HYD PUMPS (PARK BRK handle ON), wait 1 min, then reset the ELAC pb. After 8 s (end of power up test indicated by the disappearance of the ELAC FAULT warning), switch the G, Y and B HYD PUMPS to ON/AUTO.*
3. *If the ELAC 1 computer is reset on ground the pitch trim returns to the ground setting position (0 °).*

● **IF UNSUCCESSFUL:**
ELAC (AFFECTED)..... OFF

L2 *Functions are performed by the other ELAC. LAF is degraded (A320 with LAF only)*

STATUS

	INOP SYS
CAT 3 SINGLE ONLY	ELAC 1(2) CAT 3 DUAL

F/CTL ELAC 1(2) FAULT
(ONE COMPUTER FAILED)

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

CAUTION	Do not reset ELAC, if uncommanded maneuvers occurred during the flight.

ELAC (AFFECTED)..... OFF THEN ON

L2 *Note:* *1. In some sidestick transducer failure cases, ELAC 1(2) FAULT is triggered without the procedure, and FAULT lt on associated pb does not come on.*
2. If the ELAC 1 computer is reset on ground the pitch trim returns to the ground setting position (0 °).

L1 ● **IF UNSUCCESSFUL:**
ELAC (AFFECTED)..... OFF

L2 *Functions are performed by the other ELAC. LAF is degraded (A320 with LAF only)*

STATUS	
CAT 3 SINGLE ONLY	**INOP SYS** ELAC 1(2) CAT 3 DUAL

F/CTL ELAC 1 (2) FAULT
(BOTH COMPUTERS FAILED)

Applicable to: ALL

ELAC 1..... OFF THEN ON

L2 *Note: If the ELAC 1 computer is reset on ground, the pitch trim returns to the ground setting position (0 °).*

L1 ELAC 2..... OFF THEN ON

- **If both ELAC FAULT remain:**
  ELAC 1.....OFF
  ELAC 2.....OFF

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

L2 Pitch and roll normal laws are lost: *Refer to PRO-ABN-27 F/CTL ALTN LAW*. THS motor 1 and both ailerons are lost. LAF is degraded and uses spoilers only (A320 only).

L1 MAX SPEED..... 320 KT

Continued on the following page

F/CTL ELAC 1 (2) FAULT (Cont'd)
(BOTH COMPUTERS FAILED)

L12
5

STATUS

MAX SPEED..... 320 KT

APPR PROC

FOR LDG.....USE FLAP 3

Do not select CONF FULL, so as not to degrade handling qualities.

GPWS LDG FLAP 3..... ON

Will be displayed when flaps in CONF 3

APPR SPD.....VREF+10 KT

LDG DIST PROC.....APPLY

ALTN LAW: PROT LOST
WHEN L/G DOWN: DIRECT LAW
See (1)

INOP SYS

F/CTL PROT
L+R AIL
ELAC 1+2
AP 1+2
CAT 2

(1) *At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to PRO-ABN-27 F/CTL DIRECT LAW).*

F/CTL ELAC 1 (2) PITCH FAULT

Applicable to: ALL

L2 Pitch function is achieved by the other ELAC.

Crew awareness

Continued on the following page

F/CTL ELAC 1 (2) PITCH FAULT (Cont'd)

STATUS	INOP SYS
CAT 3 SINGLE ONLY	ELAC PITCH (1) CAT 3 DUAL

(1) *(If ELAC 1 and 2 PITCH FAULT)*

F/CTL ELEV SERVO FAULT

Applicable to: ALL

L2 The remaining servojack controls the elevator.

L1 L2 Crew awareness

L1

CAUTION	Do not use speedbrakes above 350 kt/M 0.82 (VMO/MMO).

STATUS	INOP SYS
CAT 3 SINGLE ONLY	CAT 3 DUAL

F/CTL FCDC 1 (2) FAULT

Applicable to: ALL

L2 Crew awareness

Continued on the following page

F/CTL FCDC 1 (2) FAULT (Cont'd)

STATUS	INOP SYS
	FCDC 1(2)

F/CTL FCDC 1+2 FAULT

Applicable to: ALL

MONITOR F/CTL OVHD PNL

L2 *F/CTL data on ECAM is lost.*
Control laws remains normal.

Note: When both FCDCs fails:
- *F/CTL warning are not available on the ECAM.*
- *Stall warning may be triggered as in alternate or direct law (it may occur at speeds greater than Vα max).*
- *Bank and pitch limits are no longer displayed on the PFD.*
- *Vα prot, Vα max are lost on the PFD.*
- *Vsw, displayed on the PFD, corresponds to the stall warning of the alternate or direct law.*

STATUS	
F/CTL INDICATIONS LOST	INOP SYS
	FCDC 1 + 2

F/CTL FLAP ATTACH SENSOR

Applicable to: ALL

L2 **Failure of flap attachment failure detection sensor.**

Crew awareness

F/CTL FLAP LVR NOT ZERO

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR

L2 The flap lever is not in the zero position, and the aircraft is above 22 000 ft.

L1 Crew awareness.

F/CTL FLAP SYS 1(2) FAULT

Applicable to: ALL

- **If FLAP sys 1 fault:**
  GPWS FLAP MODE.....OFF

	STATUS
ENG 1(2) APPR IDLE ONLY	
FLAPS SLOW	

F/CTL FLAPS FAULT/LOCKED

Applicable to: ALL

- **If flaps locked:**
  WING TIP BRK ON OR ALIGNMENT FAULT
  MAX SPEED..... *REFER TO PRO-ABN-27 F/CTL FLAPS/SLATS FAULT/LOCKED*

L2 *Limit speed to the VFE corresponding to the next flap position*

L1 FLAPS LEVER (IF FLAPS NOT LOCKED).....RECYCLE

L2 *Return to the previous selection, then back to the desired position.*

- **If unsuccessful:**

  Refer to PRO-ABN-10 Landing with Slats or Flaps Jammed .

  The autopilot may be used down to 500 ft AGL. As it is not tuned for abnormal configurations, its behavior can be less than optimum and must be monitored.

Continued on the following page

F/CTL FLAPS FAULT/LOCKED (Cont'd)

L12
6

STATUS

APPR PROC	INOP SYS
FOR LDG (IF FLAPS ≤ 3)..... USE FLAP 3 *This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder* FLAPS (IF FLAPS>3)..... KEEP CONF FULL GPWS FLAP MODE (IF FLAPS < 3)..... OFF GPWS LDG FLAP 3 (IF FLAPS ≥ 3)..... ON APPR SPD..... *REFER TO PRO-ABN-27 F/CTL FLAPS/SLATS FAULT/LOCKED* LDG DIST PROC.....APPLY ENG 1 APPR IDLE ONLY (Only in case of FLAPS FAULT) ENG 2 APPR IDLE ONLY (Only in case of FLAPS FAULT) INCREASED FUEL CONSUMP (*Refer to PRO-ABN-27 F/CTL FLAPS/SLATS FAULT/LOCKED*)	FLAPS AP 1+2 (1) A/THR (1) Moreover, both FDs are lost (1) CAT 2 (1)

(1) *(If both flap channels fault.)*

F/CTL FLAPS/SLATS FAULT/LOCKED

Applicable to: ALL 320

7

MAX SPEED					
Flaps(1) / Slats(1)	F = 0	0 < F ≤ 1	1 < F ≤ 2	2 < F ≤ 3	F > 3
S = 0	NO LIMITATION	215 kt	200 kt	185 kt	Not allowed (177 kt)
0 < S <1	230 kt				
S = 1					
1 < S ≤ 3	200 kt				
S > 3					177 kt

(1) Slats/Flaps position displayed on the upper ECAM display.

APPR SPD					
Flaps(1) / Slats(1)	F = 0	0 < F < 1	1 ≤ F < 2	2 ≤ F < 3	F ≥ 3
S = 0	VREF +60 (Appr) VREF +50 (Touch Down)	VREF +45	VREF +30	VREF +25	(FLAPS > 3 not allowed) VREF +25
0 < S < 1					
1 ≤ S ≤ 3	VREF +25		VREF +15	VREF +10	VREF +10
S > 3					VREF +5

(1) Slats/Flaps position displayed on the upper ECAM display.

CAUTION	For flight with SLATS or FLAPS extended, fuel consumption is increased. Refer to the fuel flow indication. As a guideline, determine the fuel consumption in clean configuration, at the same altitude without airspeed limitation (e.g. from ALTERNATE FLIGHT PLANNING tables, *Refer to PER-FPL-FLP-ALN-20 ALTERNATE PLANNING ISA*), and multiply this result by the applicable Fuel Penalty Factor provided in the QRH *Refer to QRH/FPE-FPF Fuel Penalty Factors Tables* to obtain the fuel penalty required to reach the destination in the current configuration.

F/CTL FLAPS/SLATS FAULT/LOCKED

Applicable to: ALL 321

8

MAX SPEED					
Flaps(1) / Slats (1)	F = 0	0 < F ≤ 1	1 < F ≤ 2	2 < F ≤ 3	F > 3
S = 0	NO LIMITATION	215 kt		195 kt	Not allowed (190 kt)
0 < S <1	230 kt				
S = 1					
1 < S ≤ 3	215 kt				
S > 3	190 kt				

(1) Slats/Flaps position displayed on the upper ECAM display.

APPR SPD					
Flaps(1) / Slats(1)	F = 0	0 < F <1	1 ≤ F < 2	2 ≤ F < 3	F ≥ 3
S = 0	VREF +60 (Appr) VREF +50 (Touch Down)	VREF +45	VREF +30	VREF +25	(FLAPS > 3 not allowed) VREF +25
0 < S < 1					
1 ≤ S ≤ 3	VREF + 30		VREF +15	VREF +10	VREF +10
S > 3	VREF + 30		VREF +15	VREF +10	VREF +5

(1) Slats/Flaps position displayed on the upper ECAM display.

CAUTION	For flight with SLATS or FLAPS extended, fuel consumption is increased. Refer to the fuel flow indication. As a guideline, determine the fuel consumption in clean configuration, at the same altitude without airspeed limitation (e.g. from ALTERNATE FLIGHT PLANNING tables, *Refer to PER-FPL-FLP-ALN-20 ALTERNATE PLANNING ISA*), and multiply this result by the applicable Fuel Penalty Factor provided in the QRH *Refer to QRH/FPE-FPF Fuel Penalty Factors Tables* to obtain the fuel penalty required to reach the destination in the current configuration.

F/CTL GND SPLR / 1+2 / 3+4 / FAULT

Applicable to: ALL

L2 Crew awareness

■ **GND SPLR FAULT:**

Loss of ground spoiler function in SEC 1+3, or 1+2, or 2+3, or 1+2+3.
If ground spoiler function is lost in SEC (1+2) or (1+3), one reverser is inoperative.
If ground spoiler function is lost in SEC (1+2+3), both reversers are inoperative.
In any case, the autobrake function is lost.

■ **GND SPLR 1+2(3+4) FAULT:**

Loss of ground spoiler function in SEC 3 (or 1).

9

	STATUS
LDG DIST PROC.....APPLY	**INOP SYS**
	GND SPLR (affected)

F/CTL L (R) AIL FAULT

Applicable to: ALL 321

L2 LAF is degraded and uses spoilers only (A320 only).

Crew awareness

L12

	STATUS
	INOP SYS
	L (R) AIL

Note: *With one or both aileron fault(s), fuel consumption increases by approximately 6 %.*

F/CTL L (R) AIL FAULT

Applicable to: ALL 320

L2 Crew awareness

L12

STATUS	INOP SYS
	L (R) AIL

Note: *With one or both aileron fault(s), fuel consumption increases by approximately 6 %.*

F/CTL L (R) ELEV FAULT

Applicable to: ALL

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

L2 *Note:* *If the L(R) elevator fails, the ELACs loose pitch control through the elevator. Therefore, the SECs control pitch in alternate law. This is not the case, if the right elevator is lost, due to the failure of B+Y hydraulic circuits. Pitch normal law remains active in ELAC.*

L1 MAX SPEED.....320 KT

L2 *Speed is limited, due to the loss of high-speed protection.*

L1 SPD BRK.....DO NOT USE

Continued on the following page

F/CTL L (R) ELEV FAULT (Cont'd)

L12
10

STATUS

MAX SPEED..... 320 KT
SPD BRK.....DO NOT USE

APPR PROC

FOR LDG.....USE FLAP 3
This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
GPWS LDG FLAP 3..... ON
Will be displayed, when flaps in CONF 3.
APPR SPD.....VREF+10 KT
LDG DIST PROC.....APPLY

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
See (1)

INOP SYS

F/CTL PROT
L (R) ELEV
ELAC PITCH
AP 1+2
CAT 2

(1) *At landing gear extension, control reverts to direct law in pitch, as well as in roll.Refer to PRO_ABN_27_F/CTL DIRECT LAW.*

F/CTL L+R ELEV FAULT

Applicable to: ALL 321

MAX SPEED.....320/.77
L2 *Due to loss of high speed protections.*
L1 MAN PITCH TRIM..... USE
L2 *Only manual trim is available for pitch control.*
L1 SPD BRK.....DO NOT USE
L2 *Do not use speed brakes, because it is difficult to control the induced pitch moment with manual pitch trim only.*

Continued on the following page

F/CTL L+R ELEV FAULT (Cont'd)

L12
11

STATUS

MAX SPEED..... 320/.77
SPD BRK.....DO NOT USE

APPR PROC

FOR LDG.....USE FLAP 3
This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder
GPWS LDG FLAP 3..... ON
Will be displayed when flaps in CONF 3.
MAN PITCH TRIM..... USE
APPR SPD.....VREF+10
LDG DIST PROC.....APPLY

PITCH MECH BACK UP
ROLL DIRECT LAW

INOP SYS

L+R ELEV
ELAC PITCH
LAF (A320 with LAF only)
AP 1+2
CAT 2

F/CTL L+R ELEV FAULT

Applicable to: ALL 320

MAX SPEED.....320/.77
L2 *Due to loss of high speed protections.*
L1 MAN PITCH TRIM..... USE
L2 *Only manual trim is available for pitch control.*
L1 SPD BRK.....DO NOT USE
L2 *Do not use speed brakes, because it is difficult to control the induced pitch moment with manual pitch trim only.*

Continued on the following page

F/CTL L+R ELEV FAULT (Cont'd)

L12
12

STATUS

MAX SPEED..... 320/.77
SPD BRK.....DO NOT USE

APPR PROC

FOR LDG.....USE FLAP 3
This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder
GPWS LDG FLAP 3..... ON
Will be displayed when flaps in CONF 3.
MAN PITCH TRIM..... USE
APPR SPD.....VREF+10
LDG DIST PROC.....APPLY

PITCH MECH BACK UP
ROLL DIRECT LAW

INOP SYS

L+R ELEV
ELAC PITCH
AP 1+2
CAT 2

F/CTL L(R) SIDESTICK FAULT

Applicable to: ALL

L2 Crew awareness

F/CTL SEC 1 (2) (3) FAULT

Applicable to: ALL 321

SEC (AFFECTED)..... OFF THEN ON

- **IF UNSUCCESSFUL:**

  SEC (AFFECTED)..... OFF

L2 *Associated spoilers are lost. If SEC 1 or 2 fails, LAF is degraded (A320 with LAF only). If all spoilers are inoperative (3 SECs failed), roll direct law and pitch alternate law become active.*

L1 SPD BRK (IF SEC 1 AFFECTED).....DO NOT USE

L2 *VLS would not be corrected, if speed brakes 2 extend (no speed brake position sent to FACs).*

L1 - **If SEC 1 + 2 + 3 fail.**

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

Continued on the following page

F/CTL SEC 1 (2) (3) FAULT (Cont'd)

L12
13

STATUS

SPD BRK.....DO NOT USE
(If SEC 1 is affected.)

- **If SEC 1 + 2 + 3 fail:**
  FOR LDG..... USE FLAP 3
  APPR SPD.....VREF+15KT

LDG DIST PROC.....APPLY

- **(If SEC 1 + 2 + 3 fail).**
  ALTN LAW: PROT LOST
- If no AP engaged
  and
  If SEC 1 + 2 + 3 fail.
  WHEN L/G DN : DIRECT LAW
  If SEC 1 + 2 + 3 fail. In such a case, the LGCIU information can no longer be sent to the ELAC. For the activation of DIRECT law, the ELAC uses the condition "slats and flaps in CONF 2", instead of "landing gear down".
- If AP engaged
  and
  If SEC 1 + 2 + 3 fail.
  WHEN L/G DN AND AP OFF : DIRECT LAW
  If SEC 1 + 2 + 3 fail. In such a case, the LGCIU information can no longer be sent to the ELAC. For the activation of DIRECT law, the ELAC uses the condition "slats and flaps in CONF 2", instead of "landing gear down".

INOP SYS

F/CTL PROT (1)
SPLR (associated)
SEC (affected)
REVERSER 1(2) (2)
AUTO BRK (3)

(1) *(If SEC 1 + 2 + 3 fail)*
(2) *(If SEC 1 + 2 fail, reverser 1 is not available for landing. If SEC 1 + 3 fail, reverser 2 is not available for landing)*
(3) *(If at least 2 SECs fail.)*

F/CTL SEC 1 (2) (3) FAULT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

SEC (AFFECTED)..... OFF THEN ON

- **IF UNSUCCESSFUL:**

  SEC (AFFECTED)..... OFF

L2 *Associated spoilers are lost.*
If all spoilers are inoperative (3 SECs failed), roll direct law and pitch alternate law become active.

L1 SPD BRK (IF SEC 1 AFFECTED).....DO NOT USE

L2 *VLS would not be corrected, if speed brakes 2 extend (no speed brake position sent to FACs).*

L1 - **If SEC 1 + 2 + 3 fail**

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
PROT LOST

Continued on the following page

F/CTL SEC 1 (2) (3) FAULT (Cont'd)

L12
14

STATUS

SPD BRK.....DO NOT USE
(If SEC 1 is affected.)

- **If SEC 1 + 2 + 3 fail:**
  FOR LDG..... USE FLAP 3
  APPR SPD.....VREF+15KT

LDG DIST PROC.....APPLY

- **(If SEC 1 + 2 + 3 fail).**
  ALTN LAW: PROT LOST
- If no AP engaged
  and
  If SEC 1 + 2 + 3 fail.
  WHEN L/G DN : DIRECT LAW
  If SEC 1 + 2 + 3 fail. In such a case, the LGCIU information can no longer be sent to the ELAC. For the activation of DIRECT law, the ELAC uses the condition "slats and flaps in CONF 2", instead of "landing gear down".
- If AP engaged
  and
  If SEC 1 + 2 + 3 fail.
  WHEN L/G DN AND AP OFF : DIRECT LAW
  If SEC 1 + 2 + 3 fail. In such a case, the LGCIU information can no longer be sent to the ELAC. For the activation of DIRECT law, the ELAC uses the condition "slats and flaps in CONF 2", instead of "landing gear down".

INOP SYS

F/CTL PROT (1)
SPLR (associated)
SEC (affected)
REVERSER 1(2) (2)
AUTO BRK (3)

(1) *(If SEC 1 + 2 + 3 fail)*
(2) *(If SEC 1 + 2 fail, reverser 1 is not available for landing. If SEC 1 + 3 fail, reverser 2 is not available for landing)*
(3) *(If at least 2 SECs fail.)*

F/CTL SEC 1 (2) (3) FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

SEC (AFFECTED)..... OFF THEN ON

- **IF UNSUCCESSFUL:**

  SEC (AFFECTED)..... OFF

L2 *Associated spoilers are lost.*
If all spoilers are inoperative (3 SECs failed), roll direct law and pitch alternate law become active.

L1 SPD BRK (IF SEC 1 AFFECTED).....DO NOT USE

L2 *VLS would not be corrected, if speed brakes 2 extend (no speed brake position sent to FACs).*

L1 ● **If SEC 1 + 2 + 3 fail**

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
PROT LOST

Continued on the following page

F/CTL SEC 1 (2) (3) FAULT (Cont'd)

L12
15

STATUS

SPD BRK.....DO NOT USE
(If SEC 1 is affected.)

- **If SEC 1 + 2 + 3 fail:**
  FOR LDG..... USE FLAP 3
  APPR SPD.....VREF+15KT

LDG DIST PROC.....APPLY

- **(If SEC 1 + 2 + 3 fail).**
  ALTN LAW: PROT LOST
- If no AP engaged
  and
  SEC 1 + 2 + 3 fail.
  WHEN L/G DN : DIRECT LAW
  If SEC 1 + 2 + 3 fail. In such a case, the LGCIU information can no longer be sent to the ELAC. For the activation of DIRECT law, the ELAC uses the condition "slats and flaps in CONF 2", instead of "landing gear down".
- If AP engaged
  and
  SEC 1 + 2 + 3 fail.
  WHEN L/G DN AND AP OFF : DIRECT LAW
  If SEC 1 + 2 + 3 fail. In such a case, the LGCIU information can no longer be sent to the ELAC. For the activation of DIRECT law, the ELAC uses the condition "slats and flaps in CONF 2", instead of "landing gear down".

INOP SYS

F/CTL PROT (1)
SPLR (associated)
SEC (affected)
REVERSER 1(2) (2)
AUTO BRK (3)

(1) *(If SEC 1 + 2 + 3 fail)*
(2) *(If SEC 1 + 2 fail, reverser 1 is not available for landing. If SEC 1 + 3 fail, reverser 2 is not available for landing)*
(3) *(If at least 2 SECs fail)*

F/CTL SIDESTICK PRIORITY

Applicable to: ALL

L2 A failure is detected in the sidestick priority logic circuit.

L1 CHECK PRIORITY LOGIC

L2 Check the integrity of flight control priority, as follows (not displayed on ECAM) :

L1 ELAC 1..... OFF THEN ON

L2 *Note:* *When the ELAC 1 computer is reset on ground, the pitch trim returns to the ground setting position (0 °).*

L1 ELAC 2..... OFF THEN ON

L2 ■ **If the warning disappears:**

CAPT TAKE OVER pb..... PRESS (at least 3 seconds)

Check that the :
- *Aural "priority left" message is activated.*
- *F/O red arrow light is on.*

CAPT TAKE OVER pb.....RELEASE
F/O TAKE OVER pb.....PRESS (at least 3 seconds)

Check that the:
- *Aural "priority right" message is activated*
- *CAPT red arrow light is on.*

F/O TAKE OVER pb..... RELEASE

Check that the warning does not reappear.

Note: *There is no need to move the sidestick for the check.*

■ **If the warning does not disappear, or if the warning reappears after the above check:**

Maintenance action is due.

F/CTL SLAT (FLAP) TIP BRK FAULT

Applicable to: ALL

L2 *Failure of one slat or flap wingtip brake.*

Crew awareness

F/CTL SLAT SYS 1(2) FAULT

Applicable to: ALL

L2 Crew awareness

	STATUS
SLATS SLOW	|

F/CTL SLATS AND FLAPS FAULT IN CONF 0

Applicable to: ALL 321

FLAPS LEVER.....RECYCLE

- **If both slat channels fail:**

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)
MAX SPEED..... 320 KT

Continued on the following page

F/CTL SLATS AND FLAPS FAULT IN CONF 0 (Cont'd)

L12

16

STATUS

- **If both slat channels fail:**
  MAX SPEED.....320 KT
  ALTN LAW: PROT LOST

  APPR PROC

  FOR LDG.....USE FLAP 1
  With FLAPS lever set at 1, AP/FD GO AROUND mode is available.
  GPWS FLAP MODE.....OFF

  APPR SPD.....VREF +60 KT
  Approach with A/THR in selected mode is recommended.

  - **If both slat channels fail:**
    WHEN L/G DN: DIRECT LAW

  - **AT 300 FT AGL:**
    TARGET SPD..... VREF +50
    Reduce speed between 500 ft and 300 ft to reach VREF +50 kt at runway threshold and disconnect A/THR, as the target speed may be below VLS.
    LDG DIST PROC..... APPLY

- **Only in case of FLAPS FAULT:**
  ENG 1 APPR IDLE ONLY
  ENG 2 APPR IDLE ONLY

INOP SYS

F/CTL PROT (1)
SLATS
FLAPS
AP 1+2 (2)
A/THR (2)
Moreover, both FDs are lost (2)
CAT 2 (2)

(1) *(If both slat channels fail.)*
(2) *(If both slat or flap channels fail.)*

F/CTL SLATS AND FLAPS FAULT IN CONF 0

Applicable to: ALL 320

FLAPS LEVER.....RECYCLE

- **If both slat channels fail:**

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)
MAX SPEED..... 320 KT

Continued on the following page

F/CTL SLATS AND FLAPS FAULT IN CONF 0 (Cont'd)

L12
17

STATUS

- **If both slat channels fail:**
  MAX SPEED.....320 KT
  ALTN LAW: PROT LOST

APPR PROC

FOR LDG.....USE FLAP 1
With FLAPS lever set at 1, AP/FD GO AROUND mode is available.
CTR TK PUMPS..... OFF
GPWS FLAP MODE.....OFF

APPR SPD.....VREF +60 KT
Approach with A/THR in selected mode is recommended.

- **If both slat channels fail:**
  WHEN L/G DN: DIRECT LAW

- **AT 300 FT AGL:**
  TARGET SPD.....VREF +50 KT
  Reduce speed between 500 ft and 300 ft to reach VREF +50 kt at runway threshold and disconnect A/THR, as the target speed may be below VLS.
  LDG DIST PROC..... APPLY

- **Only in case of FLAPS FAULT:**
  ENG 1 APPR IDLE ONLY
  ENG 2 APPR IDLE ONLY

INOP SYS

F/CTL PROT (1)
SLATS
FLAPS
AP 1+2 (2)
A/THR (2)
Moreover, both FDs are lost (2)
CAT 2 (2)

(1) *(If both slat channels fail.)*
(2) *(If both slat or flap channels fail.)*

F/CTL SLATS FAULT/LOCKED

Applicable to: ALL 321

WING TIP BRK ON

L2 *(If slats locked)*

L1 MAX SPEED..... *REFER TO PRO-ABN-27 F/CTL FLAPS/SLATS FAULT/LOCKED*

L2 *Speed is limited to the VFE corresponding to the next slat position.*

L1 FLAPS LEVER (IF SLATS NOT LOCKED)..... RECYCLE

L2 *Return to the previous selection, then back to the desired position.*

L1 ● **If unsuccessful:**

L2 *Refer to PRO-ABN-10 Landing with Slats or Flaps Jammed*

The autopilot may be used down to 500 ft AGL. As it is not tuned for the abnormal configurations, its behavior could be less than optimum and must be monitored.

Note: *1. If there is a SLATS FAULT after both slat channels fail, alternate law becomes active (Refer to PRO-ABN-27 F/CTL ALTN LAW).*
2. If the slats are locked in clean configuration (< 18 °), alternate law without protection is selected once the flaps are at or above CONF 2 (> 13 °).

Continued on the following page

F/CTL SLATS FAULT/LOCKED (Cont'd)

L12

18

STATUS

APPR PROC

FOR LDG.....USE FLAP 3

This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.

GPWS LDG FLAP 3..... ON

APPR SPD..... *REFER TO PRO-ABN-27 F/CTL FLAPS/SLATS FAULT/LOCKED*

LDG DIST PROC.....APPLY

- **If both slat channels fail, or slats locked in clean configuration and flaps are at, or above, CONF 2:**
  ALTN LAW: PROT LOST
  WHEN L/G DN: DIRECT LAW

INCREASED FUEL CONSUMP (*Refer to PRO-ABN-27 F/CTL FLAPS/SLATS FAULT/LOCKED*)

INOP SYS

F/CTL PROT (1)
SLATS
AP 1+2 (1)
A/THR (1)
Moreover, both FDs are lost (1)
CAT 2 (1)

(1) *(If both slat channels fail.)*

F/CTL SLATS FAULT/LOCKED

Applicable to: ALL 320

WING TIP BRK ON

L2 *(If slats locked)*

L1 MAX SPEED..... *REFER TO PRO-ABN-27 F/CTL FLAPS/SLATS FAULT/LOCKED*

L2 *Speed is limited to the VFE corresponding to the next slat position.*

L1 FLAPS LEVER (IF SLATS NOT LOCKED)..... RECYCLE

L2 *Return to the previous selection, then back to the desired position.*

L1 ● **If unsuccessful:**

L2 *Refer to PRO-ABN-10 Landing with Slats or Flaps Jammed.*

The autopilot may be used down to 500 ft AGL. As it is not tuned for the abnormal configurations, its behavior could be less than optimum and must be monitored.

Note: If there is a SLATS FAULT after both slat channels fail, alternate law becomes active (Refer to PRO-ABN-27 F/CTL ALTN LAW).

L1 ● **If slats not at zero:**

FUEL MODE SEL.....MAN

L2 *To allow CTR TK feeding.*

L1 CTR TK PUMPS.....AS RQRD

L2 *Set CTR TK PUMPS pb to OFF when CTR TK is empty or during approach.*

Continued on the following page

F/CTL SLATS FAULT/LOCKED (Cont'd)

L12
19

STATUS

APPR PROC

FOR LDG.....USE FLAP 3
This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
CTR TK PUMPS..... OFF
GPWS LDG FLAP 3..... ON

APPR SPD..... *REFER TO PRO-ABN-27 F/CTL FLAPS/SLATS FAULT/LOCKED*
LDG DIST PROC.....APPLY

CTR TK FEED: MAN ONLY
- **If both slat channels fail:**
  ALTN LAW : PROT LOST
  WHEN L/G DN : DIRECT LAW

INCREASED FUEL CONSUMP (*Refer to PRO-ABN-27 F/CTL FLAPS/SLATS FAULT/LOCKED*)

INOP SYS

F/CTL PROT (1)
SLATS
AP 1+2 (1)
A/THR (1)
Moreover, both FDs are lost (1)
CAT 2 (1)

(1) *(If both slat channels fail.)*

F/CTL SPD BRK 2(3+4) FAULT

Applicable to: ALL

L2 Loss of speedbrake surfaces, due to failure of speedbrake lever transducer(s). In addition associated ground spoilers are available only through reverse selection.

L1 ● **If SPD BRK 3+4 affected:**
SPD BRK..... DO NOT USE

L2 *Do not use speedbrakes since it is not efficient to use only surfaces n° 2, and would active the SPD BRK DISAGREE caution.*

Continued on the following page

F/CTL SPD BRK 2(3+4) FAULT (Cont'd)

20

STATUS

- **If SPD BRK 3+4 affected:**
  SPD BRK.....DO NOT USE
  LDG DIST PROC.....APPLY

INOP SYS

SPD BRK (affected)

F/CTL SPD BRK DISAGREE
(SURFACES 3+4 AFFECTED)

Applicable to: ALL

L2 Surfaces' position not in agreement with the handle position.

L1 SPD BRK LEVER.....RETRACT
SPD BRK.....DO NOT USE

STATUS

SPD BRK.....DO NOT USE

INOP SYS

SPD BRK 3+4

F/CTL SPD BRK DISAGREE
(SURFACES 2+3+4 AFFECTED)

Applicable to: ALL

L2 After automatic retraction (due to activation of alpha protection or slats/flaps in configuration full), surface position is not in agreement with handle position.

L1 SPD BRK LEVER.....RETRACT

F/CTL SPD BRK FAULT

Applicable to: ALL

L2 Loss of speedbrake surfaces, due to failure of the speedbrake lever transducer(s). In addition, associated ground spoilers are available only through reverse selection.

21

STATUS

	INOP SYS
LDG DIST PROC.....APPLY	SPD BRK

F/CTL SPD BRK STILL OUT

Applicable to: ALL

L2 Speedbrakes are out, with at least one engine not at idle.

L1 Crew awareness.

F/CTL SPLR FAULT

Applicable to: ALL

L2 Loss of one or more spoilers.

Note: If heavy vibrations are felt, CONF 3 may be used for landing in order to reduce the buffeting.

L1 SPD BRK (IF SPOILERS 3+4 AFFECTED).....DO NOT USE

L2 *Do not use speedbrakes, since using only surfaces N° 2 is not efficient and would activate the SPD BRK DISAGREE caution.*

Continued on the following page

F/CTL SPLR FAULT (Cont'd)

22

STATUS	INOP SYS
• **If spoilers 3+4 affected:** SPD BRK.....DO NOT USE LDG DIST PROC.....APPLY	SPLR (affected) SPD BRK (1)

(1) *(If spoilers 2+3+4 affected)*

F/CTL STABILIZER JAM

Applicable to: ALL

L2 When the Flight Control Computers detect a loss of electrical control of the stabilizer, pitch control law reverts to alternate law. Depending on the type of failure, the MAN PITCH TRIM may still be available.

L1 MAN PITCH TRIM..... CHECK

L2 *The force needed on the PITCH TRIM wheel may be higher than during pre-takeoff manual setting.*

L1 ● **IF MAN TRIM AVAIL:**

TRIM FOR NEUTRAL ELEV

L2 *If manual pitch trim is available, trim to maintain the elevator at the zero position (indications on ECAM F/CTL page).*

L1

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)
MAX SPEED.....320 KT

Continued on the following page

F/CTL STABILIZER JAM (Cont'd)

L12
23

STATUS

MAX SPEED..... 320 KT

APPR PROC:

FOR LDG.....USE FLAP 3

This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.

GPWS LDG FLAP 3..... ON

Will be displayed when flaps in CONF 3

- **IF MAN TRIM NOT AVAIL:**
  - **WHEN CONF 3 AND VAPP:**
    L/G.....DN

    Landing gear extension is delayed, in order to delay the switching to direct law.

APPR SPD:.....VREF + 10 KT
LDG DIST PROC.....APPLY
ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW

At landing gear extension, control reverts to direct law in pitch, as well as in roll. Refer to PRO-ABN-27 F/CTL DIRECT LAW.

INOP SYS

F/CTL PROT
STABILIZER
ELAC PITCH
AP 1 + 2
CAT 2

STABILIZER JAM

Applicable to: ALL

L2 The ELACs may not detect a stabilizer jam when the pitch trim wheel is jammed.
The flight control normal law remains active in this case and there is no ECAM warning.
Apply the following procedure.

L1 AP..... OFF
MAN PITCH TRIM..... CHECK

L2 *The pitch trim wheel may not be fully jammed, the force needed may be higher than pre-takeoff manual setting.*

L1 ● **IF MAN TRIM AVAIL:**

TRIM FOR NEUTRAL ELEV

L2 *If manual pitch trim is available, trim to maintain the elevator at the zero position (indications on F/CTL SD page).*

L1 **APPR PROC**

● **IF MAN TRIM NOT AVAIL:**

FOR LDG..... USE FLAP 3

L2 *Do not select configuration full so as not to degrade the handling qualities.*

L1 GPWS LDG FLAP 3..... ON

CAT 2 INOP

ACTIVE CONTROL LAW

Applicable to: B-HSI, B-HSM, B-HTD, B-HTG, B-HTH, B-HTI

ACTIVE LAW ▸	PITCH		ROLL	YAW
SYS FAILED▾	LAW	PROTEC		
ELAC 1 or 2 or SEC 1 or 2	NORM	NORM	NORM	NORM
ELAC 1 and 2 or both ailerons	ALTN	REDUCED	DIRECT	ALTN
2 SEC	NORM	NORM	NORM	NORM
3 SEC	ALTN	REDUCED	DIRECT	ALTN
2 FAC	ALTN	REDUCED	DIRECT	MECH
Yaw damper	ALTN	REDUCED	DIRECT	MECH
2 SFCC (slat channel)	ALTN	NO	DIRECT	ALTN
2 ADR or 2 IR (2nd self detected)	ALTN	REDUCED	DIRECT	ALTN
2 ADR (2nd not self detec.)	ALTN	NO ——— REDUCED(1)	DIRECT	ALTN
2 IR (2nd not self detec.)	DIRECT ——— ALTN (2)	NO ——— REDUCED(2)	DIRECT	MECH ——— ALTN (2)
3 ADR	ALTN	NO	DIRECT	MECH
3 IR	DIRECT	NO	DIRECT	MECH
2 RADIO ALT	NORM ——— DIRECT (4)	NORM ——— NO (4)	NORM ——— DIRECT (4)	NORM ——— MECH (4)
SPOILER 4 or 5 or (4 and 5)	NORM	NORM	NORM	NORM
All SPOILERS	ALTN	REDUCED	DIRECT	ALTN
1 AIL SERVO or 1 AILERON	NORM	NORM	NORM	NORM
1 ELEV SERVO	NORM	NORM	NORM	NORM
1 ELEVATOR	ALTN	REDUCED	DIRECT	ALTN
THS (jammed) (5)	NORM	NORM	NORM	NORM
	ALTN	REDUCED	DIRECT	ALTN
HYD G or Y or B	NORM	NORM	NORM	NORM
HYD G + Y	ALTN	REDUCED	DIRECT	MECH
HYD G + B	ALTN	NO	DIRECT	ALTN
HYD Y + B	NORM	NORM	NORM	NORM
on BATTERIES	ALTN	REDUCED	DIRECT	MECH
on EMER GEN	ALTN	REDUCED	DIRECT	MECH

Continued on the following page

ACTIVE CONTROL LAW (Cont'd)

ACTIVE LAW ▸	PITCH		ROLL	YAW
SYS FAILED▾	LAW	PROTEC		
				ALTN (3)

(1) In case of AOA disagree
(2) After the faulty IR is selected OFF
(3) After FAC 1 is reset
(4) When landing gear down (or CONF 2, if both LGCIUs faulty)
(5) Depending where the failure is, control law may revert to alternate law

ACTIVE CONTROL LAW

Applicable to: B-HSD, B-HSE, B-HSG, B-HSJ, B-HSK, B-HSL, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTE, B-HTF

ACTIVE LAW ▸	PITCH		ROLL	YAW
SYS FAILED▾	LAW	PROTEC		
ELAC 1 or 2 or SEC 1 or 2	NORM	NORM	NORM	NORM
ELAC 1 and 2 or both ailerons	ALTN	REDUCED	DIRECT	ALTN
2 SEC	NORM	NORM	NORM	NORM
3 SEC	ALTN	REDUCED	DIRECT	ALTN
2 FAC	ALTN	REDUCED	DIRECT	MECH
Yaw damper	ALTN	REDUCED	DIRECT	MECH
2 SFCC (slat channel)	ALTN	NO	DIRECT	ALTN
2 ADR or 2 IR (2nd self detected)	ALTN	REDUCED	DIRECT	ALTN
2 ADR (2nd not self detec.)	ALTN	NO ——— REDUCED (1)	DIRECT	ALTN
2 IR (2nd not self detec.)	DIRECT ——— ALTN (2)	NO ——— REDUCED (2)	DIRECT	MECH ——— ALTN (2)
3 ADR	ALTN (6)	NO	DIRECT	MECH
3 IR	DIRECT	NO	DIRECT	MECH
2 RADIO ALT	NORM ——— DIRECT (4)	NORM ——— NO (4)	NORM ——— DIRECT (4)	NORM ——— MECH (4)
SPOILER 4 or 5 or (4 and 5)	NORM	NORM	NORM	NORM
All SPOILERS	ALTN	REDUCED	DIRECT	ALTN
1 AIL SERVO or 1 AILERON	NORM	NORM	NORM	NORM
1 ELEV SERVO	NORM	NORM	NORM	NORM
1 ELEVATOR	ALTN	REDUCED	DIRECT	ALTN
THS (jammed) (5)	NORM	NORM	NORM	NORM
	ALTN	REDUCED	DIRECT	ALTN
HYD G or Y or B	NORM	NORM	NORM	NORM
HYD G + Y	ALTN	REDUCED	DIRECT	MECH
HYD G + B	ALTN	NO	DIRECT	ALTN
HYD Y + B	NORM	NORM	NORM	NORM
on BATTERIES	ALTN	REDUCED	DIRECT	MECH
on EMER GEN	ALTN	REDUCED	DIRECT	MECH

Continued on the following page

ACTIVE CONTROL LAW (Cont'd)

ACTIVE LAW ▸ / SYS FAILED▾	PITCH		ROLL	YAW
	LAW	PROTEC		
				ALTN (3)

(1) *In case of AOA disagree*
(2) *After the faulty IR is selected OFF*
(3) *After FAC 1 is reset*
(4) *When landing gear down (or CONF 2, if both LGCIUs faulty)*
(5) *Depending where the failure is, control law may revert to alternate law*
(6) *DIRECT when in clean configuration*

ELEVATORS AND STABILIZER CONTROL AFTER FAILURE

Applicable to: ALL

	LEFT ELEVATOR		THS	RIGHT ELEVATOR	
	BLUE	GREEN	GREEN AND YELLOW	YELLOW	BLUE
NORM OPERATION		ELAC 2	ELAC 2	ELAC 2	
SINGLE FAILURE					
ELAC 2	ELAC 1		ELAC 1		ELAC 1
ELAC 1		ELAC 2	ELAC 2	ELAC 2	
SEC 2		ELAC 2	ELAC 2	ELAC 2	
SEC 1		ELAC 2	ELAC 2	ELAC 2	
G	ELAC 1		ELAC 1		ELAC 1
Y	ELAC 1		ELAC 1		ELAC 1
B		ELAC 2	ELAC 2	ELAC 2	
DOUBLE FAILURE					
ELAC 2 + ELAC 1		SEC 2	SEC 2	SEC 2	
+ SEC 2	ELAC 1		ELAC 1		ELAC 1
+ SEC 1	ELAC 1		ELAC 1		ELAC 1
+ G	ELAC 1		ELAC 1		ELAC 1
+ Y	ELAC 1		ELAC 1		ELAC 1
+ B		SEC 2	SEC 2	SEC 2	
ELAC 1 + SEC 2		ELAC 2	ELAC 2	ELAC 2	
+ SEC 1		ELAC 2	ELAC 2	ELAC 2	
+ G	SEC 1		SEC 2	SEC 2	
+ Y		SEC 2	SEC 2		SEC 1
+ B		ELAC 2	ELAC 2	ELAC 2	
SEC 2 + SEC 1		ELAC 2	ELAC 2	ELAC 2	
+ G	ELAC 1		ELAC 1		ELAC 1
+ Y	ELAC 1		ELAC 1		ELAC 1

Continued on the following page

Continued from the previous page

+ B		ELAC 2	ELAC 2	ELAC 2	
SEC 1 + G	ELAC 1		ELAC 1		ELAC 1
+ Y	ELAC 1		ELAC 1		ELAC 1
+ B		ELAC 2	ELAC 2	ELAC 2	
G + Y	ELAC 1		INOP		ELAC 1
B + G	Damped		ELAC 2	ELAC 2	
B + Y		ELAC 2	ELAC 2	Damped	
TRIPLE FAILURE					
ELAC 2					
ELAC 1 + SEC 2	SEC 1		SEC 1		SEC 1
+ SEC 1		SEC 2	SEC 2	SEC 2	
+ G	SEC 1		SEC 2	SEC 2	
+ Y		SEC 2	SEC 2		SEC 1
+ B		SEC 2	SEC 2	SEC 2	
SEC 2 + SEC 1	ELAC 1		ELAC 1		ELAC 1
+ G	ELAC 1		ELAC 1		ELAC 1
+ Y	ELAC 1		ELAC 1		ELAC 1
+ B	Centered		Mechanical	Centered	
SEC 1 + G	ELAC 1		ELAC 1		ELAC 1
+ Y	ELAC 1		ELAC 1		ELAC 1
+ B		SEC 2	SEC 2	SEC 2	
G + Y	ELAC 1		INOP		ELAC 1
B + G	Damped		SEC 2	SEC 2	
B + Y		SEC 2	SEC 2	Damped	
ELAC 1					
SEC 2 + SEC 1		ELAC 2	ELAC 2	ELAC 2	
+ G	SEC 1		SEC 1		SEC 1
+ Y	SEC 1		SEC 1		SEC 1
+ B		ELAC 2	ELAC 2	ELAC 2	
SEC 1 + G	Damped		SEC 2	SEC 2	
+ Y		SEC 2	SEC 2	Damped	
+ B		ELAC 2	ELAC 2	ELAC 2	
G + Y	SEC 1		INOP		SEC 1
B + G	Damped		ELAC 2	ELAC 2	
B + Y		ELAC 2	ELAC 2	Damped	
SEC 2					
SEC 1 + G	ELAC 1		ELAC 1		ELAC 1
+ Y	ELAC 1		ELAC 1		ELAC 1
+ B		ELAC 2	ELAC 2	ELAC 2	
G + Y	ELAC 1		INOP		ELAC 1
B + G	Damped		ELAC 2	ELAC 2	
B + Y		ELAC 2	ELAC 2	Damped	
SEC 1					
G + Y	ELAC 1		INOP		ELAC 1

Continued on the following page

Continued from the previous page

B + G	Damped		ELAC 2	ELAC 2
B + Y		ELAC 2	ELAC 2	Damped

F/CTL RUDDER JAM

Applicable to: ALL

L2 Rudder jamming may be detected by undue (and adverse) pedal movement during rolling maneuvers.
This is because the yaw damper orders can no longer be sent to the rudder, but are fed back to the pedals.
Use F/CTL SD page for a visual check of the rudder position.

24 L1 **FOR APPROACH**

AVOID LANDING WITH CROSSWIND from the side where the rudder is deflected.
MAX CROSSWIND for LDG 15 kt
AUTO BRK..... DO NOT USE

L2 *Do not use the autobrake, so as not to delay the application of differential braking at landing roll.*

L1 FOR LDG..... USE NORMAL CONF
SPEED AND TRAJECTORY..... STABILIZE ASAP
LDG DIST PROC..... APPLY

ON GROUND

DIFFERENTIAL BRAKING..... USE ASAP

L2 *Do not use asymmetric reverse thrust.*
Use nosewheel steering handle below 70 kt.

SIDESTICK/RUDDER PEDALS STIFF

Applicable to: ALL

L2 Even if the autopilot is disengaged, the sidestick and/or the rudder pedals may be stiff. This may affect either:

- Both sidesticks (CAPT and F/O) at the same time, but not the rudder pedals, or
- One sidestick and the rudder pedals at the same time.

The piloting technique remains the same: The aircraft remains responsive.
However, the flight crew should keep in mind that they may need to use extra force on the sidesticks and/or the rudder pedals.
The extra force required to move the controls out of the neutral position is moderate.
This extra force does not significantly affect the handling of the aircraft.

L1 ● **If sidesticks and/or rudder pedals are stiff after autopilot disengagement, apply the following procedure:**

AP DISENGAGEMENT..... CONFIRM

L2 *Confirm autopilot disengagement by checking that either:*

- *The FMA no longer displays the AP1(2) indication, or*
- *The AP lights on the FCU are off, or*
- *The ECAM displays the AP1(2) OFF red message, or*
- *The cavalry charge audio alert has triggered.*

L1 CONSIDER TRANSFERRING CONTROL TO PNF

L2 *If the PNF's sidestick is not affected.*

L1 ● **FOR DECRAB, ROLLOUT, OR ENGINE FAILURE**

BE PREPARED TO APPLY EXTRA FORCE ON RUDDER PEDAL

L2 *Not applicable if both sidesticks are stiff.*

Intentionally left blank

ACT UNUSABLE PROC

Applicable to: B-HTG, B-HTH, B-HTI

ACT.....AUTO

This stops the pump dry running

FUEL ACT UNUSABLE

Applicable to: B-HTG, B-HTH, B-HTI

PROC.....APPLY

L2 *Apply the ACT UNUSABLE procedure (Refer to PRO-ABN-28 ACT UNUSABLE PROC), that is not indicated on the ECAM.*

STATUS	INOP SYS
ACT UNUSABLE • **If CTR PUMPS OFF:** CTR TK FUEL UNUSABLE	ACT XFR CTR TK PUMPS

FUEL ACT ◁ XFR FAULT

Applicable to: B-HTD, B-HTE, B-HTF

ACT.....FWD

● **IF NECESSARY:**

DESCEND TO FL270.

L2 *Note: ACT transfer rate depends on altitude and on remaining ACT quantity.*
If ACT transfer is uncertain, set the ACT pb to AUTO to avoid pump dry running.
ACT pb can be reselected to FWD at lower Flight Level to recover remaining ACT fuel.

L1 ● **WHEN ACT EMPTY:**

ACT.....AUTO

ACT UNUSABLE (IF AUTOMATIC AND MANUAL MODE ARE FAILED).

Continued on the following page

FUEL ACT ◁ XFR FAULT (Cont'd)

STATUS	INOP SYS
• **If automatic and manual mode are failed:** ACT UNUSABLE	ACT XFR

FUEL ACT ◁ XFR FAULT

Applicable to: B-HTG, B-HTH, B-HTI

ACT.....FWD

● **IF NECESSARY:**

DESCEND TO FL270.

L2 *Note: ACT transfer rate depends on altitude and on remaining ACT quantity. If ACT transfer is uncertain, set the ACT pb to AUTO to avoid pump dry running. ACT pb can be reselected to FWD at lower Flight Level to recover remaining ACT fuel.*

L1 ● **WHEN ACT EMPTY:**

ACT..... AUTO

● **IF NO XFR:**

ACT UNUSABLE (If automatic and manual mode are failed).
PROC.....APPLY

STATUS	INOP SYS
• **If automatic and manual mode are failed:** ACT UNUSABLE	ACT XFR

FUEL ACT PUMP LO PR

Applicable to: ALL 321

ACT LO LVL (DISPLAYED IF THE ACT IS EMPTY).
ACT.....OFF

FUEL APU LP VALVE FAULT

Applicable to: ALL

L2 Crew awareness

FUEL AUTO FEED FAULT

Applicable to: ALL 320

FUEL MODE SEL.....MAN

L2 *The center tank pumps will run and feed the engines.*

L1 ■ **Fuel in one wing tank < 5 000 kg (11 000 lb) and in center tank > 250 kg (550 lb):**
CTR TK PUMP 1.....ON
CTR TK PUMP 2.....ON

L2 *When the center tank is empty, CTR TK PUMP LO PR warning will come on.*

L1 ■ **CTR TK PUMPS running after slat extension, or LO LVL in center tank:**
CTR TK PUMP 1.....OFF
CTR TK PUMP 2.....OFF

STATUS

CTR TK FEED : MAN ONLY

FUEL AUTO TRANSFER FAULT

Applicable to: ALL 321

FUEL MODE SEL.....MAN

L2 *The center tank transfer valves open.*

L1 CTR TK L XFR.....CHECK ON
CTR TK R XFR.....CHECK ON

L2 *The center tank transfer valves may remain open when the center tank is empty.*

	STATUS
CTR TK FEED MAN SPLY	

FUEL CTR TK PUMP 1(2) LO PR

Applicable to: ALL 320

● **IF NO FUEL LEAK:**
FUEL X FEED.....ON

CTR TK PUMP (AFFECTED).....OFF

L2 *A fuel imbalance may occur, if the performance of the pumps of one wing is different from that of the other wing, and the CTR TK PUMP that is not affected stops automatically because:*
- *The R(L) INR TK is full, or*
- *The CTR TK is empty.*

In this case, apply the FUEL IMBALANCE procedure, as required. When the CTR TK is empty, the X FEED pb-sw may be turned off, to avoid a possible fuel imbalance.

STATUS	
	INOP SYS
	CTR TK PUMP 1(2)

FUEL CTR TK PUMPS LO PR

Applicable to: ALL 320

L2 Set FUEL MODE SEL pb-sw to MAN, to avoid the possible triggering of the FUEL CTR TK PUMPS OFF ECAM caution.

L1 CTR TK PUMP 1..... OFF
CTR TK PUMP 2..... OFF
CTR TK UNUSABLE

L2 *Gravity feeding from the center tank is not possible (no by-pass valve fitted on the center tank pumps).*

STATUS	
CTR TK FUEL UNUSABLE	**INOP SYS**
	CTR TK PUMPS

FUEL CTR TK PUMPS OFF

Applicable to: ALL 320

L2 The center tank pumps pushbuttons are OFF, with slats retracted.

L1 CTR TK PUMP 1..... ON
CTR TK PUMP 2..... ON

FUEL CTR TK XFR OFF

Applicable to: ALL 321

L2 Center tank transfer valves pushbuttons at off.

L1 CTR TK L XFR..... ON
CTR TK R XFR.....ON

FUEL ENG 1(2) LP VALVE OPEN

Applicable to: ALL

L2 Crew awareness

FUEL FQI CH 1(2) FAULT

Applicable to: ALL

L2 Crew awareness

FUEL IMBALANCE

Applicable to: ALL 320

FOB..... CHECK

Compare the FOB + FU, with the FOB at departure.
If the difference is significant, or if the FOB + FU decreases, suspect a fuel leak.

CAUTION	A fuel imbalance may indicate a fuel leak. Do not apply this procedure, if a fuel leak is suspected. *Refer to PRO-ABN-28 FUEL LEAK.*

FUEL X FEED..... ON

- **On the lighter side and in the center tank:**
  FUEL PUMPS..... OFF
- **When fuel is balanced:**
  FUEL PUMPS (WING + CTR)..... ON
  FUEL X FEED..... OFF

Note: *There is no requirement to correct an imbalance, until the ECAM fuel advisory is displayed.*

FUEL IMBALANCE

Applicable to: ALL 321

FOB..... CHECK

Compare the FOB + FU, with the FOB at departure.
If the difference is significant, or if the FOB + FU decreases, suspect a fuel leak.

CAUTION	A fuel imbalance may indicate a fuel leak. Do not apply this procedure, if a fuel leak is suspected. *Refer to PRO-ABN-28 FUEL LEAK.*

FUEL X FEED.....ON
CTR TK L+R XFR.....OFF

- **On the lighter side:**
  FUEL PUMPS.....OFF

- **When fuel is balanced:**
  FUEL PUMPS.....ON
  CTR TK L+R XFR.....ON
  FUEL X FEED.....OFF

Note: *There is no requirement to correct an imbalance, until the ECAM fuel advisory is displayed.*

FUEL LEAK

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

A fuel leak may be detected, if:
- The sum of FOB and FU significantly less than FOB at engine start or is decreasing, or
- A passenger observes fuel spray from engine/pylon or wing tip, or
- The total fuel quantity is decreasing at an abnormal rate, or
- A fuel imbalance is developing, or
- Fuel quantity in a tank is decreasing too fast (leak from engine/pylon, or hole in a tank), or
- The Fuel flow is excessive (leak from engine), or
- Fuel is smelt in the cabin.

If visibility permits, leak source may be identified by a visual check from the cabin.

WHEN A LEAK IS CONFIRMED

LAND ASAP

■ **LEAK FROM ENGINE/PYLON CONFIRMED:**

Engine fuel leak can be confirmed by excessive fuel flow indication, or a visual check.

THR LEVER (of affected engine)..... IDLE
ENG MASTER (of affected engine).....OFF
FUEL X FEED..... USE AS RQRD

If the leak stops, the crossfeed valve can now be opened to re-balance fuel quantity, or to enable use of fuel from both wings. Do not restart the engine.

■ **LEAK FROM ENGINE/PYLON NOT CONFIRMED or LEAK NOT LOCATED:**

Stop any fuel transfer, and then monitor the depletion rate of each inner tank, to determine if the leak is from an engine or a wing (case 1), or from the Center tank, or the APU feeding line (case 2).

FUEL X FEED.....MAINTAIN CLOSED

The crossfeed valve must remain closed to prevent the leak from affecting both sides.

CTR TK PUMP 1+2.....OFF

Each engine is fed via its associated inner tank only.

INNER TANK FUEL QUANTITIES..... MONITOR

Monitor the depletion rate of each inner tank.

Continued on the following page

FUEL LEAK (Cont'd)

■ **CASE 1: IF ONE INNER TANK DEPLETES FASTER THAN THE OTHER BY AT LEAST 300 kg (660 lb) IN LESS THAN 30 MINUTES:**

An engine leak may still be suspected. Therefore:

THR LEVER (engine on leaking side)..... IDLE
ENG MASTER (engine on leaking side).....OFF
CTR TK PUMP 1+2..... ON
FUEL LEAK..... MONITOR

■ **If leak stops:**

If the inner tank fuel quantity of the affected side stops decreasing, the engine leak is confirmed and stopped.

FUEL X FEED..... USE AS RQRD

The crossfeed valves can now be opened to re-balance fuel quantity, or to enable use of fuel from both wings. Do not restart the engine.

■ **If leak continues (after engine shutdown):**

The inner tank fuel quantity of the affected side continues to decrease. If the leak has not stopped after engine shut down, a leak from the wing may be suspected.

ENGINE RESTART.....CONSIDER

CAUTION	Do not apply the FUEL IMBALANCE procedure. Approach and landing can be done, even with one full wing/one empty wing.

■ **CASE 2: IF BOTH INNER TANKS DEPLETE AT A SIMILAR RATE:**

A leak from the Center tank or the APU feeding line may be suspected.

● **If fuel smell in the cabin:**
APU (if ON).....OFF
This prevents additional fuel loss through the APU feeding line.

● **When fuel quantity in one inner tank is less than 3 tons (6600 lb):**
CTR TK PUMP 1+2.....ON

FOR LANDING

CAUTION	Do not use reversers.

FUEL LEAK

Applicable to: ALL 321

A fuel leak may be detected, if:
- The sum of FOB and FU significantly less than FOB at engine start or is decreasing, or
- A passenger observes fuel spray from engine/pylon or wing tip, or
- The total fuel quantity is decreasing at an abnormal rate, or
- A fuel imbalance is developing, or
- Fuel quantity in a tank is decreasing too fast (leak from engine/pylon, or hole in a tank), or
- The Fuel flow is excessive (leak from engine), or
- Fuel is smelt in the cabin.

If visibility permits, leak source may be identified by a visual check from the cabin.

WHEN A LEAK IS CONFIRMED

LAND ASAP

■ **LEAK FROM ENGINE/PYLON CONFIRMED:**

Engine fuel leak can be confirmed by excessive fuel flow indication, or a visual check.

THR LEVER (of affected engine)..... IDLE
ENG MASTER (of affected engine).....OFF
FUEL X FEED..... USE AS RQRD

If the leak stops, the crossfeed valve can now be opened to re-balance fuel quantity, or to enable use of fuel from both wings. Do not restart the engine.

■ **LEAK FROM ENGINE/PYLON NOT CONFIRMED or LEAK NOT LOCATED:**

Stop any fuel transfer, and then monitor the depletion rate of each wing tank, to determine if the leak is from an engine or a wing (case 1), or from the Center tank, or the APU feeding line (case 2).

FUEL X FEED.....MAINTAIN CLOSED

The crossfeed valve must remain closed to prevent the leak from affecting both sides.

CTR TK L+R XFR.....OFF

Each engine is fed via its associated wing tank only.

WING TANK FUEL QUANTITIES.....MONITOR

Monitor the depletion rate of each wing tank.

Continued on the following page

FUEL LEAK (Cont'd)

■ **CASE 1: IF ONE WING TANK DEPLETES FASTER THAN THE OTHER BY AT LEAST 300 kg (660 lb) IN LESS THAN 30 MINUTES:**

An engine leak may still be suspected. Therefore:

THR LEVER (engine on leaking side)..... IDLE
ENG MASTER (engine on leaking side).....OFF
FUEL LEAK..... MONITOR

■ **If leak stops:**

If the wing tank fuel quantity of the affected side stops decreasing, the engine leak is confirmed and stopped.

CTR TK L+R XFR..... ON
FUEL X FEED..... USE AS RQRD

The crossfeed valves can now be opened to re-balance fuel quantity, or to enable use of fuel from both wings. Do not restart the engine.

■ **If leak continues (after engine shutdown):**

The wing tank fuel quantity of the affected side continues to decrease. If the leak has not stopped after engine shut down, a leak from the wing may be suspected.

ENGINE RESTART.....CONSIDER
CTR TK XFR (non-leaking side)..... ON

CAUTION	Do not apply the FUEL IMBALANCE procedure. Approach and landing can be done, even with one full wing/one empty wing.

■ **CASE 2: IF BOTH WING TANKS DEPLETE AT A SIMILAR RATE:**

A leak from the Center tank or the APU feeding line may be suspected.

● **If fuel smell in the cabin:**
APU (if ON).....OFF

This prevents additional fuel loss through the APU feeding line.

● **When fuel quantity in one wing tank is less than 3 tons (6600 lb):**
CTR TK L+R XFR..... ON

FOR LANDING

CAUTION	Do not use reversers.

FUEL LEAK

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

A fuel leak may be detected, if:
- The sum of FOB and FU significantly less than FOB at engine start or is decreasing, or
- A passenger observes fuel spray from engine/pylon or wing tip, or
- The total fuel quantity is decreasing at an abnormal rate, or
- A fuel imbalance is developing, or
- Fuel quantity in a tank is decreasing too fast (leak from engine/pylon, or hole in a tank), or
- The Fuel flow is excessive (leak from engine), or
- Fuel is smelt in the cabin.
- The destination EFOB turns to amber on the F-PLN (or on the FUEL PRED) page, or
- "DEST EFOB BELOW MIN" appears on the MCDU scratchpad.

If visibility permits, leak source may be identified by a visual check from the cabin.

WHEN A LEAK IS CONFIRMED

LAND ASAP

■ **LEAK FROM ENGINE/PYLON CONFIRMED:**

Engine fuel leak can be confirmed by excessive fuel flow indication, or a visual check.

THR LEVER (of affected engine)..... IDLE
ENG MASTER (of affected engine).....OFF
FUEL X FEED..... USE AS RQRD

If the leak stops, the crossfeed valve can now be opened to re-balance fuel quantity, or to enable use of fuel from both wings. Do not restart the engine.

■ **LEAK FROM ENGINE/PYLON NOT CONFIRMED or LEAK NOT LOCATED:**

Stop any fuel transfer, and then monitor the depletion rate of each inner tank, to determine if the leak is from an engine or a wing (case 1), or from the Center tank, or the APU feeding line (case 2).

FUEL X FEED.....MAINTAIN CLOSED

The crossfeed valve must remain closed to prevent the leak from affecting both sides.

CTR TK PUMP 1+2.....OFF

Each engine is fed via its associated inner tank only.

INNER TANK FUEL QUANTITIES..... MONITOR

Monitor the depletion rate of each inner tank.

Continued on the following page

FUEL LEAK (Cont'd)

■ **CASE 1: IF ONE INNER TANK DEPLETES FASTER THAN THE OTHER BY AT LEAST 300 kg (660 lb) IN LESS THAN 30 MINUTES:**

An engine leak may still be suspected. Therefore:

THR LEVER (engine on leaking side)..... IDLE
ENG MASTER (engine on leaking side).....OFF
CTR TK PUMP 1+2..... ON
FUEL LEAK..... MONITOR

■ **If leak stops:**

If the inner tank fuel quantity of the affected side stops decreasing, the engine leak is confirmed and stopped.

FUEL X FEED..... USE AS RQRD

The crossfeed valves can now be opened to re-balance fuel quantity, or to enable use of fuel from both wings. Do not restart the engine.

■ **If leak continues (after engine shutdown):**

The inner tank fuel quantity of the affected side continues to decrease. If the leak has not stopped after engine shut down, a leak from the wing may be suspected.

ENGINE RESTART.....CONSIDER

CAUTION	Do not apply the FUEL IMBALANCE procedure. Approach and landing can be done, even with one full wing/one empty wing.

■ **CASE 2: IF BOTH INNER TANKS DEPLETE AT A SIMILAR RATE:**

A leak from the Center tank or the APU feeding line may be suspected.

● **If fuel smell in the cabin:**
APU (if ON).....OFF
This prevents additional fuel loss through the APU feeding line.

● **When fuel quantity in one inner tank is less than 3 tons (6600 lb):**
CTR TK PUMP 1+2.....ON

FOR LANDING

CAUTION	Do not use reversers.

FUEL L (R) OUTER (INNER) TK HI TEMP

Applicable to: ALL 320

L2 This caution may spuriously trigger due to interference from communication equipment. Therefore, the flight crew should wait 2 min while the fuel temperature measurement is updated. After 2 min, if the ECAM caution has not disappeared, the flight crew must apply the following procedure:

L1 GEN (AFFECTED SIDE).....OFF

■ **On the ground:**

DELAY T.O.
ENG MASTER (AFFECTED SIDE).....OFF

■ **In flight:**

ENG F. FLOW (AFFECTED SIDE).....INCREASE

L2 *Disconnect autothrust. Adjust the thrust lever to increase fuel flow through the IDG oil heat exchanger and decrease the temperature of the fuel returning to the outer cell.*

L1 ● **IF TEMP ABV 65 DEG C in outer cell or 57 DEG C in inner cell:**

APU.....AS RQRD

L2 *APU if available may be started and APU GEN used to allow IDG disconnection.*

L1 ● **If opposite GEN avail:**

IDG (AFFECTED SIDE).....OFF

FUEL L (R) OUTER (INNER) TK LO TEMP

Applicable to: ALL 320

■ **On the ground before takeoff:**

DELAY T.O

L2 *Do not takeoff until temperatures are within limits.*

L1 ■ **In flight:**

Crew awareness

L2 Consider descending to a lower altitude and/or increasing Mach to increase TAT.

FUEL L (R) TK PUMP 1(2) LO PR

Applicable to: ALL

TK PUMP (AFFECTED).....OFF

L2 *Note:* *Aircraft altitude must be limited to 35 000 ft if a single fuel pump feeds both engines with hot JET B (JP4) fuel (fuel temperature above 30 °C).*

STATUS	
	INOP SYS
	TK PUMP (affected)

FUEL L (R) TK PUMP 1 + 2 LO PR

Applicable to: ALL 321

L2 The alert is automatically recalled, when reaching FL 150, while climbing or descending.

L1 ● **IF NO FUEL LEAK:**
FUEL X FEED (IF ABOVE FL150)..... ON

ENG MODE SEL.....IGN

L2 *The selection of continuous relight protects against flame-out, caused by possible fuel supply surging.*

L1 TK PUMP 1 (AFFECTED).....OFF
TK PUMP 2 (AFFECTED).....OFF

● **WHEN TK (affected) FUEL RQRD:**
TK (AFFECTED) FEED.....GRVTY ONLY

L2 *Apply the GRVTY FUEL FEEDING procedure, (Refer to PRO-ABN-28 GRVTY FUEL FEEDING).*
Fuel from the affected tank may be used immediately if there is no ceiling limitation for gravity fuel feeding.

L1 FUEL X FEED (IF BELOW FL150).....OFF

● **If FUEL X FEED off:**

L2 As long as fuel X feed is closed, associated engine is fed by gravity only.

L1 PROC: GRVTY FUEL FEEDING

L2 *Apply the GRVTY FUEL FEEDING procedure, (Refer to PRO-ABN-28 GRVTY FUEL FEEDING).*

L1 AVOID NEGATIVE G FACTOR

L2 *Avoiding negative g will prevent fuel surging and therefore reduce the risk of engine malfunction.*

STATUS

• **If FUEL X FEED off:** PROC: GRVTY FUEL FEEDING AVOID NEGATIVE G FACTOR TK (AFFECTED) GRVTY FEED ONLY	**INOP SYS** TK PUMPS (affected)

FUEL L (R) TK PUMP 1 + 2 LO PR
(CENTER TANK EMPTY)

Applicable to: ALL 320

L2 The alert is automatically recalled, when reaching FL 150, while climbing or descending.

L1 ● **IF NO FUEL LEAK:**
FUEL X FEED (IF ABOVE FL150)..... ON

ENG MODE SEL.....IGN

L2 *The selection of continuous relight protects against flame-out, caused by possible fuel supply surging.*

L1 TK PUMP 1 (AFFECTED).....OFF
TK PUMP 2 (AFFECTED).....OFF

● **WHEN TK (affected) FUEL RQRD:**
TK (AFFECTED) FEED.....GRVTY ONLY

L2 *Apply GRVTY FUEL FEED procedure, (Refer to PRO-ABN-28 GRVTY FUEL FEEDING). Fuel from the affected tank may be used immediately if there is no ceiling limitation for gravity fuel feeding.*

L1 FUEL X FEED (IF BELOW FL150).....OFF

● **If FUEL X FEED off:**

L2 As long as fuel X feed is closed, associated engine is fed by gravity only.

L1 PROC: GRVTY FUEL FEEDING

L2 *Apply GRVTY FUEL FEED procedure, (Refer to PRO-ABN-28 GRVTY FUEL FEEDING).*

L1 AVOID NEGATIVE G FACTOR

L2 *Avoiding negative g will prevent fuel surging and therefore reduce the risk of engine malfunction.*

STATUS

• **If FUEL X FEED off:** PROC:GRVTY FUEL FEEDING AVOID NEGATIVE G FACTOR TK (AFFECTED) GRVTY FEED ONLY	**INOP SYS** TK PUMPS (affected)

FUEL L (R) TK PUMP 1 + 2 LO PR
(CENTER TANK NOT EMPTY)

Applicable to: ALL 320

FUEL MODE SEL (IF CTR TK NOT FEEDING).....MAN

L2 *Setting FUEL MODE SEL pb-sw to MAN will allow center tank pumps to run.*

L1 TK PUMP 1 (AFFECTED).....OFF

TK PUMP 2 (AFFECTED).....OFF

- **WHEN TK (affected) FUEL RQRD:**

L2 Apply the GRVTY FUEL FEEDING procedure, (*Refer to PRO-ABN-28 GRVTY FUEL FEEDING*).

L1 TK (AFFECTED) FEED.....GRVTY ONLY

PROC: GRVTY FUEL FEEDING

STATUS

	INOP SYS
PROC:GRVTY FUEL FEEDING TK (AFFECTED) GRVTY FEED ONLY CTR TK FEED: MAN ONLY	TK PUMPS (affected)

FUEL L (R) WING TK HI TEMP

Applicable to: ALL 321

GEN (AFFECTED SIDE).....OFF

■ **On the ground:**

DELAY T.O.
ENG MASTER (AFFECTED SIDE).....OFF

■ **In flight:**

ENG. F. FLOW (AFFECTED SIDE).....INCREASE

L2 *Disconnect autothrust. Adjust the thrust lever to increase fuel flow through the IDG oil heat exchanger and decrease the temperature of the fuel returning to the wing tank.*

L1 ● **IF TEMP ABV 57 DEG C:**

APU.....AS RQRD

L2 *APU if available may be started and APU GEN used allow IDG disconnection.*

L1 ● **If opposite GEN avail:**

IDG (AFFECTED SIDE).....OFF

FUEL L (R) WING TK LO LVL

Applicable to: ALL

● **If center tank not empty:**

FUEL MODE SEL.....MAN

● **IF NO FUEL LEAK AND FUEL IMBALANCE:**

FUEL X FEED.....ON
TK PUMP 1 (ON SIDE WITH LO LVL).....OFF
TK PUMP 2 (ON SIDE WITH LO LVL).....OFF

L2 *Note: TK PUMP 1+2 (on side with LO LVL) LO PR warning will be triggered.*

STATUS

	INOP SYS
• **If center tank not empty:** CTR TK FEED: MAN ONLY	TK PUMPS

FUEL L + R WING TK LO LVL

Applicable to: ALL 320

LAND ASAP (AMBER)

FUEL MODE SEL (IF CENTER TANK NOT EMPTY)..... MAN
ALL TK PUMPS..... ON

L2 *All pumps in center tank and in wing tanks will run.*

L1 FUEL X FEED..... OFF

FUEL L + R WING TK LO LVL

Applicable to: ALL 321

LAND ASAP (AMBER)

FUEL MODE SEL (IF CENTER TANK NOT EMPTY)..... MAN
ALL TK PUMPS..... ON

L2 *The center tank transfer valves will open if the associated pushbuttons are ON.*
All pumps in wing tanks will run.

L1 FUEL X FEED..... OFF

FUEL L (R) WING TK LO TEMP

Applicable to: ALL 321

■ **On the ground before takeoff:**

DELAY T.O

L2 *Do not takeoff until temperatures are within limits.*

L1 ■ **In flight:**

Crew awareness

L2 Consider descending to a lower altitude and/or increasing mach to increase TAT.

FUEL L (R) WING TK OVERFLOW

Applicable to: ALL 321

CTR TK L (R) XFR..... OFF

- **IF UNSUCCESSFUL and if center tank not empty:**

L2 Stop fuel transfer from the center tank to L (R) wing tank by switching off both L (R) wing tank pumps. Both engines are fed by R (L) wing tank until the center tank is empty.

L1 FUEL X FEED..... ON
L (R) TK PUMP 1..... OFF
L (R) TK PUMP 2..... OFF

- **When CTR TK empty:**

L (R) TK PUMP 1..... ON
L (R) TK PUMP 2..... ON
FUEL X FEED..... OFF

STATUS	
INOP SYS	
CTR TK L (R) XFR	

FUEL L (R) XFR VALVE CLOSED

Applicable to: ALL 320

L2 *Note: When fuel quantity in affected wing reaches low level, corresponding WING TK LO LVL warning is triggered.*

L1 OUTER TK UNUSABLE (AFFECTED SIDE)

STATUS
OUTER TK UNUSABLE (affected side)

FUEL L (R) XFR VALVE FAULT
(VALVE NOT FULLY CLOSED)

Applicable to: ALL 321

CTR TK L (R) XFR..... OFF

- **IF UNSUCCESSFUL and if the center tank is not empty:**

L2 Stop fuel transfer from the center tank to L (R) wing tank by switching off both L (R) wing tank pumps ; both engines are fed by the R (L) wing tank until the center tank is empty.

L1 FUEL X FEED..... ON
L (R) TK PUMP 1..... OFF
L (R) TK PUMP 2..... OFF

L2 *Note: FUEL L(R) TK PUMP 1 + 2 LO PR will be triggered.*

L1
- **When the center tank is empty (automatic recall of the warning) :**

L (R) TK PUMP 1..... ON
L (R) TK PUMP 2..... ON
FUEL X FEED..... OFF

STATUS

INOP SYS
CTR TK L (R) XFR

FUEL L (R) XFR VALVE FAULT
(VALVE NOT FULLY OPEN)

Applicable to: ALL 321

FUEL MODE SEL.....MAN

- **IF UNSUCCESSFUL and if the center tank is not empty :**

L2 Because fuel does not transfer from the center tank to L (R) wing tank, both engines are fed by R (L) wing tank.

L1 FUEL X FEED.....ON
L (R) TK PUMP 1.....OFF
L (R) TK PUMP 2.....OFF

L2 *Note: FUEL L(R) TK PUMP 1 + 2 LO PR will be triggered.*

L1
- **When the center tank is empty (automatic recall of the warning) :**

L (R) TK PUMP 1.....ON
L (R) TK PUMP 2.....ON
FUEL X FEED.....OFF

STATUS

INOP SYS
CTR TK L (R) XFR

FUEL L (R) XFR VALVE OPEN

Applicable to: ALL 320

L2 Crew awareness

STATUS

INOP SYS
L (R) CELL VALVE

FUEL X FEED VALVE FAULT

Applicable to: ALL

L2 If valve failed open, maintain fuel balance with selective use of pumps.
If valve failed closed and if unable to maintain an acceptable balance, land as soon as possible.

Crew awareness

STATUS	
	INOP SYS
	FUEL X FEED

FUEL XFR VALVES FAULT
(XFR VALVES NOT FULLY CLOSED)

Applicable to: ALL 321

CTR TK L XFR.....OFF
CTR TK R XFR.....OFF

STATUS	
	INOP SYS
	CTR TK XFR

FUEL XFR VALVES FAULT
(XFR VALVES NOT FULLY OPEN)

Applicable to: ALL 321

FUEL MODE SEL.....MAN

- **IF UNSUCCESSFUL:**

CTR AVAIL BY GRAVITY

L2 *If the center tank transfer valves are not fully open, the center tank fuel may be used by gravity.*

L1 2 T (4400 LBS) UNUSABLE

STATUS	
CTR TK USABLE BY GRAVITY CTR TK FUEL: 2 T (4400 LBS) UNUSABLE	**INOP SYS** CTR TK XFR

GRVTY FUEL FEEDING

Applicable to: ALL

ENG MODE SEL.....IGN
AVOID NEGATIVE G FACTOR

- **DETERMINE GRAVITY FEED CEILING:**

  Consult the following table to determine the flight altitude limitation.

Flight conditions at time of gravity feeding	Gravity feed ceiling
Flight time above FL 300 more than 30 min (Fuel deaerated)	Current FL(1)
Flight time above FL 300 less than 30 min (Fuel non-deaerated)	FL 300 (1)
Aircraft flight level never exceeded FL 300 (Fuel non-deaerated)	FL 150(1), or 7 000 ft above takeoff airport, whichever is higher

(1) For JET B, gravity feed ceiling is FL 100 in all cases.

DESCEND TO GRVTY FEED CEILING (if applicable).

- **WHEN REACHING GRVTY FEED CEILING:**
  FUEL X FEED..... OFF

- **IF NO FUEL LEAK AND FOR AIRCRAFT HANDLING:**
  If no fuel leak, and for flight with only one engine running (this engine being fed by gravity), apply the following :

  FUEL X FEED..... ON
  BANK ANGLE..... 1° WING DOWN ON LIVE ENGINE SIDE
  The fuel from the wing tank on the engine running side is used.
  RUDDER TRIM.....USE
  Use rudder trim to maintain constant course and neutral stick.

  - **WHEN FUEL IMBALANCE REACHES 1 000 kg (2 200 lb):**
    BANK ANGLE.....2° or 3° WING DOWN ON LIVE ENG SIDE
    Use fuel from the opposite wing tank, until fuel imbalance is reduced to 0.

HYD B RSVR LO AIR PR

Applicable to: ALL

- **IF PRESS FLUCTUATES:**
  BLUE ELEC PUMP.....OFF

ASSOCIATED PROCEDURES

B SYS LO PR

SECONDARY FAILURES
*F/CTL

L12

1

STATUS

APPR PROC	INOP SYS
The probability of cavitation increases with altitude. Therefore, it may be possible to restore the system after descending to a lower altitude. HYD LO PR BLUE ELEC PUMP..... AUTO ● **If sys not recovered:** LDG DIST PROC..... APPLY SLATS SLOW CAT 3 SINGLE ONLY	BLUE HYD SPLR 3 CAT 3 DUAL B ELEC PUMP

HYD B ELEC PUMP LO PR OR OVHT

Applicable to: ALL

BLUE ELEC PUMP.....OFF

ASSOCIATED PROCEDURES

B SYS LO PR

SECONDARY FAILURES

*F/CTL

2 **STATUS**

APPR PROC

HYD LO PR

- **IF BLUE OVHT OUT:**
  BLUE ELEC PUMP.....AUTO

LDG DIST PROC.....APPLY

SLATS SLOW
CAT 3 SINGLE ONLY

INOP SYS

BLUE HYD
SPLR 3
CAT 3 DUAL
B ELEC PUMP

HYD B RSVR LO LVL

Applicable to: ALL

BLUE ELEC PUMP.....OFF

ASSOCIATED PROCEDURES

B SYS LO PR

SECONDARY FAILURES

*F/CTL

Continued on the following page

HYD B RSVR LO LVL (Cont'd)

3

STATUS

	INOP SYS
LDG DIST PROC.....APPLY	BLUE HYD SPLR 3 CAT 3 DUAL EMER GEN B ELEC PUMP

SLATS SLOW
CAT 3 SINGLE ONLY

HYD B RSVR OVHT

Applicable to: ALL

BLUE ELEC PUMP.....OFF

ASSOCIATED PROCEDURES

B SYS LO PR

SECONDARY FAILURES

*F/CTL

4

STATUS

APPR PROC	**INOP SYS**
HYD LO PR ● **IF BLUE OVHT OUT:** BLUE ELEC PUMP.....AUTO ● **If sys not recovered:** LDG DIST PROC.....APPLY	BLUE HYD SPLR 3 CAT 3 DUAL B ELEC PUMP

SLATS SLOW
CAT 3 SINGLE ONLY

HYD G ENG 1 PUMP LO PR
(PTU OPERATIVE)

Applicable to: ALL

GREEN ENG 1 PUMP.....OFF

STATUS

INOP SYS
G ENG 1 PUMP

HYD G ENG 1 PUMP LO PR
(PTU INOPERATIVE)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

GREEN ENG 1 PUMP.....OFF

ASSOCIATED PROCEDURES

G SYS LO PR

SECONDARY FAILURES
*WHEEL
*F/CTL

Continued on the following page

HYD G ENG 1 PUMP LO PR (Cont'd)
(PTU INOPERATIVE)

5 **STATUS**

L/G.....GRVTY EXTN
LDG DIST PROC.....APPLY

SLATS/FLAPS SLOW
CAT 3 SINGLE

INOP SYS

GREEN HYD
SPLR 1+5
CAT 3 DUAL
N.W. STEER
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
PTU
G ENG 1 PUMP
YAW DAMPER 1

HYD G ENG 1 PUMP LO PR
(PTU INOPERATIVE)

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

GREEN ENG 1 PUMP.....OFF

ASSOCIATED PROCEDURES

G SYS LO PR

SECONDARY FAILURES

*WHEEL
*F/CTL

Continued on the following page

HYD G ENG 1 PUMP LO PR (Cont'd)
(PTU INOPERATIVE)

6

STATUS

L/G.....GRVTY EXTN
LDG DIST PROC.....APPLY

SLATS/FLAPS SLOW
CAT 3 SINGLE

INOP SYS

GREEN HYD
SPLR 1+5
CAT 3 DUAL
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
PTU
G ENG 1 PUMP
YAW DAMPER 1

HYD G RSVR LO AIR PR

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

● **IF PRESS FLUCTUATES:**
PTU.....OFF
GREEN ENG 1 PUMP.....OFF

G ENG 1 PUMP LO PR

ASSOCIATED PROCEDURES

G SYS LO PR

SECONDARY FAILURES

*WHEEL
*F/CTL

Continued on the following page

HYD G RSVR LO AIR PR (Cont'd)

L12
7

STATUS

APPR PROC

HYD LO PR

The probability of cavitation increases with altitude. Therefore, it may be possible to restore the system after descending to a lower altitude.

GREEN ENG 1 PUMP.....ON

- **IF HYD NOT RECOVERED:**
  - L/G..... GRVTY EXTN
  - *Refer to PRO-ABN-32 L/G GRAVITY EXTENSION*
  - LDG DIST PROC..... APPLY

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

GREEN HYD
SPLR 1 + 5
CAT 3 DUAL
N/W STRG
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
YAW DAMPER 1

HYD G RSVR LO AIR PR

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

- **IF PRESS FLUCTUATES:**
  - PTU..... OFF
  - GREEN ENG 1 PUMP..... OFF

G ENG 1 PUMP LO PR

ASSOCIATED PROCEDURES

G SYS LO PR

SECONDARY FAILURES

*WHEEL
*F/CTL

Continued on the following page

HYD G RSVR LO AIR PR (Cont'd)

L12
8

STATUS

APPR PROC

HYD LO PR

The probability of cavitation increases with altitude. Therefore, it may be possible to restore the system after descending to a lower altitude.

GREEN ENG 1 PUMP.....ON

- **IF HYD NOT RECOVERED:**
  - L/G..... GRVTY EXTN
  - *Refer to PRO-ABN-32 L/G GRAVITY EXTENSION*
  - LDG DIST PROC..... APPLY

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

GREEN HYD
SPLR 1 + 5
CAT 3 DUAL
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
YAW DAMPER 1

HYD G RSVR LO LVL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

PTU.....OFF
GREEN ENG 1 PUMP.....OFF
G ENG 1 PUMP LO PR

ASSOCIATED PROCEDURES

G SYS LO PR

SECONDARY FAILURES

*WHEEL
*F/CTL

Continued on the following page

HYD G RSVR LO LVL (Cont'd)

L12
9

STATUS

L/G.....GRVTY EXTN
Refer to PRO-ABN-32 L/G GRAVITY EXTENSION
LDG DIST PROC.....APPLY

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

GREEN HYD
SPLR 1 + 5
CAT 3 DUAL
N/W STRG
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
YAW DAMPER 1

HYD G RSVR LO LVL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

PTU.....OFF
GREEN ENG 1 PUMP.....OFF
G ENG 1 PUMP LO PR

ASSOCIATED PROCEDURES

G SYS LO PR

SECONDARY FAILURES

*WHEEL
*F/CTL

Continued on the following page

HYD G RSVR LO LVL (Cont'd)

L12
10

STATUS

L/G.....GRVTY EXTN
Refer to PRO-ABN-32 L/G GRAVITY EXTENSION
LDG DIST PROC.....APPLY

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

GREEN HYD
SPLR 1 + 5
CAT 3 DUAL
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
YAW DAMPER 1

HYD G RSVR OVHT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

PTU.....OFF
GREEN ENG 1 PUMP.....OFF
G ENG 1 PUMP LO PR

ASSOCIATED PROCEDURES

G SYS LO PR

SECONDARY FAILURES

*WHEEL
*F/CTL

Continued on the following page

HYD G RSVR OVHT (Cont'd)

L12
11

STATUS

APPR PROC

HYD LO PR

- **IF GREEN OVHT OUT:**
  GREEN ENG 1 PUMP..... ON
- **IF HYD NOT RECOVERED:**
  L/G..... GRVTY EXTN
  Refer to PRO-ABN-32 L/G GRAVITY EXTENSION
  LDG DIST PROC..... APPLY

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

GREEN HYD
SPLR 1 + 5
CAT 3 DUAL
N/W STRG
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
YAW DAMPER 1

HYD G RSVR OVHT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

PTU.....OFF
GREEN ENG 1 PUMP.....OFF
G ENG 1 PUMP LO PR

ASSOCIATED PROCEDURES

G SYS LO PR

SECONDARY FAILURES

*WHEEL
*F/CTL

Continued on the following page

HYD G RSVR OVHT (Cont'd)

L12
12

STATUS

APPR PROC

HYD LO PR

- **IF GREEN OVHT OUT:**
  GREEN ENG 1 PUMP..... ON
- **IF HYD NOT RECOVERED:**
  L/G..... GRVTY EXTN
  Refer to PRO-ABN-32 L/G GRAVITY EXTENSION
  LDG DIST PROC..... APPLY

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

GREEN HYD
SPLR 1 + 5
CAT 3 DUAL
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
YAW DAMPER 1

HYD Y ELEC PUMP LO PR OR OVHT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

L2 If the ELEC PUMP overheats, or if the Y ELEC PUMP fails, while the Y ENG PUMP and the PTU are inoperative:

L1 YELLOW ELEC PUMP..... OFF

ASSOCIATED PROCEDURES

Y SYS LO PR

BRK Y ACCU PR MONITOR

L2 *This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 min. In that case: The only remaining braking means is the normal braking using green pressure, the parking brake should not be used since it is not available and the chocks should be in place before engine 1 shutdown.*

L1

SECONDARY FAILURES

*F/CTL

L12

13

STATUS

APPR PROC

HYD LO PR

- **IF YELLOW OVHT OUT:**
  YELLOW ENG 2 PUMP..... ON
  PTU..... AUTO
  The above two lines are only displayed, in case of an electrical pump overheat.

LDG DIST PROC.....APPLY

FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

YELLOW HYD
SPLR 2+4
CAT 3 DUAL
ALTN BRK
REVERSER 2
Y ELEC PUMP
YAW DAMPER 2

HYD Y ELEC PUMP LO PR OR OVHT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 If the ELEC PUMP overheats, or if the Y ELEC PUMP fails, while the Y ENG PUMP and the PTU are inoperative:

L1 YELLOW ELEC PUMP..... OFF

ASSOCIATED PROCEDURES

Y SYS LO PR

BRK Y ACCU PR MONITOR

L2 *This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 min. In that case: The only remaining braking means is the normal braking using green pressure, the parking brake should not be used since it is not available and the chocks should be in place before engine 1 shutdown.*

L1

SECONDARY FAILURES

*F/CTL

L12

14

STATUS

APPR PROC

HYD LO PR

- **IF YELLOW OVHT OUT:**
  YELLOW ENG 2 PUMP..... ON
  PTU..... AUTO
  The above two lines are only displayed, in case of an electrical pump overheat.

LDG DIST PROC.....APPLY

FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

YELLOW HYD
SPLR 2+4
CAT 3 DUAL
N.W STEER
ALTN BRK
REVERSER 2
Y ELEC PUMP
YAW DAMPER 2

HYD Y ENG 2 PUMP LO PR
(PTU OPERATIVE)

Applicable to: ALL

YELLOW ENG 2 PUMP.....OFF

STATUS

INOP SYS
Y ENG 2 PUMP

HYD Y ENG 2 PUMP LO PR
(PTU INOPERATIVE)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

YELLOW ENG 2 PUMP.....OFF

ASSOCIATED PROCEDURES

Y SYS LO PR

L2 *Note:* *If yellow system is affected, the yellow electrical pump may be used.*

L1

SECONDARY FAILURES
*F/CTL

Continued on the following page

HYD Y ENG 2 PUMP LO PR (Cont'd)
(PTU INOPERATIVE)

L12
15

STATUS

LDG DIST PROC.....APPLY

FLAPS SLOW
CAT 3 SINGLE
See (1)

INOP SYS

YELLOW HYD
SPLR 2+4
CAT 3 DUAL
ALTN BRK
REVERSER 2
PTU
Y ENG 2 PUMP
YAW DAMPER 2

(1)

Note: *Following a yellow hydraulic system failure, the parking brake may be inoperative due to a yellow accumulator low pressure.*

HYD Y ENG 2 PUMP LO PR
(PTU INOPERATIVE)

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

YELLOW ENG 2 PUMP.....OFF

ASSOCIATED PROCEDURES

Y SYS LO PR

L2 Note: *If yellow system is affected, the yellow electrical pump may be used.*

L1

SECONDARY FAILURES

*F/CTL

Continued on the following page

HYD Y ENG 2 PUMP LO PR (Cont'd)
(PTU INOPERATIVE)

L12
16

STATUS

LDG DIST PROC.....APPLY

FLAPS SLOW
CAT 3 SINGLE
See (1)

INOP SYS

YELLOW HYD
SPLR 2+4
CAT 3 DUAL
N.W. STEER
ALTN BRK
REVERSER 2
PTU
Y ENG 2 PUMP
YAW DAMPER 2

(1) Note: *Following a yellow hydraulic system failure, the parking brake may be inoperative due to a yellow accumulator low pressure.*

HYD Y RSVR LO AIR PR

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

- **IF PRESS FLUCTUATES:**
  - PTU..... OFF
  - YELLOW ENG 2 PUMP..... OFF
  - YELLOW ELEC PUMP..... OFF

BRK Y ACCU PR MONITOR

L2 *This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 min. In that case : The only remaining braking means is normal braking, using green pressure. The parking brake should not be used since, it is not available. And, the chocks should be in place before Engine 1 shutdown.*

L1 Y ENG 2 PUMP LO PR

ASSOCIATED PROCEDURES

Y SYS LO PR

SECONDARY FAILURES

*F/CTL

L2 The probability of cavitation increases with altitude.
Therefore, it may be possible to restore the system after descending to a lower altitude.

17 L1

STATUS

APPR PROC

HYD LO PR
YELLOW ENG 2 PUMP.....ON

- **If sys not recovered:**
  LDG DIST PROC..... APPLY

FLAPS SLOW
CAT 3 SINGLE

INOP SYS

YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
ALTN BRK
REVERSER 2
YAW DAMPER 2

HYD Y RSVR LO AIR PR

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

● **IF PRESS FLUCTUATES:**

PTU..... OFF
YELLOW ENG 2 PUMP..... OFF
YELLOW ELEC PUMP..... OFF

BRK Y ACCU PR MONITOR

L2 *This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 min. In that case : The only remaining braking means is normal braking, using green pressure. The parking brake should not be used since, it is not available. And, the chocks should be in place before Engine 1 shutdown.*

L1 Y ENG 2 PUMP LO PR

ASSOCIATED PROCEDURES

Y SYS LO PR

SECONDARY FAILURES
*F/CTL

L2 The probability of cavitation increases with altitude.
Therefore, it may be possible to restore the system after descending to a lower altitude.

18 L1

STATUS

APPR PROC	INOP SYS
HYD LO PR YELLOW ENG 2 PUMP.....ON ● **If sys not recovered:** LDG DIST PROC..... APPLY ALTN Y BRK WITH A/SKID FLAPS SLOW CAT 3 SINGLE	YELLOW HYD SPLR 2 + 4 CAT 3 DUAL N/W STRG ALTN BRK REVERSER 2 YAW DAMPER 2

HYD Y RSVR LO LVL

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

PTU.....OFF
YELLOW ENG 2 PUMP.....OFF
YELLOW ELEC PUMP..... OFF
BRK Y ACCU PR MONITOR

L2 *This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 min. In that case: The only remaining braking means is normal braking, using green pressure. The parking brake should not be used since, it is not available. And, the chocks should be in place before Engine 1 shutdown.*

L1 Y ENG 2 PUMP LO PR

ASSOCIATED PROCEDURES

Y SYS LO PR

SECONDARY FAILURES
*F/CTL

L12

19 **STATUS**

LDG DIST PROC.....APPLY

FLAPS SLOW
CAT 3 SINGLE
See (1)

INOP SYS
YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
ALTN BRK
REVERSER 2
CARGO DOOR
YAW DAMPER 2

(1) Note: *Following a yellow hydraulic system failure, the parking brake may be inoperative due to a yellow accumulator low pressure.*

HYD Y RSVR LO LVL

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

PTU.....OFF
YELLOW ENG 2 PUMP.....OFF
YELLOW ELEC PUMP..... OFF
BRK Y ACCU PR MONITOR

L2 *This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 min. In that case: The only remaining braking means is normal braking, using green pressure. The parking brake should not be used since, it is not available. And, the chocks should be in place before Engine 1 shutdown.*

L1 Y ENG 2 PUMP LO PR

ASSOCIATED PROCEDURES

Y SYS LO PR

SECONDARY FAILURES

*F/CTL

L12

20 **STATUS**

LDG DIST PROC.....APPLY

ALTN Y BRK WITH A/SKID
FLAPS SLOW
CAT 3 SINGLE
See (1)

INOP SYS

YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
N/W STRG
ALTN BRK
REVERSER 2
CARGO DOOR
YAW DAMPER 2

(1) Note: *Following a yellow hydraulic system failure, the parking brake may be inoperative due to a yellow accumulator low pressure.*

HYD Y RSVR OVHT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

PTU.....OFF
YELLOW ENG 2 PUMP.....OFF
YELLOW ELEC PUMP..... OFF
BRK Y ACCU PR MONITOR

L2 *This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 min. In that case: The only remaining braking means is normal braking, using green pressure. The parking brake should not be used since, it is not available. And, the chocks should be in place before Engine 1 shutdown.*

L1 Y ENG 2 PUMP LO PR

ASSOCIATED PROCEDURES

Y SYS LO PR

SECONDARY FAILURES

*F/CTL

21 **STATUS**

APPR PROC

HYD LO PR

- **IF YELLOW OVHT OUT:**
  YELLOW ENG 2 PUMP..... ON
- **If not recovered:**
  LDG DIST PROC..... APPLY

FLAPS SLOW
CAT 3 SINGLE

INOP SYS

YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
ALTN BRK
REVERSER 2
YAW DAMPER 2

HYD Y RSVR OVHT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

PTU.....OFF
YELLOW ENG 2 PUMP.....OFF
YELLOW ELEC PUMP..... OFF
BRK Y ACCU PR MONITOR

L2 *This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 min. In that case: The only remaining braking means is normal braking, using green pressure. The parking brake should not be used since, it is not available. And, the chocks should be in place before Engine 1 shutdown.*

L1 Y ENG 2 PUMP LO PR

ASSOCIATED PROCEDURES

Y SYS LO PR

SECONDARY FAILURES

*F/CTL

22 **STATUS**

APPR PROC

HYD LO PR

- **IF YELLOW OVHT OUT:**
  YELLOW ENG 2 PUMP..... ON
- **If not recovered:**
  LDG DIST PROC..... APPLY

ALTN Y BRK WITH A/SKID
FLAPS SLOW
CAT 3 SINGLE

INOP SYS

YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
N/W STRG
ALTN BRK
REVERSER 2
YAW DAMPER 2

HYD B+Y SYS LO PR

Applicable to: ALL 321

L2 *Note: If the yellow system has been lost by low level or overheat, "HYD PTU FAULT" should appear to demand the PTU pb-sw at OFF.*

L1 **LAND ASAP**

- **If yellow sys lost by ENG 2 PUMP LO PR:**

  YELLOW ELEC PUMP.....ON

- **If blue sys lost by ELEC PUMP LO PR:**

  RAT.....MAN ON

L2 *To extend the RAT, the flight crew must press the RAT MAN ON pb located on the Hydraulic overhead panel.*

L1 MIN RAT SPD.....140 KT

AFFECTED PUMPS.....OFF
MAX SPEED.....320/0.77

L2 *Note: Flight controls remain in normal law.*

L1 MANEUVER WITH CARE

L2 - **If blue or yellow sys recovered:**

  See procedure for single failure.

L1 - **If neither system recovered:**

SECONDARY FAILURES

*F/CTL

Continued on the following page

HYD B+Y SYS LO PR (Cont'd)

L12
23

STATUS

MIN RAT SPD.....140 KT
(If B PUMP LO PR)
MAX SPEED..... 320/.77
MANEUVER WITH CARE

APPR PROC

DUAL HYD LO PR
(Line not displayed for dual LO LVL)

- **If sys lost by RSVR LO AIR PR:**
  In approach, system lost by RSVR LO AIR PR may be recovered at low altitude.

  RELATED PUMP.....ON

- **If sys lost by RSVR OVHT:**
  In approach, system lost by RSVR OVHT may be recovered if OVHT indication disappears.

  - **IF BLUE OVHT OUT:**
    BLUE ELEC PUMP..... AUTO
  - **IF YELLOW OVHT OUT:**
    YELLOW ENG 2 PUMP.....ON

- **IF HYD NOT RECOVERED (line not displayed for dual LO LVL):**
  FOR LDG..... USE FLAP 3
  This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
  GPWS LDG FLAP 3.....ON
  L/G..... GRVTY EXTN
  Landing gear is extended by gravity to preserve green system integrity Refer to PRO-ABN-32 L/G GRAVITY EXTENSION.

INOP SYS

B+Y HYD
R ELEV
SPLR 2+3+4
SPD BRK
AP 1+2
ALTN BRK
CARGO DOOR (If Y RSVR LO LVL)
REVERSER 2
B ELEC PUMP
EMER GEN (If B RSVR LO LVL)
YAW DAMPER 2
CAT 2

Continued on the following page

HYD B+Y SYS LO PR (Cont'd)

APPR SPD.....VREF +10 KT
LDG DIST PROC.....APPLY

SLATS/FLAPS SLOW
See (1)

(1) Note: *Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.*

HYD B+Y SYS LO PR

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

L2 *Note: If the yellow system has been lost by low level or overheat, "HYD PTU FAULT" should appear to demand the PTU pb-sw at OFF.*

L1 **LAND ASAP**

- **If yellow sys lost by ENG 2 PUMP LO PR:**
  YELLOW ELEC PUMP.....ON
- **If blue sys lost by ELEC PUMP LO PR:**
  RAT.....MAN ON

L2 *To extend the RAT, the flight crew must press the RAT MAN ON pb located on the Hydraulic overhead panel.*

L1 MIN RAT SPD.....140 KT

AFFECTED PUMPS.....OFF
MAX SPEED.....320/0.77

L2 *Note: Flight controls remain in normal law.*

L1 MANEUVER WITH CARE

L2 - **If blue or yellow sys recovered:**

  See procedure for single failure.

L1 - **If neither system recovered:**

SECONDARY FAILURES

*F/CTL

Continued on the following page

HYD B+Y SYS LO PR (Cont'd)

L12
24

STATUS

MIN RAT SPD.....140 KT
(If B PUMP LO PR)
MAX SPEED.....320/.77
MANEUVER WITH CARE

APPR PROC

DUAL HYD LO PR
(Line not displayed for dual LO LVL)

- **If sys lost by RSVR LO AIR PR:**
  In approach, system lost by RSVR LO AIR PR may be recovered at low altitude.

  RELATED PUMP.....ON

- **If sys lost by RSVR OVHT:**
  In approach, system lost by RSVR OVHT may be recovered if OVHT indication disappears.

  - **IF BLUE OVHT OUT:**
    BLUE ELEC PUMP..... AUTO
  - **IF YELLOW OVHT OUT:**
    YELLOW ENG 2 PUMP.....ON

- **IF HYD NOT RECOVERED (line not displayed for dual LO LVL):**
  FOR LDG..... USE FLAP 3
  This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
  L/G..... GRVTY EXTN
  Landing gear is extended by gravity to preserve green system integrity Refer to PRO-ABN-32 L/G GRAVITY EXTENSION.

LDG DIST PROC.....APPLY

INOP SYS

B+Y HYD
R ELEV
SPLR 2+3+4
SPD BRK
AP 1+2
ALTN BRK
CARGO DOOR (If Y RSVR LO LVL)
REVERSER 2
B ELEC PUMP
EMER GEN (If B RSVR LO LVL)
YAW DAMPER 2
CAT 2

Continued on the following page

HYD B+Y SYS LO PR (Cont'd)

SLATS/FLAPS SLOW
See (1)

(1)
Note: *Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.*

HYD B+Y SYS LO PR

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 Note: *If the yellow system has been lost by low level or overheat, "HYD PTU FAULT" should appear to demand the PTU pb-sw at OFF.*

L1 **LAND ASAP**

- **If yellow sys lost by ENG 2 PUMP LO PR:**
  YELLOW ELEC PUMP.....ON
- **If blue sys lost by ELEC PUMP LO PR:**
  RAT.....MAN ON

L2 *To extend the RAT, the flight crew must press the RAT MAN ON pb located on the Hydraulic overhead panel.*

L1 MIN RAT SPD.....140 KT

AFFECTED PUMPS.....OFF
MAX SPEED.....320/0.77

L2 Note: *Flight controls remain in normal law.*

L1 MANEUVER WITH CARE

L2
- **If blue or yellow sys recovered:**

  See procedure for single failure.

L1
- **If neither system recovered:**

SECONDARY FAILURES

*F/CTL

Continued on the following page

HYD B+Y SYS LO PR (Cont'd)

L12
25

STATUS

MIN RAT SPD.....140 KT
(If B PUMP LO PR)
MAX SPEED..... 320/.77
MANEUVER WITH CARE

APPR PROC

DUAL HYD LO PR
(Line not displayed for dual LO LVL).

- **If sys lost by RSVR LO AIR PR:**

  In approach, system lost by RSVR LO AIR PR may be recovered at low altitude.

  RELATED PUMP.....ON

- **If sys lost by RSVR OVHT:**

  In approach, system lost by RSVR OVHT may be recovered if OVHT indication disappears.

  - **IF BLUE OVHT OUT:**
    BLUE ELEC PUMP..... AUTO
  - **IF YELLOW OVHT OUT:**
    YELLOW ENG 2 PUMP.....ON

- **IF HYD NOT RECOVERED (line not displayed for dual LO LVL):**
  FOR LDG..... USE FLAP 3
  This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
  L/G..... GRVTY EXTN
  Landing gear is extended by gravity to preserve green system integrity Refer to PRO-ABN-32 L/G GRAVITY EXTENSION.

INOP SYS

B+Y HYD
R ELEV
SPLR 2+3+4
SPD BRK
AP 1+2
N/W STRG
ALTN BRK
CARGO DOOR (If Y RSVR LO LVL)
REVERSER 2
B ELEC PUMP
EMER GEN (If B RSVR LO LVL)
YAW DAMPER 2
CAT 2

Continued on the following page

HYD B+Y SYS LO PR (Cont'd)

LDG DIST PROC.....APPLY

SLATS/FLAPS SLOW
See (1)

(1) Note: *Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.*

HYD G+B SYS LO PR

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

L2 *Note: If green system has been lost because of fluid low level or overheat, "HYD PTU FAULT" should appear demanding that the flight crew switches the PTU OFF.*

L1 **LAND ASAP**

- **If blue sys lost by ELEC PUMP LO PR:**
  RAT.....MAN ON
  MIN RAT SPD.....140 KT

AFFECTED PUMPS.....OFF
MANEUVER WITH CARE

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

L2 The flight control normal laws and associated protections are lost. Only load factor limitation is furnished (alternate law without protection).

L1 MAX SPEED.....320/0.77

L2 *Speed is limited due to loss of high speed protection.*

L1 SPD BRK.....DO NOT USE

- **If blue sys recovered:**

  See procedure for single failure.

- **If blue sys not recovered:**

  Refer to Landing with Slats or Flaps Jammed.

SECONDARY FAILURES

*WHEEL
*F/CTL

Continued on the following page

HYD G+B SYS LO PR (Cont'd)

L12
26

STATUS

MIN RAT SPD (IF RAT OUT)..... 140 KT
(If B PUMP LO PR)
MAX SPEED..... 320/0.77
MANEUVER WITH CARE
SPD BRK.....DO NOT USE

APPR PROC

DUAL HYD LO PR
(Line not displayed for a double LO LVL):

- **If sys lost by RSVR LO AIR PR:**
  RELATED PUMPS..... ON
- **If sys lost by RSVR OVHT:**
  - **IF BLUE OVHT OUT:**
    BLUE ELEC PUMP..... AUTO
  - **IF GREEN OVHT OUT:**
    GREEN ENG 1 PUMP.....ON
- **IF HYD NOT RECOVERED (line not displayed for a double LO LVL):**
  A/THR.....OFF
  Select the target speed on the FCU. Due to the loss of slats and some flight control surfaces, the A/THR may not satisfactorily maintain speed.
  FOR LDG..... USE FLAP 3
  This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
  GPWS LDG FLAP 3.....ON
  - **WHEN SPD 200 KT (displayed when slats are retracted):**
    L/G.....GRVTY EXTN

INOP SYS

G+B HYD
F/CTL PROT
L ELEV
L+R AIL
SPLR 1+3+5
SLATS
AP 1+2
N/W STRG
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
EMER GEN (If B RSVR LO LVL)
B ELEC PUMP
YAW DAMPER 1
CAT 2

Continued on the following page

HYD G+B SYS LO PR (Cont'd)

Refer to PRO-ABN-32 L/G GRAVITY EXTENSION
Extend the landing gear at 200 kt to revert sooner in direct law. This provides, below 200 kt , a better pitch control than in alternate law with one elevator lost and all slats lost.

APPR SPD.....VREF +25 KT

Approach speed must be increased, due to the loss of ailerons and slats.

LDG DIST PROC.....APPLY

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
See (1)
FLAPS SLOW

(1) *At landing gear extension, control reverts to direct law in pitch, as well as in roll. (Refer to "PRO-ABN-27 F/CTL DIRECT LAW)*

HYD G+B SYS LO PR

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 *Note: If green system has been lost because of fluid low level or overheat, "HYD PTU FAULT" should appear demanding that the flight crew switches the PTU OFF.*

L1 **LAND ASAP**

- **If blue sys lost by ELEC PUMP LO PR:**

  RAT.....MAN ON
  MIN RAT SPD.....140 KT

AFFECTED PUMPS.....OFF
MANEUVER WITH CARE

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

L2 The flight control normal laws and associated protections are lost. Only load factor limitation is furnished (alternate law without protection).

L1 MAX SPEED.....320/0.77

L2 *Speed is limited due to loss of high speed protection.*

L1 SPD BRK.....DO NOT USE

- **If blue sys recovered:**

  See procedure for single failure.

- **If blue sys not recovered:**

  Refer to Landing with Slats or Flaps Jammed.

SECONDARY FAILURES

*WHEEL
*F/CTL

Continued on the following page

HYD G+B SYS LO PR (Cont'd)

L12
27

STATUS

MIN RAT SPD (IF RAT OUT)..... 140 KT
(If B PUMP LO PR)
MAX SPEED..... 320/0.77
MANEUVER WITH CARE
SPD BRK.....DO NOT USE

APPR PROC

DUAL HYD LO PR
(Line not displayed for a double LO LVL):

- **If sys lost by RSVR LO AIR PR:**
  RELATED PUMPS..... ON
- **If sys lost by RSVR OVHT:**
  - **IF BLUE OVHT OUT:**
    BLUE ELEC PUMP..... AUTO
  - **IF GREEN OVHT OUT:**
    GREEN ENG 1 PUMP.....ON
- **IF HYD NOT RECOVERED (line not displayed for a double LO LVL):**
  A/THR.....OFF
  Select the target speed on the FCU. Due to the loss of slats and some flight control surfaces, the A/THR may not satisfactorily maintain speed.
  FOR LDG..... USE FLAP 3
  This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
  GPWS LDG FLAP 3.....ON
  - **WHEN SPD 200 KT (displayed when slats are retracted):**
    L/G.....GRVTY EXTN

INOP SYS

G+B HYD
F/CTL PROT
L ELEV
L+R AIL
SPLR 1+3+5
SLATS
AP 1+2
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
EMER GEN (If B RSVR LO LVL)
B ELEC PUMP
YAW DAMPER 1
CAT 2

Continued on the following page

HYD G+B SYS LO PR (Cont'd)

Refer to PRO-ABN-32 L/G GRAVITY EXTENSION
Extend the landing gear at 200 kt to revert sooner in direct law. This provides, below 200 kt , a better pitch control than in alternate law with one elevator lost and all slats lost.

APPR SPD.....VREF +25 KT

Approach speed must be increased, due to the loss of ailerons and slats.

LDG DIST PROC.....APPLY

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
See (1)
FLAPS SLOW

(1) *At landing gear extension, control reverts to direct law in pitch, as well as in roll. (Refer to "PRO-ABN-27 F/CTL DIRECT LAW)*

HYD G+Y SYS LO PR

Applicable to: B-HTF

LAND ASAP

PTU.....OFF
AFFECTED PUMPS.....OFF

- **If yellow sys lost by ENG 2 PUMP LO PR:**
  YELLOW ELEC PUMP.....ON

MANEUVER WITH CARE

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

L2 Flight control normal laws and associated protections are lost. Only load factor limitation, high and low speed stability are provided (alternate law with reduced protection).

L1 MAX SPEED.....320/0.77

L2 *Speed is limited due to loss of high speed protection.*

L1 ■ **If yellow sys recovered:**

Refer to procedure for single failure.

■ **If yellow sys not recovered:**

Refer to PRO-ABN-10 Landing with Slats or Flaps Jammed.

SECONDARY FAILURES

*F/CTL
*WHEEL

Continued on the following page

HYD G+Y SYS LO PR (Cont'd)

28

L12

STATUS

MAX SPEED..... 320/0.77
MAX BRK PR..... 1 000 PSI
MANEUVER WITH CARE

APPR PROC

DUAL HYD LO PR

(Line not displayed for a double LO LVL)

- **If sys lost by RSVR LO AIR PR:**
  RELATED PUMP.....ON
- **If sys lost by RSVR OVHT:**
  - **IF GREEN OVHT OUT:**
    GREEN ENG 1 PUMP.....ON
  - **IF YELLOW OVHT OUT:**
    YELLOW ENG 2 PUMP.....ON
- **IF HYD NOT RECOVERED (line not displayed for a double LO LVL):**
  FOR LDG..... USE FLAP 3
  This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
  GPWS FLAP MODE.....OFF
  - **WHEN CONF 3 AND VAPP:**
    L/G.....GRVTY EXTN
    Refer to PRO-ABN-32 L/G GRAVITY EXTENSION. Being stabilized at VAPP, before selecting the gear down, enables the aircraft to be trimmed for approach.

APPR SPD.....VREF +30 KT

Approach speed must be increased, due to the loss of flaps.

INOP SYS

G+Y HYD
F/CTL PROT
STABILIZER
REVERSER 1+2
SPLR 1+2+4+5
FLAPS
YAW DAMPER
AP 1+2
ANTI SKID
N.W. STEER
NORM BRK
AUTO BRK
L/G RETRACT
CARGO DOOR (If Y RSVR LO LVL)
CAT 2

Continued on the following page

HYD G+Y SYS LO PR (Cont'd)

LDG DIST PROC.....APPLY

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
See (1)
BRK Y ACCU PR ONLY
See (2)
SLATS SLOW
See (3)

(1) *At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to PRO-ABN-27-F/CTL DIRECT LAW). A slight transient pitch up may occur, depending on the frozen THS position.*

(2) *7 full brake applications are available.*

(3) *Note: Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.*

HYD G+Y SYS LO PR

Applicable to: ALL 320

LAND ASAP

PTU.....OFF
AFFECTED PUMPS.....OFF

- **If yellow sys lost by ENG 2 PUMP LO PR:**
  YELLOW ELEC PUMP.....ON

MANEUVER WITH CARE

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

L2 Flight control normal laws and associated protections are lost. Only load factor limitation, high and low speed stability are provided (alternate law with reduced protection).

L1 MAX SPEED.....320/0.77

L2 *Speed is limited due to loss of high speed protection.*

L1 ■ **If yellow sys recovered:**

Refer to procedure for single failure.

■ **If yellow sys not recovered:**

Refer to PRO-ABN-10 Landing with Slats or Flaps Jammed.

SECONDARY FAILURES

*F/CTL
*WHEEL

Continued on the following page

HYD G+Y SYS LO PR (Cont'd)

L12
29

STATUS

MAX SPEED..... 320/0.77
MAX BRK PR..... 1 000 PSI
MANEUVER WITH CARE

APPR PROC

DUAL HYD LO PR

(Line not displayed for a double LO LVL)

- **If sys lost by RSVR LO AIR PR:**
  RELATED PUMP.....ON
- **If sys lost by RSVR OVHT:**
  - **IF GREEN OVHT OUT:**
    GREEN ENG 1 PUMP.....ON
  - **IF YELLOW OVHT OUT:**
    YELLOW ENG 2 PUMP.....ON
- **IF HYD NOT RECOVERED (line not displayed for a double LO LVL):**
  FOR LDG..... USE FLAP 3
  This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
  GPWS FLAP MODE.....OFF
  - **WHEN CONF 3 AND VAPP:**
    L/G.....GRVTY EXTN
    Refer to PRO-ABN-32 L/G GRAVITY EXTENSION. Being stabilized at VAPP, before selecting the gear down, enables the aircraft to be trimmed for approach.

APPR SPD.....VREF +25 KT

Approach speed must be increased, due to the loss of flaps.

INOP SYS

G+Y HYD
F/CTL PROT
STABILIZER
REVERSER 1+2
SPLR 1+2+4+5
FLAPS
YAW DAMPER
AP 1+2
ANTI SKID
N.W. STEER
NORM BRK
AUTO BRK
L/G RETRACT
CARGO DOOR (If Y RSVR LO LVL)
CAT 2

Continued on the following page

HYD G+Y SYS LO PR (Cont'd)

LDG DIST PROC.....APPLY

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
See (1)
BRK Y ACCU PR ONLY
See (2)
SLATS SLOW
See (3)

(1) *At landing gear extension, control reverts to direct law in pitch, as well as in roll. (Refer to PRO-ABN-27-F/CTL DIRECT LAW).*

(2) *7 full brake applications are available.*

(3) Note: *Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.*

HYD G+Y SYS LO PR

Applicable to: B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

LAND ASAP

PTU.....OFF
AFFECTED PUMPS.....OFF

- **If yellow sys lost by ENG 2 PUMP LO PR:**
  YELLOW ELEC PUMP.....ON

MANEUVER WITH CARE

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

L2 Flight control normal laws and associated protections are lost. Only load factor limitation, high and low speed stability are provided (alternate law with reduced protection).

L1 MAX SPEED.....320/0.77

L2 *Speed is limited due to loss of high speed protection.*

L1 ■ **If yellow sys recovered:**

Refer to procedure for single failure.

■ **If yellow sys not recovered:**

Refer to PRO-ABN-10 Landing with Slats or Flaps Jammed.

SECONDARY FAILURES

*F/CTL
*WHEEL

Continued on the following page

HYD G+Y SYS LO PR (Cont'd)

L12

30

STATUS

MAX SPEED..... 320/0.77
MAX BRK PR..... 1 000 PSI
MANEUVER WITH CARE

APPR PROC

DUAL HYD LO PR

(Line not displayed for a double LO LVL)

- **If sys lost by RSVR LO AIR PR:**
  RELATED PUMP.....ON
- **If sys lost by RSVR OVHT:**
  - **IF GREEN OVHT OUT:**
    GREEN ENG 1 PUMP.....ON
  - **IF YELLOW OVHT OUT:**
    YELLOW ENG 2 PUMP.....ON
- **IF HYD NOT RECOVERED (line not displayed for a double LO LVL):**
  FOR LDG..... USE FLAP 3
  This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
  GPWS FLAP MODE.....OFF
  - **WHEN CONF 3 AND VAPP:**
    L/G.....GRVTY EXTN
    Refer to PRO-ABN-32 L/G GRAVITY EXTENSION. Being stabilized at VAPP, before selecting the gear down, enables the aircraft to be trimmed for approach.

APPR SPD.....VREF +30 KT

Approach speed must be increased, due to the loss of flaps.

INOP SYS

G+Y HYD
F/CTL PROT
STABILIZER
REVERSER 1+2
SPLR 1+2+4+5
FLAPS
YAW DAMPER
AP 1+2
ANTI SKID
N.W. STEER
NORM BRK
AUTO BRK
L/G RETRACT
CARGO DOOR (If Y RSVR LO LVL)
CAT 2

Continued on the following page

HYD G+Y SYS LO PR (Cont'd)

LDG DIST PROC.....APPLY

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
See (1)
BRK Y ACCU PR ONLY
See (2)
SLATS SLOW
See (3)

(1) *At landing gear extension, control reverts to direct law in pitch, as well as in roll. (Refer to PRO-ABN-27-F/CTL DIRECT LAW).*

(2) *7 full brake applications are available.*

(3) *Note: Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.*

HYD PTU FAULT

Applicable to: ALL

L2 *Note: This warning is triggered, if the second engine is started within 40 s, following the end of the cargo doors operation. In this case, reset the warning by switching the yellow ELEC pump ON, then OFF.*

L1 ● **If green or yellow reservoir low level and system low press:**
PTU.....OFF

STATUS

INOP SYS
PTU

HYD RAT FAULT

Applicable to: ALL

Crew awareness.

STATUS	INOP SYS
	RAT

Intentionally left blank

ANTI ICE ALL PITOT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR

L2 CAPT, F/O and STBY pitot heating is lost. In case of simultaneous pitot icing and in the same amount, ADR 1, ADR 2, and ADR 3 speeds will be in agreement, but incorrect. The following ECAM procedure avoids that the flight controls use erroneous, but coherent, sources.

L1 ADR 1 (2) (3) P/B..... OFF

L2 *Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1, 2 or 3 be switched OFF.*

Note: In case of subsequent, significant, speed discrepancy between the 2 remaining ADRs, the "ADR DISAGREE" ECAM caution will be triggered.

L1 ● **IF ICING EXPECTED:**

ADR 2 (3) P/B..... OFF

L2 *Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 2 or 3 be switched OFF.*

L1 UNREL SPD PROC..... APPLY

L2 *Only one ADR is available, and the corresponding pitot probe may be affected by ice accretion. Be prepared to use the UNRELIABLE SPEED INDICATION/ADR CHECK PROC procedure.*

L12

ASSOCIATED PROCEDURES

NAV ADR FAULT

Single ADR FAULT or double ADR FAULT ECAM cautions may be triggered, depending on the number of ADRs switched OFF.

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

Alternate law becomes active, if:
- *One ADR has already been switched OFF, and the 2 remaining ADRs are not in agreement, or*
- *Two ADRs have been switched OFF.*

Continued on the following page

ANTI ICE ALL PITOT (Cont'd)

STATUS

● **IF ICING EXPECTED:**
ADR 2 (3) P/B.....OFF
UNREL SPD PROC..... APPLY

INOP SYS

CAPT PITOT
F/O PITOT
STBY PITOT
CAPT PROBES (1)
F/O PROBES (2)
STBY PROBES (3)

(1) *(If all CAPT PROBES heating is lost)*
(2) *(If all F/O PROBES heating is lost)*
(3) *(If all STBY PROBES heating is lost)*

ANTI ICE CAPT (F/O) TAT

Applicable to: ALL

L2 Crew awareness.

STATUS

INOP SYS

CAPT (F/O) TAT

ANTI ICE CAPT + F/O PITOT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR

L2 CAPT and F/O pitot heating is lost. In case of simultaneous pitot icing and in the same amount, ADR 1 and ADR 2 speeds will be in agreement, but incorrect. Therefore, flight controls will consider the remaining correct source as being faulty, and will reject the only correct source. The following ECAM procedure avoids that the flight controls use 2 erroneous, but coherent, sources.

L1 ■ **If ADR 3 operative and ON:**

ADR 1 (2) P/B..... OFF

L2 *Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1 or 2 be switched OFF*

Note: In case of subsequent, significant, speed discrepancy between the 2 remaining ADRs, the "ADR DISAGREE" ECAM caution will be triggered.

L1 ■ **If ADR 3 failed or OFF:**

L2 No action is required, as long as there are no icing conditions, in order to keep 2 independent speed sources.

L1 ● **IF ICING EXPECTED:**

ADR 1 (2) P/B.....OFF

L2 *Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1 or 2 be switched OFF.*

L1 UNREL SPD PROC.....APPLY

L2 *Only one ADR is available, and the corresponding pitot probe may be affected by ice accretion. Be prepared to use the UNRELIABLE SPEED INDICATION/ADR CHECK PROC procedure.*

L1

ASSOCIATED PROCEDURES

NAV ADR FAULT

Continued on the following page

ANTI ICE CAPT + F/O PITOT (Cont'd)

STATUS	INOP SYS
● **If ADR 3 failed or OFF:**	
● **IF ICING EXPECTED:**	
ADR 1 (2) P/B.....OFF	CAPT PITOT F/O PITOT
UNREL SPD PROC.....APPLY	CAPT PROBES (1) F/O PROBES (2)

(1) *(If all CAPT PROBES heating is lost)*
(2) *(If all F/O PROBES heating is lost)*

ANTI ICE CAPT + STBY PITOT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR

L2 CAPT and STBY pitot heating is lost. In case of simultaneous pitot icing and in the same amount, ADR 1 and ADR 3 speeds will be in agreement, but incorrect. Flight controls will consider the remaining correct source as being faulty, and will reject the only correct source. The following ECAM procedure avoids that the flight controls use 2 erroneous, but coherent, sources.

L1 ■ **If ADR 2 operative and ON:**

ADR 1 (3) P/B..... OFF

L2 *Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1 or 3 be switched OFF*

Note: In case of subsequent, significant, speed discrepancy between the 2 remaining ADRs, the "ADR DISAGREE" ECAM caution will be triggered.

L1 ■ **If ADR 2 failed or OFF:**

L2 No action is required, as long as there are no icing conditions, in order to keep 2 independent speed sources.

L1 ● **IF ICING EXPECTED:**

ADR 1 (3) P/B..... OFF

L2 *Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1 or 3 be switched OFF.*

L1 UNREL SPD PROC..... APPLY

L2 *Only one ADR is available, and the corresponding pitot probe may be affected by ice accretion. Be prepared to use the Refer to FCOM_PRO_ABN 34 UNRELIABLE SPEED INDICATION/ADR CHECK PROC - MEMORY ITEM.*

L1

ASSOCIATED PROCEDURES

NAV ADR FAULT

Continued on the following page

ANTI ICE CAPT + STBY PITOT (Cont'd)

STATUS

- **If ADR 2 failed or OFF:**
  - **IF ICING EXPECTED:**
    ADR 1 (3) P/B..... OFF
    UNREL SPD PROC..... APPLY

INOP SYS

CAPT PITOT
STBY PITOT
CAPT PROBES (1)
STBY PROBES (2)

(1) *(If all CAPT PROBES heating is lost)*
(2) *(If all STBY PROBES heating is lost)*

ANTI ICE CAPT PITOT OR L(R) STAT OR AOA

Applicable to: ALL

L2 Failure of probe heating.

L1 AIR DATA SWTG ..... CAPT 3

L2 *ADR 3 supplies data to PFD 1 and ND 1.*

Note: AIR DATA SWTG should not be selected to CAPT 3 if ADR 3 is not available.

STATUS

INOP SYS

CAPT PITOT
CAPT L(R) STAT
CAPT AOA

ANTI ICE CAPT PROBES

Applicable to: ALL

AIR DATA SWTG..... CAPT 3

L2 *Note: AIR DATA SWTG should not be selected to CAPT 3 if ADR 3 is not available.*

STATUS	INOP SYS
	CAPT PROBES

ANTI ICE ENG 1(2) VALVE CLSD

Applicable to: ALL

AVOID ICING CONDITIONS

STATUS	INOP SYS
AVOID ICING CONDITIONS	ENG 1 (2) A. ICE

ANTI ICE ENG 1(2) VALVE OPEN

Applicable to: ALL

THRUST LIM PENALTY

STATUS
THRUST LIM PENALTY

ANTI ICE F/O + STBY PITOT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR

L2 F/O and STBY pitot heating is lost. In case of simultaneous pitot icing and in the same amount, ADR 2 and ADR 3 speeds will be in agreement, but incorrect. Therefore, flight controls will consider the remaining correct source as being faulty, and will reject the only correct source. The following ECAM procedure avoids that the flight controls use 2 erroneous, but coherent, sources.

L1 ■ **If ADR 1 operative and ON:**

ADR 2 (3) P/B..... OFF

L2 *Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 2 or 3 be switched OFF.*

Note: In case of subsequent, significant, speed discrepancy between the 2 remaining ADRs, the "ADR DISAGREE" ECAM caution will be triggered.

L1 ■ **If ADR 1 failed or OFF:**

L2 No action is required, as long as there are no icing conditions, in order to keep 2 independent speed sources.

L1 ● **IF ICING EXPECTED:**

ADR 2 (3) P/B.....OFF

L2 *Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 2 or 3 be switched OFF.*

L1 UNREL SPD PROC.....APPLY

L2 *Only one ADR is available, and the corresponding pitot probe may be affected by ice accretion. Be prepared to use the UNRELIABLE SPEED INDICATION/ADR CHECK PROC procedure.*

L1

ASSOCIATED PROCEDURES

NAV ADR FAULT

Continued on the following page

ANTI ICE F/O + STBY PITOT (Cont'd)

STATUS

- **If ADR 1 failed or OFF:**
  - **IF ICING EXPECTED:**
    ADR 2 (3) P/B..... OFF
    UNREL SPD PROC..... APPLY

INOP SYS
F/O PITOT
STBY PITOT
F/O PROBES (1)
STBY PROBES (2)

(1) *(If all F/O PROBES heating is lost)*
(2) *(If all STBY PROBES heating is lost)*

ANTI ICE F/O + STBY PITOT

Applicable to: B-HST, B-HSU

L2 F/O and STBY pitot heating is lost. In case of simultaneous pitot icing and in the same amount, ADR 2 and ADR 3 speeds will be in agreement, but incorrect. Therefore, flight controls will consider the remaining correct source as being faulty, and will reject the only correct source. The following ECAM procedure avoids that the flight controls use 2 erroneous, but coherent, sources.

L1 ■ **If ADR 1 operative and ON:**

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L2 No action is required, as long as there are no icing conditions, in order to keep 2 independent speed sources.

L1 ● **IF ICING EXPECTED:**

ADR 2 (3) P/B..... OFF

L2 *Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 2 or 3 be switched OFF.*

L1 UNREL SPD PROC..... APPLY

L2 *Only one ADR is available, and the corresponding pitot probe may be affected by ice accretion. Be prepared to use the UNRELIABLE SPEED INDICATION/ADR CHECK PROC procedure.*

L1

ASSOCIATED PROCEDURES

NAV ADR FAULT

ANTI ICE F/O PITOT OR L(R) STAT OR AOA

Applicable to: ALL

L2 Failure of probe heating.

L1 AIR DATA SWTG.....F/O 3

L2 *ADR 3 supplies data to PFD 2 and ND 2.*

Note: AIR DATA SWTG should not be selected to F/O 3 if ADR 3 is not available.

STATUS	INOP SYS
	F/O PITOT F/O L(R) STAT F/O AOA

ANTI ICE F/O PROBES

Applicable to: ALL

AIR DATA SWTG.....F/O 3

L2 *Note: AIR DATA SWTG should not be selected to F/O 3 if ADR 3 is not available.*

STATUS	INOP SYS
	F/O PROBES

ANTI ICE L + R WINDSHIELD

Applicable to: ALL

L2 Crew awareness.

Continued on the following page

ANTI ICE L + R WINDSHIELD (Cont'd)

STATUS	INOP SYS
	WSHLD HEAT

ANTI ICE L(R) WINDOW

Applicable to: ALL

L2 Crew awareness.

STATUS	INOP SYS
	L(R) WNDW HEAT

ANTI ICE L(R) WINDSHIELD

Applicable to: ALL

L2 Crew awareness.

STATUS	INOP SYS
	L(R) WSHLD HEAT

ANTI ICE STBY PITOT OR L(R) STAT OR AOA

Applicable to: ALL

L2 Crew awareness

L1 L2 If standby instruments are used, monitor air data information.

STATUS	INOP SYS
	STBY PITOT STBY L(R) STAT STBY AOA

ANTI ICE STBY PROBES

Applicable to: ALL

Crew awareness

STATUS	INOP SYS
	STBY PROBES

DOUBLE AOA HEAT FAILURE

Applicable to: ALL

In case of double failure of the alpha probe heaters in icing conditions, the choice made by the computers among the 3 ADR values may be erroneous.

- **If icing conditions cannot be avoided:**
  One of affected ADRs..... OFF
  There will be a disagreement between the two remaining ADRs, which will trigger the ADR DISAGREE ECAM caution.

WING ANTI ICE L(R) HI PR

Applicable to: ALL

THRUST LIM PENALTY

STATUS

THRUST LIM PENALTY	**INOP SYS**
	WAI REGUL

WING ANTI ICE L(R) VALVE OPEN
(FAILURE DETECTED IN FLIGHT)

Applicable to: ALL

WAI AVAIL IN FLT
WING ANTI ICE.....AS RQRD

L2 *Wing anti-ice is available if needed and anyway is continually on, on failed side.*

L1 THRUST LIM PENALTY

- **After landing (automatic recall):**
  ENG BLEED (AFFECTED SIDE).....OFF
  X BLEED (IF NOT CLOSED).....SHUT
  APU BLEED (IF LEFT WING AFFECTED).....OFF
  WING ANTI ICE.....OFF

Continued on the following page

WING ANTI ICE L(R) VALVE OPEN (Cont'd)
(FAILURE DETECTED IN FLIGHT)

L12

STATUS	INOP SYS
THRUST LIM PENALTY *See* (2) WAI AVAIL IN FLT *See* (2)	ENG 1(2) BLEED *See* (1) PACK 1(2) *See* (1)

(1) *Displayed on ground.*
(2) *Displayed in flight.*

WING ANTI ICE L(R) VALVE OPEN
(FAILURE DETECTED ON GROUND)

Applicable to: ALL

WING ANTI ICE..... OFF
ENG BLEED (AFFECTED SIDE).....OFF
X BLEED (IF NOT CLOSED).....SHUT
APU BLEED (IF LEFT WING AFFECTED AND IF APU RUNNING)..... OFF
WAI AVAIL IN FLT

■ **After takeoff when above 1 500 ft (automatic recall):**
WAI AVAIL IN FLT
ENG BLEED..... ON
WING ANTI ICE..... AS RQRD

L2 *Wing anti ice is available if needed and anyway is continually on, on failed side.*

L1 THRUST LIM PENALTY

■ **After landing (automatic recall):**
WING ANTI ICE.....OFF
ENG BLEED (AFFECTED SIDE)..... OFF
X BLEED (IF NOT CLOSED)..... SHUT
APU BLEED (IF LEFT WING AFFECTED).....OFF

Continued on the following page

WING ANTI ICE L(R) VALVE OPEN (Cont'd)
(FAILURE DETECTED ON GROUND)

L12

STATUS	INOP SYS
WAI AVAIL IN FLT *Displayed before takeoff only.* THRUST LIM PENALTY *Displayed in flight.*	ENG 1 (2) BLEED *See* (1) PACK 1 (2) *See* (1)

(1) *Displayed on ground.*

WING ANTI ICE OPEN ON GND

Applicable to: ALL

L2 Following ground test the valves are still open after 35 s.

L1 WING ANTI ICE..... OFF

STATUS
WAI AVAIL IN FLT

WING ANTI ICE SYS FAULT
(ONE WING VALVE REMAINS CLOSED WHEN THE WING ANTI-ICE IS TURNED ON)

Applicable to: ALL

WING ANTI ICE..... OFF
AVOID ICING CONDITIONS

Continued on the following page

WING ANTI ICE SYS FAULT (Cont'd)

(ONE WING VALVE REMAINS CLOSED WHEN THE WING ANTI-ICE IS TURNED ON)

L12

1

STATUS

	INOP SYS
AVOID ICING CONDITIONS • **IF SEVERE ICE ACCRETION:** MIN SPD.....VLS +10/G DOT MANEUVER WITH CARE *See* (1) LDG DIST PROC.....APPLY	WING ANTI ICE

(1) Note: *In the case of severe ice accretion, with wing anti-ice failed, the Angle-of-Attack (AOA) protections remain efficient. However, if full backstick is maintained while at maximum AOA, a divergent roll oscillation may occur. Slightly release the backstick to stop this oscillation.*

WING ANTI ICE SYS FAULT

(THE WING ANTI-ICE IS TURNED ON AFTER ONE ENGINE SHUTDOWN OR AFTER THE LOSS OF ONE BLEED)

Applicable to: ALL

X BLEED..... OPEN

L2 Note: *The affected pack has to be selected OFF due to precooler performance.*

Intentionally left blank

DISPLAY UNIT FAILURE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

■ **AFFECTED DU FLASHES INTERMITTENTLY:**

This phenomenon may be due to Intermittent Electrical Power Supply Interruptions. It is evidenced by one, or a combination, of the following :
- Flashing of PFD, ND, ECAM DUs (blank screen or diagonal line),
- Flashing of MCDU,
- Intermittent flight control law reversion.

■ **IF THE CAPTAIN SIDE IS AFFECTED:**
Captain PFD, captain ND, Upper ECAM or MCDU 1 is(are) affected.

GEN 1.....OFF

■ **If DUs do not stop flashing :**
GEN 1.....ON

■ **If DUs stop flashing :**
GEN 1.....KEEP OFF

Keep the generator OFF for the rest of the flight.

RUD TRIM.....CHECK/RESET

Intermittent Electrical Power Supply Interruptions may cause offset in the rudder trim. Check the need of the rudder trim to be reset using the sideslip indication

AP and/or A/THR.....AS RQRD
APU START.....CONSIDER

■ **IF THE FIRST OFFICER SIDE IS AFFECTED:**
First officer PFD, first officer ND, lower ECAM or MCDU 2 is(are) affected.

GEN 2.....OFF

■ **If DUs do not stop flashing :**
GEN 2.....ON

■ **If DUs stop flashing :**
GEN 2.....KEEP OFF

Keep the generator OFF for the rest of the flight.

RUD TRIM.....CHECK/RESET

Intermittent Electrical Power Supply Interruptions may cause offset in the rudder trim. Check the need of the rudder trim to be reset using the sideslip indication

AP and/or A/THR.....AS RQRD

Continued on the following page

DISPLAY UNIT FAILURE (Cont'd)

APU START.....CONSIDER

■ **The AFFECTED DU IS BLANK or the DISPLAY IS DISTORTED:**

DU (affected).....AS RQRD

The DU can be switched off.

ECAM/ND XFR (if the ECAM DUs are affected).....USE

Transfer SD to F/O or CAPT ND.

PFD/ND XFR (if the EFIS DUs are affected).....USE

■ **DIAGONAL LINE ON THE AFFECTED DU:**

This failure may be caused by a DMC FAULT, or a communication interruption between the DMC and DU.

EIS DMC SWITCHING.....AS RQRD

● **If unsuccessful:**

DU (affected).....OFF THEN ON

Note: *The ND display may disappear, if too many waypoints and associated information are displayed. Reduce the range, or deselect WPT or CSTR, and the display will automatically recover, after about 30 s.*

■ **INVERSION OF THE EWD AND THE SD:**

ECAM UPPER DISPLAY .....OFF THEN ON

The same action on the EIS DMC SWITCHING selector produces the same effect.

DISPLAY UNIT FAILURE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

■ **AFFECTED DU FLASHES INTERMITTENTLY:**

This phenomenon may be due to Intermittent Electrical Power Supply Interruptions. It is evidenced by one, or a combination, of the following :
- Flashing of PFD, ND, ECAM DUs (blank screen or INVALID DATA message),
- Flashing of MCDU,
- Intermittent flight control law reversion.

■ **IF THE CAPTAIN SIDE IS AFFECTED:**
Captain PFD, captain ND, ECAM DUs or MCDU 1 is(are) affected.

GEN 1.....OFF

■ **If DUs do not stop flashing :**
GEN 1.....ON

■ **If DUs stop flashing :**
GEN 1.....KEEP OFF

Keep the generator OFF for the rest of the flight.

RUD TRIM.....CHECK/RESET

Intermittent Electrical Power Supply Interruptions may cause offset in the rudder trim. Check the need of the rudder trim to be reset using the sideslip indication

AP and/or A/THR.....AS RQRD
APU START.....CONSIDER

■ **IF THE FIRST OFFICER SIDE IS AFFECTED:**
First officer PFD, first officer ND, lower ECAM or MCDU 2 is(are) affected.

GEN 2.....OFF

■ **If DUs do not stop flashing:**
GEN 2.....ON

■ **If DUs stop flashing:**
GEN 2.....KEEP OFF

Keep the generator OFF for the rest of the flight.

RUD TRIM.....CHECK/RESET

Intermittent Electrical Power Supply Interruptions may cause offset in the rudder trim. Check the need of the rudder trim to be reset using the sideslip indication

AP and/or A/THR.....AS RQRD

Continued on the following page

DISPLAY UNIT FAILURE (Cont'd)

APU START.....CONSIDER

■ **DU is blank (with or without a large letter "F" in amber), or the display is distorted:**

DU (affected).....AS RQRD

The DU can be switched off.

ECAM/ND XFR (if the ECAM DUs are affected).....USE

Transfer SD to the F/O or CAPT ND.

PFD/ND XFR (if the EFIS DUs are affected).....USE

■ **INVALID DISPLAY UNIT message is displayed:**

This may be caused by a DU failure.

FOR AUTOMATIC DU RECOVERY.....WAIT MORE THAN 40 s

● **IF DU IS AUTOMATICALLY RECOVERED:**

No crew action is required.

● **IF DU IS NOT RECOVERED:**

Non-recovered DU.....AS RQRD

The DU can be switched off.

■ **INVALID DATA message appears (not on all DUs):**

EIS DMC SWITCHING.....AS RQRD

● **If unsuccessful:**

DU (affected).....OFF THEN ON

Note: *The ND display may disappear, if too many waypoints and associated information are displayed. Reduce the range, or deselect WPT or CSTR, and the display will automatically recover, after about 30 s.*

■ **INVALID DATA message appears on all DUs:**

The autopilot, autothrust and MCDU navigation data are still available, and may be used.

FOR AUTOMATIC DUs RECOVERY .....WAIT MORE THAN 40 s

● **IF ALL DUs ARE AUTOMATICALLY RECOVERED:**

No crew action is required.

● **IF ONE OR MORE DUs ARE NOT RECOVERED:**

Non-recovered DUs.....OFF FOR 40 s

Non-recovered DUs.....BACK ON sequentially

Continued on the following page

DISPLAY UNIT FAILURE (Cont'd)

- **If the initial failure re-occurs (INVALID DATA message appears on all DUs), when switching a given DU back ON:**
  Apply the entire procedure again, from the beginning.
  Leave this specific DU permanently OFF.

■ **INVERSION OF THE EWD AND THE SD:**
ECAM UPPER DISPLAY ..... OFF THEN ON
The same action on the EIS DMC SWITCHING selector produces the same effect.

EIS DMC 1(2)(3) FAULT

Applicable to: ALL

■ **DMC 1**
EIS DMC SWITCH ..... CAPT 3

L2 *DMC 3 replaces DMC 1.*

L1 ■ **DMC 2**
EIS DMC SWITCH..... F/O 3

L2 *DMC 3 replaces DMC 2.*

L1 ■ **DMC 3**

Crew awareness.

STATUS	
	INOP SYS
	DMC 1(2)(3)

ECAM SINGLE DISPLAY

Applicable to: ALL

Only the EWD is available. There is no SD on the other DUs.

■ **To call a SYS page:**

PRESS AND MAINTAIN the SYS Page key on the ECP.

■ **OVERFLOW ON THE STATUS Page:**

PRESS AND MAINTAIN the STS key on the ECP

The first page of STATUS appears.

RELEASE IT, THEN PRESS AGAIN WITHIN 2 s

The second page of STATUS appears.

CONTINUE UNTIL THE OVERFLOW ARROW DISAPPEARS.

When the STS key is released for more than 2 s, the EWD reappears.

FWS FWC 1 + 2 FAULT

Applicable to: ALL

MONITOR SYS
MONITOR OVERHEAD PANEL

Continued on the following page

FWS FWC 1 + 2 FAULT (Cont'd)

L12

STATUS	INOP SYS
	ECAM WARN (1) ALTI ALERT (1) STATUS (1) A/CALL OUT (1) MEMO (1)
	Other INOP SYS
	CAT 2

ECAM cautions and warnings, aural warnings, master caution and warning lights are lost. ECAM system pages are still available. Therefore cockpit panels must be monitored for local warnings and ECAM system pages must be regularly called for system checks.

(1) *(The following systems are not available, in the case of FWC 1 and 2 failure)*

FWS FWC 1(2) FAULT

Applicable to: ALL

Crew awareness.

STATUS	INOP SYS
CAT 3 SINGLE ONLY	CAT 3 DUAL FWC 1(2)

FWS OEB/FWC DISCREPANCY

Applicable to: ALL

OEB DATABASE..... XCHECK

L2 *This action is normally performed by maintenance.*

FWS SDAC 1 + 2 FAULT

Applicable to: ALL

MONITOR OVERHEAD PANEL

L2 *Amber cautions are lost. Aircraft status on the ECAM STATUS page is lost.*
Only red warnings, engine and fuel parameters, and slat/flap positions are available on the upper ECAM DU.

L1 ECAM ENG FUEL F/CTL WHEEL (L/G POS IND) SYS PAGES AVAIL.

STATUS	INOP SYS
	SDAC 1 + 2

FWS SDAC 1(2) FAULT

Applicable to: ALL

Crew awareness

L12

STATUS	INOP SYS
	SDAC 1(2)

Note: *Although the ECAM may display some symbols and/or parameters in amber, this does not always signify that additional systems are failed.*

MULTIPLE UNDUE ECAM ALERTS

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU
Impacted DU: NONE

In the case of multiple undue ECAM alerts concerning :
- ENG 1(2) N1(N2) (EGT) (FF) OVER LIMIT or
- ENG 1(2) N1(N2) (EGT) (EPR) (FF) DISCREPANCY or,
- NAV ATT (ALT) (HDG) DISCREPANCY or,
- NAV FM/GPS POS DISAGREE or,
- FUEL F.USED/FOB DISAGREE or
- MINIMUM or HUNDRED ABOVE callouts,

possibly associated with EFIS red flags, apply the below procedure :

AFFECTED PARAMETERS.....CROSSCHECK

Crosscheck the affected parameters on the E/WD, PFD, ND or on the related SD page to confirm that the alerts are spurious.

- **If it is confirmed that the ECAM alerts are spurious, identify the faulty DMC:**
  EIS DMC SWITCH.....CAPT 3
  DMC3 replaces DMC1. If the undue alerts stop, DMC1 is the faulty DMC.
  - **If unsuccessful :**
    EIS DMC SWITCH.....F/O 3
    DMC3 replaces DMC2. If the undue alerts stop, DMC2 is the faulty DMC.

RECORDER DFDR FAULT

Applicable to: ALL

Crew awareness.

STATUS	
	INOP SYS
DFDR	

RECORDER SYS FAULT

Applicable to: ALL

Crew awareness.

STATUS

INOP SYS
RECORDER SYS

BRAKES - N/WS MINOR FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 Crew awareness.

BRAKES A/SKID NWS FAULT OR ANTI SKID/NWS OFF

Applicable to: ALL

L2 Either both BSCU channels are failed, or the A/SKID & N/W STRG sw is OFF.

L1 MAX BRK PR..... 1000 PSI

L2 *Monitor brake pressure on the BRAKES PRESS indicator. Limit brake pressure to approximately 1 000 PSI and, at low ground speed, adjust brake pressure as required. Avoid landing on an icy runway.*

L12

1

STATUS

MAX BRK PR.....1000 PSI

LDG DIST PROC.....APPLY

- **If Y SYS LO PR**
  BRK Y ACCU PR ONLY

CAT 3 SINGLE ONLY

See (1)

INOP SYS

CAT 3 DUAL
ANTI SKID
N/W STRG
NORM BRK
AUTO BRK

(1) Note: *Automatic rollout is not permitted as specified in QRH,Refer to QRH/OPS Required Equipment for CAT2 and CAT3.*

BRAKES ALTN BRK FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 Alternate braking function is lost.

Crew awareness.

Continued on the following page

BRAKES ALTN BRK FAULT (Cont'd)

STATUS	INOP SYS
	ALTN BRK

BRAKES ALTN L(R) RELEASED

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 As long as the normal braking system is available, braking is normal. In alternate braking mode, braking of all wheels on one gear is lost.

L1 ● **If normal braking is lost:**
ASYM BRK PROC..... APPLY

2

STATUS	
● **If normal braking is lost:** LDG DIST PROC..... APPLY	INOP SYS ALTN L(R) BRK

BRAKES AUTO BRK FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HST, B-HSU

L2 The AUTOBRAKE FAULT warning may be due to a failure of the autobrake mode itself, or to a brake released condition. The crew should, therefore, be prepared to counter a possible slight lateral drift at landing, by using the rudder.

Crew awareness

L1 BRAKE RELEASED

Continued on the following page

BRAKES AUTO BRK FAULT (Cont'd)

3

STATUS

	INOP SYS
LDG DIST PROC.....APPLY	AUTO BRK NORM BRK (1)

(1) *(NORM BRK is inoperative in case of failure causing the AUTO BRK FAULT caution to trigger with a switch to alternate braking (failures affecting the BSCU, the Normal Selector Valve, the Normal Servo Valve, or brake pedal transmitter unit).)*

BRAKES AUTO BRK FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR

L2 Autobrake function is lost.

Crew awareness

STATUS

INOP SYS
AUTO BRK

BRAKES BRK Y ACCU LO PR

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 The yellow electrical pump can be used to pressurize the accumulator. If the accumulator pressure is still low, chocks are required before Engine 1 shut down. This message is replaced on ground by BRAKES PARK BRK LO PR if parking brake is on and yellow hydraulic system pressure is low.

L1 ● **On ground:**

● **BEFORE ENG SHUT DOWN:**

CHOCKS CONSIDER

Continued on the following page

BRAKES BRK Y ACCU LO PR (Cont'd)

STATUS	
• **If Y SYS LO PR** NORM BRK ONLY	**INOP SYS** BRK Y ACCU

BRAKES HOT

Applicable to: ALL

■ **On ground:**

PARK BRK: PREFER CHOCKS

L2 - *If the BRAKES HOT message is still on when the aircraft is parked, the flight crew should not set the PARKING BRK ON.*

L1 BRK FAN (IF INSTALLED)..... ON

L2 *Note: Before selecting the brake fans at the gate, the flight crew should first warn the ground personnel in order to avoid blowing carbon brake dust on them.*

L1 DELAY T.O. FOR COOL

L2 - *Delay takeoff, until the brake temperature is below 300 °C with the brake fans OFF, and 150 °C with the brake fans ◁ ON.*
- *Refer to PRO-SUP-32 Brake Temperature Limitations Requiring Maintenance Actions for brake temperature limitations requiring maintenance actions.*

L1 ■ **In flight:**

● **IF PERF PERMITS:**

L/G.....DN FOR COOL
MAX SPEED.....250/.60

L2 *If performance permits, the landing gear should be extended or, if already extended, it should remain so, to improve brake cooling.*

L1 ● **For L/G RETRACTION:**

MAX SPEED.....220/.52

L2 *Reduce speed for landing gear retraction, when the brake temperature is within limits.*

Continued on the following page

BRAKES HOT (Cont'd)

L12

MAX SPEED..... 280/.67
See (1)

(1) *As long as the landing gear is extended, limit the speed to 280 kt/M 0.67.*
For landing gear retraction when the brake temperature is within limits, reduce the speed to 220 kt.

BRAKES NORM + ALTN FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 Normal and alternate braking functions are lost.

L1 PARK BRK ONLY

4

STATUS

	INOP SYS
PARK BRK ONLY	
LDG DIST PROC.....APPLY	CAT 3 ANTI SKID N/W STRG NORM BRK AUTO BRK ALTN BRK
CAT 2 ONLY	

BRAKES NORM BRK FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR

L2 Normal braking function is lost.

Crew awareness

Continued on the following page

BRAKES NORM BRK FAULT (Cont'd)

5

STATUS	INOP SYS
LDG DIST PROC.....APPLY	
ALTN Y BRK WITH A/SKID CAT 2 ONLY	CAT 3 NORM BRK AUTO BRK

BRAKES NORM BRK FAULT - FWSPAGE

Applicable to: B-HST, B-HSU

6

STATUS	INOP SYS
LDG DIST PROC.....APPLY	
ALTN Y BRK WITH A/SKID CAT 2 ONLY	CAT 3 NORM BRK AUTO BRK

BRAKES PARK BRK FAULT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

- **On ground:**
  - **If PARKING BRK handle is OFF and parking brake pressure is still applied:**
    BRK PRESS STILL ON
  - **If PARKING BRK handle is ON and no parking brake pressure is applied:**
    PARK BRK..... OFF
    - **BEFORE ENG SHUT DOWN**
      CHOCKS CONSIDER

BRAKES PARK BRK LO PR

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 On ground, yellow hydraulic system and accumulator pressures are low with parking brake valve on. Chocks are required before Engine 1 shut down.

L1 ● **On ground:**

● **BEFORE ENG SHUT DOWN:**

CHOCKS CONSIDER

STATUS	INOP SYS
NORM BRK ONLY	BRK Y ACCU

BRAKES PARK BRK ON

Applicable to: ALL

L2 Parking brake is selected in flight.

L1 PARK BRK..... OFF

BRAKES RELEASED

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR

L2 At least one wheel is released.

Crew awareness.

7

STATUS	INOP SYS
LDG DIST PROC.....APPLY	AUTO BRK

BRAKES SYS 1(2) FAULT

Applicable to: ALL

L2 Crew awareness.

STATUS
INOP SYS
BRK SYS 1(2)

ASYMMETRIC BRAKING

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

Normal braking is faulty, or the green hydraulic system is in low pressure, and one gear is released.

8 Progressively apply brake on the available side. Counter swing with the rudder.
Avoid crosswind in excess of 10 kt from the side of available brake.

- **IF ONLY ONE REVERSE IS AVAILABLE:**

  Do not use Reverse on the side of available brake

LDG DIST PROC.....APPLY

LOSS OF BRAKING

Applicable to: ALL

- **IF NO BRAKING AVAILABLE:**

  REV..... MAX

  BRAKE PEDALS..... RELEASE

  Brake pedals should be released when the A/SKID & N/W STRG sw is switched OFF, since the pedal force or displacement produces more braking action in alternate mode than in normal mode.

  A/SKID & N/W STRG..... OFF

  Braking system reverts to alternate mode.

  BRAKE PEDALS.....PRESS

  Apply brake with care, since initial pedal force or displacement produces more braking action in alternate mode than in normal mode.

  MAX BRK PR.....1000 PSI

  Monitor brake pressure or BRAKES PRESS indicator. Limit brake pressure to approximately 1 000 PSI and, at low ground speed, adjust brake pressure as required.

  - **If STILL NO BRAKING:**

    PARKING BRAKE.....SHORT AND SUCCESSIVE APPLICATIONS

    Use short successive parking brake applications to stop the aircraft. Brake onset asymmetry may be felt at each parking brake application. If possible, delay the use of the parking brake until low speed, to reduce the risk of tire burst and lateral control difficulties.

RESIDUAL BRAKING PROC

Applicable to: ALL

- **IN FLIGHT:**

  BRAKE PEDALS..... APPLY SEVERAL TIMES

  Press the brake pedals several times. This could zero a residual pressure on the alternate system.

  - **IF RESIDUAL PRESSURE REMAINS:**

    A/SKID & N/W STRG selector.....KEEP ON

    - **IF AUTOBRAKE IS AVAILABLE:**

      FOR LANDING.....AUTO/BRK MED

      Using MED mode gives immediate priority to normal braking upon landing gear touchdown, which cancels residual alternate pressure.

    - **IF AUTOBRAKE IS NOT AVAILABLE:**

      JUST AFTER TOUCHDOWN..... APPLY BRAKING

      Pressing the brake pedals gives immediate priority to normal braking, which cancels residual alternate pressure.

    Beware of possible braking asymmetry after touchdown, which can be controlled by using the pedals.

  Note: *In case of taxi with deflated or damaged tires, Refer to LIM-32 Taxi with Deflated Tires.*

CONFIG PARK BRK ON

Applicable to: ALL

L2 Check that the parking brake handle is in the OFF position. If warning stays on, check that the brake pressure is at zero on the BRAKES PRESSURE indicator.

L/G DOORS NOT CLOSED

Applicable to: ALL

- **If the L/G lever is UP:**
  - **WHEN SPD < 220/.54:**
    L/G..... RECYCLE
- **IF UNSUCCESSFUL:**
  MAX SPEED..... 250/.60

L12
9

STATUS	
MAX SPEED..... 250/.60	**INOP SYS**
INCREASED FUEL CONSUMP *See* (1)	L/G DOOR

(1) *Disregard FMS fuel predictions and Refer to QRH/FPE-FPF Fuel Penalty Factors Tables in order to find the applicable Fuel Penalty Factor.*

L/G GEAR NOT DOWN

Applicable to: ALL

L2 This warning appears in approach at 750 ft RA, if the landing gear is not set to DOWN, and the system has not failed. When this warning appears, the red arrow on the instrument panel comes on.
This warning could be wrongly triggered in case of landing gear position sensors disagreement between LGCIU 1 and LGCIU 2. In this case, check that at least one green triangle is displayed on each landing gear strut on the WHEEL SD page page. This confirms that the landing gear is downlocked. Rely also on the "**LDG GEAR DN**"green LDG MEMO message to confirm that the landing gear is downlocked. Press the EMER CANC pb Cancel the warning by on the ECAM Control Panel (ECP) to stop the Continus Repetitive Chime (CRC) and press CLR pb on the ECP to clear the warning on the ECAM display.

Crew awareness.

L/G GEAR NOT DOWNLOCKED

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

L2 This warning appears, if the landing gear sequence is not completed after 30 s.

L1 L/G..... RECYCLE

Note: For recycling, set the landing gear lever to UP, wait for landing gear uplock, then set the landing gear lever to DOWN again.
The active LGCIU changes when the landing gear is recycled.

● **IF UNSUCCESSFUL:**

L/G..... GRVTY EXTN

L2 *Rotate the handle clockwise about 3 turns until reaching the mechanical stop. Refer to PRO-ABN-32 L/G GRAVITY EXTENSION.*

L12

STATUS	
L/G.....GRVTY EXTN	**INOP SYS**
CAT 3 SINGLE ONLY *See* (2)	CAT 3 DUAL N.W. STEER *See* (1)

(1) *As nose gear doors remain open, hydraulic power for nosewheel steering is lost.*
(2) *If gravity extension is unsuccessful, Refer to PRO-ABN-32 LDG WITH ABNORMAL L/G.*

L/G GEAR NOT DOWNLOCKED

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 This warning appears, if the landing gear sequence is not completed after 30 s.

L1 L/G..... RECYCLE

Note: For recycling, set the landing gear lever to UP, wait for landing gear uplock, then set the landing gear lever to DOWN again.
The active LGCIU changes when the landing gear is recycled.

- **IF UNSUCCESSFUL:**

L/G..... GRVTY EXTN

L2 *Rotate the handle clockwise about 3 turns until reaching the mechanical stop. Refer to PRO-ABN-32 L/G GRAVITY EXTENSION.*

L12

	STATUS	
L/G.....	GRVTY EXTN	**INOP SYS**
	CAT 3 SINGLE ONLY *See* (1)	CAT 3 DUAL

(1) *If gravity extension is unsuccessful, Refer to PRO-ABN-32 LDG WITH ABNORMAL L/G.*

L/G GEAR NOT UPLOCKED

Applicable to: ALL

10

L2 This warning appears if the landing gear sequence is not completed after 30 s.

L1 ■ **L/G doors closed:**

AVOID EXCESS G FACTOR

L2 *Because the gear rests on the doors, avoid excessive load factors in order not to damage door structure.*

L1 ■ **L/G doors not closed and shock absorber fault:**

MAX SPEED..... 220/.54
L/G..... DOWN
MAX SPEED..... 280/.67

■ **L/G doors not closed and no shock absorber fault:**

MAX SPEED..... 220/.54
L/G.....RECYCLE

Note: For recycling, select landing gear UP, wait for landing gear uplock, then select landing gear down again. The active LGCIU changes when the landing gear is recycled.

● **IF UNSUCCESSFUL:**

L/G.....DOWN
MAX SPEED.....280/.67

Continued on the following page

L/G GEAR NOT UPLOCKED (Cont'd)

L12
11

STATUS

MAX SPEED..... 280/.67	**INOP SYS**
INCREASED FUEL CONSUMP *See* (1)	L/G RETRACT

(1) *If the flight is continued (to destination or to alternate) with landing gear extended:*
- *Disregard FMS fuel predictions. Refer to QRH/FPE-FPF Fuel Penalty Factors Tables in order to find the applicable Fuel Penalty Factor*
- *Disregard FMS altitude and speed predictions. Time predictions are only valid in cruise*
- *Do not use the managed speed mode (except in approach)*
- *Do not use the CLB and the DES autopilot modes.*

Also Refer to PRO-SPO-25-10 Flight with Gear Down.

L/G GEAR UPLOCK FAULT

Applicable to: ALL

L/G.....KEEP DOWN

L2 *The landing gear must be left down to avoid structural damage, because the uplock device will stay in the locked position.*

L1 MAX SPEED.....280/.67

Continued on the following page

L/G GEAR UPLOCK FAULT (Cont'd)

L12
12

STATUS

MAX SPEED..... 280/.67
L/G..... KEEP DOWN

INCREASED FUEL CONSUMP
See (1)

INOP SYS

L/G RETRACT

(1)
If the flight is continued (to destination or to alternate) with landing gear extended:
- *Disregard FMS fuel predictions. Refer to QRH/FPE-FPF Fuel Penalty Factors Tables in order to find the applicable Fuel Penalty Factor*
- *Disregard FMS altitude and speed predictions. Time predictions are only valid in cruise*
- *Do not use the managed speed mode (except in approach)*
- *Do not use the CLB and the DES autopilot modes.*
  Also Refer to PRO-SPO-25-10 Flight with Gear Down.

L/G LGCIU 1 FAULT

Applicable to: ALL

GPWS..... OFF

L2 *GPWS receives "L/G in up position" information even if the landing gear is down.*
Setting the GPWS SYS pb-sw to OFF will prevent untimely warnings during the approach.

Continued on the following page

L/G LGCIU 1 FAULT (Cont'd)

L12

STATUS	INOP SYS
ENG 1 APPR IDLE ONLY *See* (1)	LGCIU 1 REVERSER 1 GPWS

Note: *1. The partial spoiler extension ◁ at landing when only one main landing gear is compressed is not available. The spoilers extend normally on ground when wheel speed greater than 72 kt.*
2. Depending on the LGCIU failure, only a part of the above systems may be lost.

(1) *When idle is selected on the ground with slats extended, only approach idle is available.*

L/G LGCIU 1(2) FAULT
(TWO LGCIUS FAULTY)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

L2 Normal landing gear control and position indications are lost. LDG GEAR lights on LDG GEAR control panel remain available if LGCIU 1 is electrically supplied.

L1 L/G.....GRVTY EXTN

L2 *Refer to PRO-ABN-32 L/G GRAVITY EXTENSION.*

L1 GPWS.....OFF

L2 *As LGCIU 1 is lost, GPWS receives "L/G in up position" information even if the landing gear is down. Setting the GPWS SYS pb-sw to OFF will prevent untimely warnings during approach.*

Continued on the following page

L/G LGCIU 1(2) FAULT (Cont'd)
(TWO LGCIUS FAULTY)

L12

STATUS

	INOP SYS
L/G.....GRVTY EXTN	
L/G CONTROL NOT AVAIL	REVERSER 1 + 2
ENG 1 APPR IDLE ONLY	AP 1 + 2 (1)
ENG 2 APPR IDLE ONLY	A/THR
	N.W STEER
	LGCIU 1
	LGCIU 2
	GPWS
	CAT 2 (1)

Note: *1. The partial spoiler extension ◁ at landing when only one main landing gear is compressed is not available. The spoilers extend normally on ground when wheel speed greater than 72 kt.*
2. Depending on the LGCIU failure, only a part of the above systems may be lost.
3. In flight with both LGCIUs "faulty", the Wing Anti-Ice pb will illuminate "on" and will be only 30 s of heating. This loss of Wing Anti-Ice have an ECAM/Aural warning. Although BLEED SD page shows a "no-Anti-Ice" legend.

(1) *(except in LAND mode)*

L/G LGCIU 1(2) FAULT
(TWO LGCIUS FAULTY)

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 Normal landing gear control and position indications are lost. LDG GEAR lights on LDG GEAR control panel remain available if LGCIU 1 is electrically supplied.

L1 L/G.....GRVTY EXTN

L2 *Refer to PRO-ABN-32 L/G GRAVITY EXTENSION.*

L1 GPWS.....OFF

L2 *As LGCIU 1 is lost, GPWS receives "L/G in up position" information even if the landing gear is down. Setting the GPWS SYS pb-sw to OFF will prevent untimely warnings during approach.*

L12

STATUS

L/G.....GRVTY EXTN	**INOP SYS**
L/G CONTROL NOT AVAIL ENG 1 APPR IDLE ONLY ENG 2 APPR IDLE ONLY	REVERSER 1 + 2 AP 1 + 2 (1) A/THR LGCIU 1 LGCIU 2 GPWS CAT 2 (1)

Note: *1. The partial spoiler extension ◁ at landing when only one main landing gear is compressed is not available. The spoilers extend normally on ground when wheel speed greater than 72 kt.*
2. Depending on the LGCIU failure, only a part of the above systems may be lost.
3. In flight with both LGCIUs "faulty", the Wing Anti-Ice pb will illuminate "on" and will be only 30 s of heating. This loss of Wing Anti-Ice have an ECAM/Aural warning. Although BLEED SD page shows a "no-Anti-Ice" legend.

(1) *(except in LAND mode)*

L/G LGCIU 2 FAULT

Applicable to: ALL

L2 Crew awareness

L12

STATUS	INOP SYS
ENG 2 APPR IDLE ONLY *See* (1)	LGCIU 2 REVERSER 2

Note: *1. The partial spoiler extension ◁ at landing when only one main landing gear is compressed is not available. The spoilers extend normally on ground when wheel speed greater than 72 kt.*
2. Depending on the LGCIU failure, only a part of the above systems may be lost.

(1) *When idle is selected on the ground with slats extended, only approach idle is available.*

L/G SHOCK ABSORBER FAULT
(SHOCK ABSORBER EXTENDED ON THE GROUND)

Applicable to: ALL

L2 Crew awareness

L/G SHOCK ABSORBER FAULT
(SHOCK ABSORBER NOT EXTENDED AFTER LIFTOFF)

Applicable to: ALL

■ **Shock absorber not extended after liftoff and L/G uplocked :**

Crew awareness

■ **Shock absorber not extended after liftoff and L/G not uplocked :**

MAX SPEED..... 280/.67

■ **If L/G lever still down :**

L/G.....KEEP DOWN

■ **If L/G lever selected up :**

L/G.....DOWN

L12
13

STATUS

- **If L/G not uplocked:**
  MAX SPEED.....280/.67
  L/G.....KEEP DOWN

INCREASED FUEL CONSUMP
See (1)

INOP SYS

L/G RETRACT

(1) *If the flight is continued (to destination or to alternate) with landing gear extended:*
- *Disregard FMS fuel predictions. Refer to QRH/FPE-FPF Fuel Penalty Factors Tables in order to find the applicable Fuel Penalty Factor*
- *Disregard FMS altitude and speed predictions. Time predictions are only valid in cruise*
- *Do not use the managed speed mode (except in approach)*
- *Do not use the CLB and the DES autopilot modes.*

Also Refer to PRO-SPO-25-10 Flight with Gear Down.

Note: If WHEEL N.W. STEER FAULT is also displayed, then the nose wheels may be at maximum deflection. (Turned 90 ° from center.) During landing, delay nose wheel touchdown for as long as possible.

L/G SYS DISAGREE

Applicable to: ALL

L2 Disagreement between the landing gear positions are detected by LGCIU 1 and LGCIU 2.

L1
L2 Crew awareness.

L/G GRAVITY EXTENSION

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

CAUTION	Do not apply this procedure if at least one green triangle is displayed on each landing gear on the WHEEL SD page. This is sufficient to confirm that the landing gear is downlocked. Disregard any possible L/G GEAR NOT DOWN ECAM alert at 750 ft RA and any possible GPWS "TOO LOW GEAR"aural alert.

GRAVITY GEAR EXTN handcrank..... PULL AND TURN

Rotate the handle clockwise 3 turns until reaching the mechanical stop, even if resistance is felt.

L/G lever.....DOWN

The landing gear lever should be confirmed in the DOWN position for the following reasons:
- *To extinguish the UNLK lights on the landing gear indication panel.*
- *To prevent the L/G CTL message from appearing on the WHEEL SD page.*
- *To minimize the risk of landing gear retraction on the ground, due to an unknown system fault, when the free-fall system is reset.*

GEAR DOWN indications (if available).....CHECK

Note:
1. *Depending on aircraft speed, the display may show the landing gear doors in the amber transit position.*
2. *In the event of gravity extension, caused by the failure of both LGCIUs, landing gear position indication on ECAM are lost. LDG GEAR lights on LDG GEAR control panel remain available, if LGCIU 1 is electrically supplied.*
3. *The L/G LGCIU 2 FAULT or BRAKES SYS 1(2) FAULT warning may be spuriously triggered after a gravity extension.*
4. *If the three green downlock arrows are not on, it is possible that the handcrank is not at the mechanical stop. Check that the handcrank is firmly against the mechanical stop.*

CAUTION	Nosewheel steering is lost.

■ **If successful:**

Do not reset the free-fall system. This will avoid such undesirable effects as further loss of fluid, in the event of a leak, or possible landing gear unlocking, in the event of a gear selector valve jamming in the UP position.

Note: *The free-fall system may be reset in flights used for training. If the green hydraulic system is available, resetting the free-fall system allows the landing gear doors to be closed and the nosewheel steering to operate.*
The flight crew should not reset the free-fall system on the ground after flight.

Continued on the following page

L/G GRAVITY EXTENSION (Cont'd)

■ **If unsuccessful:**

LDG WITH ABNORMAL L/G procedure..... APPLY

L/G GRAVITY EXTENSION

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

CAUTION	Do not apply this procedure if at least one green triangle is displayed on each landing gear on the WHEEL SD page. This is sufficient to confirm that the landing gear is downlocked. Disregard any possible L/G GEAR NOT DOWN ECAM alert at 750 ft RA and any possible GPWS "TOO LOW GEAR"aural alert.

GRAVITY GEAR EXTN handcrank.....PULL AND TURN

Rotate the handle clockwise 3 turns until reaching the mechanical stop, even if resistance is felt.

L/G lever.....DOWN

The landing gear lever should be confirmed in the DOWN position for the following reasons:
- *To extinguish the UNLK lights on the landing gear indication panel.*
- *To prevent the L/G CTL message from appearing on the WHEEL SD page.*
- *To minimize the risk of landing gear retraction on the ground, due to an unknown system fault, when the free-fall system is reset.*

GEAR DOWN indications (if available).....CHECK

Note:
1. *Depending on aircraft speed, the display may show the landing gear doors in the amber transit position.*
2. *In the event of gravity extension, caused by the failure of both LGCIUs, landing gear position indication on ECAM are lost. LDG GEAR lights on LDG GEAR control panel remain available, if LGCIU 1 is electrically supplied.*
3. *The L/G LGCIU 2 FAULT or BRAKES SYS 1(2) FAULT warning may be spuriously triggered after a gravity extension.*
4. *If the three green downlock arrows are not on, it is possible that the handcrank is not at the mechanical stop. Check that the handcrank is firmly against the mechanical stop.*

■ **If successful:**

Do not reset the free-fall system. This will avoid such undesirable effects as further loss of fluid, in the event of a leak, or possible landing gear unlocking, in the event of a gear selector valve jamming in the UP position.

Note: *The free-fall system may be reset in flights used for training. If the green hydraulic system is available, resetting the free-fall system allows the landing gear doors to be closed.*
The flight crew should not reset the free-fall system on the ground after flight.

Continued on the following page

L/G GRAVITY EXTENSION (Cont'd)

■ **If unsuccessful:**

LDG WITH ABNORMAL L/G procedure..... APPLY

LDG WITH ABNORMAL L/G

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The procedure is intended for use when the nose or main landing gear fail to extend and/or lock down following the application of the L/G GRVTY EXTN procedure.
It is preferable to use any available landing gear, rather than carry out a belly landing.
Under these circumstances, a hard surface runway landing is recommended.
Full advantage should be taken of any foam, spread on the runway.

CAUTION	Do not apply this procedure if at least one green triangle is displayed on each landing gear on the WHEEL SD page. This is sufficient to confirm that the landing gear is downlocked. Disregard any possible L/G GEAR NOT DOWN ECAM alert at 750 ft RA and any possible GPWS "TOO LOW GEAR"aural alert.

PREPARATION

CABIN CREW.....NOTIFY

Notify the cabin crew of the nature of the emergency encountered and state intentions. Specify the amount of available preparation time.

ATC.....NOTIFY

Notify ATC of the nature of the emergency and state intentions.
Consider fuel reduction to a safe minimum. This reduces VREF and, consequently, the load factor at impact and the energy to be dissipated.

GALLEY.....OFF

- **If NOSE L/G abnormal:**
  CG location (if possible).....AFT
  - *10 passengers from front to rear moves the CG roughly 4 % aft*
  - *10 passengers from mid to rear moves the CG roughly 2.5 aft.*

- **If one MAIN L/G abnormal:**
  FUEL IMBALANCE..... CONSIDER
  Open the fuel X-FEED valve and switch off the pumps on the side with landing gear normally extended.

OXYGEN CREW SUPPLY.....OFF
SIGNS.....ON
CABIN and COCKPIT..... PREPARE

Secure loose equipment, prepare survival equipment, and lock belts and shoulder harnesses.

Continued on the following page

LDG WITH ABNORMAL L/G (Cont'd)

APPROACH

GPWS SYS..... OFF
L/G lever.....CHECK DOWN
GRVTY GEAR EXTN handcrank.....TURN BACK TO NORMAL

Rotating three turns back to normal may, in certain cases, pressurize the landing gear down actuators, thereby reducing the probability of gear collapse after touchdown.

AUTOBRAKE..... DO NOT ARM

Manual braking will enable better pitch and roll control. Moreover, with at least one main landing gear in the abnormal position the autobrake cannot be activated (ground spoilers not armed).

EMER EXIT LT..... ON
CABIN REPORT.....OBTAIN
A/SKID & N/W STRG.....OFF

With one main landing gear not extended, the reference speed used by the anti-skid to detect a wheel blockage is not correctly initialized. As a result, the anti-skid must be switched off to prevent permanent brake release.

MAX BRAKE PR.....1000PSI

Modulate the brake pressure to 1 000 PSI because the anti-skid is off.

- **If one or both MAIN L/G abnormal:**

  GROUND SPOILERS.....DO NOT ARM

  To keep as much roll authority as possible for maintaining the wings level. Ground spoiler extension would prevent spoilers from acting as roll surfaces.

BEFORE LANDING

RAM AIR..... ON

To ensure full depressurization of the aircraft before impact.

BRACE FOR IMPACT.....ORDER

- **If the external light condition is poor at landing:**

  DOME LT.....DIM

  Set the dome light to DIM to ensure that there is a light source after both engines are shut down after landing, in order to see and read the BRAKE PRESS indicator.

FLARE, TOUCH DOWN AND ROLL OUT

Engines should be shut down sufficiently early to ensure fuel is shut off before the nacelles impact, but sufficiently late to ensure adequate hydraulic supplies for the flight controls. Engine pumps continue to supply adequate hydraulic pressure for 30 s after engine shutdown.

Continued on the following page

LDG WITH ABNORMAL L/G (Cont'd)

REVERSE.....DO NOT USE

Do not use reverse in order to prevent:
- *The engine(s) from touching the ground during rollout*
- *Ground spoilers extension, in the case of abnormal main landing gear.*

● **If NOSE L/G abnormal:**

NOSE.....MAINTAIN UP

After touchdown, keep the nose off the runway by the use of the elevator. Then, lower the nose on to the runway before elevator control is lost.

BRAKES (compatible with elevator efficiency).....APPLY

ENG MASTERS.....OFF

Shutdown the engines before nose impact.

● **If one MAIN L/G abnormal:**

ENG MASTERS.....OFF

At touchdown, shut down both engines.

FAILURE SIDE WING.....MAINTAIN UP

Use roll control, as necessary, to maintain the unsupported wing up as long as possible.

DIRECTIONAL CONTROL.....MAINTAIN

Use rudder and brakes (maximum 1 000 PSI) to maintain the runway axis as long as possible.

● **If both MAIN L/G abnormal:**

ENG MASTERS.....OFF

Shut down the engines in the flare, before touchdown.

PITCH ATTITUDE (at touchdown).....NOT LESS THAN 6°

14 **WHEN A/C STOPPED**

ENG (all) and APU FIRE pushbutton.....PUSH

Pressing the ENG FIRE pushbutton shuts off the related hydraulic pressure within a short time.

ALL ENG and APU AGENT.....DISCH

■ **If Evacuation required:**

EVACUATION.....INITIATE

Make a short and precise announcement to order the emergency evacuation.

■ **If Evacuation not required:**

CABIN CREW and PASSENGERS (PA).....NOTIFY

Continued on the following page

LDG WITH ABNORMAL L/G (Cont'd)

Ensure that all the landing gears are secured before initiating the disembarkation (before switching OFF the seat belts signs).


NOSE L/G ABNORMAL


ONE MAIN L/G ABNORMAL


BOTH MAIN L/G ABNORMAL

REFERENCE AIRCRAFT ATTITUDE
AFTER IMPACT

LDG WITH ABNORMAL L/G

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The procedure is intended for use when the nose or main landing gear fail to extend and/or lock down following the application of the L/G GRVTY EXTN procedure.
It is preferable to use any available landing gear, rather than carry out a belly landing.
Under these circumstances, a hard surface runway landing is recommended.
Full advantage should be taken of any foam, spread on the runway.

CAUTION	Do not apply this procedure if at least one green triangle is displayed on each landing gear on the WHEEL SD page. This is sufficient to confirm that the landing gear is downlocked. Disregard any possible L/G GEAR NOT DOWN ECAM alert at 750 ft RA and any possible GPWS "TOO LOW GEAR"aural alert.

PREPARATION

CABIN CREW.....NOTIFY

Notify the cabin crew of the nature of the emergency encountered and state intentions. Specify the amount of available preparation time.

ATC.....NOTIFY

Notify ATC of the nature of the emergency and state intentions.
Consider fuel reduction to a safe minimum. This reduces VREF and, consequently, the load factor at impact and the energy to be dissipated.

GALY & CAB pb-sw .....OFF

- **If NOSE L/G abnormal:**
  CG location (if possible).....AFT
  - *10 passengers from front to rear moves the CG roughly 4 % aft*
  - *10 passengers from mid to rear moves the CG roughly 2.5 aft.*

- **If one MAIN L/G abnormal:**
  FUEL IMBALANCE..... CONSIDER
  Open the fuel X-FEED valve and switch off the pumps on the side with landing gear normally extended.

OXYGEN CREW SUPPLY.....OFF
SIGNS.....ON
CABIN and COCKPIT..... PREPARE

Secure loose equipment, prepare survival equipment, and lock belts and shoulder harnesses.

Continued on the following page

LDG WITH ABNORMAL L/G (Cont'd)

APPROACH

GPWS SYS..... OFF
L/G lever.....CHECK DOWN
GRVTY GEAR EXTN handcrank.....TURN BACK TO NORMAL

Rotating three turns back to normal may, in certain cases, pressurize the landing gear down actuators, thereby reducing the probability of gear collapse after touchdown.

AUTOBRAKE..... DO NOT ARM

Manual braking will enable better pitch and roll control. Moreover, with at least one main landing gear in the abnormal position the autobrake cannot be activated (ground spoilers not armed).

EMER EXIT LT..... ON
CABIN REPORT.....OBTAIN
A/SKID & N/W STRG.....OFF

With one main landing gear not extended, the reference speed used by the anti-skid to detect a wheel blockage is not correctly initialized. As a result, the anti-skid must be switched off to prevent permanent brake release.

MAX BRAKE PR.....1000PSI

Modulate the brake pressure to 1 000 PSI because the anti-skid is off.

- **If one or both MAIN L/G abnormal:**

  GROUND SPOILERS.....DO NOT ARM

  To keep as much roll authority as possible for maintaining the wings level. Ground spoiler extension would prevent spoilers from acting as roll surfaces.

BEFORE LANDING

RAM AIR..... ON

To ensure full depressurization of the aircraft before impact.

BRACE FOR IMPACT.....ORDER

- **If the external light condition is poor at landing:**

  DOME LT.....DIM

  Set the dome light to DIM to ensure that there is a light source after both engines are shut down after landing, in order to see and read the BRAKE PRESS indicator.

FLARE, TOUCH DOWN AND ROLL OUT

Engines should be shut down sufficiently early to ensure fuel is shut off before the nacelles impact, but sufficiently late to ensure adequate hydraulic supplies for the flight controls. Engine pumps continue to supply adequate hydraulic pressure for 30 s after engine shutdown.

Continued on the following page

LDG WITH ABNORMAL L/G (Cont'd)

REVERSE.....DO NOT USE

Do not use reverse in order to prevent:
- *The engine(s) from touching the ground during rollout*
- *Ground spoilers extension, in the case of abnormal main landing gear.*

● **If NOSE L/G abnormal:**

NOSE.....MAINTAIN UP

After touchdown, keep the nose off the runway by the use of the elevator. Then, lower the nose on to the runway before elevator control is lost.

BRAKES (compatible with elevator efficiency).....APPLY

ENG MASTERS.....OFF

Shutdown the engines before nose impact.

● **If one MAIN L/G abnormal:**

ENG MASTERS.....OFF

At touchdown, shut down both engines.

FAILURE SIDE WING.....MAINTAIN UP

Use roll control, as necessary, to maintain the unsupported wing up as long as possible.

DIRECTIONAL CONTROL.....MAINTAIN

Use rudder and brakes (maximum 1 000 PSI) to maintain the runway axis as long as possible.

● **If both MAIN L/G abnormal:**

ENG MASTERS.....OFF

Shut down the engines in the flare, before touchdown.

PITCH ATTITUDE (at touchdown).....NOT LESS THAN 6°

15 **WHEN A/C STOPPED**

ENG (all) and APU FIRE pushbutton.....PUSH

Pressing the ENG FIRE pushbutton shuts off the related hydraulic pressure within a short time.

ALL ENG and APU AGENT.....DISCH

■ **If Evacuation required:**

EVACUATION.....INITIATE

Make a short and precise announcement to order the emergency evacuation.

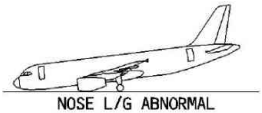
■ **If Evacuation not required:**

CABIN CREW and PASSENGERS (PA).....NOTIFY

Continued on the following page

LDG WITH ABNORMAL L/G (Cont'd)

Ensure that all the landing gears are secured before initiating the disembarkation (before switching OFF the seat belts signs).


NOSE L/G ABNORMAL


ONE MAIN L/G ABNORMAL


BOTH MAIN L/G ABNORMAL

REFERENCE AIRCRAFT ATTITUDE
AFTER IMPACT

WHEEL HYD SEL FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

L2 Failure of normal brake selector valve, or the steering selector valve, in the open position:

- If the normal brake selector valve is failed open, full green hydraulic pressure is present at normal servovalves' entry.
  Nosewheel steering remains available.
- On ground, do not tow the aircraft with the green hydraulic system pressurized: If the steering selector valve is failed open, nosewheel steering remains pressurized, and so towing may either break the towbar shear pin, or the nose gear (if towbarless towing).
- If the steering selector valve is failed open, setting A/SKID & N/W STRG sw to OFF will cause the nosewheel to go to maximum deflection.

L1 A/SKID & N/W STRG.....KEEP ON

L2 *As long as antiskid is operative, brake pressure is regulated by normal servovalves.*

WHEEL HYD SEL FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 Failure of normal brake selector valve, or the steering selector valve, in the open position:

- If the normal brake selector valve is failed open, full green hydraulic pressure is present at normal servovalves' entry.
  Nosewheel steering remains available.
- On ground, do not tow the aircraft with the yellow hydraulic system pressurized: If the steering selector valve is failed open, nosewheel steering remains pressurized, and so towing may either break the towbar shear pin, or the nose gear (if towbarless towing).
- If the steering selector valve is failed open, setting A/SKID & N/W STRG sw to OFF will cause the nosewheel to go to maximum deflection.

L1 A/SKID & N/W STRG.....KEEP ON

L2 *As long as antiskid is operative, brake pressure is regulated by normal servovalves.*

WHEEL N/W STRG FAULT

Applicable to: ALL

L12

STATUS	
	INOP SYS
CAT 3 SINGLE ONLY *See* (1)	CAT 3 DUAL N/W STRG

(1)

Note: *1. If the L/G SHOCK ABSORBER FAULT is also displayed, then the nose wheels may be at maximum deflection. (turned 90 ° from center). During landing, delay nose wheel touchdown as long as possible.*

2. As specified in theRefer to QRH/OPS Required Equipment for CAT2 and CAT3 automatic rollout is not permitted.

Intentionally left blank

ADR 1+2+3 FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

The ECAM does not display this procedure. In the case of a triple ADR failure, the ECAM only displays dual ADR warnings.

ADR (all).....OFF
STBY INST.....USE

Note: *Disregard ECAM actions for AIR DATA SWTG and ATC, because these have no effect in the case of a total loss of ADRs.*

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)
MAX SPEED.....320/0.82
See for the IAS/M relationship for 0.82

FL	*390*	*370*	*350*	*330*	*310*	*290*	*280 and below*
MAX SPD	*252*	*265*	*278*	*290*	*305*	*315*	*320*

WHEN L/G DN: DIRECT LAW

At landing gear extension, control reverts to direct law in pitch, as well as in roll Refer to PRO_ABN_27 F/CTL DIRECT LAW.

Note: *Use manual control of cabin pressurization:*

MODE SEL..... MAN
MAN V/S CTL..... AS RQRD

These lines are not displayed on the ECAM. (For details, Refer to Abnormal and Emergency Section (Pressurization)).

Continued on the following page

ADR 1+2+3 FAULT (Cont'd)

1

STATUS

MAX SPEED..... 320/0.82
RUD WITH CARE ABV 160 KT
See (1)

APPR PROC

FOR LDG.....USE FLAP 3

Do not select CONF FULL, so as not to degrade handling qualities.

GPWS LDG FLAP 3..... ON

Displayed, when CONF 3 is selected.

APPR SPD.....VREF +10 KT
LDG DIST PROC.....APPLY

Note: *As the landing gear safety valve is closed, landing gear extension must be performed by gravity(Refer to PRO-ABN-32 L/G GRAVITY EXTENSION).*

WHEN L/G DN : DIRECT LAW

At landing gear extension, control reverts to direct law in pitch, as well as in roll.

- **DURING FINAL APPR**

  V/S CTL..... FULL UP

  Note: *In case of a go-around, respect the maximum speed of 215 kt in CONF 1+F, due to loss of flap auto retraction to CONF 1.*

CAUTION	*Check that the outflow valve is fully open and that cabin altitude is at airfield elevation before opening the doors.*

INOP SYS

F/CTL PROT
WINDSHEAR DET
GPWS
ADR 1+2+3
AP 1+2
A/THR
RUD TRV LIM 1+2
CAB PR 1+2

Other INOP SYS

CAT 2
ATC ALTI MODE
TCAS
L/G RETRACT
RAT AUTOMATIC EXTENSION

Continued on the following page

ADR 1+2+3 FAULT (Cont'd)

(1) *The rudder travel limit value is frozen at the moment when the failure occurs. Therefore, to prevent damage to the aircraft structure, use the rudder with care, when the speed is above 160 kt . At slats' extension, full rudder travel authority is recovered.*

ALL ADR OFF

Applicable to: B-HSO, B-HSP

Apply this paper procedure when requested by the "NAV ADR 1+2+3 FAULT" ECAM alert.

SPD..... FLY THE GREEN

Fly within the green area of the speed scale to ensure safe flight. For slats/flaps retraction, it is better to fly at the top of the green area of the speed scale.

CAUTION	The altitude displayed on the PFD is a GPS altitude.

BACK UP NAV.....USE

When all ADRs are OFF, both FMs are lost.
Revert to Back Up Nav via the NAV B/UP prompt on the MCDU MENU page.

NAVAID TUNING.....USE RMP

Set both RMPs to NAV.

MANUAL CABIN PRESSURE CONTROL

MODE SEL..... MAN
MAN V/S CTL..... AS RQRD
MAN CAB PR CTL

TGT V/S : CLIMB 500 FT/MIN
DESC 300 FT/MIN

A/C GPS ALT	*CAB ALT TGT*
410	*8000*
350	*7000*
300	*5500*
250	*3000*
<200	*0*

2 **FOR APPROACH**

SPD.....FLY THE GREEN

Before extending the slats/flaps, it is better to fly at the bottom of the speed scale green area, and to be in straight flight.

FOR LDG.....USE FLAP 3

Note: Do not select CONF FULL so as not to degrade the handling qualities. Since ADR parameters are lost, the SFCCs will set CONF 1+F instead of CONF 1

LDG DIST PROC.....APPLY

Continued on the following page

ALL ADR OFF (Cont'd)

APPR SPD..... FLY THE BUG

During the approach, the bug indicates Vapp.

- **WHEN FLAP 2**

  LDG GRVTY EXTN..... DOWN

CAUTION	All gear doors remain open.

- **WHEN L/G DOWNLOCKED:**

  L/G lever..... DOWN

  GEAR DOWN indications..... CHECK

- **DURING FINAL APPROACH:**

  MAN V/S CTL..... FULL UP

CAUTION	Check that the outflow valve is fully open and that cabin altitude is at airfield elevation before opening the doors.

STATUS

INOP SYS

REAC W/S DET
PRED W/S DET ◁
F/CTL PROT
ADR 1+2+3
RUD TRV LIM
AP 1+2
A/THR
CAB PR 1+2
GPWS
GPWS TERR ◁

Other INOP SYS

RAT automatic extension
ATC ALTI MODE
TCAS
L/G RETRACT

ALL ADR OFF

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

Apply this paper procedure when requested by the "NAV ADR 1+2+3 FAULT" ECAM alert.

SPD..... FLY THE GREEN

Fly within the green area of the speed scale to ensure safe flight. For slats/flaps retraction, it is better to fly at the top of the green area of the speed scale.

CAUTION	The altitude displayed on the PFD is a GPS altitude.

BACK UP NAV.....USE

When all ADRs are OFF, both FMs are lost.
Revert to Back Up Nav via the NAV B/UP prompt on the MCDU MENU page.

NAVAID TUNING.....USE RMP

Set both RMPs to NAV.

MANUAL CABIN PRESSURE CONTROL

MODE SEL..... MAN
MAN V/S CTL..... AS RQRD
MAN CAB PR CTL

TGT V/S : CLIMB 500 FT/MIN
DESC 300 FT/MIN

A/C GPS ALT	*CAB ALT TGT*
410	*8000*
350	*7000*
300	*5500*
250	*3000*
<200	*0*

3 **FOR APPROACH**

SPD.....FLY THE GREEN

Before extending the slats/flaps, it is better to fly at the bottom of the speed scale green area, and to be in straight flight.

FOR LDG.....USE FLAP 3

Note: Do not select CONF FULL so as not to degrade the handling qualities. Since ADR parameters are lost, the SFCCs will set CONF 1+F instead of CONF 1

LDG DIST PROC.....APPLY

Continued on the following page

ALL ADR OFF (Cont'd)

APPR SPD..... FLY THE BUG

During the approach, the bug indicates Vapp.

- **WHEN FLAP 2**

  LDG GRVTY EXTN..... DOWN

CAUTION	All gear doors remain open.

- **WHEN L/G DOWNLOCKED:**

  L/G lever..... DOWN

  GEAR DOWN indications..... CHECK

- **DURING FINAL APPROACH:**

  MAN V/S CTL..... FULL UP

CAUTION	Check that the outflow valve is fully open and that cabin altitude is at airfield elevation before opening the doors.

STATUS

INOP SYS

REAC W/S DET
PRED W/S DET ◁✻
F/CTL PROT
ADR 1+2+3
RUD TRV LIM
AP 1+2
A/THR
CAB PR 1+2
TCAS
ATC/XPDR 1
ATC/XPDR 2
GPWS
GPWS TERR ◁✻

Other INOP SYS

RAT automatic extension
L/G RETRACT

EGPWS ALERTS

Applicable to: ALL 320, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

CAUTION	During night or IMC conditions, immediately apply the procedure. Do not delay reaction for diagnosis. During daylight VMC conditions, with terrain and obstacles clearly in sight, the alert may be considered cautionary. Take positive corrective action until the alert stops, or until a safe trajectory is ensured.

■ **"PULL UP" - "TERRAIN TERRAIN PULL UP" - "TERRAIN AHEAD PULL UP" - "OBSTACLE AHEAD PULL UP":**

Simultaneously:

AP.....OFF
PITCH..... PULL UP

Pull to full backstick and maintain in that position.

THRUST LEVERS..... TOGA
SPEED BRAKES lever.....CHECK RETRACTED
BANK..... WINGS LEVEL or ADJUST

Best climb performance is obtained when close to wings level. Then, for "TERRAIN AHEAD PULL UP" or for "OBSTACLE AHEAD PULL UP", and if the crew concludes that turning is the safest way of action, a turning maneuver can be initiated.

- **When flight path is safe and the warning stops:**
  Decrease pitch attitude and accelerate.
- **When speed is above VLS, and vertical speed is positive:**
  Clean up aircraft, as required.

■ **"TERRAIN TERRAIN" – "TOO LOW TERRAIN":**

Adjust the flight path, or initiate a go-around.

■ **"TERRAIN AHEAD" - "OBSTACLE AHEAD"**

Adjust the flight path. Stop descent. Climb and/or turn, as necessary, based on analysis of all available instruments and information.

■ **"SINK RATE" – "DON'T SINK":**

Adjust pitch attitude and thrust to silence the alert.

■ **"TOO LOW GEAR" - "TOO LOW FLAPS":**

Perform a go-around.

Continued on the following page

EGPWS ALERTS (Cont'd)

■ **"GLIDE SLOPE":**

Establish the aircraft on the glideslope, or switch OFF the G/S mode pb-sw, if flight below the glideslope is intentional (non precision approach (NPA)).

EGPWS ALERTS

Applicable to: B-HTF

CAUTION	During night or IMC conditions, immediately apply the procedure. Do not delay reaction for diagnosis. During daylight VMC conditions, with terrain and obstacles clearly in sight, the alert may be considered cautionary. Take positive corrective action until the alert stops, or until a safe trajectory is ensured.

■ **"PULL UP" - "TERRAIN TERRAIN PULL UP" - "OBSTACLE OBSTACLE PULL UP"**

Simultaneously:

AP.....OFF
PITCH..... PULL UP

Pull to full backstick and maintain in that position.

THRUST LEVERS..... TOGA
SPEED BRAKES lever.....CHECK RETRACTED
BANK..... WINGS LEVEL or ADJUST

Best climb performance is obtained when close to wings level. Then, for "TERRAIN TERRAIN PULL UP" or for "OBSTACLE OBSTACLE PULL UP", and if the crew concludes that turning is the safest way of action, a turning maneuver can be initiated.

- **When flight path is safe and the warning stops:**
  Decrease pitch attitude and accelerate.
- **When speed is above VLS, and vertical speed is positive:**
  Clean up aircraft, as required.

■ **"TERRAIN TERRAIN" – "TOO LOW TERRAIN":**

Adjust the flight path, or initiate a go-around.

■ **"CAUTION TERRAIN" - "CAUTION OBSTACLE"**

Adjust the flight path. Stop descent. Climb and/or turn, as necessary, based on analysis of all available instruments and information.

■ **"SINK RATE" – "DON'T SINK":**

Adjust pitch attitude and thrust to silence the alert.

■ **"TOO LOW GEAR" - "TOO LOW FLAPS":**

Perform a go-around.

Continued on the following page

EGPWS ALERTS (Cont'd)

■ **"GLIDE SLOPE":**

Establish the aircraft on the glideslope, or switch OFF the G/S mode pb-sw, if flight below the glideslope is intentional (non precision approach (NPA)).

NAV ADR DISAGREE

Applicable to: ALL

L2 If one ADR is faulty, or has been rejected by the ELAC, and if there is a speed or alpha disagreement between the 2 remaining ADRs, alternate law becomes active, and protections are lost.

L1 AIR SPD.....X CHECK

■ **IF SPD DISAGREE:**

ADR CHECK PROC.....APPLY

L2 *Refer to PRO-ABN-34 UNRELIABLE SPEED INDICATION/ADR CHECK PROC - GENERAL* to determine the faulty ADR.

L1 ■ **IF NO SPD DISAGREE:**

AOA DISCREPANCY

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)
MAX SPEED.....320 KT

Continued on the following page

NAV ADR DISAGREE (Cont'd)

L12
4

STATUS

MAX SPEED.....320 KT

APPR PROC

FOR LDG.....USE FLAP 3

Do not select CONF FULL, so as not to degrade handling qualities.

GPWS LDG FLAP 3..... ON

Displayed, when CONF 3 is selected.

APPR SPD.....VREF +10

LDG DIST PROC.....APPLY

- **IF NO SPD DISAGREE:**
  RISK OF UNDUE STALL WARN

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
See (1)

INOP SYS

F/CTL PROT

(1) *At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to PRO-ABN-27 F/CTL DIRECT LAW).*

IR ALIGNMENT IN ATT MODE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

If IR alignment is lost, the navigation mode is inoperative (red ATT flag on PFD and red HDG flag on ND).
Aircraft attitude and heading may be recovered by applying the following procedure.
Aircraft must stay level with constant speed during 30 s.

MODE SELECTOR.....ATT

ALIGN light on during 30 s.
ATT MODE displayed on CDU.

LEVEL A/C ATTITUDE.....HOLD
CONSTANT A/C SPEED..... MAINTAIN
DISPLAY SYS switch.....AFFECTED SYS
DISPLAY DATA switch.....HDG

Depending on the CDU keyboard installed, an “H” may be written on the “5” key:

- **If “H” is written on the “5” key:**

  H KEY..... PRESS

  Degree marker, 0 decimal point, ENT and CLR lights come on.

  A/C HEADING.....ENTER

- **If “H” is not written on the “5” key:**

  A/C HEADING.....ENTER

  Enter aircraft magnetic heading on CDU keyboard. Then press ENT key to enter data.
  Example : to enter heading 320 °, dial 3, 2, 0, 0 then press ENT.
  Heading will be displayed on the associated ND.
  “HDG–ATT MODE” will be displayed on CDU.

Due to IR drift, magnetic heading has to be periodically crosschecked with standby compass and updated if required.

IR ALIGNMENT IN ATT MODE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HTG, B-HTH, B-HTI

If IR alignment is lost, the navigation mode is inoperative (red ATT flag on PFD and red HDG flag on ND).
Aircraft attitude and heading may be recovered by applying the following procedure.
Aircraft must stay level with constant speed during 30 s.

MODE SELECTOR.....ATT

ALIGN light on during 30 s.
ATT MODE displayed on CDU.

LEVEL A/C ATTITUDE.....HOLD
CONSTANT A/C SPEED..... MAINTAIN
DISPLAY SYS switch.....AFFECTED SYS
DISPLAY DATA switch.....HDG

■ **MCDU INITIALIZATION**

DATA (MCDU KEY).....PRESS

The DATA INDEX page is displayed

IRS MONITOR (2L KEY).....PRESS

The IRS MONITOR page is displayed.

A/C HEADING.....ENTER

The heading must be entered in the SET HDG field (5R KEY).

■ **CDU INITIALIZATION:**

Depending on the CDU keyboard installed, an “H” may be written on the “5” key:

■ **If “H” is written on the “5” key:**

H KEY.....PRESS

Degree marker, 0 decimal point, ENT and CLR lights come on.

A/C HEADING..... ENTER

■ **If “H” is not written on the “5” key:**

A/C HEADING..... ENTER

Enter aircraft magnetic heading on CDU keyboard. Then press ENT key to enter data.
Example : to enter heading 320 °, dial 3, 2, 0, 0 then press ENT.
Heading will be displayed on the associated ND.
“HDG–ATT MODE” will be displayed on CDU.

Continued on the following page

IR ALIGNMENT IN ATT MODE (Cont'd)

Due to IR drift, magnetic heading has to be periodically crosschecked with standby compass and updated if required.

IR ALIGNMENT IN ATT MODE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

If IR alignment is lost, the navigation mode is inoperative (red ATT flag on PFD and red HDG flag on ND).
Aircraft attitude and heading may be recovered by applying the following procedure.
Aircraft must stay level with constant speed during 30 s.

MODE SELECTOR.....ATT
LEVEL A/C ATTITUDE.....HOLD
CONSTANT A/C SPEED..... MAINTAIN

- **MCDU INITIALIZATION**

  DATA (MCDU KEY).....PRESS

  The DATA INDEX page is displayed

  IRS MONITOR (2L KEY).....PRESS

  The IRS MONITOR page is displayed.

  A/C HEADING.....ENTER

  The heading must be entered in the SET HDG field (5R KEY).

NAV ADR 1(2)(3) FAULT

Applicable to: ALL

L2 *Note: In case of simultaneous failure of ADR and IR (same ADIRU), apply ADR FAULT procedure before IR FAULT procedure.*

L1 ■ **ADR 1 FAULT:**

AIR DATA SWTG.....CAPT 3

L2 *Select ADR 3 pb-sw (if available) to captain side.*
The GPWS TERR FAULT light comes on as the enhanced functions of the EGPWS TERR are inhibited. As such, the GPWS TERR pb-sw should be switched OFF.

L1 ADR 1 P/B..... OFF

■ **ADR 2 FAULT:**

AIR DATA SWTG..... F/O 3

L2 *Select ADR 3 pb-sw (if available) to first officer side.*

L1 ADR 2 P/B..... OFF
BARO REF..... CHECK

L2 *If ADR 2 fails, both baro reference channels are driven by the same FCU channel. Consequently the baro reference displays must be checked.*

L1 ■ **ADR 3 FAULT:**

AIR DATA SWTG (IF ADR 3 IN USE)..... NORM
ADR 3 P/B..... OFF

	STATUS
	INOP SYS
CAT 3 SINGLE ONLY	ADR 1(2)(3) CAT 3 DUAL GPWS (1)

(1) *(in case of ADR 1 FAULT only)*

NAV ADR 1+2 (1+3) (2+3) FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

L2 Flight control normal laws are lost. Pitch alternate law preserves the neutral static stability. All protections, except maneuver protections are lost.

L1 ● **ADR 1+2 FAULT:**

AIR DATA SWTG.....CAPT 3

L2 *Set ADR 3 pb-sw (if available) to the captain's side.*

L1 ADR (AFFECTED) P/B.....OFF

L2 *The GPWS TERR FAULT light comes on, as the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR pb-sw should be switched OFF.*

L1

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)
MAX SPEED..... 320 KT

L2 *Speed is limited, due to the loss of high-speed protections.*

L1 ● **ADR 1+3 (or 2+3) FAULT:**

L2 Air data information is lost on one PFD.

Note: In case of an ADR 1+3 FAULT, the landing gear safety valve is controlled closed:
- *Landing gear retraction is inoperative*
- *Landing gear extension must be performed by gravity.*

L1 AIR DATA SWTG.....NORM
ATC (IF ADR 1 FAILED).....SYS 2
ATC (IF ADR 2 FAILED).....SYS 1
ADR (AFFECTED) P/B.....OFF

L2 *In case of an ADR 1+3 FAULT, the GPWS TERR FAULT light comes on, as the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR pb-sw should be switched OFF.*

L1

ASSOCIATED PROCEDURES

F/CTL ALTN LAW

Continued on the following page

NAV ADR 1+2 (1+3) (2+3) FAULT (Cont'd)

(PROT LOST)
MAX SPEED..... 320 KT

L2 *Speed is limited, due to the loss of high-speed protections.*

L12
5

STATUS

MAX SPEED..... 320 KT

APPR PROC

FOR LDG.....USE FLAP 3

This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder

GPWS LDG FLAP 3..... ON

Appears when CONF 3 is selected.

- **If ADR 1+3 FAULT:**
  L/G..... GRVTY EXTN
  Refer to PRO-ABN-32 L/G GEAR NOT UPLOCKED - FWSPAGE

APPR SPD.....VREF + 10 KT
LDG DIST PROC.....APPLY
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW

At L/G extension, control reverts to direct law in pitch and roll (Refer to PRO-ABN-27 F/CTL DIRECT LAW).

- **If ADR 1 + 3 (or 2 + 3) FAULT:**
  BOTH PFD ON THE SAME FAC
  In the case of an ADR 1 + 3 FAULT, the GPWS TERR FAULT light comes on, because the enhanced EGPWS functions are inhibited. So, the GPWS TERR pb-sw should be switched OFF.

INOP SYS

F/CTL PROT
ADR 1 + 2 or (2 + 3) or (1 + 3)
AP 1 + 2
A/THR
RUD TRV LIM 1(2) (1)
GPWS (if ADR1 fault)
N.W. STEER (2)
CAT 2

(1) *(in the case of an ADR 1 + 3 FAULT or in the case of an ADR 2 + 3 FAULT)*
(2) *(if ADR 1 + 3 fault)*

NAV ADR 1+2 (1+3) (2+3) FAULT

Applicable to: B-HSO, B-HSP

L2 Flight control normal laws are lost. Pitch alternate law preserves the neutral static stability. All protections, except maneuver protections are lost.

L1 ● **ADR 1+2 FAULT:**

AIR DATA SWTG.....CAPT 3

L2 *Set ADR 3 pb-sw (if available) to the captain's side.*

L1 ADR (AFFECTED) P/B.....OFF

L2 *The GPWS TERR FAULT light comes on, as the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR pb-sw should be switched OFF.*

L1

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)
MAX SPEED..... 320 KT

L2 *Speed is limited, due to the loss of high-speed protections.*

L1 ● **ADR 1+3 (or 2+3) FAULT:**

L2 Air data information is lost on one PFD.

Note: In case of an ADR 1+3 FAULT, the landing gear safety valve is controlled closed:
- *Landing gear retraction is inoperative*
- *Landing gear extension must be performed by gravity.*

L1 AIR DATA SWTG.....NORM
ATC (IF ADR 1 FAILED).....SYS 2
ATC (IF ADR 2 FAILED).....SYS 1
ADR (AFFECTED) P/B.....OFF

L2 *In case of an ADR 1+3 FAULT, the GPWS TERR FAULT light comes on, as the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR pb-sw should be switched OFF.*

L1

ASSOCIATED PROCEDURES

F/CTL ALTN LAW

Continued on the following page

NAV ADR 1+2 (1+3) (2+3) FAULT (Cont'd)

(PROT LOST)
MAX SPEED..... 320 KT

L2 *Speed is limited, due to the loss of high-speed protections.*

L12
6

STATUS

MAX SPEED..... 320 KT

APPR PROC

FOR LDG.....USE FLAP 3

This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.

GPWS LDG FLAP 3..... ON

Appears when CONF 3 is selected.

- **If ADR 1+3 FAULT:**
  L/G..... GRVTY EXTN
  Refer to PRO-ABN-32 L/G GEAR NOT UPLOCKED - FWSPAGE

APPR SPD.....VREF + 10 KT
LDG DIST PROC.....APPLY
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW

At L/G extension, control reverts to direct law in pitch and roll (Refer to PRO-ABN-27 F/CTL DIRECT LAW).

- **If ADR 1 + 3 (or 2 + 3) FAULT:**
  BOTH PFD ON THE SAME FAC
  In the case of an ADR 1 + 3 FAULT, the GPWS TERR FAULT light comes on, because the predictive functions of the GPWS are inhibited. So, the GPWS TERR pb-sw should be switched OFF.

INOP SYS

F/CTL PROT
ADR 1 + 2 or (2 + 3) or (1 + 3)
AP 1 + 2
A/THR
RUD TRV LIM 1(2) (1)
GPWS (if ADR1 fault)
CAT 2

(1) *(in the case of an ADR 1 + 3 FAULT or in the case of an ADR 2 + 3 FAULT)*

NAV ADR 1+2 (1+3) (2+3) FAULT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

L2 Flight control normal laws are lost. Pitch alternate law preserves the neutral static stability. All protections, except maneuver protections are lost.

L1 ● **ADR 1+2 FAULT:**

AIR DATA SWTG.....CAPT 3

L2 *Set ADR 3 pb-sw (if available) to the captain's side.*

L1 ADR (AFFECTED) P/B.....OFF

L2 *The GPWS TERR FAULT light comes on, as the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR pb-sw should be switched OFF.*

L1

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)
MAX SPEED..... 320 KT

L2 *Speed is limited, due to the loss of high-speed protections.*

L1 ● **ADR 1+3 (or 2+3) FAULT:**

L2 Air data information is lost on one PFD.

Note: In case of an ADR 1+3 FAULT, the landing gear safety valve is controlled closed:
- *Landing gear retraction is inoperative*
- *Landing gear extension must be performed by gravity.*

L1 AIR DATA SWTG.....NORM
ATC/XPDR (IF ADR 1 FAILED).....SYS 2
ATC/XPDR (IF ADR 2 FAILED).....SYS 1
ADR (AFFECTED) P/B.....OFF

L2 *In case of an ADR 1+3 FAULT, the GPWS TERR FAULT light comes on, as the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR pb-sw should be switched OFF.*

L1

ASSOCIATED PROCEDURES

F/CTL ALTN LAW

Continued on the following page

NAV ADR 1+2 (1+3) (2+3) FAULT (Cont'd)

(PROT LOST)
MAX SPEED..... 320 KT

L2 *Speed is limited, due to the loss of high-speed protections.*

Continued on the following page

NAV ADR 1+2 (1+3) (2+3) FAULT (Cont'd)

L12

7

STATUS

MAX SPEED..... 320 KT

APPR PROC

FOR LDG.....USE FLAP 3

This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.

GPWS LDG FLAP 3..... ON

Appears when CONF 3 is selected.

- **If ADR 1+3 FAULT:**
  L/G..... GRVTY EXTN
  Refer to PRO-ABN-32 L/G GEAR NOT UPLOCKED - FWSPAGE

APPR SPD.....VREF + 10 KT
LDG DIST PROC.....APPLY
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW

At L/G extension, control reverts to direct law in pitch and roll (Refer to PRO-ABN-27 F/CTL DIRECT LAW).

- **If ADR 1 + 3 (or 2 + 3) FAULT:**
  BOTH PFD ON THE SAME FAC
  In the case of an ADR 1 + 3 FAULT, the GPWS TERR FAULT light comes on, because the enhanced EGPWS functions are inhibited. So, the GPWS TERR pb-sw should be switched OFF.

INOP SYS

F/CTL PROT
ADR 1 + 2 or (2 + 3) or (1 + 3)
AP 1 + 2
A/THR
ATC/XPDR 1 (1)
ATC/XPDR 2 (2)
RUD TRV LIM 1(2) (3)
GPWS (if ADR1 fault)
CAT 2

(1) *(ATC/XPDR 1 in the case of ADR 1 failure)*
(2) *(ATC/XPDR 2 in the case of ADR 2 failure)*
(3) *(in the case of an ADR 1 + 3 FAULT or in the case of an ADR 2 + 3 FAULT)*

NAV ADR 1+2+3 FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

8

L2 This alert triggers if each of the three ADRs self-detects a failure, or receives irrelevant data from the probes. This procedure requires that the 3 ADRs be switched OFF, to replace the PFD's normal speed scale and altitude indication by the backup speed scale and GPS altitude indication.

L1 AP+FD..... OFF
A/THR..... OFF
ADR 1+2+3 P/B.....OFF

L2 *Note: The STALL WARNING is not lost.*

L1 SPD..... FLY THE GREEN

L2 *Fly the green area of the speed scale to ensure safe flight.*

L1 STBY INST.....MAY BE UNREL

L2 *Depending on the source of the ADR 3 pb-sw FAULT, the standby instruments' indication may be unreliable. Therefore, standby instrument must be used with care.*

L1 ALL ADR OFF PROC.....APPLY

L2 *Refer to PRO-ABN-34 ALL ADR OFF.*

L1

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

L2 *Note: When the aircraft is in clean configuration, the flight control law reverts to direct law.*

L1 MANEUVER WITH CARE

L2 *Note: The rudder travel limiter is frozen at the value it had at the moment when the failure occurred, and may not be in correct position for the flight speed. At slats extension, full rudder travel authority is recovered.*

L1 SPD BRK.....DO NOT USE

Continued on the following page

NAV ADR 1+2+3 FAULT (Cont'd)

STATUS

MANEUVER WITH CARE
SPD BRK.....DO NOT USE
STBY INST.....MAY BE UNREL

APPR PROC

FOR LDG.....USE FLAP 3
LDG..... GRVTY EXTN

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW

INOP SYS

REAC W/S DET
PRED W/S DET
F/CTL PROT
ADR 1+2+3
RUD TRV LIM
AP 1+2
A/THR
CAB PR 1+2
GPWS
GPWS TERR

NAV ALTI DISCREPANCY

Applicable to: ALL

L2 Crew awareness.

NAV ATC/XPDR 1(2) FAULT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

ATC/XPDR.....SYS 2(1)

STATUS

INOP SYS

ATC/XPDR 1(2)

NAV ATC/XPDR 1+2 FAULT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

L2 Crew awareness.

STATUS	INOP SYS
	TCAS
	ATC/XPDR 1
	ATC/XPDR 2

NAV ATC/XPDR STBY

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

L2 Crew awareness.

NAV ATT DISCREPANCY

Applicable to: ALL

ATT.....X CHECK

L2 *Crosscheck with standby horizon.*

L1 ATT HDG SWTG.....AS RQRD

L2 *Select IR 3 (if available) to faulty side.*

NAV CAPT (F/O) (STBY) AOA FAULT

Applicable to: ALL

L2 Crew awareness.

Continued on the following page

NAV CAPT (F/O) (STBY) AOA FAULT (Cont'd)

STATUS	
	INOP SYS
	CAPT (F/O) (STBY) AOA

NAV FM/GPS POS DISAGREE

Applicable to: ALL

L2 The FMS and GPS positions differ by more than:
- A longitude threshold that depends on the latitude:
  - 0.5 min for latitude below 55 °
  - 0.9 min for latitude at, or above, 55 °, and below 70 °
- A latitude threshold of 0.5 min, regardless of the latitude.

L1 A/C POS.....CHECK

The following procedure is not displayed on the ECAM:

- **If the message occurs during ILS/LOC approach (LOC green):**
  DISREGARD it.
- **If the message occurs during climb, cruise, or descent:**
  CHECK navigation accuracy, using raw data.
  - **If the check is positive:**
    NAV mode and ND ARC/ROSE NAV may be used.
  - **If the check is negative:**
    HDG/TRK mode and raw data must be used.

  When possible, compare the FM position versus the GPIRS position, on the POSITION MONITOR page.
  - **If one FM position agrees with the GPIRS position on the POSITION MONITOR page:**
    Use the associated FD/AP.
  - **If not:**
    Deselect GPS and revert to basic information.
- **If the message occurs during a non-precision approach:**
  - **Overlay approach:**
    SELECT HDG, or TRK, and use raw data.
  - **GPS or RNAV approach:**
    GO AROUND or fly visual, if visual conditions are met.

NAV GPS 1(2) FAULT

Applicable to: ALL

L2 Crew awareness.

STATUS	
	INOP SYS
	GPS 1(2)

NAV GPWS FAULT

Applicable to: ALL

GPWS.....OFF

L2 *This line remains displayed, even after the GPWS pb-sw has been switched OFF.*

STATUS	
	INOP SYS
	GPWS

NAV GPWS TERR DET FAULT

Applicable to: ALL

L2 The enhanced TCF and TAD modes of the EGPWS are inoperative.

L1 GPWS TERR.....OFF

L2 *The basic GPWS mode 1 to mode 5 are still operative if SYS pusbutton switch lights FAULT or OFF are not illuminated.*

NAV HDG DISCREPANCY

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

HDG.....X CHECK

L2 *Compare the 3 IR headings on ADIRS CDU or crosscheck with standby compass.*

L1 ATT HDG SWTG.....AS RQRD

L2 *Select IR 3 (if available) to faulty side.*

NAV HDG DISCREPANCY

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

HDG.....X CHECK

L2 *Compare the 3 IR headings on MCDU or crosscheck with standby compass.*

L1 ATT HDG SWTG.....AS RQRD

L2 *Select IR 3 (if available) to faulty side.*

NAV IAS DISCREPANCY

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR

AIR SPD.....X CHECK
AIR DATA SWTG.....AS RQRD

STATUS	
	INOP SYS
CAT 3 SINGLE ONLY	CAT 3 DUAL

NAV ILS (1+2) FAULT

Applicable to: ALL

L2 Crew awareness.

Continued on the following page

NAV ILS (1+2) FAULT (Cont'd)

STATUS	INOP SYS
	ILS 1+2 GPWS

NAV ILS 1(2) FAULT

Applicable to: ALL

L2 Crew awareness.

STATUS	INOP SYS
	ILS 1(2) CAT 2 GPWS (1)

(1) *(if ILS 1 fault on ground)*

NAV IR 1(2)(3) FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

L2 *Note: In case of a simultaneous ADR and IR (same ADIRU) failure, apply the ADR FAULT procedure before the IR FAULT procedure.*

L1 ■ **IR 1 FAULT:**
ATT HDG SWTG..... CAPT 3

■ **IR 2 FAULT:**
ATT HDG SWTG..... F/O 3

■ **IR 3 FAULT:**
ATT HDG SWTG (IF IR 3 IN USE)..... NORM

L2 *This line is not displayed on the ECAM.*

L12

STATUS

IR MAY BE AVAIL IN ATT
Refer to PRO-ABN-34 IR ALIGNMENT IN ATT MODE
CAT 3 SINGLE ONLY

INOP SYS

IR 1(2)(3)
CAT 3 DUAL
GPWS TERR (1)
TCAS (1)
See (2)

(1) *(In case of an IR 1 fault)*

(2) *Note: In case of an IR 1 fault, the TCAS may be inoperative (depending on the TCAS manufacturer). If the IR 1 is available in ATT mode, the TCAS can be recovered by entering the aircraft magnetic heading into the CDU, as per the IR ALIGNMENT IN ATT MODE procedure.*

NAV IR 1(2)(3) FAULT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

L2 *Note: In case of a simultaneous ADR and IR (same ADIRU) failure, apply the ADR FAULT procedure before the IR FAULT procedure.*

L1 ■ **IR 1 FAULT:**
ATT HDG SWTG..... CAPT 3
ATC/XPDR.....SYS 2

■ **IR 2 FAULT:**
ATT HDG SWTG.....F/O 3
ATC/XPDR.....SYS 1

■ **IR 3 FAULT:**
ATT HDG SWTG (IF IR 3 IN USE).....NORM

L2 *This line is not displayed on the ECAM.*

L12

STATUS

IR MAY BE AVAIL IN ATT
Refer to PRO-ABN-34 IR ALIGNMENT IN ATT MODE
CAT 3 SINGLE ONLY

INOP SYS

IR 1(2)(3)
CAT 3 DUAL
GPWS TERR (1)
TCAS (1)
ATC/XPDR 1 (1)
ATC/XPDR 2 (2)
See (3)

(1) *(In case of an IR 1 fault)*

(2) *(In case of an IR 2 fault)*

(3) *Note: In case of an IR 1 fault, the TCAS may be inoperative (depending on the TCAS manufacturer). If the IR 1 is available in ATT mode, the TCAS can be recovered by entering the aircraft magnetic heading into the CDU, as per the IR ALIGNMENT IN ATT MODE procedure.*

NAV IR 1+2(1+3)(2+3) FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

● **If IR 1 + 2 FAULT:**

ATT HDG SWTG..... CAPT 3

L2 *Set IR 3 (If available) to the Captain's side.*
Attitude information is lost on first officer's PFD.

L1 ● **If IR 1 + 3 (or 2 + 3) FAULT:**

ATT HDG SWTG..... NORM

L2 *Attitude information is lost on one side (Captain or first officer).*

L1

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

L2 *Flight control normal laws are lost. Pitch alternate law with static stability becomes active.*
All protections, except maneuver protections, are lost.

L1 MAX SPEED..... 320 KT

L2 *Speed is limited, due to the loss of high speed protection.*

Continued on the following page

NAV IR 1+2(1+3)(2+3) FAULT (Cont'd)

L12
9

STATUS

MAX SPEED..... 320 KT

APPR PROC

FOR LDG .....USE FLAP 3

This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.

GPWS LDG FLAP 3..... ON

Will appear, when CONF 3 is selected.

APPR SPD : VREF + 10 KT
LDG DIST PROC.....APPLY
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW

At landing gear extension, control reverts to direct law, in pitch, as well as in roll (Refer to PRO-ABN-27 F/CTL DIRECT LAW).

IR (AFFECTED) MAY BE AVAIL IN ATT

Refer to PRO-ABN-34 IR ALIGNMENT IN ATT MODE

INOP SYS

F/CTL PROT
IR 1 (2)(3)
IR 1+2 or 1+3 or 2+3
AP 1+2
A/THR
YAW DAMPER 1 (1)
YAW DAMPER 2 (2)
GPWS TERR (if IR 1 fault)
TCAS
CAT 2

Note: *In case of an IR 1 fault, the TCAS may be inoperative (depending on the TCAS manufacturer). If the IR 1 is available in ATT mode, the TCAS can be recovered by entering the aircraft magnetic heading into the CDU, as per IR ALIGNMENT IN ATT MODE procedure.*

(1) *(In case of an IR 1+3 fault)*
(2) *(In case of an IR 2+3 fault)*

NAV IR 1+2(1+3)(2+3) FAULT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

- **If IR 1 + 2 FAULT:**

  ATT HDG SWTG..... CAPT 3

L2 *Set IR 3 (If available) to the Captain's side.*
Attitude information is lost on first officer's PFD.

L1
- **If IR 1 + 3 FAULT:**

  ATT HDG SWTG..... NORM

L2 *Attitude information is lost on Captain's PFD.*

L1
- **If IR 2 + 3 FAULT:**

  ATT HDG SWTG..... NORM

L2 *Attitude information is lost on first officer's PFD.*

L1 ATC/XPDR..... SYS1

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)

L2 *Flight control normal laws are lost. Pitch alternate law with static stability becomes active.*
All protections, except maneuver protections, are lost.

L1 MAX SPEED.....320 KT

L2 *Speed is limited, due to the loss of high speed protection.*

Continued on the following page

NAV IR 1+2(1+3)(2+3) FAULT (Cont'd)

L12

10

STATUS

MAX SPEED..... 320 KT

APPR PROC

FOR LDG .....USE FLAP 3

This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.

GPWS LDG FLAP 3..... ON

Will appear, when CONF 3 is selected.

APPR SPD : VREF + 10 KT
LDG DIST PROC.....APPLY
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW

At landing gear extension, control reverts to direct law, in pitch, as well as in roll (Refer to PRO-ABN-27 F/CTL DIRECT LAW).

IR (AFFECTED) MAY BE AVAIL IN ATT

Refer to PRO-ABN-34 IR ALIGNMENT IN ATT MODE

INOP SYS

F/CTL PROT
IR 1 (2)(3)
IR 1+2 or 1+3 or 2+3
AP 1+2
A/THR
YAW DAMPER 1 (1)
YAW DAMPER 2 (2)
GPWS TERR (if IR 1 fault)
TCAS
CAT 2
ATC/XPDR 1 (3)
ATC/XPDR 2 (4)

Note: *In case of an IR 1 fault, the TCAS may be inoperative (depending on the TCAS manufacturer). If the IR 1 is available in ATT mode, the TCAS can be recovered by entering the aircraft magnetic heading into the CDU, as per IR ALIGNMENT IN ATT MODE procedure.*
In the case of an IR 1+2 fault, the TCAS is inoperative.

(1) *(In case of an IR 1+3 fault)*
(2) *(In case of an IR 2+3 fault)*
(3) *(In the case of an IR 1 or IR 1+3 failure)*
(4) *(In the case of an IR 2 or IR 2+3 or IR 1+2 failure)*

NAV IR DISAGREE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

L2 Disagreement between two IRs, the third one having failed or been rejected by the ELACs. Pitch direct, roll direct, and yaw mechanical laws become active. All protections (pitch and roll) are lost.

L1 ATT.....X CHECK

L2 *Use the standby horizon to determine the faulty IR.*

L1 ● **IF DISAGREE CONFIRMED:**

FAULTY IR P/B..... OFF

L2 *This will also switch off the associated ADR.*

L1 ELAC 2.....OFF THEN ON

ELAC 1.....OFF THEN ON

L2 *Note: When the ELAC 1 computer is reset on ground, the pitch trim returns to the ground setting position (0 °).*
After corrective action (faulty IR switched off and ELACs reset), pitch alternate law with reduced protections is recovered.

L1

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)
MAX SPEED..... 320 KT

Continued on the following page

NAV IR DISAGREE (Cont'd)

L12

11

STATUS

MAX SPEED..... 320 KT

APPR PROC

FOR LDG.....USE FLAP 3

Do not select CONF FULL, so as not to degrade handling qualities.

GPWS LDG FLAP 3..... ON

Will be displayed, when CONF 3 is selected.

APPR SPD..... VREF + 10

LDG DIST PROC.....APPLY

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
See (1)

INOP SYS

F/CTL PROT

(1) *At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to PRO-ABN-27 F/CTL DIRECT LAW).*

NAV IR DISAGREE

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 Disagreement between two IRs, the third one having failed or been rejected by the ELACs. Pitch direct, roll direct, and yaw mechanical laws become active. All protections (pitch and roll) are lost.

L1 ATT.....X CHECK

L2 *Use the standby horizon to determine the faulty IR.*

L1 ● **IF DISAGREE CONFIRMED:**

FAULTY IR P/B..... OFF
ELAC 2.....OFF THEN ON
ELAC 1.....OFF THEN ON

L2 *Note: When the ELAC 1 computer is reset on ground, the pitch trim returns to the ground setting position (0 °).*
After corrective action (faulty IR switched off and ELACs reset), pitch alternate law with reduced protections is recovered.

L1

ASSOCIATED PROCEDURES

F/CTL ALTN LAW
(PROT LOST)
MAX SPEED..... 320 KT

Continued on the following page

NAV IR DISAGREE (Cont'd)

L12
12

STATUS

MAX SPEED..... 320 KT

APPR PROC

FOR LDG.....USE FLAP 3

Do not select CONF FULL, so as not to degrade handling qualities.

GPWS LDG FLAP 3..... ON

Will be displayed, when CONF 3 is selected.

APPR SPD..... VREF + 10

LDG DIST PROC.....APPLY

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
See (1)

INOP SYS

F/CTL PROT

(1) *At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to PRO-ABN-27 F/CTL DIRECT LAW).*

NAV IR NOT ALIGNED

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 This caution is available in Phase 2 (after first engine start, until takeoff)

L1 POSITION DISAGREE
POSITION MISSING
PRESENT POS.....INSERT
EXCESS MOTION
IR 1 (2) (3) (1+2) (2+3) (1+2+3) IN ALIGN

NAV PRED W/S DET FAULT

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

L2 In this caution is triggered when switching the predictive windshear function to ON, it may be cancelled by switching the weather radar and the predictive windshear function OFF then ON : If this clears the caution, the predictive windshear is operative again. If not, the predictive windshear function is lost.

L1 Crew awareness

STATUS	INOP SYS
	PRED W/S DET

NAV PRED W/S DET FAULT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

L2 The predictive windshear function is lost.

L1 Crew awareness

STATUS	INOP SYS
	PRED W/S DET

NAV RA 1 AND 2 FAULT
(DUAL RA FAILURE)

Applicable to: ALL

L2 Crew awareness.

Continued on the following page

NAV RA 1 AND 2 FAULT (Cont'd)
(DUAL RA FAILURE)

L12

STATUS

	INOP SYS
WHEN L/G DN: DIRECT LAW *See* (1)	RA 1+2 A/CALL OUT GPWS CAT 2 (when landing gear is down)

(1) *At landing gear extension, flight controls revert to direct law in pitch, as well as in roll (Refer to PRO-ABN-27 F/CTL DIRECT LAW).*
ILS APPR mode cannot be engaged, LOC mode is available via the FCU LOC pb.

NAV RA 1(2) FAULT

Applicable to: ALL

L2 Crew awareness.

STATUS

	INOP SYS
CAT 2 ONLY	RA 1(2) CAT 3 GPWS (If RA 1 fault)

NAV RA DEGRADED

Applicable to: ALL

Crew awareness.

L2 If a significant discrepancy occurs in flight between the two radio altimeters, the NAV RA DEGRADED alert only appears after landing.

NAV TCAS ◁ FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

L2 Crew awareness.

STATUS	INOP SYS
	TCAS

NAV TCAS ◁ FAULT

Applicable to: B-HSQ, B-HSR

L2 Crew awareness.

Impacted by TDU: 00013538 NAV TCAS FAULT (If Installed) - FWSPAGE

STATUS	INOP SYS
	TCAS

Continued on the following page

NAV TCAS ◁ FAULT (Cont'd)

Impacted DU: 00012435 NAV TCAS FAULT (If Installed) - FWSPAGE

L12

STATUS	
Note: *Disregard this message, if the TCAS automatically recovers normal operation within 15 s.*	**INOP SYS** TCAS

NAV TCAS STBY

Applicable to: ALL

Crew awareness.

L2 If the flight crew sets the TCAS on STBY in flight, the NAV TCAS STBY alert appears.

OVERSPEED

Applicable to: ALL 320

VMO/MMO..... 350/.82

L2 *(235/0.60 in case of dispatch with landing gear down).*

L1 VLE..... 280/.67

VFE.....SEE BELOW

CONF	*VFE*
FULL	*177*
3	*185*
2	*200*
1+F	*215*
1	*230*

OVERSPEED

Applicable to: ALL 321

VMO/MMO..... 350/.82

L2 *(235/0.60 in case of dispatch with landing gear down).*

L1 VLE..... 280/.67

VFE.....SEE BELOW

CONF	*VFE*
FULL	*190*
3	*195*
2	*215*
1+F	*215*
1	*230*

STALL WARNING

Applicable to: ALL

When the threshold is reached, a permanent aural warning is triggered "STALL + CRICKET" as long as a correct angle-of-attack is not recovered. (*Refer to FCOM/PRO/ABN - Operating Techniques Section - Stall Recovery and Stall Warning At Lift-Off procedures*).

TCAS WARNINGS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

■ **Traffic advisory: "TRAFFIC" messages:**

Do not perform a maneuver based on a TA alone.

■ **Resolution advisory: All "CLIMB" and "DESCEND" or "MAINTAIN VERTICAL SPEED MAINTAIN" or "ADJUST VERTICAL SPEED ADJUST" or "MONITOR VERTICAL SPEED" type messages:**

AP (if engaged).....OFF
BOTH FDs..... OFF

Respond promptly and smoothly to an RA by adjusting or maintaining the pitch, as required, to reach the green area and/or avoid the red area of the vertical speed scale.

Note: *Avoid excessive maneuvers while aiming to keep the vertical speed just outside the red area of the VSI, and within the green area. If necessary, use the full speed range between Vαmax and VMAX.*

Respect stall, GPWS, or windshear warning.

Notify ATC.

● **GO AROUND procedure must be performed when an RA "CLIMB" or "INCREASE CLIMB" is triggered on final approach:**

Note: *Resolution Advisories (RA) are inhibited below 900 ft.*

■ **When "CLEAR OF CONFLICT"is announced**

Resume normal navigation in accordance with ATC clearance.

AP/FD can be re-engaged as desired.

TCAS WARNINGS

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

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■ **Traffic advisory: "TRAFFIC" messages:**

Do not perform a maneuver based on a TA alone.

■ **Resolution advisory: All "CLIMB" and "DESCEND" or "MAINTAIN VERTICAL SPEED MAINTAIN" or "LEVEL OFF" or "MONITOR VERTICAL SPEED" type messages:**

AP (if engaged).....OFF
BOTH FDs..... OFF

Respond promptly and smoothly to an RA by adjusting or maintaining the pitch, as required, to reach the green area and/or avoid the red area of the vertical speed scale.

Note: *Avoid excessive maneuvers while aiming to keep the vertical speed just outside the red area of the VSI, and within the green area. If necessary, use the full speed range between Vαmax and VMAX.*

Respect stall, GPWS, or windshear warning.

Notify ATC.

● **GO AROUND procedure must be performed when an RA "CLIMB" or "INCREASE CLIMB" is triggered on final approach:**

Note: *Resolution Advisories (RA) are inhibited below 900 ft.*

■ **When "CLEAR OF CONFLICT"is announced**

Resume normal navigation in accordance with ATC clearance.

AP/FD can be re-engaged as desired.

UNRELIABLE SPEED INDIC/ADR CHECK PROC

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

Unreliable speed indication may be due to radome damage, or due to air probe failure or obstruction.
The indicated altitude may also be affected, if static probes are affected.
Unreliable speed cannot be detected by the ADIRU. The flight control and flight guidance computers normally reject erroneous speed/altitude source(s), provided a significant difference is detected.
However, they will not be able to reject two erroneous speeds or altitudes that synchronously and similarly drift away. In this remote case, the aircraft systems will consider the remaining correct source as being faulty and will reject it. Consequently, the flight control and flight guidance computers will use the remaining two wrong ADRs for their computation.
Therefore, in all cases of unreliable speed situation, the pilots must identify the faulty ADR(s) and then switch it (them) OFF. If all ADRs provide unreliable data, keep one ADR on to keep the stall warning protection. During this failure identification time, since the flight control laws may be affected, it is recommended to maneuver the aircraft with care until the ADR(s) is (are) switched OFF.

Unreliable speed indications may be suspected, either by:
- Speed discrepancies (between ADR 1, 2, 3, and standby instruments).
- Fluctuating or unexpected increase/decrease/steady indicated speed, or pressure altitude.
- Abnormal correlation of the basic flight parameters (speed, pitch attitude, thrust, climb rate).
- Abnormal AP/FD/ATHR behavior.
- STALL warning, or OVERSPEED warnings, that contradicts with at least one of the indicated speeds.
  - Rely on the stall warning that could be triggered in alternate or direct law. It is not affected by unreliable speeds, because it is based on angle of attack.
  - Depending on the failure, the OVERSPEED warning may be false or justified. Buffet, associated with the OVERSPEED VFE warning, is a symptom of a real overspeed condition.
- Inconsistency between radio altitude and pressure altitude.
- Reduction in aerodynamic noise with increasing speed, or increase in aerodynamic noise with decreasing speed.
- Impossibility of extending the landing gear by the normal landing gear control.

UNRELIABLE SPEED INDIC/ADR CHECK PROC

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

Unreliable speed indication may be due to radome damage, or due to air probe failure or obstruction.
The indicated altitude may also be affected, if static probes are affected.
Unreliable speed cannot be detected by the ADIRU. The flight control and flight guidance computers normally reject erroneous speed/altitude source(s), provided a significant difference is detected.
However, they will not be able to reject two erroneous speeds or altitudes that synchronously and similarly drift away. In this remote case, the aircraft systems will consider the remaining correct source as being faulty and will reject it. Consequently, the flight control and flight guidance computers will use the remaining two wrong ADRs for their computation.
Therefore, in all cases of unreliable speed, the pilots must identify the faulty ADR(s) and then switch it (them) OFF.

If all ADRs provide unreliable data:
- Below FL250: Switch OFF the 3 ADRs to display the Backup Speed Scale (BUSS) and fly the green area of the speed scale.
- Above FL250: Keep one ADR ON to prevent the display of the BUSS, and fly the aircraft using the Pitch/Thrust tables.

Unreliable speed indications may be suspected, either by:
- Speed discrepancies (between ADR 1, 2, 3, and standby instruments).
- Fluctuating or unexpected increase/decrease/steady indicated speed, or pressure altitude.
- Abnormal correlation of the basic flight parameters (speed, pitch attitude, thrust, climb rate).
- Abnormal AP/FD/ATHR behavior.
- STALL warning, or OVERSPEED warnings, that contradicts with at least one of the indicated speeds.
  - Rely on the stall warning that could be triggered in alternate or direct law. It is not affected by unreliable speeds, because it is based on angle of attack.
  - Depending on the failure, the OVERSPEED warning may be false or justified. Buffet, associated with the OVERSPEED VFE warning, is a symptom of a real overspeed condition.
- Inconsistency between radio altitude and pressure altitude.
- Reduction in aerodynamic noise with increasing speed, or increase in aerodynamic noise with decreasing speed.
- Impossibility of extending the landing gear by the normal landing gear control.

UNRELIABLE SPEED INDICATION/ADR CHECK PROC

Applicable to: ALL 321

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- **If the safe conduct of the flight is impacted:**

MEMORY ITEMS:

AP/FD	OFF
A/THR	OFF
PITCH/THRUST:	
Below THRUST RED ALT	15° / TOGA
Above THRUST RED ALT and Below FL 100	10° / CLB
Above THRUST RED ALT and Above FL 100	5° / CLB
FLAPS (if CONF 0(1)(2)(3))	MAINTAIN CURRENT CONF
FLAPS (if CONF FULL)	SELECT CONF 3 AND MAINTAIN
SPEEDBRAKES	CHECK RETRACTED
L/G	UP
When at, or above MSA or Circuit Altitude: Level off for troubleshooting.	

GPS ALTITUDE ..... Display on MCDU

Continued on the following page

UNRELIABLE SPEED INDICATION/ADR CHECK PROC (Cont'd)

● **To level off for troubleshooting:**

AP/FD.....OFF
A/THR.....OFF

Note: Check the actual slat/flap config. on ECAM, as flap auto-retraction may occur.

PITCH/THRUST FOR INITIAL LEVEL OFF				
SLATS/FLAPS EXTENDED				
		Above 81 t	81 t - 68 t	Below 68 t
CONF	Speed	Pitch (°)/Thrust (% N1)		
3	F	4.0/70.7	4.0/66.4	4.0/61.5
2	F	7.0/68.9	7.0/64.6	7.0/59.9
1 + F	S	3.5/67.6	3.0/63.8	3.0/58.6
1	S	7.5/65.5	7.5/61.4	7.5/56.5
CLEAN				
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 200	270 kt	3.5/69.0	2.5/66.1	1.5/63.7
FL 200 - FL 280	300 kt	2.0/78.9	1.5/75.9	1.0/73.9
Above FL 280	M 0.76	2.5/83.7	2.5/81.6	2.0/79.0

FLYING TECHNIQUE TO STABILIZE SPEED:

Adjust pitch in order to fly the required flight path.
When target pitch is reached, flying intended flight path, adjust thrust to target:
If the aircraft pitch tends to increase, aircraft is slow, then increase thrust;
If the aircraft pitch tends to decrease, aircraft is fast, then decrease thrust.

Continued on the following page

UNRELIABLE SPEED INDICATION/ADR CHECK PROC (Cont'd)

15 **WHEN FLIGHT PATH IS STABILIZED**

PROBE/WINDOW HEAT.....ON

TECHNICAL RECOMMENDATIONS

Respect Stall Warning.
To monitor speed, refer to IRS Ground Speed or GPS Ground Speed variations.

- **If remaining altitude indication is unreliable:**

  Do not use FPV and/or V/S, which are affected.

  ATC altitude is affected. Notify the ATC.

  Refer to GPS altitude: altitude variations may be used to control level flight, and is an altitude cue.

  Refer to Radio altimeter.

CAUTION	If the failure is due to radome destruction, the drag will increase and therefore N1 must be increased by 5 %. Fuel flow will increase by about 27 %.

AFFECTED ADR IDENTIFICATION

Crosscheck all speed indications and *Refer to QRH/Operating Speeds table of the FPE In Flight Performance QRH section (for F, S speeds)* or *Refer to QRH/Severe Turbulence table of QRH Operational Data section (for speed in clean conf)*:

- **If at least one ADR is reliable:**

  Faulty ADR(s).....OFF
  REMAINING AIR DATA..... CONFIRM

  Alternates sources may be used to evaluate the air data:
  - *GPS altitude.*
  - *GPS and IRS ground speeds, taking into account altitude and wind effect.*

- **If affected ADR(s) cannot be identified, or if all ADRs are affected:**

  ONE ADR.....KEEP ON
  Keep one ADR ON to maintain the STALL WARNING protection.
  TWO ADRS.....OFF
  This prevents the flight control laws from using two coherent but unreliable ADR data.
  LDG CONF.....USE FLAP 3
  APP SPD..... VLS + 10
  LDG DIST PROC..... APPLY

Continued on the following page

UNRELIABLE SPEED INDICATION/ADR CHECK PROC (Cont'd)

■ **To return to departure airport:**

Keep takeoff configuration preferably.

Refer to Approaches tables.

■ **To accelerate and clean up after takeoff:**

Accelerate and clean up the aircraft in level flight:
THRUST.....CLB
FLAPS.....RETRACT

Retract from 3 or 2 to 1, once CLB thrust is set.

Retract from 1 to 0, when the aircraft pitch is lower than the pitch for S speed (*Refer to Level-Off table*).

Once in clean configuration, *Refer to Climb, Cruise and Descent tables*, *Refer to Approaches tables* for flight continuation.

■ **Other cases:**

Refer to Climb, Cruise and Descent tables, *Refer to Approaches tables* for flight continuation.

Continued on the following page

UNRELIABLE SPEED INDICATION/ADR CHECK PROC (Cont'd)

CLIMB/CRUISE/DESCENT (PITCH & THRUST TABLES) - CLIMB

Set the thrust to CL.

CLEAN				
		Above 81 t	81 t - 68 t	Below 68 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 50	270 kt	8.5/CLB	9.0/CLB	10.0/CLB
FL 50 - FL 100		8.0/CLB	8.0/CLB	9.0/CLB
FL 100 - FL 150		7.0/CLB	7.0/CLB	8.0/CLB
FL 150 - FL 200		6.0/CLB	6.0/CLB	6.5/CLB
FL 200 - FL 250	300 kt	4.0/CLB	4.0/CLB	4.0/CLB
FL 250 - FL 280		3.5/CLB	3.0/CLB	3.0/CLB
Above FL 280	M 0.76	3.5/CLB	3.5/CLB	3.5/CLB

CLIMB/CRUISE/DESCENT (PITCH & THRUST TABLES) - CRUISE

Adjust N1 to maintain approximate level flight with pitch attitude held constant. When time permits, *Refer to PRO-SUP-91-10 General* (SEVERE TURBULENCE) and adjust pitch to maintain level flight.

CLEAN				
		Above 81 t	81 t - 68 t	Below 68 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 200	270 kt	3.5/69.0	2.5/66.1	1.5/63.7
FL 200 - FL 280	300 kt	2.0/78.9	1.5/75.9	1.0/73.9
Above FL 280	M 0.76	2.5/83.7	2.5/81.6	2.0/79.0

CLIMB/CRUISE/DESCENT (PITCH & THRUST TABLES) - DESCENT

Set the thrust to IDLE.

CLEAN				
		Above 81 t	81 t - 68 t	Below 68 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Above FL 280	M 0.76	-1.0/IDLE	-1.5/IDLE	-2.0/IDLE
FL 280 - FL 200	300 kt	-0.5/IDLE	-1.5/IDLE	-2.5/IDLE
FL 200 - FL 100	270 kt	0.5/IDLE	-0.5/IDLE	-1.5/IDLE
Below FL 100	270 kt	0.5/IDLE	-0.5/IDLE	-2.0/IDLE
Below FL 100	G-DOT	2.0/IDLE	2.0/IDLE	2.0/IDLE

Continued on the following page

UNRELIABLE SPEED INDICATION/ADR CHECK PROC (Cont'd)

INITIAL AND INTERMEDIATE APPROACH IN LEVEL FLIGHT

The approach phase between Green Dot speed (clean configuration) and the landing configuration (CONF 3), is flown in level flight.

LANDING GEAR UP IN LEVEL FLIGHT				
		Above 81 t	81 t - 68 t	Below 68 t
CONF	Speed (kts)	Pitch (°)/Thrust (% N1)		
0	G-DOT	5.0/63.4	5.0/59.4	5.0/54.6
1	S	7.5/65.6	7.5/61.4	7.5/56.6
1 + F (1)	S	3.5/67.6	3.0/63.8	3.0/58.6
2	F	7.0/68.5	7.0/64.7	7.0/59.9
LANDING GEAR DOWN IN LEVEL FLIGHT (EXPECT GRVTY EXTENSION)				
3	F	4.0/74.8	4.0/71.0	4.0/65.8

(1) Due to the fact that the speed is unreliable, the SFCC may select the 1 + F configuration in approach, instead of 1.

FINAL APPROACH AT STANDARD - 3 ° DESCENT FLIGHT PATH

LANDING GEAR DOWN				
		Above 81 t	81 t - 68 t	Below 68 t
CONF	Speed (kts)	Pitch (°)/Thrust (% N1)		
3	VLS +10	2.0/60.0	2.0/56.0	1.5/51.6

FLYING TECHNIQUE TO STABILIZE SPEED:

Adjust pitch in order to fly the required flight path.
When target pitch is reached, flying intended flight path, adjust thrust to target.

If the aircraft pitch tends to increase, aircraft is slow, then increase thrust;
If the aircraft pitch tends to decrease, aircraft is fast, then decrease thrust.

UNRELIABLE SPEED INDICATION/ADR CHECK PROC

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

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● **If the safe conduct of the flight is impacted:**

MEMORY ITEMS:

AP/FD	OFF
A/THR	OFF
PITCH/THRUST:	
Below THRUST RED ALT	15° / TOGA
Above THRUST RED ALT and Below FL 100	10° / CLB
Above THRUST RED ALT and Above FL 100	5° / CLB
FLAPS (if CONF 0(1)(2)(3))	MAINTAIN CURRENT CONF
FLAPS (if CONF FULL)	SELECT CONF 3 AND MAINTAIN
SPEEDBRAKES	CHECK RETRACTED
L/G	UP
When at, or above MSA or Circuit Altitude: Level off for troubleshooting.	

GPS ALTITUDE..... Display on MCDU

Continued on the following page

UNRELIABLE SPEED INDICATION/ADR CHECK PROC (Cont'd)

● **To level off for troubleshooting:**

AP/FD.....OFF
A/THR.....OFF

Note: Check the actual slat/flap config. on ECAM, as flap auto-retraction may occur.

PITCH/THRUST FOR INITIAL LEVEL OFF				
SLATS/FLAPS EXTENDED				
		Above 67 t	67 t - 57 t	Below 57 t
CONF	Speed	Pitch (°)/Thrust (% N1)		
3	F	7.5/61.8	7.5/57.5	7.5/53.0
2	F	9.0/61.6	9.0/57.3	9.0/52.8
1 + F	S	4.5/60.2	4.5/56.1	4.5/51.2
1	S	7.5/58.0	7.5/53.9	7.5/48.9
CLEAN				
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 200	250 kt	4.0/62.4	3.0/60.1	2.0/58.3
FL 200 - FL 320	275 kt	3.0/73.4	2.0/71.6	1.5/70.2
Above FL 320	M 0.76	2.5/79.2	2.5/78.1	2.0/77.0

FLYING TECHNIQUE TO STABILIZE SPEED:

Adjust pitch in order to fly the required flight path.
When target pitch is reached, flying intended flight path, adjust thrust to target:
If the aircraft pitch tends to increase, aircraft is slow, then increase thrust;
If the aircraft pitch tends to decrease, aircraft is fast, then decrease thrust.

Continued on the following page

UNRELIABLE SPEED INDICATION/ADR CHECK PROC (Cont'd)

17 **WHEN FLIGHT PATH IS STABILIZED**

PROBE/WINDOW HEAT.....ON

TECHNICAL RECOMMENDATIONS

Respect Stall Warning.
To monitor speed, refer to IRS Ground Speed or GPS Ground Speed variations.

- **If remaining altitude indication is unreliable:**

  Do not use FPV and/or V/S, which are affected.

  ATC altitude is affected. Notify the ATC.

  Refer to GPS altitude: altitude variations may be used to control level flight, and is an altitude cue.

  Refer to Radio altimeter.

CAUTION	If the failure is due to radome destruction, the drag will increase and therefore N1 must be increased by 5 %. Fuel flow will increase by about 27 %.

AFFECTED ADR IDENTIFICATION

Crosscheck all speed indications and *Refer to QRH/Operating Speeds table of the FPE In Flight Performance QRH section (for F, S speeds)* or *Refer to QRH/Severe Turbulence table of QRH Operational Data section (for speed in clean conf)*:

- **If at least one ADR is reliable:**

  Faulty ADR(s).....OFF
  REMAINING AIR DATA..... CONFIRM

  Alternates sources may be used to evaluate the air data:
  - *GPS altitude.*
  - *GPS and IRS ground speeds, taking into account altitude and wind effect.*

- **If affected ADR(s) cannot be identified, or if all ADRs are affected:**

  ONE ADR.....KEEP ON
  Keep one ADR ON to maintain the STALL WARNING protection.
  TWO ADRS.....OFF
  This prevents the flight control laws from using two coherent but unreliable ADR data.
  LDG CONF.....USE FLAP 3
  APP SPD..... VLS + 10
  LDG DIST PROC..... APPLY

Continued on the following page

UNRELIABLE SPEED INDICATION/ADR CHECK PROC (Cont'd)

■ **To return to departure airport:**

Keep takeoff configuration preferably.

Refer to Approaches tables.

■ **To accelerate and clean up after takeoff:**

Accelerate and clean up the aircraft in level flight:
THRUST.....CLB
FLAPS.....RETRACT

Retract from 3 or 2 to 1, once CLB thrust is set.

Retract from 1 to 0, when the aircraft pitch is lower than the pitch for S speed (*Refer to Level-Off table*).

Once in clean configuration, *Refer to Climb, Cruise and Descent tables*, *Refer to Approaches tables* for flight continuation.

■ **Other cases:**

Refer to Climb, Cruise and Descent tables, *Refer to Approaches tables* for flight continuation.

Continued on the following page

UNRELIABLE SPEED INDICATION/ADR CHECK PROC (Cont'd)

CLIMB/CRUISE/DESCENT (PITCH & THRUST TABLES) - CLIMB

Set the thrust to CL.

CLEAN				
		Above 67 t	67 t - 57 t	Below 57 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 50	250 kt	10.0/CLB	10.5/CLB	11.5/CLB
FL 50 - FL 100		9.0/CLB	9.5/CLB	10.0/CLB
FL 100 - FL 150		8.0/CLB	8.5/CLB	8.5/CLB
FL 150 - FL 200		7.0/CLB	7.0/CLB	7.0/CLB
FL 200 - FL 250	275 kt	5.0/CLB	5.0/CLB	5.0/CLB
FL 250 - FL 320		4.0/CLB	4.0/CLB	4.0/CLB
Above FL 320	M 0.76	3.5/CLB	3.5/CLB	3.5/CLB

CLIMB/CRUISE/DESCENT (PITCH & THRUST TABLES) - CRUISE

Adjust N1 to maintain approximate level flight with pitch attitude held constant. When time permits, *Refer to PRO-SUP-91-10 General* (SEVERE TURBULENCE) and adjust pitch to maintain level flight.

CLEAN				
		Above 67 t	67 t - 57 t	Below 57 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 200	250 kt	4.0/62.4	3.0/60.1	2.0/58.3
FL 200 - FL 320	275 kt	3.0/73.4	2.0/71.6	1.5/70.2
Above FL 320	M 0.76	2.5/79.2	2.5/78.1	2.0/77.0

CLIMB/CRUISE/DESCENT (PITCH & THRUST TABLES) - DESCENT

Set the thrust to IDLE.

CLEAN				
		Above 67 t	67 t - 57 t	Below 57 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Above FL 320	M 0.76	-0.5/IDLE	-1.0/IDLE	-1.5/IDLE
FL 320 - FL 200	275 kt	0.0/IDLE	-0.5/IDLE	-1.5/IDLE
FL 200 - FL 100	250 kt	1.5/IDLE	0.5/IDLE	-0.5/IDLE
Below FL 100	250 kt	1.0/IDLE	0.0/IDLE	-1.0/IDLE
Below FL 100	G-DOT	2.0/IDLE	2.5/IDLE	2.5/IDLE

Continued on the following page

UNRELIABLE SPEED INDICATION/ADR CHECK PROC (Cont'd)

INITIAL AND INTERMEDIATE APPROACH IN LEVEL FLIGHT

The approach phase between Green Dot speed (clean configuration) and the landing configuration (CONF 3), is flown in level flight.

LANDING GEAR UP IN LEVEL FLIGHT				
		Above 67 t	67 t - 57 t	Below 57 t
CONF	Speed (kts)	Pitch (°)/Thrust (% N1)		
0	G-DOT	5.5/55.7	5.5/51.5	6.0/47.3
1	S	7.5/58.2	7.5/54.0	7.5/49.0
1 + F (1)	S	4.5/60.2	4.5/56.1	4.5/51.2
2	F	9.0/61.7	9.0/57.3	9.0/52.8
LANDING GEAR DOWN IN LEVEL FLIGHT (EXPECT GRVTY EXTENSION)				
3	F	7.5/67.2	7.5/62.7	7.5/57.9

(1) Due to the fact that the speed is unreliable, the SFCC may select the 1 + F configuration in approach, instead of 1.

FINAL APPROACH AT STANDARD - 3 ° DESCENT FLIGHT PATH

LANDING GEAR DOWN				
		Above 67 t	67 t - 57 t	Below 57 t
CONF	Speed (kts)	Pitch (°)/Thrust (% N1)		
3	VLS +10	4.5/48.0	4.5/44.4	4.5/41.4

FLYING TECHNIQUE TO STABILIZE SPEED:

Adjust pitch in order to fly the required flight path.
When target pitch is reached, flying intended flight path, adjust thrust to target.

If the aircraft pitch tends to increase, aircraft is slow, then increase thrust;
If the aircraft pitch tends to decrease, aircraft is fast, then decrease thrust.

UNRELIABLE SPEED INDICATION/ADR CHECK PROC

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

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- **If the safe conduct of the flight is impacted:**

MEMORY ITEMS:

AP/FD	OFF
A/THR	OFF
PITCH/THRUST:	
Below THRUST RED ALT	15° / TOGA
Above THRUST RED ALT and Below FL 100	10° / CLB
Above THRUST RED ALT and Above FL 100	5° / CLB
FLAPS (if CONF 0(1)(2)(3))	MAINTAIN CURRENT CONF
FLAPS (if CONF FULL)	SELECT CONF 3 AND MAINTAIN
SPEEDBRAKES	CHECK RETRACTED
L/G	UP
When at, or above MSA or Circuit Altitude: Level off for troubleshooting.	

GPS ALTITUDE..... Display on MCDU

Continued on the following page

UNRELIABLE SPEED INDICATION/ADR CHECK PROC (Cont'd)

● **To level off for troubleshooting:**

AP/FD.....OFF
A/THR.....OFF

Note: Check the actual slat/flap config. on ECAM, as flap auto-retraction may occur.

PITCH/THRUST FOR INITIAL LEVEL OFF				
SLATS/FLAPS EXTENDED				
		Above 67 t	67 t - 57 t	Below 57 t
CONF	Speed	Pitch (°)/Thrust (% N1)		
3	F	7.5/61.8	7.5/57.5	7.5/53.0
2	F	9.0/61.6	9.0/57.3	9.0/52.8
1 + F	S	4.5/60.2	4.5/56.1	4.5/51.2
1	S	7.5/58.0	7.5/53.9	7.5/48.9
CLEAN				
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 200	250 kt	4.0/62.4	3.0/60.1	2.0/58.3
FL 200 - FL 320	275 kt	3.0/73.4	2.0/71.6	1.5/70.2
Above FL 320	M 0.76	2.5/79.2	2.5/78.1	2.0/77.0

FLYING TECHNIQUE TO STABILIZE SPEED:

Adjust pitch in order to fly the required flight path.
When target pitch is reached, flying intended flight path, adjust thrust to target:
If the aircraft pitch tends to increase, aircraft is slow, then increase thrust;
If the aircraft pitch tends to decrease, aircraft is fast, then decrease thrust.

Continued on the following page

UNRELIABLE SPEED INDICATION/ADR CHECK PROC (Cont'd)

WHEN FLIGHT PATH IS STABILIZED

PROBE/WINDOW HEAT.....ON

TECHNICAL RECOMMENDATIONS

Respect Stall Warning.
To monitor speed, refer to IRS Ground Speed or GPS Ground Speed variations.

CAUTION	If the failure is due to radome destruction, the drag will increase and therefore N1 must be increased by 5 %. Fuel flow will increase by about 27 %.

AFFECTED ADR IDENTIFICATION

Crosscheck all speed indications and *Refer to QRH/Operating Speeds table of the FPE In Flight Performance QRH section (for F, S speeds)* or *Refer to QRH/Severe Turbulence table of QRH Operational Data section (for speed in clean conf)*:

■ **If at least one ADR is reliable:**

Faulty ADR(s).....OFF
REMAINING AIR DATA..... CONFIRM

Alternates sources may be used to evaluate the air data:
- *GPS altitude.*
- *GPS and IRS ground speeds, taking into account altitude and wind effect.*

■ **If affected ADR(s) cannot be identified, or if all ADRs are affected:**

■ **When above FL 250:**

ONE ADR.....KEEP ON
TWO ADRs.....OFF

This prevents the flight control laws from using two coherent but unreliable ADR data.

For flight continuation, *Refer to Climb, Cruise and Descent tables.*

■ **When below FL 250, if speed still unreliable:**

ALL ADRs P/B.....OFF

All ADRs must be switched OFF to replace the PFD's normal speed scale and altitude indication to the Back Up Speed Scale and GPS altitude indication.

SPD.....FLY THE GREEN

NAV ADR 1+2+3 FAULT

Continued on the following page

UNRELIABLE SPEED INDICATION/ADR CHECK PROC (Cont'd)

CLIMB/CRUISE/DESCENT (PITCH & THRUST TABLES) - CLIMB

Set the thrust to CL.

CLEAN				
		Above 67 t	67 t - 57 t	Below 57 t
FL	Speed	Pitch (°)/Thrust (% N1)		
FL 250 - FL 320	275 kt	4.0/CLB	4.0/CLB	4.0/CLB
Above FL 320	M 0.76	3.5/CLB	3.5/CLB	3.5/CLB

CLIMB/CRUISE/DESCENT (PITCH & THRUST TABLES) - CRUISE

Adjust N1 to maintain approximate level flight with pitch attitude held constant. When time permits, *Refer to PRO-SUP-91-10 General* (SEVERE TURBULENCE) and adjust pitch to maintain level flight.

CLEAN				
		Above 67 t	67 t - 57 t	Below 57 t
FL	Speed	Pitch (°)/Thrust (% N1)		
FL 250 - FL 320	275 kt	3.0/73.4	2.0/71.6	1.5/70.2
Above FL 320	M 0.76	2.5/79.2	2.5/78.1	2.0/77.0

CLIMB/CRUISE/DESCENT (PITCH & THRUST TABLES) - DESCENT

Set the thrust to IDLE.

CLEAN				
		Above 67 t	67 t - 57 t	Below 57 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Above FL 320	M 0.76	-0.5/IDLE	-1.0/IDLE	-1.5/IDLE
FL 320 - FL 250	275 kt	0.0/IDLE	-0.5/IDLE	-1.5/IDLE

AIR APU BLEED FAULT

Applicable to: ALL

L2 The valve position disagrees with the commanded position, when the APU is running.

Crew awareness.

Note: Switching the APU BLEED pb-sw once may allow APU bleed recovery.

STATUS	INOP SYS
	APU BLEED (If valve closed)

AIR APU BLEED LEAK

Applicable to: ALL

L2 *Note: This warning may spuriously appear after electrical transients. In that case, an APU bleed reset may be attempted by switching the APU BLEED pb-sw OFF, then on.*

L1 APU BLEED (IF NOT CLOSED).....OFF

L2 - *With the APU BLEED pb-sw ON, the FAULT light remains on.*
- *With the APU BLEED pb-sw off, the FAULT light goes off when the overheat disappears.*

STATUS	INOP SYS
	APU BLEED

AIR BLEED 1(2) OFF

Applicable to: ALL

L2 One engine bleed is switched off with no fault.

Crew awareness.

AIR DUAL BLEED FAULT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

1

■ **ENG 1 BLEED failure:**

This procedure is to be applied if ENG 1 BLEED was lost due to a:
- LEAK on side 1, or
- ENG 1 FIRE, or
- Start Air Valve 1 failed open.

DESCENT TO FL100/MEA..... INITIATE

Descend rapidly to FL 100/MEA, to prevent excessive cabin altitude.

AVOID ICING CONDITIONS

● **IF ICE ACCRETION:**
APPR SPD..... VLS + 10 KT
LDG DIST PROC..... APPLY

■ **ENG 2 BLEED failure:**

This procedure is to be applied if ENG 2 BLEED was lost due to a:
- LEAK on side 2, or
- ENG 2 FIRE, or
- Start Air Valve 2 failed open.

X BLEED..... CHECK CLOSED
DESCENT TO FL200/MEA..... INITIATE

Descend rapidly to FL 200, to recover the bleed supply from the APU.

APU..... START

Start the APU during the descent.

● **AT, OR BELOW, FL 200:**
WING A.ICE..... OFF

APU BLEED must not be used for wing anti-ice.

APU BLEED..... ON

MAX FL200

AVOID ICING CONDITIONS

● **IF ICE ACCRETION:**
APPR SPD..... VLS + 10 KT
LDG DIST PROC..... APPLY

Continued on the following page

AIR DUAL BLEED FAULT (Cont'd)

■ **In all other cases:**

DESCENT.....INITIATE

Descend rapidly to FL 200, so that the bleed supply may be supplied by the APU, if the bleed system recovery is not successful.

● **If both packs are available:**

If both packs are operative, it can be suspected that the second bleed system failed due to excessive demand. Recovery of the second failed engine bleed may be attempted.

■ **If ENG 1 BLEED is lost first:**

PACK 1.....OFF
ENGINE 2 BLEED.....ON

■ **If ENG 2 BLEED is lost first:**

PACK 2.....OFF
ENGINE 1 BLEED.....ON

● **If engine bleed recovery was not successful, or if one pack is inoperative:**

X BLEED.....CHECK OPEN
DESCENT TO FL200/MEA.....CONTINUE

Descend rapidly to FL 200, to recover the bleed supply from the APU

APU.....START

Start the APU during the descent.

● **AT, OR BELOW, FL 200:**

WING A.ICE.....OFF

APU BLEED must not be used for wing anti-ice.

APU BLEED.....ON

MAX FL200

AVOID ICING CONDITIONS

● **IF ICE ACCRETION:**

APPR SPD.....VLS + 10 KT
LDG DIST PROC.....APPLY

AIR DUAL BLEED FAULT

Applicable to: B-HSQ, B-HSR

2

■ **ENG 1 BLEED failure:**

This procedure is to be applied if ENG 1 BLEED was lost due to a:
- LEAK on side 1, or
- ENG 1 FIRE, or
- Start Air Valve 1 failed open.

DESCENT TO FL100/MEA..... INITIATE

Descend rapidly to FL 100/MEA, to prevent excessive cabin altitude.

AVOID ICING CONDITIONS

● **IF ICE ACCRETION:**
APPR SPD..... VLS + 10 KT
LDG DIST PROC..... APPLY

■ **ENG 2 BLEED failure:**

This procedure is to be applied if ENG 2 BLEED was lost due to a:
- LEAK on side 2, or
- ENG 2 FIRE, or
- Start Air Valve 2 failed open.

X BLEED..... CHECK CLOSED
DESCENT TO FL225/MEA..... INITIATE

Descend rapidly to FL 225, to recover the bleed supply from the APU.

APU..... START

Start the APU during the descent.

● **AT, OR BELOW, FL 225:**
WING A.ICE..... OFF

APU BLEED must not be used for wing anti-ice.

APU BLEED..... ON

MAX FL225

AVOID ICING CONDITIONS

● **IF ICE ACCRETION:**
APPR SPD..... VLS + 10 KT
LDG DIST PROC..... APPLY

Continued on the following page

AIR DUAL BLEED FAULT (Cont'd)

■ **In all other cases:**

DESCENT.....INITIATE

Descend rapidly to FL 225, so that the bleed supply may be supplied by the APU, if the bleed system recovery is not successful.

● **If both packs are available:**

If both packs are operative, it can be suspected that the second bleed system failed due to excessive demand. Recovery of the second failed engine bleed may be attempted.

■ **If ENG 1 BLEED is lost first:**

PACK 1.....OFF
ENGINE 2 BLEED.....ON

■ **If ENG 2 BLEED is lost first:**

PACK 2.....OFF
ENGINE 1 BLEED.....ON

● **If engine bleed recovery was not successful, or if one pack is inoperative:**

X BLEED.....CHECK OPEN
DESCENT TO FL225/MEA.....CONTINUE

Descend rapidly to FL 225, to recover the bleed supply from the APU

APU.....START

Start the APU during the descent.

● **AT, OR BELOW, FL 225:**

WING A.ICE.....OFF

APU BLEED must not be used for wing anti-ice.

APU BLEED.....ON

MAX FL225

AVOID ICING CONDITIONS

● **IF ICE ACCRETION:**

APPR SPD.....VLS + 10 KT
LDG DIST PROC.....APPLY

AIR ENG 1(2) BLEED ABNORM PR

Applicable to: ALL 321

- **If wing anti-ice is on, and both packs are on:**

PACK (AFFECTED)..... OFF

L2 *One pack must be closed when the pilot is using wing anti-ice because of precooler performance.*

L1 X BLEED..... OPEN

- **If wing anti-ice is off, and both packs are on:**

ECON FLOW..... ON

L2 *The ECON FLOW pb must be selected ON, due to precooler performance.*

STATUS	
ONE PACK ONLY IF WAI ON	**INOP SYS** ENG 1(2) BLEED PACK 1(2) (If closed)

AIR ENG 1(2) BLEED ABNORM PR

Applicable to: ALL 320

- **If wing anti-ice is on and both packs are on:**

PACK (AFFECTED)..... OFF

L2 *One pack must be closed when the pilot is using wing anti-ice because of precooler performance.*

L1 X BLEED..... OPEN

STATUS	
ONE PACK ONLY IF WAI ON	**INOP SYS** ENG 1(2) BLEED PACK 1(2) (If closed)

AIR ENG 1(2) BLEED FAULT

Applicable to: ALL 321

ENG BLEED AFFECTED (IF NOT AUTOMATICALLY CLOSED).....OFF

L2 - *With the ENG BLEED pb-sw on, the FAULT light remains on.*
- *With the ENG BLEED pb-sw OFF, the FAULT light goes out when the failure (overheat or overpressure) disappears.*

L1 ● **If wing anti-ice is on and both packs are on:**
PACK AFFECTED..... OFF

L2 *One pack must be closed when the pilot is using wing anti-ice because of precooler performance.*

L1 X BLEED..... OPEN

● **If wing anti-ice is off, and both packs are on:**
ECON FLOW..... ON

L2 *The ECON FLOW pb must be selected ON, due to precooler performance.*

STATUS

ONE PACK ONLY IF WAI ON

INOP SYS

ENG 1(2) BLEED
PACK 1(2) (If closed)

AIR ENG 1(2) BLEED FAULT

Applicable to: ALL 320

ENG BLEED AFFECTED (IF NOT AUTOMATICALLY CLOSED).....OFF

L2 - *With the ENG BLEED pb-sw on, the FAULT light remains on.*
- *With the ENG BLEED pb-sw OFF, the FAULT light goes out when the failure (overheat or overpressure) disappears.*

L1 ● **If wing anti-ice is on and both packs are on:**
PACK AFFECTED..... OFF

L2 *One pack must be closed when the pilot is using wing anti-ice because of precooler performance.*

L1 X BLEED..... OPEN

STATUS	INOP SYS
ONE PACK ONLY IF WAI ON	ENG 1(2) BLEED PACK 1(2) (If closed)

AIR ENG 1(2) BLEED LO TEMP
(OPPOSITE BLEED AVAILABLE)

Applicable to: ALL

L2 In flight, engine bleed temperature is too low for correct wing de-icing.

L1 A/THR..... OFF
THR LEVER (AFFECTED ENGINE).....ADVANCE

L2 *The thrust lever of the affected engine must be advanced, with the autothrust OFF.*
Low bleed temperature may be due to low outside air temperature. Therefore, increasing engine thrust may increase bleed temperature and clear the ECAM caution.

L1 ● **IF UNSUCCESSFUL:**
X BLEED.....OPEN
ENG BLEED (AFFECTED).....OFF
ASSOCIATED PACK (IF OPPOSITE PACK ON)..... OFF

L2 *One pack must be closed, when the pilot is using wing anti-ice, due to precooler performance.*

STATUS

ONE PACK ONLY IF WAI ON

INOP SYS

ENG 1(2) BLEED
PACK 1(2) (If selected OFF)

AIR ENG 1(2) BLEED LO TEMP
(OPPOSITE BLEED NOT AVAILABLE)

Applicable to: ALL

L2 In flight, engine bleed temperature is too low for correct wing de-icing.

L1 A/THR..... OFF
THR LEVER (AFFECTED ENGINE).....ADVANCE

L2 *The thrust lever of the affected engine must be advanced, with the autothrust OFF.*
Low bleed temperature may be due to low outside air temperature. Therefore, increasing engine thrust may increase bleed temperature and clear the ECAM caution.

L1 ● **IF UNSUCCESSFUL:**
WING A. ICE..... OFF
AVOID ICING CONDITIONS

3 **STATUS**

AVOID ICING CONDITIONS
- **IF SEVERE ICE ACCRETION:**
  MIN SPD.....VLS +10 / G DOT
  MANEUVER WITH CARE

  LDG DIST PROC.....APPLY

INOP SYS

WING A. ICE

AIR ENG 1 + 2 BLEED LO TEMP

Applicable to: ALL

A/THR .....OFF
THR LEVERS.....ADVANCE

L2 *The thrust lever of the affected engine must be advanced, with the autothrust OFF.*
Low bleed temperature may be due to low outside air temperature. Therefore, increasing engine thrust may increase bleed temperature and clear the ECAM caution.

L1 ● **IF UNSUCCESSFUL:**
WING A. ICE..... OFF
AVOID ICING CONDITIONS

Continued on the following page

AIR ENG 1 + 2 BLEED LO TEMP (Cont'd)

4 AVOID ICING CONDITIONS
- **IF SEVERE ICE ACCRETION:**
  MIN SPD.....VLS +10 / G DOT
  MANEUVER WITH CARE
  LDG DIST PROC.....APPLY

AIR ENG 1(2) BLEED NOT CLSD

Applicable to: ALL

L2 Engine bleed valve fails to close:
- During engine start or when APU BLEED pb-sw is selected on.
- At engine shutdown or when APU BLEED pb-sw is selected OFF with engine not running.

L1 ENG BLEED.....OFF

L2 *Note:* *The warning may be triggered due to residual pressure between the HP or IP valves and the engine bleed valve:*
- *After engine shutdown, or*
- *After APU BLEED pb-sw is selected OFF with engine not running.*

Select the ENG BLEED pb-sw OFF then on. If the warning disappears, no maintenance action is due.

STATUS

	INOP SYS
ONE PACK ONLY IF WAI ON	ENG 1(2) BLEED

AIR ENG 1(2) HP VALVE FAULT

Applicable to: ALL

L2 Crew awareness.

Continued on the following page

AIR ENG 1(2) HP VALVE FAULT (Cont'd)

	STATUS
AIR PRESS LOW AT IDLE	

AIR ENG 1(2) LEAK DET FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 Crew awareness.

STATUS	
	INOP SYS
	ENG 1(2) LK DET

AIR L(R) WING OR ENG 1(2) BLEED LEAK

Applicable to: ALL

L2 *Note:* *Spurious ENG 1(2) BLEED LEAK or L(R) WING LEAK warnings may be triggered after electrical transients. Reset in these cases the affected ENG BLEED pushbutton-switch for an ENG BLEED LEAK, or both ENG BLEED pushbutton-switches for a WING LEAK.*

L1 ENG BLEED AFFECTED (IF NOT AUTOMATICALLY CLOSED).....OFF

L2 - *With the ENG BLEED pb-sw on, the FAULT light remains on.*
- *With the ENG BLEED pb-sw off, the FAULT light goes off when the overheat disappears.*

L1 ● **If left wing or engine 1 bleed leak:**

APU BLEED (IF NOT CLOSED).....OFF

X BLEED (IF NOT CLOSED).....SHUT
WING ANTI-ICE.....OFF
AVOID ICING CONDITIONS

Continued on the following page

AIR L(R) WING OR ENG 1(2) BLEED LEAK (Cont'd)

5

STATUS

	INOP SYS
AVOID ICING CONDITIONS • **IF SEVERE ICE ACCRETION:** MIN SPD.....VLS +10 / G DOT MANEUVER WITH CARE LDG DIST PROC.....APPLY	WING A.ICE ENG 1(2) BLEED PACK 1(2)

AIR L(R) WNG LEAK DET FAULT

Applicable to: ALL

L2 Crew awareness.

STATUS

	INOP SYS
	L(R) WNG LK DET

AIR X BLEED FAULT

Applicable to: ALL

X BLEED..... MAN CTL

L2 *Select OPEN, when the APU BLEED pb-sw is ON, or for engine start, or when WING ANTI-ICE pb-sw is ON and one bleed is inoperative.*
Select SHUT in other cases.

L1 ● **If manual opening inoperative, and only one bleed available:**
WING ANTI ICE.....OFF
AVOID ICING CONDITIONS

Continued on the following page

AIR X BLEED FAULT (Cont'd)

6

STATUS

	INOP SYS
● **If manual opening inoperative:** AVOID ICING CONDITIONS ● **IF SEVERE ICE ACCRETION:** MIN SPD.....VLS +10 / G DOT MANEUVER WITH CARE LDG DIST PROC..... APPLY X BLEED MAN CTL	X BLEED WING A.ICE

BLEED MONITORING FAULT

Applicable to: ALL

L2 Crew awareness.

STATUS

INOP SYS
BMC 1 + 2

BLEED MONIT SYS 1(2) FAULT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 Crew awareness.

Continued on the following page

BLEED MONIT SYS 1(2) FAULT (Cont'd)

STATUS	INOP SYS
	BMC 1(2)

DATALINK ATSU FAULT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTF

Crew awareness.

ATSU INIT FAULT

L2 *Displayed, in case of failure upon ATSU initialization. Refer to PRO-SUP-46-10 ATSU Initialization*

STATUS	INOP SYS
	ATSU DATA COMPANY

DATALINK COMPANY FAULT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTF

Crew awareness.

STATUS	INOP SYS
	DATA COMPANY

Intentionally left blank

APU AUTO (EMER) SHUT DOWN

Applicable to: ALL

L2 APU EMER SHUT DOWN is triggered if:

- An APU fire is detected on ground, or
- The ground crew shuts down the APU manually by pushing the APU SHUT OFF pb on the nose gear interphone panel, or
- The flight crew presses the APU FIRE pb in the cockpit.

L1 MASTER SW.....OFF

STATUS	
	INOP SYS
	APU

Intentionally left blank

DOORS (L/R/FWD/AFT) AVIONICS

Applicable to: ALL

■ **On the ground:**

Crew awareness.

■ **In flight:**

No crew action required as long as cabin pressure is normal.

● **IF ABN CAB V/S:**
MAX FL.....100/MEA

L2 *Limit maximum flight level to FL 100 or MEA or minimum obstacle clearance altitude. Avionics doors are of plug type. Therefore full depressurization is not recommended.*

• **IF ABN CAB V/S:**
MAX FL..... 100/MEA

DOORS CABIN/EMER EXIT/CARGO

Applicable to: ALL

L2 Crew may confirm a cabin door warning by checking the visual indicator on the door.

L1 ■ **On the ground:**

L2 Crew may confirm a cargo door warning by checking the indication on the cargo door.

L1 Crew awareness.

■ **In flight:**

No crew action required as long as cabin pressure is normal.

● **IF ABN CAB V/S:**
MAX FL.....100/MEA

L2 *Limit maximum flight level to FL 100 or MEA or minimum obstacle clearance altitude. If door warning is accompanied by abnormal increase of cabin altitude, flight crew must reduce cabin ΔP and altitude by descending.*

• **IF ABN CAB V/S:**
MAX FL.....100/MEA

Intentionally left blank

ENG 1(2) AIR EXCHANGER FAULT

Applicable to: ALL

L2 Failure of air/oil heat exchanger valve on ground.
Depending of the failure one of the following messages is displayed:

L1 AIR VALVE OPEN

L2 *Refer to MEL/ME-70 ENG 1(2) AIR EXCHANGR FAULT [AIR VALVE OPEN].*

L1 AIR VALVE CLOSED

ENG 1(2) AIRCRAFT FADEC SUPPLY

Applicable to: ALL

L2 On ground, loss of aircraft 28 V supply of either EEC channel, or, in flight, loss of aircraft 28 V supply of:
- Both EEC channels, or
- One EEC channel without switching to the other channel.

Crew awareness.

L12

STATUS

The ECAM only displays these inoperative systems, if there is:
- A loss of aircraft 28 V supply of both EEC channels, or
- A loss of aircraft 28 V supply of one EEC channel without switching to the other channel.

INOP SYS

REVERSER 1(2)
ENG 1(2) START

ENG 1(2) BEARING 4 OIL SYS

Applicable to: ALL

L2 One of the two following messages is displayed:

L1 SCAVENGE VALVE FAULT

L2 N° 4 bearing scavenge valve stuck open.

L1 HI PRESS

L2 N° 4 bearing carbon seal is failed or due to scavenge valve stuck closed or due to a clogged scavenge valve restrictor.
Maintenance action is due.

ENG 1(2) COMPRESSOR VANE

Applicable to: ALL

L2 Low Pressure Compressor Bleed Valve (LPCBV) or Variable Stator Vane (VSV) failure.
Engine stall may occur at any thrust change.

1 L1 ● **On ground:**
THR LEVER (AFFECTED)..... IDLE
ENG MASTER (AFFECTED).....OFF

AVOID THR CHANGES (not displayed if LPCBV goes to open position).

L2 *If autothrust engaged, adjust thrust lever (of affected engine) to align thrust lever command with actual EPR and disconnect autothrust.*

L1 AVOID RAPID THRUST CHANGES (displayed when the VSV position disagrees with the command).

L2 *Engine stall may occur at any rapid thrust change.*

AVOID THR CHANGES

ENG 1(2) EGT EXCEEDED DURING AIR START

Applicable to: ALL

L2 EGT limit has been exceeded during ENG relight in flight (only displayed on ground).
Report in maintenance log.

ENG 1(2) EIU FAULT

Applicable to: ALL

L2 The data bus between the EIU and EEC fails. Therefore:

- Affected engine start is lost
- Autothrust control is lost
- Thrust reverser on the affected engine is lost
- When idle is selected, only approach idle is available
- Bleed corrections on EPR limit are lost
- Continuous ignition is on.

Crew awareness.

L12

STATUS

ENG 1(2) APPR IDLE ONLY
Minimum idle is lost.
CAT 2 ONLY

INOP SYS

A/THR
CAT 3
REVERSER 1(2)
ENG 1(2) START

ENG 1(2) EPR MODE FAULT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

L2 EEC has reverted to the N1 MODE. Autothrust control is lost.

L1 ● **If unrated N1 MODE is active:**

L2 Loss of these upper ECAM indications: Max N1, N1 thrust lever, N1 mode, N1 rating limit.

L1 N1 DEGRADED MODE.
ENG 1 N1 MODE .....ON
ENG 2 N1 MODE .....ON

L2 *N1 mode is confirmed on the affected engine.*
The other engine must be reverted to the rated N1 mode to ease thrust setting.

L1 NOT EXCEED N1 LIMIT.

L2 *As there is no N1 limit, an overboost can occur at full forward thrust lever position.*

L1 MAN THR.....ADJUST

L2 *Align the N1 of the affected engine on the N1 of the other engine. Refer to PER-THR-N1 N1 MODE THRUST CONTROL, for power management tables.*

L1 ● **If rated N1 MODE is active:**
T.O THRUST LIMITED (ON GROUND)

L2 *When dispatching in rated N1 mode, apply thrust penalties provided in the MMEL.*

L1 ENG 1 N1 MODE.....ON
ENG 2 N1 MODE.....ON
MAN THR.....ADJUST

L2 *Refer to PER-THR-N1 N1 MODE THRUST CONTROL, for power management tables.*

As the reversion to N1 mode is seen by the FMGC as an Engine-Out condition, press the EO CLR prompt key of the MCDU to recover FM capabilities for both engines.

Note: *Recovery of EPR MODE on both engines may be attempted by switching off both ENG N1 MODE pb-sw.*

Continued on the following page

ENG 1(2) EPR MODE FAULT (Cont'd)

STATUS	INOP SYS
■ **On ground, if rated N1 mode is active:** T.O THRUST LIMITED	A/THR CAT 3
■ **If unrated N1 MODE is active:** ENG 1(2) N1 DEGRADED MODE CAT 2 ONLY	

ENG 1(2) EPR MODE FAULT

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

L2 EEC has reverted to the N1 MODE. Autothrust control is lost.

L1 ● **If unrated N1 MODE is active:**

L2 Loss of these upper ECAM indications: Max N1, N1 thrust lever, N1 mode, N1 rating limit.

L1 N1 DEGRADED MODE.

ENG 1 N1 MODE .....ON
ENG 2 N1 MODE .....ON

L2 *N1 mode is confirmed on the affected engine.*
The other engine must be reverted to the rated N1 mode to ease thrust setting.

L1 NOT EXCEED N1 LIMIT.

L2 *As there is no N1 limit, an overboost can occur at full forward thrust lever position.*

L1 MAN THR.....ADJUST

L2 *Align the N1 of the affected engine on the N1 of the other engine. Refer to PER-THR-N1 N1 MODE THRUST CONTROL, for power management tables.*

L1 ● **If rated N1 MODE is active:**

T.O THRUST LIMITED (ON GROUND)

L2 *When dispatching in rated N1 mode, apply thrust penalties provided in the MMEL.*

L1 ENG 1 N1 MODE.....ON
ENG 2 N1 MODE.....ON
MAN THR.....ADJUST

L2 *Refer to PER-THR-N1 N1 MODE THRUST CONTROL, for power management tables.*

Note: Recovery of EPR MODE on both engines may be attempted by switching off both ENG N1 MODE pb-sw.

STATUS

	INOP SYS
■ **On ground, if rated N1 mode is active:** T.O THRUST LIMITED	A/THR CAT 3
■ **If unrated N1 MODE is active:** ENG 1(2) N1 DEGRADED MODE CAT 2 ONLY	

ENG 1(2) EPR OR N1 OR N2 OR EGT OR FF DISCREPANCY

Applicable to: ALL

L2 Discrepancy between displayed value on ECAM and real value. On ECAM upper display a CHK message is displayed besides affected indication.
If both thrust levers are at the same position, cross check with the opposite parameter.

Crew awareness.

ENG 1(2) FADEC A(B) FAULT

Applicable to: ALL

L2 Loss of one FADEC channel.

Crew awareness.

ENG 1(2) FADEC ALTERNATOR

Applicable to: ALL

L2 Loss of electrical auto supply of FADEC.

Crew awareness.

ENG 1(2) FADEC FAULT

Applicable to: ALL

■ **On ground:**

THR LVR (affected) NOT ABOVE IDLE
ENG (AFFECTED) PARAMETERS.....CHECK

L2 *Due to the fact that engine indications are lost, other system pages such as HYD SD page, ELEC SD page or BLEED SD page must be used to check engine status.*

L1 ● **IF ABNORMAL:**

ENG MASTER (AFFECTED).....OFF

■ **In flight:**

ENG (AFFECTED) PARAMETERS.....CHECK

L2 *Due to the fact that engine indications are lost, other system pages such as HYD SD page, ELEC SD page or BLEED SD page must be used to check engine status.*

L1 ● **IF ABNORMAL:**

THR LEVER (AFFECTED).....IDLE
ENG MASTER (AFFECTED).....OFF

L12

ASSOCIATED PROCEDURES

ENG 1(2) SHUT DOWN

(Refer to PRO-ABN-70 ENG 1(2) SHUT DOWN).

ENG 1(2) FADEC OVHT

Applicable to: ALL

■ **On the ground:**

THR LEVER (AFFECTED)..... IDLE
ENG MASTER (AFFECTED).....OFF

■ **In flight:**

L2 Reducing engine power should decrease temperature in area of ECU.
If overheating is severe enough, EEC failure could result with consequent loss of engine function.

L1 ENG (AFFECTED) PARAMETERS.....CHECK

● **IF ABN ENG OPERATION:**

THR LEVER (AFFECTED).....IDLE
ENG MASTER (AFFECTED)..... OFF

L12

ASSOCIATED PROCEDURES

ENG 1(2) SHUT DOWN

(Refer to PRO-ABN 70 ENG 1(2) SHUT DOWN).

ENG 1(2) FADEC PLUG FAULT

Applicable to: ALL

L2 Crew awareness.

Maintenance action is due.

ENG 1(2) FAIL

Applicable to: ALL

L2 An engine flame-out may be recognized by a rapid decrease in EGT, N2, FF and EPR.

Engine damage may be accompanied by:
- Loud noise,
- Significant increase in aircraft vibrations and/or buffeting,
- Repeated or uncontrollable engine stalls,
- Associated abnormal indications such as hydraulic fluid loss, or no N2 indication.

L1 **LAND ASAP (AMBER)**

■ **Before takeoff or after landing:**

THR LEVER (AFFECTED ENGINE)..... IDLE
ENG MASTER (AFFECTED ENGINE).....OFF

● **IF DAMAGE:**

ENG FIRE P/B (AFFECTED ENGINE)..... PUSH
AGENT 1..... DISCH

● **IF NO DAMAGE:**

ENG (AFFECTED) RELIGHT.....CONSIDER

L2 *If no damage, a new start sequence may be initiated.*

L12

ASSOCIATED PROCEDURES

ENG 1(2) SHUT DOWN

Apply the ENG SHUT DOWN procedure (Refer to PRO-ABN-70 ENG 1(2) SHUT DOWN), If damage or if engine relight is unsuccessful.

L1 ■ **In flight:**

ENG MODE SEL..... IGN

L2 *Selection of continuous ignition confirms the immediate relight attempt made by the FADEC.*

L1 THR LEVER (AFFECTED ENGINE)..... IDLE

L2 *Note: In case of GPWS (EGPWS ◁) alerts, reduce speed with care below VLS with flaps extended (at light weights VMC may be reached before αMax) when applying the GPWS (EGPWS ◁) procedure.*

L1 ● **IF NO ENG RELIGHT AFTER 30 S:**

ENG MASTER (AFFECTED ENGINE)..... OFF

Continued on the following page

ENG 1(2) FAIL (Cont'd)

● **IF DAMAGE:**

ENG FIRE P/B (AFFECTED ENGINE).....PUSH

AGENT 1 (AFTER 10 SECONDS IN FLIGHT)..... DISCH

L12

ASSOCIATED PROCEDURES

ENG 1(2) SHUT DOWN

Apply the ENG SHUT DOWN procedure (Refer to PRO-ABN-70 ENG 1 (2) SHUT DOWN), if damage or if engine relight is unsuccessful.

If high vibration occurs and continues after engine shutdown, reduce airspeed and descent to a safe altitude

Attempt to determine and use a practical airspeed and altitude for minimum vibrations.

● **IF NO DAMAGE:**

ENG (AFFECTED) RELIGHT..... CONSIDER

L2

If there is no damage, an engine relight can be considered. To restart the engine, (Refer to PRO-ABN-70 ENG RELIGHT (In Flight)) apply the ENG RELIGHT (in flight) procedure.

ENG 1(2) FUEL CTL FAULT

Applicable to: ALL

L2 ■ **FMV position disagreement:**

Crew awareness.

Fuel Metering Valve position disagreement between the commanded position and the real one.

L1 ■ **Failure of FMV command or FMV position feedback:**
ENG 1(2) MIN FUEL FLOW.

L2 *FADEC is no longer able to control the fuel flow. It automatically sets a fail safe minimum fuel flow corresponding to idle or sub-idle fuel flow which may result in an engine shut-down.*

L1 THR LEVER (AFFECTED)..... IDLE

■ **In flight:**

● **IF ENG (affected) NOT AT IDLE:**
ENG MASTER (AFFECTED).....OFF

■ **On the ground:**
ENG MASTER (AFFECTED)..... OFF

STATUS

APPR PROC

REV (AFFECTED)..... DO NOT USE

● **AFTER TOUCH DOWN:**
THR LEVER (AFFECTED).....IDLE
ENG MASTER (AFFECTED) .....OFF

ENG (affected) MIN FUEL FLOW.

ENG 1(2) FUEL FILTER CLOG

Applicable to: ALL

L2 Crew awareness.

Maintenance action is due.

ENG 1(2) FUEL HEAT SYS

Applicable to: ALL

FUEL RETURN VALVE OPEN.
FUEL DIVERTER VALVE.
TEMPS SENSORS

L2 *Maintenance action is due.*

ENG 1(2) FUEL VALVE FAULT

Applicable to: ALL

■ **Associated engine at or below idle:**
FUEL VALVE NOT OPEN.

- **On ground:**
  - **IF NO ENG LIGHT UP (fuel valve is failed in the closed position):**
    - **If the EGT does not increase, the warning is confirmed:**
      MAN START (IF MANUAL START PERFORMED).....OFF
      ENG MASTER (AFFECTED).....OFF

■ **Associated engine above idle:**

- **Failure of fuel valve position feedback:**
  FUEL SWITCH FAULT.
- **Failure of fuel valve in open position:**
  FUEL VALVE NOT CLOSED.

L2 *Due to the fuel quantity between the LP valve and nozzles, the engine shuts down after approximately 2 min and 30 s.*

ENG 1(2) HOT FUEL

Applicable to: ALL

GEN 1(2)..... OFF

Continued on the following page

ENG 1(2) HOT FUEL (Cont'd)

STATUS

CAT 3 SINGLE ONLY.

INOP SYS

GEN 1(2)
MAIN GALLEY (1)
CAT 3 DUAL

(1) *(Only if APU GEN not in line)*

ENG 1(2) IGN FAULT (IGN A OR B FAULT)

Applicable to: ALL

L2 Crew awareness.

STATUS

INOP SYS

ENG 1(2) IGN A (B)

ENG 1(2) IGN FAULT (IGN A+B FAULT)

Applicable to: ALL

AVOID ADVERSE CONDITIONS

STATUS

INOP SYS

ENG 1(2) IGN (If EIU is failed)
ENG 1(2) START (If EIU is failed)

ENG 1(2) N1/N2/EGT OVERLIMIT

Applicable to: ALL 321

■ **Max pointer indication:**

L2 EGT 650 °C or above, or EGT between 610 °C and 650 °C (except during takeoff, alpha floor protection or reverse selected), or

N1 between 100 % and 109.4 %, or

N2 between 100 % and 105.7 %

L1 THR LEVER (OF AFFECTED ENGINE)..... BELOW LIMIT

L2 *Normal operation may be resumed and maintained, until the next landing.*
Report the max value observed and the length of time above limits in maintenance log. If unable to maintain engine within limits, affected engine should be shut down. If conditions do not permit engine shutdown, land ASAP using the minimum thrust required to sustain safe flight.

L1 ■ **Max pointer indication:**

L2 N1 109.4 % or above, or

N2 105.7 % or above

FADEC automatically reduces the engine power below idle.

Engine shutdown must be performed.

L1 THR LEVER (OF AFFECTED ENGINE)..... IDLE
ENG MASTER (OF AFFECTED ENGINE)..... OFF

L12

ASSOCIATED PROCEDURES

ENG 1(2) SHUT DOWN

Apply the ENG SHUT DOWN procedure (Refer to PRO-ABN-70-I ENG 1(2) SHUT DOWN).

ENG 1(2) N1/N2/EGT OVERLIMIT

Applicable to: ALL 320

■ **Max pointer indication:**

L2 EGT 635 °C or above, or EGT between 610 °C and 635 °C (except during takeoff, alpha floor protection, or reverse selected), or

N1 between 100 % and 109.4 %, or

N2 between 100 % and 105.7 %

L1 THR LEVER (OF AFFECTED ENGINE)..... BELOW LIMIT

L2 *Normal operation may be resumed and maintained until next landing.*
Report the max value observed and the length of time above limits in maintenance log. If unable to maintain engine within limits, affected engine should be shut down. If conditions do not permit engine shutdown, land ASAP using the minimum thrust required to sustain safe flight.

L1 ■ **Max pointer indication:**

L2 N1 109.4 % or above, or

N2 105.7 % or above

FADEC automatically reduces the engine power below idle.

Engine shutdown must be performed.

L1 THR LEVER (OF AFFECTED ENGINE)..... IDLE
ENG MASTER (OF AFFECTED ENGINE)..... OFF

L12

ASSOCIATED PROCEDURES

ENG 1(2) SHUT DOWN

Apply the ENG SHUT DOWN procedure (Refer to PRO-ABN-70-I ENG 1(2) SHUT DOWN).

ENG 1(2) OIL FILTER CLOG

Applicable to: ALL

L2 Crew awareness.

If message appears during cold engine start with low engine oil temp, temporarily run engine at idle for 5 min. If message disappears, no maintenance is required.

ENG 1(2) OIL HI TEMP

Applicable to: ALL

L2 Oil temp between 155 °C and 165 °C for more than 15 min, or oil temp above 165 °C.

L1 THR LEVER (OF AFFECTED ENGINE).....IDLE
ENG MASTER (OF AFFECTED ENGINE).....OFF

L2 *Operation above the maximum temperature require engine shutdown.*

L12

ASSOCIATED PROCEDURES

ENG 1 (2) SHUT DOWN

Apply the ENG SHUT DOWN procedure (Refer to PRO-ABN-70-I ENG 1(2) SHUT DOWN).

ENG 1(2) OIL LO PR

Applicable to: ALL

L2 ● **If oil pressure is between 60 and 80 PSI:**

Only the ECAM warning title is displayed (amber).

L1 ● **IF OIL PR < 60 PSI:**

L2 Check oil pressure indication on ENG SD page.

L1 THR LEVER (OF AFFECTED ENGINE)..... IDLE
ENG MASTER (OF AFFECTED ENGINE)..... OFF

L12

ASSOCIATED PROCEDURES

ENG 1(2) SHUT DOWN

Apply the ENG SHUT DOWN procedure (Refer to PRO-ABN-70-I ENG 1(2) SHUT DOWN).

Note: If oil pressure is low (< 60 PSI) is indicated only on ENG SD page (red indication) without the ENG OIL LO PR red warning, it can be assumed, that the oil pressure transducer is faulty. Flight crew may continue engine operation while monitoring other engine parameters.

ENG 1(2) OIL LO TEMP

Applicable to: ALL

DELAY T.O

L2 *The engine should be warmed up until oil temp is at, or above, 50 °C prior to takeoff.*

L1 ● **If temperature is below -10 °C:**

AVOID HI POWER

L2 *The engine should be warmed up until oil temp is at, or above, -10 °C prior to accelerating the engine above idle.*

ENG 1(2) ONE TLA FAULT

Applicable to: ALL

L2 Crew awareness.

ENG 1(2) OVSPD PROT FAULT

Applicable to: ALL

L2 The automatic fuel flow restriction in case of engine N1 or N2 overspeed may not be available.
Fault was detected during last engine shut down.
Some cases of spurious fault detection have been experienced.

The caution can be considered as spurious if it disappears after application of the following procedure:

- Enter a new FLT NBR on INIT page on MCDU (to change the maintenance phase)
- Start the affected engine and wait for 4 min at idle
- Then switch off the affected ENG GEN and shutdown the engine.

Crew awareness.

ENG 1(2) REV ISOL FAULT

Applicable to: ALL

L2 The thrust reverser shut off valve is detected failed open.

Crew awareness.

ENG 1(2) REV PRESSURIZED

Applicable to: ALL

L2 Reverse thrust system is pressurized without reverse deployment order.

L1 ■ **In flight:**
THR LEVER 1(2)..... IDLE

L2 *If flight conditions permit, reduce the thrust of the affected engine to IDLE as a precautionary measure.*

L1 ■ **On ground:**
THR LVR 1(2) NOT ABOVE IDLE

ENG 1(2) REV SWITCH FAULT

Applicable to: ALL

L2 Crew awareness.

ENG 1(2) REVERSE UNLOCKED

Applicable to: ALL

L2 The FADEC may automatically set the engine at idle.

L1 ■ **On ground:**

L2 *Note: On V2527 or V2530 engines, disregard the warning at landing, if momentarily displayed during reverser stowing.*

L1 ENG 1(2) AT IDLE

L2 *Only displayed, if engine is automatically set at idle.*

L1 THR LEVER (AFFECTED ENGINE IF IDLE NOT AUTOMATICALLY SELECTED)..... IDLE
ENG MASTER (AFFECTED ENGINE).....OFF

■ **In flight:**

LAND ASAP (AMBER)

ENG 1(2) AT IDLE

L2 *Only displayed, if the engine is automatically set at idle.*

L1 THR LEVER (AFFECTED ENGINE)..... IDLE
MAX SPEED..... 300/.78

● **IF BUFFET:**

L2 The warning alone, without buffet or vibration, may be a false warning.

L1 MAX SPEED ..... 240 KT
ENG MASTER (AFFECTED ENGINE)..... OFF

● **If reverser is actually deployed:**

RUD TRIM ..... FULL R (L)

CONTROL HDG WITH ROLL

L12

ASSOCIATED PROCEDURES

ENG 1(2) SHUT DOWN

Apply the ENG SHUT DOWN procedure (Refer to PRO-ABN-70-I ENG 1(2) SHUT DOWN).

ENG 1(2) REVERSER FAULT

Applicable to: ALL

- **If reverser position fault with reverser pressurized:**

LAND ASAP (AMBER)

ENG 1(2) AT IDLE
THR LEVER 1(2)..... IDLE

STATUS

INOP SYS
REVERSER 1(2)

ENG 1(2) SENSOR FAULT

Applicable to: ALL

L2 N1 or N2 or fuel metering valve position disagree between both EEC channels or Loss of N1 or N2 sensors.

L1 AVOID RAPID THR CHANGES

- **On ground:**

THR LEVER (AFFECTED)..... IDLE
ENG MASTER (AFFECTED).....OFF

AVOID RAPID THR CHANGES.

ENG 1(2) SHUT DOWN

Applicable to: B-HTD, B-HTE, B-HTF

L2 This alert triggers when ENG 1(2) is shut down

L1 **LAND ASAP (AMBER)**

- **If wing Anti-ice ON:**
  PACK (AFFECTED SIDE) ..... OFF

L2 *One pack must be closed when wing anti-ice is in use due to precooler performance.*

L1 X BLEED (IF ENG FIRE PB NOT PUSHED)..... OPEN

L2 *X BLEED pb-sw must be opened to have symmetrical wing anti-icing.*

L1 ENG MODE SEL..... IGN

L2 *Continuous ignition is selected, in order to protect the remaining engine.*

L1 - **IF NO FUEL LEAK:**
  IMBALANCE..... MONITOR

TCAS MODE SEL ..... TA

- **If REV unlocked:**
  - **IF BUFFET:**
    MAX SPEED ..... 240 KT
- **If ENG FIRE pb-sw pushed:**
  XBLEED ..... SHUT
  WING ANTI ICE..... OFF
  AVOID ICING CONDITIONS

SECONDARY FAILURES

* HYD
* ELEC
* AIR BLEED

L2 *Note:* *In some conditions, with full asymmetric power, the aircraft may be control-limited before reaching the protection system limit. Therefore, in extreme conditions, where low speed may be advantageous (GPWS, WINDSHEAR, etc.), reduce speed with care below VLS and respect the minimum control speed.*

Continued on the following page

ENG 1(2) SHUT DOWN (Cont'd)

L12
2

STATUS

INOP SYS

- **If ENG 1(2) FIRE pb-sw pushed:**
  AVOID ICING CONDITIONS
  - **IF SEVERE ICE ACCRETION**
    MIN SPD..... VLS+10/G DOT
    MANEUVER WITH CARE

  LDG DIST PROC..... APPLY

- **If REV unlocked:**
  MAX SPEED..... 300/0.78

CAT 3 DUAL
ENG 1(2) BLEED
PACK 1(2)
MAIN GALLEY
GEN 1(2)
G ENG 1 PUMP or
Y ENG 2 PUMP
WING A. ICE (1)
AFT CRG HEAT

APPR PROC

■ **4 doors not stowed (CFM) or reverser deployed (IAE/PW):**

- **IF BUFFET:**
  FOR LDG.....USE FLAP 1
  This line is replaced by "FOR LDG : USE FLAP 1" when CONF 1 is selected, as a reminder.
  APPR SPD.....VREF + 55 KT
  RUD TRIM.....5 DEG R(L)
  When committed to land, set 5 ° rudder trim towards live engine.
  A/THR.....OFF
  GPWS FLAP MODE..... OFF

- **WHEN LDG ASSURED:**
  L/G.....DOWN

- **AT 800 FT AGL:**
  TARGET SPD.....VREF + 40 KT
  LDG DIST PROC.....APPLY

Continued on the following page

ENG 1(2) SHUT DOWN (Cont'd)

■ **1, 2, or 3 doors not stowed (CFM), or reverse detected unlocked (IAE/PW):**

● **IF BUFFET:**

FOR LDG.....USE FLAP 3

This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.

GPWS LDG FLAP 3..... ON
APPR SPD.....VREF + 10 KT
LDG DIST PROC.....APPLY

● **If WING A/ICE off and ENG 1(2) FIRE pb-sw not pressed:**

● **IF PERF PERMITS:**

X BLEED..... OPEN

If no obstacle constraint exists, open the XBLEED, and decrease the single engine gross ceiling by1 200 ft (Refer to PER-OEI-ALT-10 GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS).

ECON FLOW.....ON
AFT CRG HOT AIR ◁ ..... OFF

The ECON FLOW must be selected ON, and the aft cargo heat ◁ must be selected OFF, due to precooler performance.

● **IF NO ENG 1(2) DAMAGE:**

CONSIDER ENG 1 (2) RELIGHT

CAT 3 SINGLE ONLY
ONE PACK ONLY IF WAI ON
See [2]

(1) *(if affected ENG FIRE pb-sw pushed)*

(2) Note: - *If available, the APU may be started and the APU GEN used*
- *If the ENG 1 FIRE pb-sw is pushed, APU bleed must not be used.*

Continued on the following page

ENG 1(2) SHUT DOWN (Cont'd)

If ENG 2 FIRE pb-sw is pushed, APU bleed may be used, provided the X BLEED rotary selector is set at SHUT.

- *After landing, the Fuel Used value of the engine, shutdown in flight, becomes incorrect.*

ENG 1(2) SHUT DOWN

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ

L2 This alert triggers when ENG 1(2) is shut down

L1 **LAND ASAP (AMBER)**

- **If wing Anti-ice ON:**
  PACK (AFFECTED SIDE) ..... OFF

L2 *One pack must be closed when wing anti-ice is in use due to precooler performance.*

L1 X BLEED (IF ENG FIRE PB NOT PUSHED)..... OPEN

L2 *X BLEED pb-sw must be opened to have symmetrical wing anti-icing.*

L1 ENG MODE SEL..... IGN

L2 *Continuous ignition is selected, in order to protect the remaining engine.*

L1 - **IF NO FUEL LEAK:**
  IMBALANCE..... MONITOR

TCAS MODE SEL ..... TA

- **If REV unlocked:**
  - **IF BUFFET:**
    MAX SPEED ..... 240 KT
- **If ENG FIRE pb-sw pushed:**
  XBLEED ..... SHUT
  WING ANTI ICE..... OFF
  AVOID ICING CONDITIONS

SECONDARY FAILURES

* HYD
* ELEC
* AIR BLEED

L2 *Note:* *In some conditions, with full asymmetric power, the aircraft may be control-limited before reaching the protection system limit. Therefore, in extreme conditions, where low speed may be advantageous (GPWS, WINDSHEAR, etc.), reduce speed with care below VLS and respect the minimum control speed.*

Continued on the following page

ENG 1(2) SHUT DOWN (Cont'd)

L12
3

STATUS

INOP SYS

- **If ENG 1(2) FIRE pb-sw pushed:**
  AVOID ICING CONDITIONS
  - **IF SEVERE ICE ACCRETION:**
    MIN SPD.....VLS + 10/G DOT
    MANEUVER WITH CARE

  LDG DIST PROC..... APPLY
- **If REV unlocked:**
  MAX SPEED..... 300/0.78

CAT 3 DUAL
ENG 1(2) BLEED
PACK 1(2)
MAIN GALLEY
GEN 1(2)
G ENG 1 PUMP or
Y ENG 2 PUMP
WING A. ICE (1)
AFT CRG HEAT

APPR PROC

■ **4 doors not stowed (CFM) or reverser deployed (IAE/PW):**

- **IF BUFFET:**
  FOR LDG.....USE FLAP 1
  This line is replaced by "FOR LDG : USE FLAP 1" when CONF 1 is selected, as a reminder.
  APPR SPD.....VREF + 55 KT
  RUD TRIM.....5 DEG R(L)
  When committed to land, set 5 ° rudder trim towards live engine.
  A/THR..... OFF
  GPWS FLAP MODE..... OFF
- **WHEN LDG ASSURED:**
  L/G.....DOWN
- **AT 800 FT AGL:**
  TARGET SPD.....VREF + 40 KT
  LDG DIST PROC.....APPLY

Continued on the following page

ENG 1(2) SHUT DOWN (Cont'd)

■ **1, 2, or 3 doors not stowed (CFM), or reverse detected unlocked (IAE/PW):**

● **IF BUFFET:**
FOR LDG.....USE FLAP 3
This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
GPWS LDG FLAP 3..... ON
APPR SPD.....VREF + 10 KT
LDG DIST PROC.....APPLY

● **If WING A/ICE off and ENG 1(2) FIRE pb-sw not pressed:**

● **IF PERF PERMITS:**
X BLEED..... OPEN
If no obstacle constraint exists, open the XBLEED, and decrease the single engine gross ceiling by1 200 ft (Refer to PER-OEI-ALT-10 GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS).

● **IF NO ENG 1(2) DAMAGE:**
CONSIDER ENG 1(2) RELIGHT

CAT 3 SINGLE ONLY
ONE PACK ONLY IF WAI ON
See [2]

[1] *(if affected ENG FIRE pb-sw pushed)*

[2]
Note: - *If available, the APU may be started and the APU GEN used*
- *If the ENG 1 FIRE pb-sw is pushed, APU bleed must not be used. If ENG 2 FIRE pb-sw is pushed, APU bleed may be used, provided the X BLEED rotary selector is set at SHUT.*
- *After landing, the Fuel Used value of the engine, shutdown in flight, becomes incorrect.*

ENG 1(2) SHUT DOWN

Applicable to: B-HTG, B-HTH, B-HTI

L2 This alert triggers when ENG 1(2) is shut down

L1 **LAND ASAP (AMBER)**

- **If wing Anti-ice ON:**
  - **If Elec Emer Config:**
    PACK 1 ..... OFF

L2 *In Emer Elec, only Pack 1 pb-sw can be controlled off.*

L1
  - **If not Elec Emer Config:**
    PACK (AFFECTED SIDE) ..... OFF

L2 *One pack must be closed when wing anti-ice is in use due to precooler performance.*

L1 X BLEED (IF ENG FIRE PB NOT PUSHED) ..... OPEN

L2 *X BLEED pb-sw must be opened to have symmetrical wing anti-icing.*

L1 ENG MODE SEL ..... IGN

L2 *Continuous ignition is selected, in order to protect the remaining engine.*

L1
- **IF NO FUEL LEAK:**
  IMBALANCE ..... MONITOR

TCAS MODE SEL ..... TA

- **If REV unlocked:**
  - **IF BUFFET:**
    MAX SPEED ..... 240 KT

- **If ENG FIRE pb-sw pushed:**
  XBLEED ..... SHUT
  WING ANTI ICE ..... OFF
  AVOID ICING CONDITIONS

SECONDARY FAILURES

* HYD
* ELEC
* AIR BLEED

Continued on the following page

ENG 1(2) SHUT DOWN (Cont'd)

L2 *Note:* *In some conditions, with full asymmetric power, the aircraft may be control-limited before reaching the protection system limit. Therefore, in extreme conditions, where low speed may be advantageous (GPWS, WINDSHEAR, etc.), reduce speed with care below VLS and respect the minimum control speed.*

Continued on the following page

ENG 1(2) SHUT DOWN (Cont'd)

L12
4

STATUS

INOP SYS

- **If ENG 1(2) FIRE pb-sw pushed:**
  AVOID ICING CONDITIONS
  - **IF SEVERE ICE ACCRETION**
    MIN SPD..... VLS+10/G DOT
    MANEUVER WITH CARE

  LDG DIST PROC..... APPLY

- **If REV unlocked:**
  MAX SPEED..... 300/0.78

APPR PROC

- **4 doors not stowed (CFM) or reverser deployed (IAE/PW):**
  - **IF BUFFET:**
    FOR LDG.....USE FLAP 1
    This line is replaced by "FOR LDG : USE FLAP 1" when CONF 1 is selected, as a reminder.
    APPR SPD.....VREF + 55 KT
    RUD TRIM.....5 DEG R(L)
    When committed to land, set 5 ° rudder trim towards live engine.
    A/THR.....OFF
    GPWS FLAP MODE..... OFF
  - **WHEN LDG ASSURED:**
    L/G.....DOWN
  - **AT 800 FT AGL:**
    TARGET SPD.....VREF + 40 KT
    LDG DIST PROC.....APPLY

CAT 3 DUAL
ENG 1(2) BLEED
PACK 1(2)
MAIN GALLEY
GEN 1(2)
G ENG 1 PUMP or
Y ENG 2 PUMP
WING A. ICE (1)
AFT CRG HEAT

Continued on the following page

ENG 1(2) SHUT DOWN (Cont'd)

■ **1, 2, or 3 doors not stowed (CFM), or reverse detected unlocked (IAE/PW):**

● **IF BUFFET:**

FOR LDG.....USE FLAP 3

This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.

GPWS LDG FLAP 3..... ON
APPR SPD.....VREF + 10 KT
LDG DIST PROC.....APPLY

● **If WING A/ICE off and ENG 1(2) FIRE pb-sw not pressed:**

● **IF PERF PERMITS:**

X BLEED..... OPEN

If no obstacle constraint exists, open the XBLEED, and decrease the single engine gross ceiling by1 200 ft (Refer to PER-OEI-ALT-10 GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS).

ECON FLOW.....ON
AFT CRG HOT AIR ◁ ..... OFF

The ECON FLOW must be selected ON, and the aft cargo heat ◁ must be selected OFF, due to precooler performance.

● **IF NO ENG 1(2) DAMAGE:**

CONSIDER ENG 1 (2) RELIGHT

CAT 3 SINGLE ONLY
ONE PACK ONLY IF WAI ON
See [2]

(1) *(if affected ENG FIRE pb-sw pushed)*

(2) Note: - *If available, the APU may be started and the APU GEN used*
- *If the ENG 1 FIRE pb-sw is pushed, APU bleed must not be used.*

Continued on the following page

ENG 1(2) SHUT DOWN (Cont'd)

If ENG 2 FIRE pb-sw is pushed, APU bleed may be used, provided the X BLEED rotary selector is set at SHUT.

- *After landing, the Fuel Used value of the engine, shutdown in flight, becomes incorrect.*

ENG 1(2) SHUT DOWN

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 This alert triggers when ENG 1(2) is shut down

L1 **LAND ASAP (AMBER)**

- **If wing Anti-ice ON:**
  - **If Elec Emer Config:**
    PACK 1 ..... OFF

L2 *In Emer Elec, only Pack 1 pb-sw can be controlled off.*

L1
  - **If not Elec Emer Config:**
    PACK (AFFECTED SIDE) ..... OFF

L2 *One pack must be closed when wing anti-ice is in use due to precooler performance.*

L1 X BLEED (IF ENG FIRE PB NOT PUSHED) ..... OPEN

L2 *X BLEED pb-sw must be opened to have symmetrical wing anti-icing.*

L1 ENG MODE SEL ..... IGN

L2 *Continuous ignition is selected, in order to protect the remaining engine.*

L1
- **IF NO FUEL LEAK:**
  IMBALANCE ..... MONITOR

TCAS MODE SEL ..... TA

- **If REV unlocked:**
  - **IF BUFFET:**
    MAX SPEED ..... 240 KT
- **If ENG FIRE pb-sw pushed:**
  XBLEED ..... SHUT
  WING ANTI ICE ..... OFF
  AVOID ICING CONDITIONS

SECONDARY FAILURES

* HYD
* ELEC
* AIR BLEED

Continued on the following page

ENG 1(2) SHUT DOWN (Cont'd)

L2 *Note:* *In some conditions, with full asymmetric power, the aircraft may be control-limited before reaching the protection system limit. Therefore, in extreme conditions, where low speed may be advantageous (GPWS, WINDSHEAR, etc.), reduce speed with care below VLS and respect the minimum control speed.*

Continued on the following page

ENG 1(2) SHUT DOWN (Cont'd)

L12

5

STATUS

INOP SYS

CAT 3 DUAL
ENG 1(2) BLEED
PACK 1(2)
MAIN GALLEY
GEN 1(2)
G ENG 1 PUMP or
Y ENG 2 PUMP
WING A. ICE (1)
AFT CRG HEAT

● **If ENG 1(2) FIRE pb-sw pushed:**

AVOID ICING CONDITIONS

● **IF SEVERE ICE ACCRETION:**

MIN SPD.....VLS + 10/G DOT

MANEUVER WITH CARE

LDG DIST PROC..... APPLY

● **If REV unlocked:**

MAX SPEED..... 300/0.78

APPR PROC

■ **4 doors not stowed (CFM) or reverser deployed (IAE/PW):**

● **IF BUFFET:**

FOR LDG.....USE FLAP 1

This line is replaced by "FOR LDG : USE FLAP 1" when CONF 1 is selected, as a reminder.

APPR SPD.....VREF + 55 KT

RUD TRIM.....5 DEG R(L)

When committed to land, set 5 ° rudder trim towards live engine.

A/THR.....OFF

GPWS FLAP MODE..... OFF

● **WHEN LDG ASSURED:**

L/G.....DOWN

● **AT 800 FT AGL:**

TARGET SPD.....VREF + 40 KT

LDG DIST PROC.....APPLY

Continued on the following page

ENG 1(2) SHUT DOWN (Cont'd)

■ **1, 2, or 3 doors not stowed (CFM), or reverse detected unlocked (IAE/PW):**

● **IF BUFFET:**
FOR LDG.....USE FLAP 3
This line is replaced by "FOR LDG : USE FLAP 3" when CONF 3 is selected, as a reminder.
GPWS LDG FLAP 3..... ON
APPR SPD.....VREF + 10 KT
LDG DIST PROC.....APPLY

● **If WING A/ICE off and ENG 1(2) FIRE pb-sw not pressed:**

● **IF PERF PERMITS:**
X BLEED..... OPEN
If no obstacle constraint exists, open the XBLEED, and decrease the single engine gross ceiling by1 200 ft (Refer to PER-OEI-ALT-10 GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS).

● **IF NO ENG 1(2) DAMAGE:**
CONSIDER ENG 1(2) RELIGHT

CAT 3 SINGLE ONLY
ONE PACK ONLY IF WAI ON
See [2]

(1) *(if affected ENG FIRE pb-sw pushed)*

(2)
Note: - *If available, the APU may be started and the APU GEN used*
- *If the ENG 1 FIRE pb-sw is pushed, APU bleed must not be used. If ENG 2 FIRE pb-sw is pushed, APU bleed may be used, provided the X BLEED rotary selector is set at SHUT.*
- *After landing, the Fuel Used value of the engine, shutdown in flight, becomes incorrect.*

ENG 1(2) STALL

Applicable to: ALL

L2 A stall may be indicated by varying degrees of abnormal engine noises, accompanied by flame from the engine exhaust (and possibly from the engine inlet in severe case), fluctuating performance parameters, sluggish or no throttle response, high EGT and/or a rapid EGT rise when thrust lever is advanced.

L1 ■ **On the ground:**
THR LEVER (AFFECTED ENGINE)..... IDLE
ENG MASTER (AFFECTED ENGINE).....OFF

■ **In flight:**
THR LEVER (AFFECTED ENGINE)..... IDLE
ENG PARAMETERS (AFFECTED ENGINE).....CHECK

■ **IF ABNORMAL:**
ENG MASTER (AFFECTED ENGINE)..... OFF

L12

ASSOCIATED PROCEDURES

ENG 1(2) SHUT DOWN

Apply the ENG SHUT DOWN procedure (Refer to PRO-ABN-70-I ENG 1(2) SHUT DOWN).
Engine restart at crew discretion.

■ **Normal:**
ENG A. ICE (AFFECTED ENGINE)..... ON
WING A. ICE.....ON

L2 *Operation of engine and wing anti ice will increase the stall margin, but EGT will increase accordingly.*

L1 THR LEVER (AFFECTED ENGINE).....SLOWLY ADVANCE

● **If a stall recurs:**
THR LEVER (AFFECTED ENGINE)..... REDUCE

L2 *Reduce thrust and operate below the stall threshold.*

L1 ● **If a stall does not recur:**

L2 Continue engine operation.

ENG 1(2) START FAULT

Applicable to: ALL

6 L2 ■ **ENG 1(2) IGNITION FAULT:**

The engine does not start within the 20 s (30 s in flight) that follow the ignition start.

■ **NO N1 ROTATION:**
or
STALL
or
EGT OVERLIMIT
or
HUNG START:

● **In flight:**
ENG MASTER (AFFECTED)..... OFF
Wait 30 s before attempting a new start (to drain the engine).

● **On ground (auto start):**

If the engine does not start or in case of detected stall, potential EGT overheat or hung start, the FADEC will immediately shut off fuel and turn off ignition. After any start attempt that is not successful, a dry crank automatically occurs. At the end of the dry crank sequence, the start valve is closed. The ECAM displays the following message:

AUTO CRANK IN PROGRESS.

● **When dry crank process is completed:**
ENG MASTER (AFFECTED).....OFF
Setting ENG MASTER to OFF confirms automatic start abort.
After the starter cools, and for any subsequent attempt to start the engine, the flight crew must perform a manual engine, or must report the "no start condition" to maintenance for appropriate action.

Note: With engine above idle, if EGT limit is exceeded ECAM requires to set engine master lever at OFF.

● **On ground (manual start):**
ENG MASTER (AFFECTED)..... OFF
MAN START (AFFECTED)..... OFF
MODE SEL.....CRANK
MAN START (AFFECTED).....ON

Continued on the following page

ENG 1(2) START FAULT (Cont'd)

Note: ECAM does not display the last two lines of the above procedure.
Dry crank the engine for 30 s. The start valve automatically reopens when N2 is below 10 %.
After the starter cools, and for any subsequent attempt to start the engine, the flight crew must perform a manual engine, or must report the "no start condition" to maintenance for appropriate action.

■ **LO START AIR PRESS:**
BLEED AIR SUPPLY..... CHECK

■ **THR LEVER NOT AT IDLE:**
THR LEVER..... IDLE

ENG 1(2) START VALVE FAULT

Applicable to: ALL

■ **START VALVE NOT CLOSED**

L2 Remove all bleed sources supplying the faulty start valve.

L1 APU BLEED (IF ENG 1 AFFECTED)..... OFF
X BLEED..... SHUT

L2 *If opposite engine is supplying, X-BLEED must be closed.*

L1 ● **In flight:**
ENG BLEED (AFFECTED SIDE).....OFF

● **On the ground:**
MAN START (IF MAN START PERFORMED).....OFF
ENG MASTER.....OFF

L2 *On the ground, consider application of "START VALVE MANUAL OPERATION" procedure.*

L1 ■ **START VALVE NOT OPEN**

● **If opposite engine running:**
X BLEED..... ON

● **If APU AVAIL below FL 200:**
APU BLEED..... ON

● **If UNSUCCESSFUL:**
MAN START (IF MAN START PERFORMED).....OFF
ENG MASTER (AFFECTED) (IF AUTO START PERFORMED).....OFF

L2 *MAN START procedure is useless since in both cases, the start valve is controlled by FADEC.*
On the ground, consider application of "START VALVE MANUAL OPERATION" procedure.

L1 ■ **EEC control of start valve failed:**

● **On the ground:**
START VALVE MAN ONLY

L2 *Start valve must be manually opened (Refer to PRO-SUP-70 Start Valve Manual Operation).*

L1 ● **In flight:**
WINDMILL START ONLY.

Continued on the following page

ENG 1(2) START VALVE FAULT (Cont'd)

L2 *Windmilling start only is available since EEC cannot control the start valve.*

STATUS

ENG 1(2) WINDMILL START ONLY.

ENG 1(2) SYSTEM FAULT

Applicable to: ALL

L2 Failure of internal engine bleed or failure of engine probe heat resulting in EGT increase.

L1 ■ **On ground:**
THR LEVER 1(2)..... IDLE
ENG MASTER 1(2).....OFF

■ **In flight:**
RISK OF HI EGT.

L2 *Continue normal operation.*

ENG 1(2) THR LEVER ABV IDLE

Applicable to: ALL

L2 This alert is triggered associated with the repetitive "RETARD-RETARD" synthetic voice at landing when:
- One thrust lever is above idle while the other thrust lever is in reverse detent,
- One thrust lever is above idle while the other thrust lever is at idle.

L1 THR LEVER (AFFECTED ENGINE).....IDLE

ENG 1(2) THR LEVER DISAGREE

Applicable to: ALL

L2 Both Thrust Lever Angle (TLA) sensors not in agreement on one engine.

L1 **LAND ASAP (AMBER)**

■ **On ground (if both TLA not at TOGA or FLX/MCT or if only one TLA is at TOGA or FLX/MCT and the other is below IDLE):**
ENG (AFFECTED) IDLE POWER ONLY.

L2 *In that situation, the FADEC automatically selects IDLE.*

L1 THR LEVER (AFFECTED)..... IDLE

■ **During take-off (if both TLA are above IDLE):**
ENG (AFFECTED) TO, FLX, OR DRT TO

L2 *If both TLA are above IDLE, the FADEC automatically selects TO, FLX TO, or DRT TO thrust until thrust reduction, after which the maximum available thrust is CLB.*

L1 ■ **In cruise (with slats retracted):**
AVAIL MAX POWER : CLB

L2 *In flight, if the failure occurs while the thrust lever is between idle and MCT, and if the slats are not extended, (or when MN >0.55, if the onside EIU is failed) the FADEC selects the larger TLA power limited to CLB.*

L1 A/THR (IF ENGAGED) ..... KEEP ON
A/THR (IF NOT ENGAGED AND IF SLATS ARE NOT EXTENDED) ..... ON

L2 *With A/THR engaged, thrust is automatically managed between IDLE and higher TLA position.*

L1 ■ **In approach (with slats extended):**
ENG (AFFECTED) AT IDLE (WHEN SLATS ARE EXTENDED FOR APPROACH)..

L2 *If TLA at, or below, MCT and if the slats are extended for approach, (or when MN <0.47, if the onside EIU is failed).*

L1 THR LEVER (AFFECTED)..... IDLE

Continued on the following page

ENG 1(2) THR LEVER DISAGREE (Cont'd)

L12

STATUS	INOP SYS
● **If TLA at, or below, MCT** ● **WHEN SLATS OUT:** (Displayed, if slats not extended), or ● **WHEN MN < 0.47:** (Displayed, if the onside EIU is failed) ENG (AFFECTED) AT IDLE *For any case of thrust lever disagree (TO, FLEX, or between Idle and MCT), the FADEC will command idle thrust for the approach when slats are extended (or when the Mach number is less than 0.47, if associated EIU is failed). It is independent of the autothrust condition. The affected engine's thrust remains definitively at idle, even for go-around.*	ENG 1(2) THR

ENG (affected) AVAIL MAX PWR: CLB
ON GND ENG (affected) MAX PWR: IDLE.

ENG 1(2) THR LEVER FAULT

Applicable to: ALL

L2 No validated thrust lever angle for one engine thrust lever.

L1 **LAND ASAP (AMBER)**

■ **On the ground:**

ENG (AFFECTED) IDLE POWER ONLY.

L2 *Idle power is automatically selected by FADEC.*
If associated thrust reverser is already deployed, FADEC commands restow.

L1 THR LEVER (AFFECTED)..... IDLE

■ **In flight:**

L2 If the selected thrust lever position at the time of fault detection is:
TO or FLEX: FADEC freezes TO or flex TO thrust until slat retraction. At slat retraction it will select MCT thrust.
Between IDLE and MCT: in manual thrust setting mode, engine rating increases and freezes at MCT or IDLE with slats extended (or MN <0.47 if the FADEC no longer receives the slats position due to EIU failure). It is possible to activate autothrust. If selected, autothrust mode will manage thrust between idle and MCT.

L1 ENG (AFFECTED) AT IDLE

L2 *For any case of thrust lever fault (TO, FLEX or between IDLE and MCT) the FADEC will command idle thrust for the approach when slats are extended (or when MN <0.47 if associated EIU is failed). It is independant of the autothrust condition. Thrust of affected engine remains definitively at idle even for go around.*

L1 THR LEVER (AFFECTED) ..... IDLE

L2 *When slats are extended or MN <0.47, if on side EIU is failed.*

L1 ■ **A/THR engaged:**

A/THR..... KEEP ON

■ **A/THR not engaged:**

ENG (AFFECTED) HI PWR IN MAN THR.

L2 *Inhibited when the FADEC commands the affected engine at IDLE*

L1 ● **BEFORE SLATS IN:**

A/THR ..... ON

L2 *HI POWER ONLY (if thrust lever angle failed in TO or flex position).*

Continued on the following page

ENG 1(2) THR LEVER FAULT (Cont'd)

L12

STATUS	INOP SYS
● **WHEN SLATS OUT:** (Displayed if slats not extended) or, ● **WHEN MN < 0.47:** (Displayed if the onside EIU is failed). ENG 1(2) AT IDLE	REVERSER 1(2) ENG 1(2) THR

ENG DUAL FAILURE

Applicable to: ALL 321

L2 This warning inhibits the ELEC EMER CONFIG warning, and provides the flight crew with the immediate actions to take in the case of a dual engine failure. This procedure then directs the flight crew to apply the applicable QRH procedure, depending on if there is fuel or not.

When applying the QRH ENG DUAL FAILURE paper procedure:
- If one or more engines are recovered, apply the corresponding ECAM procedure instead
- If no engines are recovered, continue to apply the QRH ENG DUAL FAILURE paper procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.

7 L1 **LAND ASAP**

EMER ELEC PWR (IF EMER GEN NOT IN LINE).....MAN ON

L2 *Pressing EMER ELEC PWR MAN ON pb allows extension of RAT and emergency generator coupling.*

L1 THR LEVERS.....IDLE

FAC 1.....OFF THEN ON

L2 *Resetting FAC 1 enables the recovery of characteristics speed displayed on the PFD.*
Resetting FAC 1 also enables rudder trim recovery, even if no indication is available.
When the hydraulic power is lost, the right aileron is lost, and is in the upfloat position.
Rudder trim may be used to compensate for this upfloating aileron.

L1 ■ **IF NO FUEL:**

OPT SPD.....240 KT/GREEN DOT

L2 *If there is no fuel remaining, the optimum speed is the green dot speed.*
Initially fly 240 kt then refer to the paper procedure to get the accurate green dot speed.

L1 ENG/NO FUEL PROC.....APPLY

L2 *Refer to FCOM - QRH ABN 70 ENG DUAL FAILURE - NO FUEL REMAINING.*

L1 ■ **IF FUEL REMAINS:**

ENG MODE SEL.....IGN

OPT RELIGHT SPD.....280 KT

L2 *If there is fuel remaining, the optimum speed is the optimum relight speed.*

Note: In the case of an "ENG DUAL FAILURE"during high power operations (i.e. climb, cruise), it is mandatory to fly at or above the optimum relight speed in order to prevent engine core lock.

Continued on the following page

ENG DUAL FAILURE (Cont'd)

The ECAM provides reference to an envelope speed. In case of speed indication failure (volcanic ash), pitch attitude for optimum relight is provided in the paper procedure.

L1 ENG/FUEL PROC..... APPLY

L2 *Refer to FCOM - QRH ABN 70 ENG DUAL FAILURE - FUEL REMAINING.*

Continued on the following page

ENG DUAL FAILURE (Cont'd)

L12
8

STATUS

MIN RAT SPEED..... 140 KT
MAX SPEED 320/0.77
MAX BRK PR..... 1000 PSI
MANEUVER WITH CARE
FUEL GRVTY FEED
AVOID NEGATIVE G FACTOR

INOP SYS

See below

APPR PROC

- **IF HYD NOT RECOVERED:**
  FOR LDG..... USE FLAP 3
- **WHEN CONF 3 AND VAPP:**
  L/G ..... GRVTY EXTN
  (Refer to PRO-ABN-32 L/G GRAVITY EXTENSION). Being stabilized at VAPP before selecting the gear down enables the aircraft to be trimmed for approach.
  APPR SPD..... VREF +30 KT
  Approach speed must be increased, due to the loss of flaps.

LDG DIST PROC..... APPLY

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
See (1)
BRK Y ACCU PR ONLY
See (2)
SLATS SLOW

INOP SYS

G+Y HYD	F/CTL PROT	STABILIZER

Continued on the following page

ENG DUAL FAILURE (Cont'd)

R AIL	REVERSER 1+2	ADR 2+3
IR 2+3	RA 1+2	SPLR 1+2+4+5
ELAC 2	SEC 2+3	FLAPS
YAW DAMPER	A/CALL OUT	AP 1+2
A/THR	FUEL PUMPS	ANTI SKID
N/W. STEER	AUTO BRK	CAT 2
L/G RETRACT	CAB PR 1+2	PACK 1+2

(1) *At landing gear extension, control reverts to direct law in pitch as well as in roll (Refer to PRO-ABN-27 F/CTL DIRECT LAW).*

(2) *7 full brake applications are available.*

ENG DUAL FAILURE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

L2 This warning inhibits the ELEC EMER CONFIG warning, and provides the flight crew with the immediate actions to take in the case of a dual engine failure. This procedure then directs the flight crew to apply the applicable QRH procedure, depending on if there is fuel or not.

When applying the QRH ENG DUAL FAILURE paper procedure:
- If one or more engines are recovered, apply the corresponding ECAM procedure instead
- If no engines are recovered, continue to apply the QRH ENG DUAL FAILURE paper procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.

9 L1 **LAND ASAP**

EMER ELEC PWR (IF EMER GEN NOT IN LINE).....MAN ON

L2 *Pressing EMER ELEC PWR MAN ON pb allows extension of RAT and emergency generator coupling.*

L1 THR LEVERS.....IDLE

FAC 1.....OFF THEN ON

L2 *Resetting FAC 1 enables the recovery of characteristics speed displayed on the PFD.*
Resetting FAC 1 also enables rudder trim recovery, even if no indication is available.
When the hydraulic power is lost, the right aileron is lost, and is in the upfloat position.
Rudder trim may be used to compensate for this upfloating aileron.

L1 ■ **IF NO FUEL:**

OPT SPD.....220 KT/GREEN DOT

L2 *If there is no fuel remaining, the optimum speed is the green dot speed.*
Initially fly 220 kt then refer to the paper procedure to get the accurate green dot speed.

L1 ENG/NO FUEL PROC.....APPLY

L2 *Refer to FCOM - QRH ABN 70 ENG DUAL FAILURE - NO FUEL REMAINING.*

L1 ■ **IF FUEL REMAINS:**

ENG MODE SEL.....IGN

OPT RELIGHT SPD.....280 KT

L2 *If there is fuel remaining, the optimum speed is the optimum relight speed.*

Note: In the case of an "ENG DUAL FAILURE"during high power operations (i.e. climb, cruise), it is mandatory to fly at or above the optimum relight speed in order to prevent engine core lock.

Continued on the following page

ENG DUAL FAILURE (Cont'd)

The ECAM provides reference to an envelope speed. In case of speed indication failure (volcanic ash), pitch attitude for optimum relight is provided in the paper procedure.

L1 ENG/FUEL PROC..... APPLY

L2 *Refer to FCOM - QRH ABN 70 ENG DUAL FAILURE - FUEL REMAINING.*

Continued on the following page

ENG DUAL FAILURE (Cont'd)

L12
10

STATUS

MIN RAT SPEED..... 140 KT
MAX SPEED 320/0.77
MAX BRK PR..... 1000 PSI
MANEUVER WITH CARE
FUEL GRVTY FEED
AVOID NEGATIVE G FACTOR

INOP SYS

See below

APPR PROC

- **IF HYD NOT RECOVERED:**
  FOR LDG..... USE FLAP 3
- **WHEN CONF 3 AND VAPP:**
  L/G ..... GRVTY EXTN
  (Refer to PRO-ABN-32 L/G GRAVITY EXTENSION). Being stabilized at VAPP before selecting the gear down enables the aircraft to be trimmed for approach.
  APPR SPD..... VREF +25 KT
  Approach speed must be increased, due to the loss of flaps.

LDG DIST PROC..... APPLY

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
See (1)
BAT ONLY
BRK Y ACCU PR ONLY
See (2)
SLATS SLOW

INOP SYS

Continued on the following page

ENG DUAL FAILURE (Cont'd)

G+Y HYD	F/CTL PROT	STABILIZER
R AIL	REVERSER 1+2	ADR 2+3
IR 2+3	RA 1+2	SPLR 1+2+4+5
ELAC 2	SEC 2+3	FLAPS
YAW DAMPER	A/CALL OUT	AP 1+2
A/THR	FUEL PUMPS	ANTI SKID
N/W. STEER	AUTO BRK	CAT 2
L/G RETRACT	CAB PR 1+2	PACK 1+2

(1) *At landing gear extension, control reverts to direct law in pitch as well as in roll (Refer to PRO-ABN-27 F/CTL DIRECT LAW).*

(2) *7 full brake applications are available.*

ENG DUAL FAILURE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

L2 This warning inhibits the ELEC EMER CONFIG warning, and provides the flight crew with the immediate actions to take in the case of a dual engine failure. This procedure then directs the flight crew to apply the applicable QRH procedure, depending on if there is fuel or not.

When applying the QRH ENG DUAL FAILURE paper procedure:
- If one or more engines are recovered, apply the corresponding ECAM procedure instead
- If no engines are recovered, continue to apply the QRH ENG DUAL FAILURE paper procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.

11 L1 **LAND ASAP**

EMER ELEC PWR (IF EMER GEN NOT IN LINE).....MAN ON

L2 *Pressing EMER ELEC PWR MAN ON pb allows extension of RAT and emergency generator coupling.*

L1 THR LEVERS.....IDLE

FAC 1.....OFF THEN ON

L2 *Resetting FAC 1 enables the recovery of characteristics speed displayed on the PFD.*
Resetting FAC 1 also enables rudder trim recovery, even if no indication is available.
When the hydraulic power is lost, the right aileron is lost, and is in the upfloat position.
Rudder trim may be used to compensate for this upfloating aileron.

L1 ■ **IF NO FUEL:**

OPT SPD.....220 KT/GREEN DOT

L2 *If there is no fuel remaining, the optimum speed is the green dot speed.*
Initially fly 220 kt then refer to the paper procedure to get the accurate green dot speed.

L1 ENG/NO FUEL PROC.....APPLY

L2 *Refer to FCOM - QRH ABN 70 ENG DUAL FAILURE - NO FUEL REMAINING.*

L1 ■ **IF FUEL REMAINS:**

ENG MODE SEL.....IGN

OPT RELIGHT SPD.....280 KT

L2 *If there is fuel remaining, the optimum speed is the optimum relight speed.*

Note: In the case of an "ENG DUAL FAILURE"during high power operations (i.e. climb, cruise), it is mandatory to fly at or above the optimum relight speed in order to prevent engine core lock.

Continued on the following page

ENG DUAL FAILURE (Cont'd)

The ECAM provides reference to an envelope speed. In case of speed indication failure (volcanic ash), pitch attitude for optimum relight is provided in the paper procedure.

L1 ENG/FUEL PROC..... APPLY

L2 *Refer to FCOM - QRH ABN 70 ENG DUAL FAILURE - FUEL REMAINING.*

Continued on the following page

ENG DUAL FAILURE (Cont'd)

L12
12

STATUS

MIN RAT SPEED..... 140 KT
MAX SPEED 320/0.77
MAX BRK PR..... 1000 PSI
MANEUVER WITH CARE
FUEL GRVTY FEED
AVOID NEGATIVE G FACTOR

INOP SYS

See below

APPR PROC

- **IF HYD NOT RECOVERED:**
  FOR LDG..... USE FLAP 3
- **WHEN CONF 3 AND VAPP:**
  L/G ..... GRVTY EXTN
  (Refer to PRO-ABN-32 L/G GRAVITY EXTENSION). Being stabilized at VAPP before selecting the gear down enables the aircraft to be trimmed for approach.
  APPR SPD..... VREF +25 KT
  Approach speed must be increased, due to the loss of flaps.

LDG DIST PROC..... APPLY

ALTN LAW: PROT LOST
WHEN L/G DN: DIRECT LAW
See (1)
BRK Y ACCU PR ONLY
See (2)
SLATS SLOW

INOP SYS

G+Y HYD	F/CTL PROT	STABILIZER

Continued on the following page

ENG DUAL FAILURE (Cont'd)

R AIL	REVERSER 1+2	ADR 2+3
IR 2+3	RA 1+2	SPLR 1+2+4+5
ELAC 2	SEC 2+3	FLAPS
YAW DAMPER	A/CALL OUT	AP 1+2
A/THR	FUEL PUMPS	ANTI SKID
N/W. STEER	AUTO BRK	CAT 2
L/G RETRACT	CAB PR 1+2	PACK 1+2

(1) *At landing gear extension, control reverts to direct law in pitch as well as in roll (Refer to PRO-ABN-27 F/CTL DIRECT LAW).*

(2) *7 full brake applications are available.*

ENG DUAL FAILURE - FUEL REMAINING

Applicable to: B-HTD, B-HTE, B-HTF

As long as none of the engines recover, the flight crew must apply this paper procedure when required by the ECAM ENG DUAL FAILURE procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.

LAND ASAP

OPTIMUM RELIGHT SPD.....280 KT

In the case of a speed indication failure (volcanic ash), Pitch attitude for optimum relight speed is:

WEIGHT	*PITCH (°)*
At or below 60 000 kg/132 000 lb	*-2.5*
70 000 kg/154 000 lb	*-1.5*
80 000 kg/176 000 lb	*-0.5*

At 280 kt, the aircraft can fly up to about 2.4 nm per 1 000 ft (with no wind).

LANDING STRATEGY..... DETERMINE

Determine whether a runway can be reached, or the most appropriate place for a forced landing/ditching.

VHF1/HF1 ◁ /ATC1.....USE

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify air traffic control of the nature of the emergency, and state intentions. Switch to code A7700, or transmit a distress message on one of the following frequencies: VHF frequency 121.5 MHz, HF 2 182 kHz or 8 364 kHz.

- **IF NO RELIGHT AFTER 30 SEC:**

  ENG MASTERS..... OFF 30 S/ON

  Unassisted start attempts can be repeated until successful, or until APU bleed is available.

- **IF UNSUCCESSFUL:**

  CREW OXY MASKS (Above FL 100).....ON

  Cabin altitude will increase, due to the lack of engine bleed: The EXCESS CAB ALT warning could be triggered. Depending on the situation, to gain gliding distance, the flight crew may disregard the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.

  APU (IF AVAIL).....START

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

If APU is available, APU may be started when below FL 250 and APU BLEED may be used for engine start below FL 200 if speed ≥ 200 kt, or below FL 150 if speed is between 160 kt and 200 kt, or below FL 100 if speed ≤ 160 kt.

WING ANTI ICE.....OFF
APU BLEED.....ON

● **IN SEQUENCE:**
ENG MASTERS (all non running engines).....OFF

After 30 s

ENG MASTERS (one at a time).....ON

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

● **When APU bleed is available or if engine restart is definitively considered impossible:**

OPTIMUM SPEED.....REFER TO TABLE BELOW

Weight (1 000 kg)	*At or below FL 200*	*FL 300*	*FL 400*
94	*251*	*261*	*271*
92	*248*	*258*	*268*
88	*242*	*252*	*262*
86	*239*	*249*	*259*
84	*236*	*246*	*256*
82	*233*	*243*	*253*
80	*230*	*240*	*250*
78	*227*	*237*	*247*
76	*224*	*234*	*244*
74	*221*	*231*	*241*
72	*218*	*228*	*238*
70	*215*	*225*	*235*
68	*212*	*222*	*232*
66	*209*	*219*	*229*
64	*206*	*216*	*226*
62	*203*	*213*	*223*
60	*200*	*210*	*220*
58	*197*	*207*	*217*
56	*194*	*204*	*214*
54	*191*	*201*	*211*
52	*188*	*198*	*208*

GREEN DOT SPEED WITH ALL ENGINES INOPERATIVE (KNOTS)

At green dot speed, the aircraft can fly up to approximately 2.5 nm per 1 000 ft (with no wind). Average rate of descent is approximately 1 700 ft/min.

CABIN AND COCKPIT.....PREPARE

- *Loose equipment secured.*
- *Survival equipments prepared.*
- *Belts and shoulder harnesses locked.*

CABIN SIGNS.....ON

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

GALLEY..... OFF

USE RUDDER WITH CARE

As hydraulic power is only available from the RAT, avoid large and rapid rudder deflection.

● **WHEN BELOW FL 150:**

RAM AIR.....ON

COMMON ACTIONS FOR THE APPROACH

Note: Final descent slope, when configured (CONF 3; L/G DOWN) will be approximately 1.1 nm per 1 000 ft (with no wind).

BARO..... SET

CREW MASKS/OXY SUPPLY (below FL 100).....OFF

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

IF FORCED LANDING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED.....160 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF + 30 kt/160 kt:

Weight (1 000 kg)	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*80*	*84*	*88*	*92*	*94*
VAPP	*160*	*160*	*160*	*160*	*163*	*167*	*171*	*174*	*178*	*181*	*185*	*187*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for landing (CONF 3 ; L/G DOWN):**
  - **When in CONF 3 and VAPP:**

    GRAVITY GEAR EXTN handcrank..... PULL AND TURN

    Flight controls revert to direct law at landing gear extension. Wait for CONF 3 and VAPP before extending the landing gear to enable the aircraft to be trimmed for approach. Disregard "USE MAN PITCH TRIM" on the PFD, because the stabilizer is frozen in the position where it was at, when the windmilling was insufficient to provide hydraulic power.

  - **When L/G downlocked**

    L/G lever.....DOWN

    APPROACH SPEED.....ADJUST

    Adjust the speed to the determined VAPP. Nevertheless, to reach the landing field/runway, the approach speed may be adjusted up to 215 kt (max speed with slats extended).

  GND SPLR.....ARM

  MAX BRK PR..... 1 000 PSI

AT 2 000 FT AGL

CABIN.....NOTIFY FOR LANDING

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

AT TOUCHDOWN

ENG MASTERS.....OFF
APU MASTER SW.....OFF
BRAKES ON ACCU ONLY

AFTER LANDING

● **When the aircraft has stopped:**
PARKING BRK.....ON
ATC.....NOTIFY
FIRE pushbutton (ENG and APU).....PUSH
AGENTS (ENG and APU).....DISCH

Engine Agent 2 is not available.

■ **If Evacuation required:**
EVACUATION.....INITIATE

Announce "EVACUATE! EVACUATE!"using the Passenger Address (PA) system, and press the EVAC COMMAND pb ◁

ELT ◁ .....CHECK EMITTING

If not, switch on the transmitter.

■ **If Evacuation not required:**
CABIN CREW and PASSENGERS (PA).....NOTIFY

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

13 **IF DITCHING ANTICIPATED**

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED..... 160 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +30 kt/160 kt:

Weight (1 000 kg)	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*80*	*84*	*88*	*92*	*94*
VAPP	*160*	*160*	*160*	*160*	*163*	*167*	*171*	*174*	*178*	*181*	*185*	*187*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for ditching (CONF 3; L/G UP):**

  L/G lever.....CHECK UP

AT 2 000 FT AGL

CABIN.....NOTIFY FOR DITCHING

DITCHING pushbutton..... ON

Prefer ditching parallel to the swell.
If that causes a strong crosswind, ditch into the wind.
In all cases, touch down with a pitch attitude of approximately 11 °.
Minimize aircraft vertical speed.

AT 500 FT AGL

BRACE FOR IMPACT..... ORDER

AT TOUCHDOWN

ENG MASTERS.....OFF

APU MASTER SW..... OFF

AFTER DITCHING

ATC (VHF 1).....NOTIFY

FIRE pushbutton (ENG and APU).....PUSH

AGENT (ENG and APU)..... DISCH

Engine Agent 2 is not available.

EVACUATION..... INITIATE

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

ELT ..... CHECK EMITTING

If not, switch on the transmitter.

ENG DUAL FAILURE - FUEL REMAINING

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

As long as none of the engines recover, the flight crew must apply this paper procedure when required by the ECAM ENG DUAL FAILURE procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.

LAND ASAP

OPTIMUM RELIGHT SPD.....280 KT

In the case of a speed indication failure (volcanic ash), Pitch attitude for optimum relight speed is:

WEIGHT	*PITCH (°)*
At or below 50 000 kg/110 000 lb	*-2.5*
60 000 kg/132 000 lb	*-1.5*
70 000 kg/154 000 lb	*-0.5*

At 280 kt, the aircraft can fly up to about 2.2 nm per 1 000 ft (with no wind).

LANDING STRATEGY..... DETERMINE

Determine whether a runway can be reached, or the most appropriate place for a forced landing/ditching.

VHF1/HF1 ◁ /ATC1.....USE

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify air traffic control of the nature of the emergency, and state intentions. Switch to code A7700, or transmit a distress message on one of the following frequencies: VHF frequency 121.5 MHz, HF 2 182 kHz or 8 364 kHz.

- **IF NO RELIGHT AFTER 30 SEC:**

  ENG MASTERS..... OFF 30 S/ON

  Unassisted start attempts can be repeated until successful, or until APU bleed is available.

  CREW OXY MASKS (Above FL 100).....ON

  Cabin altitude will increase, due to the lack of engine bleed: The EXCESS CAB ALT warning could be triggered. Depending on the situation, to gain gliding distance, the flight crew may disregard the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.

- **WHEN APU AVAIL FL < 200:**

  If the APU is available, APU BLEED may be used for engine start below FL 200 if speed > 150 kt or below FL 150 if speed < 150 kt.

  WING ANTI ICE.....OFF

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

APU BLEED.....ON

- **IN SEQUENCE:**

  ENG MASTERS (all non running engines).....OFF

  After 30 s

  ENG MASTERS (one at a time).....ON

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

● **When APU bleed is available or if engine restart is definitively considered impossible:**
OPTIMUM SPEED.....REFER TO TABLE BELOW

Weight (1 000 kg)	*At or below FL 200*	*FL 300*	*FL 400*
78	*236*	*246*	*256*
76	*232*	*242*	*252*
72	*224*	*234*	*244*
68	*216*	*226*	*236*
64	*208*	*218*	*228*
60	*200*	*210*	*220*
56	*192*	*202*	*212*
52	*184*	*194*	*204*
48	*176*	*186*	*196*
44	*168*	*178*	*188*
40	*160*	*170*	*180*

GREEN DOT SPEED WITH ALL ENGINES INOPERATIVE (KNOTS)

At green dot speed, the aircraft can fly up to approximately 2.5 nm per 1 000 ft (with no wind).
Average rate of descent is approximately 1 600 ft/min.

CABIN AND COCKPIT.....PREPARE

- *Loose equipment secured.*
- *Survival equipments prepared.*
- *Belts and shoulder harnesses locked.*

CABIN SIGNS.....ON
GALLEY.....OFF

USE RUDDER WITH CARE

As hydraulic power is only available from the RAT, avoid large and rapid rudder deflection.

● **WHEN BELOW FL 150:**
RAM AIR.....ON

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

COMMON ACTIONS FOR THE APPROACH

Note: *Final descent slope, when configured (CONF 3; L/G DOWN) will be approximately 1.2 nm per 1 000 ft (with no wind).*

BARO..... SET
CREW MASKS/OXY SUPPLY (below FL 100).....OFF

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

IF FORCED LANDING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED.....150 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF + 25 kt/150 kt:

Weight (1 000 kg)	*40*	*44*	*48*	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*78*
VAPP	*150*	*150*	*150*	*150*	*150*	*154*	*159*	*163*	*167*	*171*	*172*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for landing (CONF 3 ; L/G DOWN):**
  - **When in CONF 3 and VAPP:**

    GRAVITY GEAR EXTN handcrank..... PULL AND TURN

    Flight controls revert to direct law at landing gear extension. Wait for CONF 3 and VAPP before extending the landing gear to enable the aircraft to be trimmed for approach. Disregard "USE MAN PITCH TRIM" on the PFD, because the stabilizer is frozen in the position where it was at, when the windmilling was insufficient to provide hydraulic power.

  - **When L/G downlocked:**

    L/G lever.....DOWN

    APPROACH SPEED.....ADJUST

    Adjust the speed to the determined VAPP. Nevertheless, to reach the landing field/runway, the approach speed may be adjusted up to 200 kt (max speed with slats extended).

  GND SPLR.....ARM

  MAX BRK PR..... 1 000 PSI

AT 2 000 FT AGL

CABIN.....NOTIFY FOR LANDING

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

AT TOUCHDOWN

ENG MASTERS.....OFF
APU MASTER SW.....OFF
BRAKES ON ACCU ONLY

AFTER LANDING

● **When the aircraft has stopped:**
PARKING BRK.....ON
ATC.....NOTIFY
FIRE pushbutton (ENG and APU).....PUSH
AGENTS (ENG and APU).....DISCH

Engine Agent 2 is not available.

■ **If Evacuation required:**
EVACUATION.....INITIATE

Announce "EVACUATE! EVACUATE! "using the Passenger Address (PA) system, and press the EVAC COMMAND pb ◁ .

ELT ◁ .....CHECK EMITTING

If not, switch on the transmitter.

■ **If Evacuation not required:**
CABIN CREW and PASSENGERS (PA).....NOTIFY

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

14

IF DITCHING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED..... 150 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +25 kt/150 kt:

Weight (1 000 kg)	*40*	*44*	*48*	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*78*
VAPP	*150*	*150*	*150*	*150*	*150*	*154*	*159*	*163*	*167*	*171*	*172*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for ditching (CONF 3; L/G UP):**

  L/G lever.....CHECK UP

AT 2 000 FT AGL

CABIN.....NOTIFY FOR DITCHING

DITCHING pushbutton..... ON

Prefer ditching parallel to the swell.
If that causes a strong crosswind, ditch into the wind.
In all cases, touch down with a pitch attitude of approximately 11 °.
Minimize aircraft vertical speed.

AT 500 FT AGL

BRACE FOR IMPACT..... ORDER

AT TOUCHDOWN

ENG MASTERS.....OFF

APU MASTER SW..... OFF

AFTER DITCHING

ATC (VHF 1).....NOTIFY

FIRE pushbutton (ENG and APU).....PUSH

AGENT (ENG and APU)..... DISCH

Engine Agent 2 is not available.

EVACUATION..... INITIATE

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

ELT ..... CHECK EMITTING

If not, switch on the transmitter.

ENG DUAL FAILURE - FUEL REMAINING

Applicable to: B-HSJ

As long as none of the engines recover, the flight crew must apply this paper procedure when required by the ECAM ENG DUAL FAILURE procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.

LAND ASAP

OPTIMUM RELIGHT SPD.....280 KT

In the case of a speed indication failure (volcanic ash), Pitch attitude for optimum relight speed is:

WEIGHT	*PITCH (°)*
At or below 50 000 kg/110 000 lb	*-2.5*
60 000 kg/132 000 lb	*-1.5*
70 000 kg/154 000 lb	*-0.5*

At 280 kt, the aircraft can fly up to about 2.2 nm per 1 000 ft (with no wind).

LANDING STRATEGY..... DETERMINE

Determine whether a runway can be reached, or the most appropriate place for a forced landing/ditching.

VHF1/HF1 ◁ /ATC1.....USE

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify air traffic control of the nature of the emergency, and state intentions. Switch to code A7700, or transmit a distress message on one of the following frequencies: VHF frequency 121.5 MHz, HF 2 182 kHz or 8 364 kHz.

- **IF NO RELIGHT AFTER 30 SEC:**

  ENG MASTERS..... OFF 30 S/ON

  Unassisted start attempts can be repeated until successful, or until APU bleed is available.

- **IF UNSUCCESSFUL:**

  CREW OXY MASKS (Above FL 100).....ON

  Cabin altitude will increase, due to the lack of engine bleed: The EXCESS CAB ALT warning could be triggered. Depending on the situation, to gain gliding distance, the flight crew may disregard the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.

  APU (IF AVAIL).....START

  If the APU is available, it may be started when below FL 250 and the APU BLEED may be used for engine start below FL 200 if speed ≥ 150 kt, or below FL 150 if speed is < 150 kt.

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

WING ANTI ICE.....OFF
APU BLEED.....ON

● **IN SEQUENCE:**
ENG MASTERS (all non running engines).....OFF

After 30 s

ENG MASTERS (one at a time).....ON

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

● **When APU bleed is available or if engine restart is definitively considered impossible:**
OPTIMUM SPEED.....REFER TO TABLE BELOW

Weight (1 000 kg)	*At or below FL 200*	*FL 300*	*FL 400*
78	*236*	*246*	*256*
76	*232*	*242*	*252*
72	*224*	*234*	*244*
68	*216*	*226*	*236*
64	*208*	*218*	*228*
60	*200*	*210*	*220*
56	*192*	*202*	*212*
52	*184*	*194*	*204*
48	*176*	*186*	*196*
44	*168*	*178*	*188*
40	*160*	*170*	*180*

GREEN DOT SPEED WITH ALL ENGINES INOPERATIVE (KNOTS)

At green dot speed, the aircraft can fly up to approximately 2.5 nm per 1 000 ft (with no wind).
Average rate of descent is approximately 1 600 ft/min.

CABIN AND COCKPIT.....PREPARE

- *Loose equipment secured.*
- *Survival equipments prepared.*
- *Belts and shoulder harnesses locked.*

CABIN SIGNS.....ON
GALY & CAB.....OFF

USE RUDDER WITH CARE

As hydraulic power is only available from the RAT, avoid large and rapid rudder deflection.

● **WHEN BELOW FL 150:**
RAM AIR.....ON

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

COMMON ACTIONS FOR THE APPROACH

Note: Final descent slope, when configured (CONF 3; L/G DOWN) will be approximately 1.2 nm per 1 000 ft (with no wind).

BARO.....SET
CREW MASKS/OXY SUPPLY (below FL 100).....OFF

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

IF FORCED LANDING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED.....150 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF + 25 kt/150 kt:

Weight (1 000 kg)	*40*	*44*	*48*	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*78*
VAPP	*150*	*150*	*150*	*150*	*150*	*154*	*159*	*163*	*167*	*171*	*172*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for landing (CONF 3 ; L/G DOWN):**
  - **When in CONF 3 and VAPP:**

    GRAVITY GEAR EXTN handcrank..... PULL AND TURN

    Flight controls revert to direct law at landing gear extension. Wait for CONF 3 and VAPP before extending the landing gear to enable the aircraft to be trimmed for approach. Disregard "USE MAN PITCH TRIM" on the PFD, because the stabilizer is frozen in the position where it was at, when the windmilling was insufficient to provide hydraulic power.

  - **When L/G downlocked:**

    L/G lever.....DOWN

    APPROACH SPEED.....ADJUST

    Adjust the speed to the determined VAPP. Nevertheless, to reach the landing field/runway, the approach speed may be adjusted up to 200 kt (max speed with slats extended).

  GND SPLR.....ARM

  MAX BRK PR..... 1 000 PSI

AT 2 000 FT AGL

CABIN.....NOTIFY FOR LANDING

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

AT TOUCHDOWN

ENG MASTERS.....OFF
APU MASTER SW.....OFF
BRAKES ON ACCU ONLY

AFTER LANDING

● **When the aircraft has stopped:**
PARKING BRK.....ON
ATC.....NOTIFY
FIRE pushbutton (ENG and APU).....PUSH
AGENTS (ENG and APU).....DISCH

Engine Agent 2 is not available.

■ **If Evacuation required:**
EVACUATION.....INITIATE

Announce "EVACUATE! EVACUATE! "using the Passenger Address (PA) system, and press the EVAC COMMAND pb ◁ .

ELT ◁ .....CHECK EMITTING

If not, switch on the transmitter.

■ **If Evacuation not required:**
CABIN CREW and PASSENGERS (PA).....NOTIFY

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

15 **IF DITCHING ANTICIPATED**

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED..... 150 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +25 kt/150 kt:

Weight (1 000 kg)	*40*	*44*	*48*	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*78*
VAPP	*150*	*150*	*150*	*150*	*150*	*154*	*159*	*163*	*167*	*171*	*172*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for ditching (CONF 3; L/G UP):**

  L/G lever.....CHECK UP

AT 2 000 FT AGL

CABIN.....NOTIFY FOR DITCHING

DITCHING pushbutton..... ON

Prefer ditching parallel to the swell.
If that causes a strong crosswind, ditch into the wind.
In all cases, touch down with a pitch attitude of approximately 11 °.
Minimize aircraft vertical speed.

AT 500 FT AGL

BRACE FOR IMPACT..... ORDER

AT TOUCHDOWN

ENG MASTERS.....OFF

APU MASTER SW..... OFF

AFTER DITCHING

ATC (VHF 1).....NOTIFY

FIRE pushbutton (ENG and APU).....PUSH

AGENT (ENG and APU)..... DISCH

Engine Agent 2 is not available.

EVACUATION..... INITIATE

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

ELT ..... CHECK EMITTING

If not, switch on the transmitter.

ENG DUAL FAILURE - FUEL REMAINING

Applicable to: B-HTG, B-HTH, B-HTI

As long as none of the engines recover, the flight crew must apply this paper procedure when required by the ECAM ENG DUAL FAILURE procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.

LAND ASAP

OPTIMUM RELIGHT SPD.....280 KT

In the case of a speed indication failure (volcanic ash), Pitch attitude for optimum relight speed is:

WEIGHT	*PITCH (°)*
At or below 60 000 kg/132 000 lb	*-2.5*
70 000 kg/154 000 lb	*-1.5*
80 000 kg/176 000 lb	*-0.5*

At 280 kt, the aircraft can fly up to about 2.4 nm per 1 000 ft (with no wind).

LANDING STRATEGY..... DETERMINE

Determine whether a runway can be reached, or the most appropriate place for a forced landing/ditching.

VHF1/HF1 ◁ /ATC1.....USE

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify air traffic control of the nature of the emergency, and state intentions. Switch to code A7700, or transmit a distress message on one of the following frequencies: VHF frequency 121.5 MHz, HF 2 182 kHz or 8 364 kHz.

- **IF NO RELIGHT AFTER 30 SEC:**

  ENG MASTERS..... OFF 30 S/ON

  Unassisted start attempts can be repeated until successful, or until APU bleed is available.

- **IF UNSUCCESSFUL:**

  CREW OXY MASKS (Above FL 100).....ON

  Cabin altitude will increase, due to the lack of engine bleed: The EXCESS CAB ALT warning could be triggered. Depending on the situation, to gain gliding distance, the flight crew may disregard the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.

  APU (IF AVAIL).....START

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

If APU is available, APU may be started when below FL 250 and APU BLEED may be used for engine start below FL 200 if speed ≥ 200 kt, or below FL 150 if speed is between 160 kt and 200 kt, or below FL 100 if speed ≤ 160 kt.

WING ANTI ICE.....OFF
APU BLEED.....ON

● **IN SEQUENCE:**
ENG MASTERS (all non running engines).....OFF

After 30 s

ENG MASTERS (one at a time).....ON

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

● **When APU bleed is available or if engine restart is definitively considered impossible:**

OPTIMUM SPEED.....REFER TO TABLE BELOW

Weight (1 000 kg)	*At or below FL 200*	*FL 300*	*FL 400*
94	*251*	*261*	*271*
92	*248*	*258*	*268*
88	*242*	*252*	*262*
86	*239*	*249*	*259*
84	*236*	*246*	*256*
82	*233*	*243*	*253*
80	*230*	*240*	*250*
78	*227*	*237*	*247*
76	*224*	*234*	*244*
74	*221*	*231*	*241*
72	*218*	*228*	*238*
70	*215*	*225*	*235*
68	*212*	*222*	*232*
66	*209*	*219*	*229*
64	*206*	*216*	*226*
62	*203*	*213*	*223*
60	*200*	*210*	*220*
58	*197*	*207*	*217*
56	*194*	*204*	*214*
54	*191*	*201*	*211*
52	*188*	*198*	*208*

GREEN DOT SPEED WITH ALL ENGINES INOPERATIVE (KNOTS)

At green dot speed, the aircraft can fly up to approximately 2.5 nm per 1 000 ft (with no wind). Average rate of descent is approximately 1 700 ft/min.

CABIN AND COCKPIT.....PREPARE

- *Loose equipment secured.*
- *Survival equipments prepared.*
- *Belts and shoulder harnesses locked.*

CABIN SIGNS.....ON

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

COMMERCIAL.....OFF

USE RUDDER WITH CARE

As hydraulic power is only available from the RAT, avoid large and rapid rudder deflection.

● **WHEN BELOW FL 150:**

RAM AIR.....ON

COMMON ACTIONS FOR THE APPROACH

Note: Final descent slope, when configured (CONF 3; L/G DOWN) will be approximately 1.1 nm per 1 000 ft (with no wind).

BARO.....SET

CREW MASKS/OXY SUPPLY (below FL 100).....OFF

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

IF FORCED LANDING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED.....160 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF + 30 kt/160 kt:

Weight (1 000 kg)	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*80*	*84*	*88*	*92*	*94*
VAPP	*160*	*160*	*160*	*160*	*163*	*167*	*171*	*174*	*178*	*181*	*185*	*187*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for landing (CONF 3 ; L/G DOWN):**
  - **When in CONF 3 and VAPP:**

    GRAVITY GEAR EXTN handcrank..... PULL AND TURN

    Flight controls revert to direct law at landing gear extension. Wait for CONF 3 and VAPP before extending the landing gear to enable the aircraft to be trimmed for approach. Disregard "USE MAN PITCH TRIM" on the PFD, because the stabilizer is frozen in the position where it was at, when the windmilling was insufficient to provide hydraulic power.

  - **When L/G downlocked**

    L/G lever.....DOWN

    APPROACH SPEED.....ADJUST

    Adjust the speed to the determined VAPP. Nevertheless, to reach the landing field/runway, the approach speed may be adjusted up to 215 kt (max speed with slats extended).

  GND SPLR.....ARM

  MAX BRK PR..... 1 000 PSI

AT 2 000 FT AGL

CABIN.....NOTIFY FOR LANDING

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

AT TOUCHDOWN

ENG MASTERS.....OFF
APU MASTER SW.....OFF
BRAKES ON ACCU ONLY

AFTER LANDING

● **When the aircraft has stopped:**
PARKING BRK.....ON
ATC.....NOTIFY
FIRE pushbutton (ENG and APU).....PUSH
AGENTS (ENG and APU).....DISCH

Engine Agent 2 is not available.

■ **If Evacuation required:**
EVACUATION.....INITIATE

Announce "EVACUATE! EVACUATE!"using the Passenger Address (PA) system, and press the EVAC COMMAND pb ◁

ELT ◁ .....CHECK EMITTING

If not, switch on the transmitter.

■ **If Evacuation not required:**
CABIN CREW and PASSENGERS (PA).....NOTIFY

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

16 **IF DITCHING ANTICIPATED**

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED..... 160 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +30 kt/160 kt:

Weight (1 000 kg)	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*80*	*84*	*88*	*92*	*94*
VAPP	*160*	*160*	*160*	*160*	*163*	*167*	*171*	*174*	*178*	*181*	*185*	*187*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for ditching (CONF 3; L/G UP):**

  L/G lever.....CHECK UP

AT 2 000 FT AGL

CABIN.....NOTIFY FOR DITCHING

DITCHING pushbutton..... ON

Prefer ditching parallel to the swell.
If that causes a strong crosswind, ditch into the wind.
In all cases, touch down with a pitch attitude of approximately 11 °.
Minimize aircraft vertical speed.

AT 500 FT AGL

BRACE FOR IMPACT..... ORDER

AT TOUCHDOWN

ENG MASTERS.....OFF

APU MASTER SW..... OFF

AFTER DITCHING

ATC (VHF 1).....NOTIFY

FIRE pushbutton (ENG and APU).....PUSH

AGENT (ENG and APU)..... DISCH

Engine Agent 2 is not available.

EVACUATION..... INITIATE

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

ELT ..... CHECK EMITTING

If not, switch on the transmitter.

ENG DUAL FAILURE - FUEL REMAINING

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

As long as none of the engines recover, the flight crew must apply this paper procedure when required by the ECAM ENG DUAL FAILURE procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.

LAND ASAP

OPTIMUM RELIGHT SPD.....280 KT

In the case of a speed indication failure (volcanic ash), Pitch attitude for optimum relight speed is:

WEIGHT	*PITCH (°)*
At or below 50 000 kg/110 000 lb	*-2.5*
60 000 kg/132 000 lb	*-1.5*
70 000 kg/154 000 lb	*-0.5*

At 280 kt, the aircraft can fly up to about 2.2 nm per 1 000 ft (with no wind).

LANDING STRATEGY..... DETERMINE

Determine whether a runway can be reached, or the most appropriate place for a forced landing/ditching.

VHF1/HF1 ◁ /ATC1.....USE

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify air traffic control of the nature of the emergency, and state intentions. Switch to code A7700, or transmit a distress message on one of the following frequencies: VHF frequency 121.5 MHz, HF 2 182 kHz or 8 364 kHz.

- **IF NO RELIGHT AFTER 30 SEC:**

  ENG MASTERS..... OFF 30 S/ON

  Unassisted start attempts can be repeated until successful, or until APU bleed is available.

- **IF UNSUCCESSFUL:**

  CREW OXY MASKS (Above FL 100).....ON

  Cabin altitude will increase, due to the lack of engine bleed: The EXCESS CAB ALT warning could be triggered. Depending on the situation, to gain gliding distance, the flight crew may disregard the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.

  APU (IF AVAIL).....START

  If the APU is available, it may be started when below FL 250 and the APU BLEED may be used for engine start below FL 200 if speed ≥ 150 kt, or below FL 150 if speed is < 150 kt.

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

WING ANTI ICE.....OFF
APU BLEED.....ON

● **IN SEQUENCE:**
ENG MASTERS (all non running engines).....OFF

After 30 s

ENG MASTERS (one at a time).....ON

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

● **When APU bleed is available or if engine restart is definitively considered impossible:**

OPTIMUM SPEED.....REFER TO TABLE BELOW

Weight (1 000 kg)	*At or below FL 200*	*FL 300*	*FL 400*
78	*236*	*246*	*256*
76	*232*	*242*	*252*
72	*224*	*234*	*244*
68	*216*	*226*	*236*
64	*208*	*218*	*228*
60	*200*	*210*	*220*
56	*192*	*202*	*212*
52	*184*	*194*	*204*
48	*176*	*186*	*196*
44	*168*	*178*	*188*
40	*160*	*170*	*180*

GREEN DOT SPEED WITH ALL ENGINES INOPERATIVE (KNOTS)

At green dot speed, the aircraft can fly up to approximately 2.5 nm per 1 000 ft (with no wind). Average rate of descent is approximately 1 600 ft/min.

CABIN AND COCKPIT.....PREPARE

- *Loose equipment secured*
- *Survival equipments prepared*
- *Belts and shoulder harnesses locked.*

CABIN SIGNS.....ON
COMMERCIAL.....OFF

USE RUDDER WITH CARE

As hydraulic power is only available from the RAT, avoid large and rapid rudder deflection.

● **WHEN BELOW FL 150:**

RAM AIR.....ON

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

COMMON ACTIONS FOR THE APPROACH

Note: Final descent slope, when configured (CONF 3; L/G DOWN) will be approximately 1.2 nm per 1 000 ft (with no wind).

BARO.....SET
CREW MASKS/OXY SUPPLY (below FL 100).....OFF

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

IF FORCED LANDING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED.....150 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF + 25 kt/150 kt:

Weight (1 000 kg)	*40*	*44*	*48*	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*78*
VAPP	*150*	*150*	*150*	*150*	*150*	*154*	*159*	*163*	*167*	*171*	*172*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for landing (CONF 3 ; L/G DOWN):**
  - **When in CONF 3 and VAPP:**

    GRAVITY GEAR EXTN handcrank..... PULL AND TURN

    Flight controls revert to direct law at landing gear extension. Wait for CONF 3 and VAPP before extending the landing gear to enable the aircraft to be trimmed for approach. Disregard "USE MAN PITCH TRIM" on the PFD, because the stabilizer is frozen in the position where it was at, when the windmilling was insufficient to provide hydraulic power.

  - **When L/G downlocked:**

    L/G lever.....DOWN

    APPROACH SPEED.....ADJUST

    Adjust the speed to the determined VAPP. Nevertheless, to reach the landing field/runway, the approach speed may be adjusted up to 200 kt (max speed with slats extended).

  GND SPLR.....ARM

  MAX BRK PR..... 1 000 PSI

AT 2 000 FT AGL

CABIN.....NOTIFY FOR LANDING

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

AT TOUCHDOWN

ENG MASTERS.....OFF
APU MASTER SW.....OFF
BRAKES ON ACCU ONLY

AFTER LANDING

● **When the aircraft has stopped:**
PARKING BRK.....ON
ATC.....NOTIFY
FIRE pushbutton (ENG and APU).....PUSH
AGENTS (ENG and APU).....DISCH

Engine Agent 2 is not available.

■ **If Evacuation required:**
EVACUATION.....INITIATE

Announce "EVACUATE! EVACUATE! "using the Passenger Address (PA) system, and press the EVAC COMMAND pb ◁ .

ELT ◁ .....CHECK EMITTING

If not, switch on the transmitter.

■ **If Evacuation not required:**
CABIN CREW and PASSENGERS (PA).....NOTIFY

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

17 **IF DITCHING ANTICIPATED**

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED..... 150 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +25 kt/150 kt:

Weight (1 000 kg)	*40*	*44*	*48*	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*78*
VAPP	*150*	*150*	*150*	*150*	*150*	*154*	*159*	*163*	*167*	*171*	*172*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for ditching (CONF 3; L/G UP):**

  L/G lever.....CHECK UP

AT 2 000 FT AGL

CABIN.....NOTIFY FOR DITCHING

DITCHING pushbutton..... ON

Prefer ditching parallel to the swell.
If that causes a strong crosswind, ditch into the wind.
In all cases, touch down with a pitch attitude of approximately 11 °.
Minimize aircraft vertical speed.

AT 500 FT AGL

BRACE FOR IMPACT..... ORDER

AT TOUCHDOWN

ENG MASTERS.....OFF

APU MASTER SW..... OFF

AFTER DITCHING

ATC (VHF 1).....NOTIFY

FIRE pushbutton (ENG and APU).....PUSH

AGENT (ENG and APU)..... DISCH

Engine Agent 2 is not available.

EVACUATION..... INITIATE

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

ELT ..... CHECK EMITTING

If not, switch on the transmitter.

ENG DUAL FAILURE - FUEL REMAINING

Applicable to: B-HSQ, B-HSR

As long as none of the engines recover, the flight crew must apply this paper procedure when required by the ECAM ENG DUAL FAILURE procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.

LAND ASAP

OPTIMUM RELIGHT SPD.....280 KT

In the case of a speed indication failure (volcanic ash), Pitch attitude for optimum relight speed is:

WEIGHT	*PITCH (°)*
At or below 50 000 kg/110 000 lb	*-2.5*
60 000 kg/132 000 lb	*-1.5*
70 000 kg/154 000 lb	*-0.5*

At 280 kt, the aircraft can fly up to about 2.2 nm per 1 000 ft (with no wind).

LANDING STRATEGY..... DETERMINE

Determine whether a runway can be reached, or the most appropriate place for a forced landing/ditching.

VHF1/HF1 ◁ /ATC1.....USE

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify air traffic control of the nature of the emergency, and state intentions. Switch to code A7700, or transmit a distress message on one of the following frequencies: VHF frequency 121.5 MHz, HF 2 182 kHz or 8 364 kHz.

- **IF NO RELIGHT AFTER 30 SEC:**

  ENG MASTERS..... OFF 30 S/ON

  Unassisted start attempts can be repeated until successful, or until APU bleed is available.

- **IF UNSUCCESSFUL:**

  CREW OXY MASKS (Above FL 100).....ON

  Cabin altitude will increase, due to the lack of engine bleed: The EXCESS CAB ALT warning could be triggered. Depending on the situation, to gain gliding distance, the flight crew may disregard the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.

  APU (IF AVAIL).....START

  If the APU is available, it may be started when below FL 250 and the APU BLEED may be used for engine start below FL 200if speed ≥ 180 kt, or below FL 150 if speed is < 150 kt.

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

WING ANTI ICE.....OFF
APU BLEED.....ON

- **IN SEQUENCE:**

  ENG MASTERS (all non running engines).....OFF

  After 30 s

  ENG MASTERS (one at a time).....ON

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

● **When APU bleed is available or if engine restart is definitively considered impossible:**

OPTIMUM SPEED.....REFER TO TABLE BELOW

Weight (1 000 kg)	*At or below FL 200*	*FL 300*	*FL 400*
78	*236*	*246*	*256*
76	*232*	*242*	*252*
72	*224*	*234*	*244*
68	*216*	*226*	*236*
64	*208*	*218*	*228*
60	*200*	*210*	*220*
56	*192*	*202*	*212*
52	*184*	*194*	*204*
48	*176*	*186*	*196*
44	*168*	*178*	*188*
40	*160*	*170*	*180*

GREEN DOT SPEED WITH ALL ENGINES INOPERATIVE (KNOTS)

At green dot speed, the aircraft can fly up to approximately 2.5 nm per 1 000 ft (with no wind). Average rate of descent is approximately 1 600 ft/min.

CABIN AND COCKPIT.....PREPARE

- *Loose equipment secured*
- *Survival equipments prepared*
- *Belts and shoulder harnesses locked.*

CABIN SIGNS.....ON
COMMERCIAL.....OFF

USE RUDDER WITH CARE

As hydraulic power is only available from the RAT, avoid large and rapid rudder deflection.

● **WHEN BELOW FL 150:**

RAM AIR.....ON

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

COMMON ACTIONS FOR THE APPROACH

Note: Final descent slope, when configured (CONF 3; L/G DOWN) will be approximately 1.2 nm per 1 000 ft (with no wind).

BARO.....SET
CREW MASKS/OXY SUPPLY (below FL 100).....OFF

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

IF FORCED LANDING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED.....150 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF + 25 kt/150 kt:

Weight (1 000 kg)	*40*	*44*	*48*	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*78*
VAPP	*150*	*150*	*150*	*150*	*150*	*154*	*159*	*163*	*167*	*171*	*172*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for landing (CONF 3 ; L/G DOWN):**
  - **When in CONF 3 and VAPP:**

    GRAVITY GEAR EXTN handcrank..... PULL AND TURN

    Flight controls revert to direct law at landing gear extension. Wait for CONF 3 and VAPP before extending the landing gear to enable the aircraft to be trimmed for approach. Disregard "USE MAN PITCH TRIM" on the PFD, because the stabilizer is frozen in the position where it was at, when the windmilling was insufficient to provide hydraulic power.

  - **When L/G downlocked:**

    L/G lever.....DOWN

    APPROACH SPEED.....ADJUST

    Adjust the speed to the determined VAPP. Nevertheless, to reach the landing field/runway, the approach speed may be adjusted up to 200 kt (max speed with slats extended).

  GND SPLR.....ARM

  MAX BRK PR..... 1 000 PSI

AT 2 000 FT AGL

CABIN.....NOTIFY FOR LANDING

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

AT TOUCHDOWN

ENG MASTERS.....OFF
APU MASTER SW.....OFF
BRAKES ON ACCU ONLY

AFTER LANDING

● **When the aircraft has stopped:**
PARKING BRK.....ON
ATC.....NOTIFY
FIRE pushbutton (ENG and APU).....PUSH
AGENTS (ENG and APU).....DISCH

Engine Agent 2 is not available.

■ **If Evacuation required:**
EVACUATION.....INITIATE

Announce "EVACUATE! EVACUATE! "using the Passenger Address (PA) system, and press the EVAC COMMAND pb ⋖ .

ELT ⋖ .....CHECK EMITTING

If not, switch on the transmitter.

■ **If Evacuation not required:**
CABIN CREW and PASSENGERS (PA).....NOTIFY

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

18 **IF DITCHING ANTICIPATED**

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED..... 150 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +25 kt/150 kt:

Weight (1 000 kg)	*40*	*44*	*48*	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*78*
VAPP	*150*	*150*	*150*	*150*	*150*	*154*	*159*	*163*	*167*	*171*	*172*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for ditching (CONF 3; L/G UP):**

  L/G lever.....CHECK UP

AT 2 000 FT AGL

CABIN.....NOTIFY FOR DITCHING

DITCHING pushbutton..... ON

Prefer ditching parallel to the swell.
If that causes a strong crosswind, ditch into the wind.
In all cases, touch down with a pitch attitude of approximately 11 °.
Minimize aircraft vertical speed.

AT 500 FT AGL

BRACE FOR IMPACT..... ORDER

AT TOUCHDOWN

ENG MASTERS.....OFF

APU MASTER SW..... OFF

AFTER DITCHING

ATC (VHF 1).....NOTIFY

FIRE pushbutton (ENG and APU).....PUSH

AGENT (ENG and APU)..... DISCH

Engine Agent 2 is not available.

EVACUATION..... INITIATE

Continued on the following page

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

ELT ..... CHECK EMITTING

If not, switch on the transmitter.

ENG DUAL FAILURE - NO FUEL REMAINING

Applicable to: B-HTD, B-HTE, B-HTF

The flight crew must apply this paper procedure when required by the ENG DUAL FAILURE procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.

OPTIMUM SPEED..... 240 KT/GREEN DOT

Initially, fly 240 kt, because the PFD may not display the correct green dot speed. Then fly the green dot speed according to the following table:

Weight (1000 kg)	*At or below FL 200*	*FL 300*	*FL 400*
80	*230*	*240*	*250*
78	*227*	*237*	*247*
76	*224*	*234*	*244*
74	*221*	*231*	*241*
72	*218*	*228*	*238*
70	*215*	*225*	*235*
68	*212*	*222*	*232*
66	*209*	*219*	*229*
64	*206*	*216*	*226*
62	*203*	*213*	*223*
60	*200*	*210*	*220*
58	*197*	*207*	*217*
56	*194*	*204*	*214*
54	*191*	*201*	*211*
52	*188*	*198*	*208*

GREEN DOT SPEED WITH ALL ENGINES INOPERATIVE (KNOTS)

At green dot speed, the aircraft can fly up to approximately 2.5 nm per 1 000 ft (with no wind). Average rate of descent is approximately 1 700 ft/min .

LANDING STRATEGY..... DETERMINE

Determine whether a runway can be reached or the most appropriate place for a forced landing/ditching.

VHF1 ◁ /HF1 ◁ /ATC1.....USE

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify air traffic control of the nature of the emergency, and state intentions. Switch to code A7700, or transmit a distress message on one of the following frequencies: VHF frequency 121.5 MHz, HF 2 182 kHz or 8 364 kHz.

CREW OXY MASKS (Above FL 100)..... ON

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

Cabin altitude will increase due to the lack of engine bleed: The EXCESS CAB ALT warning could be triggered. Depending on the situation, to gain gliding distance, the flight crew may disregard the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.

CABIN AND COCKPIT.....PREPARE

- *Loose equipment secured.*
- *Survival equipments prepared.*
- *Belts and shoulder harnesses locked*

SIGNS.....ON
GALLEY.....OFF
USE RUDDER WITH CARE

As hydraulic power is only available from the RAT, avoid large and rapid rudder deflection.

● **WHEN BELOW FL 150:**

RAM AIR.....ON

Switch ON the RAM AIR to ensure complete depressurization.

COMMON ACTIONS FOR THE APPROACH

APPROACH PREPARATION

Note: Final descent slope, when configured (CONF 3/L/G DOWN), will be approximately 1.1 nm per 1 000 ft (with no wind).

BARO.....SET
CREW MASKS/OXY SUPPLY (below FL 100).....OFF

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

IF FORCED LANDING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED.....160 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +30 kt/160 kt

Weight (1000 kg)	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*80*	*84*	*88*	*92*	*94*
VAPP	*160*	*160*	*160*	*160*	*163*	*167*	*171*	*174*	*178*	*181*	*185*	*187*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for landing (CONF 3; L/G DOWN):**
  - **When in CONF 3 and VAPP:**

    GRAVITY GEAR EXTN handcrank..... PULL AND TURN

    Flight controls revert to direct law at landing gear extension. Wait for CONF 3 and VAPP before extending the landing gear to enable the aircraft to be trimmed for approach. Disregard "USE MAN PITCH TRIM" on the PFD, because the stabilizer is frozen in the position where it was at, when the windmilling was insufficient to provide hydraulic power.

  - **When L/G downlocked:**

    L/G lever.....DOWN

    APPROACH SPEED.....ADJUST

    Adjust the speed to the determined VAPP. Nevertheless, to reach the landing field/runway, the approach speed may be adjusted up to 215 kt (max speed with slats extended).

  GND SPLR.....ARM

  MAX BRK PR.....1000 PSI

AT 2 000 FT AGL

CABIN.....NOTIFY FOR LANDING

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

AT TOUCHDOWN

ENG MASTERS.....OFF
BRAKES ON ACCU ONLY

AFTER LANDING

● **When the aircraft has stopped:**
PARKING BRK..... ON
ATC..... NOTIFY

■ **If Evacuation required:**
EVACUATION..... INITIATE
Announce "EVACUATE! EVACUATE! "using the Passenger Address (PA) system, and press the EVAC COMMAND pb ⋘ .
ELT ⋘ ..... CHECK EMITTING
If not, switch on the transmitter

■ **If Evacuation not required:**
CABIN CREW and PASSENGERS (PA)..... NOTIFY

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

IF DITCHING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED.....160 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +30 kt/160 kt:

Weight (1 000 kg)	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*80*	*84*	*88*	*92*	*94*
VAPP	*160*	*160*	*160*	*160*	*163*	*167*	*171*	*174*	*178*	*181*	*185*	*187*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for ditching (CONF 3; L/G UP):**

  L/G lever.....CHECK UP

AT 2 000 FT AGL

CABIN.....NOTIFY FOR DITCHING

DITCHING pushbutton.....ON

Prefer ditching parallel to the swell.
If that causes a strong crosswind, ditch into the wind.
In all cases, touch down with a pitch attitude of approximately 11 °.
Minimize aircraft vertical speed.

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

AT TOUCHDOWN

ENG MASTERS.....OFF

AFTER DITCHING

ATC (VHF 1).....NOTIFY

EVACUATION.....INITIATE

ELT .....CHECK EMITTING

If not, switch on the transmitter.

ENG DUAL FAILURE - NO FUEL REMAINING

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

The flight crew must apply this paper procedure when required by the ENG DUAL FAILURE procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.

OPTIMUM SPEED.....220 KT/GREEN DOT

Initially, fly 220 kt, because the PFD may not display the correct green dot speed. Then fly the green dot speed according to the following table:

Weight (1000 kg)	*At or below FL 200*	*FL 300*	*FL 400*
68	*216*	*226*	*236*
64	*208*	*218*	*228*
60	*200*	*210*	*220*
56	*192*	*202*	*212*
52	*184*	*194*	*204*
48	*176*	*186*	*196*
44	*168*	*178*	*188*
40	*160*	*170*	*180*

GREEN DOT SPEED WITH ALL ENGINES INOPERATIVE (KNOTS)

At green dot speed, the aircraft can fly up to approximately 2.5 nm per 1 000 ft (with no wind). Average rate of descent is approximately 1 600 ft/min .

LANDING STRATEGY..... DETERMINE

Determine whether a runway can be reached or the most appropriate place for a forced landing/ditching.

VHF1 ◁✳ /HF1 ◁✳ /ATC1.....USE

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify air traffic control of the nature of the emergency, and state intentions. Switch to code A7700, or transmit a distress message on one of the following frequencies: VHF frequency 121.5 MHz, HF 2 182 kHz or 8 364 kHz.

CREW OXY MASKS (Above FL 100)..... ON

Cabin altitude will increase due to the lack of engine bleed: The EXCESS CAB ALT warning could be triggered. Depending on the situation, to gain gliding distance, the flight crew may disregard the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.

CABIN AND COCKPIT.....PREPARE

- *Loose equipment secured.*

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

- *Survival equipments prepared.*
- *Belts and shoulder harnesses locked*

SIGNS.....ON
GALLEY.....OFF
USE RUDDER WITH CARE

As hydraulic power is only available from the RAT, avoid large and rapid rudder deflection.

● **WHEN BELOW FL 150:**

RAM AIR.....ON

Switch ON the RAM AIR to ensure complete depressurization.

COMMON ACTIONS FOR THE APPROACH

APPROACH PREPARATION

Note: Final descent slope, when configured (CONF 3/L/G DOWN), will be approximately 1.2 nm per 1 000 ft (with no wind).

BARO.....SET
CREW MASKS/OXY SUPPLY (below FL 100).....OFF

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

IF FORCED LANDING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED.....150 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +25 kt/150 kt

Weight (1000 kg)	*40*	*44*	*48*	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*78*
VAPP	*150*	*150*	*150*	*150*	*150*	*154*	*159*	*163*	*167*	*171*	*172*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for landing (CONF 3; L/G DOWN):**
  - **When in CONF 3 and VAPP:**

    GRAVITY GEAR EXTN handcrank..... PULL AND TURN

    Flight controls revert to direct law at landing gear extension. Wait for CONF 3 and VAPP before extending the landing gear to enable the aircraft to be trimmed for approach. Disregard "USE MAN PITCH TRIM" on the PFD, because the stabilizer is frozen in the position where it was at, when the windmilling was insufficient to provide hydraulic power.

  - **When L/G downlocked:**

    L/G lever.....DOWN

    APPROACH SPEED.....ADJUST

    Adjust the speed to the determined VAPP. Nevertheless, to reach the landing field/runway, the approach speed may be adjusted up to 200 kt (max speed with slats extended).

  GND SPLR.....ARM

  MAX BRK PR.....1000 PSI

AT 2 000 FT AGL

CABIN.....NOTIFY FOR LANDING

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

AT TOUCHDOWN

ENG MASTERS.....OFF
BRAKES ON ACCU ONLY

AFTER LANDING

● **When the aircraft has stopped:**
PARKING BRK..... ON
ATC..... NOTIFY

■ **If Evacuation required:**
EVACUATION.....INITIATE

Announce "EVACUATE! EVACUATE! "using the Passenger Address (PA) system, and press the EVAC COMMAND pb ◁ .

ELT ◁ ..... CHECK EMITTING

If not, switch on the transmitter

■ **If Evacuation not required:**
CABIN CREW and PASSENGERS (PA)..... NOTIFY

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

IF DITCHING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED..... 150 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +25 kt/150 kt:

Weight (1 000 kg)	*40*	*44*	*48*	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*78*
VAPP	*150*	*150*	*150*	*150*	*150*	*154*	*159*	*163*	*167*	*171*	*172*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for ditching (CONF 3; L/G UP):**

  L/G lever.....CHECK UP

AT 2 000 FT AGL

CABIN.....NOTIFY FOR DITCHING

DITCHING pushbutton..... ON

Prefer ditching parallel to the swell.
If that causes a strong crosswind, ditch into the wind.
In all cases, touch down with a pitch attitude of approximately 11 °.
Minimize aircraft vertical speed.

AT 500 FT AGL

BRACE FOR IMPACT..... ORDER

AT TOUCHDOWN

ENG MASTERS.....OFF

AFTER DITCHING

ATC (VHF 1).....NOTIFY

EVACUATION..... INITIATE

ELT ..... CHECK EMITTING

If not, switch on the transmitter.

ENG DUAL FAILURE - NO FUEL REMAINING

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The flight crew must apply this paper procedure when required by the ENG DUAL FAILURE procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.

OPTIMUM SPEED..... 220 KT/GREEN DOT

Initially, fly 220 kt, because the PFD may not display the correct green dot speed. Then fly the green dot speed according to the following table:

Weight (1000 kg)	*At or below FL 200*	*FL 300*	*FL 400*
68	*216*	*226*	*236*
64	*208*	*218*	*228*
60	*200*	*210*	*220*
56	*192*	*202*	*212*
52	*184*	*194*	*204*
48	*176*	*186*	*196*
44	*168*	*178*	*188*
40	*160*	*170*	*180*

GREEN DOT SPEED WITH ALL ENGINES INOPERATIVE (KNOTS)

At green dot speed, the aircraft can fly up to approximately 2.5 nm per 1 000 ft (with no wind). Average rate of descent is approximately 1 600 ft/min .

LANDING STRATEGY..... DETERMINE

Determine whether a runway can be reached or the most appropriate place for a forced landing/ditching.

VHF1 ◁ /HF1 ◁ /ATC1.....USE

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify air traffic control of the nature of the emergency, and state intentions. Switch to code A7700, or transmit a distress message on one of the following frequencies: VHF frequency 121.5 MHz, HF 2 182 kHz or 8 364 kHz.

CREW OXY MASKS (Above FL 100)..... ON

Cabin altitude will increase due to the lack of engine bleed: The EXCESS CAB ALT warning could be triggered. Depending on the situation, to gain gliding distance, the flight crew may disregard the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.

CABIN AND COCKPIT.....PREPARE

- *Loose equipment secured.*

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

- *Survival equipments prepared.*
- *Belts and shoulder harnesses locked*

SIGNS.....ON
COMMERCIAL.....OFF
USE RUDDER WITH CARE

As hydraulic power is only available from the RAT, avoid large and rapid rudder deflection.

● **WHEN BELOW FL 150:**

RAM AIR.....ON

Switch ON the RAM AIR to ensure complete depressurization.

COMMON ACTIONS FOR THE APPROACH

APPROACH PREPARATION

Note: Final descent slope, when configured (CONF 3/L/G DOWN), will be approximately 1.2 nm per 1 000 ft (with no wind).

BARO.....SET
CREW MASKS/OXY SUPPLY (below FL 100).....OFF

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

IF FORCED LANDING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED.....150 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +25 kt/150 kt

Weight (1000 kg)	*40*	*44*	*48*	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*78*
VAPP	*150*	*150*	*150*	*150*	*150*	*154*	*159*	*163*	*167*	*171*	*172*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for landing (CONF 3; L/G DOWN):**
  - **When in CONF 3 and VAPP:**

    GRAVITY GEAR EXTN handcrank..... PULL AND TURN

    Flight controls revert to direct law at landing gear extension. Wait for CONF 3 and VAPP before extending the landing gear to enable the aircraft to be trimmed for approach. Disregard "USE MAN PITCH TRIM" on the PFD, because the stabilizer is frozen in the position where it was at, when the windmilling was insufficient to provide hydraulic power.

  - **When L/G downlocked:**

    L/G lever.....DOWN

    APPROACH SPEED.....ADJUST

    Adjust the speed to the determined VAPP. Nevertheless, to reach the landing field/runway, the approach speed may be adjusted up to 200 kt (max speed with slats extended).

  GND SPLR.....ARM

  MAX BRK PR.....1000 PSI

AT 2 000 FT AGL

CABIN.....NOTIFY FOR LANDING

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

AT TOUCHDOWN

ENG MASTERS.....OFF
BRAKES ON ACCU ONLY

AFTER LANDING

● **When the aircraft has stopped:**
PARKING BRK..... ON
ATC..... NOTIFY

■ **If Evacuation required:**
EVACUATION..... INITIATE
Announce "EVACUATE! EVACUATE! "using the Passenger Address (PA) system, and press the EVAC COMMAND pb ⋖ .
ELT ⋖ ..... CHECK EMITTING
If not, switch on the transmitter

■ **If Evacuation not required:**
CABIN CREW and PASSENGERS (PA)..... NOTIFY

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

IF DITCHING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED.....150 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +25 kt/150 kt:

Weight (1 000 kg)	*40*	*44*	*48*	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*78*
VAPP	*150*	*150*	*150*	*150*	*150*	*154*	*159*	*163*	*167*	*171*	*172*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for ditching (CONF 3; L/G UP):**

  L/G lever.....CHECK UP

AT 2 000 FT AGL

CABIN.....NOTIFY FOR DITCHING

DITCHING pushbutton.....ON

Prefer ditching parallel to the swell.
If that causes a strong crosswind, ditch into the wind.
In all cases, touch down with a pitch attitude of approximately 11 °.
Minimize aircraft vertical speed.

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

AT TOUCHDOWN

ENG MASTERS.....OFF

AFTER DITCHING

ATC (VHF 1).....NOTIFY

EVACUATION.....INITIATE

ELT .....CHECK EMITTING

If not, switch on the transmitter.

ENG DUAL FAILURE - NO FUEL REMAINING

Applicable to: B-HTG, B-HTH, B-HTI

The flight crew must apply this paper procedure when required by the ENG DUAL FAILURE procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.

OPTIMUM SPEED.....240 KT/GREEN DOT

Initially, fly 240 kt, because the PFD may not display the correct green dot speed. Then fly the green dot speed according to the following table:

Weight (1000 kg)	*At or below FL 200*	*FL 300*	*FL 400*
80	*230*	*240*	*250*
78	*227*	*237*	*247*
76	*224*	*234*	*244*
74	*221*	*231*	*241*
72	*218*	*228*	*238*
70	*215*	*225*	*235*
68	*212*	*222*	*232*
66	*209*	*219*	*229*
64	*206*	*216*	*226*
62	*203*	*213*	*223*
60	*200*	*210*	*220*
58	*197*	*207*	*217*
56	*194*	*204*	*214*
54	*191*	*201*	*211*
52	*188*	*198*	*208*

GREEN DOT SPEED WITH ALL ENGINES INOPERATIVE (KNOTS)

At green dot speed, the aircraft can fly up to approximately 2.5 nm per 1 000 ft (with no wind). Average rate of descent is approximately 1 700 ft/min .

LANDING STRATEGY.....DETERMINE

Determine whether a runway can be reached or the most appropriate place for a forced landing/ditching.

VHF1 ◁ /HF1 ◁ /ATC1.....USE

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify air traffic control of the nature of the emergency, and state intentions. Switch to code A7700, or transmit a distress message on one of the following frequencies: VHF frequency 121.5 MHz, HF 2 182 kHz or 8 364 kHz.

CREW OXY MASKS (Above FL 100).....ON

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

Cabin altitude will increase due to the lack of engine bleed: The EXCESS CAB ALT warning could be triggered. Depending on the situation, to gain gliding distance, the flight crew may disregard the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.

CABIN AND COCKPIT.....PREPARE

- *Loose equipment secured.*
- *Survival equipments prepared.*
- *Belts and shoulder harnesses locked*

SIGNS.....ON
COMMERCIAL.....OFF
USE RUDDER WITH CARE

As hydraulic power is only available from the RAT, avoid large and rapid rudder deflection.

● **WHEN BELOW FL 150:**

RAM AIR.....ON

Switch ON the RAM AIR to ensure complete depressurization.

COMMON ACTIONS FOR THE APPROACH

APPROACH PREPARATION

Note: Final descent slope, when configured (CONF 3/L/G DOWN), will be approximately 1.1 nm per 1 000 ft (with no wind).

BARO.....SET
CREW MASKS/OXY SUPPLY (below FL 100).....OFF

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

IF FORCED LANDING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED.....160 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +30 kt/160 kt

Weight (1000 kg)	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*80*	*84*	*88*	*92*	*94*
VAPP	*160*	*160*	*160*	*160*	*163*	*167*	*171*	*174*	*178*	*181*	*185*	*187*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for landing (CONF 3; L/G DOWN):**
  - **When in CONF 3 and VAPP:**

    GRAVITY GEAR EXTN handcrank..... PULL AND TURN

    Flight controls revert to direct law at landing gear extension. Wait for CONF 3 and VAPP before extending the landing gear to enable the aircraft to be trimmed for approach. Disregard "USE MAN PITCH TRIM" on the PFD, because the stabilizer is frozen in the position where it was at, when the windmilling was insufficient to provide hydraulic power.

  - **When L/G downlocked:**

    L/G lever.....DOWN

    APPROACH SPEED.....ADJUST

    Adjust the speed to the determined VAPP. Nevertheless, to reach the landing field/runway, the approach speed may be adjusted up to 215 kt (max speed with slats extended).

  GND SPLR.....ARM

  MAX BRK PR.....1000 PSI

AT 2 000 FT AGL

CABIN.....NOTIFY FOR LANDING

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

AT TOUCHDOWN

ENG MASTERS.....OFF
BRAKES ON ACCU ONLY

AFTER LANDING

● **When the aircraft has stopped:**
PARKING BRK..... ON
ATC..... NOTIFY

■ **If Evacuation required:**
EVACUATION.....INITIATE

Announce "EVACUATE! EVACUATE! "using the Passenger Address (PA) system, and press the EVAC COMMAND pb .

ELT ..... CHECK EMITTING

If not, switch on the transmitter

■ **If Evacuation not required:**
CABIN CREW and PASSENGERS (PA)..... NOTIFY

Continued on the following page

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

IF DITCHING ANTICIPATED

APPROACH

FOR LDG.....USE FLAP 3

Only slats extend, and slowly.

MIN APPR SPEED.....160 KT

VAPP.....DETERMINE

VAPP is the maximum between VREF +30 kt/160 kt:

Weight (1 000 kg)	*52*	*56*	*60*	*64*	*68*	*72*	*76*	*80*	*84*	*88*	*92*	*94*
VAPP	*160*	*160*	*160*	*160*	*163*	*167*	*171*	*174*	*178*	*181*	*185*	*187*

- **At a suitable altitude (not below 3 000 ft AGL), configure the aircraft for ditching (CONF 3; L/G UP):**

  L/G lever.....CHECK UP

AT 2 000 FT AGL

CABIN.....NOTIFY FOR DITCHING

DITCHING pushbutton.....ON

Prefer ditching parallel to the swell.
If that causes a strong crosswind, ditch into the wind.
In all cases, touch down with a pitch attitude of approximately 11 °.
Minimize aircraft vertical speed.

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

AT TOUCHDOWN

ENG MASTERS.....OFF

AFTER DITCHING

ATC (VHF 1).....NOTIFY

EVACUATION.....INITIATE

ELT .....CHECK EMITTING

If not, switch on the transmitter.

ENG RELIGHT
(IN FLIGHT)

Applicable to: B-HSI, B-HSK, B-HSM
Impacted by TDU: 00013479 ENG RELIGHT (In Flight)

No attempt should be made to restart an engine, if there are indications of engine damage, if the engine had been shut down because of an engine fire, or if there is a recognizable possibility that an attempted relight may result in fire.

MAX ALTITUDE..... See below
ENG MASTER (affected)..... OFF
THR LEVER (affected)..... Check IDLE
ENG MODE SEL..... IGN
X BLEED..... OPEN

If outside the windmilling start envelope, the FADEC will open the starter valve.

WING A. ICE (for starter assist)..... OFF
ENG MASTER (affected)..... ON

Be aware that, unlike the procedure for auto start on ground, the crew must take appropriate action in case of an abnormal start.
Engine light-up should be achieved within 30 s after the fuel flow increases.
Monitor N2. If uncertain about successful relight, move the thrust lever forward and check engine response.

- **When idle is reached:**

  ENG MODE SEL..... NORM
  TCAS MODE SEL ◁ ..... check TA/RA

  Check that the selector is at TA/RA since, if the ENG SHUT DOWN procedure (Refer to PRO-ABN-70 ENG 1(2) SHUT DOWN) has been applied, the TCAS mode selector may have been set to the TA position.

  Affected SYS..... RESTORE

  Restore affected systems, and set the X BLEED rotary selector to AUTO.

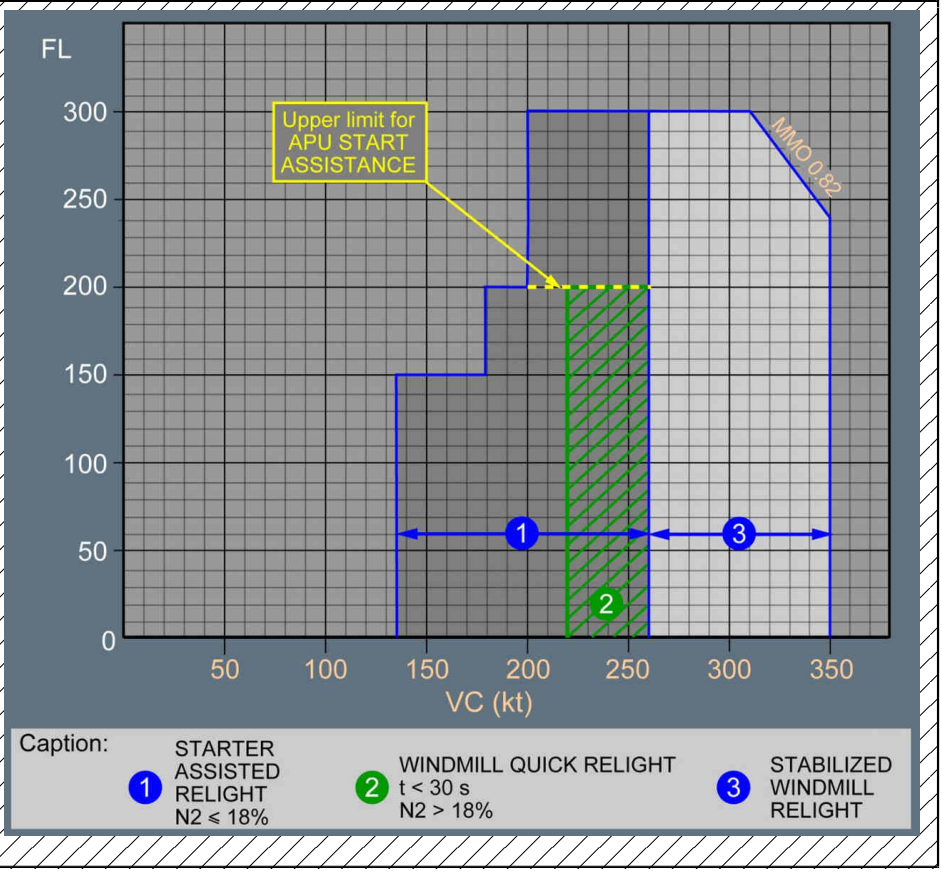
- **If no relight:**

  ENG MASTER..... OFF

  Wait 30 s before attempting a new start (to drain the engine).

Continued on the following page

ENG RELIGHT (Cont'd)
(IN FLIGHT)



ENG RELIGHT
(IN FLIGHT)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSJ, B-HSL, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU
Impacted by TDU: 00013479 ENG RELIGHT (In Flight)

No attempt should be made to restart an engine, if there are indications of engine damage, if the engine had been shut down because of an engine fire, or if there is a recognizable possibility that an attempted relight may result in fire.

MAX ALTITUDE..... See below
ENG MASTER (affected)..... OFF
THR LEVER (affected)..... Check IDLE
ENG MODE SEL..... IGN
X BLEED..... OPEN

If outside the windmilling start envelope, the FADEC will open the starter valve.

WING A. ICE (for starter assist)..... OFF
ENG MASTER (affected)..... ON

Be aware that, unlike the procedure for auto start on ground, the crew must take appropriate action in case of an abnormal start.
Engine light-up should be achieved within 30 s after the fuel flow increases.
Monitor N2. If uncertain about successful relight, move the thrust lever forward and check engine response.

■ **When idle is reached (AVAIL indication pulses in green):**

ENG MODE SEL..... NORM
TCAS MODE SEL ◁ ..... check TA/RA

Check that the selector is at TA/RA since, if the ENG SHUT DOWN procedure (Refer to PRO-ABN-70 ENG 1(2) SHUT DOWN) has been applied, the TCAS mode selector may have been set to the TA position.

Affected SYS..... RESTORE

Restore affected systems, and set the X BLEED rotary selector to AUTO.

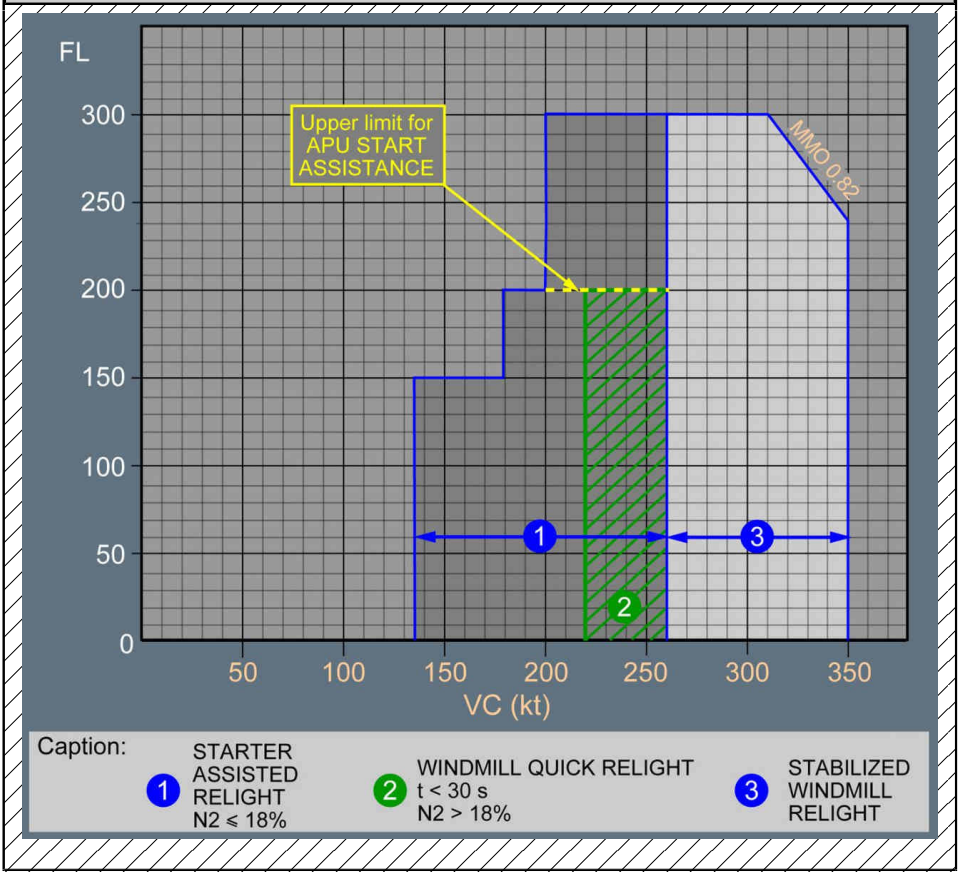
■ **If no relight:**

ENG MASTER..... OFF

Wait 30 s before attempting a new start (to drain the engine).

Continued on the following page

ENG RELIGHT (Cont'd)
(IN FLIGHT)



ENG RELIGHT
(IN FLIGHT)

Applicable to: B-HSI, B-HSK, B-HSM
Impacted DU: 00012594 ENG RELIGHT (In Flight)

No attempt should be made to restart an engine, if there are indications of engine damage, if the engine had been shut down because of an engine fire, or if there is a recognizable possibility that an attempted relight may result in fire.

MAX ALTITUDE..... See below
ENG MASTER (affected)..... OFF
THR LEVER (affected).....Check IDLE
ENG MODE SEL.....IGN
X BLEED..... OPEN

If outside the windmilling start envelope, the FADEC will open the starter valve.

WING A. ICE (for starter assist)..... OFF
ENG MASTER (affected)..... ON

Be aware that, unlike the procedure for auto start on ground, the crew must take appropriate action in case of an abnormal start.
Engine light-up should be achieved within 30 s after the fuel flow increases.
Monitor N2. If uncertain about successful relight, move the thrust lever forward and check engine response.

■ **When idle is reached:**

ENG MODE SEL.....NORM
TCAS MODE SEL ◁✻ ..... check TA/RA

Check that the selector is at TA/RA since, if the ENG SHUT DOWN procedure (Refer to PRO-ABN-70 ENG 1(2) SHUT DOWN) has been applied, the TCAS mode selector may have been set to the TA position.

Affected SYS..... RESTORE

Restore affected systems, and set the X BLEED rotary selector to AUTO.

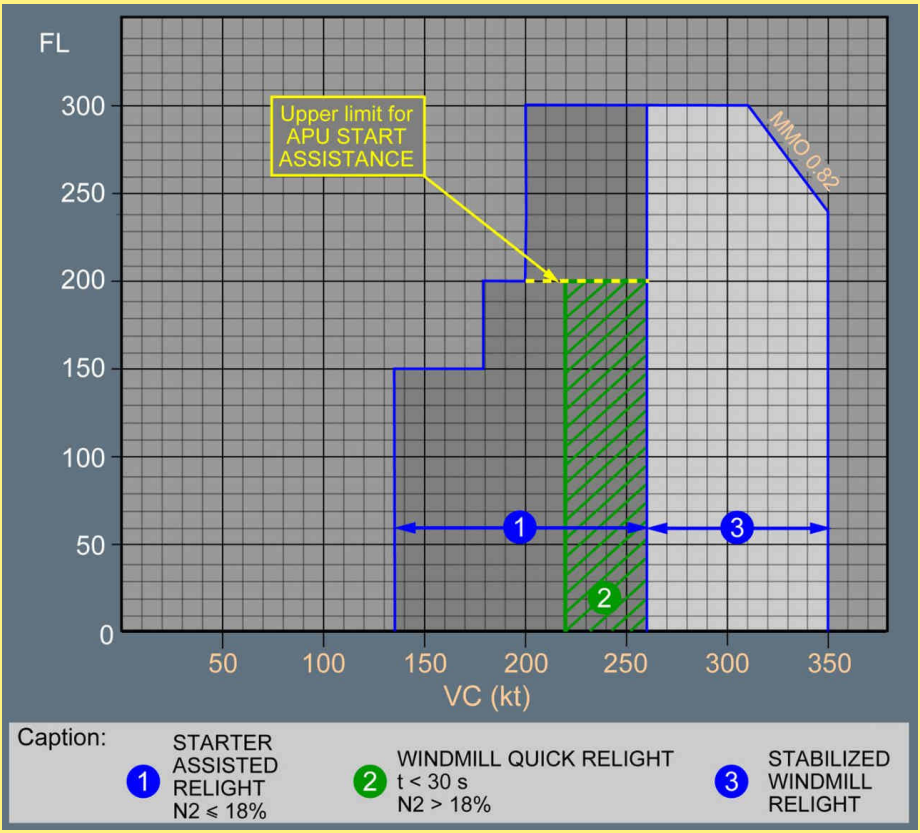
■ **If no relight:**

ENG MASTER..... OFF

Wait 30 s before attempting a new start (to drain the engine).

Continued on the following page

ENG RELIGHT (Cont'd)
(IN FLIGHT)



ENG RELIGHT
(IN FLIGHT)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSJ, B-HSL, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU
Impacted DU: 00012594 ENG RELIGHT (In Flight)

No attempt should be made to restart an engine, if there are indications of engine damage, if the engine had been shut down because of an engine fire, or if there is a recognizable possibility that an attempted relight may result in fire.

MAX ALTITUDE..... See below
ENG MASTER (affected)..... OFF
THR LEVER (affected).....Check IDLE
ENG MODE SEL.....IGN
X BLEED..... OPEN

If outside the windmilling start envelope, the FADEC will open the starter valve.

WING A. ICE (for starter assist)..... OFF
ENG MASTER (affected)..... ON

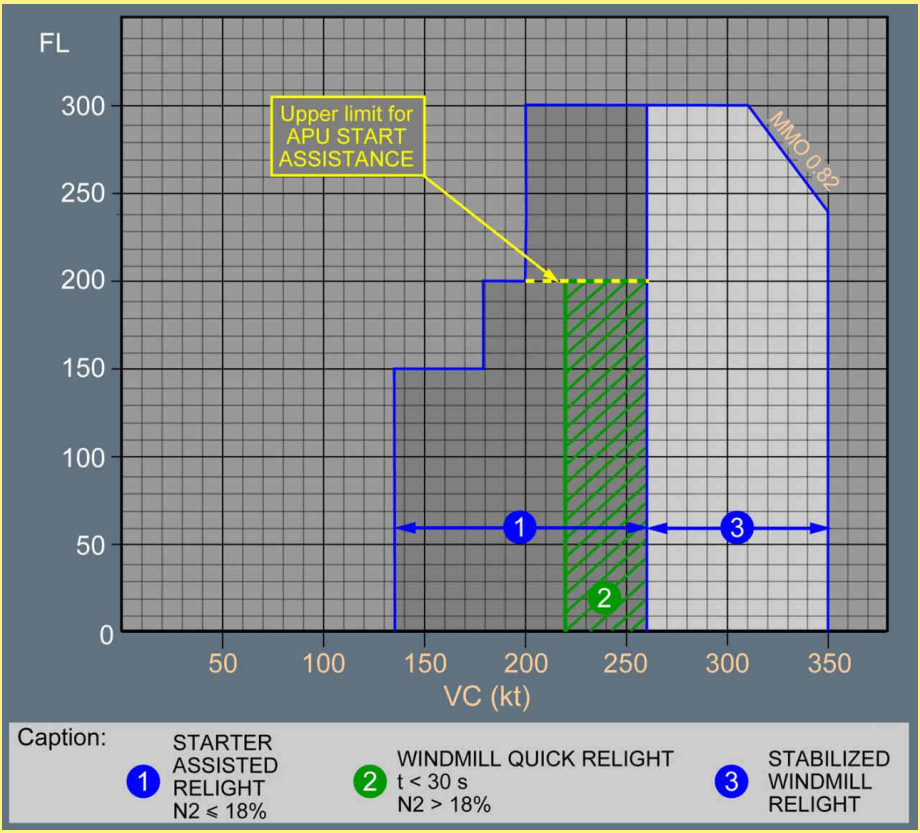
Be aware that, unlike the procedure for auto start on ground, the crew must take appropriate action in case of an abnormal start.
Engine light-up should be achieved within 30 s after the fuel flow increases.
Monitor N2. If uncertain about successful relight, move the thrust lever forward and check engine response.

- **When idle is reached (AVAIL indication pulses in green):**
  ENG MODE SEL.....NORM
  TCAS MODE SEL ◁✻ ..... check TA/RA
  Check that the selector is at TA/RA since, if the ENG SHUT DOWN procedure (Refer to PRO-ABN-70 ENG 1(2) SHUT DOWN) has been applied, the TCAS mode selector may have been set to the TA position.
  Affected SYS..... RESTORE
  Restore affected systems, and set the X BLEED rotary selector to AUTO.

- **If no relight:**
  ENG MASTER..... OFF
  Wait 30 s before attempting a new start (to drain the engine).

Continued on the following page

ENG RELIGHT (Cont'd)
(IN FLIGHT)



ENG REV SET

Applicable to: ALL

L2 Reverse thrust has been selected in flight.

L1 THR LEVER (AFFECTED ENGINE)..... FWD THR

ENG TAILPIPE FIRE

Applicable to: ALL

Internal engine fire may be encountered during engine start or engine shutdown.
It may be seen by the ground crew, or the EGT may fail to decrease after the MASTER switch is turned OFF.

CAUTION	External fire agents can cause severe corrosive damage and should, therefore, only be considered after having applied the following procedure:

ENG MASTER (affected) ..... OFF

Note: Do not press the engine fire pushbutton, since this would cut off the FADEC power supply, which would prevent motoring sequence.

MAN START (if manual start performed)..... OFF
AIR BLEED PRESS ..... ESTABLISH

Select the APU, or opposite BLEED, to motor the engine.
If APU BLEED is not available, and the opposite engine is shut down, connect external pneumatic power (if readily available).

BEACON ..... ON
ENG MODE SEL..... CRANK
MAN START.....ON

The start valve automatically reopens, when N2 is below 10 %.

- **When burning has stopped:**
  MAN START .....OFF
  ENG MODE SEL ..... NORM

  Maintenance action is due.

ENG THR LEVERS NOT SET

Applicable to: ALL

19 L2 At least one FADEC engaged a takeoff thrust mode that is not in accordance with the position of the thrust levers.

L1 *Note:* *1. The takeoff thrust mode is engaged when the flight crew sets the thrust levers above the CL position.*
2. The flex takeoff thrust mode is armed only if the flight crew entered a FLEX TO TEMP on the MCDU that is above the OAT.

20 ■ **If the flex mode is not armed, and the flight crew sets the thrust levers below or at the MCT/FLX position:**
THR LEVERS..... TO/GA

■ **If the flex mode is armed, and the flight crew sets the thrust levers below the MCT/FLX position:**
THR LEVERS ..... MCT/FLX

ENG THRUST LOCKED

Applicable to: ALL

L2 The thrust is frozen on one or more engine after a failure or an involuntary autothrust disconnections.
This caution is automatically repeated every 5 s until thrust levers are moved.

L1 THR LEVERS.....MOVE

ENG TYPE DISAGREE

Applicable to: ALL

L2 This caution is triggered when a rating discrepancy is detected between two engines.

Crew awareness

ENG VIB SYS FAULT

Applicable to: ALL

L2 Crew awareness.

HIGH ENGINE VIBRATION

Applicable to: ALL

21

■ **High N2 vibrations during engine start on ground:**

Engine start should be aborted (if vibration indication are available) when N2 vibration level exceeds the 6.5 units advisory threshold. The subsequent start is to be initiated after the engine has completely spooled down. This procedure may be repeated a maximum of three times. Report in log book any N2 vibration advisory condition.

■ **High N1 or N2 vibrations in operation:**

The VIB advisory on ECAM (N1 ≥5 units, N2 ≥5 units) is mainly a guideline to induce the crew to monitor engine parameters more closely.

VIB detection alone does not require engine shut down.

Note: *1. High engine vibrations may be accompanied by cockpit and cabin smoke and/or the smell of burning. This may be due only to compressor blade tip contact with associated abradable seals.*
2. High N1 vibrations are generally accompanied by perceivable airframe vibrations. High N2 vibrations can occur without perceivable airframe vibrations.

■ **If no icing conditions:**

ENG PARAMETERS .....CHECK

Check engine parameters and especially EGT; crosscheck with other engine. Report in maintenance log.

● **If rapid increase above the advisor:**

THRUST LEVER (affected engine)..... RETARD

Flight conditions permitting reduce N1 to maintain vibration level below advisory threshold.

Note: *If the VIB indication does not decrease following thrust reduction, this may indicate other problems on the engine. Apply adequate procedure.*

■ **If icing conditions:**

An increase of engine vibration in icing conditions with or without engine anti-ice may be due to fan blades and/or spinner icing.

ATHR ..... OFF
ENGINE ANTI ICE..... CHECK

If ENG ANTI ICE is off, switch it ON at idle fan speed, one engine after the other with approximately 30 s interval.

Continued on the following page

HIGH ENGINE VIBRATION (Cont'd)

THRUST LEVER (one engine at a time)..... INCREASE THRUST

Increase thrust to a setting compatible with the flight phase. VIB level will come back to normal after ice shed despite a slight increase during acceleration.
Resume normal operation.

Note: *If possible, shut the engine down after landing for taxiing, when vibrations above the advisory level have been experienced during the flight.*

BOMB ON BOARD

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

IF POSSIBLE, LAND AND EVACUATE THE AIRCRAFT IMMEDIATELY.

If it is not possible to land and evacuate the aircraft within 30 min, apply the following procedures:

1 ## COCKPIT PROCEDURES

BACKGROUND

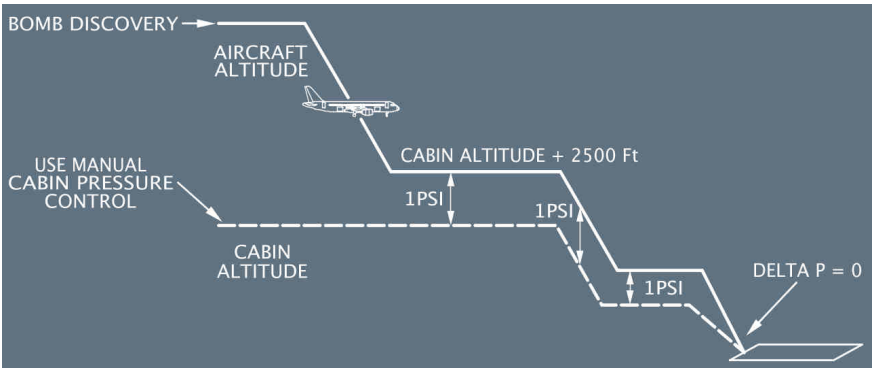
To avoid the activation of an altitude-sensitive bomb, the cabin altitude should not exceed the value at which the bomb has been discovered.
To reduce the effects of the explosion, the aircraft should fly as long as possible with approximately 1 PSI differential pressure, to help the blast go outwards. 1 PSI differential pressure corresponds to a 2 500 ft difference between the aircraft and the cabin altitude.
These conditions are achieved by using the manual pressure control.

PROCEDURE

The following procedure assumes that it is initiated during climb or cruise:

First, maintain the cabin altitude.
While maintaining the cabin altitude, descend the aircraft to the cabin altitude + 2 500 ft and maintain delta P at 1 PSI.
During further steps of descent, maintain delta P at 1 PSI.
For landing, reduce the differential pressure to zero, until the final approach.

If flight conditions are different, the crew should adapt the procedure, bearing in mind the above-mentioned principles (background paragraph).



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BOMB ON BOARD (Cont'd)

AIRCRAFT (if climbing).....LEVEL OFF
CABIN PRESS MODE SEL.....MAN

The purpose is to immediately prevent the cabin altitude from increasing, in order to avoid the activation of an altitude-sensitive bomb.

CAB ALT.....MAINTAIN

Use MAN V/S CTL selector to maintain the cabin altitude at the value it had when the bomb was discovered.

CABIN CREW.....NOTIFY
ATC/COMPANY OPERATIONS.....NOTIFY

To obtain expert advice from explosive specialists.

FUEL RESERVES.....DETERMINE

Keep in mind that when flying at cabin altitude + 2 500 ft, fuel consumption in CONF 1, with landing gear down, will be about 2.1 times that consumed in clean configuration.

NEXT SUITABLE AIRPORT.....DETERMINE
FCU SPEED SELECTION KNOB..... PULL AND TURN

Select the most appropriate speed, taking into account the time to destination, the fuel consumption and the fact that low speed could reduce the consequences of possible structural damage, if the bomb explodes.

DESCENT TO CAB ALT + 2500 FT or MEA or minimum obstacle clearance altitude.....
.....INITIATE

Descending to 2 500 ft above the cabin altitude gives a cabin differential pressure of approximately 1 PSI, which helps to ensure that the blast goes outwards, if the bomb explodes.

AVOID SHARP MANEUVERS

Which might result in the bomb moving.

CAB ALT.....MAINTAIN

Use MAN V/S CTL selector to maintain the cabin altitude. Initially brief UP input should be required; but, be careful not to increase the cabin altitude.

- **When at CAB ALT + 2 500 ft:**

  1 PSI DELTA P.....MAINTAIN

  Use MAN V/S CTL selector to adjust delta P to 1 PSI. Brief DN input should be initially required to set 0 ft/min cabin vertical speed.

  GALLEY.....OFF
  FLAPS (fuel permitting).....AT LEAST CONF 1

Continued on the following page

BOMB ON BOARD (Cont'd)

For landing, use normal configuration.

LANDING GEAR (fuel permitting, except for flight over water)..... DOWN

The detonation could damage the landing systems. Therefore, if fuel permits, configure the aircraft for landing as soon as possible. Reducing the speed will minimize stress on the aircraft structure.

- **For any other steps of descent:**

  1 PSI DELTA P.....MAINTAIN

  Use MAN V/S CTL selector to DN to adjust delta P to 1 PSI.

- **During approach:**

  CABIN PRESS MODE SEL..... AUTO

  This allows CPC to automatically control the cabin altitude to 0 during final approach.

- **When the aircraft is on ground and stopped in a remote area (if possible):**

  - **If Evacuation required:**

    EVACUATION..... INITIATE

    Make a short and precise announcement to order the emergency evacuation. Avoid exiting on the same side as the bomb and near the bomb.

  - **If Evacuation not required:**

    CABIN CREW and PASSENGERS (PA)..... NOTIFY

2 **CABIN PROCEDURES**

If a suspect device is found in the cabin:

WARNING	Do not cut or disconnect any wires and do not open or attempt to gain entry to internal components of a closed or concealed suspect device. Any attempt may result in an explosion. Booby-trapped closed devices have been used on aircraft in the past.

WARNING	Alternate locations must not be used without consulting with an aviation explosives security specialist. Never take a suspect device to the flight deck.

CAUTION	The least risk bomb location for the aircraft structure and systems is center of the RH aft cabin door.

EOD PERSONNEL ON BOARD.....CHECK

Announce "Is there any EOD personnel on board ?". By using the initials, only persons familiar with EOD (Explosive Ordnance Disposal) will be made aware of the problem.

Continued on the following page

BOMB ON BOARD (Cont'd)

BOMB.....DO NOT OPEN
BOMB..... DO NOT CUT WIRES
BOMB.....SECURE AGAINST SLIPPING
BOMB.....AVOID SHOCKS

Secure in the attitude found and do not lift before having checked for an anti-lift ignition device.

PASSENGERS..... LEAD AWAY FROM BOMB

Move passengers at least 4 seat rows away from the bomb location. On full flights, it may be necessary to double up passengers to achieve standoff from the suspect device.
Passengers near the bomb should protect their heads with pillows, blankets.
All passengers must remain seated with seatbelts on and, if possible, head below the top of the head rest. Seat backs and tray tables should be in their full upright position.
Service items may need to be collected in order to secure tray tables.

PORTABLE ELECTRONIC DEVICES.....SWITCH OFF

The cabin crews must command passengers to switch off all portable electronic devices.

BOMB.....CHECK NO ANTI-LIFT DEVICE

To check for an anti-lift switch or lever, slide a string or stiff card, (such as the emergency information card) under the bomb, without disturbing the bomb.
If the string or card cannot be slipped under the bomb, it may indicate that an anti-lift switch or lever is present and that the bomb cannot be moved.
If a card is used and can be slid under the bomb, leave it under the bomb and move together with the bomb.
If it is not possible to move the bomb, then it should be surrounded with a single thin sheet of plastic (e. g. trash bag), then with wetted materials, and other blast attenuation materials such as seat cushions and soft carry-on baggage. Move personnel as far away from the bomb location as possible.

EMERGENCY EQUIPMENTS.....REMOVE AND STOW

Emergency equipments (PBE, fire extinguisher, ...) located close to the LRBL must be removed and stowed in alternate location.

GALLEY/IFE POWER.....OFF

All galley and IFE equipments located close to the LRBL must be switched off.

- **If the bomb can be moved:**

  RH AFT CABIN DOOR SLIDE..... DISARM
  LEAST RISK BOMB LOCATION (LRBL)..... PREPARE

  Build up a platform of solid baggage against the door up to about 25 cm (10 in) below the middle of the door.

Continued on the following page

BOMB ON BOARD (Cont'd)

On top of this, build up at least 25 cm (10 in) of wetted material such as blankets and pillows. Place a single thin sheet of plastic (e. g. trash bag) on top of the wetted materials. This prevents any possible short circuit.

CAUTION	*DO NOT OMIT THE PLASTIC SHEETS, AS THE SUSPECT DEVICE COULD GET WET AND POSSIBLY SHORT CIRCUIT ELECTRONIC COMPONENTS CAUSING INADVERTENT DEVICE ACTIVATION.*

BOMB INDICATION LINE.....POSITION

Note: *A bomb location indicator line is a 6 to 8 ft (1.8 to 2.4 m) (e.g. neckties, headset cord, or belts connected together) preferably of constrating color, that helps the responding bomb squad find the precise location of the suspect device within the LRBL stack once constructed.*

Position the bomb indication line from the location on the platform where you will place the suspect device, EXTENDING outward into the aisle.

BOMB.....MOVE TO LRBL

Carefully carry in the attitude found and place on top of the wetted materials in the same attitude and as close to the door structure as possible.

CAUTION	*Ensure that the suspect device, when placed on the stack against the door, is above the slide pack but not against the door handle, and if possible, avoid placement in the view port.*

LEAST RISK BOMB LOCATION (LRBL).....COMPLETE

Place an additional single thin sheet of plastic over the bomb.

CAUTION	*DO NOT OMIT THE PLASTIC SHEETS, AS THE SUSPECT DEVICE COULD GET WET AND POSSIBLY SHORT CIRCUIT ELECTRONIC COMPONENTS CAUSING INADVERTENT DEVICE ACTIVATION.*

Build up at 25 cm (10 in) of wetted material around the sides and on top of the bomb.

DO NOT PLACE ANYTHING BETWEEN THE BOMB AND THE DOOR, AND MINIMIZE AIRSPACE AROUND THE BOMB.

The idea is to build up a protective surrounding of the bomb so that the explosive force is directed in the only unprotected area into the door structure.
Fill the area around the bomb with seat cushions and other soft materials such as hand luggage (saturated with water or any other nonflammable liquid) up to the cabin ceiling, compressing as much as possible. Secure the LRBL stack in place using belt, ties or other

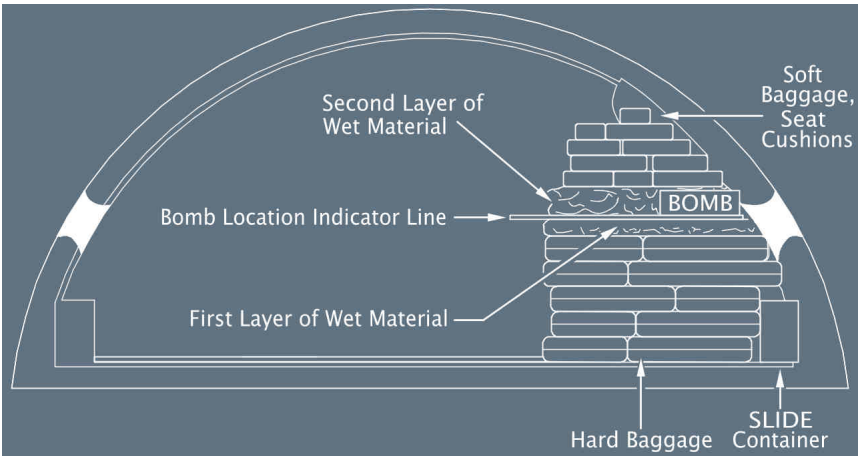
Continued on the following page

BOMB ON BOARD (Cont'd)

appropriate materials. The more material stacked around the bomb, the less the damage will be.

USE ONLY SOFT MATERIAL. AVOID USING MATERIALS CONTAINING ANY INFLAMMABLE LIQUID AND ANY METAL OBJECTS WHICH COULD BECOME DANGEROUS PROJECTILES.

LRBL STACK



PASSENGERS..... MOVE/ADVISE

Move passengers at least 4 seat rows away from the least risk bomb location (RH aft cabin door). On full flights, it may be necessary to double up passengers to achieve standoff from the suspect device.

Passengers near the bomb should protect their heads with pillows, blankets. All passengers must remain seated with seatbelts on and, if possible, head below the top of the head rest. Seat backs and tray tables must be in their full upright position.

CABIN CREW..... NOTIFY COCKPIT CREW

Cabin crew notify the flight crew that the bomb is secured at the LRBL.

EVACUATION/DISEMBARKATION.....EXECUTE

Evacuate through normal and emergency exits on the opposite side of the "bomb" location. Do not use the door just opposite the "bomb".

Use all available airport facilities to disembark without delay.

BOMB ON BOARD

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

IF POSSIBLE, LAND AND EVACUATE THE AIRCRAFT IMMEDIATELY.

If it is not possible to land and evacuate the aircraft within 30 min, apply the following procedures:

3 **COCKPIT PROCEDURES**

BACKGROUND

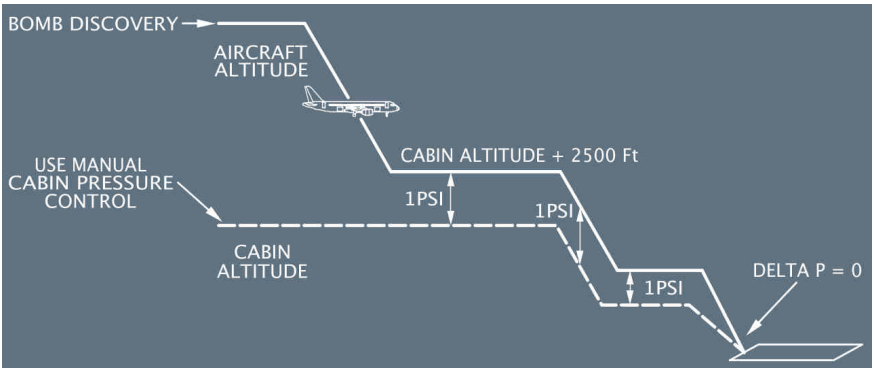
To avoid the activation of an altitude-sensitive bomb, the cabin altitude should not exceed the value at which the bomb has been discovered.
To reduce the effects of the explosion, the aircraft should fly as long as possible with approximately 1 PSI differential pressure, to help the blast go outwards. 1 PSI differential pressure corresponds to a 2 500 ft difference between the aircraft and the cabin altitude.
These conditions are achieved by using the manual pressure control.

PROCEDURE

The following procedure assumes that it is initiated during climb or cruise:

First, maintain the cabin altitude.
While maintaining the cabin altitude, descend the aircraft to the cabin altitude + 2 500 ft and maintain delta P at 1 PSI.
During further steps of descent, maintain delta P at 1 PSI.
For landing, reduce the differential pressure to zero, until the final approach.

If flight conditions are different, the crew should adapt the procedure, bearing in mind the above-mentioned principles (background paragraph).



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BOMB ON BOARD (Cont'd)

AIRCRAFT (if climbing).....LEVEL OFF
CABIN PRESS MODE SEL.....MAN

The purpose is to immediately prevent the cabin altitude from increasing, in order to avoid the activation of an altitude-sensitive bomb.

CAB ALT.....MAINTAIN

Use MAN V/S CTL selector to maintain the cabin altitude at the value it had when the bomb was discovered.

CABIN CREW.....NOTIFY
ATC/COMPANY OPERATIONS.....NOTIFY

To obtain expert advice from explosive specialists.

FUEL RESERVES.....DETERMINE

Keep in mind that when flying at cabin altitude + 2 500 ft, fuel consumption in CONF 1, with landing gear down, will be about 2.1 times that consumed in clean configuration.

NEXT SUITABLE AIRPORT.....DETERMINE
FCU SPEED SELECTION KNOB..... PULL AND TURN

Select the most appropriate speed, taking into account the time to destination, the fuel consumption and the fact that low speed could reduce the consequences of possible structural damage, if the bomb explodes.

DESCENT TO CAB ALT + 2500 FT or MEA or minimum obstacle clearance altitude.....
.....INITIATE

Descending to 2 500 ft above the cabin altitude gives a cabin differential pressure of approximately 1 PSI, which helps to ensure that the blast goes outwards, if the bomb explodes.

AVOID SHARP MANEUVERS

Which might result in the bomb moving.

CAB ALT.....MAINTAIN

Use MAN V/S CTL selector to maintain the cabin altitude. Initially brief UP input should be required; but, be careful not to increase the cabin altitude.

- **When at CAB ALT + 2 500 ft:**

  1 PSI DELTA P.....MAINTAIN

  Use MAN V/S CTL selector to adjust delta P to 1 PSI. Brief DN input should be initially required to set 0 ft/min cabin vertical speed.

  GALLEY.....OFF

Continued on the following page

BOMB ON BOARD (Cont'd)

- **When the bomb is secured at the LRBL or cannot be moved:**
  EMER EXIT LT..... ON
  To recover minimum cabin lighting when the COMMERCIAL pb-sw will be switched OFF
  COMMERCIAL.....OFF

FLAPS (fuel permitting).....AT LEAST CONF 1
For landing, use normal configuration.
LANDING GEAR (fuel permitting, except for flight over water)..... DOWN
The detonation could damage the landing systems. Therefore, if fuel permits, configure the aircraft for landing as soon as possible. Reducing the speed will minimize stress on the aircraft structure.

- **For any other steps of descent:**
  1 PSI DELTA P.....MAINTAIN
  Use MAN V/S CTL selector to DN to adjust delta P to 1 PSI.

- **During approach:**
  CABIN PRESS MODE SEL..... AUTO
  This allows CPC to automatically control the cabin altitude to 0 during final approach.

- **When the aircraft is on ground and stopped in a remote area (if possible):**
  - **If Evacuation required:**
    EVACUATION..... INITIATE
    Make a short and precise announcement to order the emergency evacuation.
    Avoid exiting on the same side as the bomb and near the bomb.
  - **If Evacuation not required:**
    CABIN CREW and PASSENGERS (PA)..... NOTIFY

4 **CABIN PROCEDURES**

If a suspect device is found in the cabin:

WARNING	Do not cut or disconnect any wires and do not open or attempt to gain entry to internal components of a closed or concealed suspect device. Any attempt may result in an explosion. Booby-trapped closed devices have been used on aircraft in the past.

Continued on the following page

BOMB ON BOARD (Cont'd)

WARNING	Alternate locations must not be used without consulting with an aviation explosives security specialist. Never take a suspect device to the flight deck.

CAUTION	The least risk bomb location for the aircraft structure and systems is center of the RH aft cabin door.

EOD PERSONNEL ON BOARD.....CHECK

Announce "Is there any EOD personnel on board ?". By using the initials, only persons familiar with EOD (Explosive Ordnance Disposal) will be made aware of the problem.

BOMB.....DO NOT OPEN
BOMB..... DO NOT CUT WIRES
BOMB.....SECURE AGAINST SLIPPING
BOMB.....AVOID SHOCKS

Secure in the attitude found and do not lift before having checked for an anti-lift ignition device.

PASSENGERS..... LEAD AWAY FROM BOMB

Move passengers at least 4 seat rows away from the bomb location. On full flights, it may be necessary to double up passengers to achieve standoff from the suspect device.
Passengers near the bomb should protect their heads with pillows, blankets.
All passengers must remain seated with seatbelts on and, if possible, head below the top of the head rest. Seat backs and tray tables should be in their full upright position.
Service items may need to be collected in order to secure tray tables.

PORTABLE ELECTRONIC DEVICES.....SWITCH OFF

The cabin crews must command passengers to switch off all portable electronic devices.

BOMB.....CHECK NO ANTI-LIFT DEVICE

To check for an anti-lift switch or lever, slide a string or stiff card, (such as the emergency information card) under the bomb, without disturbing the bomb.
If the string or card cannot be slipped under the bomb, it may indicate that an anti-lift switch or lever is present and that the bomb cannot be moved.
If a card is used and can be slid under the bomb, leave it under the bomb and move together with the bomb.
If it is not possible to move the bomb, then it should be surrounded with a single thin sheet of plastic (e. g. trash bag), then with wetted materials, and other blast attenuation materials such as seat cushions and soft carry-on baggage. Move personnel as far away from the bomb location as possible.

EMERGENCY EQUIPMENTS.....REMOVE AND STOW

Continued on the following page

BOMB ON BOARD (Cont'd)

Emergency equipments (PBE, fire extinguisher, ...) located close to the LRBL must be removed and stowed in alternate location.

GALLEY/IFE POWER.....OFF

All galley and IFE equipments located close to the LRBL must be switched off.

- **If the bomb can be moved:**

RH AFT CABIN DOOR SLIDE..... DISARM
LEAST RISK BOMB LOCATION (LRBL)..... PREPARE

Build up a platform of solid baggage against the door up to about 25 cm (10 in) below the middle of the door.
On top of this, build up at least 25 cm (10 in) of wetted material such as blankets and pillows. Place a single thin sheet of plastic (e. g. trash bag) on top of the wetted materials. This prevents any possible short circuit.

CAUTION	*DO NOT OMIT THE PLASTIC SHEETS, AS THE SUSPECT DEVICE COULD GET WET AND POSSIBLY SHORT CIRCUIT ELECTRONIC COMPONENTS CAUSING INADVERTENT DEVICE ACTIVATION.*

BOMB INDICATION LINE.....POSITION

Note: A bomb location indicator line is a 6 to 8 ft (1.8 to 2.4 m) (e.g. neckties, headset cord, or belts connected together) preferably of constrating color, that helps the responding bomb squad find the precise location of the suspect device within the LRBL stack once constructed.

Position the bomb indication line from the location on the platform where you will place the suspect device, EXTENDING outward into the aisle.

BOMB.....MOVE TO LRBL

Carefully carry in the attitude found and place on top of the wetted materials in the same attitude and as close to the door structure as possible.

CAUTION	*Ensure that the suspect device, when placed on the stack against the door, is above the slide pack but not against the door handle, and if possible, avoid placement in the view port.*

LEAST RISK BOMB LOCATION (LRBL).....COMPLETE

Place an additional single thin sheet of plastic over the bomb.

Continued on the following page

BOMB ON BOARD (Cont'd)

CAUTION	*DO NOT OMIT THE PLASTIC SHEETS, AS THE SUSPECT DEVICE COULD GET WET AND POSSIBLY SHORT CIRCUIT ELECTRONIC COMPONENTS CAUSING INADVERTENT DEVICE ACTIVATION.*

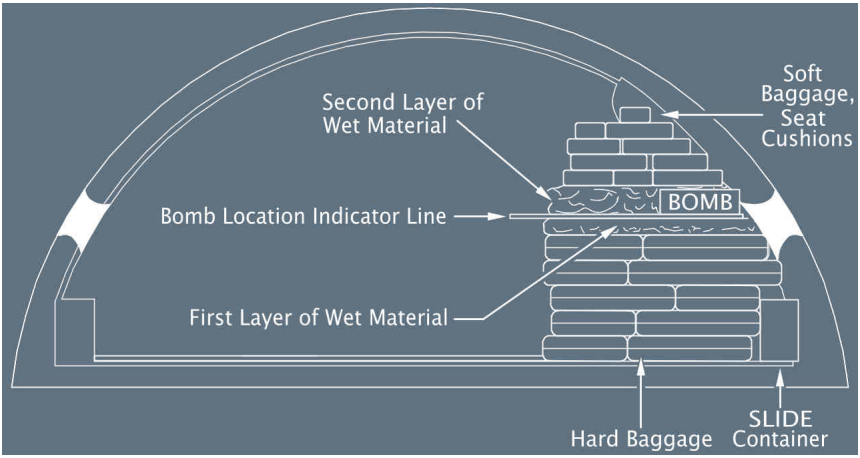
Build up at 25 cm (10 in) of wetted material around the sides and on top of the bomb.

DO NOT PLACE ANYTHING BETWEEN THE BOMB AND THE DOOR, AND MINIMIZE AIRSPACE AROUND THE BOMB.

The idea is to build up a protective surrounding of the bomb so that the explosive force is directed in the only unprotected area into the door structure.
Fill the area around the bomb with seat cushions and other soft materials such as hand luggage (saturated with water or any other nonflammable liquid) up to the cabin ceiling, compressing as much as possible. Secure the LRBL stack in place using belt, ties or other appropriate materials. The more material stacked around the bomb, the less the damage will be.

USE ONLY SOFT MATERIAL. AVOID USING MATERIALS CONTAINING ANY INFLAMMABLE LIQUID AND ANY METAL OBJECTS WHICH COULD BECOME DANGEROUS PROJECTILES.

LRBL STACK



PASSENGERS..... MOVE/ADVISE

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BOMB ON BOARD (Cont'd)

Move passengers at least 4 seat rows away from the least risk bomb location (RH aft cabin door). On full flights, it may be necessary to double up passengers to achieve standoff from the suspect device.
Passengers near the bomb should protect their heads with pillows, blankets. All passengers must remain seated with seatbelts on and, if possible, head below the top of the head rest. Seat backs and tray tables must be in their full upright position.

CABIN CREW..... NOTIFY COCKPIT CREW

Cabin crew notify the flight crew that the bomb is secured at the LRBL.

EVACUATION/DISEMBARKATION.....EXECUTE

Evacuate through normal and emergency exits on the opposite side of the "bomb" location. Do not use the door just opposite the "bomb".
Use all available airport facilities to disembark without delay.

BOMB ON BOARD

Applicable to: B-HSJ

IF POSSIBLE, LAND AND EVACUATE THE AIRCRAFT IMMEDIATELY.

If it is not possible to land and evacuate the aircraft within 30 min, apply the following procedures:

5 ## COCKPIT PROCEDURES

BACKGROUND

To avoid the activation of an altitude-sensitive bomb, the cabin altitude should not exceed the value at which the bomb has been discovered.
To reduce the effects of the explosion, the aircraft should fly as long as possible with approximately 1 PSI differential pressure, to help the blast go outwards. 1 PSI differential pressure corresponds to a 2 500 ft difference between the aircraft and the cabin altitude.
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PROCEDURE

The following procedure assumes that it is initiated during climb or cruise:

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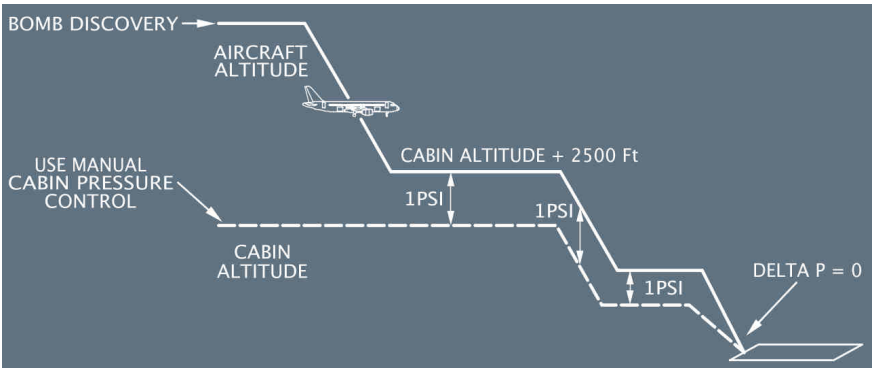
While maintaining the cabin altitude, descend the aircraft to the cabin altitude + 2 500 ft and maintain delta P at 1 PSI.
During further steps of descent, maintain delta P at 1 PSI.
For landing, reduce the differential pressure to zero, until the final approach.

If flight conditions are different, the crew should adapt the procedure, bearing in mind the above-mentioned principles (background paragraph).



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BOMB ON BOARD (Cont'd)

AIRCRAFT (if climbing).....LEVEL OFF
CABIN PRESS MODE SEL.....MAN

The purpose is to immediately prevent the cabin altitude from increasing, in order to avoid the activation of an altitude-sensitive bomb.

CAB ALT.....MAINTAIN

Use MAN V/S CTL selector to maintain the cabin altitude at the value it had when the bomb was discovered.

CABIN CREW.....NOTIFY
ATC/COMPANY OPERATIONS.....NOTIFY

To obtain expert advice from explosive specialists.

FUEL RESERVES.....DETERMINE

Keep in mind that when flying at cabin altitude + 2 500 ft, fuel consumption in CONF 1, with landing gear down, will be about 2.1 times that consumed in clean configuration.

NEXT SUITABLE AIRPORT.....DETERMINE
FCU SPEED SELECTION KNOB..... PULL AND TURN

Select the most appropriate speed, taking into account the time to destination, the fuel consumption and the fact that low speed could reduce the consequences of possible structural damage, if the bomb explodes.

DESCENT TO CAB ALT + 2500 FT or MEA or minimum obstacle clearance altitude.....
.....INITIATE

Descending to 2 500 ft above the cabin altitude gives a cabin differential pressure of approximately 1 PSI, which helps to ensure that the blast goes outwards, if the bomb explodes.

AVOID SHARP MANEUVERS

Which might result in the bomb moving.

CAB ALT.....MAINTAIN

Use MAN V/S CTL selector to maintain the cabin altitude. Initially brief UP input should be required; but, be careful not to increase the cabin altitude.

- **When at CAB ALT + 2 500 ft:**

  1 PSI DELTA P.....MAINTAIN

  Use MAN V/S CTL selector to adjust delta P to 1 PSI. Brief DN input should be initially required to set 0 ft/min cabin vertical speed.

  GALY & CAB..... OFF
  FLAPS (fuel permitting).....AT LEAST CONF 1

Continued on the following page

BOMB ON BOARD (Cont'd)

For landing, use normal configuration.

LANDING GEAR (fuel permitting, except for flight over water)..... DOWN

The detonation could damage the landing systems. Therefore, if fuel permits, configure the aircraft for landing as soon as possible. Reducing the speed will minimize stress on the aircraft structure.

- **For any other steps of descent:**

  1 PSI DELTA P.....MAINTAIN

  Use MAN V/S CTL selector to DN to adjust delta P to 1 PSI.

- **During approach:**

  CABIN PRESS MODE SEL..... AUTO

  This allows CPC to automatically control the cabin altitude to 0 during final approach.

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  - **If Evacuation required:**

    EVACUATION..... INITIATE

    Make a short and precise announcement to order the emergency evacuation. Avoid exiting on the same side as the bomb and near the bomb.

  - **If Evacuation not required:**

    CABIN CREW and PASSENGERS (PA)..... NOTIFY

6 **CABIN PROCEDURES**

If a suspect device is found in the cabin:

WARNING	Do not cut or disconnect any wires and do not open or attempt to gain entry to internal components of a closed or concealed suspect device. Any attempt may result in an explosion. Booby-trapped closed devices have been used on aircraft in the past.

WARNING	Alternate locations must not be used without consulting with an aviation explosives security specialist. Never take a suspect device to the flight deck.

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BOMB ON BOARD (Cont'd)

BOMB.....DO NOT OPEN
BOMB..... DO NOT CUT WIRES
BOMB.....SECURE AGAINST SLIPPING
BOMB.....AVOID SHOCKS

Secure in the attitude found and do not lift before having checked for an anti-lift ignition device.

PASSENGERS..... LEAD AWAY FROM BOMB

Move passengers at least 4 seat rows away from the bomb location. On full flights, it may be necessary to double up passengers to achieve standoff from the suspect device.
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If the string or card cannot be slipped under the bomb, it may indicate that an anti-lift switch or lever is present and that the bomb cannot be moved.
If a card is used and can be slid under the bomb, leave it under the bomb and move together with the bomb.
If it is not possible to move the bomb, then it should be surrounded with a single thin sheet of plastic (e. g. trash bag), then with wetted materials, and other blast attenuation materials such as seat cushions and soft carry-on baggage. Move personnel as far away from the bomb location as possible.

EMERGENCY EQUIPMENTS.....REMOVE AND STOW

Emergency equipments (PBE, fire extinguisher, ...) located close to the LRBL must be removed and stowed in alternate location.

GALLEY/IFE POWER.....OFF

All galley and IFE equipments located close to the LRBL must be switched off.

- **If the bomb can be moved:**

  RH AFT CABIN DOOR SLIDE..... DISARM
  LEAST RISK BOMB LOCATION (LRBL)..... PREPARE

  Build up a platform of solid baggage against the door up to about 25 cm (10 in) below the middle of the door.

Continued on the following page

BOMB ON BOARD (Cont'd)

On top of this, build up at least 25 cm (10 in) of wetted material such as blankets and pillows. Place a single thin sheet of plastic (e. g. trash bag) on top of the wetted materials. This prevents any possible short circuit.

CAUTION	*DO NOT OMIT THE PLASTIC SHEETS, AS THE SUSPECT DEVICE COULD GET WET AND POSSIBLY SHORT CIRCUIT ELECTRONIC COMPONENTS CAUSING INADVERTENT DEVICE ACTIVATION.*

BOMB INDICATION LINE.....POSITION

Note: *A bomb location indicator line is a 6 to 8 ft (1.8 to 2.4 m) (e.g. neckties, headset cord, or belts connected together) preferably of constrating color, that helps the responding bomb squad find the precise location of the suspect device within the LRBL stack once constructed.*

Position the bomb indication line from the location on the platform where you will place the suspect device, EXTENDING outward into the aisle.

BOMB.....MOVE TO LRBL

Carefully carry in the attitude found and place on top of the wetted materials in the same attitude and as close to the door structure as possible.

CAUTION	*Ensure that the suspect device, when placed on the stack against the door, is above the slide pack but not against the door handle, and if possible, avoid placement in the view port.*

LEAST RISK BOMB LOCATION (LRBL).....COMPLETE

Place an additional single thin sheet of plastic over the bomb.

CAUTION	*DO NOT OMIT THE PLASTIC SHEETS, AS THE SUSPECT DEVICE COULD GET WET AND POSSIBLY SHORT CIRCUIT ELECTRONIC COMPONENTS CAUSING INADVERTENT DEVICE ACTIVATION.*

Build up at 25 cm (10 in) of wetted material around the sides and on top of the bomb.

DO NOT PLACE ANYTHING BETWEEN THE BOMB AND THE DOOR, AND MINIMIZE AIRSPACE AROUND THE BOMB.

The idea is to build up a protective surrounding of the bomb so that the explosive force is directed in the only unprotected area into the door structure.
Fill the area around the bomb with seat cushions and other soft materials such as hand luggage (saturated with water or any other nonflammable liquid) up to the cabin ceiling, compressing as much as possible. Secure the LRBL stack in place using belt, ties or other

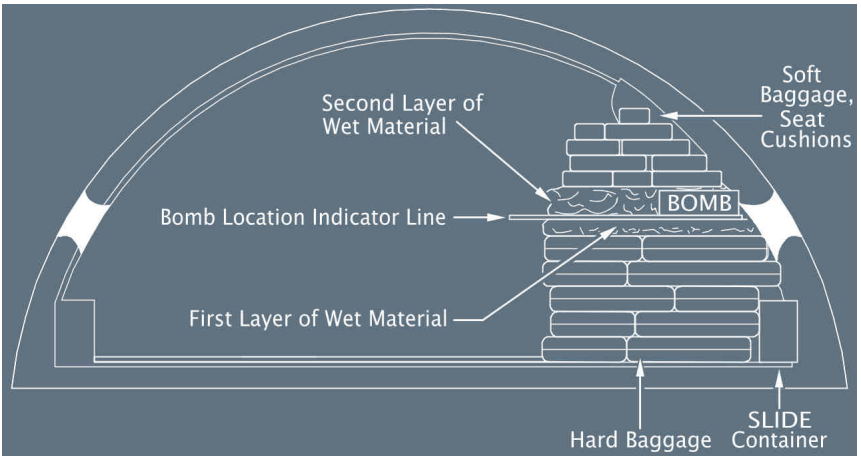
Continued on the following page

BOMB ON BOARD (Cont'd)

appropriate materials. The more material stacked around the bomb, the less the damage will be.

USE ONLY SOFT MATERIAL. AVOID USING MATERIALS CONTAINING ANY INFLAMMABLE LIQUID AND ANY METAL OBJECTS WHICH COULD BECOME DANGEROUS PROJECTILES.

LRBL STACK



PASSENGERS..... MOVE/ADVISE

Move passengers at least 4 seat rows away from the least risk bomb location (RH aft cabin door). On full flights, it may be necessary to double up passengers to achieve standoff from the suspect device.

Passengers near the bomb should protect their heads with pillows, blankets. All passengers must remain seated with seatbelts on and, if possible, head below the top of the head rest. Seat backs and tray tables must be in their full upright position.

CABIN CREW..... NOTIFY COCKPIT CREW

Cabin crew notify the flight crew that the bomb is secured at the LRBL.

EVACUATION/DISEMBARKATION.....EXECUTE

Evacuate through normal and emergency exits on the opposite side of the "bomb" location. Do not use the door just opposite the "bomb".

Use all available airport facilities to disembark without delay.

COCKPIT WINDSHIELD/WINDOW ARCING

Applicable to: ALL

7 Affected WINDOW/WINDSHIELD ANTI-ICE C/B.....PULL

Pull the circuit breaker of the affected window/windshield heating system, in case of:
- *Electrical arcing of the cockpit windshield/window, or*
- *Burning smell or smoke identified as coming from the bottom right corner of CAPT windshield or bottom left corner of the F/O windshield.*

On the rear C/B panel:

- *ANTI-ICE L WSHLD AF10 C/B (123VU). ANTI-ICE/WINDOWS L X14 C/B (122VU),*
- *ANTI-ICE R WSHLD AF03 C/B (123VU). ANTI-ICE/WINDOWS R W14 C/B (122VU).*

COCKPIT WINDSHIELD/WINDOW CRACKED

Applicable to: ALL

DIAGNOSIS OF INNER PLY..... PERFORM

Touch the cracks with a pen (or carefully with fingernail) to determine if there is a crack on the cockpit side.

■ **If no crack on cockpit side:**

No limitation

The inner ply is not affected. Therefore, the window/windshield is still able to sustain the maximum differential pressure at the current flight level.

■ **If cracks on cockpit side:**

MAX FL..... 230/MEA

The inner ply is affected. The flight crew is not able to easily determine if other plies are affected. Descend to FL 230/MEA and reduce differential pressure to 5 PSI .

Note: The maximum flight level is restricted to FL 230/MEA to obtain ΔP 5 PSI , without resulting in an excessive cabin altitude and an EXCESS CAB ALT warning.

The following procedure enables maintaining ΔP 5 PSI in manual cabin pressure mode.

CAB PRESS MODE SEL..... MAN
MAN V/S CTL.....AS RQRD

Disregard the CAB ALT TARGET table displayed on the ECAM and set the cabin altitude according to the table below:

ΔP = 5 PSI	FL	100	150	200	230
	CABIN ALTITUDE	0	3 000	6 000	8 000

● **When starting the descent for approach:**

CAB PRESS MODE SEL.....AUTO

Note: If all front facing windows are affected and if sufficient visibility is not granted for approach, consider AUTOLAND. If AUTOLAND is not available, consider opening the sliding window (maximum speed 200 kt) on the PF's side, after cabin depressurization. To manually depressurize the cabin:

CAB PRESS MODE SEL..... MAN
MAN V/S CTL.....FULL UP

Due to the increased noise level, pay particular attention to visual warnings.

CREW INCAPACITATION

Applicable to: ALL

If a cockpit crew member becomes incapacitated, the remaining crew member must call a cabin attendant as soon as practicable.
The best way to request assistance from the cabin crew, is by means of the passenger address system:
"ATTENTION, PURSER TO COCKPIT PLEASE". The purser or any other cabin attendant must proceed to the cockpit immediately.
The cabin attendant must then:

Tighten and manually lock the shoulder harness of the incapacitated crew member;
Place the pilots hands on his/her chest underneath the shoulder harness.
Push the seat completely aft;
Recline the seat back.
Apply oxygen as required.

It takes 2 people to remove the dead weight of an unconscious body from a seat without endangering any controls and switches.
If it is not possible to remove the body, one cabin attendant must stay in the cockpit to take care of and observe the incapacitated crew member.
In coordination with the purser:

Request assistance from any medically qualified passenger,
Check if a type qualified company pilot is on board to replace the incapacitated crew member.
If no type qualified company pilot is on board one cabin attendant must remain in the cockpit and assist with checklist reading.

DITCHING

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This procedure applies when engines are running. If engines are not running, *Refer to QRH/ABN-70 ENG DUAL FAILURE - FUEL REMAINING - DITCHING* or *Refer to QRH/ABN-70 ENG DUAL FAILURE - NO FUEL REMAINING - DITCHING*, which has been amended to include the ditching procedure when the engines are not running.

PREPARATION

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify ATC of the nature of emergency encountered and state intentions.
Select transponder code A7700 or transmit a distress message on: (VHF) 121.5 MHz or (HF) 2 182 kHz or 8 364 kHz.

CABIN and COCKPIT..... PREPARE

Notify the cabin crew of the nature of the emergency and state intentions.

Specify the available time:
- *Loose equipment secured*
- *Survival equipment prepared*
- *Belts and shoulder harnesses locked*

GPWS SYS..... OFF
GPWS TERR.....OFF

Setting the SYS pb and TERR pb to OFF avoids nuisance warnings.

SIGNS.....ON
GALLEY.....OFF
LDG ELEV.....SELECT 00
BARO.....SET

Omit normal approach and landing check list.

CREW MASKS/OXY SUPPLY (below FL100).....OFF

APPROACH

L/G lever..... UP
SLATS and FLAPS..... MAX AVAIL

AT 2 000 FT AGL

CAB PRESS MODE SEL..... CHECK AUTO

The outflow valve would remain open, if the MODE SEL pb were not at AUTO.

Continued on the following page

DITCHING (Cont'd)

BLEED (ENGs and APU).....OFF
CABIN..... NOTIFY FOR DITCHING
DITCHING pushbutton..... ON

The outflow valve, emergency ram air inlet, avionics ventilation inlet and extract valves, and pack flow control valves close.
The ditching direction mainly depends on the wind direction, and on the state of the sea.

These factors may be considered as follows:
1. Wind direction:
This may be determined by observing of the waves, which move and break downwind. Spray from the wave tops is also a reliable indicator.
2. Wind speed:

The following guidelines can be used to evaluate wind speed:

A few white crests	:	*8-17 kt*
Many white crests	:	*17-26 kt*
Streaks of foam along the water	:	*23-35 kt*
Spray from the waves	:	*35-43 kt*

3. Sea state:
This is best determined from a height of 500 to 1 000 ft.
At a lower altitude, the swell direction may be less obvious than the wave direction, even though the waves are much smaller.
4. When there is no swell, align into the wind. In the presence of swell, and provided that drift does not exceed 10 °, ditch parallel to the swell and as nearly into wind as possible. If drift exceeds 10 °, ditch into the wind. The presence of drift on touchdown is not dangerous, but every effort should be made to minimize roll.
Touch down with approximately 11 ° of pitch, and minimum aircraft vertical speed.

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

AT TOUCHDOWN

ENG MASTERS..... OFF
APU MASTER SW.....OFF

AFTER DITCHING

ATC (VHF 1).....NOTIFY
With engine and APU shut down, only VHF 1 is supplied.

Continued on the following page

DITCHING (Cont'd)

FIRE pushbutton (ENG and APU).....PUSH
AGENTS (ENG and APU).....DISCH
EVACUATION.....INITIATE

After impact the lowest point of the passenger exits (aft door) remains above the waterline for more than 7 min.

DITCHING

Applicable to: B-HSJ

This procedure applies when engines are running. If engines are not running, *Refer to QRH/ABN-70 ENG DUAL FAILURE - FUEL REMAINING - DITCHING* or *Refer to QRH/ABN-70 ENG DUAL FAILURE - NO FUEL REMAINING - DITCHING*, which has been amended to include the ditching procedure when the engines are not running.

PREPARATION

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify ATC of the nature of emergency encountered and state intentions.
Select transponder code A7700 or transmit a distress message on: (VHF) 121.5 MHz or (HF) 2 182 kHz or 8 364 kHz.

CABIN AND COCKPIT.....PREPARE

Notify the cabin crew of the nature of the emergency and state intentions.

Specify the available time:
- *Loose equipment secured*
- *Survival equipment prepared*
- *Belts and shoulder harnesses locked*

GPWS SYS..... OFF
GPWS TERR.....OFF

Pressing OFF the SYS pb and TERR pb avoids nuisance warnings.

SIGNS.....ON
GALY & CAB.....OFF
LDG ELEV.....SELECT 00
BARO..... SET

Omit normal approach and landing check list.

CREW MASKS/OXY SUPPLY (below FL100).....OFF

APPROACH

L/G lever..... UP
SLATS and FLAPS..... MAX AVAIL

AT 2 000 FT AGL

CAB PRESS MODE SEL..... CHECK AUTO

The outflow valve would remain open, if the MODE SEL pb were not at AUTO.

Continued on the following page

DITCHING (Cont'd)

BLEED (ENGs and APU).....OFF
CABIN..... NOTIFY FOR DITCHING
DITCHING pushbutton..... ON

The outflow valve, emergency ram air inlet, avionics ventilation inlet and extract valves, and pack flow control valves close.
The ditching direction mainly depends on the wind direction, and on the state of the sea.

These factors may be considered as follows:

1. *Wind direction:*
   This may be determined by observing of the waves, which move and break downwind. Spray from the wave tops is also a reliable indicator.
2. *Wind speed:*

   The following guidelines can be used to evaluate wind speed:

A few white crests	:	*8-17 kt*
Many white crests	:	*17-26 kt*
Streaks of foam along the water	:	*23-35 kt*
Spray from the waves	:	*35-43 kt*

3. *Sea state:*
   This is best determined from a height of 500 to 1 000 ft.
   At a lower altitude, the swell direction may be less obvious than the wave direction, even though the waves are much smaller.
4. *When there is no swell, align into the wind. In the presence of swell, and provided that drift does not exceed 10 °, ditch parallel to the swell and as nearly into wind as possible. If drift exceeds 10 °, ditch into the wind. The presence of drift on touchdown is not dangerous, but every effort should be made to minimize roll.*
   Touch down with approximately 11 ° of pitch, and minimum aircraft vertical speed.

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

AT TOUCHDOWN

ENG MASTERS..... OFF
APU MASTER SW.....OFF

AFTER DITCHING

ATC (VHF 1).....NOTIFY
With engine and APU shut down, only VHF 1 is supplied.

Continued on the following page

DITCHING (Cont'd)

FIRE pushbutton (ENG and APU).....PUSH
AGENTS (ENG and APU).....DISCH
EVACUATION.....INITIATE

After impact the lowest point of the passenger exits (aft door) remains above the waterline for more than 7 min.

DITCHING

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

This procedure applies when engines are running. If engines are not running, *Refer to QRH/ABN-70 ENG DUAL FAILURE - FUEL REMAINING - DITCHING* or *Refer to QRH/ABN-70 ENG DUAL FAILURE - NO FUEL REMAINING - DITCHING*, which has been amended to include the ditching procedure when the engines are not running.

PREPARATION

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify ATC of the nature of emergency encountered and state intentions.
Select transponder code A7700 or transmit a distress message on: (VHF) 121.5 MHz or (HF) 2 182 kHz or 8 364 kHz.

CABIN AND COCKPIT.....PREPARE

Notify the cabin crew of the nature of the emergency and state intentions.

Specify the available time:
- *Loose equipment secured*
- *Survival equipment prepared*
- *Belts and shoulder harnesses locked*

GPWS SYS..... OFF
GPWS TERR.....OFF

Pressing OFF the SYS pb and TERR pb avoids nuisance warnings.

SIGNS.....ON
EMER EXIT LT..... ON
COMMERCIAL.....OFF
LDG ELEV.....SELECT 00
BARO..... SET

Omit normal approach and landing check list.

CREW MASKS/OXY SUPPLY (below FL100).....OFF

APPROACH

L/G lever..... UP
SLATS and FLAPS..... MAX AVAIL

AT 2 000 FT AGL

CAB PRESS MODE SEL..... CHECK AUTO

The outflow valve would remain open, if the MODE SEL pb were not at AUTO.

Continued on the following page

DITCHING (Cont'd)

BLEED (ENGs and APU).....OFF
CABIN..... NOTIFY FOR DITCHING
DITCHING pushbutton..... ON

The outflow valve, emergency ram air inlet, avionics ventilation inlet and extract valves, and pack flow control valves close.
The ditching direction mainly depends on the wind direction, and on the state of the sea.

These factors may be considered as follows:
1. Wind direction:
This may be determined by observing of the waves, which move and break downwind. Spray from the wave tops is also a reliable indicator.
2. Wind speed:

The following guidelines can be used to evaluate wind speed:

A few white crests	:	*8-17 kt*
Many white crests	:	*17-26 kt*
Streaks of foam along the water	:	*23-35 kt*
Spray from the waves	:	*35-43 kt*

3. Sea state:
This is best determined from a height of 500 to 1 000 ft.
At a lower altitude, the swell direction may be less obvious than the wave direction, even though the waves are much smaller.
4. When there is no swell, align into the wind. In the presence of swell, and provided that drift does not exceed 10 °, ditch parallel to the swell and as nearly into wind as possible. If drift exceeds 10 °, ditch into the wind. The presence of drift on touchdown is not dangerous, but every effort should be made to minimize roll.
Touch down with approximately 11 ° of pitch, and minimum aircraft vertical speed.

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

AT TOUCHDOWN

ENG MASTERS..... OFF
APU MASTER SW.....OFF

AFTER DITCHING

ATC (VHF 1).....NOTIFY
With engine and APU shut down, only VHF 1 is supplied.

Continued on the following page

DITCHING (Cont'd)

FIRE pushbutton (ENG and APU).....PUSH
AGENTS (ENG and APU).....DISCH
EVACUATION.....INITIATE
ELT.....CHECK EMITTING

If not, switch on the transmitter.
After impact the lowest point of the passenger exits (aft door) remains above the waterline for more than 7 min.

ECAM ADVISORY CONDITIONS

Applicable to: ALL 321

SYSTEM	CONDITIONS	RECOMMENDED ACTION
CAB PRESS	CAB VERTICAL SPEED V/S >1 800 ft/min	CPC changeover is recommended: MODE SEL: MAN Wait 10 s then: MODE SEL: AUTO
	CAB ALTITUDE altitude ≥ 8 800 ft	MODE SEL: MAN Manual pressure control
	CAB DIFF PRESS ΔP ≥ 1.5 PSI in phase 7	LDG ELEV: ADJUST If unsuccessful: MODE SEL: MAN Manual pressure control
ELEC	IDG OIL TEMP ≥147 °C	Reduce IDG load if possible (GALLEY or GEN OFF). If required, restore when temperature has dropped. Restrict use of generator to short time, if temperature rises again excessively.
FUEL	Difference between wing fuel quantities greater than 1 500 kg (3 307 lb)	FUEL MANAGEMENT: CHECK If a fuel leak is suspected, *Refer to PRO-ABN-28 FUEL LEAK.* For limitations, *Refer to LIM-28 Maximum Allowed Wing Fuel Imbalance*
	Fuel temp greater than 45 °C in wing tank	GALLEY: OFF
	Fuel temp lower than -40 °C in wing tank	Consider descending to a lower altitude and/or increasing Mach to increase TAT.
APU	EGT >EGT MAX -33 °C (inhibited during APU start)	
	OIL QTY (message LOW OIL LEVEL pulsing)	If there is no oil leak, then the remaining oil quantity allows normal APU operation for about 10 h.

Continued on the following page

Continued from the previous page

SYSTEM	CONDITIONS	RECOMMENDED ACTION
ENG	OIL PRESS P < 80 PSI	- If the oil pressure is between 80 and 60 PSI, continue normal engine operation. - If the oil pressure is below 60 PSI (red indication) without the ENG OIL LO PR warning, continue normal engine operation (it can be assumed that the oil pressure transducer is faulty). In both cases, monitor other engine parameters, particularly oil temperature and oil quantity.
	OIL PRESS P > 390 PSI	Closely monitor other engine parameters for symptoms of engine malfunction. If high oil pressure is not accompanied by other abnormal indications operate engine normally for remainder of the flight. Record high oil pressure, and corresponding N2 readings for maintenance action.
	OIL TEMP T >155 °C	An increase in oil temperature during normal steady-state operation indicates a system malfunction and should be closely monitored for other symptoms of engine malfunction. Note: *If the OIL TEMP increase thrust reduction: Increasing thrust may decrease oil temperature.* In addition, an increase in oil temperature could be related to the IDG oil cooling system. To decrease oil temperature, before limits are reached, the following are recommended: 1. Low Speed - Increase engine speed to increase fuel flow and thereby cool IDG oil. 2. High Speed - Reduce generator load or turn off generator. If oil temperature continues to rise, mechanically disconnect IDG.
	OIL QTY <5 qt	If the quantity of oil is low at a high power setting, expect level increase after power reduction
	NAC TEMP ≥320 °C	Monitor engine parameters and crosscheck with other engine.
	VIBRATION N1 ≥5 units N2 ≥5 units	*Refer to PRO-ABN-70 HIGH ENGINE VIBRATION.*

ECAM ADVISORY CONDITIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

SYSTEM	CONDITIONS	RECOMMENDED ACTION
CAB PRESS	CAB VERTICAL SPEED V/S >1 800 ft/min	CPC changeover is recommended: MODE SEL: MAN Wait 10 s then: MODE SEL: AUTO
	CAB ALTITUDE altitude ≥ 8 800 ft	MODE SEL: MAN Manual pressure control
	CAB DIFF PRESS ΔP ≥ 1.5 PSI in phase 7	LDG ELEV: ADJUST If unsuccessful: MODE SEL: MAN Manual pressure control
ELEC	IDG OIL TEMP ≥147 °C	Reduce IDG load if possible (GALLEY or GEN OFF). If required, restore when temperature has dropped. Restrict use of generator to short time, if temperature rises again excessively.
FUEL	Difference between wing fuel quantities greater than 1 500 kg (3 307 lb)	FUEL MANAGEMENT: CHECK If a fuel leak is suspected, *Refer to PRO-ABN-28 FUEL LEAK.* For limitations, *Refer to LIM-28 Maximum Allowed Wing Fuel Imbalance*
	Fuel temp greater than 45 °C in inner cell, or 55 °C in outer cell	GALLEY: OFF
	Fuel temp lower than -40 °C in inner or outer cell	Consider descending to a lower altitude and/or increasing Mach to increase TAT.
APU	EGT >EGT MAX -33 °C (inhibited during APU start)	
	OIL QTY (message LOW OIL LEVEL pulsing)	If there is no oil leak, then the remaining oil quantity allows normal APU operation for about 10 h.

Continued on the following page

Continued from the previous page

SYSTEM	CONDITIONS	RECOMMENDED ACTION
ENG	OIL PRESS P < 80 PSI	- If the oil pressure is between 80 and 60 PSI, continue normal engine operation. - If the oil pressure is below 60 PSI (red indication) without the ENG OIL LO PR warning, continue normal engine operation (it can be assumed that the oil pressure transducer is faulty). In both cases, monitor other engine parameters, particularly oil temperature and oil quantity.
	OIL PRESS P > 390 PSI	Closely monitor other engine parameters for symptoms of engine malfunction. If high oil pressure is not accompanied by other abnormal indications operate engine normally for remainder of the flight. Record high oil pressure, and corresponding N2 readings for maintenance action.
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	NAC TEMP ≥320 °C	Monitor engine parameters and crosscheck with other engine.
	VIBRATION N1 ≥5 units N2 ≥5 units	*Refer to PRO-ABN-70 HIGH ENGINE VIBRATION.*

ECAM ADVISORY CONDITIONS

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

SYSTEM	CONDITIONS	RECOMMENDED ACTION
CAB PRESS	CAB VERTICAL SPEED V/S >1 800 ft/min	CPC changeover is recommended: MODE SEL: MAN Wait 10 s then: MODE SEL: AUTO
	CAB ALTITUDE altitude ≥ 8 800 ft	MODE SEL: MAN Manual pressure control
	CAB DIFF PRESS ΔP ≥ 1.5 PSI in phase 7	LDG ELEV: ADJUST If unsuccessful: MODE SEL: MAN Manual pressure control
ELEC	IDG OIL TEMP ≥147 °C	Reduce IDG load if possible (GALLEY or GEN OFF). If required, restore when temperature has dropped. Restrict use of generator to short time, if temperature rises again excessively.
FUEL	Difference between wing fuel quantities greater than 1 500 kg (3 307 lb)	FUEL MANAGEMENT: CHECK If a fuel leak is suspected, *Refer to PRO-ABN-28 FUEL LEAK.* For limitations, *Refer to LIM-28 Maximum Allowed Wing Fuel Imbalance*
	Fuel temp greater than 45 °C in inner cell, or 55 °C in outer cell	GALLEY: OFF
	Fuel temp lower than -40 °C in inner or outer cell	Consider descending to a lower altitude and/or increasing Mach to increase TAT.
OXY	Cockpit oxygen bottle pressure < 600 PSI.	If mask is not being used, check if it is correctly stowed, *Refer to DSC-35-20-10 Mask Stowage.*
APU	EGT >EGT MAX -33 °C (inhibited during APU start)	
	OIL QTY (message LOW OIL LEVEL pulsing)	If there is no oil leak, then the remaining oil quantity allows normal APU operation for about 10 h.

Continued on the following page

Continued from the previous page

SYSTEM	CONDITIONS	RECOMMENDED ACTION
ENG	OIL PRESS P < 80 PSI	- If the oil pressure is between 80 and 60 PSI, continue normal engine operation. - If the oil pressure is below 60 PSI (red indication) without the ENG OIL LO PR warning, continue normal engine operation (it can be assumed that the oil pressure transducer is faulty). In both cases, monitor other engine parameters, particularly oil temperature and oil quantity.
	OIL PRESS P > 390 PSI	Closely monitor other engine parameters for symptoms of engine malfunction. If high oil pressure is not accompanied by other abnormal indications operate engine normally for remainder of the flight. Record high oil pressure, and corresponding N2 readings for maintenance action.
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	OIL QTY <5 qt	If the quantity of oil is low at a high power setting, expect level increase after power reduction
	NAC TEMP ≥320 °C	Monitor engine parameters and crosscheck with other engine.
	VIBRATION N1 ≥5 units N2 ≥5 units	*Refer to PRO-ABN-70 HIGH ENGINE VIBRATION.*

EMER DESCENT

Applicable to: ALL

8

IMMEDIATE ACTIONS

CREW OXY MASKS.....ON
EMER DESCENT..... ANNOUNCE(PA)

The flight crew should inform the cabin of emergency descent on the PA system.

SIGNS.....ON
EMER DESCENT.....INITIATE

Descend with the autopilot engaged:
- *Turn the ALT selector knob and pull.*
- *Turn the HDG selector knob and pull.*
- *Adjust the target SPD/MACH.*

Use of the autopilot is also permitted in EXPEDITE mode ◁

THR LEVERS (if A/THR not engaged)..... IDLE

- *If autothrust is engaged, check that THR IDLE is displayed on the FMA.*
- *If not engaged, retard the thrust levers*

SPD BRK..... FULL

Extension of the speedbrakes will significantly increase Vls.
To avoid autopilot disconnection and automatic retraction of the speedbrakes, due to possible activation of the angle of attack protection, allow the speed to increase before starting to use the speedbrakes.

WHEN DESCENT ESTABLISHED

EMER DESCENT FL 100 or minimum allowable altitude

SPEED.....MAX/APPROPRIATE

CAUTION	*Descend at the maximum appropriate speed. If structural damage is suspected, use the flight controls with care and reduce speed as appropriate.*

Landing gear may be extended below 25 000 ft. Speed must be reduced to VLO/VLE

ENG MODE SEL.....IGN
ATC.....NOTIFY

Notify ATC of the nature of the emergency, and state intention. if not in contact with ATC, transmit a distress message on one of the following frequencies: (VHF) 121.5 MHz , or (HF) 2 182 kHz , or 8 364 kHz.

Continued on the following page

EMER DESCENT (Cont'd)

ATC XPDR 7700..... CONSIDER

Squawk 7700 unless otherwise specified by ATC.

- *To save oxygen, set the oxygen diluter selector to the N position.*
- *With the oxygen diluter selector left at 100 % , oxygen quantity may be insufficient to cover the entire emergency descent profile.*
- *Ensure crew communication is established with oxygen masks. Avoid continuous use of the interphone to minimize interference from the oxygen mask breathing noise*

MAX FL..... 100/MEA

● **IF CAB ALT > 14000 feet:**

PAX OXY MASKS..... MAN ON

This action confirms that the passenger oxygen masks are released.

Note: *Notify the cabin crew, when the aircraft reaches a safe flight level, and when cabin oxygen is no more necessary.*

EMERGENCY EVACUATION

Applicable to: ALL

Apply this procedure when considering an emergency evacuation, or when required by the ECAM. Carefully analyze the situation before deciding to evacuate passengers. However do not waste valuable time.

AIRCRAFT/PARKING BRK..... STOP/ON
ATC (VHF1).....NOTIFY

Notify ATC of the nature of the emergency, and state intentions.
Only VHF 1 is available on batteries.

CABIN CREW (PA).....ALERT

Make a short and precise announcement to warn that an emergency evacuation may be required.

ΔP (only if MAN CAB PR has been used)..... CHECK ZERO

If ΔP is not at zero, MODE selector on MAN and V/S CTL FULL UP, to fully open the outflow valve.

ENG MASTER (ALL).....OFF

Associated LP and HP valves close.

FIRE Pushbuttons (ALL: ENG and APU).....PUSH
AGENTS (ENG and APU)..... AS RQRD

Engine Agent 2 is not available.
The use of agents is required if the ENG FIRE or APU FIRE is displayed.

■ **If Evacuation required:**

EVACUATION..... INITIATE

Notify the cabin crew about the emergency encountered and the intentions.
Press the EVAC COMMAND ◁ pb.

■ **If Evacuation not required:**

CABIN CREW and PASSENGERS (PA).....NOTIFY

FORCED LANDING

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

This procedure applies when engines are running. If engines are not running, *Refer to QRH/ABN-70 ENG DUAL FAILURE - FUEL REMAINING - FORCED LANDING* or *Refer to QRH/ABN-70 ENG DUAL FAILURE - NO FUEL REMAINING - FORCED LANDING*, which has been amended to include the forced landing procedure when the engines are not running.

PREPARATION

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify ATC of the nature of emergency encountered and state intentions.
Select transponder code A7700, or transmit a distress message on: (VHF) 121.5 MHz or (HF) 2 182 kHz or 8 364 kHz.

CABIN and COCKPIT..... PREPARE

Notify the cabin crew of the nature of the emergency and state intentions.

Specify the available time:
- *Loose equipment secured.*
- *Survival equipment prepared.*
- *Belts and shoulder harnesses locked.*

GPWS SYS..... OFF
GPWS TERR.....OFF

Switching OFF the SYS pb and TERR pb avoids nuisance warnings.

CABIN SIGNS..... ON
GALLEY.....OFF
LDG ELEV..... SET

If not known, select an approximate value.

BARO..... SET

Omit normal approach and landing checklist.

CREW MASKS/OXY SUPPLY (below FL100).....OFF

APPROACH

RAM AIR..... ON

Switch ON the RAM AIR to ensure complete cabin depressurization on ground.

L/G lever.....DOWN
SLATS and FLAPS..... MAX AVAIL
GND SPLR..... ARM

Continued on the following page

FORCED LANDING (Cont'd)

MAX BRK PR..... 1000 PSI

AT 2 000 FT AGL

CABIN.....NOTIFY FOR LANDING

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

AT TOUCHDOWN

ENG MASTERS..... OFF
APU MASTER SW.....OFF
BRAKES ON ACCU ONLY

AFTER LANDING

- **When aircraft has stopped:**

  PARKING BRK..... ON
  ATC (VHF 1).....USE

  With both engines and APU shut down, only VHF 1 is supplied.

  FIRE pushbutton (ENG and APU).....PUSH
  AGENTS (ENG and APU)..... DISCH

  - **If Evacuation required:**

    EVACUATION.....INITIATE

    Announce "EVACUATE! EVACUATE!"using the Passenger Address (PA) system, and press the EVAC COMMAND pb.

  - **If Evacuation not required:**

    CABIN CREW and PASSENGERS (PA).....NOTIFY

FORCED LANDING

Applicable to: B-HSJ

This procedure applies when engines are running. If engines are not running, *Refer to QRH/ABN-70 ENG DUAL FAILURE - FUEL REMAINING - FORCED LANDING* or *Refer to QRH/ABN-70 ENG DUAL FAILURE - NO FUEL REMAINING - FORCED LANDING*, which has been amended to include the forced landing procedure when the engines are not running.

PREPARATION

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify ATC of the nature of emergency encountered and state intentions.
Select transponder code A7700, or transmit a distress message on: (VHF) 121.5 MHz or (HF) 2 182 kHz or 8 364 kHz.

CABIN and COCKPIT..... PREPARE

Notify the cabin crew of the nature of the emergency and state intentions.

Specify the available time:
- *Loose equipment secured.*
- *Survival equipment prepared.*
- *Belts and shoulder harnesses locked.*

GPWS SYS..... OFF
GPWS TERR.....OFF

Switching the SYS pb and TERR pb OFF avoids nuisance warnings.

SIGNS.....ON
GALY & CAB.....OFF
LDG ELEV..... SET

If not known, select an approximate value.

BARO..... SET

Omit normal approach and landing checklist.

CREW MASKS/OXY SUPPLY (below FL100).....OFF

APPROACH

RAM AIR..... ON

Switch ON the RAM AIR to ensure complete cabin depressurization on ground.

L/G lever.....DOWN
SLATS and FLAPS..... MAX AVAIL
GND SPLR..... ARM

Continued on the following page

FORCED LANDING (Cont'd)

MAX BRK PR..... 1000 PSI

AT 2 000 FT AGL

CABIN.....NOTIFY FOR LANDING

AT 500 FT AGL

BRACE FOR IMPACT..... ORDER

AT TOUCHDOWN

ENG MASTERS..... OFF
APU MASTER SW..... OFF
BRAKES ON ACCU ONLY

AFTER LANDING

- **When aircraft has stopped:**

  PARKING BRK..... ON
  ATC (VHF 1).....USE

  With both engines and APU shut down, only VHF 1 is supplied.

  FIRE pushbutton (ENG and APU).....PUSH
  AGENTS (ENG and APU)..... DISCH

  - **If Evacuation required:**

    EVACUATION.....INITIATE

    Announce "EVACUATE!EVACUATE!"using the Passenger Address (PA) system, and press the EVAC COMMAND pb.

  - **If Evacuation not required:**

    CABIN CREW and PASSENGERS (PA)..... NOTIFY

FORCED LANDING

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

This procedure applies when engines are running. If engines are not running, *Refer to QRH/ABN-70 ENG DUAL FAILURE - FUEL REMAINING - FORCED LANDING* or *Refer to QRH/ABN-70 ENG DUAL FAILURE - NO FUEL REMAINING - FORCED LANDING*, which has been amended to include the forced landing procedure when the engines are not running.

PREPARATION

ATC/TRANSPONDER.....NOTIFY/SELECT A7700

Notify ATC of the nature of emergency encountered and state intentions.
Select transponder code A7700, or transmit a distress message on: (VHF) 121.5 MHz or (HF) 2 182 kHz or 8 364 kHz.

CABIN and COCKPIT..... PREPARE

Notify the cabin crew of the nature of the emergency and state intentions.

Specify the available time:
- *Loose equipment secured.*
- *Survival equipment prepared.*
- *Belts and shoulder harnesses locked.*

GPWS SYS..... OFF
GPWS TERR.....OFF

Switching the SYS pb and TERR pb OFF avoids nuisance warnings.

SIGNS.....ON
EMER EXIT LT..... ON
COMMERCIAL.....OFF
LDG ELEV..... SET

If not known, select an approximate value.

BARO..... SET

Omit normal approach and landing checklist.

CREW MASKS/OXY SUPPLY (below FL100).....OFF

APPROACH

RAM AIR..... ON

Switch ON the RAM AIR to ensure complete cabin depressurization on ground.

L/G lever.....DOWN
SLATS and FLAPS..... MAX AVAIL

Continued on the following page

FORCED LANDING (Cont'd)

GND SPLR..... ARM
MAX BRK PR..... 1000 PSI

AT 2 000 FT AGL

CABIN.....NOTIFY FOR LANDING

AT 500 FT AGL

BRACE FOR IMPACT.....ORDER

AT TOUCHDOWN

ENG MASTERS..... OFF
APU MASTER SW.....OFF
BRAKES ON ACCU ONLY

AFTER LANDING

● **When the aircraft has stopped:**
PARKING BRK..... ON
ATC (VHF 1).....USE
With both engines and APU shut down, only VHF 1 is supplied.
FIRE pushbutton (ENG and APU).....PUSH
AGENTS (ENG and APU)..... DISCH

■ **If Evacuation required:**
EVACUATION.....INITIATE
Announce "EVACUATE! EVACUATE!"using the Passenger Address (PA) system, and press the EVAC COMMAND pb.
ELT..... CHECK EMITTING
If not, switch on the transmitter.

■ **If Evacuation not required:**
CABIN CREW and PASSENGERS (PA).....NOTIFY

OVERWEIGHT LANDING

Applicable to: ALL 321

LDG CONF..... AS REQUIRED

Use the ECAM flap setting, if required for abnormal operations. In all other cases:
- *FULL is preferred for optimized landing performance.*
- *If the aircraft weight is above the maximum weight for go-around given in the below (See TABLE), use FLAP 3 for landing.*

In all cases, if landing configuration is different from FLAP FULL, use 1+F for go-around.

Note: At very high weights, VFE CONF1 is close to VLS clean. To select CONF1, deselect A/THR, decelerate to (or slightly below) VLS and select CONF1 when below VFE. When established at CONF1, the crew can reengage A/THR and use managed speed again.

LDG DIST.....CHECK
PACK 1 and PACK 2..... OFF or supplied by APU

Selecting packs OFF (or supplied from APU) will increase the maximum thrust available from the engines, in the event of a go-around.

- **In the final stages of approach**
  TARGET SPEED.....VLS
  Reduce the selected speed on the FCU to reach VLS at runway threshold.
  Touch down as smoothly as possible (Maximum V/S at touchdown 360 ft/min).

- **At main landing gear touchdown**
  REVERSE THRUST..... USE MAX AVAILABLE

- **After nosewheel touchdown**
  BRAKES.....APPLY AS NECESSARY
  Maximum braking may be used after nosewheel touchdown. But, if landing distance permits, delay or reduce braking to take full benefit of the available runway length.

- **Landing complete**
  BRAKE FANS ⋘ .....ON
  Be prepared for tire deflation, if temperatures exceed 800 °C.

OAT °C	AIRPORT ELEVATION (FT)							
	0	2 000	4 000	6 000	8 000	10 000	12 000	14 000
<10	92	88	82	76	70	65	60	55
15	92	88	82	76	70	65	60	55
20	92	88	82	76	70	65	60	55

Continued on the following page

OVERWEIGHT LANDING (Cont'd)

OAT °C	AIRPORT ELEVATION (FT)							
	0	2 000	4 000	6 000	8 000	10 000	12 000	14 000
25	92	87	80	75	69	64	59	
30	92	85	79	73	68			
35	88	82	76	70	65			
40	85	79	73	68				
45	82	75	70					
50	78	72						
55								

MAXIMUM WEIGHT FOR GO AROUND IN CONF 3 (1000 KG)

OVERWEIGHT LANDING

Applicable to: ALL 320

LDG CONF..... AS REQUIRED

Use the ECAM flap setting, if required for abnormal operations. In all other cases:
- *FULL is preferred for optimized landing performance.*
- *If the aircraft weight is above the maximum weight for go-around given in the table below (See TABLE), use FLAP 3 for landing.*

In all cases, if landing configuration is different from FLAP FULL, use 1+F for go-around.

Note: For weights greater than 70 000 kg (or 154 000 lb) S speed is greater than VFE CONF 2 (200 kt). Consequently the crew must select on FCU a speed below 200 kt before setting FLAPS 2. When in FLAPS 2, the crew can use managed speed again.

LDG DIST.....CHECK
PACK 1 and PACK 2..... OFF or supplied by APU

Selecting packs OFF (or supplied from APU) will increase the maximum thrust available from the engines, in the event of a go-around.

- **In the final stages of approach:**
  TARGET SPEED.....VLS
  Reduce the selected speed on the FCU to reach VLS at runway threshold.
  Touch down as smoothly as possible (Maximum V/S at touchdown 360 ft/min).

- **At main landing gear touchdown:**
  REVERSE THRUST..... USE MAX AVAILABLE

- **After nosewheel touchdown:**
  BRAKES.....APPLY AS NECESSARY
  Maximum braking may be used after nosewheel touchdown. But, if landing distance permits, delay or reduce braking to take full benefit of the available runway length.

- **Landing complete:**
  BRAKE FANS ⋘ .....ON
  Be prepared for tire deflation, if temperatures exceed 800 °C.

OAT °C	AIRPORT ELEVATION (FT)							
	0	2 000	4 000	6 000	8 000	10 000	12 000	14 000
<10	83	81	78	74	71	66	62	58
15	83	81	78	74	71	66	62	58
20	83	81	78	74	71	66	61	56

Continued on the following page

OVERWEIGHT LANDING (Cont'd)

OAT °C	AIRPORT ELEVATION (FT)							
	0	2 000	4 000	6 000	8 000	10 000	12 000	14 000
25	83	81	78	74	70	64	59	
30	83	81	78	73	67			
35	83	81	76	70	65			
40	83	80	73	67				
45	82	76	70					
50	79	73						
55								

MAXIMUM WEIGHT FOR GO AROUND IN CONF 3 (1000 KG)

TAILSTRIKE

Applicable to: ALL

In the event of a tailstrike, apply the following procedure:

LAND ASAP

MAX FL.....100 or MSA

500 ft/min should be targeted for the climb, to minimize pressure changes, and for passenger and crew comfort. Similarly, the rate of descent must be limited to about 1 000 ft/min, except for the final approach that must be performed normally.

Notify the ATC of the aircraft's rate of climb.

RAM AIR.....ON

PACK 1 and 2.....OFF

VOLCANIC ASH ENCOUNTER

Applicable to: ALL 320

9

● **If the aircraft enters a volcanic ash cloud:**

180° TURN.....INITIATE

The performance of a 180 ° turn will usually enable the aircraft to exit the volcanic ash clouds as quickly as possible, because volcanic ash clouds can extend for hundreds of nautical miles.

ATC.....NOTIFY

Note: Electrostatic conditions may cause communication problems.

A/THR.....OFF

This prevents the autothrust from generating thrust variations.

THRUST (if conditions permit).....REDUCE

Reduced thrust minimizes ash ingestion.
If altitude permits, reduce thrust to idle. This maximizes engine surge margin and lowers engine turbine temperature.

CREW OXYGEN MASKS.....ON/100 %/EMER
CABIN CREW.....NOTIFY
PASSENGER OXYGEN.....AS RQRD

Depending on contamination.

ENG ANTI ICE..... ON
WING ANTI ICE..... ON
PACK FLOW..... HI

Maximum air bleed gives the engines additional stall margin.

Note: If CARGO VENTILATION system is installed, it is recommended to switch off the CARGO ISOL VALVES, to prevent a cargo smoke warning being triggered.

APU..... START

If possible, start the APU and have it ready for an assisted engine relight in the event of an engine flame-out. Refer to APU limitations to get maximum FL for engine start using APU BLEED.

ENGINE PARAMETERS.....MONITOR

Monitor particularly EGT. If EGT exceeds limits, it may become necessary to consider a precautionary engine shutdown and engine restart in flight.

Note: In the case of precautionary shutdown:
- restart when clear of the volcanic ash cloud

Continued on the following page

VOLCANIC ASH ENCOUNTER (Cont'd)

- *Upon restart, the engine may accelerate very slowly. Do not misinterpret this as a failure to start*
- *Consider that the compressor and turbine blades have been eroded and avoid sudden changes in thrust. Fuel flow and EGTmay increase.*

AIRSPEED INDICATIONS.....MONITOR

If airspeed is unreliable or lost, Refer to UNRELIABLE SPEED INDICATION/ADR CHECK PROC .

Note: *If both engines flame out and speed indications are lost,Refer to DUAL ENGINE FAILURE procedure to get the required pitch attitude for the optimum relight speed. In case of engine failure, switch off the wing anti ice before engine restart.*

Note: *If sufficient visibility is not granted for approach due to windshield/window damage, consider AUTOLAND. If AUTOLAND is not available, consider opening the sliding window on the PF's side (maximum speed 200 kt), after cabin depressurization.*

To manually depressurize the cabin:

CAB PRESS MODE SEL.....MAN
MAN V/S CTL..... FULL UP

Due to the increased noise level, pay particular attention to visual warnings.

VOLCANIC ASH ENCOUNTER

Applicable to: ALL 321

10 ● **If the aircraft enters a volcanic ash cloud:**

180° TURN.....INITIATE

The performance of a 180 ° turn will usually enable the aircraft to exit the volcanic ash clouds as quickly as possible, because volcanic ash clouds can extend for hundreds of nautical miles.

ATC.....NOTIFY

Note: Electrostatic conditions may cause communication problems.

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This prevents the autothrust from generating thrust variations.

THRUST (if conditions permit).....REDUCE

Reduced thrust minimizes ash ingestion.
If altitude permits, reduce thrust to idle. This maximizes engine surge margin and lowers engine turbine temperature.

CREW OXYGEN MASKS.....ON/100 %/EMER
CABIN CREW.....NOTIFY
PASSENGER OXYGEN.....AS RQRD

Depending on contamination.

ENG ANTI ICE..... ON
WING ANTI ICE..... ON
ECON FLOW..... OFF

Maximum air bleed gives the engines additional stall margin.

Note: If CARGO VENTILATION system is installed, it is recommended to switch off the CARGO ISOL VALVES, to prevent a cargo smoke warning being triggered.

APU..... START

If possible, start the APU and have it ready for an assisted engine relight in the event of an engine flame-out. Refer to APU limitations to get maximum FL for engine start using APU BLEED.

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- restart when clear of the volcanic ash cloud

Continued on the following page

VOLCANIC ASH ENCOUNTER (Cont'd)

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Note: *If sufficient visibility is not granted for approach due to windshield/window damage, consider AUTOLAND. If AUTOLAND is not available, consider opening the sliding window on the PF's side (maximum speed 200 kt), after cabin depressurization.*

To manually depressurize the cabin:

CAB PRESS MODE SEL.....MAN
MAN V/S CTL..... FULL UP

Due to the increased noise level, pay particular attention to visual warnings.

WINDSHEAR

Applicable to: ALL

A red flag "WINDSHEAR" is displayed on each PFD associated with an aural synthetic voice "WINDSHEAR"repeated three times.
If windshear is detected either by the system or by pilot observation, apply the following recovery technique:

■ **At takeoff:**

■ **If before V1:**

The takeoff should be rejected only if significant airspeed variations occur below indicated V1 and the pilot decides that there is sufficient runway remaining to stop the airplane.

■ **If after V1:**

THR LEVERS.....TOGA
REACHING VR.....ROTATE
SRS ORDERS..... FOLLOW

This includes the use of full backstick, if demanded.

Note: *1. If engaged, the autopilot disengages when α is greater than α prot.*
2. If the FD bars are not available, use an initial pitch attitude up to 17.5 ° with full backstick, if necessary. If needed, to minimize the loss of height, increase this pitch attitude.

■ **Airborne, initial climb or landing:**

THR LEVERS AT TOGA..... SET OR CONFIRM
AP (if engaged).....KEEP
SRS ORDERS.....FOLLOW

This includes the use of full backstick, if demanded.

Note: *1. If engaged, the autopilot disengages when α is greater than α prot.*
2. If the FD bars are not available, use an initial pitch attitude up to 17.5 ° with full backstick, if necessary. If needed, to minimize the loss of height, increase this pitch attitude.

DO NOT CHANGE CONFIGURATION (SLATS/FLAPS, GEAR) UNTIL OUT OF SHEAR.
CLOSELY MONITOR FLIGHT PATH AND SPEED.
RECOVER SMOOTHLY TO NORMAL CLIMB OUT OF SHEAR.

WINDSHEAR AHEAD

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The "W/S AHEAD" message is displayed on each PFD. The color of the message depends on the severity and location of the windshear

Note: When a predictive windshear alert ("WINDSHEAR AHEAD" or "GO AROUND WINDSHEAR AHEAD") is triggered, if the flight crew makes a positive verification that no hazard exists, then the alert may be disregarded, as long as:

- *There are no other signs of possible windshear conditions, and*
- *The reactive windshear system is operational.*

Known cases of spurious predictive windshear alerts have been reported at some airports, during either takeoff or landing, due to the specific obstacle environment.
However, always rely on any reactive windshear ("WINDSHEAR").

W/S AHEAD RED

■ **Takeoff**

Associated with an aural synthetic voice "WINDSHEAR AHEAD, WINDSHEAR AHEAD".

● **Before takeoff:**

Delay takeoff, or select the most favorable runway.

● **During the takeoff run:**

Reject takeoff.

Note: Predictive windshear alerts are inhibited above 100 kt until 50 ft.

● **When airborne:**

THR LEVERS.....TOGA

As usual, the slat/flap configuration can be changed, provided the windshear is not entered.

SRS ORDERS..... FOLLOW

This includes the use of full backstick, if required.

Note: 1. If engaged, the autopilot disengages when α is greater than α prot.
2. If the FD is not available, use a pitch initial attitude up to 17.5 °. If necessary to minimize the loss of height, increase this pitch attitude.

Continued on the following page

WINDSHEAR AHEAD (Cont'd)

■ **Landing:**

Associated with an aural synthetic voice "GO AROUND, WINDSHEAR AHEAD".

GO-AROUND..... PERFORM

This includes the use of full backstick, if required.

Note: *1. If engaged, the autopilot disengages when α is greater than α prot.*
2. If the FD is not available, use a pitch initial attitude up to 17.5 °. If necessary to minimize the loss of height, increase this pitch attitude.

W/S AHEAD AMBER

Apply precautionary measures, as indicated in the SUPPLEMENTARY TECHNIQUES *Refer to PRO-SUP-91-10 General.*

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GENERAL

Applicable to: ALL

A successful outcome for an emergency situation depends, first of all, upon each crew member's perfect knowledge and execution of the duties assigned to him.
The captain should check frequently that all crew members know exactly their assigned positions and their specific duties, as well as the duties of the other crew members, in case of an abnormal or an emergency condition.
Since it is not possible to cover all the situations that may occur, the captain will be responsible for adapting the following instructions to obtain the best coordination of the emergency operation.
Should it be physically impossible for the captain to carry out his duties, another crew member will substitute for him according to the chain of command. The procedures in this manual are AIRBUS INDUSTRIE procedures and should be considered to be a reference.

COCKPIT-ASSIGNED DUTIES FOR EVACUATION

Applicable to: ALL

■ **If it is NOT POSSIBLE to reach the passenger cabin:**

The cockpit crew should evacuate the aircraft via the cockpit clearview windows, by using the escape ropes.

On ground, each crewmember must help passengers, and direct them away from the aircraft.

■ **If it is POSSIBLE to reach the passenger cabin:**

CAPT	- Is the last person to leave the cockpit: Proceeds to the cabin, and helps with passenger evacuation, as necessary - Is the last person to leave the aircraft: Checks that all persons have evacuated the aircraft - Evacuates the aircraft, via the rear door, or any other available exit, if he/she cannot reach the rear door. - On ground, he/she takes command of operations until rescue units arrive.
F/O	- Proceeds to the cabin, and takes the emergency equipment. - Evacuates the aircraft, using any available exit. - Helps passengers on ground, and directs them away from the aircraft.

CABIN CREW-ASSIGNED AREAS FOR EVACUATION

Applicable to: ALL 320

CABIN CREW DESIGNATION	ASSIGNED JUMPSEAT AND DOOR	ASSIGNED DOOR	ASSIGNED AREA
1 PURSER	DOOR 1 LH	FWD OUTBOARD	FWD/MID
1 CABIN CREW	DOOR 1 RH/LH	FWD INBOARD	FWD/MID

Continued on the following page

Continued from the previous page

CABIN CREW DESIGNATION	ASSIGNED JUMPSEAT AND DOOR	ASSIGNED DOOR	ASSIGNED AREA
1 CABIN CREW	DOOR 2 RH	AFT CENTER	MID/AFT
1 CABIN CREW	DOOR 2 LH	REARWARD	MID/AFT

Note: These procedures are established for the minimum required number of 4 cabin crews.

CABIN CREW-ASSIGNED AREAS FOR EVACUATION

Applicable to: ALL 321

CABIN CREW DESIGNATION	ASSIGNED DOOR	ASSIGNED JUMPSEAT	ASSIGNED AREA
1 PURSER	DOOR 1 LH	FWD INBOARD	FWD/MID
1 CABIN CREW	FWD EMERGENCY EXIT	FWD /MID	FWD/MID
1 CABIN CREW	AFT EMERGENCY EXIT	AFT/MID	MID/AFT
1 CABIN CREW	DOOR 2 LH	AFT LH	MID/AFT
1 CABIN CREW	DOOR 2 RH	AFT RH	MID/AFT

Note: The above procedures are established for a minimum required number of 5 cabin crewmembers.
For customized A321 seating configurations of 200 passengers or less, the minimum number of cabin crewmembers can be reduced to 4, in accordance with JAR-Ops (1.990). If this is the case, a cabin crewmember is not required at the AFT RH seat.

COMMUNICATIONS

Applicable to: ALL

1

1. EMERGENCY CALL			
FROM	**TO**	**COMMUNICATION METHOD(S)**	**REMARKS**
COCKPIT	CABIN	- Press EMER pb-sw on the CALLS panel, or - Passenger Address (PA) System: "PURSER TO COCKPIT PLEASE!"	Purser must immediately go to the cockpit.
CABIN	COCKPIT	- Interphone: "PRIO CAPT"	Any cabin crewmember can make such a call. The cockpit crew must reply.

2. EMERGENCY ALERT

FROM	TO	COMMUNICATION METHOD(S)	REMARKS
COCKPIT	CABIN	- PA System: "ATTENTION! CABIN CREW AT STATIONS!"	The cockpit crew makes a short and precise announcement to warn that an emergency evacuation may soon be required.

3. NOTIFICATION TO PASSENGERS

FROM	TO	COMMUNICATION METHOD(S)	REMARKS
COCKPIT	CABIN	- SIGNS ON - PA System	For psychological reasons, the cockpit crew should be the first to inform of an intended emergency landing.
PURSER	CABIN	- CABIN LIGHTS 100 % - PA System	Purser informs passengers that they have to pay special attention to these warnings: - "BRACE"

4. FINISH PREPARATION

FROM	TO	COMMUNICATION METHOD(S)	REMARKS
COCKPIT	CABIN	- PA System: "ATTENTION! CABIN CREW AT STATIONS!"	The cockpit crew gives this order at 2 000 ft AAL before an emergency landing. If the PA is U/S, the order will be conveyed via the interphone.

5. BRACE FOR IMPACT

FROM	TO	COMMUNICATION METHOD(S)	REMARKS
COCKPIT	CABIN	- PA System: "BRACE, BRACE!"	The cockpit crew gives this order at 500 ft AAL before an emergency landing. If the PA is U/S, switch the seatbelt signs OFF and ON six times.

6. INITIATE EVACUATION (RESTRICTED EXITS)

FROM	TO	COMMUNICATION METHOD(S)	REMARKS
COCKPIT	CABIN	- PA System: "EVACUATE! EVACUATE!" - Activate EVAC signals	The cockpit crew orders an immediate evacuation, and the cabin crew directs passengers to all available exists.
CABIN	COCKPIT AND CABIN	- EVAC SIGNAL SYSTEM on FWD ATTND panel (FAP) - PA System or megaphone	Used by the cabin crew, if there is no signal or order from the cockpit, and if it is unmistakably clear that the aircraft must be evacuated.
CABIN	CABIN	- Verbal	The cabin crew stands up and shouts: - "EVACUATE! EVACUATE! (SAW SAAN!)"
CABIN	CABIN	- Verbal	The cabin crew stands up and shouts: - "EVACUATE! EVACUATE!" - "UNFASTEN SEAT BELT!" - "COME THIS WAY!"

7. EVACUATION NOT REQUIRED			
FROM	**TO**	**COMMUNICATION METHOD(S)**	**REMARKS**
COCKPIT	CABIN	- PA System: "CABIN CREW RESUME DUTIES!"	When the Captain decides that an evacuation is not required, the cockpit crew makes an immediate announcement to this effect.

ON GROUND EVACUATION

Applicable to: ALL

COCKPIT CREW PROCEDURES

The cockpit crew notifies the cabin crew of the nature of the emergency, and states intentions. The cockpit crew uses the Passenger Address system to make an appropriate announcement, such as: "EVACUATE! EVACUATE!", and presses the EVAC COMMAND pb.

CABIN CREW PROCEDURES

When the cabin receives the order to evacuate, each cabin crewmember must proceed as follows:

STAND UP AND SHOUT..... "UNFASTEN SEATBELTS"
OUTSIDE CONDITIONS.....CHECK

■ **If outside conditions are safe:**
DOOR IN ARMED POSITION.....OPEN FIRMLY
SHOUT..... "COME THIS WAY"

● **If the door does not open automatically:**
DOOR.....PUSH AND OPEN MANUALLY

SLIDE (or SLIDERAFT) DEPLOYMENT.....CHECK FULL DEPLOYMENT

It takes approximately 4 s for the slide (or slideraft) to deploy.

● **If the slide (or slideraft) does not automatically inflate:**
RED, MANUAL INFLATION HANDLE.....PULL

The red, manual inflation handle is located on the right-hand side of the slide (or slideraft) girt extension.

ORDER..... "EVACUATE! EVACUATE!"
PASSENGER EVACUATION .....EXPEDITE

● **If the slide (or slideraft) becomes unserviceable:**
PASSENGER EVACUATION.....STOP
PASSENGERS TO ANOTHER USABLE EXIT.....REDIRECT

TOTAL ZONE EVACUATION.....CHECK
CABIN CREW..... EVACUATE

PASSENGERS AWAY FROM THE AIRCRAFT.....DIRECT

■ **If outside conditions are unsafe:**

EXIT DOOR.....BLOCK
PASSENGERS TO NEAREST USABLE EXIT.....REDIRECT

COCKPIT EVACUATION THROUGH WINDOW

Applicable to: ALL

OPENING THE SLIDING WINDOW

HANDLE.....PUSH DOWN AND PULL BACK

Pulling the handle backwards, opens the sliding window.

COCKPIT EVACUATION WITH ESCAPE ROPE

ESCAPE ROPE STOWAGE.....OPEN

The escape rope stowage is located above the sliding window, on either side of the overhead panel.

ESCAPE ROPE.....UNROLL

Unroll the escape rope until the red flag appears, and throw it through the window.

SEAT.....STEP ON
ESCAPE ROPE.....GRASP

Grasp the escape rope firmly with both hands, and slide down along the rope.

EVACUATION ON WATER

Applicable to: ALL

CABIN CREW RESPONSIBLE FOR TYPE "I" DOORS

When the cabin receives the order to evacuate, each cabin crewmember must proceed as follows:

CHILDREN LIFEVESTS.....DISTRIBUTE
STAND UP AND SHOUT.....
..... "UNFASTEN SEATBELTS – PUT ON YOUR LIFEVEST"

Inflate the lifevest, only once outside the aircraft.

ORDER..... "REMOVE SHOES"

● **If the Type I door is usable:**

DOOR IN ARMED POSITION..... OPEN
SLIDE.....DEPLOY

RED, MANUAL INFLATION HANDLE..... PULL

Do not wait for automatic inflation of the slide.

■ **If the water level is close to the door sill:**

The slide inflates on the water.

SLIDE..... LEAVE ATTACHED TO CABIN FLOOR
PASSENGER LIFEVESTS.....INFLATE WHEN EVACUATING AIRCRAFT
PASSENGERS.....EVACUATE

Evacuate passengers into the water. The slide is used as a flotation device.

TOTAL ZONE EVACUATION.....CHECK
LAST CREWMEMBER.....EVACUATE
SLIDE.....SEPARATE FROM DOOR SILL

The last crewmember must separate the slide from the door sill.

MOORING LINE.....CUT

■ **If the water level is too far away from the door sill:**

SLIDE..... DISCONNECT FROM DOOR SILL

The slide remains tied to the aircraft by a 6 m (20 ft) mooring line.

MOORING LINE..... HOLD

To keep the slide close to the exit, hold the mooring line.

PASSENGER LIFEVESTS.....INFLATE WHEN EVACUATING AIRCRAFT
PASSENGERS.....EVACUATE

Evacuate passengers into the water. The slide is used as a flotation device.

TOTAL ZONE EVACUATION.....CHECK
LAST CREWMEMBER.....EVACUATE
MOORING LINE.....CUT

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NORMAL PROCEDURES

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PRO-NOR-SOP-01 USE OF AP/FD, A/THR AND FLIGHT GUIDANCE	E	1	Update of the technical wording
			Update ofthe technical wording
PRO-NOR-SOP-01 RADIO NAVIGATION PROCEDURES	M	2	DDG replaced by MEL
PRO-NOR-SOP-02 CREW RESPONSIBILITIES	B	1	Update of the technical wording
PRO-NOR-SOP-04 Flight Deck Check - Parking Brake	D	1	New DU
PRO-NOR-SOP-04 Flight Deck Check - Braking System	D	2	Deletion of text
			Revert to Airbus procedure
PRO-NOR-SOP-05 EXTERIOR WALK-AROUND - RH L/G AND FUSELAGE	B	1	"If installed" has been added for Water drain mast line as this equipment is optional.
PRO-NOR-SOP-06 FLOW PATTERN SEQUENCE	B	1	Update of the illustration
PRO-NOR-SOP-06 Overhead Panel - RCDR	D	2	Update of the technical wording
PRO-NOR-SOP-06 Overhead Panel - Air Cond	D	3	Effectivity update: The information no longer applies to MSN 0812, 0930.
PRO-NOR-SOP-06 OVERHEAD PANEL - ELEC	D	4	Improvement of the note regarding the battery current check.
PRO-NOR-SOP-06 Overhead Panel - RMP 3 (If Installed)	D	5	Effectivity update: The information now also applies to MSN 5024, 5030, 5362, 5429.
PRO-NOR-SOP-06 Overhead Panel - RMP 3 (If Installed)	D	6	"If installed" has been added for RMP 3 as this equipment is optional.
PRO-NOR-SOP-06 FMGS Initialization - FM Database Validity	E	7	Revert to Airbus procedure
			Update of the technical wording
PRO-NOR-SOP-06 Lateral Consoles	G	8	Improvement of illustration quality.
			WARNING introduced to prevent hearing damage to ground mechanics
PRO-NOR-SOP-06 ACARS	K	9	Update of the technical wording
PRO-NOR-SOP-06 ACARS - ECAM	K	10	Deletion of the illustration
PRO-NOR-SOP-07 Before Pushback or Start - Flight Deck Door	A	1	Documentation update: Addition of "Before Pushback or Start - Flight Deck Door" documentary unit
PRO-NOR-SOP-07 BEFORE PUSHBACK OR START - PERF TO - NW STRG DISC MEMO	A	2	Effectivity update: The information now also applies to MSN 5362, 5429.

Localization Title	Toc Index	ID	Reason
PRO-NOR-SOP-08 AUTOMATIC ENGINE START	A	1	Removal of the note related to the description of N1 and N2 indications, in order to incorporate this note in section DSC Aircraft Systems.
PRO-NOR-SOP-09 After Start - Rudder Trim	A	1	Content enhanced to clarify that after the RUD TRIM reset, an indication of up to 0.3° (L or R) may be observed in the rudder trim position indication.
PRO-NOR-SOP-09 AFTER START - AFTER START CHECKLIST	A	2	Deletion of the illustration
PRO-NOR-SOP-10 TAXI - ATC CLEARANCE	A	1	Update of the technical wording
PRO-NOR-SOP-10 Taxi - Loadsheet	A	2	Documentation update: Addition of "Taxi - Loadsheet" documentary unit
PRO-NOR-SOP-10 TAXI - BEFORE TAKEOFF CHECKLIST	A	3	Deletion of the illustration
PRO-NOR-SOP-10 Visual Ground Geometry	B	4	Improvement of illustration quality.
PRO-NOR-SOP-11 BEFORE ENTERING THE RUNWAY	A	1	Update of the technical wording
PRO-NOR-SOP-11 ENTERING THE RUNWAY	B	2	Deletion of the illustration
PRO-NOR-SOP-13 AFTER TAKEOFF	A	1	Deletion of the illustration
PRO-NOR-SOP-14 Climb - Climb Speed	A	1	Documentation update: Addition of "Climb - Climb Speed" documentary unit
PRO-NOR-SOP-16 Descent Preparation - Landing Performance	A	1	Update of the technical wording **New DU**
PRO-NOR-SOP-16 DESCENT PREPARATION - FMGS SET UP	A	2	Deletion of the illustration Update of the technical wording
PRO-NOR-SOP-17 DESCENT - WHEN SETTING ALTIMETER BARO REFERENCE	A	1	Update of the technical wording
PRO-NOR-SOP-18 INTERMEDIATE/FINAL APPROACH - AT 5,000 AAL	B	1	Deletion of the illustration
PRO-NOR-SOP-18 Intermediate/Final Approach - At Green Dot Speed	B	2	New DU

Localization Title	Toc Index	ID	Reason
PRO-NOR-SOP-18 Intermediate/Final Approach - At Green Dot Speed	B	3	New DU
PRO-NOR-SOP-18 Intermediate/Final Approach - At Green Dot Speed	B	4	The expanded note is modified to clarify the use of the TCAS modes.
PRO-NOR-SOP-18 Intermediate/Final Approach - At Green Dot Speed	B	5	The expanded note is modified to clarify the use of the TCAS modes.
PRO-NOR-SOP-18 INTERMEDIATE/FINAL APPROACH (ILS APPROACH ENTERED IN F-PLN) - FINAL APPROACH	B	6	Deletion of the illustration
PRO-NOR-SOP-18 INTERMEDIATE/FINAL APPROACH (ILS APPROACH ENTERED IN F-PLN) - AT DH + 100 FT (or MDA + 100 FT)	B	7	Update of the technical wording
PRO-NOR-SOP-18 Precision Approach Pattern	C	8	Update of the illustration
PRO-NOR-SOP-19 INTERMEDIATE/FINAL APPROACH - AT 5000 FT AAL	D	1	Deletion of the illustration
PRO-NOR-SOP-19 Intermediate/Final Approach - At Green Dot Speed	D	2	Effectivity update: The information now also applies to MSN 5362, 5429.
PRO-NOR-SOP-19 Intermediate/Final Approach - At Green Dot Speed	D	3	Update of the technical wording The expanded note is modified to clarify the use of the TCAS modes.
PRO-NOR-SOP-19 INTERMEDIATE/FINAL APPROACH - AT GREEN DOT SPEED	D	4	Update of the technical wording
PRO-NOR-SOP-19 INTERMEDIATE/FINAL APPROACH - APPROACH STRATEGIES	D	5	Effectivity update: The information now also applies to MSN 5362, 5429.
PRO-NOR-SOP-19 INTERMEDIATE/FINAL APPROACH - FINAL APPROACH	D	6	Deletion of the illustration
PRO-NOR-SOP-19 INTERMEDIATE/FINAL APPROACH - AT MDA +100FT	D	7	Update of the technical wording

Localization Title	Toc Index	ID	Reason
PRO-NOR-SOP-19 Intermediate/Final Approach - At Entered Minimum	D	8	Revert to Airbus procedure
PRO-NOR-SOP-19 Intermediate/Final Approach - At Entered Minimum	D	9	New DU
PRO-NOR-SOP-19 CIRCLING APPROACH - LOW VISIBILITY CIRCLING APPROACH PATTERN	E	10	Update of the illustration
PRO-NOR-SOP-20 VISUAL APPROACH - VISUAL CIRCUIT	A	1	Update of the illustration
PRO-NOR-SOP-21 Landing - At Touchdown	D	1	Update of the technical wording
			Enhancement of the Landing procedure: The flight crew can now select and maintain REV IDLE on dry runway only and if landing performance permits. For any other case, they should immediately select REV MAX on all reverser levers after the main landing gear touches down.
PRO-NOR-SOP-22 GO AROUND - AT GO-AROUND ACCELERATION ALTITUDE	A	1	Deletion of the illustration
PRO-NOR-SOP-24 IRS PERFORMANCE	A	1	Improvement of illustration quality.
PRO-NOR-SOP-24 SHUT DOWN C/L	A	2	Deletion of the illustration DU moved
PRO-NOR-SOP-24 REPORTS	A	3	Update of the technical wording
PRO-NOR-SOP-25 SECURING THE AIRCRAFT - SECURING THE AIRCRAFT CHECKLIST	A	1	Deletion of the illustration
PRO-NOR-SOP-90 SUMMARY FOR EACH PHASE - APPROACH & LANDING	I	1	Update of the technical wording
PRO-NOR-SOP-90 SUMMARY FOR EACH PHASE - AUTOLAND	I	2	Update of the technical wording
PRO-NOR-SRP-01-10 FMGS Initialization	A	1	Improvement of illustration quality.
PRO-NOR-SRP-01-10 FMGS Initialization	A	2	Improvement of illustration quality.

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PRO-NOR-SRP-01-10 FMGS Initialization	A	3	Improvement of illustration quality.
PRO-NOR-SRP-01-10 Flight Plan Initialization - General	B	4	Improvement of illustration quality.
PRO-NOR-SRP-01-10 Flight Plan Initialization - General	B	5	Documentation update: Addition of "Flight Plan Initialization - General" documentary unit
PRO-NOR-SRP-01-10 Flight Plan Initialization - Aligning IRS	B	6	Improvement of illustration quality.
PRO-NOR-SRP-01-10 Flight Plan Initialization - Aligning IRS	B	7	Improvement of illustration quality.
PRO-NOR-SRP-01-10 Flight Plan Initialization - Lateral Flight Plan	B	8	Improvement of illustration quality.
PRO-NOR-SRP-01-10 Flight Plan Initialization - Lateral Flight Plan	B	9	Improvement of illustration quality.
PRO-NOR-SRP-01-10 Flight Plan Initialization - Lateral Flight Plan	B	10	Documentation update: Addition of "Flight Plan Initialization - Lateral Flight Plan" documentary unit
PRO-NOR-SRP-01-10 Flight Plan Initialization - Vertical Flight Plan	B	11	Improvement of illustration quality.
PRO-NOR-SRP-01-10 Flight Plan Initialization - Vertical Flight Plan	B	12	Improvement of illustration quality.
PRO-NOR-SRP-01-10 FMGS Data Insertion - Gross Weight Insertion	C	13	Improvement of illustration quality.
PRO-NOR-SRP-01-10 FMGS Data Insertion - Weight/CG Insertion and Fuel Planning	C	14	Improvement of illustration quality.
PRO-NOR-SRP-01-10 FMGS Data Insertion - Gross Weight Insertion	C	15	Improvement of illustration quality.
PRO-NOR-SRP-01-10 FMGS Data Insertion - Takeoff Data Insertion	C	16	Improvement of illustration quality.
PRO-NOR-SRP-01-10 FMGS Data Insertion - Takeoff Data Insertion	C	17	Improvement of illustration quality.
PRO-NOR-SRP-01-10 FMGS Data Insertion - Climb Speed Preselection	C	18	Improvement of illustration quality.

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PRO-NOR-SRP-01-10 FMGS Data Insertion - Climb Speed Preselection	C	19	Improvement of illustration quality.
PRO-NOR-SRP-01-15 Change of Runway	A	1	Improvement of illustration quality.
PRO-NOR-SRP-01-15 Change of Runway	A	2	Improvement of illustration quality.
PRO-NOR-SRP-01-20 FMA Mode Check	B	1	Improvement of illustration quality.
PRO-NOR-SRP-01-20 Selecting a Navigation Display	C	2	HL: Improvement of illustration quality.
PRO-NOR-SRP-01-30 Normal Takeoff Profile	C	1	HL: Improvement of illustration quality.
PRO-NOR-SRP-01-50 Reaching Cruise Flight Level	A	1	Improvement of illustration quality.
PRO-NOR-SRP-01-50 Monitoring the Navigation Accuracy - General	B	2	Improvement of illustration quality.
PRO-NOR-SRP-01-50 Monitoring the Fuel Predictions	C	3	New DU
PRO-NOR-SRP-01-50 Monitoring the Fuel Predictions	C	4	New DU
PRO-NOR-SRP-01-50 Entering a Step Climb or a Step Descent	D	5	HL: Improvement of illustration quality.
PRO-NOR-SRP-01-50 Entering a Step Climb or a Step Descent	D	6	HL: Improvement of illustration quality.
PRO-NOR-SRP-01-50 Entering a Step Climb or a Step Descent	D	7	HL: Improvement of illustration quality.
PRO-NOR-SRP-01-50 Entering a Step Climb or a Step Descent	D	8	HL: Improvement of illustration quality.
PRO-NOR-SRP-01-50 Preparation for Descent and Approach - Revision of Lateral F-PLN	F	9	HL: Improvement of illustration quality.
PRO-NOR-SRP-01-50 Preparation for Descent and Approach - Revision of Vertical Flight Plan	F	10	Improvement of illustration quality.

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PRO-NOR-SRP-01-50 Preparation for Descent and Approach - Entering an Auto Speed	F	11	HL: Improvement of illustration quality.
PRO-NOR-SRP-01-50 Preparation for Descent and Approach - Preselecting a Managed Speed/Mach	F	12	HL: Improvement of illustration quality.
PRO-NOR-SRP-01-50 Preparation for Descent and Approach - Entering the Approach Data	F	13	Improvement of illustration quality.
PRO-NOR-SRP-01-50 Preparation for Descent and Approach - Entering the Approach Data	F	14	Improvement of illustration quality.
PRO-NOR-SRP-01-50 Preparation for Descent and Approach - Entering the Approach Data	F	15	Documentation update: Addition of "Preparation for Descent and Approach - Entering the Approach Data" documentary unit
PRO-NOR-SRP-01-50 Preparation for Descent and Approach - Selecting the Radio NAVAIDs	F	16	Improvement of illustration quality.
PRO-NOR-SRP-01-60 Descent Monitoring - DES Mode Engaged	B	1	Improvement of illustration quality.
PRO-NOR-SRP-01-60 Descent Monitoring - DES Mode Engaged	B	2	Improvement of illustration quality.
PRO-NOR-SRP-01-60 Descent Monitoring - DES Mode Engaged	B	3	Improvement of illustration quality.
PRO-NOR-SRP-01-60 Descent Monitoring - OP DES, V/S or FPA Mode Engaged	B	4	HL: Improvement of illustration quality.
PRO-NOR-SRP-01-60 Descent Monitoring - OP DES, V/S or FPA Mode Engaged	B	5	HL: Improvement of illustration quality.
PRO-NOR-SRP-01-60 Expedite Descent (If installed)	C	6	Improvement of illustration quality.
PRO-NOR-SRP-01-60 Too Steep Path	E	7	Improvement of illustration quality.

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PRO-NOR-SRP-01-60 Too Steep Path	E	8	Improvement of illustration quality.
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PRO-NOR-SRP-01-70 ILS Approach - Standard ILS Automatic Approach	B	2	Improvement of illustration quality.
PRO-NOR-SRP-01-70 ILS/MLS Approach - Glideslope Interception from Above	B	3	Update of the technical wording
PRO-NOR-SRP-01-70 ILS Approach - Localizer (LOC) Beam Capture	B	4	Improvement of illustration quality.
PRO-NOR-SRP-01-70 Failures and Associated Actions Below 1 000 ft During A CAT II Approach	L	5	Improvement of illustration quality.
PRO-NOR-SRP-01-70 Back-Course Localizer Approach - Procedure	O	6	Improvement of illustration quality.
PRO-NOR-SRP-01-70 Back-Course Localizer Approach - Procedure	O	7	Improvement of illustration quality.
PRO-NOR-SRP-01-70 Back-Course Localizer Approach - Procedure	O	8	Improvement of illustration quality.
PRO-NOR-SRP-01-70 Non Precision Approach - Managed Lateral Selected Vertical Guidance	P	9	Improvement of illustration quality.
PRO-NOR-SRP-01-70 Non Precision Approach Profile - Managed Lateral and Selected Vertical Guidance	Q	10	Improvement of illustration quality.
PRO-NOR-SRP-01-70 Non Precision Approach Profile - Selected Guidance	Q	11	Improvement of illustration quality.
PRO-NOR-SRP-01-80 Go-Around Profile	C	1	Improvement of illustration quality.
PRO-NOR-SRP-01-80 Go-Around Profile	C	2	Improvement of illustration quality.
PRO-NOR-SRP-01-80 Go-Around Profile	C	3	Improvement of illustration quality.

Localization Title	Toc Index	ID	Reason
PRO-NOR-SRP-01-80 Task Sharing During a Go-Around	F	4	Update of the illustration

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INTRODUCTION

Applicable to: ALL

Standard Company practices within the framework of operating procedures are described in the Normal Procedures (PRO-NOR-SOP) and Supplementary Procedures (PRO-SUP). Normal Procedures are those performed on every flight whereas Supplementary Procedures are those performed on an irregular basis, depending on requirements.
Additional operating information can be found in System Related Procedures (PRO-NOR-SRP) and Special Operations Procedures (PRO-SPO). System Related Procedures provide an amplified description of the Normal Procedures and the use of the FMGS. Special Operations Procedures includes information about Extended Range Operations, flight in RVSM airspace and RNP.

PHILOSOPHY

Applicable to: ALL

Normal Procedures are designed to establish a safe and standardised operating practice, mitigate the effects of adverse task and environmental factors and provide defences against the consequences of human error. They are performed by memory and shall be followed for all normal operations.
Normal Procedures shall be used by the crew to ensure the aircraft is acceptable for flight and the flight deck is correctly configured for each phase of flight. Flight profiles applicable to Normal Procedures represent recommended flight profiles and sequences for aircraft configuration changes.
Infrequently used Supplementary Procedures are usually accomplished by reference to the chapter. Supplementary Procedures not related to a specific phase of flight are provided by section title corresponding to the system being addressed.
Normal Procedures assume that all systems are operating normally. Automated features should be fully utilised.
The Captain retains the authority to vary procedures if and when circumstances dictate.

MONITORING AND CROSS-CHECKING

Applicable to: ALL

Monitoring and cross-checking are essential components of effective procedures, and are primary tasks for all crew members.
Active monitoring involves effective prioritisation and workload management strategies and as such, crew members shall only perform non essential duties/activities during the lowest workload periods.
Effective cross-checking requires that actions and responses described in Normal Procedures be generated only after consciously processing the relevant information.

Lack of effective monitoring and cross-checking by the crew can render the procedural defences ineffective.

TASK SHARING AND RESPONSIBILITIES

Applicable to: ALL

The objective of Normal Procedures, as they apply to the Flight Deck Check and Cockpit Preparation, is for all tasks to be completed up to and including the Before Start Checklist 20 minutes prior to the scheduled departure time.

PILOT FLYING (PF)

The PF is the pilot, designated by the Commander, who operates or commands the operation of the flight controls during the flight.
The PF is primarily responsible for all tasks associated with cockpit configuration and FMGS programming up until completion of engine start and following engine shutdown.
After engine start until engine shutdown, the PF is primarily responsible for monitoring and control of the aircraft, either manually or automatically, and management of aircraft configuration and flight deck systems to achieve the desired flight path. The PF, where practical, shall direct the PM to make any changes to the flight deck systems.
Exceptions:

- PF shall complete tasks described in CRUISE and DESCENT PREPARATION.
- PF shall operate PARK BRAKE and SPEEDBRAKES. Where practical, the PF shall keep his hand on the speedbrake handle whenever speedbrakes are applied.
- The respective crew member is responsible for the onside operation of any duplicated control panel whose function is independent.
- Other exceptions to this policy are described below under the appropriate heading in GENERAL INFORMATION and/or annotated in the expanded procedures.

PF directives are normally verbal, or via specific cues described in the expanded procedures. The PF shall pace his directives to ensure that the PM does not become overloaded.

PILOT MONITORING (PM)

The PM is the pilot who monitors and supports the pilot flying (PF).
The PM is primarily responsible for monitoring aircraft flight path and flight deck systems, ensuring safe and standard conditions exist at all times, and supporting the PF by cross-checking his actions and responding appropriately to any directives. The PM must always confirm the suitability of the PF's directive before actioning it.

CONFIGURATION CHANGES

When ordering configuration changes, the PF shall first check that the correct parameters exist before directing the required change. Following the PF directive, the PM shall check the parameters and choose either a positive or negative response. Following a positive response (e.g. "speed checks"), the PM shall repeat the order before making a selection. A negative response will take the form, "check <parameter>" (e.g. "check speed"), and no configuration change shall take place until the correct parameter has been achieved.
The monitoring role of the PM requires that he ensure the appropriate and correct configuration changes are achieved. However, it is accepted the ECAM will monitor and alert most system malfunctions.

USE OF AP/FD, A/THR AND FLIGHT GUIDANCE

Applicable to: ALL

COMPLACENCY

The FMGS includes features to protect the Airbus from excursions outside the design flight envelope. However, it is still possible to achieve very low energy situations near terrain from which the aircraft may not recover. It is therefore extremely important that this aircraft is flown with normal levels of airmanship and with particular respect for the limitations. The crew shall not rely on the automatic protections.
Whenever a change is made on the FCU or MCDU, both pilots are to monitor the FMA, PFD and ND, as appropriate, to confirm the correct outcome.

MCDU

Only essential tasks are to be completed during climb and descent.
All changes entered into the MCDU (other than BRG/DIST TO) are to be communicated to the other pilot.
Changes to the F-PLN directly affecting navigation are directed by the PF, actioned where possible (note 2), but not executed by the PM until receiving confirmation from the PF.

Note:
1. *Examples of MCDU operations that directly affect navigation include DIRECT TO, ACTIVATE SEC, ENABLE ALTN, INSERT/EXIT HOLD, activation or deletion of an active OFFSET, and the addition or deletion of any primary F-PLN waypoint. This list is not exhaustive.*
2. *On Legacy FM equipped aircraft, a DIRECT TO action results in an immediate execution.*

AUTO-FLIGHT

Once the PF has engaged the AP, the PF shall select appropriate modes to fly the aircraft through the FCU.

Flight Directors/Flight Path Directors shall be used for all phases of flight.
The AP, when available, shall be used during abnormal or emergency situations.
When an AP is engaged the PF will confirm the selection by calling the AP1(2) annunciation on the FMA.

CAUTION	If the aircraft does not follow the desired flight path or airspeed control, and time does not permit analysing and resolving the anomaly, revert without delay from FMGS guidance to selected guidance or manual flight. No attempt shall be made to reprogram the FMGS until the desired flight path and airspeed are restored, and time and conditions permit. In this context, spatial and situational awareness must be maintained at all times.

The normal method of AP disconnection is through the take-over pushbutton on the sidestick. The PF shall alert the PM prior to disconnecting the AP.
A force above a certain threshold applied to the sidestick or rudder pedals will disengage the AP.

1 **MANUAL FLIGHT**

The PF flies the aircraft manually and will normally direct the PM to make all necessary FCU selections. The PM should automatically make selections in response to ATC clearances without PF direction.
Flight Directors/Flight Path Directors shall be used for all phases of flight, except when flying a visual approach or the visual descent segment of a non-precision or circling approach. In these situations, only the FPV shall be used.
Hand flying of the aircraft shall be practised only at those airfields where weather conditions are appropriate (normally VMC) and when the overall workload is low.
Hand flying without Flight Directors/Autothrust for practice purposes is permitted under the following conditions:

Flight Director OR Autothrust selected OFF (not both together)
- The reduced level of automation must be briefed prior to TOD
- Below 10 000 amsl
- Daytime VMC only
- ILS Approach only

Flight Director and Autothrust selected OFF
- The reduced level of automation must be briefed prior to TOD
- Established on the ILS (prior to selecting the FD's OFF)
- 1 000 ft Cloud base
- 5 km Visibility
- Surface crosswind 15 kts or less (10 kts or less for SO's)

It is the responsibility of all pilots to ensure they fly sufficient manual approaches to maintain manual flying competence.

Both pilots shall have their seats positioned to allow full travel of the sidestick and rudder. The PF's feet should rest lightly on the rudder pedals. Use of the rudder is normally only required for asymmetric flight, or takeoff and landing in a crosswind.

FCU ALTITUDE SELECTION

As each clearance level is given, it shall be set in the FCU ALT window by the PF, or PM in the case of manual flight, and confirmed on the PFD by both pilots.
Normally, all altitude restrictions should be set in the FCU ALT window. Notwithstanding, the following exceptions are permitted:

- When managed vertical mode (CLB) or (DES) is in use during a published departure or arrival procedure, which has been selected from the database, the cleared altitude/level may be set.
- When managed vertical mode (FINAL APP) is in use during a published non-ILS approach which has been selected from the database, the missed approach altitude shall be set after FINAL APP mode engagement.
- When a selected vertical mode (VS/FPA) is in use during a published non-ILS approach, the missed approach altitude shall normally be set after passing the FAF, and only when below the missed approach altitude.
- MDA/DA shall not be set in the FCU ALT window.

CAUTION	The use of a selected vertical mode will remove the protection provided by any active managed vertical mode and could result in procedural altitudes being violated.

CAUTION	When cleared for an instrument approach and not on a published segment of the approach, the last ATC assigned altitude shall be maintained until established on a published segment of that approach.

FLIGHT PATH CONTROL

It is the responsibility of all operating crewmembers to ensure aircraft speed, configuration and flight path are managed appropriately at all times. Normal principles of CRM and crew management should be used to immediately address any crew member concerns, FCTM OP-050 CRM and TEM refers.

DUAL INPUTS TO FLIGHT CONTROLS

Simultaneous control inputs by both PF and PM are not recommended.
If the Captain or PM deems it necessary to take-over control of the aircraft in manual flight, he shall clearly state, “I have control,” and press the sidestick priority pushbutton. The other pilot shall respond, "You have control." The pushbutton shall remain pressed until the transfer of control is clearly established.

It is not possible for one pilot to monitor the other by 'feeling' sidestick inputs. Visual cues are the primary means of determining the correct control inputs have been applied.

FLIGHT CONTROLS MONITORING

In order to cover the possibility of incapacitation causing an unwanted deflection of the sidestick, the PM shall place his hand near his sidestick during critical phases of flight, ready to take priority. The PM shall rest his feet lightly on the rudder pedals clear of the brakes at all times below circuit height in case of incapacitation.

AUTO-THRUST

Normally, the A/THR should be active from THR RED ALT down to RETARD in the flare. In conditions of severe turbulence, it may be preferable to use manual thrust. Since A/THR activity is not fed back to the thrust levers, the pilot shall use other available cues such as engine instruments, speed trend arrow and the FMA to monitor A/THR activity. A high level of speed awareness shall be maintained.
The crew shall monitor the A/THR operation by checking the active mode on the FMA, the current speed versus the target speed, the Speed Trend Vector and the thrust command symbols on the E/WD.
If the PF is not satisfied with the A/THR operation, he shall match the thrust lever position to the current engine thrust, then disengage it using the Instinctive Disconnect pushbutton located on the thrust levers. The PF can then command thrust manually.

AUTO-BRAKE

MAX autobrake shall be selected for all takeoffs.
LO or MED autobrake shall be armed for all landings. When selecting an autobrake setting, consider landing weight, environmental conditions, runway conditions, runway length, turnoff location and aircraft configuration. Refer FCTM NO-160 Braking.

COMMUNICATION

Applicable to: ALL

Effective cross-cockpit communication is vital. Any time a crew member makes or notices any significant changes to displayed information or switch selection, he shall advise the other crew member, and obtain acknowledgement. This includes, but is not limited to, FMGS alterations, FMA indications, changes in Speed/Mach, tuning of navigation aids, flight path deviations, and selection of such systems as anti-ice and pack flow.

ATC CLEARANCES AND COMMUNICATION PROCEDURES

ATC clearances must be unambiguously received and understood by both pilots through effective monitoring, acknowledgement and confirmation:

- Both pilots shall monitor all ATC clearances.
- On receipt of any ATC clearance, after PM readback, the PF shall acknowledge the clearance and the PM will confirm it. The PF may achieve the acknowledgement by, as appropriate:
  - Announcing the changes in altitude, heading and speed.
  - Calling the FMA changes.
  - Cross-checking the active F-PLN against any Departure, Arrival, Route clearance, and runway (when multiple runways are available for use).
  - Paraphrasing the taxi instructions to enhance crew understanding.

The PF shall handle all communications with the ground crew.
The PM will normally handle all ATC and Company communications, and the receipt of ATIS or other weather information.
Normal communications shall be made to ATC through VHF 1, which is the only VHF available in the event of a major power failure. VHF 2 is used to monitor 121.5, obtain ATIS information, In Flight Broadcast Procedures or company communications. VHF 3 is normally used by ACARS.
When required to contact the next FIR prior to ATC transfer, the call should be made through VHF 2 by the PM using headset. The PM shall advise the PF of any onward clearance.
The PM shall use his onside RMP to tune all VHF/HF radios.
Guidance on radio procedures and terminology is provided in Part A 8.3.13.1.

HAND MICROPHONES, INTERPHONE, AND HEADSETS

Part A 8.3.13.1 refers. In addition, live interphone communication shall be used from the commencement of taxiing, and in all phases of flight during which headsets are required to be worn.
To ensure effective communication, the ACP INT pushbutton shall be left OUT and the ACP INT and loudspeaker volume knobs shall be set to an audible level whenever headsets are not worn. The switches shall be left in these positions when the aircraft is parked and the cockpit is unoccupied.

DESIGNATORS

Applicable to: ALL

Specific designators, PF (Pilot Flying), PM (Pilot Monitoring), or C (Captain) allocate responsibility accordingly.
For Normal Procedures, where a task is assigned to a specific crew member(s), the appropriate designator is placed to the right of the task.
For Normal Checklists, a standard response and the appropriate designator are placed to the right of each challenge. This response is made to confirm that the task (challenge) has been carried out.

NORMAL CHECKLISTS

Applicable to: ALL

Normal Checklists take advantage of the ECAM system and include only those items that may have a direct impact on safety, if not correctly accomplished. They are presented on a plasticised card held in a slot adjacent to each pilot. Normal Checklists are non-action checklists. After completion of the Normal Procedures and prior to commencing each new phase of flight, the Normal Checklist shall be used to ascertain that the critical tasks have been completed.
The use of checklists is mandatory, and Normal Checklists shall be completed by challenge and response. The response confirms that the relevant action has been carried out. Each item shall be answered correctly before proceeding to the next item.

PROTOCOL

All checklists shall be initiated by the PF and read by the PM. The designated crew member(s) shall provide the standard response. If no crew member is designated, the PF shall respond. If annotated PF/PM, the PF shall respond first followed by the PM. The After Takeoff Checklist shall be read and responded to by the PM.
If the reading of a checklist is unintentionally interrupted, the last item called before the interruption shall be repeated before continuing with the checklist. Where a checklist item is indicated by an underline (____) , the response shall be the actual number or quantity involved.
If a change to aircraft configuration, takeoff data or runway occurs prior to departure, after having commenced or completed the Before Takeoff Checklist, the Before Takeoff Checklist shall be repeated.
If a change of runway occurs after having completed the Descent Checklist, the Descent and Landing Checklist if already actioned shall be repeated.
On completion of any normal checklist, the PM shall announce, "<checklist title> complete."

FINAL ITEMS

The After Start, Before Takeoff, and Landing Checklists contain FINAL ITEMS. This intentional break is designed to allow the checklist to be initiated prior to completion of all the included tasks. When appropriate, the checklist shall be completed down to the FINAL ITEMS. Upon completion of the outstanding items, the PM shall complete the checklist. The PF shall ensure the FINAL ITEMS have been completed.

LANDING CHECKLIST

The PM shall complete the FINAL ITEMS when the ECAM LDG MEMO is displayed with no blue action lines. If the ECAM LDG MEMO does not annunciate below 2 000 ft RA, the PM shall read the FINAL ITEMS including each item of the expanded LDG MEMO directly from the checklist when the aircraft is fully configured for landing.

MONITORING

Normal checklist philosophy is designed around continual reference to the MEMO area of upper ECAM for the position of certain items. The PF shall monitor that all items covered in Normal Checklists have been actioned correctly (aircraft configuration from the ECAM, and systems from switch positions and the ECAM).

GROUND PROCEDURES

Applicable to: ALL

PUSHBACK AND TOWING

To expedite departure, start up and pushback clearance should be requested simultaneously from ATC provided this is not expected to cause any appreciable delay to other aircraft movements.
The nose wheel steering deactivation pin shall be inserted prior to pushback or towing.
Complete the Before Start and Start Checklists before commencing pushback.
Standard phraseology to be used during pushback are laid down in the Part A 8.3.13.2 and in PRO-NOR-SOP-90 Cockpit to Ground Communications.
ATC clearance shall not be requested during pushback. If, during the pushback, ATC calls the aircraft with a clearance, they shall be told to standby.
The use of reverse thrust to back, or assist pushback of the aircraft is not permitted.
Do not give clearance for the engineer to disconnect until the start is complete and the engines have stabilized.
Do not release the parking brake until the ground crew clear signal has been received, the After Start Checklist has been completed, the PM has confirmed, “clear,” and the taxi clearance has been received from ATC.

TAXI OPERATIONS

Airport ground manoeuvring areas are high threat environments that require close monitoring by the crew at all times. Prioritisation is essential, and completion of tasks during taxi is secondary to maintaining a high degree of situational awareness. Activities that require prolonged attention inside the cockpit should be carried out when the aircraft is stationary.
All cockpit crew should monitor ATC instructions to other aircraft and maintain a good lookout for aircraft, vehicles and obstacles.
Correct taxi routing is to be confirmed by reference to airport diagrams and airport signage. Particular attention shall be paid to routing near runway incursion hot spots or when crossing active runways. The PF shall communicate and update as necessary his intended taxi route for confirmation by the PM. If any doubt exists as to the correct taxi route, the aircraft should be stopped and confirmation sought from ATC before continuing.

When taxiing in reduced visibility conditions, groundspeed shall be closely monitored and, when appropriate, expected headings should be compared with aircraft instrumentation. If LVP is in force, refer to PRO-SUP-91-60 Low Visibility Operations.

CAUTION	Before entering the runway, the correct runway and departure point shall be positively identified and confirmed by both pilots by reference to signage or markings.

SEAT AND SEAT BELTS

Applicable to: ALL

Each crew member shall ensure that before takeoff or landing, his seat, rudder pedals and armrests are correctly positioned and that his seat belt and shoulder harness are secured.

ALTIMETRY PROCEDURES

Applicable to: ALL

Part A 8.1.1.2 and 8.3.1.3 refers.

ARRIVAL AND DEPARTURE BRIEFINGS

Applicable to: ALL

All briefings shall be conducted by the PF. Refer to FCTM SI-080 Briefing Procedure.

RADIO NAVIGATION PROCEDURES

Applicable to: ALL

All navaids shall be identified by both pilots. This may be done visually, using the EFIS ident displayed on the ND, or if unavailable or incorrectly displayed, aurally, using the ACP.
The required VOR/ADF navaid(s) shall be manually tuned for departure and approach. The ILS normally remains auto-tuned, however for departures only, it shall be tuned manually in cases where backtracking the LLZ or the ILS DME is required.
Auto-tuning of the navaids is recommended during climb, cruise and descent, except as required for track or raw data monitoring. When operating along airways defined by radio navigation aids with long distances between them, the PF should manually tune the 'to' and/or 'from' navaid for reception up to the maximum range of the aid. There is no requirement to manually tune NDBs which are co-located with displayed VORs.

2 **GPS PRIMARY AND NAVIGATION ACCURACY**

Both pilots shall regularly monitor that GPS PRIMARY is available throughout all phases of flight. No navigation accuracy check is required as long as GPS PRIMARY is available. However, FMGS information shall be cross-checked whenever raw data is available.

If the GPS is inoperative, or GPS PRIMARY is not indicated, regular navigation accuracy checks (DSC-22_20-20-20 Navigation Accuracy Check and PRO-NOR-SRP-01-50 Monitoring the Navigation Accuracy refers) shall be carried out to ensure the required ENROUTE, TERMINAL or APPROACH RNP is achieved. In the terminal and approach area, navigation inaccuracy greater than 1 nm will influence the AP/FD mode, non-precision approach guidance modes, EFIS display, and EGPWS TERR pb selection.

Operations on routes with Required Navigation Performance (RNP) require that the ESTIMATED navigation accuracy indicated on the PROG page is better than the RNP for the route. With radio updating, the equipment will maintain better than RNP 5, as required in European Basic RNAV (BRNAV). Due to large areas without radio updating, GPS PRIMARY is required to ensure RNP 10 in remote regions, unless the requirements under the MEL/PRO-SPO-51 Special Operations RNP with the GPS primary function inoperative, are satisfied.

STANDARD TO ANDGATHRUST REDUCTION & ACCELERATION

Applicable to: ALL

The all engines operating takeoff and go-around THR RED and ACC altitudes are 1 500 ft AAL. The ENG OUT ACC altitude is 1 500 ft AAL.

NOISE ABATEMENT DEPARTURE PROCEDURES(NADP)

Applicable to: ALL

The Standard noise abatement procedure, as annotated on a Port Page, shall be flown in accordance with NADP 1 unless annotated otherwise.

NADP 1/ ICAO A - Maintain SRS climb to 3 000 ft AAL, followed by acceleration and flap retraction.

NADP 2/ ICAO B - Maintain SRS climb to standard acceleration altitude, followed by normal acceleration and flap retraction. CLB thrust is set after first flap retraction (the flap Automatic Retraction System complies with this requirement). Thereafter, maintain Green Dot speed until 3 000 ft AAL.

In all cases the THR RED altitude on the PERF T/O page shall be standard.

Noise abatement procedures should not be conducted in conditions of significant turbulence or windshear.

OPERATING SPEEDS

Applicable to: ALL

DEPARTURE

The aircraft shall be operated in compliance with state speed limit requirements. On departure, if a speed greater than the state speed limit is required for operational reasons, a request shall be made to ATC.
The maximum speed is the greater of 250 kt or Green Dot speed until:

- The highest applicable sector MSA, and
- In all cases, 3 000 ft AAL.

ARRIVAL

The PF shall reduce speed in descent to a maximum of 250 kt IAS:

- Before descending below the highest applicable sector MSA.
- In accordance with state requirements.
- At the speed limit point, if one is defined.
- In all cases, before descending below 3 000 ft AAL.

TERRAIN AWARENESS

Applicable to: ALL

TERRAIN CLEARANCE

During departures and arrivals that do not follow published procedures, the crew must take account of the:

- MRA (Part A 8.1.8.2 Operational Flight Plan).
- Grid MORA if not on the CFP track.
- 25 nm MSA where valid.
- Minimum vectoring altitudes when under radar control.

CAUTION	Relevant terrain may exist outside the 25 nm MSA coverage.

Crews are not to assume that ATC instructions will ensure terrain clearance. If ATC issue an instruction that conflicts with the crew's assessment of terrain clearance, it shall be questioned and any confusion resolved before the aircraft accepts the instruction.

CAUTION	If any doubt exists regarding aircraft position or terrain clearance, immediately climb to a known safe altitude.

TERRAIN DISPLAY

To enhance situational awareness, TERR may be selected at any time. Normally TERR is selected on the ND:

- Before takeoff, and retained until above the relevant sector MSA.
- During descent, when cleared below the highest sector MSA.

These requirements may be modified with significant weather or if terrain is not a factor.

EGPWS OPERATION

The EGPWS enhanced function shall only be inhibited in accordance with the guidelines in LIM-34 Enhanced Ground Proximity Warning System (EGPWS).

CAUTION	The response to a (E)GPWS hard warning shall be immediate, and not an evaluated response which may delay the escape manoeuvre and increase the likelihood of CFIT.

RATE OF DESCENT

High rates of descent when in close proximity to terrain are dangerous and can reduce the warning time provided by the GPWS. A rate of descent greater than 2 500 ft/min below 2 500 ft RA, or greater than 1 500 ft/min below 1 000 ft RA, is considered excessive and shall be immediately corrected by the PF.

RADIO ALTIMETRY AND AUTOMATED VOICE CALLOUTS

The radio altitude shall be included in the instrument scan for all approaches. Radio altimetry and automated voice callouts (e.g. 2 500, 1 000) enhance terrain awareness and approach monitoring. The crew shall ensure the aircraft flight path and performance is appropriate for the approach procedure and current position when any automated altitude callout activates.

WEATHER RADAR OPERATION

Applicable to: ALL

Effective antenna tilt management is the single most important factor in producing informative weather radar displays. The PF is responsible for weather radar operation and adjusting antenna tilt throughout all phases of flight. With the AP off, the PF shall direct the PM with the weather radar operation.
Refer to FCTM SI-070 Use of Radar.

DESCENT AND APPROACH TO LAND

Applicable to: ALL

DESCENT PROFILE

The crew shall be aware of their descent profile, that is, track miles to run and height to lose. Possible threats to profile management include airports not at sea level and false lateral or vertical guidance.
During descent, crews should strive for best efficiency to minimise fuel burn, whilst actively considering and managing:

- ATC/procedural restrictions.
- Track miles to touchdown.
- Weather conditions.
- Crew experience/recency/fatigue.
- Preceding/following traffic.

STABILISED APPROACH

On all approaches, the Commander should ensure that the aircraft speed, configuration and descent profile are managed to comply with the following:

- Landing configuration achieved before 1 500 ft AAL.
- Stabilised on Final Approach Path before 1 500 ft AAL (see Note).

For approach procedures that require lateral manoeuvring, the aircraft shall be wings level on the extended runway centreline by 300 ft AAL.
A missed approach is mandatory if any of the following have not been achieved by 1 000 ft AAL:

- Landing configuration.
- Stabilised on Final Approach Path.
- Stabilised at VAPP, taking into consideration the prevailing conditions.
- Landing Checklist complete.

Note:
1. *Final Approach Path means the published instrument approach path or a constant flight path angle to the touchdown point.*
2. *Prevailing conditions include rapid wind changes, turbulence, and appropriate adherence to published or accepted ATC speed requirements. In the case of an ATC speed requirement, the aircraft speed must be reducing towards VAPP by 1 000 ft AAL.*
3. *Where instrument, visual or circling approach procedures require level flight at or below 1 500 ft AAL, the landing configuration shall be achieved before descent below 1 000 ft AAL.*

APPROACH

Applicable to: ALL

NORMAL APPROACH

The normal approach is an instrument approach. In IMC, approaching minimums, the PF should start to take in visual cues. The primary task of the PM is to monitor the cockpit instrument indications on all approaches, instrument or visual.

CONVERTING AN ILS APPROACH TO AN AUTOLAND

If the captain considers it necessary to change a manual landing to an autoland during an ILS approach he may do so if the following conditions can be met:

- The crew has previously checked the Port Page and NOTAMs to verify the suitability of the ILS installation for autoland capability, and included this in the arrival briefing.
- The decision is announced and briefed before the aircraft descends below 500 ft RA.
- The Captain is PF for the autoland.
- If there is any doubt over the safe completion of the approach and landing a go-around is executed.

CIRCLING AND VISUAL APPROACHES

FCTM NO-130 Circling Approach, FCTM NO-140 Visual Approach, Part A 8.3.7 and 8.3.8 refers.

FM NON-DATABASE APPROACHES

If the FM database does not have a selectable approach procedure, time permitting, it is acceptable to manually build an approach using stored database or pilot-created waypoints. However, altitude constraints below the highest sector MSA shall not be entered against these waypoints.
In all cases where the procedure has not been selected from the database, managed vertical modes shall not be used below the highest sector MSA.

CAUTION	Lateral and vertical guidance derived from manually inserted waypoints shall be treated with extreme care. Raw data shall be used as the primary navigation reference.

MANDATORY MISSED APPROACH

Applicable to: ALL

A missed approach is mandatory and shall be executed by the PF immediately if:

- The aircraft has not achieved the parameters defined under STABILISED APPROACH, or
- The RVR/visibility or minimum visual reference requirements for the approach in use, as defined in Part A 8.3.6.2 and 8.4.1, are not achieved, or

- Visual references are subsequently lost, or
- The successful outcome of the manoeuvre is in doubt, or
- Loss of situational awareness below the MSA, or
- The Captain announces, “Go-Around.”

TOUCHDOWN AND ROLLOUT

Applicable to: ALL

The normal touchdown zone is bounded by the 2nd Touchdown Zone Marker and the Aiming Point Marker. FCTM NO-160 Touchdown Point refers.
If touchdown occurs beyond the planned touchdown point, the Commander must assess whether a safe landing will be achievable in the remaining distance available:

- If the Commander decides the landing is to be discontinued, he shall announce, "Go-around." The PF shall perform a normal go-around procedure or a go-around after touchdown, as required.
- If the Commander decides the landing is to be continued, he shall ensure the PF uses appropriate braking and reverse thrust.

WARNING	If the touchdown is delayed beyond the Touchdown Zone Markings, it may be difficult to accurately assess the remaining landing distance available due to the absence of Touchdown Markings.

REVERSE THRUST

Maximum reverse thrust shall normally be used for landing.
However, in suitable conditions, idle reverse should be briefed and used.

WARNING	After reverse thrust is selected, a full stop landing shall be made.

FIRST AND SECOND OFFICER FLYING

Applicable to: ALL

First and Second Officers may operate as PF. Before sectors can be given to the F/O or S/O by the Captain, the requirements of Part A 4.1.2.2 and 5.2.3.7 must be satisfied. Additionally, the Captain is ultimately responsible, and shall monitor all flying and procedures (especially noise abatement procedures), and be prepared to take over at any time.
Captains should allow and encourage the F/O or S/O to be fully involved in all facets of the operation, particularly when PF.

TAXIING

Particular notice must be taken of taxiing proficiency and, in this regard, the Captain shall ensure that he only takes ATC clearances when he is certain that he can continue to monitor the taxiing. Similarly, when any potential taxiing restriction exists, such as Left Seat Docking Systems, icy

taxiways, 180 ° turns on limited width runways, or confined ramp areas, the Captain shall taxi the aircraft at the appropriate time. The briefing and handover for this shall be carefully and clearly executed.

TAKEOFF

In the event of a malfunction before V1, the Captain shall decide whether to STOP or continue the takeoff. If the decision is to reject the takeoff, the Captain shall announce "Stop!" and take control. In the event of incapacitation of the Captain below 100 kt the F/O or S/O will execute the rejected takeoff procedure. Between 100 kt and V1, the F/O or S/O shall decide whether to execute the rejected takeoff procedure or continue the takeoff.

FINAL APPROACH

The Captain may seek verbal assurance during the approach that the F/O or S/O has the correct runway environment in sight.
F/O and S/O deviations from the correct flight path must never exceed the capability of the Captain to recover the situation. It is not possible to see the control inputs of the F/O or S/O directly through sidestick movement and therefore the Captain shall be particularly sensitive to the other cues such as unusual speed trends, thrust, pitch attitudes, FMAs, or other PFD or ND indications. It is NOT recommended to add control inputs to those of the F/O or S/O. If any doubt exists concerning the safety of the approach or landing, the Captain shall take control.

LANDING

The Captain shall monitor the touchdown point, reverse thrust selection and control inputs by the F/O or S/O.

DISPLAY UNITS: LCD

Applicable to: ALL

The DUs on some aircraft are of the Liquid Crystal Display (LCD) type. The surface of these screens has a special coating that requires a specialized cleaning process as detailed in the applicable CX Engineering manuals.
To maintain and extend the life of the LCD:

- Do not touch the surface of any LCD screen.
- Do not clean the surface with normal screen wipes.

Maintenance are required to routinely clean the displays. If the displays require additional cleaning then enter this requirement in the Maintenance Log.

HANDOVER DUTIES IN-FLIGHT

Applicable to: ALL

Part A 8.3.4.2 refers.

CABIN SIGNS

Applicable to: ALL

Part A 8.3.13.2 refers.

DUPLICATE INSPECTIONS

Applicable to: ALL

Part A 8.6.1.10 and 8.6.1.8 refers.

TRANSIT REQUIREMENTS

Applicable to: ALL

Part A 8.3.12.1, 8.6.1.12 and 8.6.1.13 refers.

PRE-FLIGHT BRIEFING

Applicable to: ALL

The briefing shall be in sufficient detail to ensure all crew members are familiar with the requirements of the flight and that factors such as weather, NOTAMs, MEL, PADD, are included in the overall flight planning. All crew members are encouraged to make comments or ask questions concerning the flight, and to review any late revisions to operating procedures, limitations, or flight data. Any uncertainties shall be clarified at the briefing stage.

CREW RESPONSIBILITIES

Applicable to: ALL

1 **CAPTAIN**

- Ensure the following aircraft documentation is carried, and is valid*:
  - Certificate of Airworthiness.
  - Certificate of Registration.
  - Certificate of Maintenance Review.
  - Aircraft Radio Station Licence.
  - Noise Certificate.

  Note: ** The validity period can only be checked on the Certificates of Airworthiness and Maintenance Review.*

- When an On Call Transit (OCT) applies, check the 'OIL QTY/UPLIFT' block has been completed, and the 'OCT Completed' entry has been made in the Action Taken field adjacent to the 'OCT Required' entry in the Maintenance Log.
- When a Pre Flight Check (PFC) applies, check/complete the 'OIL QTY/UPLIFT' block, and check the 'PFC Completed' entry has been made, together with signature and ERN, in the Action Taken field adjacent to the 'PFC Required' entry in the Maintenance Log.
- Whenever scheduled maintenance (e.g. HKG, overnight, extended layover) or defect rectification has been carried out, check the 'OIL QTY/UPLIFT' block has been completed, and the Certificate of Release to Service and Aircraft Released for Flight signature blocks in the Maintenance Log have been satisfactory actioned and signed by the licensed engineer. If an Engineering Check has been carried out, check the Check Completed block has been actioned and signed by the licenced engineer.
- Check the acceptability of any deferred defects.
- Check that dispensations for flight outside the MEL have been properly authorized in accordance with the published procedure for the appropriate sector.
- Check that dispatch for flight under Article 11(1) of the AN(HK)O has been properly administered, Part A 8.6.1.9 refers.

- Sign the Outbound Commander's Acceptance in the Maintenance Log.
- Complete a review of the OEB section of the QRH. Ensure all operating flight crew understand the operational relevance of the OEBs.
- Check RTOW data (ACARS, WEB, SMS) or Simplified RTOW data computation, as appropriate.
- Check and sign the Loadsheet, and acknowledge via ACARS, Part A 8.1.7.4 and 8.3.2.1 refers.
- Confirm refueling procedures complete.

FIRST/SECOND OFFICER

As the second in command, the F/O or S/O shall satisfy himself that all required actions are completed correctly.

PILOT FLYING (PF)

- Carry out the Flow Pattern Sequence.
- Check SMS/Simplified RTOW data computation, if applicable.
- Complete Refueling Procedures.

PILOT MONITORING (PM)

- Complete the Flight Deck Check.
- Perform an external inspection.
- When a Pre Flight Check (PFC) applies, complete the 'OIL QTY/UPLIFT' block and enter 'PFC Completed', together with signature and ERN, in the Action Taken field adjacent to the 'PFC Required' entry in the Maintenance Log.
- Carry out the Flow Pattern Sequence after it has been completed by the PF.
- Complete the refueling procedures.
- Complete the SMS/Simplified RTOW data computation, if applicable.
- Operate the communication's radios, and conduct all other duties as outlined in this chapter.
- Complete the Computer Flight Plan.

REFUELLING PROCEDURES

Applicable to: ALL

The Captain is responsible for cross-checking the fuel uplift, distribution and signing the Refuel Record Form.
Any crew member may sign the fuel delivery sheet.

REFUEL RECORD FORM

The Refuel Record Form shall be completed prior to each flight, including those sectors which do not require fuel uplift. The white copy is retained with the flight documents, the blue copy is retained at the station.

The PM shall enter the A/C registration, Date, Flight Number, Sector and Departure Fuel Order. When a Standby figure has been entered, and the Final fuel has been determined, the PM shall enter the Final fuel figure and notify the Approved Refueller. Fuel figures shall not be transmitted verbally, but entered on the Refuel Record Form and presented to the Refueller.
An Approved Refueller will normally carry out the actual refuelling operation; this includes authorised refuellers, qualified ground engineers/mechanics, and pilots.
The Approved Refueller shall enter:

- Fuel distribution and total quantity in the 'BEFORE REFUEL' block before refuelling.
- Stick number and units, and the corrected fuel quantity in the 'BEFORE REFUEL' block, whenever the fuel quantity indicating system is inoperative.
- Fuel distribution and total quantity in the 'DEPARTURE FUEL' block, after refuelling.
- Fuel uplift volume (in LTR, USG or IMPG) in the 'FUEL-UPLIFT' block, and the actual UPLIFT SG.
- Sign the Refuel Record Form as the APPROVED REFUELLER.

Note: If a pilot is supervising the refuelling operation, refer to PER-LOD-FUL for operation of the refuel panel.

FUEL REFUEL RECORD WITH UPLIFT

On completion of refuelling the PM shall:

- Enter the MAINT LOG ARR FUEL in the 'BEFORE REFUEL' block, and ensure it is in close agreement with the BEFORE REFUEL - TOTAL.
- Subtract TOTAL BEFORE REFUEL from TOTAL DEPARTURE FUEL and enter against ESTIMATED UPLIFT.
- Check FUEL-UPLIFT volume (LTR, USG, IMPG) on the Refuel Record Form agrees with the fuel receipt.
- Calculate the ACTUAL UPLIFT (x 1 000 kg) using the formula shown on the form. Calculate the difference between ESTIMATED UPLIFT and the ACTUAL UPLIFT and enter against DISCREPANCY. The discrepancy is positive if the Actual Uplift is greater than the Estimated Uplift and negative if less.
- Confirm the fuel grade.
- Confirm that the approved refueller has accomplished the water check and signed the Refuel Record Form.

The Captain and F/O (or S/O) shall:

- Cross-check the TOTAL DEPARTURE FUEL shown on the Refuel Record Form against the ECAM FOB.
- Verify the fuel distribution displayed on the ECAM agrees with the distribution entered on the Refuel Record Form. The Fuel Distribution Table on the back of the Normal Checklist is used to check for gross errors in distribution. Tank capacities vary by approximately 1.3 % per 0.01 change in SG from 0.785 kg/l.
- Investigate and resolve, to the satisfaction of the crew, discrepancies outside the range of +500 kg and -400 kg. The flight may still depart provided the Captain is satisfied that:
  - Sufficient fuel is on board.
  - Aircraft limitations are not exceeded.
  - Takeoff performance requirements are satisfied.

Note: Small discrepancies or degraded fuel quantity indication are unlikely to be resolved through a stick check due to the level of accuracy of the MMI system. Stick checks are only necessary in the event of the fuel quantity indicating system being inoperative.

FUEL REFUEL RECORD WITH NO UPLIFT

When fuel uplift is not required, the Refuel Record Form shall still be used to confirm that fuel quantity and distribution are correct for departure.
The PM shall:

- Enter individual tank quantities as displayed on the ECAM FUEL SD page in the 'DEPARTURE FUEL' block.
- Calculate and enter the TOTAL DEPARTURE FUEL by adding individual tank quantities.

The Captain and F/O (or S/O) shall:

- Cross-check the TOTAL DEPARTURE FUEL shown on the Refuel Record Form against the ECAM FOB.
- Verify the fuel distribution displayed on ECAM agrees with the distribution entered on the Refuel Record Form. The Fuel Distribution Table on the back of the Normal Checklist is used to check for gross errors in distribution.

REFUEL RECORD FORM

Applicable to: ALL

DRAGONAIR

A320 / A321 / A330 REFUEL RECORD

BEFORE REFUEL	ECAM FUEL S/D, wing station indication or corrected stick quantity x 1,000 kg
L.OUTER	.
L.INR/WING	.
CENTRE	.
ACT	.
R.INR/WING	.
R.OUTER	.
TRIM	.
TOTAL	.
MAINT LOG ARR FUEL	.

A/C REG	DATE
B -	

FLT NO	SECTOR
KA	

DEP FUEL ORDER kg x 1,000	
STANDBY	.
FINAL	.

DEPARTURE FUEL	ECAM FUEL S/D, wing station indication or corrected stick quantity x 1,000 kg
L.OUTER	.
L.INR/WING	.
CENTRE	.
ACT	.
R.INR/WING	.
R.OUTER	.
TRIM	.
TOTAL DEPARTURE FUEL	.
TOTAL BEFORE REFUEL	.
ESTIMATED UPLIFT	.
ACTUAL UPLIFT	.
DISCREPANCY + –	.

APPROVED REFUELLER

CAPTAIN

FUEL – UPLIFT					
USG		X	3.785	X	UPLIFT SG
LTR					0.
IMPG		X	4.546		

KA/OPS/11 (17 SEP 08)

Distribution 1: Aircraft

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SAFETY EXTERIOR INSPECTION

Applicable to: ALL

All necessary precautions shall be taken to ensure the aircraft and its surroundings are safe for operation prior to starting the APU and before the application of hydraulic and/or pneumatic power. This may involve a visual inspection prior to boarding the aircraft, as part of the published Exterior Inspection (PRO-NOR-SOP-05), or by obtaining the appropriate clearances from Ground Crew, whatever is most appropriate for the task. The following items should be considered:

Wheel chocks in position (PARK BRK OFF and/or brake or ACCU pressure low).

Ground equipment (HP, LP ground air, external electrical power).

Landing gear door position.

WARNING	Do not pressurize any hydraulic circuit(s) in order to operate a system without first confirming that flight control surface positions (flaps/spoilers) are in agreement with control handle positions, and obtaining clearance from the ground engineer.

Note: *The green hydraulic system will pressurize if the yellow hydraulic system is pressurized and the PTU pb is in the AUTO position, and vice versa.*

APU inlet and outlet areas are clear.

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GENERAL

Applicable to: ALL

The Aircraft Power Up and the APU Fire Test/Start procedures are performed by the PM if electrical power has not been established prior to the arrival of the crew in the cockpit. This ensures that all required safety checks are performed before the application of electrical power to avoid inadvertent operation of systems and danger to the aircraft or personnel.

AIRCRAFT POWER UP

Applicable to: ALL

ENG

ENG MASTER 1 sw and ENG MASTER 2 sw ..... OFF
ENG START selector ..... NORM

L/G

L/G lever ..... Check DOWN position

WIPERS

WIPERS..... OFF

ELEC

■ **If the aircraft has not been electrically supplied for 6 h or more, perform the following check.**

BAT 1 pb-sw and BAT 2 pb-sw ..... CHECK OFF
BAT 1 and 2 VOLTAGE..... CHECK ABOVE 25.5 V

Battery voltage above 25.5 V ensures a charge above 50 %.

● **If battery voltage is below 25.5 V:**

a charging cycle of about 20 min is required.

BAT 1 pb-sw and BAT 2 pb-sw ..... AUTO
EXT PWR pb ..... ON

Check on ELEC SD page, battery contactors closed and batteries charging.

● **after 20 min:**

BAT 1 pb-sw and BAT 2 pb-sw ..... OFF
BAT 1 and 2 VOLTAGE..... CHECK ABOVE 25.5 V

● **If battery voltage is above 25.5 V:**

BAT 1 pb-sw and BAT 2 pb-sw ..... AUTO

If the APU is started on batteries only, it should be started within 30 min after the selection of batteries to AUTO (35 min after battery selection to AUTO, the battery charge is less than 25 % of maximum capacity).

■ **If the aircraft has been electrically supplied during the last 6 h**

BAT 1 pb-sw and BAT 2 pb-sw ..... AUTO

EXT PWR pb (if AVAIL is illuminated)..... ON

AVAIL goes out.

HYD

WARNING	Do not pressurize hydraulic systems without clearance from ground crew.

APU FIRE TEST/START

Applicable to: ALL

APU FIRE

APU FIRE pb-sw ..... IN and GUARDED
AGENT lights ..... OUT
APU FIRE TEST pb ..... PRESS

Check:
- *APU FIRE warning on ECAM + CRC + MASTER WARN light. (if AC Power available).*
- *APU FIRE pb-sw illuminated red.*
- *APU SQUIB light and APU DISCH light on.*

APU START

APU MASTER SW pb-sw ..... ON

APU ON light comes on.
APU SD page appears on ECAM. (Note 1)

APU START pb-sw ..... ON

Note: Wait at least 5 s before selecting APU START pb-sw.

FLAP OPEN indication appears on APU SD page. (Note 1)
On APU SD page, N and EGT rise. (Note 1)

When N = 95 %:

- *On APU SD page, AVAIL indication appears. (Note 1)*
- *On APU panel : START ON light goes out.*
  APU AVAIL light comes on. (Note 2)

10 s later:

- *DOOR/OXY SD page replaces APU SD page.*

Note: 1. APU page does not appear unless EXT PWR is connected with the ON light illuminated.
2. Without EXT PWR connected, the APU page appears 10 s after the AVAIL light illuminates.

ELEC

* EXT PWR pb (if ON).....AS RQRD

External power may be kept ON to reduce the APU load, especially in hot conditions. When the APU BLEED pb-sw is ON, keeping the EXT PWR pb ON increases the bleed air flow of the APU, improving the efficiency of the air condiitioning.

FLIGHT DECK CHECK

Applicable to: ALL

The Flight Deck Check is normally performed by the PM. This procedure assumes that electrical power has been established. If electrical power has not been established, the Aircraft Power Up and the APU Fire Test/Start procedure must be applied first.
Other than ECAM Recall and ATIS, the Flight Deck Check is only required prior to a crew's first sector in a flight duty period, or following an aircraft change.

Applicable to: ALL

1 **PARKING BRAKE**

PRK BRK handle ..... ON
ACCU PRESS indicator & BRAKES PRESS indicator..... CHECK

- *Check for normal indications.*
- *The ACCU PRESS indication must be in the green band. If required use the electric pump on yellow hydraulic system to recharge the brake accumulator.*
- *The parking brake must be on during the exterior inspection to allow the flight crew to check brake wear indicators.*

WARNING	*Yellow and green hydraulic systems are pressurized from yellow electric pump. Get ground crew clearance before using the electric pump.*

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

2 **ALTERNATE BRAKING SYSTEM**

Note: *The purpose of this check is to verify, before the first flight of the day, the efficiency of the alternate braking system (absence of "spongy pedals").*

Y ELEC PUMP pb-sw ..... CHECK OFF
CHOCKS..... CHECK IN PLACE
PRK BRK handle .....OFF
BRAKE PEDALS ..... PRESS

Apply maximum pressure on both pedals.

BRAKE PRESSURE (on BRAKE press indicator).....CHECK

Pressure must build up without delay symmetrically on left and right sides for the same application simultaneously applied on left and right pedals. With full pedal deflection, the pressure must be between 2 000 and 2 700 PSI.

BRAKE PEDALS .....RELEASE
PRK BRK handle ..... ON

Applicable to: ALL

ECAM CONTROL PANEL

RCL pb ..... PRESS

- *Press the RCL pb for at least 3 s to recall all warnings that have been cleared or cancelled.*
- *If applicable, check warnings compatible with the MEL, then CLEAR or EMER CANCEL them. If any action is required, call maintenance personnel as soon as possible.*

Applicable to: ALL

OPERATIONS ENGINEERING BULLETINS (OEB)

OEB in QRH.....CHECK

Go to the OEB section of the QRH and review all OEBs (particulary red OEBs). It is the Captain's responsibility to ensure all flight crew members are present and fully aware of the impact of the aircraft's OEB status.

Note: *If there is a transfer of duties during the flight, the flight crew must remind the incoming flight crew of the applicable OEB(s) during the handover briefing when transferring duties.*

Applicable to: ALL

ATIS

ATIS .....OBTAIN

Applicable to: ALL

EMERGENCY EQUIPMENT

Check the following equipment:

- Life jackets (4) stowed.
- PBE (1) stowed, indicator green, lockwire or seal intact.
- Portable fire extinguisher stowed, lockwire seal and safety pin intact, pressure in the green band.
- Protective gloves stowed.
- Fire axe stowed.
- Oxygen masks stowed.
- Torches (2) stowed.
- Escape ropes stowed.

Applicable to: ALL

RAIN REPELLENT ⋖

Pressure and quantity indicators.....CHECK

Note: *If the rain repellent system has been deactivated, apply the MEL procedure unless the aircraft has had a hydrophobic coating applied to the windshields.*

CAUTION	*Never use rain repellent to wash the windshield and never use it on a dry windshield.*

Applicable to: ALL

CIRCUIT BREAKER PANELS

REAR & OVHD C/B PANELS.....CHECK

Applicable to: ALL

AIRCRAFT LIBRARY

MANUALS.....CHECK

Check all the aircraft and Company manuals are on board. Review all Operations Notices and advise the PF of any issued after commencement of the crew's Flight Duty pattern in HKG.

Applicable to: ALL

SECURITY CHECK

FLT DECK..... CHECK

In all cases where flight spares or any other items have been placed on board, they shall be cross-checked against the appropriate documentation.

GENERAL

Applicable to: ALL

The exterior inspection ensures that the overall condition of the aircraft and its visible components and equipment are safe for the flight. This inspection is normally performed by the PM.
The parking brake must be ON during the exterior inspection, to allow the flight crew to check brake wear indicators.

- Check structure for no impact damage.
- Check there is no evident fuel, oil, or hydraulic leaks.
- Check all ground access doors are closed. Liase with Engineering if a panel is found open.

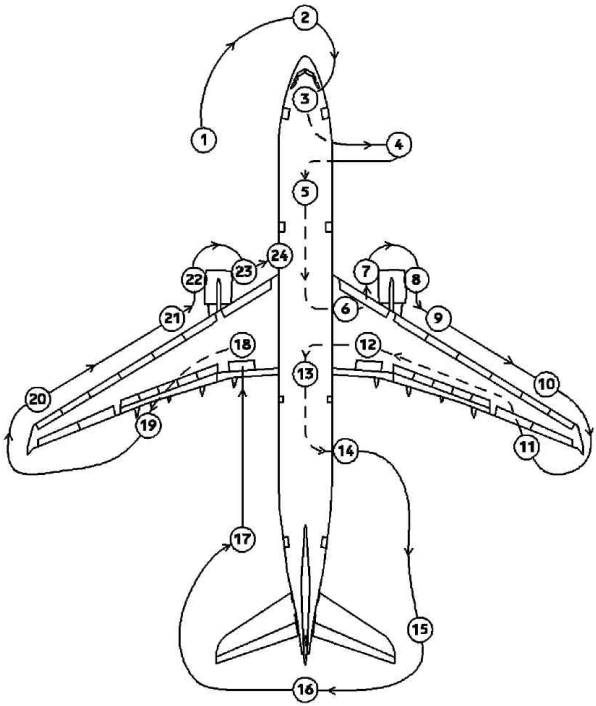
OLEO EXTENSION

- High passenger, cargo and/or fuel loads or low temperatures will substantially reduce the length of the oleo extension.
- Liaise with Engineering if oleo(s) extension is abnormally low or substantially uneven. Engineering will accurately check the oleo(s) extension and inform the Captain if it is within limits and acceptable for flight.

EXTERIOR WALK-AROUND

Applicable to: ALL

SCHEMATIC



Applicable to: ALL

LH FWD FUSELAGE

AOA probe (CAPT and STBY)..... CONDITION
Static ports (F/O and CAPT)..... CLEAR
Avionics equipment vent air inlet valve..... CONDITION
Oxygen bay..... CLOSED

Oxygen overboard discharge indicator..... GREEN
Toilet servicing door ◁ ..... CLOSED

Applicable to: ALL

NOSE SECTION

Pitot probes (CAPT, F/O and STBY)..... CONDITION
Static ports (STBY)..... CLEAR
TAT probes (CAPT and F/O)..... CONDITION
Radome and latches..... CONDITION/LATCHED
Forward avionics compartment door..... CLOSED
Ground electrical power door (if not required)..... CLOSED

Applicable to: ALL

NOSE L/G

Nose wheel chocks..... IN PLACE
Wheels and tires..... CONDITION
Nose gear structure..... CONDITION
Oleo..... CONDITION/NO LEAK
Taxi, TO, turn-off lights..... CONDITION
Hydraulic lines and electrical wires..... CONDITION
Wheel well..... CHECK
Safety pin..... REMOVED

Applicable to: ALL

RH FWD FUSELAGE

RH + AFT avionic compartment doors..... CLOSED
Avionic equipment vent air outlet vavle..... CONDITION
Static ports (F/O and CAPT)..... CLEAR
AOA probes (F/O)..... CONDITION
Forward cargo door and selector panel..... CHECK

Applicable to: ALL 320

LOWER CENTER FUSELAGE

Potable water drain panel ◁ ..... CLOSED
Antennas..... CONDITION
Drain mast..... CONDITION
RAM air inlet flap..... CONDITION
LP and HP ground connection doors..... CLOSED
Anticollision light..... CHECK

CTR TK magnetic fuel level.....FLUSH
Pack air intakes and outlets..... CLEAR

Applicable to: ALL 321

LOWER CENTER FUSELAGE

Potable water drain panel .....CLOSED
Antennas..... CONDITION
Drain mast.....CONDITION
RAM air inlet flap.....CONDITION
LP and HP ground connection doors..... CLOSED
Anticollision light..... CHECK
CTR TK magnetic fuel level.....FLUSH
Pack air intakes and outlets..... CLEAR

Applicable to: ALL 320

RH CENTER WING

Yellow hydraulic bay door.....CLOSED
Fuel panel.....CLOSED
Inner tank magnetic fuel..... FLUSH
Fuel water drain valve inner tank..... NO LEAK
Landing light.....CONDITION
Slat 1.....CONDITION

Applicable to: ALL 321

RH CENTER WING

Yellow hydraulic bay door.....CLOSED
Fuel panel.....CLOSED
Magnetic fuel level..... FLUSH
Fuel water drain valve tank..... NO LEAK
Landing light.....CONDITION
Slat 1.....CONDITION

Applicable to: ALL

ENG 2 LH SIDE

Oil fill access door.....CLOSED
Master magnetic chip detector access door.....CLOSED
Fan cowl doors.....CLOSED/LATCHED
Drain mast.....CONDITION/NO LEAK

Engine inlet and fan blades..... CHECK

Applicable to: ALL

ENG 2 RH SIDE

Pressure-relief/Start valve handle access door..... CLOSED
Turbine exhaust..... CLEAR
Pylon/access panel..... CONDITION/CLOSED

Applicable to: ALL

RH WING LEADING EDGE

Slats 2, 3, 4, 5..... CONDITION
Magnetic fuel level..... FLUSH
Fuel water drain valve..... NO LEAK
Refuel coupling..... CLOSED
Surge tank air inlet..... CLEAR
Fuel ventilation overpressure disc..... INTACT
Navigation light..... CONDITION
Wing tip..... CONDITION

Applicable to: ALL

RH WING TRAILING EDGE

Static dischargers..... CHECK
Control surfaces..... CONDITION
Flaps and fairings..... CONDITION

Applicable to: ALL 320

RH L/G AND FUSELAGE

Wheels and tires..... CONDITION
Brakes and brake wear ind..... CONDITION
Torque link damper ◁ ..... CONDITION
Hydraulic lines..... CHECK
Landing gear structure..... CHECK
Oleo..... CONDITION/NO LEAK
Downlock springs..... CHECK
Safety pin..... REMOVED
Ground hydraulic connection yellow..... CLOSED
Shroud fuel drain..... CONDITION/NO LEAK

Applicable to: ALL 321

1 **RH L/G AND FUSELAGE**

Wheels and tires.....CONDITION
Brakes and brake wear ind.....CONDITION
Torque link damper.....CONDITION
Hydraulic lines.....CHECK
Landing gear structure.....CHECK
Oleo.....CONDITION/NO LEAK
Downlock springs.....CHECK
Safety pin.....REMOVED
Ground hydraulic connection yellow.....CLOSED
Water drain mast ◁ .....CONDITION
Shroud fuel drain.....CONDITION/NO LEAK

Applicable to: ALL

RH AFT FUSELAGE

Cargo door and selector panel.....CHECK
Bulk door ◁ .....CHECK
Toilet service access door.....CLOSED
Outflow valve.....CONDITION
Drain mast .....CONDITION
Flight recorder access door .....CLOSED

Applicable to: ALL

TAIL

Stabilizer, elevator, fin and rudder.....CONDITION
Static dischargers.....CHECK
Lower fuselage structure (tail impact on runway).....CONDITION

Applicable to: ALL

APU

Access doors.....CLOSED
Air intake.....CONDITION
Drain.....CONDITION/NO LEAK
Oil cooler air outlet .....CLEAR
Exhaust.....CLEAR
Navigation light.....CONDITION
Fire extinguisher overpressure indication (red disc).....IN PLACE

Applicable to: ALL

LH AFT FUSELAGE

Stabilizer, elevator, fin, and rudder.....CONDITION
Potable water service door.....CLOSED
Ground hydraulic connection blue door.....CLOSED
Ground hydraulic connection green and reservoir filling door.....CLOSED

Applicable to: ALL 320

LH LANDING GEAR

Wheels and tires.....CONDITION
Brakes and brake wear indicator.....CONDITION
Torque link damper ◁ .....CONDITION
Hydraulic lines.....CHECK
Landing gear structure.....CHECK
Oleo.....CONDITION/NO LEAK
Downlock springs.....CHECK
Safety pin.....REMOVED

Applicable to: ALL 321

LH LANDING GEAR

Wheels and tires.....CONDITION
Brakes and brake wear indicator.....CONDITION
Torque link damper.....CONDITION
Hydraulic lines.....CHECK
Landing gear structure.....CHECK
Oleo.....CONDITION/NO LEAK
Downlock springs.....CHECK
Safety pin.....REMOVED

Applicable to: ALL

LH WING TRAILING EDGE

Flaps and fairings.....CONDITION
Control surfaces.....CONDITION
Static dischargers.....CHECK

Applicable to: ALL 320

LH WING LEADING EDGE

Wing tip.....CONDITION

Navigation light..... CONDITION
Surge tank air inlet..... CLEAR
Fuel ventilation overpressure disc..... INTACT
Fuel water drain valve..... NO LEAK
Inner and outer cell magnetic fuel level.....FLUSH
Slats 2, 3, 4, 5..... CONDITION

Applicable to: ALL 321

LH WING LEADING EDGE

Wing tip..... CONDITION
Navigation light..... CONDITION
Surge tank air inlet..... CLEAR
Fuel ventilation overpressure disc..... INTACT
Fuel water drain valve..... NO LEAK
Magnetic fuel level..... FLUSH
Slats 2, 3, 4, 5..... CONDITION

Applicable to: ALL

ENG 1 LH SIDE

Oil fill access door.....CLOSED
Master magnetic chip detector access door..... CLOSED
Fan cowl doors..... CLOSED/LATCHED
Drain mast.....CONDITION/NO LEAK
Engine inlet and fan blades..... CHECK

Applicable to: ALL

ENG 1 RH SIDE

Pressure relief/Start valve handle access door..... CLOSED
Turbine exhaust..... CLEAR
Pylon/access panel..... CONDITION/CLOSED

Applicable to: ALL 320

LH CENTER WING

Slat 1.....CONDITION
Wing leading edge ventilation intake ◁ .....CLEAR
Fuel water drain valves.....NO LEAK
Inner tank magnetic fuel..... FLUSH
Landing lights.....CONDITION
Hydraulic reservoir pressurization door..... CLOSED

RAT doors..... CLOSED

Applicable to: ALL 321

LH CENTER WING

Slat 1.....CONDITION
Wing leading edge ventilation intake ◁ ..... CLEAR
Fuel water drain valves.....NO LEAK
Magnetic fuel level..... FLUSH
Landing lights.....CONDITION
Hydraulic reservoir pressurization door..... CLOSED
RAT doors..... CLOSED

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INTRODUCTION

Applicable to: ALL

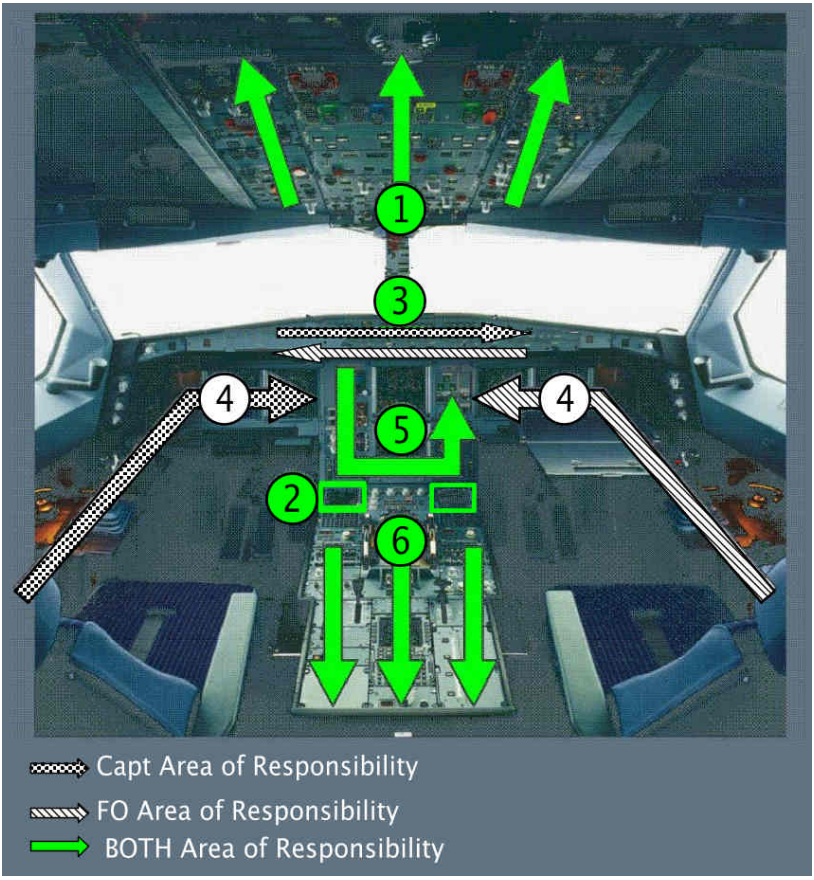
The Cockpit Preparation shall be performed according to the flow pattern and the defined task sharing. However, certain items may be handled in the most logical sequence for existing conditions. PF shall carry out all cockpit preparation checks. The PM shall then complete the flow pattern to ensure correct switch positions and lights out philosophy. The PM shall not change switch positions without reference to the PF. Where applicable, specific items are annotated for either pilot as PF, PM or C.

Note: *System Tests shall be carried out by the PF on the crew's first sector in a flight duty period, or following an aircraft change. Cancel any master warning that is generated by a system test by pressing the MASTER WARN pb.*

FLOW PATTERN SEQUENCE

Applicable to: ALL

1



GEAR PINS AND COVERS

Applicable to: ALL

GEAR PINS and COVERS..... CHECK

Check three gear pins are on board and stowed.

OVERHEAD PANEL

Applicable to: ALL

WHITE LIGHTS ON OVERHEAD PANEL

It is a general rule to turn off all white lights for all the systems during the scan sequence. Therefore, these actions are not listed here.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HTD, B-HTE, B-HTF

RCDR

RCDR GND CTL pb-sw ..... ON
CVR TEST..... PRESS

Check low frequency signal through the loudspeakers.

Note: The PARK BRK handle must be ON to perform the CVR test.

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

2 ### RCDR

RCDR GND CTL..... ON

In order to perform the test, ensure that the PARK BRK is on.

LOUDSPEAKER VOLUME knob ..... OFF (BOTH SIDES)
ACP INT/RAD sw (CAPT or F/O)..... SET to INT
INTERPHONE VOLUME RECEPTION KNOB..... RELEASE

Turn up the volume to the maximum.

CVR TEST..... PRESS AND MAINTAIN

An audio test signal, and a beep every 4 s, should be heard through the loudspeakers. Once this is done, talk through the handmike, ensure that your voice is heard on the loudspeakers, and only then release the CVR test push button.

Note: Only the handmike, not the boomset, should be used to carry out the test, as the audio signal must be heard on the loudspeakers.

Applicable to: B-HSQ, B-HSR

RCDR

RCDR GND CTL pb-sw ..... ON

In order to perform the test, ensure the PARK BRK is ON.

LOUDSPEAKER VOLUME knob ..... OFF (BOTH SIDES)
ACP INT/RAD sw (CAPT or F/O)..... SET to INT

INTERPHONE VOLUME RECEPTION KNOB..... RELEASE

Turn up the volume to the maximum.

CVR TEST.....PRESS AND MAINTAIN

An audio test signal, and a beep every 4 s, should be heard through the loudspeakers. Once this is done, talk through the handmike, ensure that your voice is heard on the loudspeakers, and only then release the CVR test push button.

Note: - *Only the handmike, not the boomset, should be used to carry out the test, as the audio signal must be heard on the loudspeakers.*
- *The flight crew may also hear acoustic feedback during the test. The test is still valid if acoustic feedback is heard.*

Applicable to: ALL

EVAC

CAPT & PURS/CAPT sw .....CAPT

Applicable to: ALL

ADIRS

Mode rotary selector (3)..... NAV

If OFF, select NAV. Otherwise confirm in NAV. Do not cycle.

Applicable to: ALL

LIGHTS

EXTERIOR lights..... SET

Set STROBE sw to AUTO, BEACON sw to OFF and NAV & LOGO sw to 1. If NAV & LOGO system 1 is reported inoperative, select system 2.

OVHD INTEG LT, STBY Compass, DOME, ANN LT.....AS RQRD

DOME light shall be selected to BRT or DIM. DIM is recommended for takeoff.

Applicable to: ALL

SIGNS

SEAT BELTS.....ON

Note: The Seat Belt sign shall remain OFF until the refuelling is complete.

NO SMOKING.....AUTO
EMER EXIT LT..... ARM

Applicable to: ALL

PROBE/WINDOW HEAT

PROBE/WINDOW HEAT..... AUTO

Applicable to: ALL

CABIN PRESS

LDG ELEV selector ..... AUTO

3 **Applicable to: B-HSD, B-HSE, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU**

AIR COND

APU BLEED..... AS RQRD

Do not use the APU BLEED if ground air is connected.

X BLEED..... AUTO

TEMPERATURE SELECTOR (Cabin and cockpit)..... AS RQRD

The temperature selection recommended for the cabin is 23 C (about 11 o'clock).

PACK FLOW selector ..... AS RQRD

Select:

LO : If the number of passengers is below 120.

HI : For abnormally hot and humid conditions.

NORM : For all other normal operating cases.

If the APU is supplying, pack controllers select HI flow automatically, independent of the selector position.

Applicable to: ALL 321

AIR COND

ECON FLOW pb ..... AS RQRD

Select:

ON : ECON FLOW, If number of passengers is below 120.

OFF : For normally flow.

If the APU is supplying, pack controllers select normal flow automatically, independent of the selector position.

Applicable to: B-HSG, B-HSI

AIR COND

APU BLEED..... AS RQRD

Do not use the APU BLEED if ground air is connected.

X BLEED.....AUTO

TEMPERATURE SELECTOR (Cabin and cockpit).....AS RQRD

The temperature selection recommended for the cabin is 23 C (about 11 o'clock).

PACK FLOW selector .....AS RQRD

Select:

LO : If the number of passengers is below 120.

HI : For abnormally hot and humid conditions.

NORM : For all other normal operating cases.

If the APU is supplying, pack controllers select HI flow automatically, independent of the selector position.

Note: In flight, when the PACK FLOW selector is at LO, the air flow from the air conditioning system may fluctuate, which causes a surging type noise. To stop the fluctuations, set the PACK FLOW selector back to NORM.

Applicable to: ALL

4 **ELEC**

GEN FAULT lights (amber).....CHECK

Scan and check there are no other amber lights.

ELEC SD page .....CALL

BAT 1 pb-sw and BAT 2 pb-sw ..... OFF then ON

10 s after setting all BAT pb-sw to ON, check that the current charge of each battery is below 60 A, and continues to decrease. If, after 10 s, the current charge of each battery remains above 60 A, wait until the end of the charging cycle, and perform the test again.

Applicable to: ALL 320

FUEL

■ **If the center tank is empty for the flight:**

FUEL MODE SEL pb-sw ..... MAN

CTR TK PUMP 1 pb-sw and CTR TK PUMP 2 pb-sw .....OFF

■ **If the center tank is NOT empty for the flight:**

CAUTION	If the FUEL MODE SEL pb is in the MAN position on the ground, when the CTR TK PUMP 1 pb-sw&CTR TK PUMP 2 pb-sw are not in the OFF position, there is a possibility of fuel spillage, if there are any hidden failures.

FUEL MODE SEL pb-sw .....CHECK AUTO

Applicable to: ALL 321

FUEL

CAUTION	If the FUEL MODE SEL pb-sw is in the MAN position on the ground, when the CTR TK L XFR pb-sw and CTR TK R XFR pb-sw are not in the OFF position, there is a possibility of fuel spillage. In this configuration, the center tank fuel transfer will not stop when the wing tanks become full.

FUEL MODE SEL pb-sw ..... CHECK AUTO

Applicable to: ALL

ENG 1 – ENG 2 FIRE

ENG 1 FIRE pb and ENG 2 FIRE pb ..... CHECK IN and GUARDED
AGENT 1 lights and AGENT 2 lights..... CHECK OUT
ENG 1 TEST pb and ENG 2 TEST pb ..... PRESS

Check:

- *ENG 1 (2) FIRE warning on the ECAM + CRC + MASTER WARN light.*
- *ENG FIRE pb-sw illuminated red.*
- *SQUIB light and DISCH light on.*
- *FIRE light (ENG panel) on.*

Applicable to: ALL

APU FIRE TEST

If the APU is already running ensure the following check has been completed. If not perform it.

APU FIRE pb-sw ..... IN and GUARDED
AGENT lights ..... OUT
APU FIRE TEST pb ..... PRESS

Check :

- *APU FIRE warning on ECAM + CRC + MASTER WARN light.*
- *APU FIRE pb-sw illuminated red.*
- *SQUIB and DISCH light on.*

Applicable to: ALL

VENT

Check all lights are out.
Refer to PRO-SUP-30 Ground Operations in Heavy Rain for VENT configuration during operations in heavy rain.

Applicable to: ALL

AUDIO SWITCHING PANEL

AUDIO SWITCHING rotary selector ..... NORM

5 **Applicable to: ALL**

6 **RMP 3** ⋖

RMP .....SET

For guidance on RMP and ACP set up, PRO-SUP-23 refers.

Applicable to: ALL

ACP 3

VHF 1, 2 and PA reception knobs.....OUT

To facilitate reception after AUDIO SWITCHING and to allow cabin attendant's announcements to be recorded on the CVR, set volume at or above medium range.

Applicable to: ALL

DATA LOADER ⋖

DATA LOADER.....CHECK OFF

Applicable to: ALL

MAINTENANCE PANEL

Check all lights are out. If not, select associated pushbutton switch to off.

FMGS INITIALIZATION

Applicable to: ALL

At electrical power up, the FMGSs and FCU run through various internal tests. Allow sufficient time (3 min) for test completion and do not start to press pushbuttons until the tests are complete. If the message 'PLEASE WAIT' appears, do not press any MCDU key until the message clears.
The PM shall cross-check the FMGS initialization as per PF duties. No changes shall be made without reference to the PF.

Applicable to: ALL

DATA

Press the DATA key and display the AIRCRAFT STATUS page (if not displayed).

ENGINE & AIRCRAFT TYPE..... CHECK

Applicable to: ALL

7 FM database validity..... CHECK

- *Press the DATA key, and display the STATUS page (if not displayed).*
- *Check DATA BASE validity and stored WPT/NAVAIDS/RWY/ROUTES, if any. If applicable, review the stored data for deletion decision.*
- *On the MCDU ACFT STATUS page, the last day of the active database validity period is the same day as the first day of the second database validity period. On this day, the message "CHECK DATA BASE CYCLE" will not be triggered. For any flight on that day, manually select the second database.*
- *Check the PERF factor agrees with the Computer Flight Plan. If required, manually amend the factor. (Refer to DSC-22_20-40-30 PERF Factor - General.)*

Applicable to: ALL

NAVAID DESELECTION.....AS RQRD

If NOTAMs warn of any unreliable or unservicable navaids (DME or VOR/DME), deselect the related navaid. Deselect the GPS if required (refer Port Page or NOTAM).

Applicable to: ALL

INIT PAGE A

INIT A page.....COMPLETE

If there is no CO RTE available, insert a city pair and check FROM/TO.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

IRS ALIGNMENT

COMPLETE OR FAST ALIGNMENT PROCEDURE

Note: A Complete or Fast Alignment is normally only required prior to a crew's first sector in any flight duty period, or following any aircraft change. A Complete Alignment is only required if the the ADIRS Mode selectors were previously OFF, or if GPS is not available and long segments with poor navaid coverage are expected.

LAT/LONG (INIT A).....CHECK

When the CO RTE or origin airport (FROM) is modified, the MCDU INIT coordinates are reset to the airport reference point stored in the FMGS database. Use the default FMGS database airport reference point LAT/LONG to initialise the IRS.
If necessary, a more accurate IRS alignment can be achieved by slewing the LAT/LONG to Present Position (PPOS) coordinates in accordance with the following prioritised list.
The preferred PPOS to be used when performing an alignment is:

- *The coordinates displayed on the gate.*
- *The gate coordinates from the Jeppesen parking chart.*
- *If the airport reference point is not stored in the FMGS database, and gate coordinates are not available, use the airport coordinates shown on the Jeppesen chart.*

● **If ALIGN IRS prompt is not displayed:**

ADIRS Mode Selectors.....CYCLE OFF/NAV (within 5 s)

Prepares ADIRS for a fast alignment which takes approximately 30 s. ALIGN IRS prompt is displayed.

Note: For a complete realignment, select all three ADIRS Mode Selectors OFF for more than 5 s then back to NAV.

ALIGN IRS prompt.....PRESS

Press the ALIGN IRS prompt without undue delay after cycling the ADIRS Mode Selectors to prevent delays if an alignment error occurs.

Applicable to: B-HSO, B-HSP

IRS ALIGNMENT

COMPLETE OR FAST ALIGNMENT PROCEDURE

Note: 1. A Complete or Fast Alignment is normally only required prior to a crew's first sector in any flight duty period, or following any aircraft change. A Complete Alignment is only required if the the ADIRS Mode selectors were previously OFF, or if GPS is not available and long segments with poor navaid coverage are expected.

2. Once the Mode Selectors have been set, or cycled to NAV, if GPS is available, initialisation is automatic using the GPS position without further pilot intervention. However, automatic initialisation may be manually overriden by pilot entry at any time during the alignment phase using the Completed or Fast Alignment Procedure. If the pilot manually initialises the ADIRS and a GPS position is avaliable, the GPS position is used to cross-check the pilot entry.

LAT/LONG (INIT A).....CHECK

When the CO RTE or origin airport (FROM) is modified, the MCDU INIT coordinates are reset to the airport reference point stored in the FMGS database. Use the default FMGS database airport reference point LAT/LONG to initialise the IRS.
If necessary, a more accurate IRS alignment can be achieved by slewing the LAT/LONG to Present Position (PPOS) coordinates in accordance with the following prioritised list.
The preferred PPOS to be used when performing an alignment is:

- *The coordinates displayed on the gate.*
- *The gate coordinates from the Jeppesen parking chart.*
- *If the airport reference point is not stored in the FMGS database, and gate coordinates are not available, use the airport coordinates shown on the Jeppesen chart.*

● **If ALIGN IRS prompt is not displayed:**

ADIRS Mode Selectors.....CYCLE OFF/NAV (within 5 s)

Prepares ADIRS for a fast alignment which takes approximately 30 s. ALIGN IRS prompt is displayed.

Note: For a complete realignment, select all three ADIRS Mode Selectors OFF for more than 5 s then back to NAV.

ALIGN IRS prompt.....PRESS

Press the ALIGN IRS prompt without undue delay after cycling the ADIRS Mode Selectors to prevent delays if an alignment error occurs.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

IRS ALIGNMENT

COMPLETE OR FAST ALIGNMENT PROCEDURE

Note:
1. *A Complete or Fast Alignment is normally only required prior to a crew's first sector in any flight duty period, or following any aircraft change. A Complete Alignment is only required if the the ADIRS Mode selectors were previously OFF, or if GPS is notavailable and long segments with poor navaid coverage are expected.*
2. *Once the Mode Selectors have been set, or cycled to NAV, if GPS is available, initialisation is automatic using the GPS position without further pilot intervention. However, automatic initialisation may be manually overriden by pilot entry at any time during the alignment phase using the Completed or Fast Alignment Procedure. If the pilot manually initialises the ADIRS and a GPS position is avaliable, the GPS position is used to cross-check the pilot entry.*

LAT/LONG (INIT A).....CHECK

When the CO RTE or origin airport (FROM) is modified, the MCDU INIT coordinates arereset to the airport reference point stored in the FMGS database. Use the default FMGS database airport reference point LAT/LONG to initialise the IRS.
If necessary, a more accurate IRS alignment can be achieved by slewing the LAT/LONG to Present Position (PPOS) coordinates in accordance with the following prioritised list.
The preferred PPOS to be used when performing an alignment is:

- *The coordinates displayed on the gate.*
- *The gate coordinates from the Jeppesen parking chart.*
- *If the airport reference point is not stored in the FMGS database, and gatecoordinates are not available, use the airport coordinates shown on the Jeppesenchart.*

● **If ALIGN ON REF prompt is not displayed:**

ADIRS Mode Selectors.....CYCLE OFF/NAV (within 5 s)

Prepares ADIRS for a fast alignment which takes approximately 30 s. ALIGN ON REF prompt is displayed.

Note: For a complete realignment, select all three ADIRS Mode Selectors OFF formore than 5 s then back to NAV.

ALIGN ON REF prompt..... PRESS

Press the ALIGN ON REF prompt without undue delay after cycling the ADIRS Mode Selectors to prevent delays if an alignment error occurs.

Applicable to: ALL

IRS POSITION CHECK

IRS Position.....CHECK

Check/confirm:

- *Cross-check the MCDU INIT coordinates against the IRS position on the POSITION MONITOR page.*

  Note: If the MCDU INIT coordinates change while the ADIRS are in NAV mode, the RESET IRS TO NAV message is displayed on the scratchpad.

- *On the POSITION MONITOR page, check the IRS are in NAV mode, and the distance between each IRS and the onside FMGS position is <5 nm.*

- *On the ND, check the aircraft position is consistent with the position of the airport, SID and surrounding navaids.*
- *When a Complete or Fast Alignment procedure has not been completed, confirm the residual ground speed error on each IRS was <5 kt (normally checked during previous sector shutdown procedures).*

In the event of a discrepancy, re-align all three IRSs by repeating the alignment procedure.

Note: *1. There is no requirement for a complete realignment before a long range flight with either radio updating or GPS PRIMARY available.*
2. For a complete realignment, select all three ADIRS Mode Selectors OFF for more than 5 s then back to NAV, and repeat the alignment procedure. Complete the alignment procedure without undue delay to avoid excessive IRS drift.
3. IRS IN ALIGN (steady green) is indicated on ECAM MEMO during normal alignment.
4. Do not move the aircraft during alignment.

Applicable to: ALL

F-PLN

F-PLN ..... COMPLETE/CHECK

Modify or insert the F-PLN according to the data given by ATIS, ATC or MET:

- *Insert runway, SID and Transition for expected departure and check against published procedures (SID tracks and distances must be checked, as well as speed and altitude constraints).*
- *Make Lateral or Vertical revisions as required. Where appropriate, inserting one or more CFP STEP ALTs will allow a valid cross-check of CFP arrival fuel against MCDU F-PLN DEST arrival fuel (EFOB).*
- *Check EOSID on ND plan mode (yellow line).*
- *Check the MCDU F-PLN with ND PLAN mode displayed:*
  - *If a CO RTE hase been loaded/uplinked and not modified, check the waypoints on the F-PLN page against the CFP for correct sequence.*
  - *In other cases, check track and distance between each waypoint on the F-PLN page against the CFP or en-route chart.*
  - *It is acceptable to delete any non-CFP waypoints not required for the route.*
  - *Check the DIST TO DEST along F-PLN as displayed on the bottom line of the F-PLN page agrees roughly with the total distance on the CFP.*

Applicable to: ALL

SEC F-PLN

SECONDARY FLIGHT PLAN..... AS APPROPRIATE

This is routinely a copy of the active. The relevant SEC pages may be modified to prepare for the most likely practical use of the SEC F-PLN. Consider the following scenarios:

- *The probability of a change of runway and/or SID during taxi.*
- *An immediate diversion after takeoff if the weather is below landing minima at the departure airfield.*
- *The probability of flying an alternate route after airborne.*
- *An immediate return to the departure airport.*

Applicable to: ALL

RAD NAV

RAD NAV .....SET

Applicable to: ALL

INIT PAGE B

ZFWCG/ZFW .....INSERT
BLOCK FUEL.....INSERT

CAUTION	*The characteristic speeds displayed on the PFD (Green Dot, F, S, VLS) are computed using the ZFW and ZFWCG entered by the crew on the MCDU. Therefore this data shall be carefully checked.*

The flight crew shall insert the weights after completing all other insertions. This is to avoid cycles of prediction computations at each change in flight plan, constraints etc.
If the ZFWCG and ZFW are not available it is acceptable to enter the expected values in order to obtain predictions. Similarly the flight crew may enter the expected fuel on board if the refuelling has not been completed at that time.

Note: The ZFW must be entered in INIT B before sending the ACARS RTOW data in order for the RTOW calculator to perform an automatic gross error check on the entered weights.

TRIP WIND.....INSERT

If time permits, consider inserting climb, cruise and/or descent winds.
Climb winds may be entered manually or by selecting the HISTORY WIND> prompt. Cruise and Descent winds may be entered manually or by selecting the WIND REQUEST prompt to uplink CFP wind data via ACARS.*
After uplink insertion is completed, winds may be manually added or updated on any wind page.

Applicable to: ALL

PERF TO

THR RED/ACC/EO ACC and TRANS ALT ..... CHECK

Applicable to: ALL

PERF CLB

PRESEL SPEED..... AS RQRD

If the flight is cleared for a close-in turn or close-in altitude constraint, the flight crew may preselect Green Dot speed on the PERF CLB page. Once the CLB phase is active, the preselected speed will be displayed in the FCU speed window and on the PFD as a selected speed (blue symbol). Once the turn is completed or the altitude cleared, resume the managed speed profile by pressing the SPD/MACH knob on the FCU.
SPD LIM is defaulted to 250 kt below 10 000 ft in the managed speed profile. This may either be cleared, or modified, on the VERT REV page at the origin (or a climb waypoint).

Applicable to: ALL

PERF CRZ

PRESEL SPEED..... AS RQRD

Applicable to: ALL

PROG PAGE

CRZ/OPT/REC MAX levels..... CHECK
BRG/DIST ..... AS RQRD

Consider the use of a radio aid or waypoint in BRG/DIST field.

GPS PRIMARY..... CHECK

GPS PRIMARY requires IR alignment. If the IRs are aligned and 'GPS PRIMARY' is not displayed, confirm that GPS is selected for FMGS position computation and navigation mode on the NAVAID DESELECTION page of the MCDU.

GLARESHIELD

Applicable to: ALL

GLARESHIELD

Glareshield light and FCU integral light ..... AS RQRD

EFIS CONTROL PANEL

BARO REF.....SET

- Set QNH on the EFIS control panel and on the standby altimeter/ISIS.
- Check barometer settings and altitude indications on the PFD and standby altimeter (refer to PRO-SUP-34 Flight Instrument Tolerances).

FD .....CHECK ON
ILS/LS.....AS RQRD
CSTR pb .....ON
ND mode and range..... AS RQRD

MODE : Display the ARC mode on the ND, if the takeoff direction is approximately the departure direction or the ROSE NAV mode, if the direction change will be more than 70 ° after takeoff (to allow the ND to display the area behind the aircraft).

RANGE : Set the minimum range to display the first waypoint after departure, or as required for weather radar.

VOR/ADF selector .....AS RQRD

Display the VOR and ADF needles, as needed.

FCU

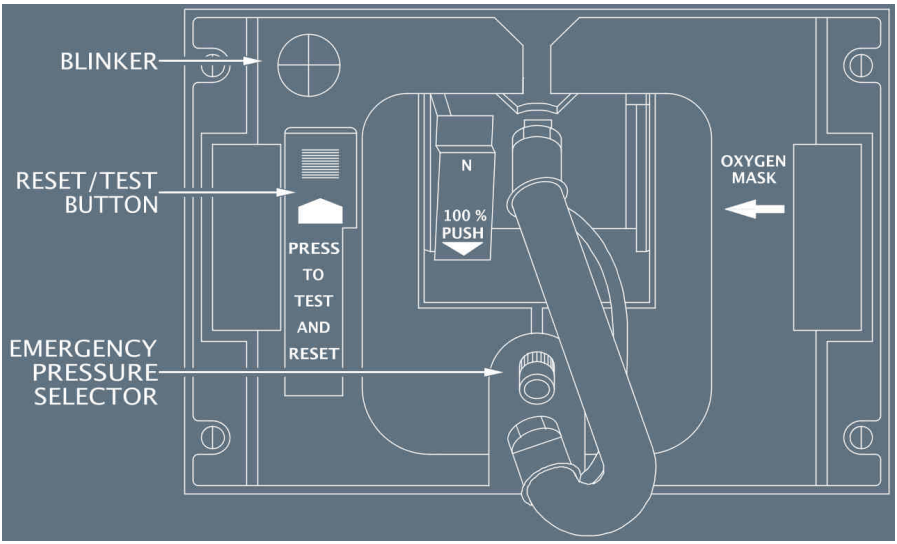
SPD MACH window.....DASHED
HDG V/S/TRK-FPA pb ..... HDG V/S
ALT window.....INITIAL EXPECTED CLEARANCE ALT

Note: Do not engage the autothrust on ground, as it may generate the AUTO FLT A/THR OFF warning at engine start.

LATERAL CONSOLES

Applicable to: ALL

8 OXYGEN MASK TEST



WARNING	To prevent hearing damage to ground mechanics connected to the intercom system, inform them that a loud noise may be heard in the headset when performing this test.

On the OXYGEN panel:

CREW SUPPLY pb ..... CHECK ON

On the glareshield:

LOUDSPEAKERS..... ON

On the audio control panel:

INT reception knob ..... PRESS OUT-ADJUST
INT/RAD sw ..... INT

Pre-warn any engineer, whose headset may be connected to the nose intercom, that a loud noise may be heard.

On the mask stowage box:

- Press and hold the reset/test button in the direction of the arrow.
  - Check the blinker turns yellow for a short time, and then goes black.
- Hold the reset/test button down, and press the emergency pressure selector.
  - Check the blinker turns yellow and remains yellow, as long as the emergency pressure selector is pressed.
  - Listen for oxygen flow through the loudspeakers.
- Check the reset/test button returns to the up position and the N 100 % selector is in the 100 % position.
- Press the emergency pressure selector again, and check the blinker does not turn yellow. This ensures that the mask is not supplied.

On the ECAM DOOR/OXY page:

REGUL LO PR message.....CHECK OFF

The crew must perform this check after having checked all masks. It ensures that the LP valve is open, (Due to residual pressure between the LP valve and the oxygen masks, an LP valve failed in the closed position may not be detected during the oxygen mask test).

INSTRUMENT PANELS

Applicable to: ALL

PFD and ND brightness knob .....AS RQRD

Check the outer ring of the ND knob is set to a suitable level of brightness (radar display).

LOUDSPEAKER..... SET

Approximately at the 1 o'clock position.

PFD ..... CHECK

- *Check PFD/ND not transferred.*
- *Check for correct display, when ATT and HDG are available.*
- *Check IAS, FMA, initial target ALT, altimeter readings, VSI, altimeter settings, heading and attitude display.*

ND ..... CHECK

- *Check for correct display.*
- *Cross-check compass indication on the ND and DDRMI* ◁ .
- *Check ground speed less than 5 kt, heading, initial waypoint, VOR/ADF indications.*

CTR INSTRUMENT PANEL

Applicable to: ALL

STBY ASI ◁ ..... CHECK
STBY ALT ◁ ..... CHECK
STBY ALT (metric) ◁ ..... AS REQD

When departing a port where metric levels are assigned, set QNH. Otherwise set STD.

STBY HORIZON ◁ ..... CHECK

Check no flag. Erect if necessary.

ISIS ◁ ..... CHECK

Check no flags. Reset attitude if necessary. Adjust brightness.

CLOCK

Check time, and adjust if necessary. Check elapsed time at zero and chrono at zero.

Note: If GPS updating is available, set clock to GPS.

LANDING GEAR

ACCU PRESS & BRAKES PRESS indicators ..... CHECK

The ACCU PRESS indication must be in the green band.
If required use the HYD YELLOW ELEC Pump to recharge the brake accumulators.

WARNING	*Do not pressurize any hydraulic circuit(s) in order to operate a system without first confirming that flight control surface positions (flaps/spoilers) are in agreement with control handle positions, and obtaining clearance from the ground engineer.*

Note: The green hydraulic system will be pressurized if the yellow hydraulic system is pressurized and the PTU pb is in the AUTO position, and vice versa.

A/SKID & NW STRG sw ..... ON

PEDESTAL

Applicable to: ALL

RMP 1

RMP ..... SET

ACP 1

RECEPTION knob(s)..... SET

LIGHTS

Main Panel FLOOD & INTEG LT.....AS RQRD

WEATHER RADAR

TILT.....+4°
Power Supply switch..... OFF
WINDSHEAR switch ⊲✻ ..... OFF
GAIN.....AUTO
Mode..... WX or WX/TURB

SPEED BRAKE

SPEED BRAKE lever .....RETRACTED AND DISARMED

CKPT DOOR PANEL

DOOR SWITCH..... NORM

Check FAULT light is extinguished. If the FAULT light is illuminated, check the overhead control panel to identify the faulty component (strike, pressure sensor channel).

SWITCHING PANEL

SWITCHING panel..... CHECK

Check all selectors at NORM.

ECAM CONTROL PANEL

DOOR pb .....PRESS

Check CKPT OXY pressure is >1 100 psi. If the CKPT OXY pressure is ≤1 100 psi, LIM-35 refers.

HYD pb .....PRESS

Check quantity indices are in the normal range.

ENG pb .....PRESS | PF

- *Check the oil quantity is not less than:*
  - *11 qt, plus estimated consumption up to tank capacity (maximum estimated consumption = 0.3 qt/hr).*

PRESS pb ..... PRESS

Check that 'LDG ELEV AUTO' is displayed on the CAB PRESS SD page to confirm correct position of the LDG ELEV selector.

STS pb .....PRESS

Check that any INOP SYS displayed is compatible with the MEL.

ENGINES

THRUST levers..... CHECK IDLE
ENG MASTER sw ..... CHECK OFF
ENG MODE selector .....CHECK NORM

PARKING BRK

PARK BRK handle ..... ON

- *Check pressure on BRAKE PRESS indicator.*
- *If chocks are in place, release PRK BRK handle to increase brake cooling, if required.*

GRAVITY GEAR EXTN

GRAVITY GEAR EXTN..... CHECK STOWED

RMP 2

RMP ..... SET

ACP 2

RECEPTION knob(s)..... SET

LIGHTS

Pedestal FLOOD LT.....AS RQRD

ATC

Mode selector ..... AUTO
ALT RPTG ..... ON
ATC Code..... SET
SYS 1 or 2..... SET

SYS 1 for CAPT sector, SYS 2 for F/O sector to match with the intended autopilot selection.

TCAS

Traffic selector ..... ABV
Mode selector ..... TA/RA

Refer to Part A 8.3.1.4 for additional information.

FLAPS

FLAPS..... CHECK POSITION

Check on the upper ECAM display the FLAP position agrees with the handle position.

ACARS

Applicable to: ALL

9 The PM shall cross-check the ACARS set up as per PF duties.

ACARS ..... INITIALISE
CREW INFO..... CONFIRM

- *Confirm crew data loaded (data should automatically load after initialisation request).*

CAR REPORT..... CONFIRM

- *Confirm CFP Edition Number (EDNO) is current (data should automatically load after initialisation request).*
- *Complete as required; normally enroute or post flight.*

FUEL FIGURES..... SEND

The SEND request should only be made after the final ZFW is confirmed and both pilots have cross-checked the data.

PDC REQUEST..... SEND

- *PF enters the required data. Ensure flight number agrees with CFP.*
- *PM selects SEND after a silent cross-check of the data.*
- *PM selects ACCEPT prompt upon PDC receipt. Any discrepancies shall be resolved by voice.*

RTOW MANDATORY DATA..... INSERT

- *Enter the required data into the ACARS RTOW system (AIRPORT, RWY CODE, OAT, QNH and WIND).*
- *Check/modify the default data (RWY SURFACE, CONF, RATING, PACKS, ENG and WING AI).*
- *Check/modify the default MEL codes (00-00-000) and default CDL/SP OPS code (N).*

Note: ACTUAL TOW/ZFW shall be entered after receipt of either the final ZFW or loadsheet.

APU START

Note: The APU start should be delayed until about 20 min before departure.

APU MASTER pb-sw ..... ON

ON light comes on, APU SD page appears on ECAM.

- **When N and EGT amber crosses have disappeared:**

  APU START pb-sw ..... ON

  Note: Wait at least 5 s before selecting APU START.

- **When APU AVAIL MEMO is displayed:**

  EXT PWR pb ..... AVAIL

  Check AVAIL light illuminated and ON light extinguished.

  EXT PWR&GND AIR..... ORDER DISCONNECT

  External power may be kept ON to reduce the APU load, especially in hot conditions . When the APU BLEED pb-sw is ON, keeping the EXT PWR pb ON increases the bleed air flow of the APU, improving the efficiency of the air conditioning.

  APU BLEED..... ON

  After disconnection of the ground air has been confirmed.

CAUTION	*APU start or shutdown is permitted during refuel/defuel procedures with the following restrictions:* - *An APU start is not permitted during a refuel/defuel procedure if the APU has previously failed to start, or an automatic shutdown has occurred.* - *Following a fuel spill, and with ground external power available, an APU shutdown should be considered.*

FUEL

REFUELLING..... CHECK

INSTRUMENTS

INSTRUMENTS.....CHECK

The PF shall announce:

- *Airport Elevation, Altimeter setting and indication, including Standby Altimeter/ISIS.*
- *Navaids displayed for departure.*
- *FD status from FMA.*
  e.g. "Elevation 28 feet, QNH 1016 set, 20 feet, 30 feet, CH on 1, TD on 2, ISR hard tuned, 1 FD 2."

The PM shall respond with any differences and, "Set for Departure."

TAKE OFF BRIEFING

Refer to FCTM SI-080 Briefing Procedure.

10 **ECAM**

MEMO.....CHECK

Check SEAT BELTS, NO SMOKING, PARK BRK, NW STRG DISC and APU BLEED memos, as appropriate, are displayed.

Note: The IRS IN ALIGN and REFUELG memos should not be displayed.

BEFORE START C/L .....COMPLETE

Note: Before start, the PM shall note the ECAM FOB for later use on the upper line of the ACTUAL FUEL column of the CFP.

BEFORE PUSHBACK OR START

Applicable to: ALL

ATC CLEARANCE

ATC CLEARANCE..... CONFIRM

On receipt of the ATC clearance or PDC, the PF shall confirm and announce, and the PM shall cross-check the following:

- *F-PLN pages show ATC cleared runway, SID/Transition routing if applicable.*
- *FMA and cleared altitude displayed on the PFD.*
- *SSR Code entered on the transponder.*
  e.g. "07R, Lakes 3A, CLB NAV blue 5000, squawk 5342," or "05, OP CLB blue 900 metres 3000, heading 055, squawk 5003."

Applicable to: ALL

ACARS RTOW

This procedure may be completed on receipt of either the FINAL ZFW or loadsheet.

ACTUAL ZFW/TOW ..... INSERT

If ACARS RTOW is unavailable, refer to Volume 9. Takeoff data not received on a printout shall be entered on the Takeoff Data Form/CFP, Volume 9 refers.

RTOW .....CHECK and SEND | PM

Applicable to: ALL

INIT B

INIT B..... COMPLETE

The PF together with the PM (who shall cross-check the entries and calculations), shall then:

- *Enter the ZFWCG and ZFW from the Loadsheet and enter the Final Fuel ordered as the BLOCK fuel.*

Check the:

- *BLOCK fuel agrees with Loadsheet fuel (TO + CFP planned taxi), and is in close agreement with ECAM FOB.*
- *Loadsheet TOW agrees with FM TOW, and is in close agreement with ECAM GW (if displayed) less CFP planned taxi fuel.*

Applicable to: ALL

PERF TO

TAKEOFF DATA..... CHECK | C

The Captain shall:

- *Ensure the RWY, takeoff conditions and ATOW on the RTOW printout (or Takeoff Data Form/CFP) are correct. If Simplified RTOW Charts are used for the takeoff data calculations, check the entire calculation.*

The Crew shall:

- *Check the ATOW on the RTOW printout (or Takeoff Data Form/CFP) agrees with the actual TOW on the Loadsheet. If not, check the actual TOW on the Loadsheet falls within the allowable weight band. If it falls outside the allowable weight band, new data shall be computed.*
- *Check the ACARS RTOW runway entry point, environmental conditions, aircraft MEL/CDL and NOTAM WIP/Obstacles information is correct.*
- *Check PACK configuration for takeoff.*
- *Check the RWY designator on the RTOW printout (or Takeoff Data Form/CFP) agrees with the RWY designator on the PERF TO page.*

MCDU PERF TO ..... COMPLETE

The PF together with the PM (who shall cross-check the entries), shall then:

- *Enter CONF/THS and THRUST setting. Use the THS setting from the Loadsheet. If the THS setting is not annotated on the Loadsheet, use the Normal Checklist table to determine the THS setting based on the Loadsheet MACTOW.*
- *Enter the V speeds. Visually confirm V1 (blue) and V2 (magenta) values on the top of the PFD speed scale.*
- *Brief the configuration for takeoff and the associated flap retraction strategy including activation of the (flap) Automatic Retraction System. Clearly identify configuration requirements for close-in turns, refer to FCTM NO-050 Close-in Turns and Altitude Restrictions After Takeoff.*
- *Brief packs off for takeoff (if applicable).*

Applicable to: ALL

MCDU ..... AS RQRD

PF should display PERF TO and PM F-PLN.

Applicable to: ALL

1

FLT DECK DOOR.....LOCKED

Applicable to: ALL

PUSHBACK/START UP CLEARANCE.....OBTAIN

Applicable to: ALL

BEACON sw .....ON

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

NW STRG DISC MEMO (for pushback).....CHECK

CAUTION	*If NW STRG DISC is not displayed on the ECAM, but the ground crew confirms that the steering selector bypass pin is in the towing position, then the pushback must not be performed. This is to avoid possible nose landing gear damage upon green hydraulic pressurization.* *To dispatch the aircraft in such a case, refer to MEL-32-51 Nose Wheel Steering Control System.*

2 **Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU**

NW STRG DISC MEMO (for pushback).....CHECK

CAUTION	*If NW STRG DISC is not displayed on the ECAM, but the ground crew confirms that the steering selector bypass pin is in the towing position, then the pushback must not be performed. This is to avoid possible nose landing gear damage upon yellow hydraulic pressurization.* *To dispatch the aircraft in such a case, refer to MEL-32-51 Nose Wheel Steering Control System.*

Applicable to: ALL

WINDOWS and DOORS.....CLOSED

- *Check cockpit windows closed and locked (red band visible on the handle).*
- *Check on ECAM lower display that all doors are closed.*
- *Check on the COCKPIT DOOR panel the OPEN light is extinguished.*

Applicable to: ALL

THRUST levers.....IDLE

CAUTION	*The engines will start regardless of the thrust lever position. Thrust will increase rapidly to the corresponding thrust lever position, causing a hazardous situation, if the thrust levers are not at IDLE.*

CAUTION	*If, during engine start with the parking brake on, the aircraft starts to move due to a parking brake failure, immediately release the PARK BRK handle to restore braking by pedals.*

Applicable to: ALL

START C/L .....COMPLETE

Applicable to: ALL

PUSHBACK (if required).....ORDER

CAUTION	*Do not use brakes during push back unless required due to an emergency.*

After push back completed, set PARK BRK to ON, and confirm brake pressure applied.

AUTOMATIC ENGINE START

Applicable to: ALL

1

Use the automatic engine start procedure in most circumstances. However, if the start aborts due to insufficient starter inlet air pressure (e.g. on high airfields, or in case of low pressure from an external pneumatic power group), it is recommended to use the manual start procedure, instead of the automatic procedure.
If, during the engine start, the ground crew reports a fuel leak from the engine drain mast, run the engine at idle for 5 min. If the leak disappears during these 5 min, the aircraft can be dispatched without maintenance action. If the leak is still present after 5 min, maintenance action may be required before the flight.

ENG MODE selector ..... IGN/START

The lower ECAM displays the ENGINE SD page.

START ENGINE 2..... ANNOUNCE

Engine 2 is usually started first. It powers the yellow hydraulic system, that pressurizes the parking brake.

ENG 2 MASTER sw ..... ON

- *Do not turn the ENG 2 MASTER sw ON before all amber crosses (except on N1 and N2) and messages, have disappeared on the engine parameters (upper ECAM display).*
- *Parameter callouts are not necessary. PF starts the chrono to time the starter cycle.*
- *In case the electrical power supply is interrupted during the start sequence (indicated by the loss of ECAM DUs), abort the start by switching OFF the ENG 2 MASTER sw. Then, perform a 30 s dry crank.*

ON ECAM UPPER DISPLAY	*ON ECAM LOWER DISPLAY*
N2 increases	*Corresponding start valve inline.* *Bleed pressure indication green.* *Oil pressure increases.*
30 s after ENG 2 MASTER sw is ON: *- FF increases.*	*Indication of the active igniter (A or B).*
20 s (maximum) after fuel is on *- EGT increases* *- N1 increases prior to 34 % N2.*	
At 43 % N2	*Igniter indication off.*
Slightly above 43 % N2	*Start valve crossline.*

Note: *When the FADEC detects an impending hung start or hot start, the FADEC applies an automatic recovery sequence without an ECAM message. The crew will notice that dual ignition (A+B) is applied, and that fuel will be commanded OFF, and then re-commanded ON within 0.5 s. It is not necessary for the crew to shut down the engine.*

MAIN AND SECONDARY ENG. IDLE PARAMETERS.....CHECK NORMAL

At ISA sea level : *N1 about 21.4 %*
N2 about 57.8 %
EPR about 1.01
EGT about 414 °C
FF about 350 kg/h (775 lb/h)

Grey background on N2 indication disappears.

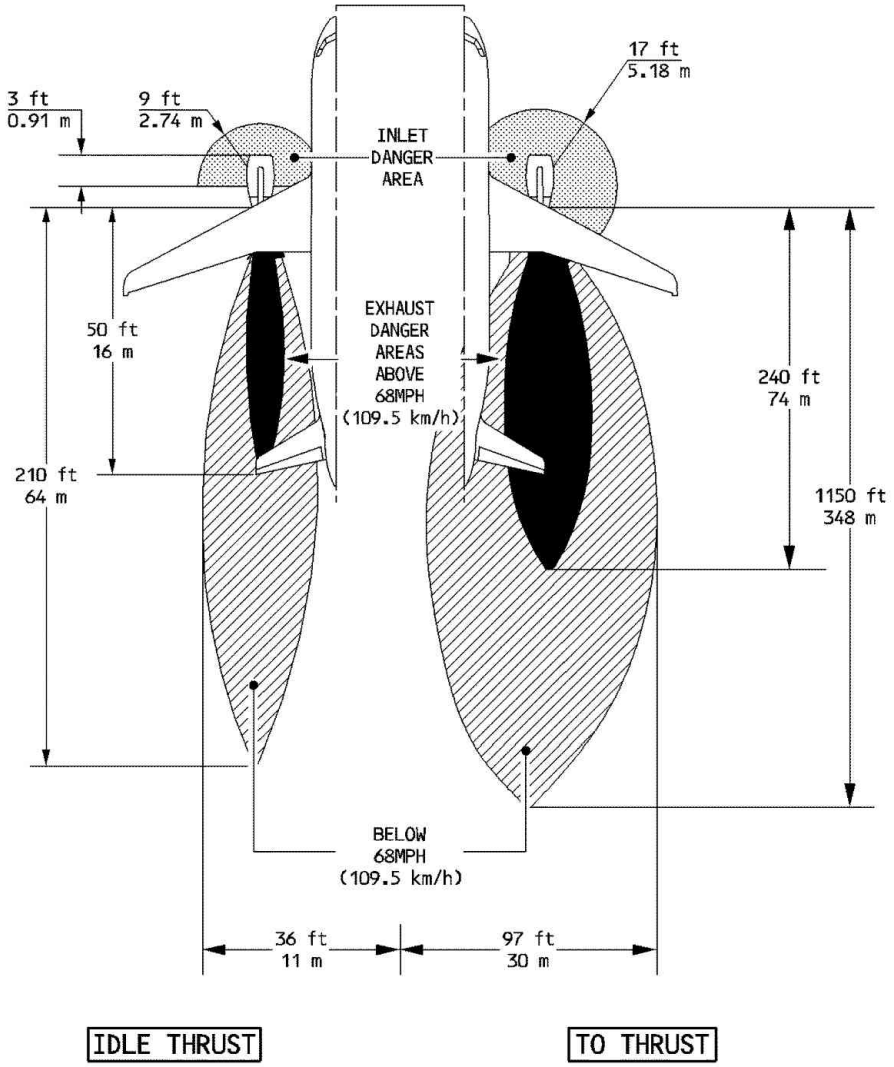
START ENGINE 1.....ANNOUNCE
ENG 1 MASTER sw ..... ON

Same procedure as for engine 2.
Both pack valves reopen 30 s after the second engine N2 is above 50 %.

Note: *A PTU FAULT is triggered, if the second engine is started within 40 s following the end of the cargo doors operation.*

GROUND RUN UP - DANGER AREAS

Applicable to: ALL


17 ft
5.18 m
3 ft
0.91 m
9 ft
2.74 m
INLET
DANGER
AREA
50 ft
16 m
EXHAUST
DANGER
AREAS
ABOVE
68MPH
(109.5 km/h)
240 ft
74 m
210 ft
64 m
1150 ft
348 m
BELOW
68MPH
(109.5 km/h)
36 ft
11 m
97 ft
30 m
IDLE THRUST
TO THRUST

AFTER START

Applicable to: ALL

ENG MODE selector ..... NORM | PF

- *Turning the ENG MODE selector to NORM indicates the end of the start sequence. The AFTER START actions may then be performed by the PM.*
- *ON the lower ECAM display, the WHEEL SD page replaces the ENGINE SD page.*
- *Leaving the ENG MODE selector in the START/IGN position would prevent continuous relight selection on ground (it would be supplied at lift-off). The selector must be cycled to recover normal control of the ignition and to display the WHEEL SD page.*
- *After start, to avoid thermal shock, the engine should be operated at idle or near idle for at least 5 min prior to advancing the thrust lever to high power. Taxi time at idle may be included in the warm-up period.*

Note: *The last engine started must be run for at least 2 minutes prior to takeoff to ensure that the centre tank pumps test is completed (takeoff on centre tanks is prohibited).*

APU BLEED pb-sw ..... OFF

- *Turn the APU BLEED pb-sw off, just after engine start, to avoid ingestion of engine exhaust gases.*
- *APU BLEED valve closes, ENG BLEED valves open.*

ENG ANTI ICE pb-sw ..... AS RQRD

Note: *Icing conditions may be expected when the OAT (on ground and for takeoff), or the TAT (in flight), is 10 °C or below and there is visible moisture in the air (such as clouds, fog with low visibility, rain, snow, sleet, ice crystals), or when standing water, slush, ice or snow is present on the taxiways or runway.*

- With ENG ANTI ICE ON, continuous ignition is automatically selected (IGNITION memo displayed on ECAM).
- If the ENG ANTI-ICE is selected ON and the valve(s) do not open (FAULT light(s) remain ON), increase N2 on the associated engine by about 5 %. When the valves open, retard the thrust levers to IDLE.
- During ground operations, when in icing conditions and the OAT is plus 3 °C or less, or if significant engine vibration occurs, the following procedure should be applied for ice shedding:

CAUTION	If, during thrust increase, the aircraft starts to move, immediately retard the thrust levers to IDLE.

  - If ground surface conditions and the environment permit, the flight crew should accelerate the engines to minimum 50 % of N1 at intervals not greater than 15 min. There is no requirement to maintain the high trust settings.
  - In addition, this engine acceleration should also be performed just before takeoff, with particular attention to the engine parameters (including vibration indications) to ensure normal engine operation.
  - Advise ATC of the runup requirement when reporting 'Ready' for departure.
  - Provided a takeoff clearance has been received, advance the thrust levers to the desired takeoff thrust setting on completion of the ice shedding procedure.

Note: When performing the static run-up, the 61-74% N1 range should be avoided.

WING ANTI-ICE pb-sw ..... AS RQRD

Select WAI ON when severe airframe icing conditions are expected airborne and provided its use has been included in the ACARS RTOW calculation. (Do not interrupt the 30 s test sequence as this could lead to a latched WING ANTI-ICE FAULT which can only be reset by maintenance action.) Leave the WAI ON. A successful test (no fault message) will ensure that WAI is automatically turned on at lift-off.

APU MASTER pb-sw (if APU not required)..... OFF

AVAIL light goes out (after a cooling period).

[1] RUD TRIM..... ZERO

If RUD TRIM position indication is not at zero, press the RESET pb. After the reset, an indication of up to 0.3° (L or R) may be observed in the RUD TRIM position indication.

FLAPS lever ..... SET

- *Set the FLAP for takeoff from the MCDU PERF TO page.*
- *Check the position on the upper ECAM display agrees with the MCDU PERF TO page and the flap lever position.*
- *If taxiing in slush, keep the flaps retracted until reaching the holding point for takeoff.*

GROUND SPOILERS..... ARM

PITCH TRIM..... SET

The THS setting should be in agreement with that on the MCDU PERF TO page.

DOOR/OXY SD page ..... SELECT

- *Check that all the slides are armed.*
- *Deselect the DOOR/OXY SD page after verifying the slides.*

ECAM STATUS..... CHECK

- *PM checks and PF cross-checks there is no status reminder (STS) on the upper ECAM display.*
- *If STS is displayed, press the STS pb and review the ECAM Status page. Any STS messages(s) shall be discussed by both crew members and their acceptability for dispatch confirmed prior to clearing the Status page.*

GROUND CREW..... RELEASE

[2] AFTER START C/L ..... COMPLETE

Check:

- *'NW STRG DISC 'is not displayed on ECAM MEMO, and*
- *Visual sighting of the nose wheel steering by-pass pin, and*
- *Hand signal on the left/right side.*

AFTER START C/L ..... FINAL ITEMS

TAXI CLEARANCE..... REQUEST

Taxi clearance shall not be requested until the After Start Checklist has been completed.

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TAXI

Applicable to: ALL

TAXI clearance ..... OBTAINED

Applicable to: ALL

NOSE light ..... TAXI | PF

Select the nosewheel light to TAXI (day or night).
RWY TURN OFF lights may be switched ON, as required.

Applicable to: ALL

PARK BRK handle ..... OFF

Check the brake pressure is zero (triple indicator). A slight residual pressure may be indicated for a short period of time.

Applicable to: ALL

THRUST levers..... AS RQRD

- *In order to get the aircraft moving, little, if any, power above idle thrust will be required (40 % N1 maximum). Thrust should normally be used symmetrically. Once the aircraft is moving, little thrust is required.*
- *Use of the engine anti-ice increases ground idle thrust, so the pilot must use care on slippery surfaces.*
- *The engines are close to the ground. Avoid positionning them over unconsolidated or unprepared ground (e.g. over the edge of taxiways).*
- *Avoid high thrust settings at low ground speeds, due to the risk of ingestion (FOD), and the possibility of FOD damage to the THS and elevators.*

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

BRAKES..... CHECK

Once the aircraft starts moving:

- *Check the brake efficiency of the normal braking system; the aircraft must slow down when pressing the brake pedals.*

CAUTION	*If the aircraft has been parked in wet conditions for a long period, the efficiency of the first brake application at low speed will be reduced.*

- *Also check the green system has taken over from the yellow system. The yellow pressure on the brake pressure triple indicator should remain at 0 when pressing the brake pedals. Although the green hydraulic power supplies the braking system, each time the pedals are pressed quickly, a brief brake pressure indication may appear on the BRAKE PRESS indicator.*
- *If a 'spongy' pedal is felt during taxi, this indicates degraded performance of the alternate braking system.*
- *If an arc is displayed on the WHEEL SD page above the brake temperature, select the brake fans on.*

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

BRAKES..... CHECK

Once the aircraft starts moving:

- *Check the brake efficiency of the normal braking system; the aircraft must slow down when pressing the brake pedals.*

CAUTION	*If the aircraft has been parked in wet conditions for a long period, the efficiency of the first brake application at low speed will be reduced.*

- *If an arc is displayed on the WHEEL SD page above the brake temperature, select the brake fans on.*

Applicable to: ALL

NOSEWHEEL STEERING..... AS RQRD

- *The nosewheel steering angle is limited to 75 °.*
- *Braked pivot turns are not allowed (i.e. differential braking cannot be used to fully stop one main gear).*

Applicable to: ALL

FLIGHTS CONTROLS..... CHECK

1. At a convenient stage, prior to or during taxi, and before arming the autobrake, the PF applies full longitudinal and lateral sidestick deflection.

On the F/CTL SD page, the PM checks full travel and the correct sense of all elevators and all ailerons, and the correct deflection and retraction of all spoilers.

Note: In order to reach full travel, full sidestick must be held for a sufficient period of time.

2. *The PF presses the PEDAL DISC pb on the nosewheel tiller, and applies full left rudder, full right rudder, and neutral.*
3. *The PM applies full longitudinal and lateral sidestick deflection, and checks full travel and the correct sense of all elevators and all ailerons, and the correct deflection and retraction of all spoilers, on the F/CTL SD page.*

   Note: The F/CTL page is automatically displayed for 20 s.

4. *Refer to PRO-NOR-SOP-90 Standard Callouts.*

Applicable to: ALL

AUTO BRK ..... MAX

- *The ON light comes on.*
- *AUTO BRK may be armed, with the parking brake on.*
- *In the event of an aborted takeoff, selecting the MAX mode before takeoff improves safety. If the takeoff must be aborted, the autobrake system applies maximum braking (if the ground speed is above 72 kt), as soon as the thrust levers are set to idle.*

Applicable to: ALL

TERR ON ND.....AS RQRD

- *If radar is required, consider selecting the radar display on the PF side, and TERR ON ND on the PM side only.*

Applicable to: ALL

TO CONFIG pb ..... PRESS

Check the upper ECAM displays TO CONFIG NORMAL (no blue action lines).

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

RADAR..... ON

Normally SYS 1 for CAPT sector, SYS 2 for F/O sector.

PREDICTIVE WINDSHEAR SYSTEM ..... AUTO

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

RADAR..... ON

To check the radar and the departure path, set the MULTISCAN sw to MAN. The flight crew can then set the radar to the AUTO position.

Gain must be manually set to +4, when MULTISCAN selector is set to AUTO and when flying below FL 200.

Note: 1. *If the weather is good, or no significant, in order to check that the radar is operating correctly: down tilt until displaying ground echoes*
2. *If the weather display is ambiguous or unexpected, in order to better analyze the weather situation, use manual tilt according to standard technique.*
3. *In particular below FL 200, for situations with low-level weather, weather with low reflectivity or in front of suspected active cells, the flight crew should switch to Manual mode and adjust the tilt setting downward until the weather is detected or the ground clutter appears on the upper part of the display.*
4. *In addition, the flight crew may increase the manual gain control to display lower reflectivity targets. The manual gain control can be increased in both AUTO and Manual modes to display lower levels of weather. In both cases, ground clutter may also be displayed as a result of low settings and/or increased gain.*

PREDICTIVE WINDSHEAR SYSTEM ⋖⋗ ..... AUTO

Applicable to: ALL

ENG MODE selector .....AS RQRD

Select IGN/START if the runway is covered with standing water, heavy rain or if severe turbulence is expected after takeoff.

Applicable to: ALL

1 ATC CLEARANCE..... CONFIRM

In the case of a late change of runway and/or if new takeoff data is required, see FCTM NO-040 Late Change of Runway and/or Takeoff Data.
If a heading is required by ATC after takeoff, preset the heading on the FCU. NAV mode will be disarmed. Once Airborne RWY TRK will be the initial lateral mode.

Applicable to: ALL

2 LOADSHEET.....ACKNOWLEDGED

Ensure the final edition number of the loadsheet has been received and acknowledged BEFORE takeoff

Applicable to: ALL

TAKEOFF BRIEFING.....CONFIRM

The briefing shall include:

- *Takeoff thrust limit mode (FLX/TOGA) displayed on the E/WD.*
- *PACKS OFF (if applicable).*
- *Confirmation of the SID.*
- *Initial track or action after takeoff.*
- *FMA annunciation.*
  e g "FLX, OCEAN 2A, straight ahead to PORPA, CLB, NAV blue 5000."
  PM shall respond with any queries, otherwise, "Check."

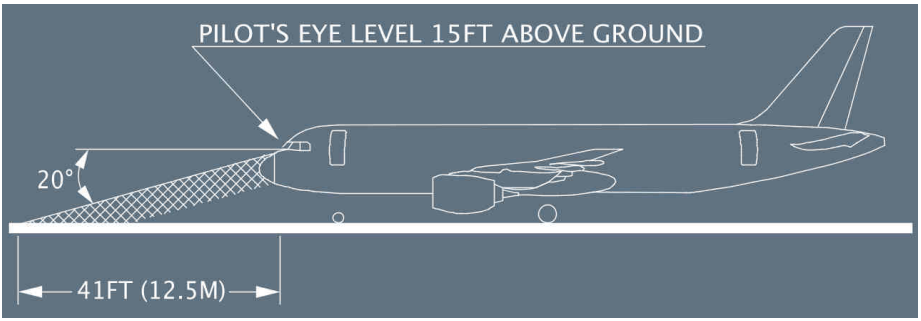
Applicable to: ALL

3 BEFORE TAKEOFF C/L .....COMPLETE

VISUAL GROUND GEOMETRY

Applicable to: ALL

4



180 DEG TURN ON RUNWAY

Applicable to: ALL 320

The standard width of a runway is 45 m. However, this aircraft only needs a runway width of 30 m (99 ft) for a 180 ° turn.
The following procedure is recommended for performing a 180 ° turn on the runway.

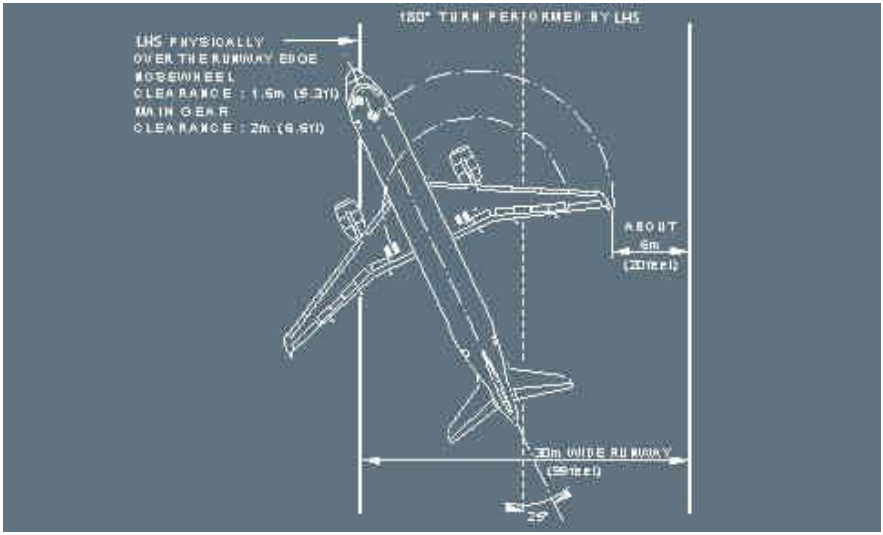
● **FOR THE LHS:**

- Taxi on the right of the runway and turn left, maintaining 25 ° of divergence from the runway axis
- When the LHS is physically over the runway edge:
  - Turn the nosewheel fully right,
  - On ENG 1, set the EPR to between 1.02 and 1.03,
  - Set ENG 2 to idle.

The Ground Speed (GS) for the entire maneuver should be between 5 kt and 8 kt, to prevent the width of the turn from increasing.

● **FOR THE RHS:**

The procedure is symmetrical. (Taxi on the left-hand side of the runway.)



Note: *To prevent the nosewheel from skidding on a wet runway, it is possible to perform the turn at a very low speed using asymmetric thrust and differential braking, as necessary.*

180 DEG TURN ON RUNWAY

Applicable to: ALL 321

The standard width of a runway is 45 m. However, this aircraft only needs a runway width of 32 m (105 ft) for a 180 ° turn.

The following procedure is recommended for performing a 180 ° turn on the runway.

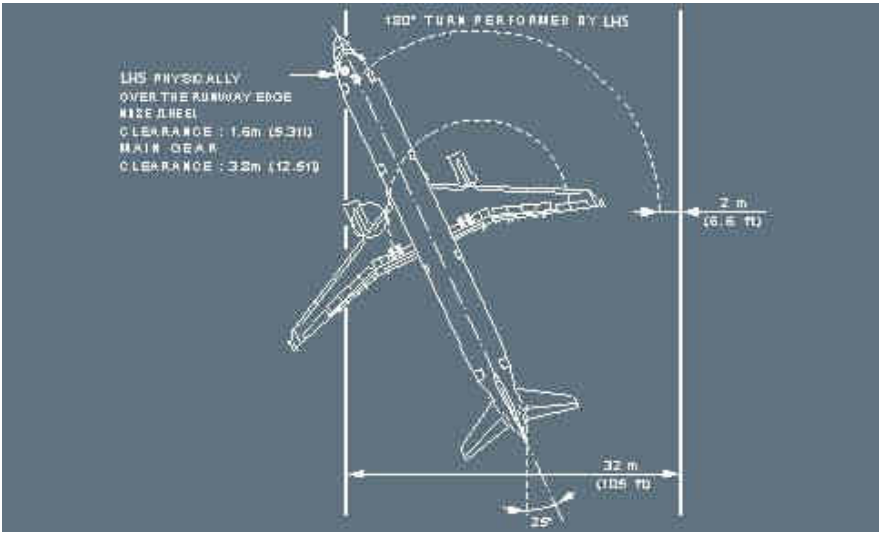
● **FOR THE LHS:**

- Taxi on the right of the runway and turn left, maintaining 25 ° of divergence from the runway axis
- When the LHS is physically over the runway edge:
  - Turn the nosewheel fully right
  - On ENG 1, set the EPR to between 1.02 and 1.03,
  - Set ENG 2 to idle.

The Ground Speed (GS) for the entire maneuver should be between 5 kt and 8 kt, to prevent the width of the turn from increasing.

● **FOR THE RHS:**

The procedure is symmetrical. (Taxi on the left-hand side of the runway).



Note: *To prevent the nosewheel from skidding on a wet runway, it is possible to perform the turn at a very low speed using asymmetric thrust and differential braking, as necessary.*

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BEFORE ENTERING THE RUNWAY

Applicable to: ALL

1 Before entering the departure runway, both pilots should:

- Confirm the runway and runway entry point are correct. Useful aids are:
  - The runway markings
  - The runway lights. Be careful in low visibility, do not mistake runway edge lights with the centerline lights.
  - The ILS signal. If the runway is ILS equipped, the flight crew can press the ILS pb (or LS pb). The LOC deviation should be centered after line up.
  - The runway symbol on the ND.
- Confirm the approach path is clear, and
- Confirm there is no conflicting TCAS traffic.

SLIDING TABLE.....STOW
ANNOUNCE..... "CABIN CREW, PLEASE BE SEATED FOR TAKEOFF." PM

Check CABIN READY memo displayed on ECAM/CDSS monitor (select the CDSS monitor OFF).

Note: Due to the 'time out' function, it is possible the CABIN READY memo may disappear from the ECAM MEMO before takeoff.

● **If BRAKE FANS are ON:**

BRAKE TEMP.....CHECK

- *If any brake temperature is >150 °C, delay takeoff.*
- *If all brake temperatures are ≤150 °C, select BRAKE FANS to OFF.*

ENTERING THE RUNWAY

Applicable to: ALL

2 EXTERIOR lights.....ON

Set STROBE, RWY TURN-OFF, L LAND, R LAND and NOSE switches at ON/TO.

PACK 1 and 2.....AS REQD
BEFORE TO C/L .....FINAL ITEMS

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TAKEOFF

Applicable to: ALL

Rolling takeoff is recommended.

BRAKES..... RELEASE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

THRUST SETTING

■ **If the crosswind is at or below 20 kt and there is no tailwind:**

THRUST LEVERS..... FLX or TOGA | C

- *To counter the nose-up effect of setting engine takeoff thrust, apply half forward stick until the airspeed reaches 80 kt. Release the stick gradually to reach neutral at 100 kt.*
- *CAPTAIN progressively adjusts engine thrust in two steps:*
  - *from idle to about 50 % N1 (1.05 EPR).*
  - *from both engines at similar N1 to takeoff thrust.*
- *Once the thrust levers are set to FLX or TOGA detent, the captain keeps his hand on the thrust levers until the aircraft reaches V1.*

■ **In case of tailwind or if crosswind is greater than 20 kt:**

THRUST LEVERS..... FLX or TOGA | C

- *PF applies full forward stick.*
- *CAPTAIN sets 50 % N1 (1.05 EPR) on both engines then increases thrust progressively to reach takeoff thrust at 40 kt ground speed, while maintaining stick full forward up to 80 kt. Release stick gradually to reach neutral at 100 kt.*
- *Once the thrust levers are set to FLX or TOGA detent, the captain keeps his hand on the thrust levers until the aircraft reaches V1.*

Note: *1. ENGINE SD page replaces WHEEL SD page on the ECAM lower display*
2. The FADEC includes a keep-out zone, which is designed to avoid steady state operation inside a N1 range between 60 % and 74 % due to fan flutter phenomenon. This can result in discontinuous EPR increase during thrust setting (Refer to DSC-70-20 Functions).

DIRECTIONAL CONTROL..... USE RUDDER

At 130 kt (wheel speed), the connection between nosewheel steering and the rudder pedals is removed. Therefore, in strong crosswinds, more rudder input will be required at this point to prevent the aircraft from turning into the wind.

PFD/ND .....SCAN

1. Check the FMA on the PFD. The following modes are displayed: MAN TOGA (or MAN FLX xx) /SRS/RWY (or blank) / A/THR (in blue).

Note: If an ILS that corresponds to the departure runway is tuned, RWY mode appears. If not, no lateral mode appears until the aircraft lifts off.

2. Check the FMS position on the ND (aircraft on runway centerline).

FMA .....ANNOUNCE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

THRUST SETTING

■ **If the crosswind is at or below 20 kt and there is no tailwind:**

THRUST LEVERS..... FLX or TOGA | C

- *To counter the nose-up effect of setting engine takeoff thrust, apply half forward stick until the airspeed reaches 80 kt. Release the stick gradually to reach neutral at 100 kt.*
- *PF progressively adjusts engine thrust in two steps:*
  - *from idle to about 50 % N1 (1.05 EPR).*
  - *from both engines at similar N1 to takeoff thrust.*
- *Once the thrust levers are set to FLX or TOGA detent, the captain keeps his hand on the thrust levers until the aircraft reaches V1.*

■ **In case of tailwind or if crosswind is greater than 20 kt:**

THRUST LEVERS..... FLX or TOGA | C

- *PF applies full forward stick.*
- *PF sets 50 % N1 (1.05 EPR) on both engines then increases thrust progressively to reach takeoff thrust at 40 kt ground speed, while maintaining stick full forward up to 80 kt. Release stick gradually to reach neutral at 100 kt.*
- *Once the thrust levers are set to FLX or TOGA detent, the captain keeps his hand on the thrust levers until the aircraft reaches V1.*

Note: 1. ENGINE SD page replaces WHEEL SD page on the ECAM lower display

2. The FADEC includes a keep-out zone, which is designed to avoid steady state operation inside a N1 range between 60 % and 74 % due to fan flutter phenomenon. This can result in discontinuous EPR increase during thrust setting (Refer to DSC-70-20 Functions).

DIRECTIONAL CONTROL..... USE RUDDER

At 130 kt (wheel speed), the connection between nosewheel steering and the rudder pedals is removed. Therefore, in strong crosswinds, more rudder input will be required at this point to prevent the aircraft from turning into the wind.

PFD/ND .....SCAN

1. Check the FMA on the PFD. The following modes are displayed: MAN TOGA (or MAN FLX xx) /SRS/RWY (or blank) / A/THR (in blue).

Note: If an ILS that corresponds to the departure runway is tuned, RWY mode appears. If not, no lateral mode appears until the aircraft lifts off.

2. Check the FMS position on the ND (aircraft on runway centerline).

Note: If GPS PRIMARY is not available, check the FMS position update.

FMA .....ANNOUNCE

Applicable to: ALL

BEFORE REACHING 80 KNOTS

TAKEOFF EPR ..... CHECK

Check the actual EPR of the individual engines has reached the EPR rating limit, before the aircraft reaches 80 kt. Check EGT.

THRUST SET.....ANNOUNCE
PFD and ENG indications.....SCAN

- *Scan airspeed, EPR, and EGT throughout the takeoff.*

Applicable to: ALL

REACHING 100 KNOTS

ONE HUNDRED KNOTS..... ANNOUNCE

- *The PF cross-checks and confirms the speed indicated on the PFD.*
- *Below 100 kt, the Captain may decide to abort the takeoff, depending on the circumstances.*
- *Above 100 kt, rejecting the takeoff is a more serious matter.*

Applicable to: ALL

AT V1

V1 ..... AUTOCALL/ANNOUNCE

Applicable to: ALL

AT VR

ROTATION.....ORDER
ROTATION.....PERFORM

- *At VR, initiate the rotation with a positive sidestick input to achieve a continuous rotation rate of about 3 °/s, towards a pitch attitude of 15 ° (12.5 °, if one engine is failed).*
- *Minimize lateral inputs on the ground and during the rotation, to avoid spoiler extension. In strong crosswind conditions, small lateral sidestick inputs may be used, if necessary, to maintain wings level.*
- *After lift-off, follow the SRS pitch command bar.*

CAUTION	If a tailstrike occurs, avoid flying at an altitude requiring a pressurized cabin, and return to the originating airport for damage assessment.

Applicable to: ALL

WHEN POSTIVE CLIMB

POSITIVE CLIMB.....ANNOUNCE

Announce positive climb, when the vertical speed indication is positive and radio altitude has increased.

LDG GEAR UP.....ORDER
LDG GEAR lever.....SELECT UP
AP.....AS RQRD

Above 100 ft AGL, AP1 or 2 may be engaged.

FMA .....ANNOUNCE

Applicable to: ALL

AT THRUST REDUCTION ALTITUDE

THRUST LEVERS.....CL

Move the thrust levers to the CL detent when the flashing LVR CLB prompt appears on the FMA. Autothrust is now active.
In manual flight the pilot must anticipate the pitch attitude, in order to prevent the speed from decaying, when the thrust is reduced.

FMA .....ANNOUNCE
PACK 1 and PACK 2 (if applicable).....ON

- *Select PACK 1 on, after CLB thrust reduction.*
- *Select PACK 2 on, after 10 s.*

Note: *1. Selecting the packs on, before reducing the takeoff thrust, will result in an EGT increase.*
2. If the packs are not switched on after the takeoff phase, an ECAM caution will be triggered.

Applicable to: ALL

AT ACCELERATION ALTITUDE

FMA ..... ANNOUNCE

Check the target-speed changes from V2 +10 to the first CLB speed (either preselected or managed).

Note: *1. When the THR RED altitude and ACC altitude are the same, the FMA will change from MAN FLX/SRS/RWY to THR CLB/CLB/NAV (or THR CLB/OP CLB/NAV).*
2. If the FCU-selected altitude is the same as, or close to, the ACC altitude, then the FMA will switch from SRS to ALT.*

Applicable to: ALL 320

ABOVE ACCELERATION ALTITUDE (OR ONCE IN CLIMB PHASE)

The following procedure ensures the aircraft is effectively accelerating toward climb speed.

- **At or above F speed:**

Note: *For takeoff in CONF 1 + F, F speed does not appear.*

FLAPS 1 ..... ORDER
FLAPS 1 ..... SELECT

- **At as above S speed:**

FLAPS ZERO ..... ORDER
FLAPS ZERO ..... SELECT

The CRUISE SD page replaces the ENGINE SD page.

CAUTION	Manoeuvring the aircraft in the clean configuration at a speed lower than Green Dot is not recommended.

Note: *Flap at ZERO is the cue for the PM to disarm the GRND SPLRS and set the Exterior Lights.*

GRND SPLRS ..... DISARM
EXTERIOR lights ..... SET

- *Set NOSE and RWY TURN OFF lights to OFF.*
- *LAND lights remain ON.*

Applicable to: ALL 321

ABOVE ACCELERATION ALTITUDE (OR ONCE IN CLIMB PHASE)

The following procedure ensures the aircraft is effectively accelerating toward climb speed.

- **At or above F speed:**

Note: *For takeoff in CONF 1 + F, F speed does not appear.*

FLAPS 1..... ORDER
FLAPS 1..... SELECT

- **At or above S speed:**

Note: *At heavy takeoff weights, S speed may be higher than the MAX speed for configuration 1 + F (215 kt). Continue to accelerate and on reaching 210 kt an automatic flap retraction will occur and the MAX speed will move to 230 kt.*

FLAPS ZERO..... ORDER
FLAPS ZERO..... SELECT

The CRUISE SD page replaces the ENGINE SD page.

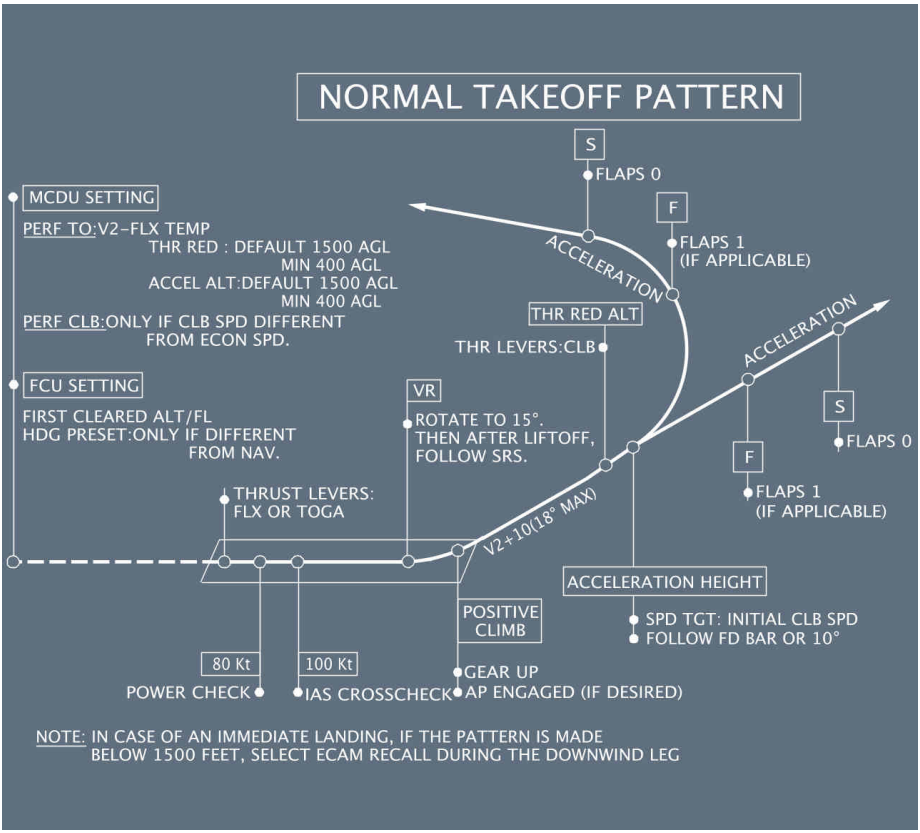
CAUTION	Manoeuvring the aircraft in the clean configuration at a speed lower than Green Dot is not recommended.

Note: *Flap at ZERO is the cue for the PM to disarm the GRND SPLRS and set the Exterior Lights.*

GRND SPLRS ..... DISARM
EXTERIOR lights..... SET

- *Set NOSE and RWY TURN OFF lights to OFF.*
- *LAND lights remain ON.*

Applicable to: ALL



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AFTER TAKEOFF

Applicable to: ALL

1 ENG MODE selector .....AS RQRD

Select IGN/START if severe turbulence or heavy rain is encountered.

ANTI-ICE PROTECTION..... AS RQRD

AFTER TAKEOFF C/L .....COMPLETE

The PF shall call for this checklist when the aircraft is in a stabilized flight path with flaps retracted and climb thrust set.

SEAT BELTS..... CYCLE

Cycle the Seat Belt signs when conditions are safe for the cabin crew to commence cabin duties.

TERR ON ND .....OFF

Select the TERR ON ND pb off when above the highest applicable sector MSA.

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CLIMB

Applicable to: ALL

Normal climb mode is CLB or OP CLB with managed speed active.

MCDU ..... AS RQRD

- *It is recommended the PF displays PERF CLB and the PM displays F-PLN.*
- *Clear manually tuned navaids.*
- *If the CRZ FL is lower than that displayed on the PROG page, insert this lower CRZ FL.*

Applicable to: ALL

ENG ANTI ICE..... AS RQRD

ENG ANTI ICE should be ON when the aircraft encounters icing conditions, unless the SAT is below -40 C.

Applicable to: ALL

1

CLIMB SPEED..... AS RQRD

If the ROC is insufficient to achieve operational constraints, first reduce speed towards 275 kt/M0.76 and evaluate before considering further speed reductions.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

RADAR TILT..... ADJUST

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU
Impacted by TDU: 00013047 Climb - Radar

RADAR..... AS APPROPRIATE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU
Impacted DU: 00010259 Climb - Radar

RADAR..... AS APPROPRIATE

Gain must be manually set to +4, when MULTISCAN selector is set to AUTO and when flying below FL 200.

Note:
1. *If the weather is good, or no significant, in order to check that the radar is operating correctly: down tilt until displaying ground echoes.*
2. *If the weather display is ambiguous or unexpected, in order to better analyze the weather situation, use manual tilt according to standard technique.*
3. *In particular below FL 200, for situations with low-level weather, weather with low reflectivity or in front of suspected active cells, the flight crew should switch to Manual mode and adjust the tilt setting downward until the weather is detected or the ground clutter appears on the upper part of the display.*
4. *In addition, the flight crew may increase the manual gain control to display lower reflectivity targets. The manual gain control can be increased in both AUTO and Manual modes to display lower levels of weather. In both cases, ground clutter may also be displayed as a result of low settings and/or increased gain.*

Applicable to: ALL

AT 10.000FT AAL

LAND lights..... RETRACT

If departing from airports significantly above sea level or in areas of high traffic density, consider leaving the lights ON until a higher level.
Landing lights may be selected OFF earlier if airframe vibration is considered excessive above 250 kt.

CRUISE - RADAR TILT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

RADAR TILT..... ADJUST

CRUISE - RADAR TILT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU
Impacted by TDU: 00013068 Cruise - Radar Tilt

RADAR .....AS APPROPRIATE

CRUISE - RADAR TILT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU
Impacted DU: 00010291 Cruise - Radar Tilt

RADAR .....AS APPROPRIATE

Gain must be manually set to +4, when MULTISCAN selector is set to AUTO and when flying below FL FL 200.

Note:
1. *If the weather is good, or no significant, in order to check that the radar is operating correctly: down tilt until displaying ground echoes.*
2. *If the weather display is ambiguous or unexpected, in order to better analyze the weather situation, use manual tilt according to standard technique.*
3. *In particular below FL 200, for situations with low-level weather, weather with low reflectivity or in front of suspected active cells, the flight crew should switch to Manual mode and adjust the tilt setting downward until the weather is detected or the ground clutter appears on the upper part of the display.*
4. *In addition, the flight crew may increase the manual gain control to display lower reflectivity targets. The manual gain control can be increased in both AUTO and Manual modes to display lower levels of weather. In both cases, ground clutter may also be displayed as a result of low settings and/or increased gain.*

CRUISE

Applicable to: ALL

TCAS Traffic selector.....AS RQRD
ECAM MEMO.....PERIODICALLY REVIEW

ECAM CRUISE/SYS PAGES.....PERIODICALLY REVIEW

Note: 1. *Advise CX Engineering via ACARS or HF of any defects occurring enroute which could affect dispatch on the next sector.*
2. *Engine oil quantity variation may not be linear during climb and cruise. A small decrease in quantity is normal.*
3. *Green hydraulic system quantity indication is lower than on ground following landing gear retraction.*

NAVIGATION ACCURACY..... CHECK

When approaching each waypoint, check the track and distance to the next waypoint is rational.
Make optimum use of the MCDU, FCTM NO-070 and PRO-NOR-SRP-01-50 refers.
On aircraft equipped with GPS, no navigation accuracy check is required, as long as GPS PRIMARY is available.

Otherwise, navigation accuracy must be monitored, at all times but especially when any of the following occurs:
- *IRS only navigation.*
- *The PROG page displays LOW accuracy.*
- *'NAV ACCUR DOWNGRAD' appears on the MCDU/ND.*

If the check is positive (error ≤ 3 nm): FM position is reliable.

- Use ND (ARC or NAV) and managed lateral guidance.

If the check is negative (error >3 nm): FM position is not reliable.

- Use raw data for navigation and monitor it.
- If there is a significant mismatch between the display and the real position: disengage MANAGED NAV mode and use raw data navigation (possibly switching to ROSE VOR, so as not to be misled by FM data).

FLIGHT PROGRESS..... RECORD | PM

Insert enroute and descent winds into the MCDU if they were not entered previously.
Use may be made of the WIND REQUEST function. Once the uplink message is received, the cruise and descent winds may need to be inserted using the INSERT UPLINK* prompt on both the Cruise and Descent wind pages.*
Fuel checks shall be carried out at least once every hour, when passing over a waypoint (FCTM NO-070 Fuel Monitoring and Part A 8.3.1.6 refers).

CAUTION	*This check must also be performed each time a FUEL IMBALANCE procedure is necessary. Perform the check before applying the FUEL IMBALANCE procedure. If a fuel leak is confirmed, apply the FUEL LEAK procedure.*

DESCENT PREPARATION

Applicable to: ALL

Descent preparation and approach briefing can take approximately 10 min, so they should begin approximately 80 nm before top of descent.

LDG ELEV.....CHECK

Check on ECAM CRUISE page that LDG ELEV AUTO is displayed.

WEATHER AND LANDING INFORMATION.....OBTAIN

Check weather reports at ALTERNATE and DESTINATION airports. Airfield data should include runway in use for arrival.

1 LANDING PERFORMANCE..... CONFIRM

Refer to FCTM/NO-080 LANDING PERFORMANCE.

2 **FMGS SET UP**

The PF shall set up the FMGS. The PM shall cross-check FMGS set up as per PF duties.

F-PLN ..... COMPLETE/CHECK

Insert RWY/APPR, STAR, TRANS, APPR VIA, (as appropriate) and check against the published procedure. (The approach and missed approach tracks and distances must be checked, as well as the speed and altitude contraints.)
Modify the F-PLN as required to comply with ATC clearances, published procedures, or expected profile. In all cases, do not modify the final approach (FAF to the runway or missed approach point), including altitude constraints.
For a non-precision approach, identify the position and altitude of the Final Descent Point (FDP) and check the value of the FPA after the FDP against the published procedure.

PERF DES ..... CHECK

A descent speed of 300 kt shall be inserted, however for operational reasons this may be varied to suit the circumstances.

PERF APPR ..... COMPLETE/CHECK

- *Enter the QNH, temperature, and wind (Note 1) at destination.*
- *For non-precision or CAT 1 approaches, insert MDA (Note 2).*
- *Check or modify the TRANS LEVEL.*
- *Check or modify the LDG CONF (normally CONF FULL) (Note 3 and 4).*

Note: *1. The wind entered should be the average wind given by ATC or the ATIS. Do not enter gust values, for example if the wind is 150/20-25, insert the lower speed 150/20.*
2. Changing RWY or type of approach automatically erases the previous MDA.
3. If the forecast tailwind on landing is >10 kt, CONF FULL is the recommended configuration.
4. If CONF 3 is selected for landing on the MCDU PERF APPR page, select the GPWS LDG FLAP 3 pb to ON.
5. The MCDU VAPP field is pilot modifiable.

PERF GO-AROUND.....CHECK

Check the THR RED/ACC/EO ACC altitudes.

RADNAV ..... AS RQRD
PROG .....AS RQRD

Consider the use of a radio aid or a waypoint in the BRG/DIST field.

SEC F-PLN ..... AS RQRD

The SEC F-PLN should be modified for either an alternative runway at the destination, or to the landing runway in case of circling.

Note: *After the activation of the SEC F-PLN, check the VAPP, and modify if necessary.*

STBY INST ..... SET

Set QNH on the STBY ALT/ISIS.

EFIS CONTROL PANEL..... CSTR pb ON
ECAM STATUS.....CHECK

Take particular note of any landing capability downgrade or any other aspect affecting the approach and landing. Include this in the arrival briefing.

AUTO BRK ..... ARM

Check the associated AUTO BRK light illuminates. The use of MAX mode is not recommended for landing.

Note: *On long dry runways where minimal braking is anticipated, the AUTO BRK maybe disengaged after touchdown provided the aircraft has landed within the Touchdown Zone.*

ARRIVAL BRIEFING.....COMPLETE

FCTM SI-080 Briefing Procedure refers.

CABIN CREW.....CONTACT

Advise 30 min to landing.

ANTI ICE PROTECTION..... AS RQRD

DESCENT C/L ..... COMPLETE

DESCENT CLEARANCE.....OBTAIN

When clearance is obtained, set the ATC cleared altitude (FL) in the FCU (taking into consideration any relevant safe altitudes).

ANTI ICE PROTECTION..... AS RQRD

- *During descent the ENG ANTI ICE pb-sw must be ON, when icing conditions are encountered. (Refer to PRO-SUP-30 Operations in Icing Conditions.)*
- *With engine ANTI ICE ON, the FADEC automatically controls continuous ignition and selects a higher idle thrust, which gives better protection against an engine flame-out.*
- *ANTI ICE ON reduces the descent path angle (when the engines are at idle). The pilot can compensate for this by increasing the descent speed, or by extending up to half speedbrakes.*

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DESCENT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

RADAR TILT knob .....ADJUST

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU
Impacted by TDU: 00013353 Descent Adjustment - Radar

RADAR knob .....AS APPROPRIATE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU
Impacted DU: 00011545 Descent Adjustment - Radar

RADAR knob .....AS APPROPRIATE

Gain must be manually set to +4, when MULTISCAN selector is set to AUTO and when flying below FL 200.

Note:
1. *If the weather is good, or no significant, in order to check that the radar is operating correctly: down tilt until displaying ground echoes.*
2. *If the weather display is ambiguous or unexpected, in order to better analyze the weather situation, use manual tilt according to standard technique.*
3. *In particular below FL 200, for situations with low-level weather, weather with low reflectivity or in front of suspected active cells, the flight crew should switch to Manual mode and adjust the tilt setting downward until the weather is detected or the ground clutter appears on the upper part of the display.*
4. *In addition, the flight crew may increase the manual gain control to display lower reflectivity targets. The manual gain control can be increased in both AUTO and Manual modes to display lower levels of weather. In both cases, ground clutter may also be displayed as a result of low settings and/or increased gain.*

Applicable to: ALL

Normal descent mode is DES or OP DES with managed speed active.

DESCENT..... INITIATE
MCDU ..... AS RQRD

It is recommended the PF displays PERF DES or PROG, the PM displays F-PLN, and that both pilots select CSTR on their respective EFIS display pbs.

ATC CLEARANCE..... CONFIRM

On receipt of initial and any subsequent ATC clearance, the PF shall confirm and the PM shall crosscheck that the F-PLN pages show the ATC cleared runway, STAR/Transition routing as applicable.

Applicable to: ALL

AT FL 200

Consider increasing this altitude when the destination airport elevation is significantly above sea-level.

ILS/LS pb ..... AS RQRD
ANNOUNCE..... "CABIN CREW, PREPARE THE CABIN FOR LANDING." | PM
SEAT BELTS..... ON

Note: Do not cycle the Seat Belt signs if they have previously been selected ON.

Applicable to: ALL

1 **WHEN SETTING ALTIMETER BARO REFERENCE**

Refer to Part A 8.3.1.3 for additional information.

QNH..... SET AND CROSS-CHECK

When descending to a port where metric levels are not used, leave the standby metric altimeter set to STD, otherwise set QNH.

CAUTION	*Presetting the FCU BARO reference prior to being cleared to an altitude can lead to inadvertent level- off on the incorrect BARO reference.*

ECAM STATUS..... CHECK

Take particular note of any degradation in landing capability or any other factor affecting the approach and landing.

Applicable to: ALL

AT 10 000 FT

Consider increasing this altitude when the destination airport elevation is significantly above sea-level.

LAND lights..... ON | PF

In areas of high traffic density, consider selecting the lights ON at a higher level.

SEAT BELTS..... CYCLE

Alerts the cabin crew - approximately 10 min to landing.

Applicable to: ALL

AT MSA

TERR ON ND..... AS RQRD

If use of radar is required, consider selecting the radar display on the PF side and TERR ON ND on the PM side only.

INITIAL APPROACH

Applicable to: ALL

GENERAL

Information about precision approaches and how to use the FMGS can be found in PRO-NOR-SRP-01-70. The approach procedures described here assume the flight crew uses managed speed guidance, which is the recommended method.
Guidance on Low Visibility Operations (LVO) is provided in Part A 8.4.1 and in PRO-SUP-91-60.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

INITIAL APPROACH

APPROACH PHASE..... ACTIVATE

- *In NAV mode, the APPR phase automatically activates at the DECEL pseudo waypoint.*
- *In HDG or TRK mode, manually activate the APPR phase on the PERF APPR page.*

POSITIONING.....MONITOR

- *In NAV mode, use VDEV information on the PFD and PROG page.*
- *In HDG or TRK mode, use the energy circle displayed on the ND, representing the required distance to land.*

MANAGED SPEED..... CHECK

If the ATC requires a particular speed, use selected speed. When the ATC speed constraint no longer applies, return to managed speed.

SPEEDBRAKES lever .....AS RQRD

If speedbrakes are used to increase the rate of deceleration, or to increase the rate of desecent, it is important to note that VLS with the speedbrakes fully extended, in the clean configuration, may be higher than Green Dot speed and possibly than VFE FLAP 1. The A/THR in speed mode, or the pitch demand in OPEN DES, will limit the speed to VLS. In this situation, the pilot should begin to retract the speedbrakes upon reaching VLS+5 kt and should select FLAP 1, as soon as the speed is below VFE NEXT. The speedbrakes may then be re-extended, if necessary. The landing gear may always be extended out of sequence to facilitate deceleration.

RADAR TILT knob .....ADJUST

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

INITIAL APPROACH

APPROACH PHASE..... ACTIVATE

- *In NAV mode, the APPR phase automatically activates at the DECEL pseudo waypoint.*
- *In HDG or TRK mode, manually activate the APPR phase on the PERF APPR page.*

POSITIONING.....MONITOR

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RADAR knob .....AS APPROPRIATE

Gain must be manually set to +4, when MULTISCAN selector is set to AUTO and when flying below FL 200.

Note:
1. *If the weather is good, or no significant, in order to check that the radar is operating correctly: down tilt until displaying ground echoes.*
2. *If the weather display is ambiguous or unexpected, in order to better analyze the weather situation, use manual tilt according to standard technique.*
3. *In particular below FL 200, for situations with low-level weather, weather with low reflectivity or in front of suspected active cells, the flight crew should switch to Manual mode and adjust the tilt setting downward until the weather is detected or the ground clutter appears on the upper part of the display.*
4. *In addition, the flight crew may increase the manual gain control to display lower reflectivity targets. The manual gain control can be increased in both AUTO and Manual modes to display lower levels of weather. In both cases, ground clutter may also be displayed as a result of low settings and/or increased gain.*

Applicable to: B-HSD, B-HSE

NAV ACCURACY.....MONITOR

- *Monitor NAV accuracy, and be prepared to change approach strategy. If NAV ACCURACY DOWNGRAD occurs, use raw data to crosscheck navigation accuracy.*
- *Navigation accuracy determines which autopilot modes the flight crew should use, and the type of displays to be shown on the ND.*

<table>
<tr><td rowspan="2">NAVIGATION ACCURACY</td><td colspan="2">ND</td><td rowspan="2">AP/FD mode</td></tr>
<tr><td>PF</td><td>PNF</td></tr>
<tr><td>NAV ACCUR HIGH</td><td colspan="2" rowspan="2">ARC or ROSE NAV with NAVAID raw data</td><td rowspan="2">NAV</td></tr>
<tr><td>NAV ACCUR LOW and NAV ACCURACY check ≤ 1 nm</td></tr>
<tr><td>NAV ACCUR LOW and NAV ACCURACY check >1 nm</td><td rowspan="2">ROSE ILS</td><td rowspan="2">ARC or ROSE NAV or ROSE ILS with NAVAID raw data</td><td rowspan="2">HDG or TRK</td></tr>
<tr><td>Aircraft flying within unreliable radio NAVAID area</td></tr>
</table>

Applicable to: B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

NAV ACCURACY.....MONITOR

- *When GPS PRIMARY is available, no NAV ACCURACY monitoring is required.*
- *When GPS PRIMARY is lost, check the PROG page to verify that the required navigation accuracy is appropriate to the flight phase. Monitor NAV accuracy, and be prepared to change approach strategy. If NAV ACCURACY DOWNGRAD occurs, use raw data to crosscheck navigation accuracy.*
- *Navigation accuracy determines which autopilot modes the flight crew should use, and the type of displays to be shown on the ND.*

<table>
<tr><td rowspan="2">NAVIGATION ACCURACY</td><td colspan="2">ND</td><td rowspan="2">AP/FD mode</td></tr>
<tr><td>PF</td><td>PNF</td></tr>
<tr><td>GPS PRIMARY</td><td colspan="2" rowspan="3">ARC or ROSE NAV with NAVAID raw data</td><td rowspan="3">NAV</td></tr>
<tr><td>NAV ACCUR HIGH</td></tr>
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<tr><td>GPS PRIMARY LOST and Aircraft flying within unreliable radio NAVAID area</td></tr>
</table>

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

NAV ACCURACY.....MONITOR

When GPS PRIMARY is available, no NAV ACCURACY monitoring is required.
When GPS PRIMARY is lost, check the PROG page to verify that the required navigation accuracy is appropriate to the flight phase. Monitor NAV accuracy, and be prepared to change approach strategy. If NAV ACCURACY DOWNGRAD occurs, use raw data to crosscheck navigation accuracy. Navigation accuracy determines which autopilot modes the flight crew should use, and the type of displays to be shown on the ND.

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<tr><td>GPS PRIMARY LOST and NAV ACCUR LOW and NAV ACCURACY check > 1 nm</td><td rowspan="2">ROSE LS</td><td rowspan="2">ARC or ROSE NAV or ROSE LS with NAVAID raw data</td><td rowspan="2">HDG or TRK</td></tr>
<tr><td>GPS PRIMARY LOST and Aircraft flying within unreliable radio NAVAID area</td></tr>
</table>

INTERMEDIATE/FINAL APPROACH (ILS APPROACH ENTERED IN F-PLN)

Applicable to: ALL

1 **AT 5 000 FT AAL OR BEFORE**

ANNOUNCE..... "CABIN CREW, PLEASE BE SEATED FOR LANDING." | PM

Check CABIN READY Memo is displayed on ECAM/CDSS monitor (select the CDSS monitor OFF).

Note: Due to the 'time out' function, it is possible the CABIN READY memo may disappear from the ECAM MEMO before landing.

ENG MODE selector .....AS RQRD

Select IGN if the runway is covered with standing water or heavy rain, or if severe turbulence is expected in the approach or go-around area.

LANDING C/L ..... COMPLETE

Applicable to: ALL

APPR MODE ACTIVATION

APPR pb .....PRESS

The APPR pb shall not be pressed until:

- *The ILS is tuned and identified.*
- *Clearance for the approach has been received.*
- *The aircraft is on an acceptable intercept heading.*
- *Raw data confirms correct sensing.*
- *The aircraft is not laterally displaced to the extent that a false capture may occur.*

Note: ICAO defines the envelope where the quality of the G/S signal ensures a normal capture. This envelope is within 10 nm , +/– 8 ° of the centerline of the ILS glide path and up to 1.75 Θ and down to 0.3 Θ (Θ = nominal glide path angle). When arming the approach well outside of the normal G/S capture envelope, a spurious G/S engagement may occur due to a wrong G/S deviation signal. This spurious G/S capture will order a pitch up, if the aircraft is below the glide beam, and a pitch down attitude, if the aircraft is above the glide beam. Whenever the pilot notices the pitch movement, or the spurious G/S*, or the trajectory deviation, he will immediately disconnect the AP, if engaged, to re-establish a normal attitude and will disengage APPR mode. It is then recommended to arm/rearm APP (ILS) mode within the normal capture zone.*

BOTH AP pb ..... ENGAGE

When APPR mode is selected, both autopilots should be engaged.

Applicable to: B-HSD, B-HSE, B-HSG

2 ## AT GREEN DOT SPEED

FLAPS 1.....ORDER
FLAPS 1.....SELECT

FLAPS 1 should be selected more than 3 nm before the FAF (Final Approach Fix).

Note: The ECAM automatically displays the STATUS page, if it is applicable, and if the flight crew has not already selected a system page manually.

- Check deceleration toward “S” speed
- The aircraft must reach, or be established on, the glideslope with FLAPS 1 and S speed at, or above, 2 000 ft AGL.
- If the aircraft speed is significantly higher than S on the glideslope, or if the aircraft does not decelerate on the glideslope, extend the landing gear to slow it down. It is also possible to use speed brakes. However, the flight crew should be aware that the use of speed brakes causes an increase in VLS.

TCAS ◁ Mode selector .....TA or TA/RA

L2 *The flight crew should use the TA/RA mode as the default mode of the TCAS.*
Refer to Part A 8.3.1.4 for additional information.

L1 FMA .....CHECK and ANNOUNCE
LOC CAPTURE.....MONITOR

The flight crew must always monitor the capture of LOC beam. During the capture phase, the associated deviation indications on the PFD and ND must indicate movement towards the center of the scale.

G/S CAPTURE.....MONITOR

- **If above the glideslope:**
  FCU ALTITUDE..... SET ABOVE A/C ALTITUDE
  V/S mode.....SELECT
  Do not reach VFE to avoid reversion to OP CLB.
  Refer to FCTM NO-120 Final Approach

Note: *If the aircraft intercepts the ILS above the radio altimeter validity range (no radio altitude indication available on the PFD), CAT 1 is displayed on the FMA. Check that the FMA displays the correct capability for the intended approach, when the aircraft is below 5 000 ft.*

GO-AROUND ALT..... SET
Set the go around altitude on the FCU.

Applicable to: B-HTF

3 **AT GREEN DOT SPEED**

FLAPS 1.....ORDER
FLAPS 1.....SELECT

- *At high weights, if the green dot speed is close to VFE NEXT, the crew may select a lower speed*
- *FLAPS 1 should be selected more than 3 nm before the FAF (Final Approach Fix).*

Note: *The ECAM automatically displays the STATUS page, if it is applicable, and if the flight crew has not already selected a system page manually.*

- Check deceleration toward "S" speed
- The aircraft must reach, or be established on, the glideslope with FLAPS 1 and S speed at, or above, 2 000 ft AGL.
- If the aircraft speed is significantly higher than S on the glideslope, or if the aircraft does not decelerate on the glideslope, extend the landing gear to slow it down. It is also possible to use speed brakes. However, the flight crew should be aware that the use of speed brakes causes an increase in VLS.

TCAS ⋖ Mode selector .....TA or TA/RA

L2 *The flight crew should use the TA/RA mode as the default mode of the TCAS.*
Refer to Part A 8.3.1.4 for additional information.

L1 FMA .....CHECK and ANNOUNCE
LOC CAPTURE.....MONITOR

The flight crew must always monitor the capture of LOC beam. During the capture phase, the associated deviation indications on the PFD and ND must indicate movement towards the center of the scale.

G/S CAPTURE.....MONITOR

● **If above the glideslope:**
FCU ALTITUDE..... SET ABOVE A/C ALTITUDE
V/S mode.....SELECT

Do not reach VFE to avoid reversion to OP CLB.

Refer to FCTM NO-120 Final Approach.

Note: *If the aircraft intercepts the ILS above the radio altimeter validity range (no radio altitude indication available on the PFD), CAT 1 is displayed on the FMA. Check that the FMA displays the correct capability for the intended approach, when the aircraft is below 5 000 ft.*

GO-AROUND ALT..... SET

Set the go around altitude on the FCU.

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

4 **AT GREEN DOT SPEED**

FLAPS 1.....ORDER
FLAPS 1.....SELECT

FLAPS 1 should be selected more than 3 nm before the FAF (Final Approach Fix).

Note: *The ECAM automatically displays the STATUS page, if it is applicable, and if the flight crew has not already selected a system page manually.*

- Check deceleration toward "S" speed
- The aircraft must reach, or be established on, the glideslope with FLAPS 1 and S speed at, or above, 2 000 ft AGL.
- If the aircraft speed is significantly higher than S on the glideslope, or if the aircraft does not decelerate on the glideslope, extend the landing gear to slow it down. It is also possible to use speed brakes. However, the flight crew should be aware that the use of speed brakes causes an increase in VLS.

TCAS ◁ Mode selector .....TA or TA/RA

L2 *The flight crew should use the TA/RA mode as the default mode of the TCAS.*
Refer to Part A 8.3.1.4 for additional information.

L1 FMA .....CHECK and ANNOUNCE
LOC CAPTURE.....MONITOR

The flight crew must always monitor the capture of LOC beam. During the capture phase, the associated deviation indications on the PFD and ND must indicate movement towards the center of the scale.

G/S CAPTURE.....MONITOR

● **If above the glideslope:**
FCU ALTITUDE..... SET ABOVE A/C ALTITUDE
V/S mode.....SELECT

Refer to FCTM NO-120 Final Approach

Note: *1. When reaching VFE, the AP maintains VFE and reduces the V/S without MODE REVERSION.*
2. If the aircraft intercepts the ILS above the radio altimeter validity range (no radio altitude indication available on the PFD), CAT 1 is displayed on the FMA. Check that the FMA displays the correct capability for the intended approach, when the aircraft is below 5 000 ft.

GO-AROUND ALT..... SET

Set the go around altitude on the FCU.

Applicable to: B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

5 **AT GREEN DOT SPEED**

FLAPS 1.....ORDER

FLAPS 1.....SELECT

- *At high weights, if the green dot speed is close to VFE NEXT, the crew may select a lower speed*
- *FLAPS 1 should be selected more than 3 nm before the FAF (Final Approach Fix).*

Note: *The ECAM automatically displays the STATUS page, if it is applicable, and if the flight crew has not already selected a system page manually.*

- Check deceleration toward "S" speed
- The aircraft must reach, or be established on, the glideslope with FLAPS 1 and S speed at, or above, 2 000 ft AGL.
- If the aircraft speed is significantly higher than S on the glideslope, or if the aircraft does not decelerate on the glideslope, extend the landing gear to slow it down. It is also possible to use speed brakes. However, the flight crew should be aware that the use of speed brakes causes an increase in VLS.

TCAS ◁❄ Mode selector .....TA or TA/RA

L2 *The flight crew should use the TA/RA mode as the default mode of the TCAS.*
Refer to Part A 8.3.1.4 for additional information.

L1 FMA .....CHECK and ANNOUNCE
LOC CAPTURE.....MONITOR

The flight crew must always monitor the capture of LOC beam. During the capture phase, the associated deviation indications on the PFD and ND must indicate movement towards the center of the scale.

G/S CAPTURE.....MONITOR

● **If above the glideslope:**
FCU ALTITUDE..... SET ABOVE A/C ALTITUDE
V/S mode.....SELECT

Refer to FCTM NO-120 Final Approach.

Note: 1. *When reaching VFE, the AP maintains VFE and reduces the V/S without MODE REVERSION.*
2. *If the aircraft intercepts the ILS above the radio altimeter validity range (no radio altitude indication available on the PFD), CAT 1 is displayed on the FMA. Check that the FMA displays the correct capability for the intended approach, when the aircraft is below 5 000 ft.*

GO-AROUND ALT..... SET

Set the go around altitude on the FCU.

Applicable to: ALL

GLIDESLOPE FROM ABOVE

- **If above the glideslope:**

FCU ALTITUDE..... SET ABOVE A/C ALTITUDE
V/S mode.....SELECT

Refer to FCTM/NO-110 FINAL APPROACH.

Applicable to: ALL

GO-AROUND ALTITUDE

GO AROUND ALTITUDE..... SET

Set the go-around altitude on the FCU after G/S is annunciated on the FMA.*

Note: If the aircraft intercepts the ILS above radio altimeter validity range (no radio altitude indication available on the PFD), CAT 1 is displayed on FMA. Check the FMA displays the correct capability for the intended approach when the aircraft is below 5 000 ft.

Applicable to: ALL

AT 2 000 FT AGL MINIMUM

FLAPS 2.....ORDER
FLAPS 2.....SELECT

- *Check deceleration toward F speed.*
- *If the aircraft intercepts the ILS glideslope below 2 000 ft AGL, select Flaps 2 at one dot below the glideslope.*
- *If the aircraft speed is significantly higher than S speed on the glideslope, or the aircraft does not decelerate on the glideslope, extend the landing gear to slow it down. The use of speedbrakes is not recommended.*
- *When the speedbrakes are deployed, extending the flaps beyond Flaps 1 may induce a slight roll movement, and in calm conditions a small lateral control asymmetry may remain until disturbed by a control input or by an atmospheric disturbance.*

Applicable to: ALL

WHEN FLAPS ARE AT 2

LDG GEAR DOWN.....ORDER
LDG GEAR lever .....SELECT DOWN
AUTO BRK .....CONFIRM

If the runway conditions have changed from the approach briefing, consider another braking mode.

GROUND SPOILERS..... ARM

EXTERIOR lights..... SET

Set the NOSE sw to TAXI and RWY TURN OFF sw to ON.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

WHEN LANDING GEAR IS DOWN

FLAPS 3.....ORDER
FLAPS 3.....SELECT

- *Select Flaps 3 below VFE NEXT.*

WHEEL SD page .....CHECK

- *The WHEEL SD page appears below 800 ft, or at landing gear extension.*
- *Check for three green indications on the landing gear indicator panel. At least one green triangle on each landing gear strut on the WHEEL SD page is sufficient to indicate the landing gear is downlocked. Rely also on the 'LDG GEAR DN'green LDG MEMO message to confirm the landing gear is downlocked.*

● **If residual pressure is indicated on the triple indicator:**
RESIDUAL BRAKING PROC .....APPLY

FLAPS FULL.....ORDER
FLAPS FULL.....SELECT

- *Select Flaps FULL below VFE NEXT.*
- *Retract the speed brakes before selecting Flaps FULL to avoid an unexpected pitch down, when the speed brakes retract automatically.*
- *Check deceleration towards VAPP.*

Applicable to: ALL 321

WHEN LANDING GEAR IS DOWN

FLAPS 3.....ORDER
FLAPS 3.....SELECT

- *Select Flaps 3 below VFE NEXT.*
- *Retract the speed brakes before selecting Flaps 3 to avoid an unexpected pitch down, when the speed brakes retract automatically.*

WHEEL SD page ..... CHECK

- *The WHEEL SD page appears below 800 ft, or at landing gear extension.*
- *Check for three green indications on the landing gear indicator panel. At least one green triangle on each landing gear strut on the WHEEL SD page is sufficient to indicate the landing gear is downlocked. Rely also on the 'LDG GEAR DN'green LDG MEMO message to confirm the landing gear is downlocked.*

● **If residual pressure is indicated on the triple indicator:**
RESIDUAL BRAKING PROC ..... APPLY

FLAPS FULL..... ORDER
FLAPS FULL..... SELECT

- *Select Flaps FULL below VFE NEXT. Check deceleration towards VAPP.*

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

WHEN LANDING GEAR IS DOWN

FLAPS 3..... ORDER
FLAPS 3..... SELECT

- *Select Flaps 3 below VFE NEXT.*

WHEEL SD page ..... CHECK

- *The WHEEL SD page appears below 800 ft, or at landing gear extension.*
- *Check for three green indications on the landing gear indicator panel. At least one green triangle on each landing gear strut on the WHEEL SD page is sufficient to indicate the landing gear is downlocked. Rely also on the 'LDG GEAR DN'green LDG MEMO message to confirm the landing gear is downlocked.*

● **If residual pressure is indicated on the triple indicator:**
RESIDUAL BRAKING PROC ..... APPLY

Note: Due to the accomplishment of the alternate braking functional test after the landing is downlocked, brief brake pressure indications may be observed on BRAKE PRESS indicator.

FLAPS FULL..... ORDER
FLAPS FULL..... SELECT

- *Select Flaps FULL below VFE NEXT.*
- *Retract the speed brakes before selecting Flaps FULL to avoid an unexpected pitch down, when the speed brakes retract automatically.*
- *Check deceleration towards VAPP.*

Applicable to: ALL

6 **FINAL APPROACH**

A/THR .....CHECK IN SPEED MODE or OFF
WING ANTI ICE pb-sw ..... OFF

Select the WAI pb-sw ON, only in severe icing conditions.

SLIDING TABLE ..... STOWED
LDG MEMO..... CHECK NO BLUE LINE
LANDING CHECKLIST.....FINAL ITEMS
FLIGHT PARAMETERS..... CHECK

The PM calls out if:

- *The speed goes lower than the speed target -5 kt, or greater than the speed target +10 kt.*
- *The pitch attitude goes lower than -2.5 °, or greater than 10 ° nose up (A320)/7.5 ° nose up (A321).*
- *The bank angle becomes greater than 7 °.*
- *The descent rate becomes greater than 1 000 ft/min.*
- *Excessive LOC or GLIDE deviation occurs:*
  1/4 dot LOC; 1 dot GS.

Following a PM flight parameter callout, the PF response will be:

- *Acknowledge the PM callout, for proper crew coordination purposes.*
- *Take immediate corrective action.*
- *Assess whether stabilized conditions will be recovered early enough prior to landing, otherwise initiate a go-around.*

Applicable to: ALL

7 **AT DH + 100 FT (OR MDA + 100 FT)**

HUNDRED ABOVE.....MONITOR or ANNOUNCE

Applicable to: ALL

AT DH (OR MDA)

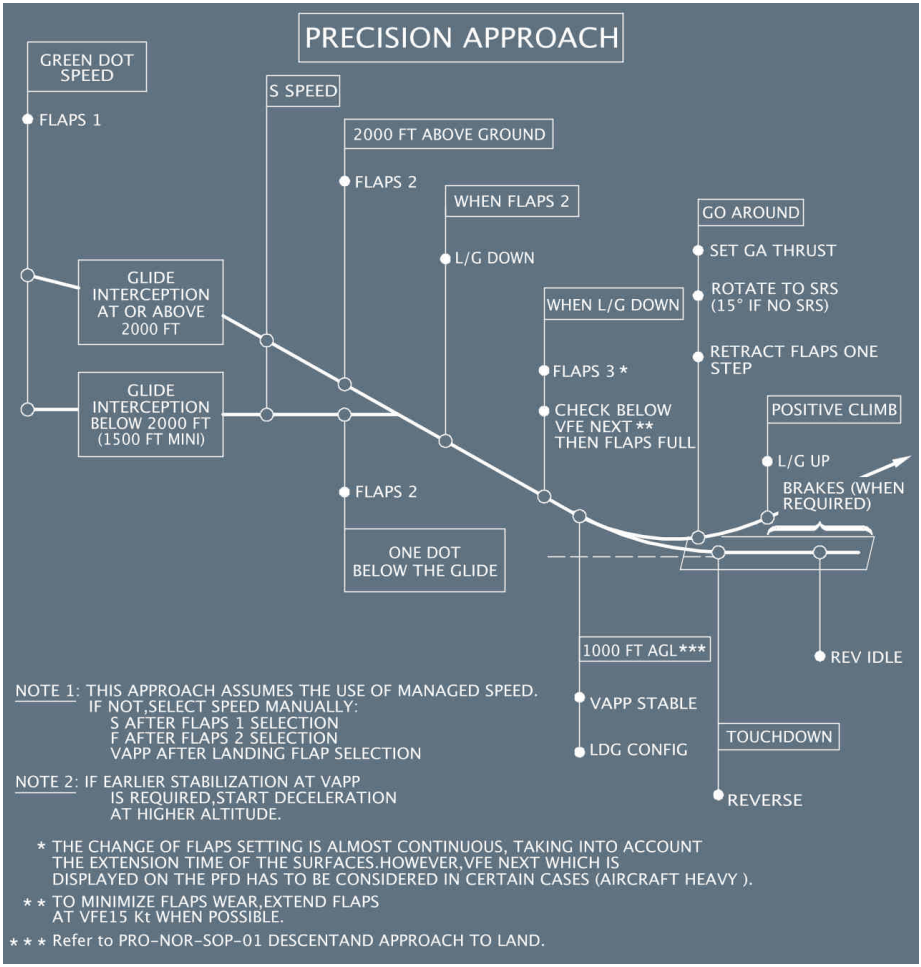
MINIMUM.....MONITOR or ANNOUNCE
CONTINUE or GO-AROUND.....ANNOUNCE

Maintain a stabilized flight path down to the flare.
At 50 ft, one dot below the glideslope is 7 ft below the glideslope.
Do not duck under the glideslope.

PRECISION APPROACH PATTERN

Applicable to: ALL

8



APPROACH GUIDANCE

Applicable to: ALL

NON PRECISION APPROACHES (OTHER THAN LOC AND LOC B/C)

FINAL APP is the recommended approach guidance mode. NAV-FPA and TRK-FPA modes are also available. Observe the following guidelines:

- TRK-FPA modes shall not be used for RNAV approaches.
- NAV-FPA and FINAL APP modes:
  - require that the approach is stored in the navigation database.
  - shall not be used for approach procedures that include a procedure turn followed by a course-to-fix leg (PROC-T indicated on the MCDU F-PLN). Use TRK-FPA modes.
- FINAL APP mode shall be used for LNAV/VNAV RNAV approaches (lateral and vertical navigation).

For RNAV approaches, or any time FINAL APP mode is to be used, the following conditions shall be met:

- The approach stored in the navigation database has been validated by scrupulous comparison between the database profile and the published procedure. This includes an assessment of the minimum OAT defined (if applicable) for the approach. If the OAT is below the minimum defined OAT, and/or low temperature corrections are applied to the approach altitudes, selected vertical guidance (FPA) must be used, Part A 8.1.1.2 refers.
- The approach as extracted from the navigation database is not modified either laterally or vertically from the Final Approach Fix (FAF) to the runway or missed approach point.
- RNAV approach without GPS is not authorised. Before starting an RNAV approach, two FMGS and two GPS must be operative.
- The approach trajectory is laterally and vertically intercepted before the FAF or equivalent waypoint in the F-PLN.
- The final approach is laterally and vertically monitored using the appropriate raw data:
  - For conventional approach based on a radio navaid procedure, monitor navaids, VDEV, distance to runway, altitude, FPV.
  - For RNAV approach based on, or overlayed on a radio navaid procedure, monitor navaids, VDEV, distance to runway, altitude, FPV.
  - For RNAV approach not overlayed on a radio navaid procedure (standalone approach), monitor VDEV, distance to runway, altitude, FPV.

LOC NON PRECISION APPROACHES

LOC-FPA modes shall be used for approach guidance.
The LOC pb will arm the LOC AP/FD mode as appropriate.
The final approach is laterally and vertically monitored using the appropriate raw data:

- Laterally using the localiser navaid (on PFD or ND).
- Vertially using altimeter and DME.

CAUTION	LOC B/C approaches are not authorised.

NAVIGATION ALERTS

Applicable to: ALL

VOR, VORDME, NDB AND NDBDME APPROACH (INCLUDING RNAV OVERLAY)

If the FM/GPS POS DISAGREE caution is triggered on the ECAM:

- Select TRK-FPA mode and continue the approach using the radio navaid raw data.

If the GPS PRIMARY LOST indication appears on one or both NDs:

- Check radio navaid raw data indication.
- If correct navigation, FINAL APP or NAV-FRA modes can be maintained or selected to continue the approach.
- If incorrect navigation, TRK-FPA mode must be used to adjust flightpath as required.

RNAV APPROACH (STANDALONE)

GPS FAULT 1(2) ECAM caution:

- Continue the approach.

If the FM/GPS POS DISAGREE caution is triggered on ECAM:

- Discontinue the approach (if not visual).

If the FMS1/FMS2 POS DIFF message is triggered on the MCDU scratchpad:

- Discontinue the approach (if not visual).

If GPS PRIMARY LOST indication appears:

- On both NDs, discontinue the approach (if not visual).
- On one ND, continue the approach using the AP/FD associated with the other ND/FMGS.

INITIAL APPROACH

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

GENERAL

For more information about non-precision approaches and how to use the FMGS, refer to PRO-NOR-SRP-01-70.

INITIAL APPROACH

APPROACH PHASE..... ACTIVATE

- *In NAV mode, the APPR phase automatically activates at the DECEL pseudo waypoint.*
- *In HDG or TRK mode, manually activate the APPR phase on the PERF APPR page.*

POSITIONING.....MONITOR

- *In NAV mode, use VDEV information on the PFD and PROG page.*
- *In HDG or TRK mode, use the energy circle displayed on the ND, representing the required distance to land.*

MANAGED SPEED..... CHECK

If the ATC requires a particular speed, use selected speed. When the ATC speed constraint no longer applies, return to managed speed.

SPEEDBRAKES lever .....AS RQRD
RADAR TILT knob .....ADJUST

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

GENERAL

For more information about non-precision approaches and how to use the FMGS, refer to PRO-NOR-SRP-01-70.

INITIAL APPROACH

APPROACH PHASE..... ACTIVATE

- *In NAV mode, the APPR phase automatically activates at the DECEL pseudo waypoint.*
- *In HDG or TRK mode, manually activate the APPR phaseon the PERF APPR page.*

POSITIONING.....MONITOR

- *In NAV mode, use VDEV information on the PFD and PROG page.*
- *In HDG or TRK mode, use the energy circle displayed on the ND, representing the required distance to land.*

MANAGED SPEED..... CHECK

If the ATC requires a particular speed, use selected speed. When the ATC speed constraint no longer applies, return to managed speed.

SPEEDBRAKES lever .....AS RQRD
RADAR knob .....AS APPROPRIATE

Gain must be manually set to +4, when MULTISCAN selector is set to AUTO and when flying below FL 200.

1. *If the weather is good, or no significant, in order to check that the radar is operating correctly: down tilt until displaying ground echoes.*
2. *If the weather display is ambiguous or unexpected, in order to better analyze the weather situation, use manual tilt according to standard technique.*
3. *In particular below FL 200, for situations with low-level weather, weather with low reflectivity or in front of suspected active cells, the flight crew should switch to Manual mode and adjust the tilt setting downward until the weather is detected or the ground clutter appears on the upper part of the display.*
4. *In addition, the flight crew may increase the manual gain control to display lower reflectivity targets. The manual gain control can be increased in both AUTO and Manual modes to display lower levels of weather. In both cases, ground clutter may also be displayed as a result of low settings and/or increased gain.*

Applicable to: ALL

NAVIGATION ACCURACY

NAVIGATION ACCURACY.....MONITOR

- *When GPS PRIMARY is available, no accuracy check is required.*
- *When GPS PRIMARY is lost, check the PROG page to ensure the required navigation accuracy is appropriate to the phase of flight. Perform a navigation accuracy check (refer to DSC-22_20-20-20 Navigation Accuracy Check).*

If the approach is stored in the navigation database, determine the strategy to be used for the final approach, according to the table below:

NAVIGATION ACCURACY	*Approach guidance*	*ND*		*AP/FD mode*
		PF	*PNF*	
GPS PRIMARY	*Managed (3) or Selected*	*ARC or ROSE NAV (1) With NAVAID raw data*		*NAV-FPA or APP-NAV/ FINAL (3)*
NAV ACCUR HIGH				
NAV ACCUR LOW and NAV ACCURACY check ≤1 nm				

Continued on the following page

Continued from the previous page

GPS PRIMARY LOST and NAV ACCUR LOW and NAV ACCURACY check>1 nm	*Selected*	*ROSE VOR (2)*	*ARC or ROSE NAV or ROSE VOR (2) With NAVAID raw data*	*TRK-FPA*
GPS PRIMARY LOST and Aircraft flying within unreliable radio NAVAID area				

1. For VOR approaches, one flight crew may select ROSE VOR.
2. For LOC approaches, select ROSE ILS.
3. Managed vertical guidance can be used, provided that the approach coding in the navigation database was validated.

Note: 1. During an approach overlayed on a conventional radio navaid procedure, monitor raw data. If the raw data indicates unsatisfactory managed guidance, revert to selected guidance.
2. The flight crew can continue to fly a managed approach, after they receive a NAV ACCUR DOWNGRAD message, if the raw data indicates the guidance is satisfactory.

INTERMEDIATE/FINAL APPROACH

Applicable to: ALL

1 **AT 5 000 FT AAL OR BEFORE**

ANNOUNCE..... "CABIN CREW, PLEASE BE SEATED FOR LANDING." | PM

Check CABIN READY Memo is displayed on ECAM/CDSS monitor (select the CDSS monitor OFF).

Note: Due to the 'time out' function, it is possible the CABIN READY memo may disappear from ECAM MEMO before landing.

ENG MODE selector .....AS RQRD

Select IGN if the runway is covered with standing water or heavy rain, or if severe turbulence is expected in the approach or go-around area.

| LANDING C/L ..... COMPLETE

● **For LOC Approach**

LOC pb ..... PRESS

The LOC pb shall not be pressed until:

- *The ILS LOC is tuned and identified.*
- *Clearance for the approach has been received.*
- *The aircraft is on an acceptable intercept heading.*

- *Raw data confirms correct sensing of the LOC beam.*
- *The aircraft is not laterally displaced to the extent that a false capture may occur.*

LOC CAPTURE.....MONITOR

Capture of the LOC beam must be monitored. The LOC deviation indication must move towards and settle at the centre of the scale.

● **For RNAV Approach**

GPS 1+2 on GPS MONITOR page.....CHECK BOTH IN NAV

On each PROG page:

GPS PRIMARY..... CHECK AVAILABLE

● **For approach in selected vertical guidance**

FPA.....PRESET/PULL

● **For approach in managed vertical guidance:**

APPR pb on FCU ..... PRESS

Once cleared for the approach, press the APPR pb when flying towards the FAF. Check that APPR NAV is engaged, FINAL is armed, and the VDEV scale is on the PFD.

Note: For instructions for switching from a non ILS to an ILS approach, refer to PRO-NOR-SRP-01-70 Switching from NON ILS to ILS Approach.

2 **Applicable to: ALL 320**

3 **AT GREEN DOT SPEED**

FLAPS 1..... ORDER
FLAPS 1.....SELECT

- *Check deceleration toward S speed.*
- *If the aircraft speed is significantly higher than S speed on the glideslope, or if the aircraft does not decelerate on the flight path, extend the landing gear to slow it down. It is also possible to use the speedbrakes. However, the flight crew must be aware that the use of speedbrakes causes an increase in VLS.*

TCAS ◁ Mode selector .....TA or TA/RA

L2 *The flight crew should use the TA/RA mode as the default mode of the TCAS. Refer to Part A 8.3.1.4 for additional information*

L1 ND DISPLAY.....SELECT RANGE/MODE

Applicable to: ALL 321

4 **AT GREEN DOT SPEED**

FLAPS 1.....ORDER

FLAPS 1.....SELECT

Note: *At heavy weights, if Green Dot is close to VFE NEXT a speed below Green Dot, but not below VLS, may be selected to facilitate the selection of Flaps 1.*

- *Check deceleration toward S speed.*
- *If the aircraft speed is significantly higher than S speed on the glideslope, or if the aircraft does not decelerate on the flight path, extend the landing gear to slow it down. It is also possible to use the speedbrakes. However, the flight crew must be aware the use of speedbrakes causes an increase in VLS.*

TCAS ◁ Mode selector .....TA or TA/RA

The flight crew should use the TA/RA mode as the default mode of the TCAS.
Refer to Part A 8.3.1.4 for additional information.

ND DISPLAY.....SELECT RANGE/MODE

Applicable to: ALL

AT S SPEED

FLAPS 2.....ORDER
FLAPS 2.....SELECT

- *Check deceleration toward F speed.*
- *If the aircraft speed is significantly higher than F speed on the flight path, or the aircraft does not decelerate on the flight path, extend the landing gear to slow it down. The use of speedbrakes is not recommended.*
- *When the speedbrakes are deployed, extending the flaps beyond Flaps 1 may cause a slight roll movement, and in calm conditions a small lateral control asymmetry may remain until it is affected by control input or an atmospheric disturbance.*

MISSED APPROACH ALTITUDE.....SET

Set the missed approach altitude after FINAL APP is annunciated on the FMA (managed vertical guidance), or when established on final approach and below the missed approach altitude (selected vertical guidance).

Applicable to: ALL

WHEN FLAPS ARE AT 2

LDG GEAR DOWN.....ORDER
LDG GEAR lever .....SELECT DOWN
AUTO BRK .....CONFIRM

If the runway conditions have changed from the approach briefing, consider another braking mode.

GROUND SPOILERS..... ARM

EXTERIOR lights..... SET

Set the NOSE sw to TAXI and RWY TURN OFF sw to ON.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

WHEN LANDING GEAR DOWN

FLAPS 3.....ORDER
FLAPS 3.....SELECT

- *Select Flaps 3 below VFE NEXT.*

WHEEL SD page .....CHECK

- *The WHEEL SD page appears below 800 ft, or at landing gear extension.*
- *Check for three green indications on the landing gear indicator panel. At least one green triangle on each landing gear strut on the WHEEL SD page is sufficient to indicate the landing gear is downlocked. Rely also on the 'LDG GEAR DN' green LDG MEMO message to confirm the landing gear is downlocked.*

● **If residual pressure is indicated on the triple indicator:**
RESIDUAL BRAKING PROC..... APPLY

FLAPS FULL.....ORDER
FLAPS FULL.....SELECT

- *Select Flaps FULL below VFE NEXT.*
- *Retract the speedbrakes before selecting Flaps FULL to prevent a pitch down when the speedbrakes automatically retract.*
- *Check deceleration towards VAPP.*
- *Check correct TO waypoint on the ND.*

Applicable to: ALL 321

WHEN LANDING GEAR DOWN

FLAPS 3.....ORDER
FLAPS 3.....SELECT

- *Select Flaps 3 below VFE NEXT.*
- *Retract the speedbrakes before selecting Flaps 3 to avoid an unexpected pitch down, when the speed brakes retract automatically.*

WHEEL SD page .....CHECK

- *The WHEEL SD page appears below 800 ft, or at landing gear extension.*
- *Check for three green indications on the landing gear indicator panel. At least one green triangle on each landing gear strut on the WHEEL SD page is sufficient to indicate the landing gear is downlocked. Rely also on the 'LDG GEAR DN' green LDG MEMO message to confirm the landing gear is downlocked.*

● **If residual pressure is indicated on the triple indicator:**
RESIDUAL BRAKING PROC..... APPLY

FLAPS FULL.....ORDER
FLAPS FULL.....SELECT

- *Select Flaps FULL below VFE NEXT.*
- *Check deceleration towards VAPP.*
- *Check correct TO waypoint on the ND.*

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

WHEN LANDING GEAR DOWN

FLAPS 3.....ORDER
FLAPS 3.....SELECT

- *Select Flaps 3 below VFE NEXT.*

WHEEL SD page .....CHECK

- *The WHEEL SD page appears below 800 ft, or at landing gear extension.*
- *Check for three green indications on the landing gear indicator panel. At least one green triangle on each landing gear strut on the WHEEL SD page is sufficient to indicate the landing gear is downlocked. Rely also on the 'LDG GEAR DN' green LDG MEMO message to confirm the landing gear is downlocked.*

● **If residual pressure is indicated on the triple indicator:**
RESIDUAL BRAKING PROC..... APPLY

Note: Due to the accomplishment of the alternate braking functional test after the landing gear is downlocked, brief brake pressure indications may be observed on BRAKE PRESS.

FLAPS FULL.....ORDER
FLAPS FULL.....SELECT

- *Select Flaps FULL below VFE NEXT.*
- *Retract the speedbrakes before selecting Flaps FULL to prevent a pitch down when the speedbrakes automatically retract.*

- *Check deceleration towards VAPP.*
- *Check correct TO waypoint on the ND.*

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

APPROACH STRATEGIES

	MANAGED VERTICAL GUIDANCE	ANY SELECTED GUIDANCE
Cleared for the APPR	— **APPR pb ..... PRESS**	— **NAV/TRACK..... CONFIRM**
Prior to FAF	Confirm FPD displayed Confirm correct TO wpt on ND Confirm blue descent arrow on ND	Confirm FPD displayed Confirm correct TO wpt on ND — **FPA..... PRE SET**
At FAF		— **FPA..... PULL**
After FAF	— **FINAL APP green..... CHECK** — **GA ALT ..... SET**	— **GA ALT..... SET** *When below GA altitude*
Position and Flight Path	**MONITOR** **For an approach overlayed on a conventional radio navaid procedure:** • Use radio navaid raw data and altitude to monitor lateral and vertical navigation, taking into account minimum altitudes. • If lateral guidance is unsatisfactory, revert to TRK-FPA and continue as for Selected Guidance. • If vertical guidance is unsatisfactory, revert to NAV-FPA and continue as for Selected Guidance. **For RNAV approach:** • Monitor VDEV and FPV (on the PFD) and XTK error (on the ND). • Use altitude information versus distance to the runway to monitor vertical navigation, taking into account minimum altitudes. If the vertical guidance is unsatisfactory, revert to NAV/FPA with appropriate minima, or go-around. • If lateral guidance is unsatisfactory, go-around.	**MONITOR / ADJUST** **For an approach overlayed on a conventional radio navaid procedure:** • Use radio navaid raw data to monitor lateral navigation. If lateral guidance is unsatisfactory, revert to TRK-FPA. • Using altitude indication versus radio navaid position, adjust FPA to fly the profile, taking into account minimum altitudes. • PM to read DME/ALT profile, if available. • Do NOT use VDEV on the PFD. **For RNAV approach:** • Monitor XTK error (on the ND). • Using altitude information versus distance to the runway, adjust the FPA as necessary to follow the published descent profile, taking into account minimum altitudes. • PM to read DME/ALT profile, if available. • If lateral guidance is unsatisfactory, go-around.
MDA minus 50 ft or MAP (Whichever comes first)	AP disengages, TRK-FPA engages	

5 Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

APPROACH STRATEGIES

	MANAGED VERTICAL GUIDANCE	ANY SELECTED GUIDANCE
Cleared for the APPR	— **APPR pb .....PRESS**	— **NAV/TRACK.....CONFIRM**
Prior to FAF	Confirm FPD displayed Confirm correct TO wpt on ND Confirm blue descent arrow on ND	Confirm FPD displayed Confirm correct TO wpt on ND — **FPA..... PRE SET**
At FAF		— **FPA..... PULL**
After FAF	— **FINAL APP green..... CHECK** — **GA ALT ..... SET**	— **GA ALT.....SET** *When below GA altitude*
Position and Flight Path	**MONITOR** **For an approach overlayed on a conventional radio navaid procedure:** • Use radio navaid raw data and altitude to monitor lateral and vertical navigation, taking into account minimum altitudes. • If lateral guidance is unsatisfactory, revert to TRK-FPA and continue as for Selected Guidance. • If vertical guidance is unsatisfactory, revert to NAV-FPA and continue as for Selected Guidance. **For RNAV approach:** • Monitor VDEV and FPV (on the PFD) and XTK error (on the ND). • Use altitude information versus distance to the runway to monitor vertical navigation, taking into account minimum altitudes. If the vertical guidance is unsatisfactory, revert to NAV/FPA with appropriate minima, or go-around. • If lateral guidance is unsatisfactory, go-around.	**MONITOR / ADJUST** **For an approach overlayed on a conventional radio navaid procedure:** • Use radio navaid raw data to monitor lateral navigation. If lateral guidance is unsatisfactory, revert to TRK-FPA. • Using altitude indication versus radio navaid position, adjust FPA to fly the profile, taking into account minimum altitudes. • PM to read DME/ALT profile, if available. • Do NOT use VDEV on the PFD. **For RNAV approach:** • Monitor XTK error (on the ND). • Using altitude information versus distance to the runway, adjust the FPA as necessary to follow the published descent profile, taking into account minimum altitudes. • PM to read DME/ALT profile, if available. • If lateral guidance is unsatisfactory, go-around.
MAP	AP disengages, TRK-FPA engages	

Applicable to: ALL

6 **FINAL APPROACH**

A/THR.....CHECK IN SPEED MODE or OFF
WING ANTI ICE pb-sw ..... OFF

Select the WAI pb-sw ON, only in severe icing conditions.

SLIDING TABLE ..... STOWED
LDG MEMO..... CHECK NO BLUE LINE
LANDING CHECKLIST.....FINAL ITEMS
FLIGHT PARAMETERS.....CHECK

PF announces any FMA modification.

The PM calls out if:
- *The speed goes lower than the speed target -5 kt, or greater than the speed target +10 kt.*
- *The pitch attitude goes lower than -2.5 °, or greater than 10 ° nose up (A320)/7.5 ° nose up (A321).*
- *The bank angle becomes greater than 7 °.*
- *The descent rate becomes grater than 1 000 ft/min.*
- *Excessive course deviation occurs greater than ½ dot/2.5 °(VOR), or 5 °(ADF).*

Following a PM flight parameter callout, the PF response will be:
- *Acknowledge the PM callout, for proper crew coordination purposes.*
- *Take immediate corrective action.*
- *Assess whether stabilized conditions will be recovered early enough prior to landing, otherwise initiate a go-around.*

Applicable to: ALL

7 **AT MDA +100FT**

HUNDRED ABOVE.....MONITOR or ANNOUNCE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

8 **AT ENTERED MINIMUM**

MINIMUM.....MONITOR OR ANNOUNCE

- **If ground references are visible:**
  CONTINUE.....ANNOUNCE
  AP pb ..... OFF
  Continue, as with a visual approach Refer to PRO-NOR-SOP-20 Visual Approach - Preface

- **If ground references are not visible:**

GO AROUND.....ANNOUNCE

Initiate a go-around.

Note: When FINAL APP mode is engaged, the AP/FD will disengage under the following conditions, depending on which one occurs first:
- *At the minimum minus 50 ft (if entered) or at 400 ft AGL (if no minimum is entered), or*
- *At the Missed Approach Point (MAP).*

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

9 **AT ENTERED MINIMUM**

MINIMUM.....MONITOR OR ANNOUNCE

Note: When the aircraft reaches minimum minus 50 ft, the autopilot remains engaged and will automatically disengage at MAP.

- **If ground references are visible:**

CONTINUE.....ANNOUNCE
AP pb .....OFF

Continue, as with a visual approach Refer to PRO-NOR-SOP-20 Visual Approach - Preface

- **If ground references are not visible:**

GO AROUND.....ANNOUNCE

Note: At minimum –50 ft, if the AP is still engaged, the message DISCONNECT AP FOR LDG pulses on the FMA to remind the flight crew that automatic landing is not approved.

CIRCLING APPROACH

Applicable to: ALL

CIRCLING APPROACH

Part A 8.3.7 and FCTM NO-130 refers.
The flight crew should prepare the flight plan as follows.

Primary flight plan :
- The instrument approach.

Secondary flight plan:
- Copy the ACTIVE F-PLN, and
- Revise the landing runway.

The aircraft should circle in CONF 3 at F speed.

Upon reaching the MDA:
- Push the V/S/FPA knob to level off.
- Search for visual references.

● **If the flight crew finds no visual reference:**

- At the MAP initiate a go-around.

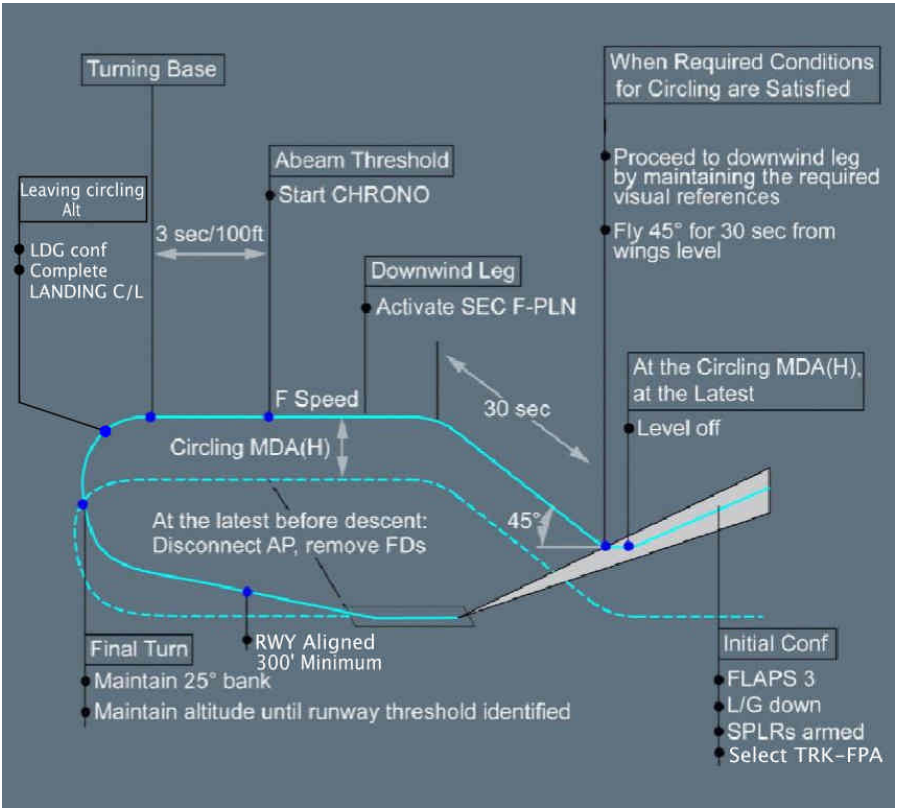
● **If the flight crew finds sufficient visual references:**

- Select TRK for downwind.
- Early on downwind, activate SEC F-PLN.

CAUTION	The PM should activate the SEC F-PLN. The PF should maintain visual contact thoughout the circling.

- Select the AP and FDs off prior to the base turn.

10 **LOW VISIBILITY CIRCLING APPROACH PATTERN**



Note: *If circling above 1 000 ft AAL, add 3 s to the timing abeam the landing threashold for each 100 ft above 1 000 ft AAL, whilst ensuring the aircraft remains within the circling area.*

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VISUAL APPROACH

Applicable to: ALL

PREFACE

Plan to start a visual approach at 1 500 ft AAL, 2.5 nm abeam the upwind threshold. The flight plan in the MCDU should include the landing runway such that managed speed is available. The downwind leg may also be part of the flight plan. This may produce a useful indication on the ND of the aircraft position in the circuit, but visual references must also be used. Part A 8.3.8 and FCTM NO-140 refers.

CAUTION	Visual approaches at night present an increased likelihood of optical illusions because of reduced visual cues.

DETAILED APPROACH SEQUENCE

Use the following technique:

- Select ROSE NAV and 10 nm on the EFIS display to assist in positioning the aircraft accurately.
- Activate the APPR PHASE at the start of the downwind leg.
- Ensure A/THR is on and managed speed is engaged.
- Select TRK/FPA.
- Select Flaps 1 abeam the upwind threshold.
- Set the go-around altitude in the FCU.
- Fly the downwind leg at 1 500 ft AAL at S Speed.
- Maintain a track parallel to the landing runway approximately 2.5 nm abeam.
- The AP and FD may be used on the downwind leg, but must be selected off prior to the base turn.
- Abeam the landing threshold, select Flaps 2, start the chrono. Time for 45 s ±1 s/1 kt of wind (+3 s for each 100 ft above 1 500 ft AAL), and lower the gear.
- Select Flaps 3 prior to the base turn.
- Commence the base turn and select Flaps FULL when leaving 1 500 ft.
- Complete the Landing Checklist.

BASE TURN

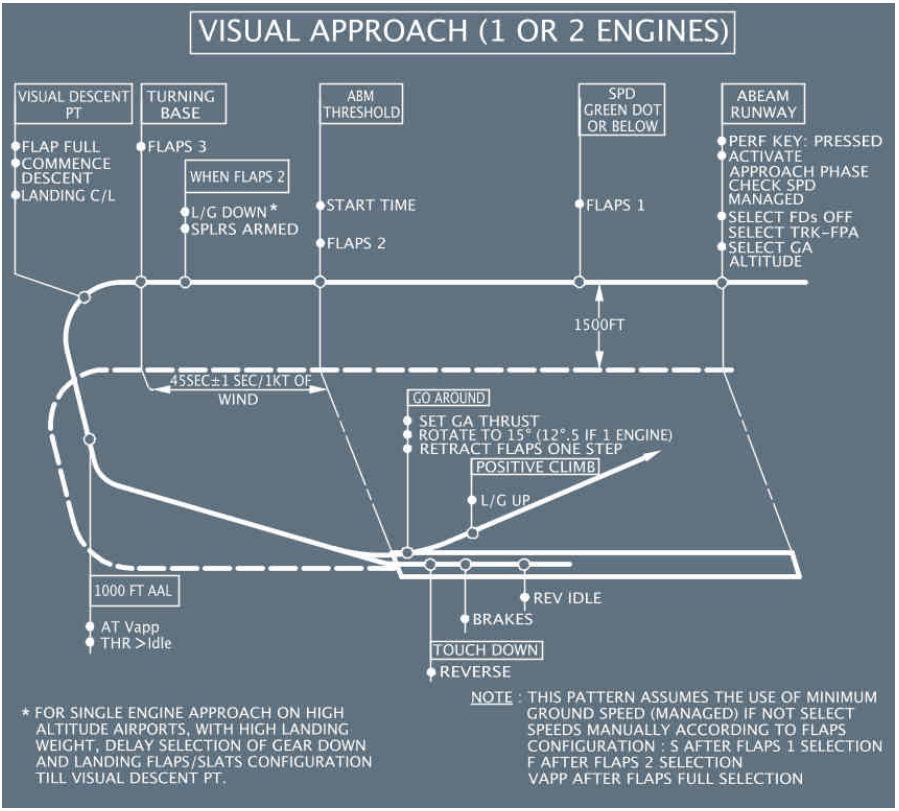
In calm winds, only 15 ° of bank will be required. In strong tightening crosswinds, up to 30 ° of bank may be required. Speed, bank angle and rate of descent should be closely monitored by the PM. If an ILS is being intercepted from a visual circuit, a G/S warning is possible during the turn. Commence the final turn onto the runway centreline at approximately 0.8 nm before the extended centreline (if displayed on the ND). The initial ROD should be approximately 400 ft/min, increasing

to 700 ft/min when established on the correct descent path. Establish a normal 3 ° approach as per the stabilised approach criteria.

FINAL APPROACH

Roll out of the turn on the extended runway centreline and maintain VAPP. Thrust should be stable by 1 000 ft. Use the speed trend arrow to anticipate thrust changes and the FPV to monitor approach path deviations. Use available G/S and/or PAPIs as well as the visual picture to assist in maintaining a stable approach.
A continuous visual/instrument scan is required to fly a successful approach. An effective scan will assist in highlighting small errors, allowing small, early corrections to be made.
A 3 ° slope will normally be flown with a ROD of approximately 700 ft/min, a higher ROD is an indication that the aircraft is about to descend below the ideal approach path. A small correction of approx 1 ° of pitch will change the ROD by approximately 100 ft/min. Azimuth errors will require bank angle changes both to stop the drift and then to recover to the centreline. Avoid using bank angles greater than 10 °, for small corrections.

1 VISUAL CIRCUIT



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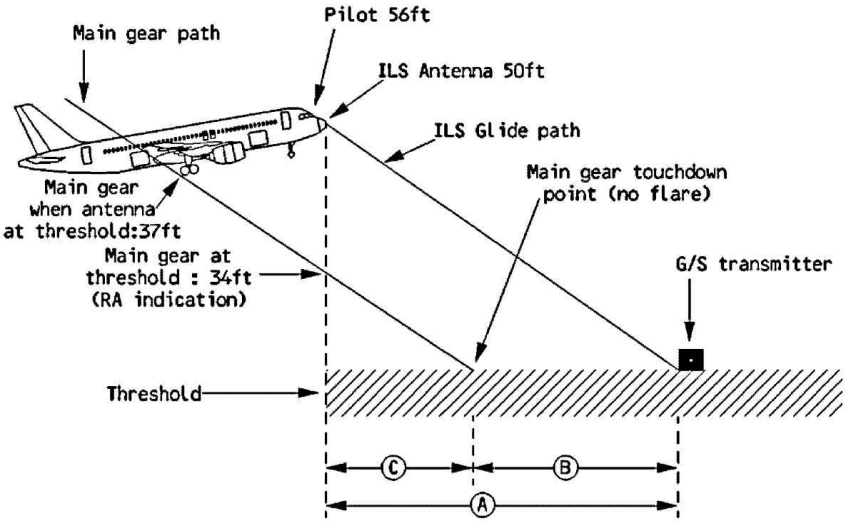
ILS FINAL APPROACH AND LANDING GEOMETRY

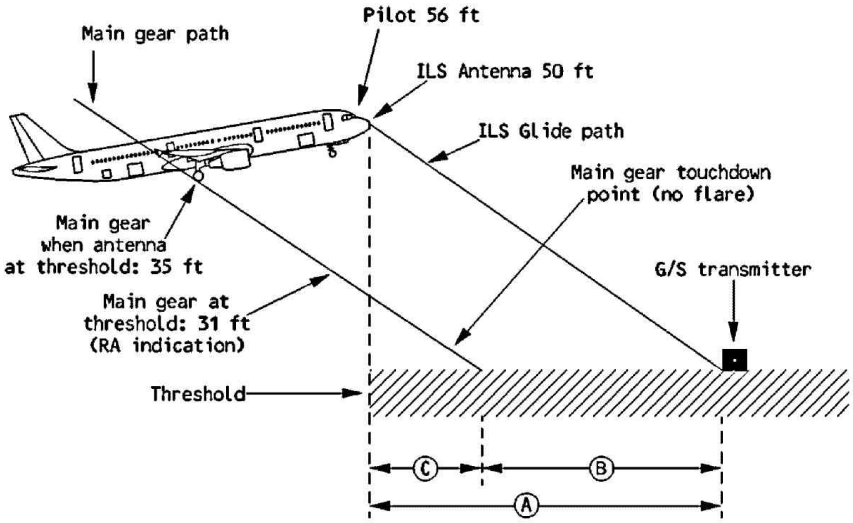
Applicable to: ALL 320



CONDITIONS :	GLIDE PATH (°)	Ⓐ	Ⓑ	TOUCHDOWN POINT Ⓒ
- FLAPS FULL - ILS ANTENNA AT 50 ft AT THRESHOLD - NO FLARE - PITCH ANGLE : 4°	2°5	348 m 1145 ft	112 m 366 ft	236 m 779 ft
	3°	291 m 954 ft	93 m 306 ft	198 m 648 ft

ILS FINAL APPROACH AND LANDING GEOMETRY

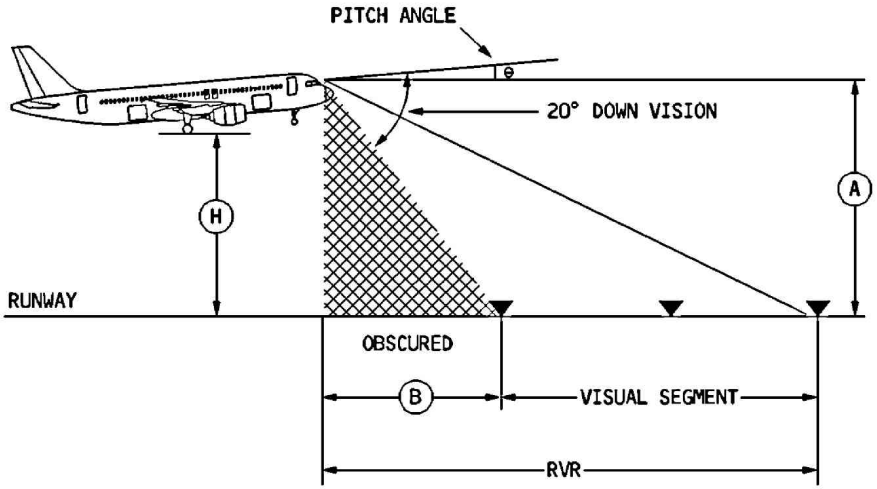
Applicable to: ALL 321



CONDITIONS :	PITCH ANGLE	GLIDE PATH (°)	Ⓐ	Ⓑ	TOUCHDOWN POINT Ⓒ
- FLAPS FULL - ILS ANTENNA AT 50 ft AT THRESHOLD	3°7	2°5	349 m 1145 ft	120 m 395 ft	229 m 751 ft
- NO FLARE	4°2	3°	291 m 954 ft	109 m 355 ft	182 m 599 ft

MINIMUM VISUAL GROUND SEGMENTS (FLARE PHASE)

Applicable to: ALL 320

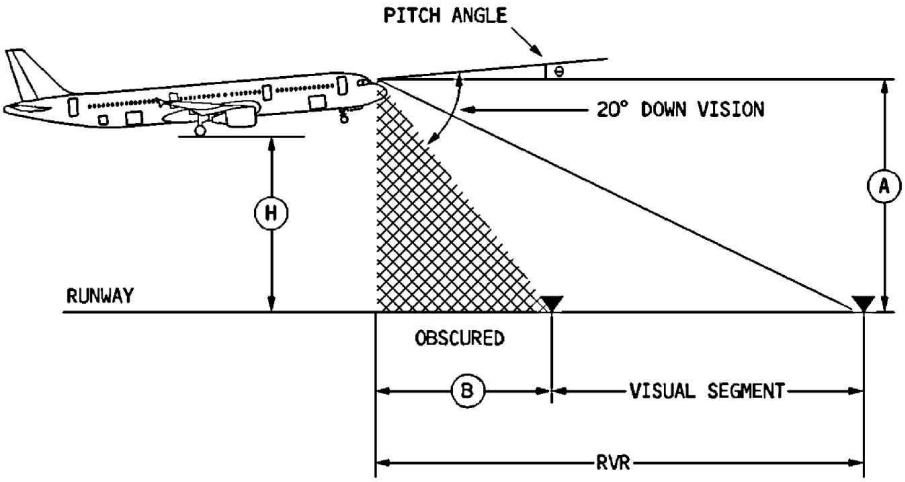


	CAT III		CAT II
H	15 ft (θ = 5.4°)	50 ft (θ = 4.7°)	100 ft (θ = 4.7°)
VISUAL SEGMENT	60 m (197 ft)		120 m (394 ft)
A	36 ft	71 ft	121 ft
OBSCURED B	43 m (140 ft)	79 m (259 ft)	134 m (442 ft)
MINIMUM RVR	103 m (337 ft)	139 m (456 ft)	254 m (836 ft)

Note: *This drawing shows that, for a CAT III landing (60 m minimum visual segment), the minimum RVR is 103 m at 15 ft.*

MINIMUM VISUAL GROUND SEGMENTS (FLARE PHASE)

Applicable to: ALL 321

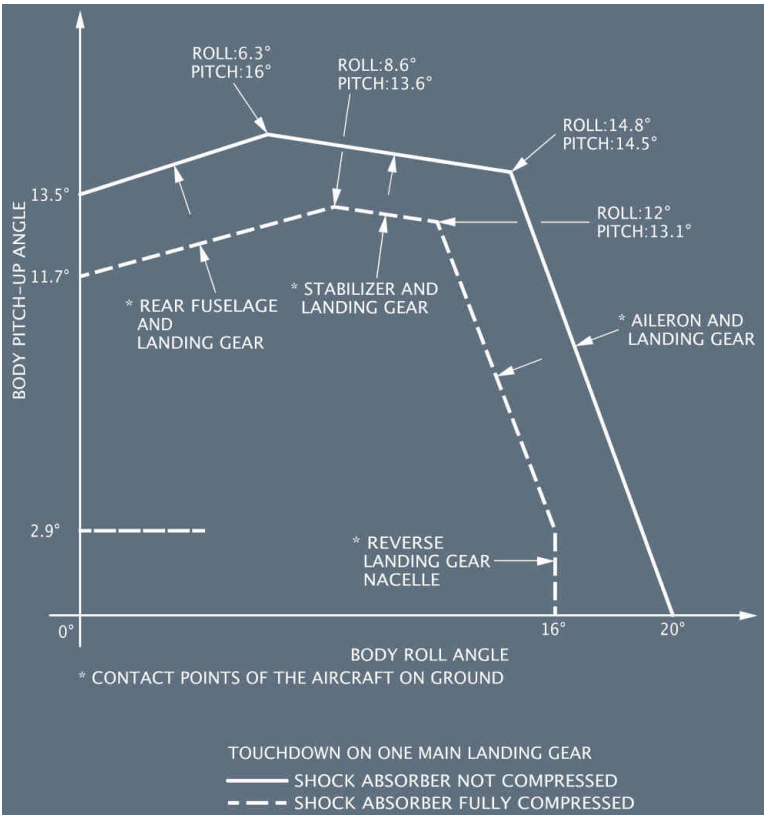


	CAT III		CAT II
(H)	15 ft (θ = 4.9°)	50 ft (θ = 4.4°)	100 ft (θ = 4.4°)
VISUAL SEGMENT	60 m (197 ft)		120 m (394 ft)
(A)	37 ft	71 ft	121 ft
OBSCURED (B)	42 m (137 ft)	78 m (256 ft)	133 m (435 ft)
MINIMUM RVR	102 m (334 ft)	138 m (453 ft)	253 m (829 ft)

Note: This drawing shows that, for a CAT III landing (60 m minimum visual segment), the minimum RVR is 102 m at 15 ft.

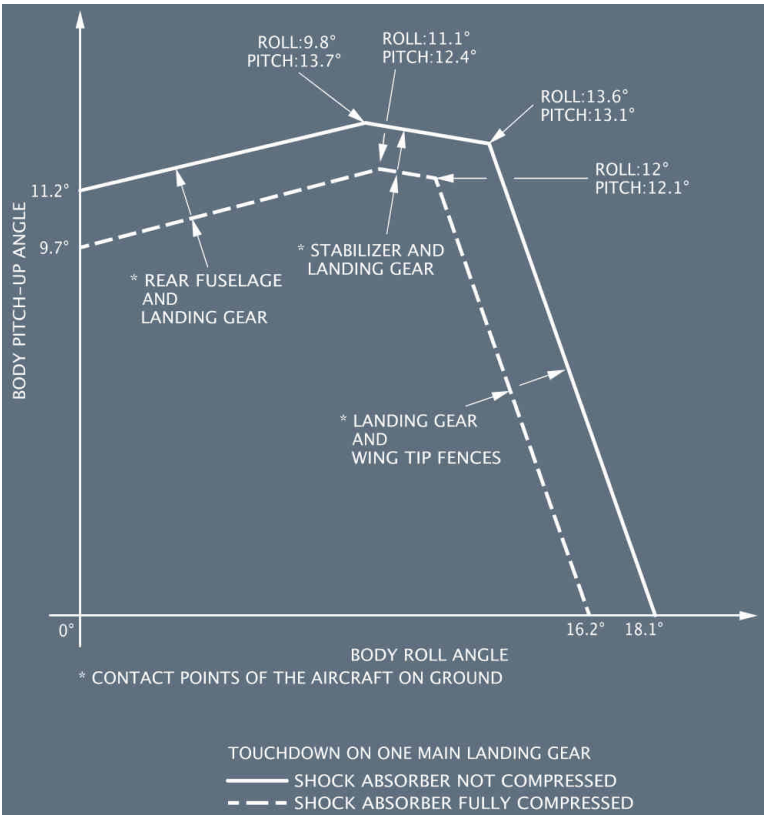
GROUND CLEARANCE DIAGRAM

Applicable to: ALL 320



GROUND CLEARANCE DIAGRAM

Applicable to: ALL 321



LANDING

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HST, B-HSU

FLARE

The cockpit cut-off angle is 20 °.

- **In stabilized approach conditions, the flare height is approximately 30 ft:**
  FLARE..... PERFORM

ATTITUDE..... MONITOR

The PM should monitor the attitude, and callout if:
- *The pitch angle reaches 10 °.*
- *The bank angle reaches 7 °.*

THRUST levers..... IDLE

- *If autothrust is engaged, it automatically disconnects when the pilot sets both thrust levers to the IDLE detent.*
- *In manual landing conditions, the "RETARD"callout is triggered at 20 ft Radio Altitude (RA), in order to remind the pilot to retard the thrust levers.*

Note: *If one or both thrust levers remain above the IDLE detent, ground spoilers extension is inhibited.*

GROUND CLEARANCE

- Avoid flaring high.
- A tailstrike occurs, if the pitch attitude exceeds 13.5 ° (11 ° with the landing gear compressed).
- A wingtip or engine scrape occurs, if the roll angle exceeds 20 ° (16 ° with the landing gear compressed).
- Be aware of the pitch-up tendency, with ground spoiler extension.

Applicable to: ALL 321

FLARE

The cockpit cut-off angle is 20 °.

● **In stabilized approach conditions, the flare height is approximately 30 ft:**

FLARE..... PERFORM
ATTITUDE..... MONITOR

The PM should monitor the attitude, and callout if:
- *The pitch angle reaches 7.5 °.*
- *The bank angle reaches 7 °.*

THRUST levers..... IDLE

- *If autothrust is engaged, it automatically disconnects when the pilot sets both thrust levers to the IDLE detent.*
- *In manual landing conditions, the "RETARD"callout is triggered at 20 ft Radio Altitude (RA), in order to remind the pilot to retard the thrust levers.*

Note: *If one or both thrust levers remain above the IDLE detent, ground spoilers extension is inhibited.*

GROUND CLEARANCE

- Avoid flaring high.
- A tailstrike occurs, if the pitch attitude exceeds 11 ° (9.5 ° with the landing gear compressed).
- A wingtip or engine scrape occurs, if the roll angle exceeds 18 ° (16 ° with the landing gear compressed).
- Be aware of the pitch-up tendency, with ground spoiler extension.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR

FLARE

The cockpit cut-off angle is 20 °.

● **In stabilized approach conditions, the flare height is approximately 30 ft:**

FLARE..... PERFORM
ATTITUDE..... MONITOR

"PITCH, PITCH"auto-callout is available.

The PM should monitor the attitude, and callout if:
- *The pitch angle reaches 10 °.*
- *The bank angle reaches 7 °.*

THRUST levers..... IDLE

- *If autothrust is engaged, it automatically disconnects when the pilot sets both thrust levers to the IDLE detent.*
- *In manual landing conditions, the "RETARD"callout is triggered at 20 ft Radio Altitude (RA), in order to remind the pilot to retard the thrust levers.*

Note: *If one or both thrust levers remain above the IDLE detent, ground spoilers extension is inhibited.*

GROUND CLEARANCE

- Avoid flaring high.
- A tailstrike occurs, if the pitch attitude exceeds 13.5 ° (11 ° with the landing gear compressed).
- A wingtip or engine scrape occurs, if the roll angle exceeds 20 ° (16 ° with the landing gear compressed).
- Be aware of the pitch-up tendency, with ground spoiler extension.

Applicable to: ALL

1 AT TOUCHDOWN

DEROTATION..... INITIATE

- *Lower the nosewheel without undue delay.*
- *The PNF continues to monitor the attitude.*

BOTH THRUST LEVERS.....REV MAX or REV IDLE

- *On dry runway only and if landing performance permits, REV IDLE is recommended until taxi speed is reached. For any other case, immediately select REV MAX on all reverser levers after main landing gear touches down.*

  The flight crew must select REV MAX under the following conditions:
  - *Wet or Contaminated runways*
  - *Runways assessed as short, considering the actual landing weight and conditions.*
  - *Tailwind ≥ 10 kt.*
  - *Touchdown beyond Zone B. Refer to FCTM/NO-160 TOUCHDOWN POINT.*
  - *Any aircraft failure that impacts the landing performance.*
  - *If required due to an emergency.*

  A slight pitch up that can be easily controlled by the pilot, may occur when the thrust reversers are deployed before the nose landing gear touches down.
- *After the flight crew selects reverse thrust, they should perform a full stop landing.*

WARNING	*After reverse thrust is selected, a full stop landing shall be made.*

GROUND SPOILERS..... CHECK/ANNOUNCE

Check that the WHEEL SD page displays the ground spoilers extended after touchdown.

If no ground spoilers are extended:
- *Verify and confirm that both thrust levers are set to IDLE or REV detent.*
- *Set both thrust reverser levers to REV MAX, and fully press the brake pedals.*

Note: If ground spoilers are not armed, ground spoilers extend at reverser thrust selection.

REVERSERS..... CHECK/ANNOUNCE

Check that the ECAM E/WD displays that the reverse deployment is as expected (REV green).

DIRECTIONAL CONTROL.....MONITOR/ENSURE

- *Monitor directional control, if the rollout is automatic.*
- *Ensure directional control, if rollout is manual. Use rudder pedals for directional control.*
- *Do not use the nosewheel steering control handle before reaching taxi speed.*

- *During rollout, the flight crew should avoid sidestick inputs (either lateral or longitudinal).*
- *If directional control problems are encountered, the flight crew should reduce thrust to reverse idle until directional control is satisfactory.*

BRAKES..... AS RQRD

- *Monitor the autobrake. When required, brake with the pedals*
- *Although the green hydraulic system supplies the braking system, if pedals are pressed rapidly, a brake pressure indication appears briefly on the BRAKE PRESS indicator.*
- *Braking may begin before the nosewheel has touched down, if required for performance reasons. However, when comfort is the priority, the flight crew should delay braking until the nosewheel has touched down.*

Note: *If no ground spoilers are extended, the autobrake is not activated.*

DECELERATION..... CHECK/ANNOUNCE

The PM will check and announce the illumination of the autobrake DECEL light. The crew will confirm that deceleration is both felt and confirmed by the speed trend on the PFD.

Applicable to: ALL

AT 70 KT

BOTH THRUST levers..... IDLE REV

It is better to reduce thrust when passing 70 kt. However, high levels of reverse thrust may be used in order to control aircraft speed in the case of an emergency.

CAUTION	*Avoid the use of high levels of reverse thrust at low airspeed, unless required due to an emergency. The distortion of the airflow, caused by gases reentering the compressor, can cause engine stalls that may result in excessive EGT.*

Applicable to: ALL

AT TAXI SPEED

BOTH THRUST levers..... FWD IDLE

- *When reaching taxi speed, and before leaving the runway, deselect the reversers.*
- *On snow-covered grounds, the reversers should be stowed when the aircraft speed reaches 25 kt.*

- *When deselecting the reversers, be careful not to apply forward thrust by moving the thrust levers beyond the FWD IDLE position.*

CAUTION	*Except in an emergency, do not use the reverse thrust to control the aircraft speed while on taxiways.*

- *On taxiways, the use of reversers, even when restricted to idle thrust, would have the following effects:*
  - *The engines may ingest fine sand and debris that may be detrimental to the engines and airframe systems.*
  - *On snow–covered areas, snow will recirculate into the air inlet, and may cause an engine flameout or rollback.*

Applicable to: ALL

BEFORE 20 KNOTS

AUTO BRK ..... DISENGAGE

Disengage the autobrake to avoid jerking at low speed.

Intentionally left blank

GO-AROUND

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

Apply the following three actions simultaneously:

THRUST levers.....TOGA

If TOGA thrust is not required, set the thrust levers to TOGA detent then retard the thrust levers as required. This enables to engage the GO-AROUND phase, with associated AP/FD modes.

Note: *If the thrust levers are not set briefly to TOGA detent :*
- *The FMS does not engage the GO-AROUND phase, and flying over, or close to the airport (less than 7 nm) will sequence the Destination waypoint in the F-PLN.*
- *When descending at minimum speed with AP and A/THR engaged, the speed may go below VLS if APPR mode is deselected, and/or if OP CLB or V/S mode is engaged.*

ROTATION.....PERFORM

Initiate rotation towards 15 ° of pitch with all engines operative (approximately 12.5 ° if one engine is out) to get a positive rate of climb, then follow the SRS Flight Director pitch bars orders.

GO AROUND .....ANNOUNCE
FLAPS lever .....SELECT AS RQRD

Retract one step of flaps.

FMA .....CHECK AND ANNOUNCE

Check the FMA on the PFD. The following modes are displayed: MAN TOGA / SRS / GA TRK / A/THR (in blue).

POSITIVE CLIMB .....ANNOUNCE
LDG GEAR UP .....ORDER
L/G lever .....SELECT UP
NAV or HDG mode.....AS RQRD

Reselect NAV or HDG, as required (minimum height 100 ft).

AP .....AS RQRD

Note: *Go-around may be flown with both autopilots engaged. Whenever any other mode engages, AP 2 disengages.*

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

Apply the following three actions simultaneously:

THRUST levers.....TOGA

If TOGA thrust is not required, set the thrust levers to TOGA detent then retard the thrust levers as required. This enables to engage the GO-AROUND phase, with associated AP/FD modes.

Note: If the thrust levers are not set briefly to TOGA detent, the FMS does not engage the GO-AROUND phase, and flying over, or close to the airport (less than 7 nm) will sequence the Destination waypoint in the F-PLN.

ROTATION.....PERFORM

Initiate rotation towards 15 ° of pitch with all engines operative (approximately 12.5 ° if one engine is out) to get a positive rate of climb, then follow the SRS Flight Director pitch bars orders.

GO AROUND .....ANNOUNCE
FLAPS lever .....SELECT AS RQRD

Retract one step of flaps.

FMA .....CHECK AND ANNOUNCE

Check the FMA on the PFD. The following modes are displayed: MAN TOGA / SRS / GA TRK / A/THR (in blue).

POSITIVE CLIMB .....ANNOUNCE
LDG GEAR UP .....ORDER
L/G lever .....SELECT UP
NAV or HDG mode.....AS RQRD

Reselect NAV or HDG, as required (minimum height 100 ft).

AP .....AS RQRD

Note: Go-around may be flown with both autopilots engaged. Whenever any other mode engages, AP 2 disengages.

Applicable to: ALL

AT GO-AROUND THRUST REDUCTION ALTITUDE

THRUST LEVERS..... CL

LVR CLB flashing on FMA.

Applicable to: ALL

[1] AT GO-AROUND ACCELERATION ALTITUDE

First check FMA indicates OP CLB or ALT* and target speed is Green Dot.

- **If FMA continues to indicate SRS mode and/or target speed does not increase to Green Dot:**

  FCU ALT .....CHECK and PULL

FLAPS lever .....RETRACT ON SCHEDULE

- *At or above F speed and accelerating, select Flaps 1.*
- *At or above S speed and accelerating to a minimum of Green Dot, select Flaps ZERO.*

CAUTION	*Manoeuvring the aircraft in the clean configuration at a speed lower than Green Dot is not recommended.*

Note: *Flap at ZERO is the cue for the PM to disarm the GRND SPLRS and set the Exterior Lights.*

GRND SPLRS ..... DISARM
EXTERIOR lights..... SET

- *Set NOSE and RWY TURN OFF lights to OFF.*
- *LAND lights remain ON.*

AFTER TAKEOFF C/L ..... COMPLETE

The PF shall call for this checklist when the aircraft is in a stabilized flight path with flaps retracted and climb thrust set.

Intentionally left blank

AFTER LANDING

Applicable to: ALL

Commence the following when:
- Runway is vacated, and
- Taxi instructions have been received and understood by both pilots.

GROUND SPOILERS.....DISARM | PF

Disarming the Ground Spoilers is the cue for the PM to commence the After Landing procedures.

ANTI ICE.....AS RQRD

EXTERIOR lights..... SET

Select LAND lights to RETRACT unless required. Select STROBE lights to AUTO and RWY TURN OFF lights as required.

TERR ON ND.....OFF

RADAR.....OFF

PREDICTIVE WINDSHEAR SYSTEM ◁ ..... OFF

ENG MODE selector..... NORM

FLAPS.....RETRACT

If the approach was made in icing conditions, or if the runway was contaminated with slush or snow, do not retract the flaps until after engine shut down, and after the ground crew has confirmed the flaps and slats are clear of obstructing ice.

BRAKE TEMPERATURE.....CHECK

For brake temperatures requiring maintenance action, refer to PRO-SUP-32 Brake Temperature Limitations Requiring Maintenance Actions.

BRAKE FANS ◁ .....AS REQD

Delay selection until at least 5 min after landing or just before stopping at the parking bay (whichever occurs first) to allow thermal stabilisation. However, when turnaround times are short, or brake temperatures are likely to exceed 500 °C, select brake fans ON without delay.

APU .....START

APU START should be delayed until approaching the parking bay.

APU BLEED .....ON

APU BLEED selection should be delayed until just prior to engine shutdown.

PARKING

Applicable to: ALL

Prior to performing this check, consider "GROUND OPERATIONS IN HEAVY RAIN" (*Refer to PRO-SUP-30 Ground Operations in Heavy Rain*).

Applicable to: ALL

PARK BRK handle..... ON

When the brake temperature is above 500 °C (or 350 °C with brake fans ON), avoid applying the parking brake unless operationally necessary. Refer to PRO-SUP-32 Brake Temperature Limitations Requiring Maintenance Actions and Brake Cooling.

CAUTION	*If the aircraft starts to move with the parking brake ON, immediately release the PARK BRK handle to restore braking with the pedals.*

BRAKE & ACCU PRESS..... CHECK

The ACCU PRESS indication must be in the green band, otherwise wheel chocks are required before engine 1 shutdown.

Applicable to: ALL

ANTI ICE pb-sw ..... OFF

Applicable to: ALL

ENG MASTER sw (in sequence)..... OFF

- *Following high thrust operation, such as maximum reverse thrust during landing, it is recommended that the engine be operated at idle for 3 min prior to shutdown to thermally stabilize the engine hot section. Operating time at idle, such as taxiing, is included in this 3 min period.*
- *If the APU is not available, set the EXT PWR pb ON before selecting the ENG MASTERs OFF.*
- *Check engine parameters decrease on the E/WD.*

Applicable to: ALL

SEAT BELTS..... OFF

Applicable to: ALL

SLIDE DISARMED..... CHECK

Check slides disarmed on the DOOR/OXY SD page. Warn the cabin crew, if any slide is not disarmed.

Applicable to: ALL

BEACON.....OFF

- *Select Beacon lights OFF when engines have safely spooled down and the slides are disarmed.*

Applicable to: ALL 320

FUEL PUMPS.....OFF

Applicable to: ALL 321

FUEL PUMPS.....OFF

Switch off the wing tank pumps and the center tank transfer valves.

Applicable to: ALL

GROUND CONTACT.....ESTABLISH

Applicable to: ALL

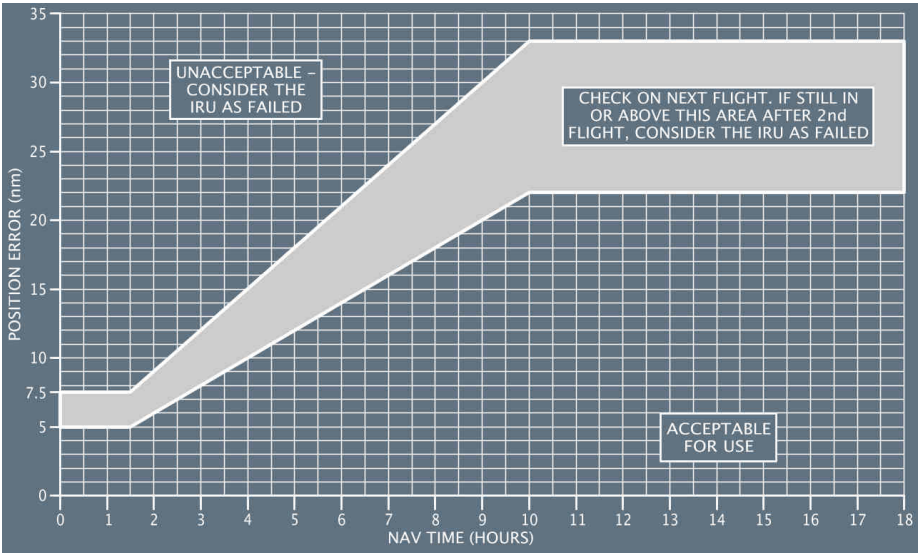
1 IRS PERFORMANCE.....CHECK

Residual ground speed check:

- *CAPT and F/O NDs display the IRS 1 and 2 residual ground speeds respectively. The IRS 3 residual ground speed can be read on the CAPT ND by switching the ATT HDG selector to CAPT ON 3.*
  - *If ground speed ≥ 15 kt : Report (The IR part of the ADIRU must be considered as failed, if the excessive deviation occurs after two consecutive flights).*
  - *If ground speed ≥ 21 kt : Report (The IR part of the ADIRU must be considered as failed).*
  - *Perform this check within 2 min of aircraft stop.*

Position error check:

- *If any radial distance error on the Position Monitor page is greater than the limits in the graph below, make a Maintenance Log entry identifying the associated IRS and stating the BLOCK/NAV time and error in nautical miles.*



Applicable to: ALL

BRAKE FANS ..... AS REQD

Select OFF when no longer required.

Applicable to: ALL

PARK BRK handle ..... AS REQD

The parking brake should be released after chocks are in place, if the BRAKES HOT caution is displayed, or if any brake temperature is >300 °C (>150 °C with brake fans ON), unless operational considerations dictate otherwise.

Note: When the aircraft terminates or transits with a crew change, the parking brake should be selected ON and brake fans OFF, prior to vacating the aircraft unless the next crew is on board and briefed.

Applicable to: ALL

2 SHUT DOWN C/L ..... COMPLETE

Applicable to: ALL

3 REPORTS..... COMPLETE

- *ACARS (T/O&LDG pilot, fuel uplift, RTOW edition, delay codes, LVO, ETOPS etc).*
- *CFP (PDC/ATC clearances, ATIS, etc).*
- *Maintenance Log; refer to Part A 8.6.1.14 (Maintenance Log Entries), 8.6.1.15 (Post Flight Entries), 8.6.1.16 (Hard or Overweight Landings), 8.6.1.18 (Spillages in Aircraft), 8.6.1.19 (Pilot Approved CFDS Procedures), 8.6.1.20 (Monitoring of Autoland Performance). In addition:*
  - *Record discrepancies of > 1% N1 between engines during TO.*
  - *Make an entry following inadvertent chemical oxygen mask deployment regardless of whether the oxygen generator activated or not.*
  - *Record CKPT OXY pressure if ≤ 1 100 psi.*
  - *Captain signs the Maintenance Log.*
- *CAR.*
- *Any other reports deemed necessary.*

Applicable to: ALL

DU's..... DIM

Leave the WXRDR knob fully bright.

SECURING THE AIRCRAFT

Applicable to: ALL

The Securing Aircraft Checklist shall be accomplished when the flight terminates or when the transit time exceeds 4 hours with a crew change.
The PF is not to action this procedure until the passengers have disembarked.
Prior to performing this check, consideration should be given to the cold weather requirements, refer to PRO-SUP-91-30.

PARK BRK handle ..... CHECK ON
Keep the parking brake on to reduce the hydraulic leak rate in the brake accumulator.

BRAKE FANS ..... OFF

OXYGEN CREW SUPPLY pb-sw ..... OFF

ADIRS (1+2+3)..... OFF
The ADIRS should not be switched off during transits at latitudes above 70 ° N in order to avoid excessive alignment time.
After having switched off the ADIRS, wait at least 10 s before switching off the electrical supply to ensure the ADIRS memorize the last data.

EXTERIOR lights..... OFF

MAINT BUS sw ..... AS RQRD
Should electrical power be required for crew or servicing personel, consider selecting the MAINT BUS sw in the forward cabin to the ON position prior to selecting aircraft power off.

APU BLEED pb-sw ..... OFF
EXT PWR pb ..... AS RQRD
APU MASTER SW pb-sw ..... OFF
Switch off the APU after the passengers have disembarked.

EMER EXIT lights..... OFF
NO SMOKING ..... OFF

BAT 1 pb-sw, and BAT 2 pb-sw ..... OFF

- *Wait until the APU flap is fully closed (about 2 min after APU AVAIL light goes out) before switching off the batteries. Switching the batteries off before the APU flap is closed may cause smoke in the cabin during the next flight.*
- *If the batteries are off while the APU is running, the APU fire extinguishing is not available.*

[1] SECURING THE AIRCRAFT CHECKLIST..... COMPLETE

COMMUNICATIONS AND STANDARD TERMS

Applicable to: ALL

Standard phraseology is essential to ensure effective crew communication. The phraseology should be concise and exact. The following Chapter lists the standard callouts. They supplement the callouts identified in the SOPs. These standard callouts are also designed to promote situational awareness, and to ensure crew understanding of systems and their use in line operation.

ACTIONS COMMANDED BY PF

Applicable to: ALL

GENERAL

The following commands do not necessarily initiate a guidance mode change, e.g. selected to managed/managed to selected. The intent is to ensure clear, consistent, standard communication between crewmembers.
All actions performed on the FCU and MCDU must be checked on the PFD and ND (e.g."FL 350 blue," "FL 200 magenta"). Ensure the correct FCU pb is used, then verify indications on the PFD/ND.

SET

The "Set"command means using an FCU knob to set a value, but not to change the mode.

SET is accomplished by rotating the appropriate selection knob. For example:
- "Set go-around altitude__"
- "Set QNH__"
- "Set FL__"
- "Set heading__"

PUSH/PULL

The command "Push" means to push an FCU knob to engage, or arm a managed mode. The command "Pull" means to pull an FCU knob to engage a selected mode. For example:
- "Heading push" (HDG knob is pushed to arm or engage managed NAV mode).
- "FL 190 pull" (ALT knob is turned and pulled to engage selected mode OP CLB or OP DES).
- "Speed 250 kt pull" (Speed knob is turned and pulled to achieve a selected speed).

Note: *If the value was previously set, there is no requirement to repeat the figure; simply call, for example, "Heading pull," "Speed push," etc. It is sometimes preferable to pull the FCU knob before setting the value (e.g. turns greater than 180 °).*

The VS/FPA selector knob has no managed function. For example:
- "V/S(FPA) +(-) 700 pull" (V/S (FPA) knob is turned and pulled to achieve the required V/S or FPA).
- "V/S (FPA) push" (V/S (FPA) knob is pushed to level off).

ARM

The command "Arm"means to arm a system by pushing the specified specified FCU pb. For example:
- "Arm approach."

ON/OFF

These commands are generally used for AP, FD and A/THR. For example:
- "Autopilot off."

PFD/FMA CHANGES TO BE CALLED

Applicable to: ALL

All changes on the FMA are called by the PF and cross-checked by the PM unless otherwise specified. The colour of armed lateral and vertical modes shall be included in the PF call.
A/THR blue do not need to be called, however, failure of this mode to arm on takeoff or go-around should be called.
If any change has not been called, then the PM shall call the change. There is no competition to see who can be the first to call these changes; The PM should allow reasonable time for the PF to call and not pre-empt him with every change.

The result of any action on the FCU shall be checked on the PFD/FMA, and any target changes are to be confirmed on the PFD/FMA and ND as appropriate. To achieve this, the PF shall call from the PFD, and the PM shall cross-check:
- All altitude/level targets. Any metric-to-feet conversion is to be completed independently by each pilot, set on the FCU, and the target called in both metric and feet.
- When a magenta database constraint is displayed on the PFD, the actual cleared altitude should be read from the FCU in addition to the magneta value on the FMA.
- Heading and speed targets (heading targets used to avoid weather need not be called).
- Initial VS/FPA targets (minor adjustments from the initial target need not be called).

FMA modes/targets are normally read from left to right across the FMA.
The effect on the flight path shall be monitored using raw data.

Selection of an autopilot shall be confirmed by the PF calling the AP1(2) annunciation on the FMA. Examples of standard calls are given in FCTM SI-090.

ALTITUDE

Applicable to: ALL

The PF calls out “One to go,” when passing 1 000 ft before the cleared altitude or FL, and the PM responds with, “Check."

FLAPS OR GEAR CALLOUTS

Applicable to: ALL

FLAPS CALLOUTS

FLAPS' CONFIGURATION	CALL
1	"Flaps one."
1 + F	"Flaps one."
0	“Flaps zero.”

The reply will be given when selecting the new flap position. For example:

	CALLOUT	REMARK
PF	"Flaps one."	
PM	"Speed checks. Flaps one."	PM checks the speed: - At or above S or F speed and accelerating (takeoff or go-around), - Below VFE next and decelerating (approach). The PM repeats the order before making the selection.

GEAR CALLOUTS

	CALLOUT	REMARK
PF	″Gear up (down).″	
PM	″Gear up (down).″	PM checks: - Positive climb on both the VSI and RAD ALT (takeoff or go-around), - Speed below VLO (landing). The PM repeats the order before making the selection.

PF/PM DUTIES TRANSFER

Applicable to: ALL

To transfer control, flight crewmembers must use the following callouts:

To give control: The PF calls, “You have control." The PM accepts this transfer by replying, “I have control,” before assuming PF duties.

To take control: The PM calls, “I have control." The PF accepts this transfer by replying, “You have control," before reverting to PM duties.

ABNORMAL AND EMERGENCY CALLOUTS

Applicable to: ALL

ECAM INITIATION

PM or PF (who sees first): " Master Warning/Master Caution, <read ECAM title>."
PF or PM: "<repeat ECAM title>."
PF: "I have control, ECAM Actions."

Note: If multiple ECAM warnings are present then the PF will repeat each title after it is read by the PM prior to carrying out the ECAM actions for the new item.

ECAM PROCEDURE

1. The question, "Clear <title of the system> ?”is asked by the PM when all actions have been taken/reviewed for the present ECAM WARNING/CAUTION or SYSTEM PAGE, e.g. "Clear hydraulic?" or "Clear status?"
2. The statement, “Clear <title of the system>”by the PF confirms the action and review is complete, e.g. "Clear hydraulic," or "Clear status".
3. “ECAM Actions complete,”by the PM indicates that all applicable actions have been completed.
4. Should the PF need to interupt the ECAM procedures, the order “Stop ECAM,” will be used. When ready to resume the ECAM, the order “Continue ECAM,” will be used. Refer to FCTM OP-040 ECAM Handling.

ECAM HANDLING		
Warning Display	**PF**	**PM**
Master Caution & Single Chime HYD B RSVR OVHT	"Master Caution, hydraulics, blue reservoir overheat." (Pilot who sees it first.)	
	"Hydraulics, blue reservoir overheat." (Second pilot repeats title.)	
Initiating ECAM actions	"Standby," OR "I have control, ECAM actions."	

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ECAM HANDLING		
When PM has completed the ECAM actions	"Clear hydraulics."	"Clear hydraulics?"
Resultant Warnings/Cautions		
HYD B RSVR OVHT B SYS LO PR *FCTL		"Blue system low pressure."
If no ECAM actions required		"No actions required."
ECAM items completed	"Clear hydraulics."	"Clear hydraulics?"
If LAND ASAP message displayed		"Land ASAP amber/red."
Secondary Failures e.g. *F/CTL		"Secondary failure, flight controls."
After reviewing the SYS page	"Clear flight controls."	"Clear flight controls?"
STS page displayed	"Read status."	"Status."
STS review complete	"Clear status."	"Clear status?"
When all applicable ECAM actions are complete		"ECAM Actions complete."

MEMORY ITEMS

The aim of the following callouts is to alert the other pilot to the appropriate procedure by calling out, in most cases, the title of the procedure. This will help the crew to react appropriately (crew coordination, task sharing and communication).

GPWS

As soon as avoidance manoeuver is envisaged.
“Pull up, TOGA.”

REACTIVE WINDSHEAR

"Windshear, TOGA.”

UNRELIABLE SPEED INDICATION

"Unreliable speed.”

EMERGENCY DESCENT

"Emergency descent.”

LOSS OF BRAKING

"Loss of braking."

COCKPIT TO GROUND COMMUNICATIONS

Applicable to: ALL

Standard phaseology ensures clear and consistent communications between the Flight Deck and the Ground Engineer during pushback and arrival operations. It is company policy that the headset shall be manned by an engineer or suitably trained mechanic with an acceptable standard of English language proficiency.
All communications between the Flight Deck and the Ground Engineer should be unhurried and in a clear and deliberate manner, with a distinct pause between separate instructions to assist clarity.
The procedures below may vary if abnormal situations arise. When non-standard situations occur, e.g. starting engines on the bay with HP ground air, the Flight Crew should co-ordinate with the Ground Engineer the procedures to be employed. This will ensure effective communications and adherence to the correct procedures.
Never be complacent; the "Standard" or "Normal" pushback can present the greatest safety risk if vigilance and standard phraseology are not employed at all times.

INTERCOM NOT AVAILABLE

If the use of a headset via the intercom is not possible, the standard hand signals for brakes are :

Park brake SET..... Clench fist, palm side forward
Park brake RELEASED.....Open hand, fingers spread, and palm side forward

CONTACT WITH GROUND CREW - USE OF LANDING OR TAXI LIGHTS

Flight Crew should not flash the aircraft landing and/or taxi lights in order to gain the attention of the Ground Crew any time they suspect a tug is attached to the aircraft. In the past Ground Crew have suffered temporary damage to their eyesight as a result of aircraft landing and/or taxi lights being illuminated when they were looking directly at the light and only a short distance away. A number of countries have banned the practice of flashing aircraft lights.
Notwithstanding the above, should the cockpit crew require the Ground Crew to return to the aircraft after headset disconnection, they should wait until the ground crew are sighted abeam the aircraft and then flash the runway turn off lights twice. The Ground Engineer will then return to the aircraft and re-establish communications with the Cockpit. Do not flash these lights if personnel are in close proximity to the nose landing gear.

SUMMARY FOR EACH PHASE

Applicable to: ALL

COCKPIT - GROUND COMMUNICATIONS		
EVENT	**Cockpit to Ground**	**Ground to Cockpit**
Cleared for pushback	"Remove ground equipment." (if applicable)	"Ground equipment removed."
Pressurising the hydraulics	"Confirm clear to pressurise yellow hydraulics?" (if applicable)	"Cleared to pressurise."
Pushback	"Cleared to pushback." (Include any ATC instruction, e.g. "Pushback red/face west/starting point number 3.")	"Release parking brake."
Note: 1. *The request to release the Parking Brake should only be made once all doors are checked closed and locked. 'All Doors' includes passenger and cargo doors, servicing access panels and hatches (except the NLG Service Interphone Access panel), and verifies all passenger steps, air bridges and external equipment (not required for the start) are clear of the aircraft.* 2. *The use of "released" and "set" for the parking brake will reduce the chance of misunderstanding which may occur if "on" or "off" are used.*		
	"Park brake released. Off blocks at ___."	
Starting engines	"Ready to start engine 1(2)?" "Starting engine 1(2)."	"Clear to start engine 1(2)." (or as per local procedures)."
Completion of pushback	"Park brake set."	"Pushback complete. Set park brake."
Note: *This confirms to the Ground Engineer the towbar can be disconnected. The tug and all ground equipment should move away from the aircraft and clear of the taxiway.*		
Completion of engine start	"Start complete, clear to disconnect."	
Note: *The Ground Engineer is clear to disconnect the headset, close the access panel and move clear of the aircraft.*		
Completion of engine start (cont.)	"Signals on the left/right. Goodbye."	"Roger. All ground equipment clear. Steering pin removed. Standby for hand signals on the left/right."

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COCKPIT - GROUND COMMUNICATIONS

Note: 1. *The Ground Crew will then disconnect the headset and move to the left or right of the Flight Deck, in clear sight of the Flight Crew. Once the Ground Crew and all equipment is clear of the taxiway, the appropriate Gear/Steering Pin fitted with a Safety Streamer will be raised above the head together with a Thumbs Up indicating all ground equipment and personnel are safely clear and the aircraft is clear to taxi.*
2. *For Night Departures the Pin with Streamer will be illuminated to ensure the Flight Crew can confirm the clearance signal. The clearance signal should be given using an illuminated marshalling wand.*

Arrival at Gate/Stand	"Go ahead." "Parking brake Set/Released." "Right engine/Engine 2 running (if applicable)."	"Ground to cockpit." "Chocks in position. Standby for ground power (if applicable)." "Ground power connected."
Alert Calls		"Cockpit Alert! Cockpit Alert! Set park brake." (An explanation will follow, e.g. shear pin failure.)
		"Cockpit Alert! Cockpit Alert! Shutdown left/right/Engine 1/2." (Most likely due to ingestion risk.)
		"Cockpit Alert! Cockpit Alert! Tailpipe smoke/Fire left/right/Engine 1/2 or wheel/brake smoke or fire etc."
	"Hold Position!" or "Stop Pushback! Hold Position!"	

TAXI

EVENT	PF	PM
Initiating taxi	"Clear left (right)."	"Clear right (left)."
Brake check	"Brake check."	"Pressure zero."
Flight control check	"Flight control check."	
1. PF Elevators		"Full up, full down, neutral."
2. PF Ailerons		"Full left, full right, neutral."
3. PF Rudder *(Note 1)*		"Full left, full right, neutral."
4. PM Elevators		"Full up, full down, neutral."
5. PM Ailerons		"Full left, full right, neutral."
Completion of F/CTL Check	"Check."	

Note: 1. *The PM should follow the pedal movement with his/her feet.*

TAKEOFF		
EVENT	**PF**	**PM**
Before entering the runway - use PA *(Note 1)*		"Cabin crew, please be seated for takeoff."
Ready for takeoff	"Set thrust."	
FMA	"MAN FLX_/TOGA, SRS, (RWY)."	"Check."
Thrust set and checked on ECAM		"Thrust set."
100 kt (IAS)	"Check."	"One hundred knots."
V1 speed		"V1." *(Note 2)*
VR speed		"Rotate."
Positive ROC on VSI and RAD ALT	"Gear up."	"Positive climb." "Gear up." *(Note 3)*

Note: *1. Refer to the Cockpit-Cabin Communications table for full procedures.*
2. If the auto-callout is inoperative, the PM shall make this call.
3. This call is to be made before placing your hand on the landing gear lever.

ACCELERATION		
EVENT	**PF**	**PM**
At or above F speed *and* accelerating	"Flaps 1."	"Speed checks, Flaps 1." *(Note 1)*
At or above S speed *and* accelerating *and* next speed target at least Green Dot	"Flaps Zero."	"Speed checks, Flaps Zero." *(Note 1)*
PM notices *any* incorrect parameter regarding a configuration change request from PF		Check (parameter) e.g. "Check speed."

Note: *1. This call is to be made before placing your hand on the flap lever.*

CLIMB		
EVENT	**PF**	**PM**
Transition altitude	"Transition, Set STD." *(Note 1)* "Check."	"STD cross-checked, Passing FL __ now."

Continued on the following page

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CLIMB		
1 000 ft below assigned altitude	"One to go."	"Check."

Note: 1. *The "Transition" call and setting of 1013 is made when climbing through the Transition Altitude and not when first cleared to a Flight Level.*

DESCENT		
EVENT	**PF**	**PM**
1 000 ft above assigned level	"One to go."	"Check."
Passing FL 200 in descent	"Twenty thousand."	"Check."
		"Cabin crew, prepare the cabin for landing."
When cleared to an altitude	"Set QNH ___ ." "Check."	"QNH ___ cross-checked, Passing ___ ft now."
Transition Level (if QNH not previously set)		"Transition." *(Note 1)*
Passing 10 000 ft	"Ten thousand."	"Check."
At 5 000 ft AAL or before		"Cabin crew, please be seated for landing."

Note: 1. *The setting of QNH and associated calls are normally made when first cleared to an altitude on descent. The "Transition" call is only made descending through the Transition Level if the QNH has not been previously set.*

1

APPROACH		
EVENT	**PF**	**PM**
Prior to configuring for approach (if Approach Phase not active).	"Activate approach phase."	"Approach phase activated."
ILS Approach Positive movement of LOC/GS indications	"Check."	"LOC/Glideslope moving." *(Note 1)*
Intercepting the glideslope from above	"Intercept from above!"	"Check"
NP Approach LOC/Radial moving	"Check."	"LOC/Radial moving." *(Note 1) (Note 2)*

Continued on the following page

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APPROACH		
Initial RAD ALT indication "Two Thousand Five Hundred" (Auto callout)	"Check."	
Speed below VFE Next on PFD	"Flaps 1 (2 or 3 or FULL)."	"Speed checks - Flaps 1 (2 or 3 or FULL)." *(Note 3)*
Speed below VLO	"Gear down."	"Gear down." *(Note 3)*
Setting missed approach altitude	"<altitude> blue."	"Check."
Final approach altitude check	"Check."	e.g."OM/xx DME, altitude checked, aids set."

Note:
1. *This call is made at the first indication of LOC or G/S movement, even if the FMA modes LOC*/G/S* annunciate first.*
2. *"Radial moving" may be omitted if the PM's ND is not selected to ROSE VOR display.*
3. *This call is made before placing your hand on the flap or gear lever.*

LANDING		
EVENT	**PF**	**PM**
1 000 ft RA "One thousand" (Auto callout) (Note 1)	"Check."	"Landing checklist complete." *(Note 2)* e.g."Plus 10, 800" means VAPP +10 kt and 800 ft/min ROD. *(Note 3)*
Passing 350 ft RA and **LAND** green displayed on the FMA	"Land green."	"Check."
100 ft above MDA/DH "Hundred Above" (Auto callout) (Note 1)	"Check."	
MDA/DH "Minimum" (Auto callout) (Note 1)	"Continue," OR "Go-around, Flaps."	
At MAP prior to circling	"Go-around, Flaps," OR "Continue." *(Note 4)*	"Missed approach point."

Continued on the following page

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LANDING		
After Landing - Spoilers Extended - Reverser Deployed - Auto Brake Active		"Spoilers, Reverse green," OR "No Reverse engine 1(2)," OR "No Reverse." *(Note 5)* "Decel," OR "No Decel." *(Note 6)*
At 70 kt		"Seventy knots."

Note:
1. *If the auto callout is inoperative, the PM shall make these calls.*
2. *The call "Landing checklist complete" is always made passing 1 000 ft as a confirmation that all landing checks have been previously completed.*
3. *Following an initial call, further calls should be made only for significant deviation or trend away from the target parameters.*
4. *PF shall respond "Continue" at the MAP if visual.*
5. *In case of reverser failure or if reverse was not selected.*
6. *The "Decel" call is referenced to the green DECEL light.*

2

AUTOLAND		
EVENT	**PF**	**PM**
Passing 350 ft RA and **LAND** green displayed on FMA	"Land green."	"Check."
100 ft above DH "Hundred Above" (Auto callout) (Note 1)	"Check."	
DH "Minimum" (Auto callout) (Note 1)	"Continue," or "Go-around, Flaps."	
FLARE annunciate on FMA		"Flare."
No **FLARE** annunciated by 30 ft RA		"No Flare."
ROLLOUT annunciated		"Rollout."
No **ROLLOUT** annunciated on FMA		"No Rollout."
After Landing - Spoilers Extended - Reverser Deployed - Auto Brake Active		"Spoilers, Reverse green," OR "No Reverse engine 1(2)," OR "No Reverse." *(Note 2)* "Decel," OR "No Decel." *(Note 3)*

Continued on the following page

Continued from the previous page

AUTOLAND		
At 70 kt		"Seventy knots."

Note: 1. *If the auto callout is inoperative, the PM shall make these calls.*
2. *In case of reverser failure or if reverse was not selected.*
3. *The "Decel" call is referenced to the green DECEL light.*

GO-AROUND		
EVENT	**PF**	**PM**
Any time a missed approach is executed	"Go-around, Flaps."	"Speed Checks, Flaps 3 (2 or 1)." *(Note 1)*
	Read specific mode changes on FMA.	"Check."
Positive ROC on VSI and RAD ALT	"Gear up."	"Positive climb." "Gear up." *(Note 1)*

Note: 1. *This call is made before placing your hand on the flap or gear lever.*

FLIGHT PARAMETER DEVIATIONS		
EVENT	**PF**	**PM**
PM notices *any* incorrect parameter regarding a configuration change request from PF		Check (parameter) e.g. "Check Speed."
LOC deviation > 1 dot		"LOC."
G/S deviation > 1 dot		"Glideslope."
Tracking on a VOR radial: • >0.5 Dot or 2.5 ° deviation		"Course."
Tracking on a NDB bearing: • >5 ° deviation		"Course."
Below 1 000 ft AAL: • Speed > VAPP +10 • Speed < VAPP -5, or		"Speed."
Below 1 000 ft AAL: • ROD >1 000 ft/min		"Sink rate."

Continued on the following page

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FLIGHT PARAMETER DEVIATIONS		
Below 1 000 ft AAL: • Attitude >10 ° nose up (A320), or • Attitude >7.5 ° nose up (A321), or • Attitude < -2.5 ° nose down		"Pitch."
Below 1 000 ft AAL: • LOC deviation > 1/4 dot		"LOC."
Pitch attitude in flare >7.5 °		"Pitch."
Bank angle in flare > 7 °		"Bank."
Touchdown beyond the Touchdown Zone Markings	(Captain) "Continue." *(Note 1)*	
	(Captain) "Go-around." *(Note 2)*	
Pitch attitude during go-around >20 ° or <10 ° nose up		"Pitch."
Bank angle during go-around > 7 °		"Bank."
No climb rate during go-around		"Sink rate."

Note: *1. If the Captain decides that the landing can be safely continued.*
2. If the Captain decides that the landing should be discontinued.

RTO		
EVENT	**CAPT**	**F/O**
Decision *not* to reject the takeoff	"Go!"	
Decision to reject the takeoff	"Stop!"	
During the deceleration phase		"Reverse green, Decel." *(Note 1)*
ATC Call		Advise as appropriate. *(Note 2)*
Parking brake set - Cabin Crew PA	"Attention! Cabin Crew at Stations!"	

Note: *1. If the green DECEL light is not illuminated call, "No Decel." In case of reverser failure of if reverse was not selected call, "No reverse engine 1(2)," or "No reverse," as appropriate.*
2. The standard ICAO phraseology for any stopping event on the runway is, "Stopping."

COCKPIT - CABIN NORMAL OPERATIONS		
EVENT	**COCKPIT**	**CABIN**
Before entering the runway if CDSS Cabin Ready function serviceable	"Cabin crew, please be seated for takeoff."	Press cabin ready CDSS switch. *(Note 3)*
Commence cabin service	Seatbelt sign cycled OFF and ON	
Conditions suitable for passengers to move around cabin	Seatbelt sign to OFF/AUTO	

Continued on the following page

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COCKPIT - CABIN NORMAL OPERATIONS		
Turbulence anticipated or encountered	Seatbelt sign to ON	
Moderate to Severe turbulence anticipated or encountered	"Please note that the seatbelt signs are switched on. Cabin crew please be seated." *(Note 1)*	
Approximately 30 min before landing	"30 minutes." *(Note 2)*	
Approximately 15 min before landing	"Cabin crew, prepare the cabin for landing."	
	Seatbelt sign ON @20 000 ft	
Approximately 10 min before landing	Seatbelt sign cycled OFF and ON @ 10 000 ft	
At 5 000 ft AAL or before if CDSS cabin ready function serviceable	"Cabin crew, please be seated for landing."	Press cabin ready CDSS switch. *(Note 3)*

Note:
1. *In case the PA system is u/s, the seatbelt signs should be cycled once.*
2. *Made via the CAB INT - all other normal Cockpit to Cabin calls are made by the PM over the PA using the ACP panel pb.*
3. *If the CDSS 'Cabin Ready Function' is unserviceable the FA1 will advise verbally when the pre-landing preparations are complete and the cabin crew are seated.*

COCKPIT - CABIN EMERGENCY COMMUNICATIONS		
EVENT	**COCKPIT**	**CABIN**
Initiation of an Emergency Descent	“Attention! Emergency Descent!”	
• RTO • Emergency Landing at 2 000 ft AAL • On Ground Emergency *(Note 2)*	"Attention! Cabin Crew At Stations!"	
Alert level to be cancelled	"Cabin Crew resume duties."	
Emergency Landing at 500 ft AAL *(Note 1)*	"Brace! Brace!"	
Initiation of evacuation	"Evacuate! Evacuate!"	
Attempted hijack		Refer to Vol.7.1.16

Note:
1. *If the PA is u/s, switch the seatbelt signs OFF and ON six times.*
2. *This order may also be used in-flight if Cabin Crew are not seated and an emergency or abnormal situation requires the crew to immediately return to their seats.*

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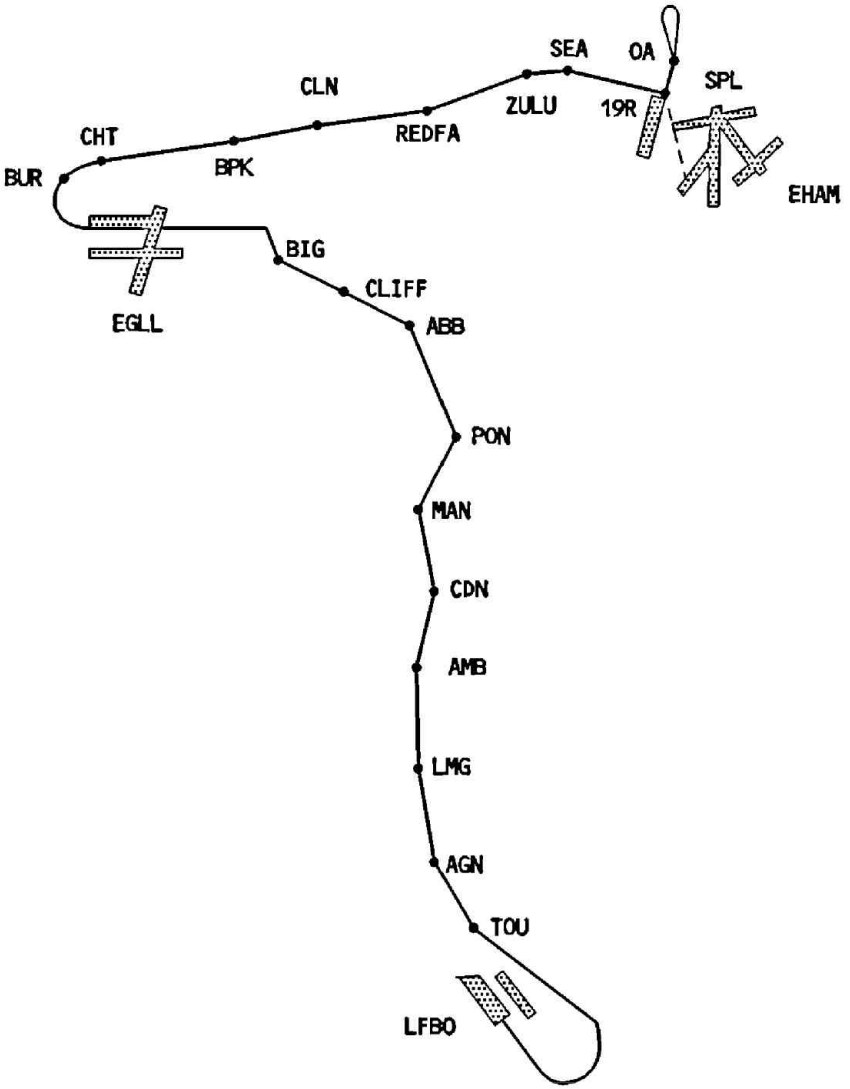
Introduction

INTRODUCTION

Applicable to: ALL

Note: This chapter is an amplification of the SOP. Anytime it was feasible, the same chapters and the same titles of paragraph were retained.

The following discussion of the FMGS uses this flight plan as an example.


SEA
OA
CLN
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ZULU
19R
CHT
REDFA
BPK
BUR
EHAM
BIG
CLIFF
EGLL
ABB
PON
MAN
CDN
AMB
LMG
AGN
TOU
LFBO

Cockpit Preparation

FMGS INITIALIZATION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

1 **CHECKING THE CLOCK DATE**

CHECK the CLOCK DATE and ADJUST, if necessary.

If the date in the active database does not match the clock date, the MCDU displays "CHECK DATA BASE CYCLE". If this message appears, check the period of validity in the second database and select it, if required.



CAUTION	*Cycling the navigation database deletes the active and secondary flight plans. Do not cycle it while airborne because doing so will delete the flight plan, eliminate all speed predictions, and blank the ND. If the aircraft is in managed speed, Green Dot becomes the speed target.*

CHECKING STORED WAYPOINTS, NAVAIDS, RUNWAYS, OR ROUTES

PRESS the DATA key.

SELECT, successively, as required:
- STORED WAYPOINT
- STORED NAVAIDS
- STORED RUNWAYS
- STORED ROUTES

CHECK the contents of each of these data storages and DELETE items, as appropriate.

NAVAIDS DESELECTION

- **If NOTAMS indicate that selected NAVAIDs are unreliable or unserviceable, deselect them as follows:**

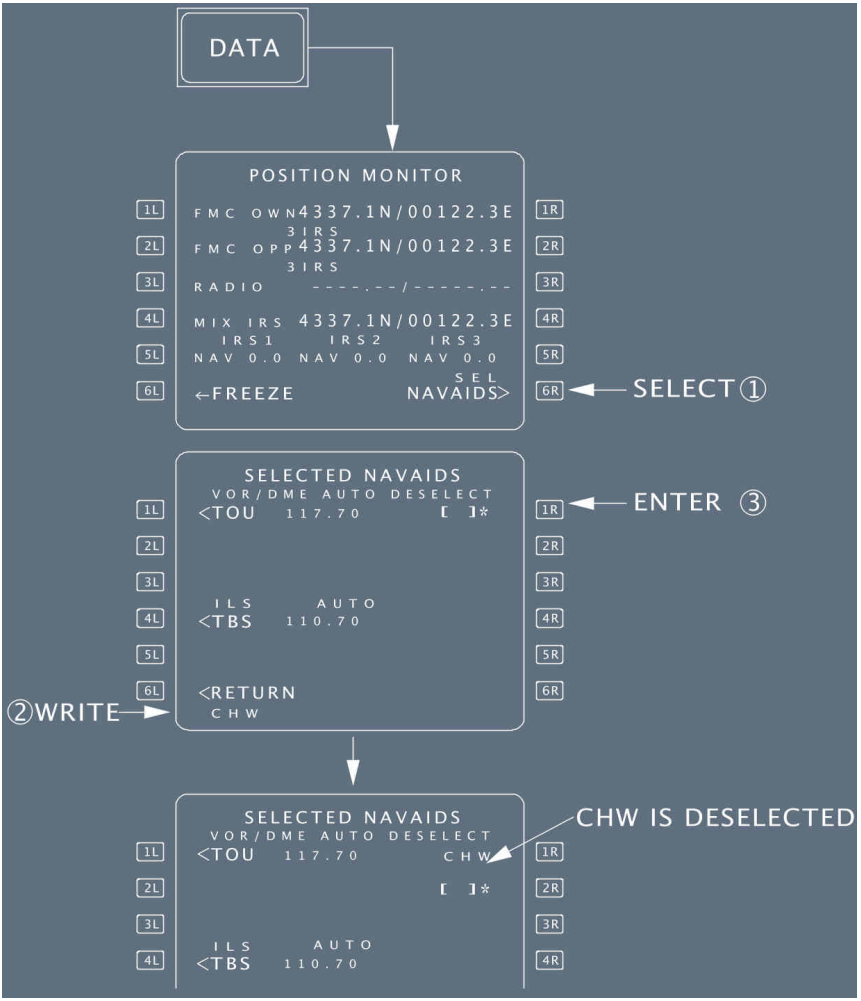
  PRESS the DATA key.

  SELECT the POSITION MONITOR page.

  SELECT the SELECTED NAVAIDS page.

  Under “DESELECT”, INSERT the NAVAID identifier in the brackets.

  The pilot can only make six deselections.


DATA
POSITION MONITOR
FMC OWN 4337.1N/00122.3E
3IRS
FMC OPP 4337.1N/00122.3E
3IRS
RADIO ----.--/-----.--
MIX IRS 4337.1N/00122.3E
IRS1 IRS2 IRS3
NAV 0.0 NAV 0.0 NAV 0.0
←FREEZE
SEL
NAVAIDS>
SELECT ①
SELECTED NAVAIDS
VOR/DME AUTO DESELECT
<TOU 117.70 [ ]*
ENTER ③
ILS AUTO
<TBS 110.70
<RETURN
CHW
②WRITE
SELECTED NAVAIDS
VOR/DME AUTO DESELECT
<TOU 117.70 CHW
[ ]*
ILS AUTO
<TBS 110.70
CHW IS DESELECTED

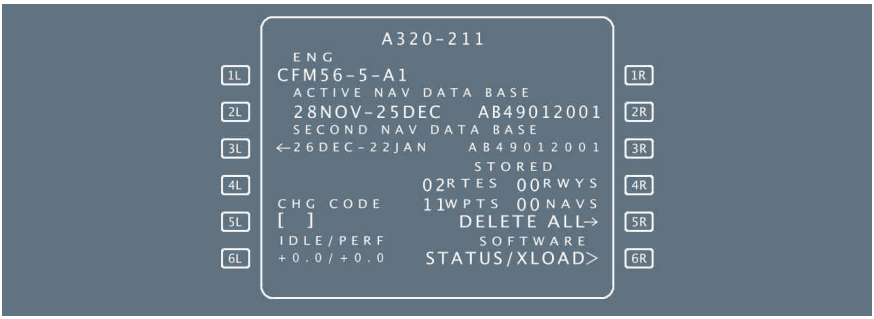
FMGS INITIALIZATION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

2 **CHECKING THE CLOCK DATE**

CHECK the CLOCK DATE and ADJUST, if necessary.

If the date in the active database does not match the clock date, the MCDU displays "CHECK DATA BASE CYCLE". If this message appears, check the period of validity in the second database and select it, if required.



CAUTION	*Cycling the navigation database deletes the active and secondary flight plans. Do not cycle it while airborne because doing so will delete the flight plan, eliminate all speed predictions, and blank the ND. If the aircraft is in managed speed, Green Dot becomes the speed target.*

CHECKING STORED WAYPOINTS, NAVAIDS, RUNWAYS, OR ROUTES

PRESS the DATA key.
PRESS the next page key.

SELECT, successively, as required:
- STORED WAYPOINT
- STORED NAVAIDS
- STORED RUNWAYS
- STORED ROUTES

CHECK the contents of each of these data storages and DELETE items, as appropriate.

3 **NAVAIDS DESELECTION**

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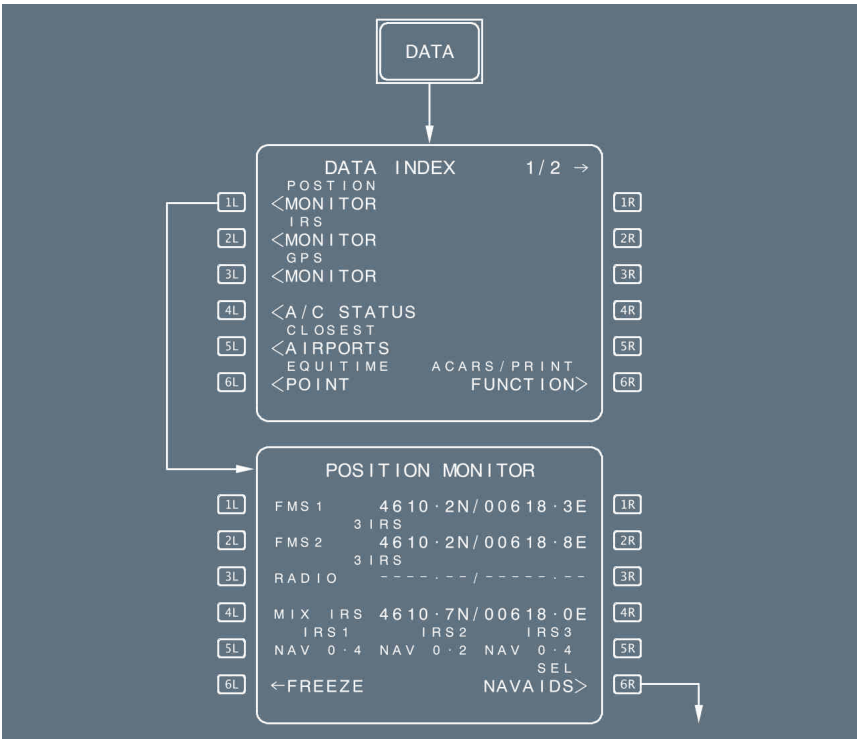
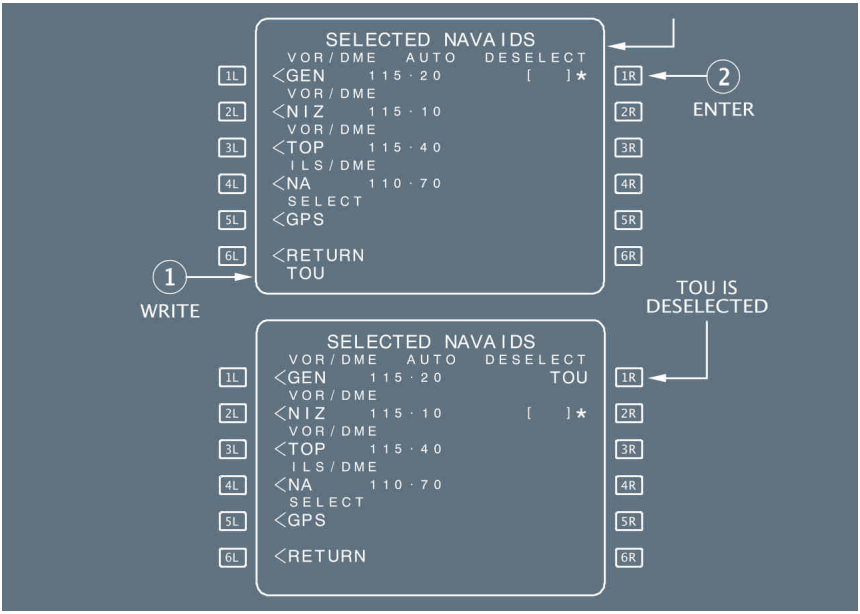
SELECT the SELECTED NAVAIDS page.

Under “DESELECT”, INSERT the NAVAID identifier in the brackets.

The pilot can only make six deselections.





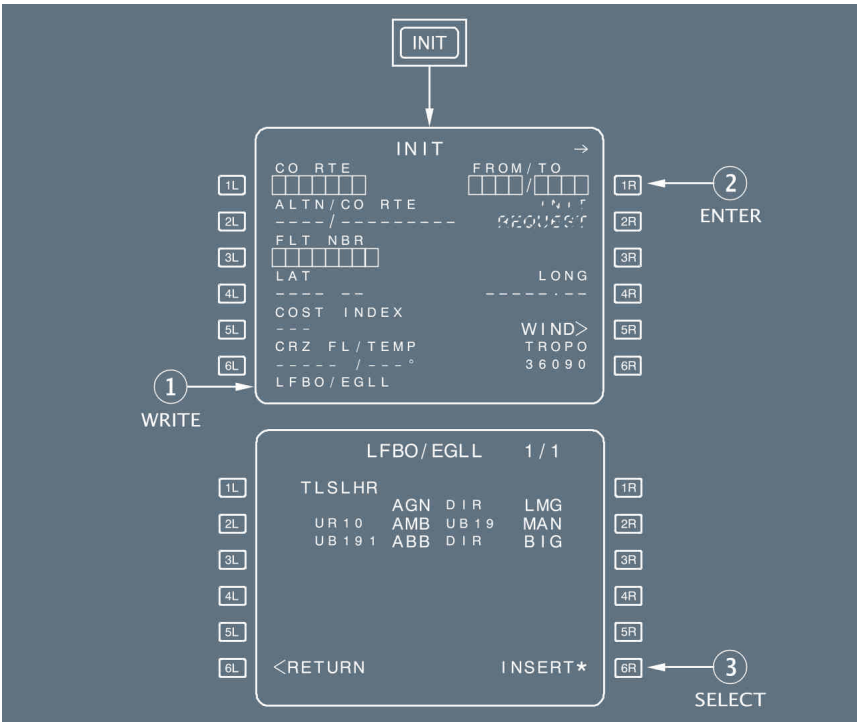
FLIGHT PLAN INITIALIZATION

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

4 **GENERAL**

Follow SOP instructions, when the route is a company route stored in the database.

- **If the company route is unknown, proceed as follows:**



WRITE a "FROM/TO" city pair, then ENTER it:

If one or more company routes run between the cities, the ROUTE SELECTION page appears and defines them.

INSERT the preferred company route.

- **If the database does not contain a company route:**

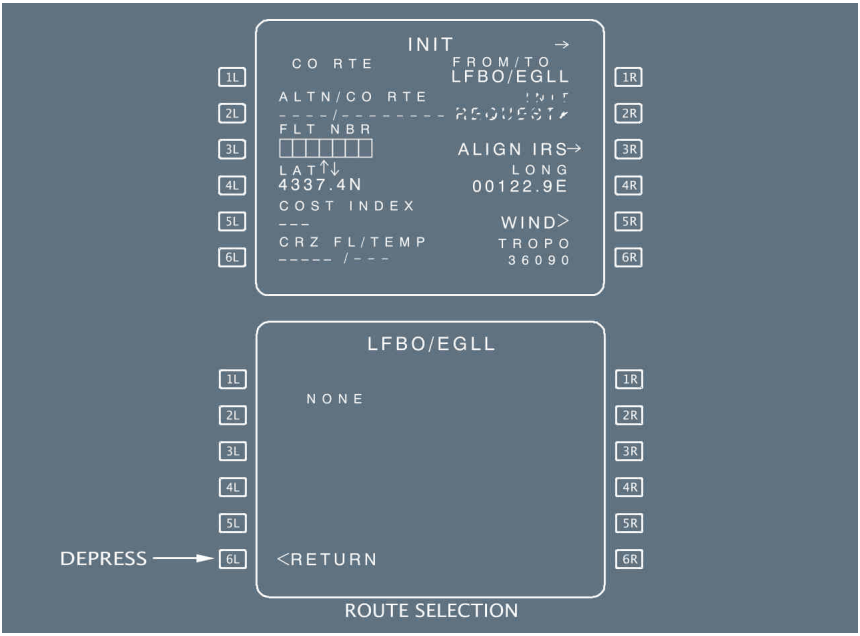
The flight plan must be constructed manually:

PRESS the INIT key

ENTER a city pair in the FROM/TO field.

The ROUTE SELECTION page comes up with "NONE"

SELECT RETURN [6L] key then construct the flight plan manually.



If waypoints, NAVAIDs or airports are not in the NAV database, the pilot must define and store them manually, using the “data stored” function.

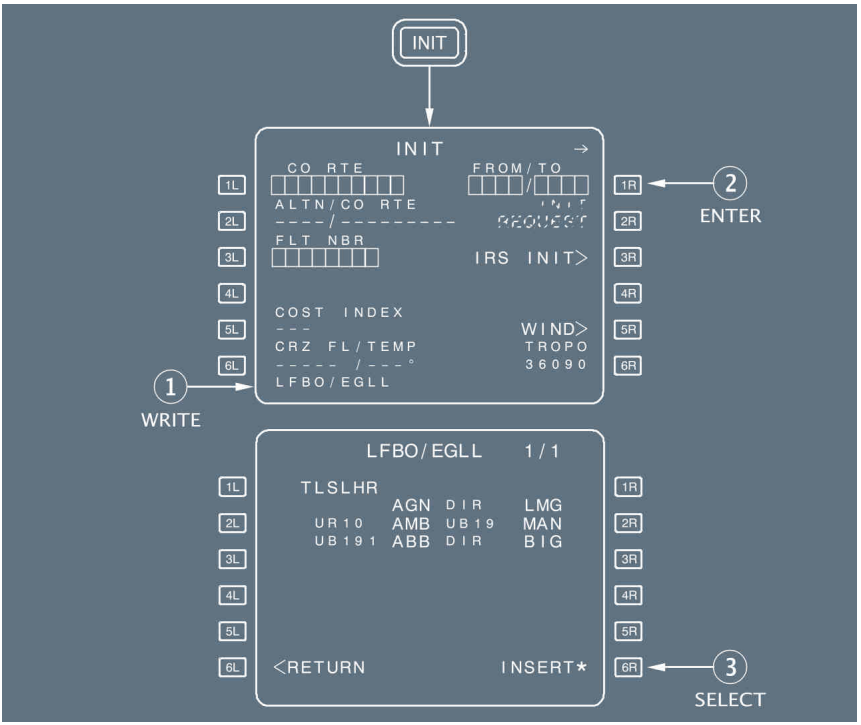
Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

5

GENERAL

Follow SOP instructions, when the route is a company route stored in the database.

- **If the company route is unknown, proceed as follows:**



WRITE a “FROM/TO” city pair, then ENTER it:

If one or more company routes run between the cities, the ROUTE SELECTION page appears and defines them.

INSERT the preferred company route.

- **If the database does not contain a company route:**

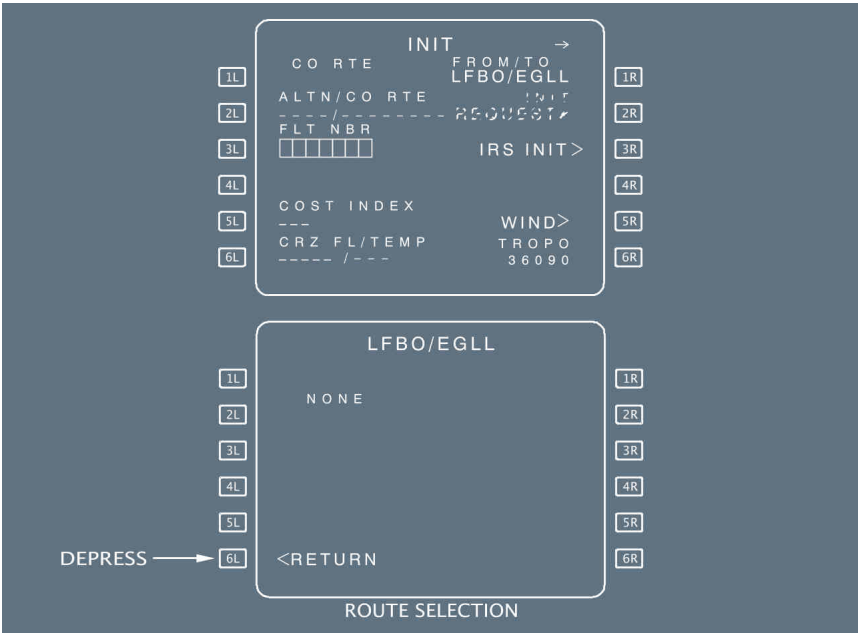
The flight plan must be constructed manually:

PRESS the INIT key

ENTER a city pair in the FROM/TO field.

The ROUTE SELECTION page comes up with “NONE”

SELECT RETURN [6L] key then construct the flight plan manually.

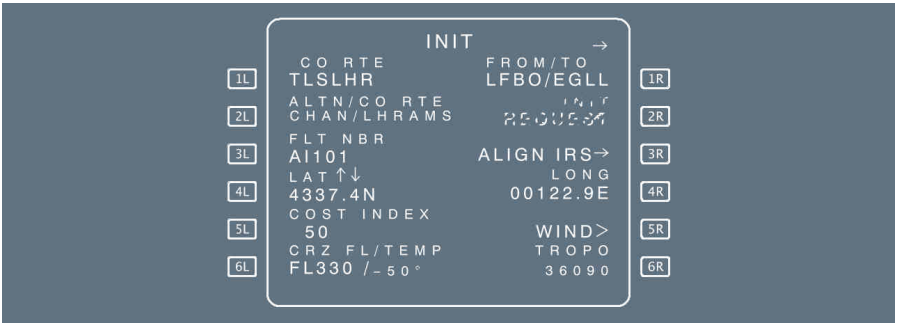


If waypoints, NAVAIDs or airports are not in the NAV database, the crew must define and store them manually, using the “data stored” function.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

6 ALIGNING IRS

The crew can enter latitude with N or S preceding or following the value (for example, N4350.5 or 4350.5N), and longitude with E or W preceding or following the value (for example, E00364.5 or 364.5E, W11020.3 or 11020.3W).
Leading zeros may be omitted.



- **If the airport reference point is modified after the completion of the alignment,** the MCDU displays the message "RESET IRS TO NAV". During stop over, it should be considered as a reminder for a quick realignment.

- **If the "RESET IRS TO NAV"message comes up later:**

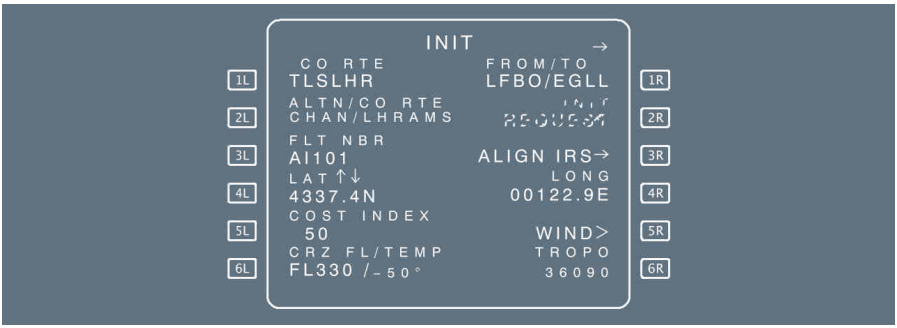
  Check the latitude and longitude shown on the INIT A page against the position of the IRSs in NAV MODE on the Inertial System Display Unit (overhead panel).

  If these positions differ, RESET the ADIRS CDU mode by switching the selector switches OFF and back to NAV within 5 s. (All three IRSs must be switched OFF, and then all three switched to NAV.)

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

7 **ALIGNING IRS**

The pilot can enter latitude with N or S preceding or following the value (for example, N4350.5 or 4350.5N), and longitude with E or W preceding or following the value (for example, E00364.5 or 364.5E, W11020.3 or 11020.3W).
Leading zeros may be omitted.



- **If the airport reference point is modified after the completion of the alignment,** the MCDU displays the message "RESET IRS TO NAV". During stop over, it should be considered as a reminder for a quick realignment.

- **If the "RESET IRS TO NAV"message comes up later:**

  Check the latitude and longitude shown on the INIT A page against the position of the IRSs in NAV MODE on the IRS pages (accessed through the IRS MONITOR page).

  If these positions differ, RESET the ADIRS CDU mode by switching the selector switches OFF and back to NAV within 5 s. (All three IRSs must be switched OFF, and then all three switched to NAV.)

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

ALIGNING IRS

The alignment phase is completed, when the ADIRS is initialized to an appropriate position. If the GPS is available, initialization is automatic, using the GPS position. Flight crew intervention is not necessary.
However, automatic initialization may be manually overriden by flight crew entry, at any moment during the alignment phase. In this case, perform the following procedure as soon as possible, to prevent delays if an alignment error occurs:

PRESS the INIT key, and then the IRS INIT prompt.

IRS INIT page is displayed with the airport reference point as default coordinates.

If necessary, PRESS [1L] and/or [1R] and use scroll keys to adjust the latitude and/or longitude values.

For example, this can be used to enter the gate precise coordinates when the aircraft is intended to fly without GPS on long segments without radio coverage.

PRESS the ALIGN ON REF prompt and CONFIRM ALIGN* prompt.

The displayed coordinates are sent to ADIRS for initialization.
The alignment status changes to ALIGNING ON REF.

- **If the "CHECK IRS/AIRPORT POS"or "REF/GPS POS DIF"or "REF/LAST IRS POS DIF"message is displayed:**

  CHECK the departure airport on INIT A page and CORRECT it if necessary.

  REALIGN the IRS per the procedure described previously.

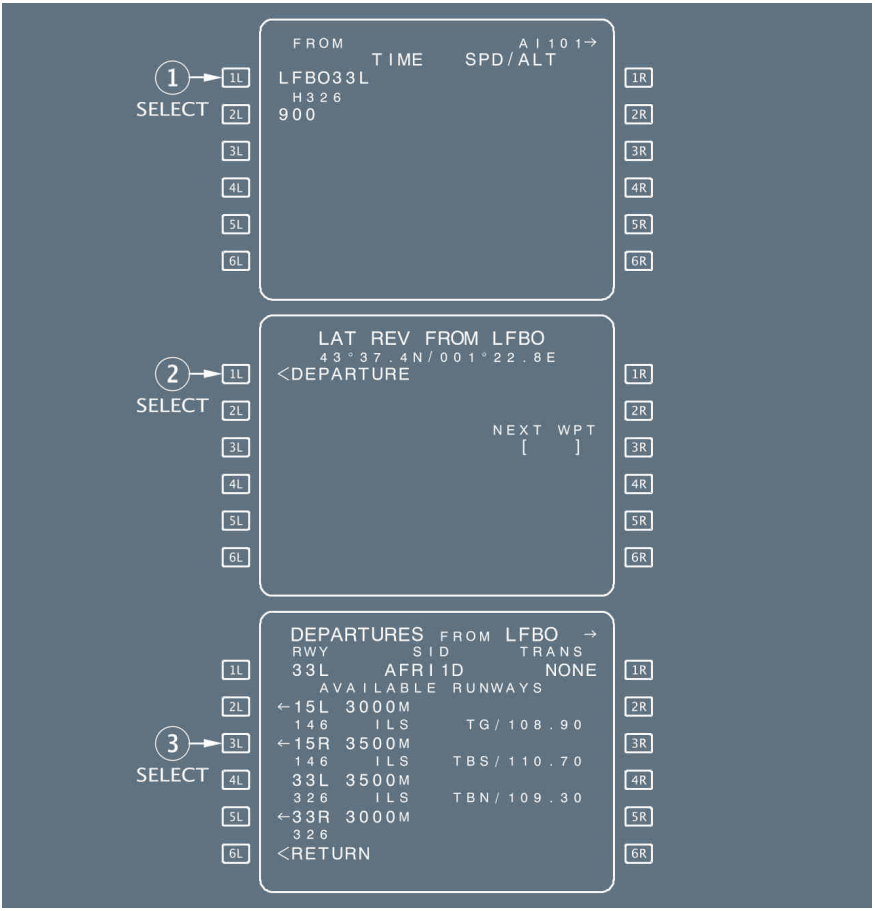
- **If a new FROM or a new CO RTE is entered after IRS alignment is already completed, the ALIGN ON REF prompt is displayed in [6R]:**

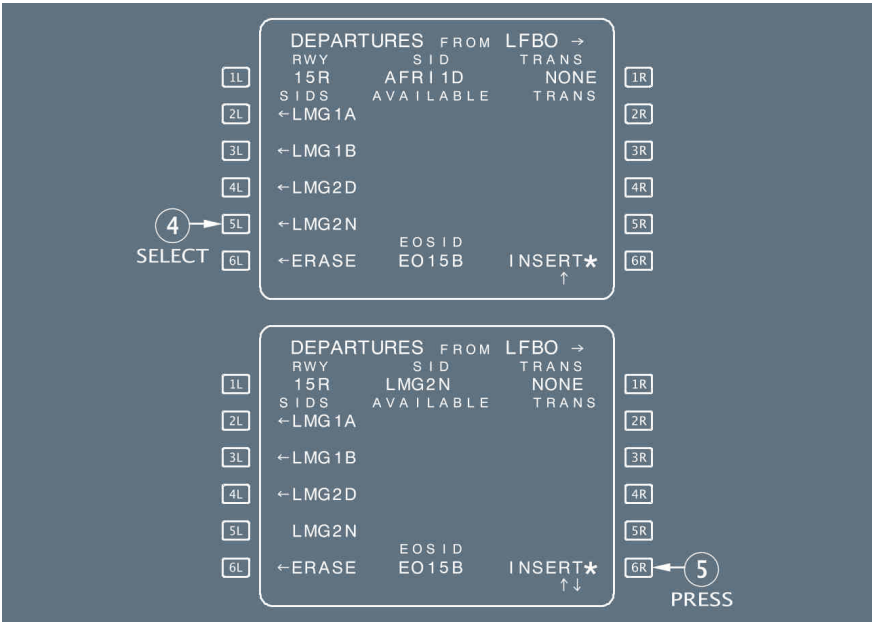
  REALIGN the IRS per the procedure described previously.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

8 **LATERAL FLIGHT PLAN**

SELECTING A DEPARTURE





You may use the [NEXT PAGE] to gain access to the listings of runways, SIDs, and transitions.

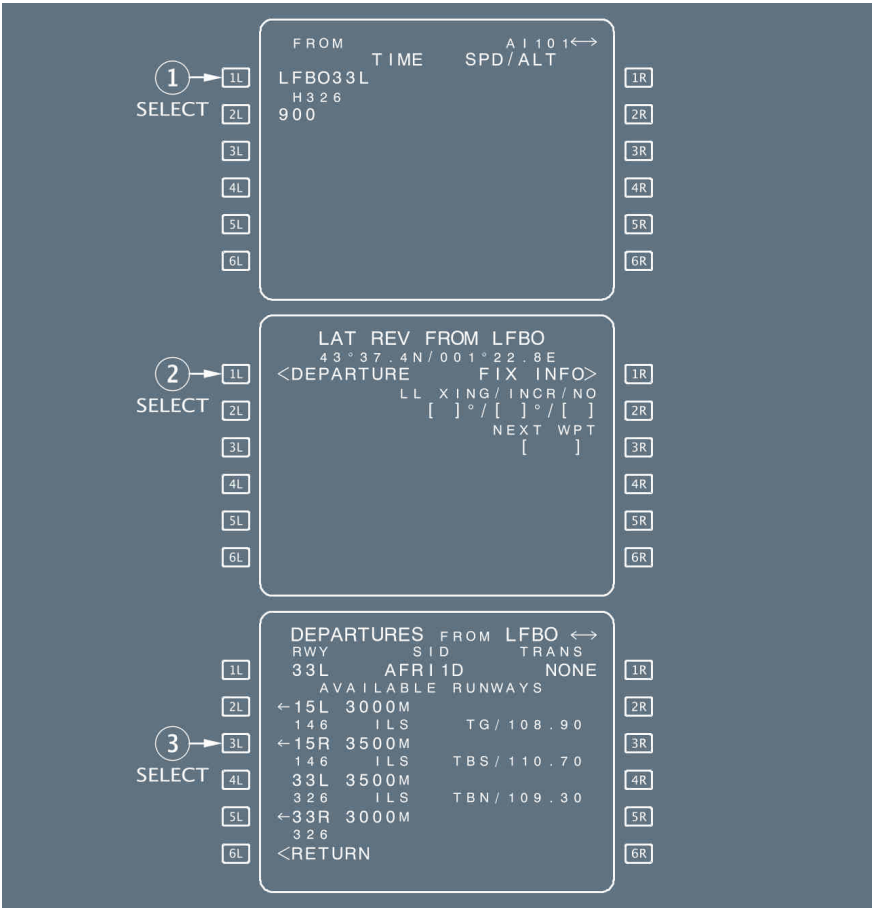
Procedure

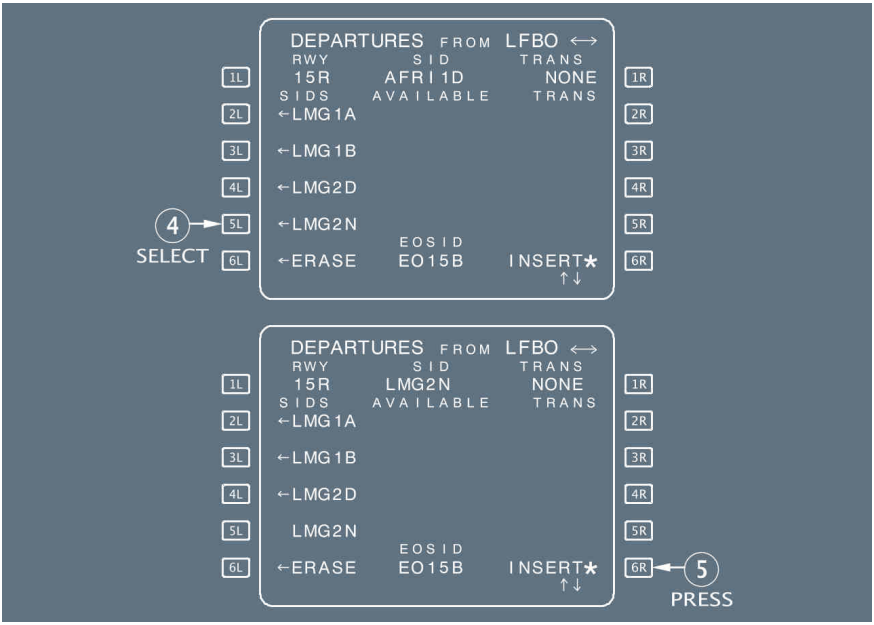
PRESS the F-PLN key on MCDU
SELECT the DEPARTURE prompt [1L] key
SELECT the RWY in USE, SID and TRANS
CHECK the resulting temporary F-PLN
If it is correct, INSERT it using [6R] key.
If it is not correct, ERASE it using [6L] key.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

9 **LATERAL FLIGHT PLAN**

SELECTING A DEPARTURE





You may use the "NEXT PAGE" ⏩ , or the "←" or "→" keys to gain access to the listings of runways, SIDs, and transitions.

Procedure

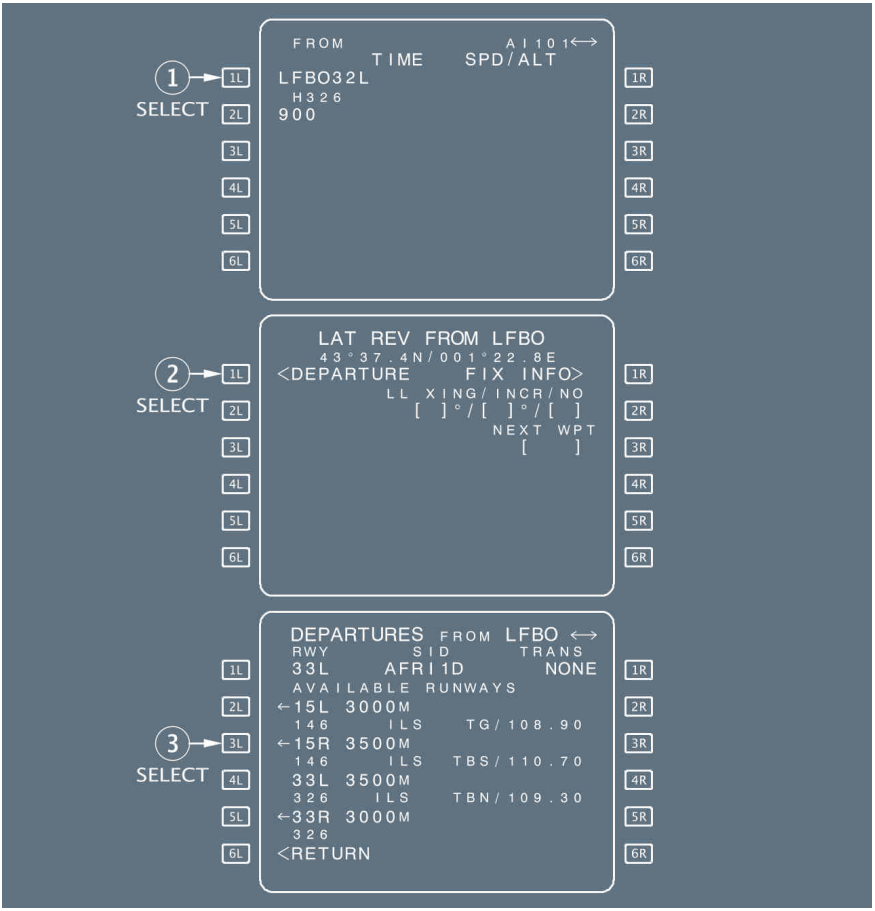
PRESS the F-PLN key on MCDU
SELECT the DEPARTURE prompt [1L] key
SELECT the RWY in USE, SID and TRANS
CHECK the resulting temporary F-PLN
If it is correct, INSERT it using [6R] key.
If it is not correct, ERASE it using [6L] key.

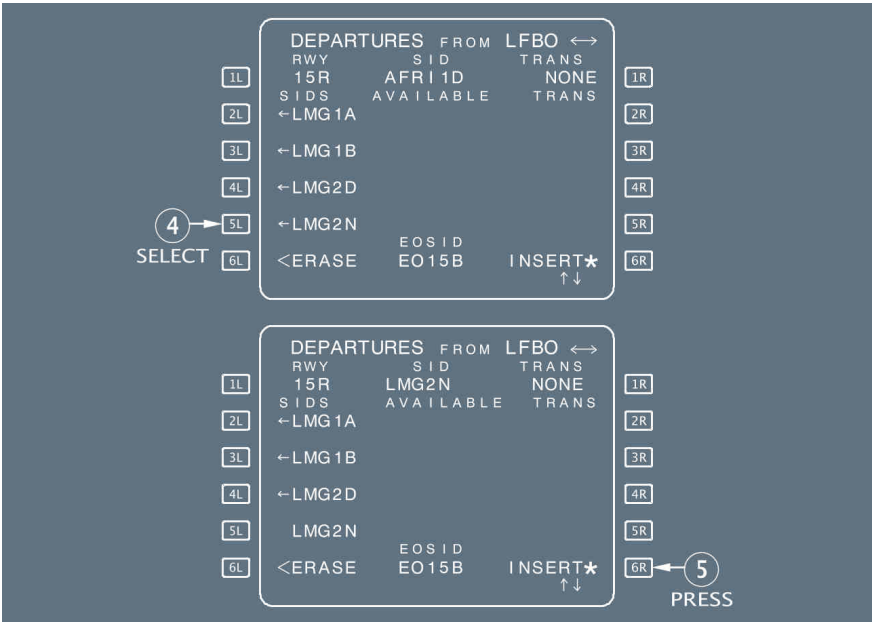
Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

10

LATERAL FLIGHT PLAN

SELECTING A DEPARTURE





You may use the "NEXT PAGE" ⏪ , or the "←" or "→" keys to gain access to the listings of runways, SIDs, and transitions.

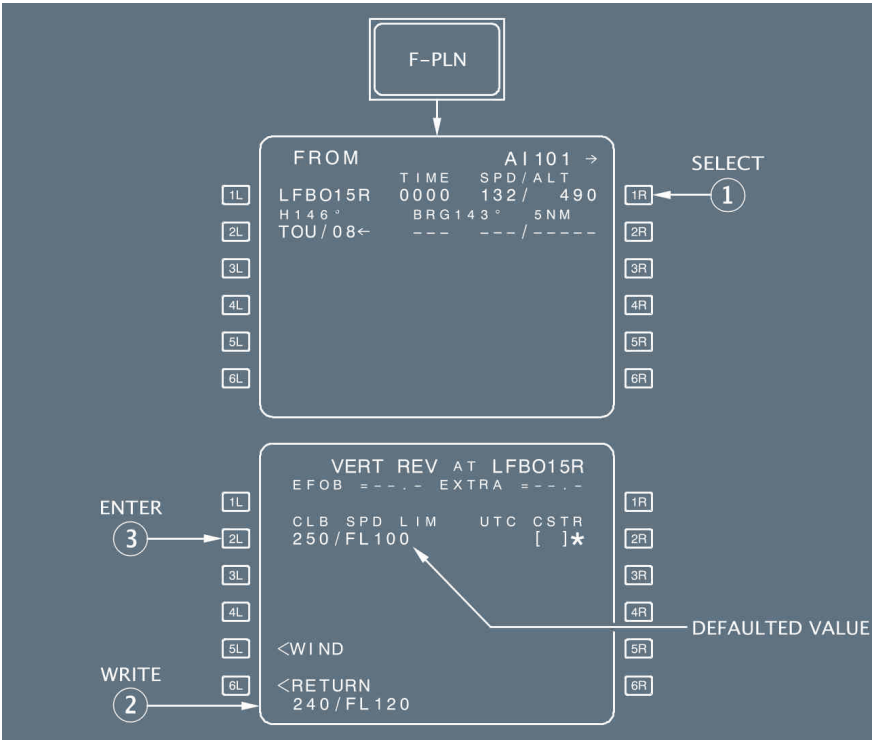
Procedure

PRESS the F-PLN key on MCDU
SELECT the DEPARTURE prompt [1L] key
SELECT the RWY in USE, SID and TRANS
CHECK the resulting temporary F-PLN
If it is correct, INSERT it using [6R] key.
If it is not correct, ERASE it using [6L] key.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

11 **VERTICAL FLIGHT PLAN**

ENTERING/MODIFYING A SPEED LIMIT



Procedure

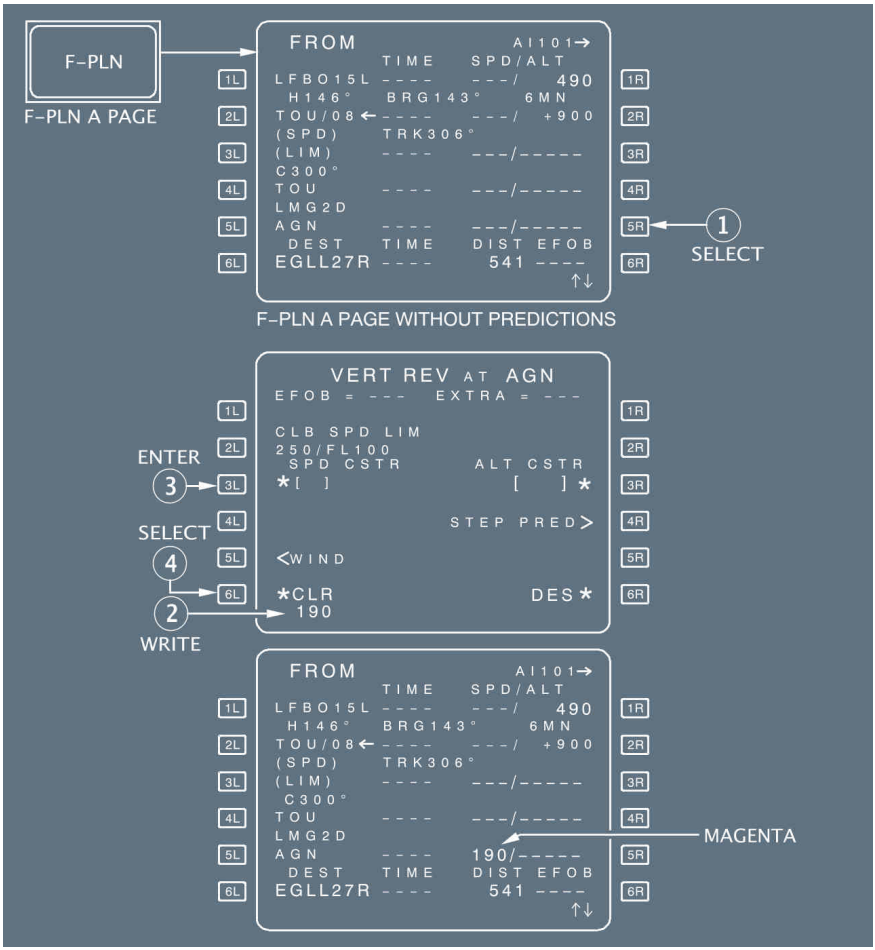
PRESS the F-PLN key on the MCDU.
SELECT VERTICAL REVISION at the FROM waypoint.
WRITE a new speed limit/altitude and ENTER.

The crew can insert one climb speed limit and one descent speed limit into the vertical flight plan, or modify or clear the limits that are already in it.

The speed limit is defined by a speed and an altitude (for example, 230/9 000), which means that the managed speed target will be limited by the speed limit when the aircraft flies below the specified altitude.

In both climb and descent, 250 kt at 10 000 ft is the default speed limit in the vertical flight plan. The vertical revision page presents the climb speed (CLB SPD) limit if the revised waypoint belongs to a SID or is between departure and top of climb.
The vertical revision page shows the descent speed (DES SPD) limit, if the revised waypoint belongs to a standard terminal arrival route (STAR) or is between top of descent and destination.
It can be deleted by a clear action, the field reverts to brackets. It can also be cleared directly on the F-PLN A page by clearing the SPD LIM pseudo-waypoint.

ENTERING A SPEED CONSTRAINT



Procedure

PRESS the F-PLN key on the MCDU.
SELECT the VERT REV page at the revised waypoint.
WRITE the speed constraint value into the scratchpad and ENTER it in 3L.

INSERT the constraint using the appropriate *CLB or DES* prompt when displayed. If CLB and DES are not displayed, insertion occurs when the value is entered in 3L.

The system displays the climb (CLB) or the descent (DES) prompt at [6L] or [6R] when the predictions are not yet available or when the waypoint is part of the cruise phase as originally defined.

When predictions are not yet available, the constraints are displayed on the F-PLN A page in magenta.

When predictions are available, the speed constraint is highlighted by a star (*).

** If the predicted speed matches the constraint, the star is magenta.*

** If the prediction is that the aircraft will miss the speed constraint, the star is amber.*

If a speed constraint cannot be met (by more than 10 kt), the FMGS generates the message "SPD ERROR AT WPT XX".

A speed constraint may be assigned to any waypoint in the climb or the descent phase except the FROM, origin, or destination waypoints, and any pseudo waypoint.

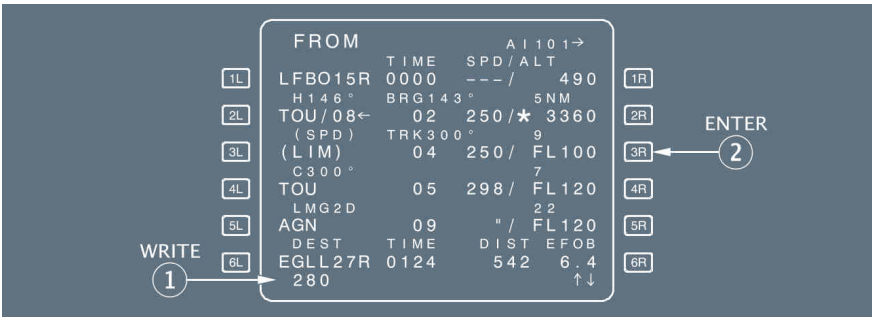
When a speed constraint is assigned to a waypoint, the constraint will limit the managed speed target as follows:

- *In takeoff or climb phase until you pass the constrained waypoint.*
- *In descent an approach phase, after passing the constrained waypoint.*

Speed constraints are observed by the FMGS when NAV mode and speed managed are active.

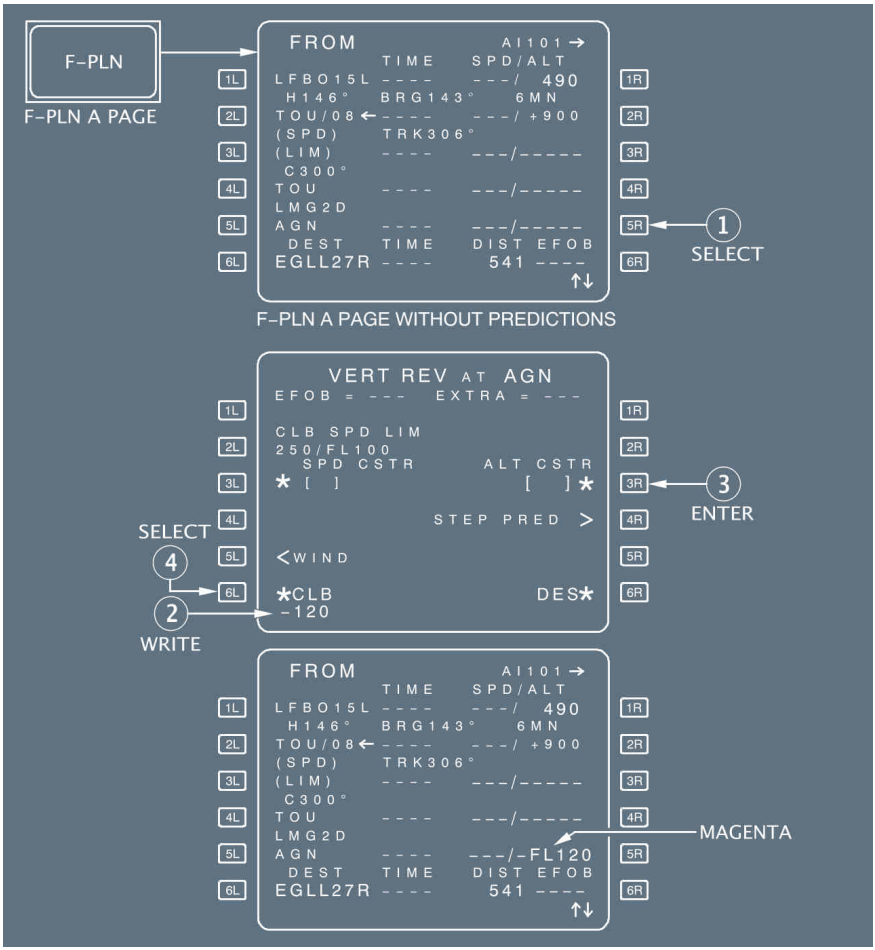
ENTERING A SPEED CONSTRAINT THROUGH F-PLN A PAGE

You may also enter a speed constraint through the F-PLN A page.



Note: You may delete the constraint using the clear key on the relevant right hand key. However if there is an altitude constraint assigned at that point, the clear action deletes it too.

ENTERING AN ALTITUDE CONSTRAINT



Procedure

PRESS the F-PLN key on the MCDU.
SELECT the “VERT REV”page at the revised waypoint.
WRITE an altitude constraint in the scratchpad and ENTER it in 3R.

INSERT the constraint using *CLB or DES* prompt when it is displayed. Otherwise the value is inserted when it is entered in 3R field.

*The system displays the *CLB or DES* prompt, when the predictions are not yet available, or when the waypoint is part of the cruise phase as originally defined.*

Note: *In case of QFE operations, the altitude constraints must be converted and entered as an altitude in feet.*

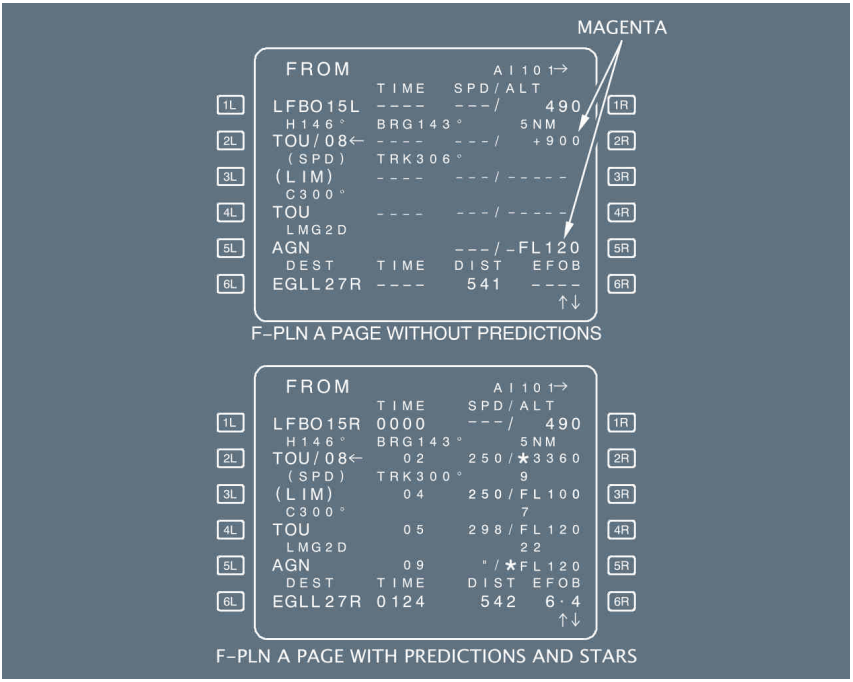
You or the database may assign an altitude constraint to any waypoint in the climb or descent phases except the FROM, origin, or destination waypoints, or any pseudo waypoint.
An altitude constraint may be defined as an "at", an "at or above", or an "at or below" constraint. In certain procedures, the database may define an altitude constraint as a window in which the aircraft should fly.

Enter "AT" constraints with no sign.
Enter "AT or ABOVE" constraints preceded by a + sign (+FL 130, for example).
Enter "AT or BELOW" constraints preceded by a – sign (-15 000, for example).
enter four or five-digit number when entering altitude. Include the lead zero (0 500 ft , for example).

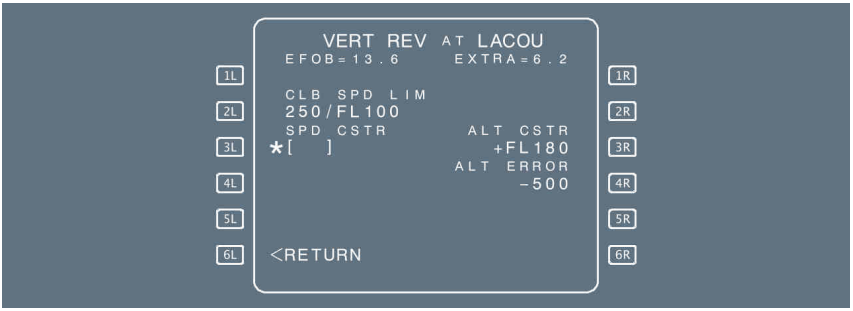
For flight level, enter a two- or three-digit number, with or without the letters "FL". The lead zero is optional. (Examples : +FL 120 or + 120 ; -FL 090 or -90 or - 090)

Enter the altitude value as either altitude or flight level; the MCDU displays the selected value as an "ALT"or "FL," as appropriate for the transition altitude.

The constraint must be higher than the thrust reduction altitude and lower than the cruise flight level.
Once inserted in the flight plan, the altitude constraint (ALT CSTR) is displayed in magenta as long as predictions are not available.
When predictions are available, the altitude constraints are replaced by the predicted altitude at relevant waypoints highlighted by a star.
** If the predicted altitude matches the constraint the star is magenta. If the predicted altitude is missed (by more than 250 ft), the star is amber.*



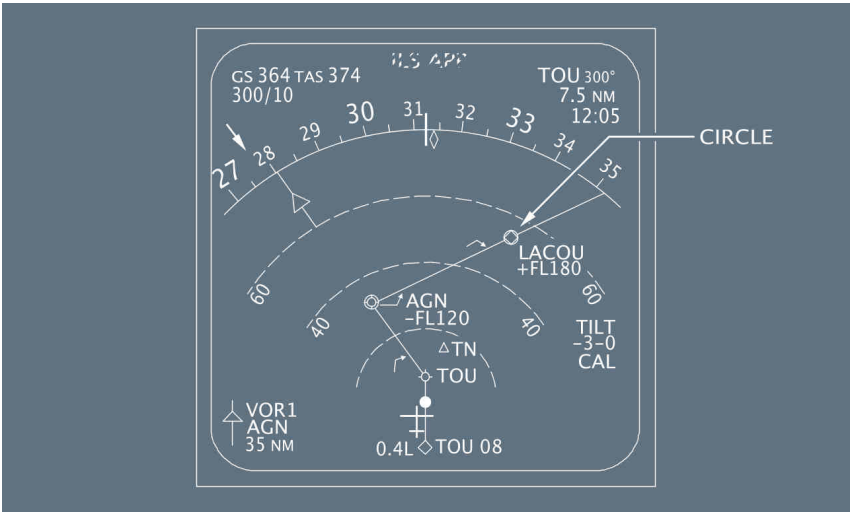
The vertical revision page displays “ALT ERROR”, along with the difference between the constraint and the predicted altitude at the revised waypoint.



ND Display

An altitude-constrained waypoint is marked by a circle (◯) on the navigation display.

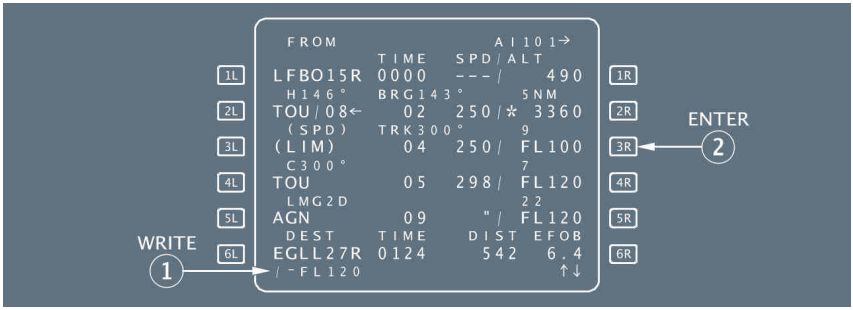
This circle is white when the guidance does not take the altitude constraint into account. It is magenta if the guidance system takes the altitude constraint into account and predicts that it will be matched.
It is amber if the guidance system takes the altitude constraint into account and predicts that it will not be matched.



The aircraft should be at or below FL 120 at AGN and above FL 180 at LACOU.

Entering an Altitude Constraint Through F-PLN A Page

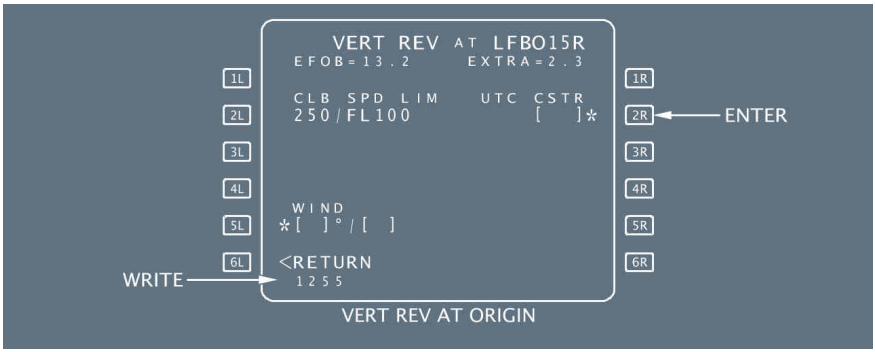
The pilot may also enter an altitude constraint directly through the F-PLN A page.
When entering the value into the scratchpad do not forget the slash e.g. /- 120 or /-FL 120.
If the slash is omitted the value will be considered as a speed constraint if it is within the range value.



Use CLR to delete them directly from the flight plan page, as well. However, if there is also a speed constraint assigned at that waypoint, the clear action deletes it too.

ENTERING AN ESTIMATED TIME OF TAKEOFF (ETT)

The estimated takeoff time (ETT) is a time entered during preflight at the origin airport. The computer then uses this time as the start time for predictions. The system accepts it during the preflight phase if the ETT is later than the time at which you enter it.



Procedure

PRESS the F-PLN key
SELECT the VERT REV page at departure.
WRITE the estimated takeoff time into the scratchpad and ENTER it in 2R.

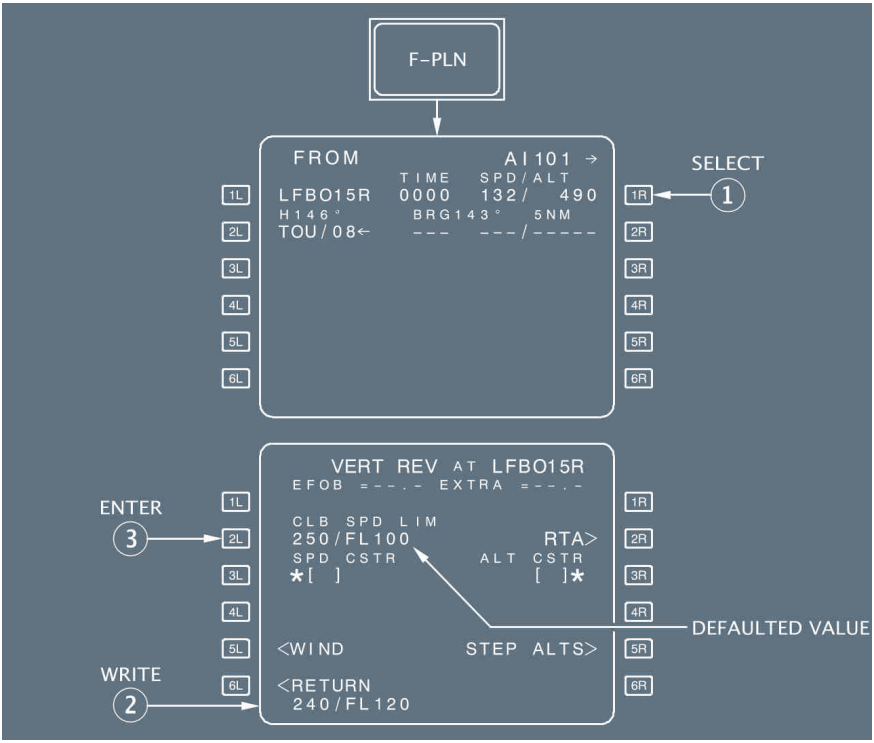
The display reverts automatically to F-PLN A page.
If the aircraft has not taken off by the time entered as the estimated takeoff time, the MCDU displays the "CLK IS TAKE OFF TIME" message, meaning that the system will replace your estimated takeoff time with the actual time.

When beginning the takeoff roll, the system automatically adopts that clock time as the takeoff time.
If the origin airport is changed, or the clock time is invalid, the system automatically deletes the estimated takeoff time.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

12 **VERTICAL FLIGHT PLAN**

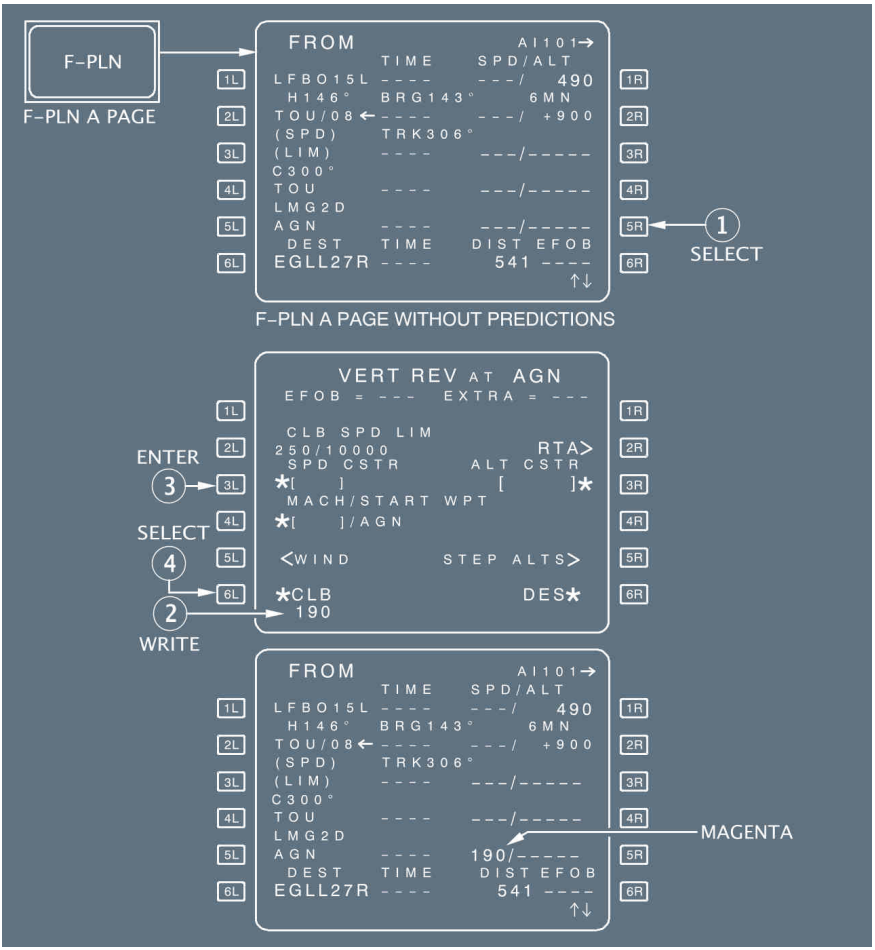
ENTERING/MODIFYING A SPEED LIMIT



PRESS the F-PLN key on the MCDU.
SELECT VERTICAL REVISION at the FROM waypoint.
WRITE a new speed limit/altitude and ENTER.
The crew can insert one climb speed limit and one descent speed limit into the vertical flight plan, or modify or clear the limits that are already in it.

The speed limit is defined by a speed and an altitude (for example, 230/9 000), which means that the managed speed target will be limited by the speed limit when the aircraft flies below the specified altitude.
In both climb and descent, 250 kt at 10 000 ft is the default speed limit in the vertical flight plan.
The vertical revision page presents the climb speed (CLB SPD) limit if the revised waypoint is between departure and top of descent.
The vertical revision page shows the descent speed (DES SPD) limit, if the revised waypoint is between top of descent and destination.
It can be deleted by a clear action, the field reverts to brackets. It can also be cleared directly on the F-PLN A page by clearing the SPD LIM pseudo-waypoint.

ENTERING A SPEED CONSTRAINT



Procedure

PRESS the F-PLN key on the MCDU.
SELECT the VERT REV page at the revised waypoint.
WRITE the speed constraint value into the scratchpad and ENTER it in 3L.

INSERT the constraint using the appropriate *CLB or DES* prompt when displayed. If CLB and DES are not displayed, insertion occurs when the value is entered in 3L.

The system displays the climb (CLB) or the descent (DES) prompt at [6L] or [6R] when the predictions are not yet available or when the waypoint is part of the cruise phase as originally defined.

When predictions are not yet available, the constraints are displayed on the F-PLN A page in magenta.

When predictions are available, the speed constraint is highlighted by a star (*).

** If the predicted speed matches the constraint, the star is magenta.*

** If the prediction is that the aircraft will miss the speed constraint, the star is amber.*

If a speed constraint cannot be met (by more than 10 kt), the FMGS generates the message "SPD ERROR AT WPT XX".

A speed constraint may be assigned to any waypoint in the climb or the descent phase except the FROM, origin, or destination waypoints, and any pseudo waypoint.

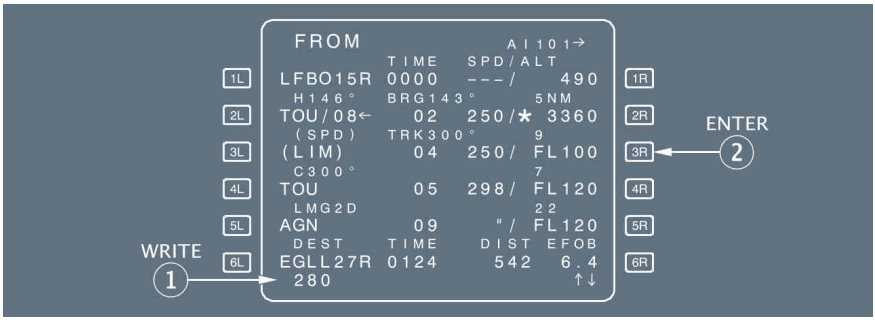
When a speed constraint is assigned to a waypoint, the constraint will limit the managed speed target as follows:

- *In takeoff or climb phase until you pass the constrained waypoint.*
- *In descent an approach phase, after passing the constrained waypoint.*

Speed constraints are observed by the FMGS when NAV mode and speed managed are active.

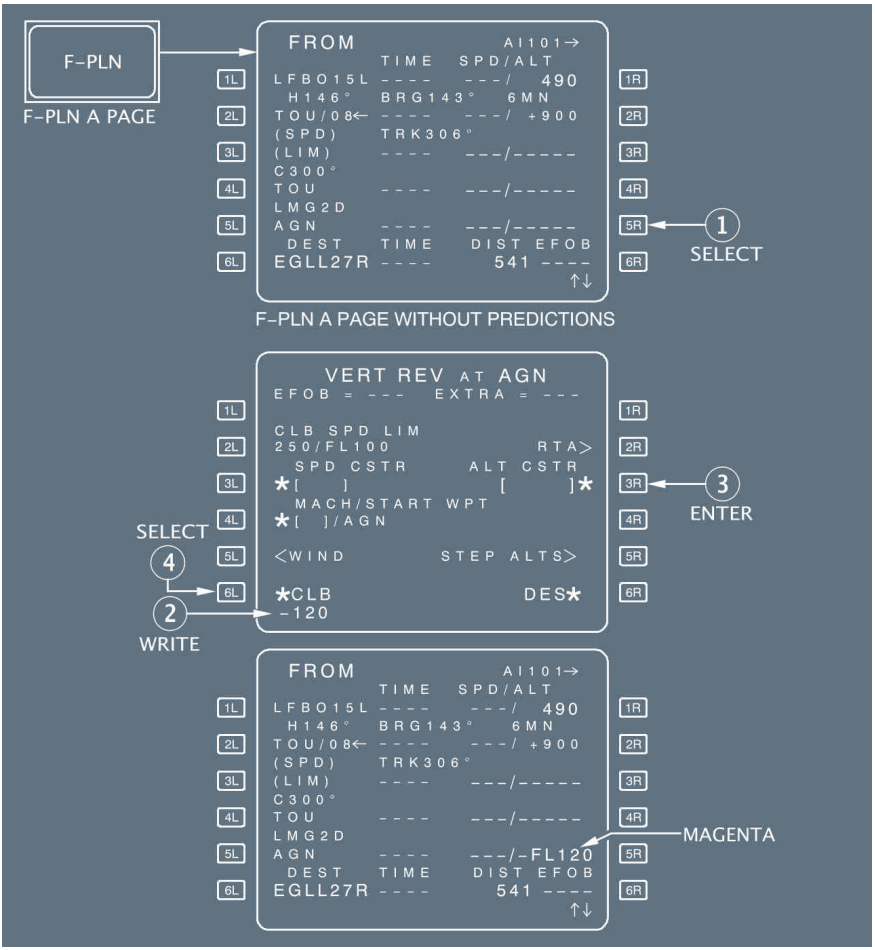
ENTERING A SPEED CONSTRAINT THROUGH F-PLN A PAGE

You may also enter a speed constraint through the F-PLN A page.



Note: *You may delete the constraint using the clear key on the relevant right hand key. However if there is an altitude constraint assigned at that point, the clear action deletes it too.*

ENTERING AN ALTITUDE CONSTRAINT



Procedure

PRESS the F-PLN key on the MCDU.
SELECT the “VERT REV”page at the revised waypoint.
WRITE an altitude constraint in the scratchpad and ENTER it in 3R.

INSERT the constraint using *CLB or DES* prompt when it is displayed. Otherwise the value is inserted when it is entered in 3R field.

*The system displays the *CLB or DES* prompt, when the predictions are not yet available, or when the waypoint is part of the cruise phase as originally defined.*

Note: *In case of QFE operations, the altitude constraints must be converted and entered as an altitude in feet.*

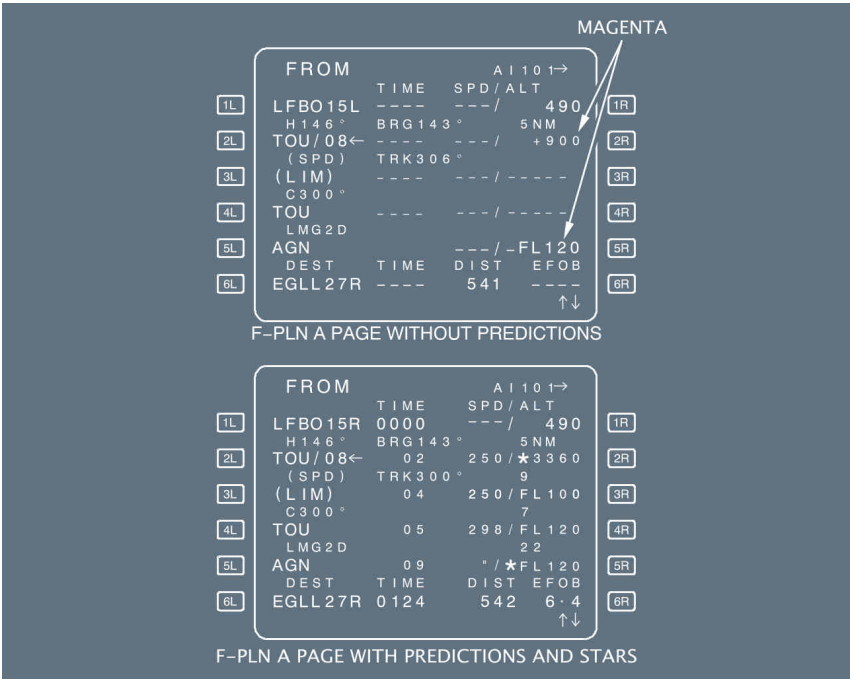
You or the database may assign an altitude constraint to any waypoint in the climb or descent phases except the FROM, origin, or destination waypoints, or any pseudo waypoint.
An altitude constraint may be defined as an “at”, an “at or above”, or an “at or below” constraint. In certain procedures, the database may define an altitude constraint as a window in which the aircraft should fly.

Enter “AT” constraints with no sign.
Enter “AT or ABOVE” constraints preceded by a + sign (+FL 130, for example).
Enter “AT or BELOW” constraints preceded by a – sign (-15 000, for example).
enter four or five-digit number when entering altitude. Include the lead zero (0 500 ft , for example).

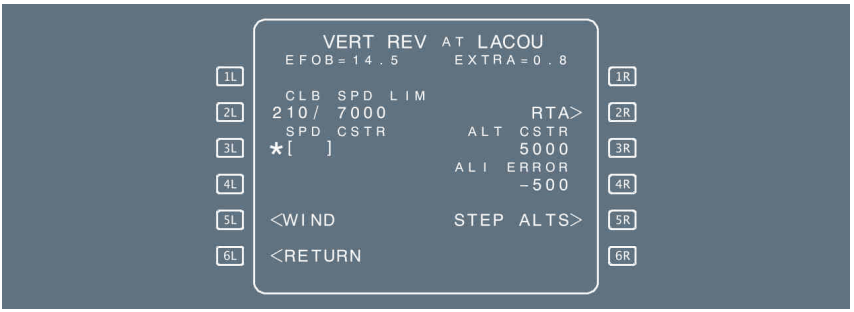
For flight level, enter a two- or three-digit number, with or without the letters “FL”. The lead zero is optional. (Examples : +FL 120 or + 120 ; -FL 090 or -90 or - 090)

Enter the altitude value as either altitude or flight level ; the MCDU displays the selected value as an “ALT”or “FL,” as appropriate for the transition altitude.

The constraint must be higher than the thrust reduction altitude and lower than the cruise flight level.
Once inserted in the flight plan, the altitude constraint (ALT CSTR) is displayed in magenta as long as predictions are not available.
When predictions are available, the altitude constraints are replaced by the predicted altitude at relevant waypoints highlighted by a star.
** If the predicted altitude matches the constraint the star is magenta. If the predicted altitude is missed (by more than 250 ft), the star is amber.*



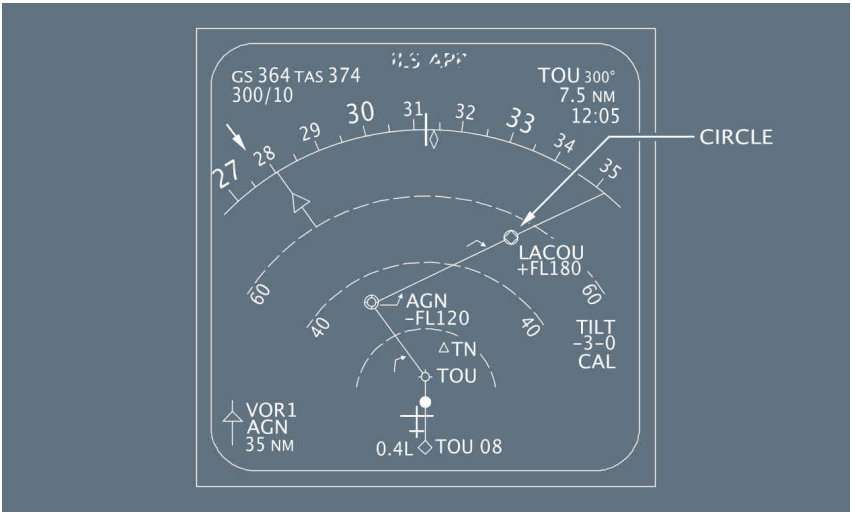
The vertical revision page displays “ALT ERROR”, along with the difference between the constraint and the predicted altitude at the revised waypoint.



ND Display

An altitude-constrained waypoint is marked by a circle (◯) on the navigation display.

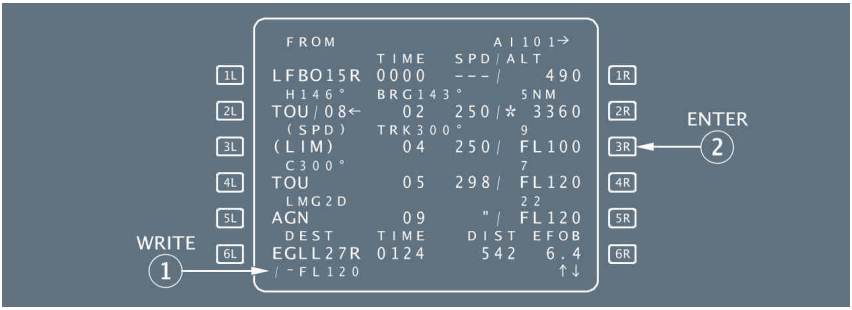
This circle is white when the guidance does not take the altitude constraint into account. It is magenta if the guidance system takes the altitude constraint into account and predicts that it will be matched.
It is amber if the guidance system takes the altitude constraint into account and predicts that it will not be matched.



The aircraft should be at or below FL 120 at AGN and above FL 180 at LACOU.

Entering an Altitude Constraint Through F-PLN A Page

The pilot may also enter an altitude constraint directly through the F-PLN A page.
When entering the value into the scratchpad do not forget the slash e.g. /- 120 or /-FL 120.
If the slash is omitted the value will be considered as a speed constraint if it is within the range value.



Use CLR to delete them directly from the flight plan page, as well. However, if there is also a speed constraint assigned at that waypoint, the clear action deletes it too.

ENTERING AN ESTIMATED TIME OF TAKEOFF (ETT)

In Preflight Phase:

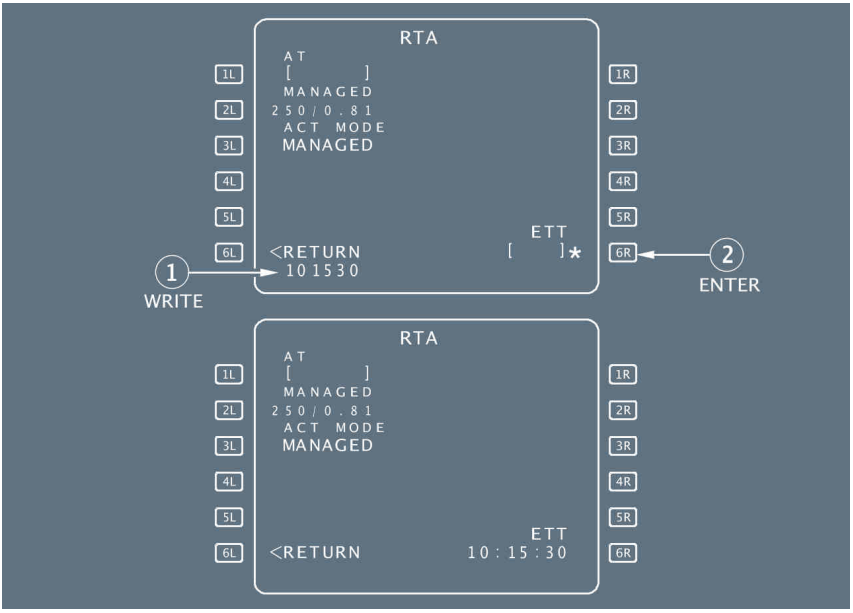
SELECT the SEC F-PLN key on the MCDU.
SELECT a VERT REV at any waypoint.
SELECT the Required Time of Arrival (RTA) prompt (2R).

The MCDU displays the RTA page.

ENTER the Estimated Takeoff Time in the [6R] field.

The format is HHMMSS (entry of seconds is not mandatory).

ENTER it in the 6R field



If the aircraft has not taken off by the time entered as estimated takeoff time, the MCDU displays the "CLK IS TAKE OFF TIME" message, meaning that the system will replace your estimated takeoff time with the actual time.
When beginning the takeoff roll, the system automatically adopts that clock time as the takeoff time.
If the origin airport is changed, or the clock time is invalid, the system automatically deletes the estimated takeoff time.

Applicable to: ALL

FLIGHT PLAN CHECK

CHECK the EOSID on the ND plan mode (yellow line).

Note: If the details of the EOSID require review, select the EOSID as a TMPY F-PLN and review it as TMPY. Then ERASE it.

Applicable to: ALL

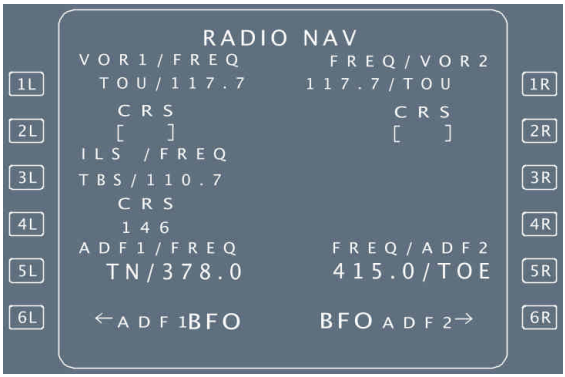
SECONDARY F-PLN

For details : *Refer to DSC-22_20-60-50 Secondary Flight Plan.*

Applicable to: ALL

RADIO NAV

Whenever a NAVAID IDENT is correctly decoded, in agreement with that published, no audio check is necessary.
Morse decoding is displayed on the ND for VOR/DME, VOR/TAC, DME, ADF, and on the PFD for ILS.
Preferably use the identifier for NAVAID entry.
If the ADF IDENT is not in the database, be sure to include a decimal point when tuning the frequency (e.g 315. or 325.7).



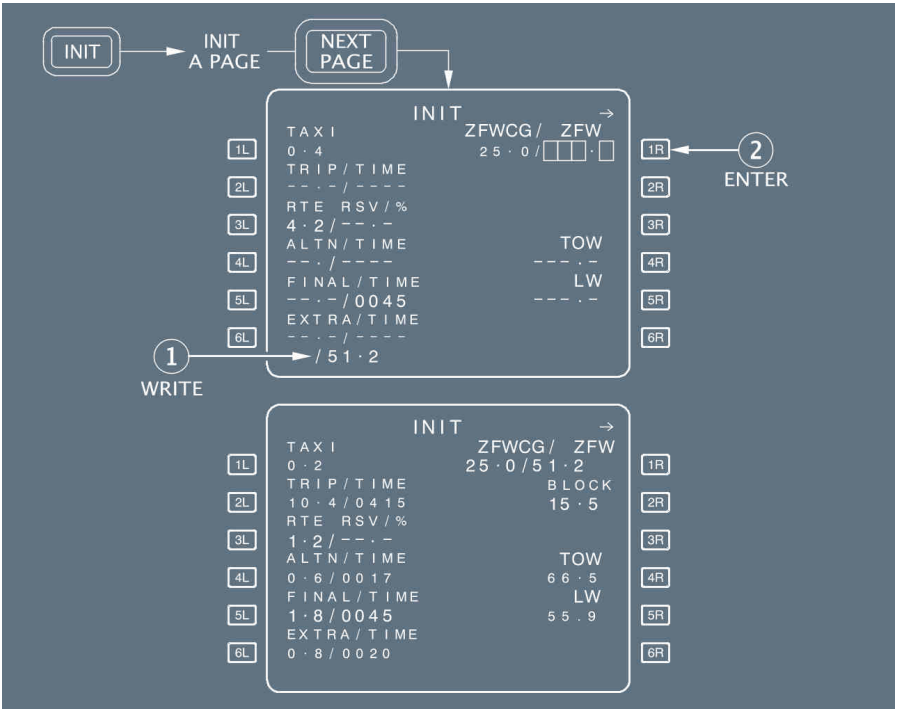
Note: *Whenever, the runway ILS is intented to be retained for guidance after the takeoff phase, it is recommended to manually tune the ILS by its identifier.*

FMGS DATA INSERTION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

13 ## GROSS WEIGHT INSERTION

The flight system must have a number for aircraft gross weight (GW) in order to perform all the performance computations.



PROCEDURE

CHECK/MODIFY the ZFWCG
ENTER a ZFW
ENTER a BLOCK FUEL
CHECK/MODIFY the TAXI FUEL.
CHECK/MODIFY the RTE RSV.
CHECK/MODIFY the FINAL/TIME.

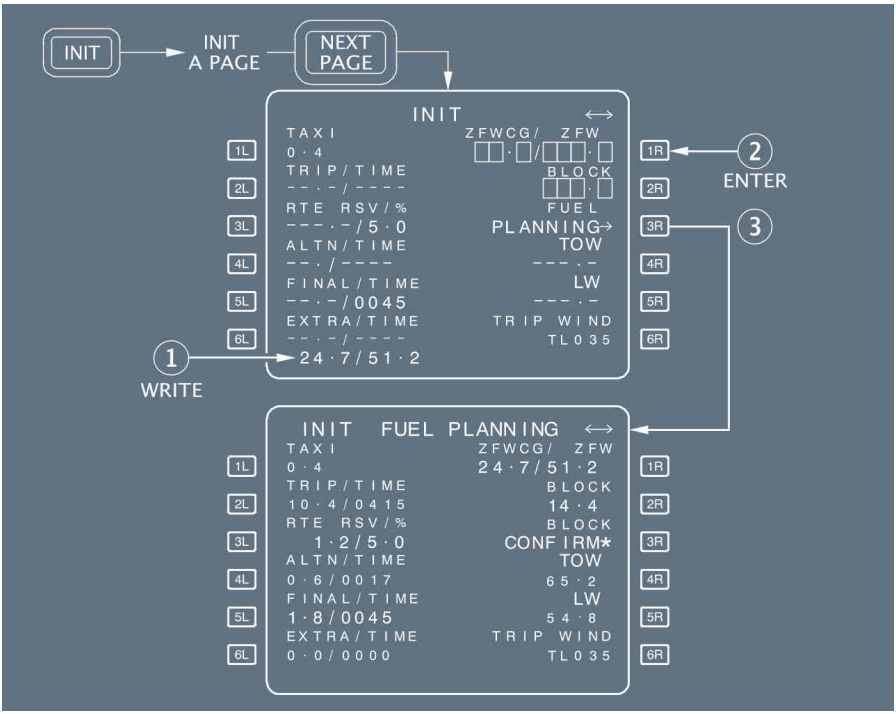
Note: - *As long as the final Load and Trim Sheet is not available, the flight crew may insert the estimated ZFWCG/ZFW in order to get fuel, time, and altitude estimates. The ZFWCG and ZFW must be updated with the final Load and Trim Sheet.*

- *Insert the ZFWCG/ZFW/BLOCK fuel preferably after F-PLN completion. If inserted before F-PLN completion, the FMGC automatically recomputes the predictions at each F-PLN change, including weight or wind changes. Therefore, F-PLN completion takes more time than normal.*

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

14 **WEIGHT/CG INSERTION AND FUEL PLANNING**

The flight crew must enter the Zero Fuel Weight (ZFW) and Zero Fuel Weight Center of Gravity (ZFWCG) values on the INIT B page, to allow the FMS to perform the fuel planning computations.



PROCEDURE

PRESS the INIT key, and the Next ("->") key to access the INIT B page.
ENTER the ZFWCG and ZFW value in the [1R] field.

The "FUEL PLANNING →" prompt appears in the [3R] field.

Note: As long as the final Load and Trim Sheet is not available, the crew should insert the estimated ZFWCG/ZFW in order to get fuel estimates. The ZFWCG and ZFW values must be updated with the final Load and Trim Sheet values.

CHECK/MODIFY the TAXI [1L] and RTE RSV [3L] values.

The TAXI and RTE RSV fields display the default values specified in the AMI file (for example, "0.4 t"for TAXI, and "5.0 %"for RTE RSV). The flight crew may modify these values.

CHECK/MODIFY the TRIP WIND value in the [6R] field.

If no wind profile has been entered in the F-PLN, the crew may enter an average TRIP WIND in this field, to have more realistic fuel/time predictions.

Note:
1. *If the crew has already defined a wind profile, even partially (such as climb wind), it is not possible to enter a TRIP WIND.*
2. *If the crew enters a TRIP WIND, and subsequently enters a wind profile on the WIND pages, the TRIP WIND will be erased, and the FMS will use the wind profile defined on the WIND pages for predictions computations.*

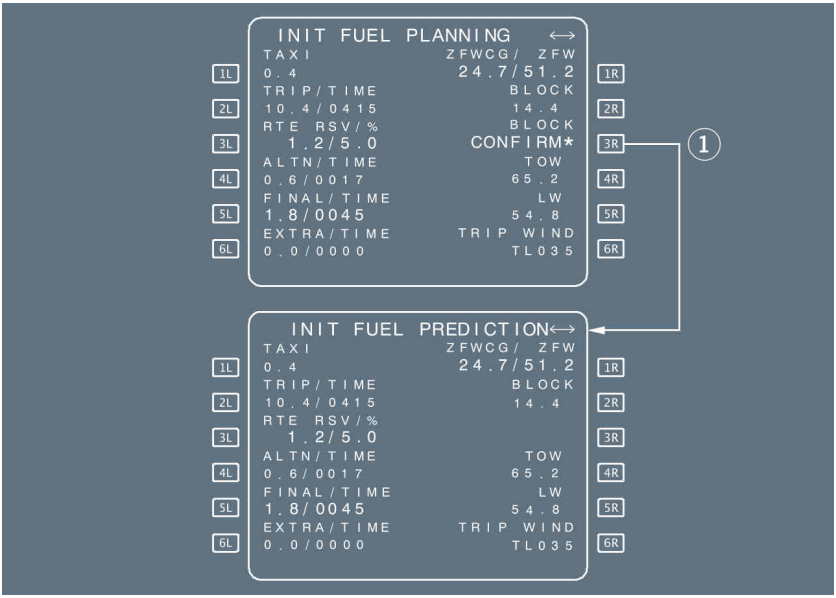
PRESS the FUEL PLANNING prompt [3R].

The FMS computes the required BLOCK fuel in order to have EXTRA fuel = 0, based on the parameters entered on the INIT and F-PLN pages. The computed BLOCK fuel value is displayed in the [2R] field, and a BLOCK CONFIRM prompt appears in the [3R] field.

Note: In order to obtain a realistic BLOCK fuel computation, the flight crew should ensure that the F-PLN initialization has been completed (including ALTN if necessary), and that flight parameters, such as CRZ FL, steps climbs (if any), and winds, have been inserted, before using the FUEL PLANNING function.

The flight crew must check the FMS-computed BLOCK fuel value against the actual block fuel required for the flight. Fuel planning must not be based only on FMS predictions.

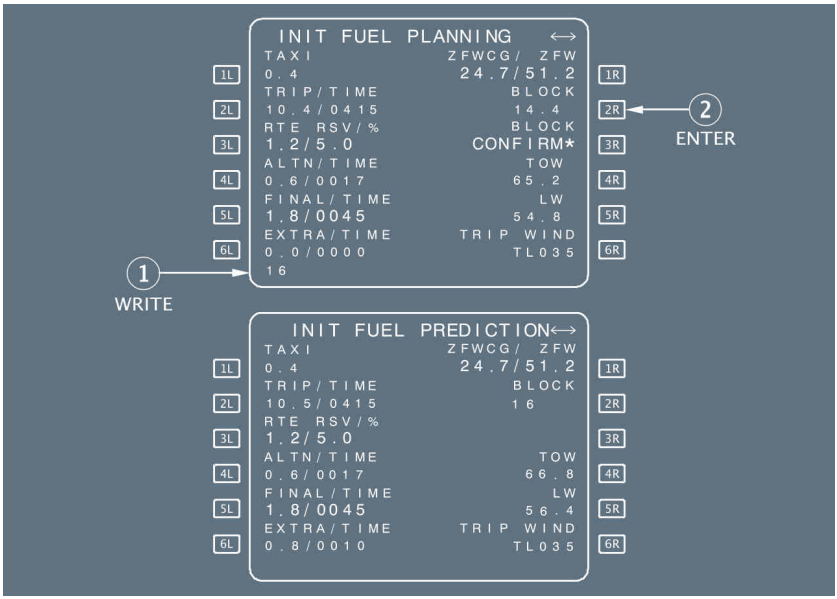
- **If the computed BLOCK fuel corresponds to the actual block fuel required for the flight:**



PRESS the BLOCK CONFIRM prompt [3R].

The FMS computes all the predictions, based on the computed BLOCK fuel.

- **If the computed BLOCK fuel does NOT correspond to the actual block fuel required for the flight:**



ENTER the desired BLOCK fuel in the [2R] field.

The FMS computes the predictions, based on the entered BLOCK fuel, and estimates the EXTRA fuel value.

- **When the BLOCK fuel has been entered:**

CHECK/ MODIFY the FINAL/TIME [5L] values.

If the crew modifies the FINAL or TIME values, the EXTRA fuel value will be modified accordingly.

Note: The ALTN value computed by the FMS may differ from the value retained on the operational flight plan, since some computation hypothesis (such as, for example, the route, wind profile, CRZ FL, CI) may differ.

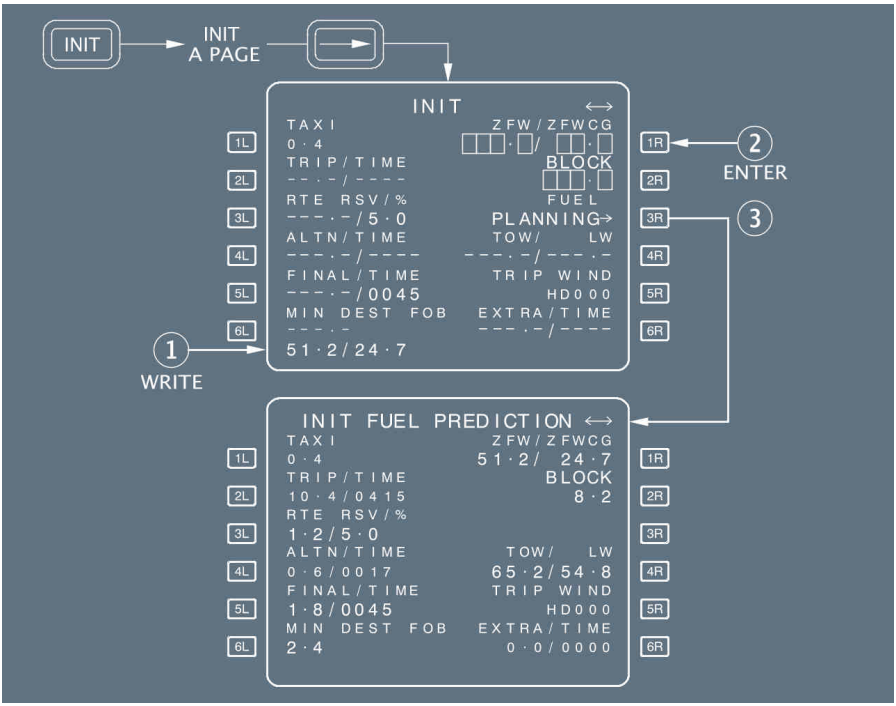
PRINT the PREFLIGHT REPORT, if necessary

When the final Load and Trim Sheet values (ZFWCG/ZFW/BLOCK) have been entered, and the FUEL PLANNING is completed, the flight crew may print the pre-flight report, which provides a copy of the F-PLN with the associated FMS predictions.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

15 **WEIGHT/CG INSERTION AND FUEL PLANNING**

The flight crew must enter the Zero Fuel Weight (ZFW) and Zero Fuel Weight Center of Gravity (ZFWCG) values on the INIT B page, to allow the FMS to perform the fuel planning computations.



PROCEDURE

PRESS the INIT key, and the Next ("→") key to access the INIT B page.
ENTER the ZFW and ZFWCG value in the [1R] field.
The "FUEL PLANNING →" prompt appears in the [3R] field.

Note: As long as the final Load and Trim Sheet is not available, the crew should insert the estimated ZFW/ZFWCG in order to get fuel estimates. The ZFW and ZFWCG values must be updated with the final Load and Trim Sheet values.

CHECK/MODIFY the TAXI [1L], RTE RSV [3L] and FINAL TIME [5L] values.

The TAXI, RTE RSV and FINAL TIME fields display the default values specified in the AMI file (for example, "0.4 t"for TAXI, "5.0 %"for RTE RSV and "0045" for FINAL TIME). The flight crew may modify these values.

Note: At takeoff, the RTE RSV field will automatically be reset to 0. The RTE RSV fuel is then added to the EXTRA fuel, which ensures that the EXTRA fuel and MIN DEST FOB values are consistent in flight.

ENTER an ALTN fuel value in the [4L] field, as necessary.

The flight crew may enter the ALTN fuel value planned on the Computerized Flight Plan (CFP), as necessary.

ENTER a MIN DEST FOB value in the [6L] field, as necessary.

Note: MIN DEST FOB (equal to ALTN + FINAL) can be increased at flight crew discretion (e.g. when HOLD is expected at destination).

ENTER the TRIP WIND value in the [5R] field, as necessary.

In no wind profile has been entered in the F-PLN, the crew may enter an average TRIP WIND in this field, to obtain more realistic fuel/time predictions before departure.

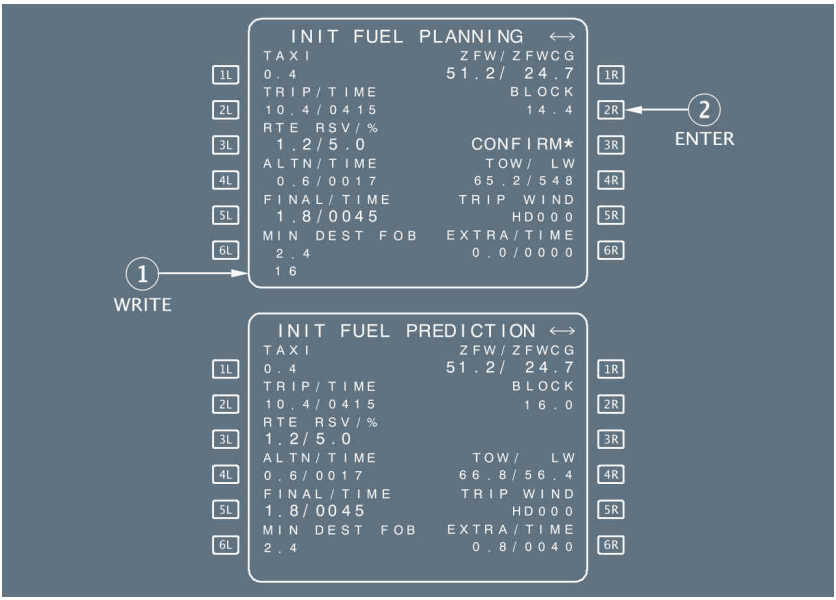
Note:
1. The flight crew should only enter a TRIP WIND to obtain realistic fuel/time predictions, on ground. Then, the flight crew should enter a wind profile using the WIND pages, for fuel/time predictions in flight. As soon as flight crew has entered a wind profile on the WIND pages, the TRIP WIND will be erased.
2. If the crew has already defined a wind profile, even partially (such as climb wind), it is not possible to enter a TRIP WIND.

ENTER the planned BLOCK fuel, as indicated in the computerized flight plan (CFP)

If the planned BLOCK fuel is not available, the crew may obtain a prediction of the minimum BLOCK fuel required for the flight by pressing the FUEL PLANNING prompt [3R].
Pressing this prompt makes the FMS compute the minimum required BLOCK fuel, which is the BLOCK fuel required to have EXTRA fuel = 0, based on the parameters entered on the INIT and F-PLN pages.
The computed BLOCK fuel value is displayed in the [2R] field, and a BLOCK CONFIRM prompt appears in the [3R] field.

Note: In order to obtain a realistic fuel computation, the flight crew should ensure that the F-PLN initialization has been completed (including insertion of the ALTN F-PLN and/or ALTN fuel and/or MIN DEST FOB if necessary), and that flight parameters, such as CRZ FL, steps climbs (if any), and winds, have been inserted.

- **When the final Load and Trim Sheet (LTS) data are available:**



ENTER the final ZFW/ZFWCG [1R], and the required BLOCK fuel [2R].

The FMS computes the predictions, based on the entered BLOCK fuel, and estimates the EXTRA fuel value.

CHECK the resulting computed data, against the data planned on the CFP: TRIP fuel, RTE RSV fuel, ALTN fuel, FINAL and EXTRA fuel values.

If necessary, the flight crew may modify the ALTN or FINAL fuel values.

PRINT the PREFLIGHT REPORT, if necessary.

When the final Load and Trim Sheet values (ZFW/ZFWCG/BLOCK) have been entered, the crew may print the pre-flight report, which provides a copy of the F-PLN with the associated FMS predictions.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

TAKEOFF WITH NO WEIGHT/CG ENTRY - WEIGHT/CG DATA LOST BY THE FMGC

If weight/CG data have not been entered, or if the FMGC loses the values due to a power interruption, managed speed will only be available for the takeoff phase (provided a V2 has been inserted).

After engine start, the MCDU displays “INITIALIZE WEIGHTS”.

If the crew does not enter weight/CG data, the following occurs:
- At takeoff, the Speed Reference System (SRS) mode is available,
- When the aircraft leaves the SRS mode, the target speed becomes the current speed and reverts to selected.

Note: If the AP/FD has reverted to ALT or V/S (FPA) mode, the associated A/THR mode is SPEED. In this case, the system will probably reduce thrust, because the speed will be equal to, or greater than, the target speed.

● **To regain a normal speed target, the flight crew must:**

SELECT the appropriate speed on the FCU and PULL the speed knob

INSERT the GW/CG values on the FUEL PRED page.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

TAKEOFF WITH NO GROSS WEIGHT ENTRY (GW)-GROSS WEIGHT LOST BY THE FMGS

If a GW is not entered, or if the FMGS loses the values due to a power interruption, managed speed will only be available for the takeoff phase (provided a V2 has been inserted).
After engine start, the MCDU displays “INITIALIZE WEIGHTS”.

If the crew does not respond, the following occurs:
- At takeoff, the Speed Reference System (SRS) mode remains active until the aircraft reaches acceleration altitude (ACC ALT), or engages another vertical mode.
- When the aircraft leaves the SRS mode, the target speed becomes the current speed and is no longer managed.

Note: If the AP/FD has reverted to ALT or V/S (FPA) mode, the associated A/THR mode is SPEED. In this case, the system will probably reduce thrust, because the speed will be equal to, or greater than, the target speed.

● **To regain a normal speed target, the flight crew must:**

SELECT the appropriate speed on the FCU and PULL out the speed knob

INSERT the FOB, if necessary, and GW on the FUEL PRED page.

PRESS the SPD pb on FCU to get managed speed target.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

TAKEOFF WITH NO WEIGHT/CG DATA

If the crew does not enter ZFW/ZFWCG data prior takeoff, or if the FMGC looses these values due to a power interruption, the following will occur:

- At takeoff, the Speed Reference System (SRS) mode is available (provided a V2 has been inserted)
- When the aircraft leaves the SRS mode, the target speed becomes the current speed and reverts to selected.

Note: If the AP/FD has reverted to ALT or V/S (FPA) mode, the associated A/THR mode is SPEED. In this case, the system will probably reduce thrust, because the speed will be equal to, or greater than, the target speed.

- **When appropriate, to regain FMS predictions and associated managed modes:**

  INSERT the ZFW/ZFWCG values on the FUEL PRED page.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

INSERTING WEIGHT/CG AFTER ENGINE START

The flight crew must enter the ZFWCG/ZFW values on INIT B page prior to engine start.
After engine start, the flight crew can enter the GW/CG values on the FUEL PRED page.

PRESS to the FUEL PRED key.
INSERT the GW/CG values in the [4R] field.
This allows predictions and performance computation.

Note: Before flight crew entry, the CG is defaulted to 25 %.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

INSERTING GW AND CG AFTER ENGINE START

The pilot must enter the ZFW and ZFWCG on the INIT B page before engine start. If this is not done, the pilot can enter the GW and CG after engine start on the FUEL PRED page.

ACCESS to the FUEL PRED PAGE.
INSERT the gross weight and center of gravity. This allows performance computation.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

INSERTING WEIGHT/CG DATA AFTER ENGINE START

The flight crew must enter the ZFW/ZFWCG values on INIT B page prior to engine start. If these data have not been entered at engine start, the MCDU displays the “INITIALIZE WEIGHTS” amber

message in the scratchpad. After engine start, the crew should enter the ZFW/ZFWCG values on the FUEL PRED page.

PRESS to the FUEL PRED key.
INSERT the ZFW/ZFWCG values in the [4R] field.

This allows predictions and performance computation.

CHECK the resulting computed data, against the data planned on the CFP: TRIP fuel, RTE RSV fuel, ALTN fuel, FINAL and EXTRA fuel values.

If necessary, the flight crew may modify the ALTN or FINAL fuel values.

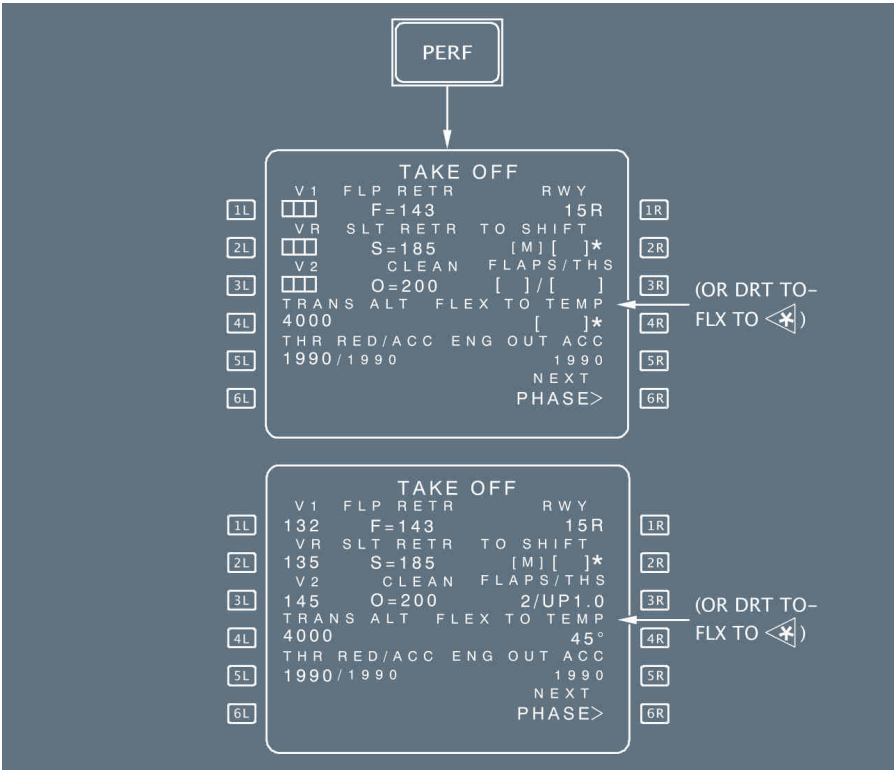
PRINT the PREFLIGHT REPORT, if necessary.

When the final load sheet values (ZFW/ZFWCG/BLOCK) have been entered, the crew may print the pre-flight report, which provides a copy of the F-PLN with the associated FMS predictions.

Applicable to: ALL

16

TAKEOFF DATA INSERTION



PROCEDURE

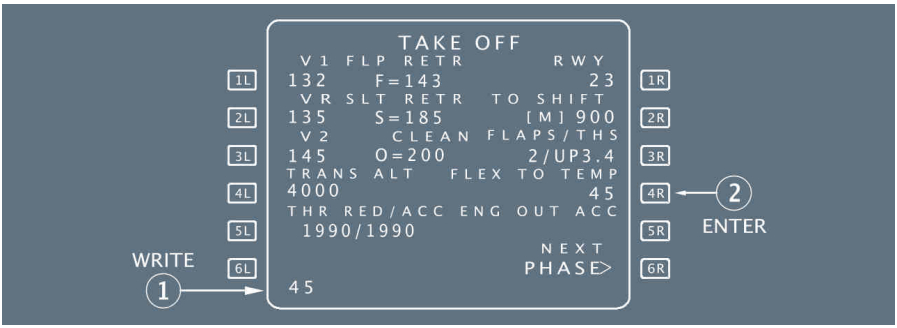
PRESS the PERF key on the MCDU.
WRITE successively and ENTER : V1, VR, V2.
WRITE successively and ENTER T.O. SHIFT and FLX TEMP or DRT TO
CHECK/MODIFY the THR RED ALT (Thrust reduction altitude) See *.
CHECK/MODIFY the ACC ALT (acceleration altitude) See *.
CHECK/MODIFY the ENG OUT ACC (engine out acceleration altitude) See *.
CHECK/MODIFY the TRANS ALT (transition altitude) See *
CHECK V1, V2 on PFD See **

* *Altitudes less than 400 ft above airfield elevation cannot be selected.*

** *If the PFD does not display V2 at the top of its speed scale, check that at least one FD is ON.*

17 **ENTERING A FLEX TEMPERATURE**

WRITE the desired flex temperature in the scratchpad and ENTER using the [4R] key.

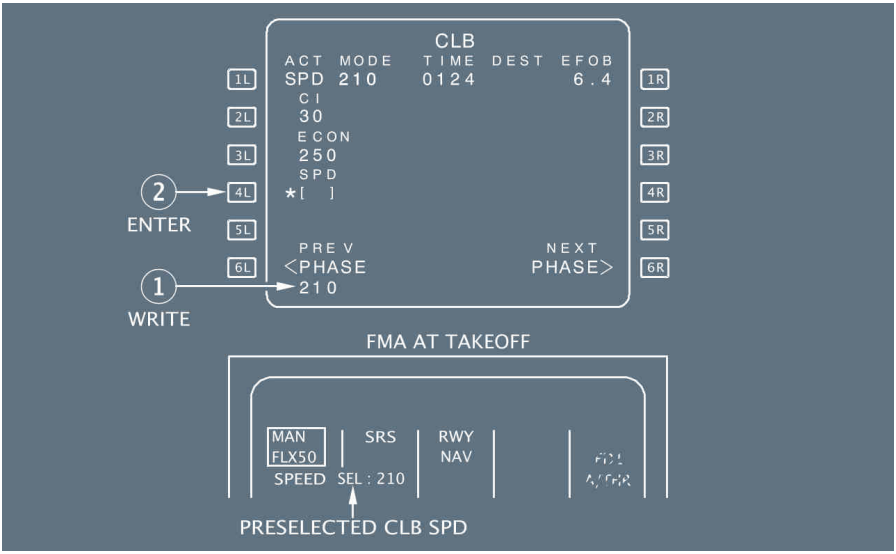


Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

18 **CLIMB SPEED PRESELECTION**

If the managed speeds for the initial climb are not suitable, the pilot can preselect an appropriate climb speed on the “PERF CLB”page, as long as the climb phase is not active.

The CLB SPD preselection applies, when the:
- ATC specifies an initial climb speed.
- Initial climb speed must be lower than normal because:
  - There are to be turns greater than 120 ° in the initial climb out.
  - Obstacle clearance, or some other situation, requires a high climb angle.
  - The airfield has a risk area to be quickly cleared (birds reported, for example).



PROCEDURE

PRESS the PERF key on the MCDU.

The PERF TAKE OFF page is displayed.

SELECT the “NEXT PHASE” [6R] key to display the CLB page.
WRITE a climb speed and ENTER it.
To revert to managed speed, select ECON by pressing [3L].

When the aircraft is transitioning into the climb phase, the preselected value becomes the target speed:

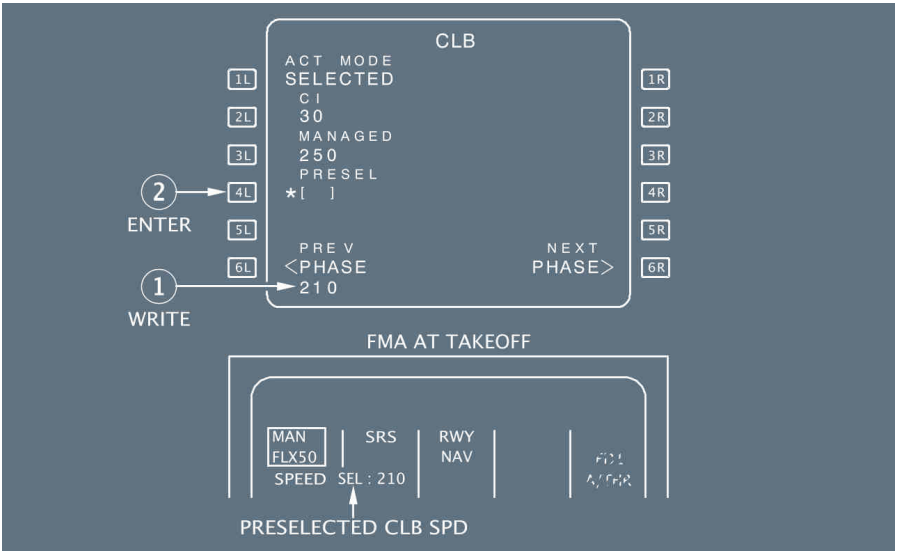
- The selected speed target is active.
- The primary flight display shows the target speed in blue.
- The FCU’s speed window displays the new speed or Mach number.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

19 **CLIMB SPEED PRESELECTION**

If the managed speeds for the initial climb are not suitable, the pilot can preselect an appropriate climb speed on the “PERF CLB”page, as long as the climb phase is not active.

The CLB SPD preselection applies, when the:
- ATC specifies an initial climb speed.
- Initial climb speed must be lower than normal because:
  - There are to be turns greater than 120 ° in the initial climb out.
  - Obstacle clearance, or some other situation, requires a high climb angle.
  - The airfield has a risk area to be quickly cleared (birds reported, for example).



PROCEDURE

PRESS the PERF key on the MCDU.

The PERF TAKE OFF page is displayed.

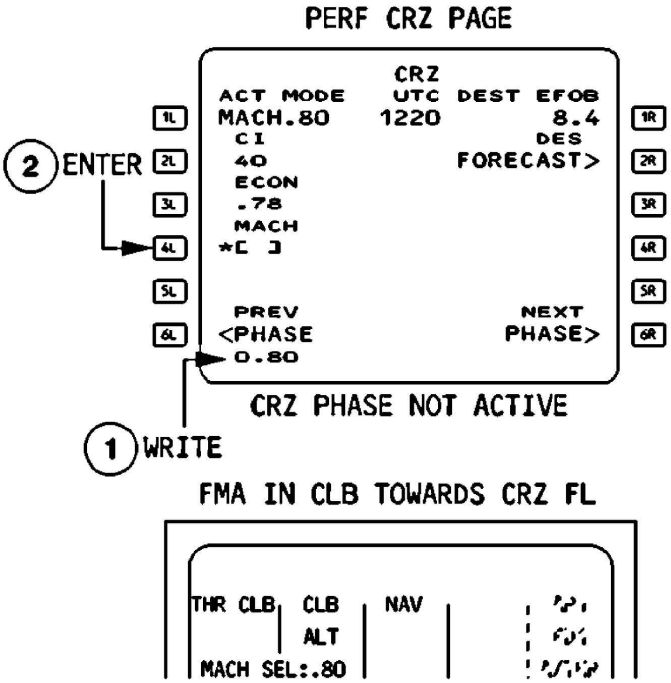
SELECT the “NEXT PHASE” [6R] key to display the CLB page.
WRITE a climb speed and ENTER it.
To revert to managed speed, select MANAGED by pressing [3L].

When the aircraft is transitioning into the climb phase, the preselected value becomes the target speed:
- The selected speed target is active.
- The primary flight display shows the target speed in blue.
- The FCU’s speed window displays the new speed or Mach number.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

CRUISE MACH (SPEED) PRESELECTION

The pilot preselects a cruise Mach, when a Mach number other than the ECON cruise Mach number is required.
When the aircraft transitions to the cruise phase, the speed target symbol goes to the preselected value and MACH (or SPD) becomes selected (blue target on PFD, target MACH shown in the speed/Mach window of the FCU).



PROCEDURE

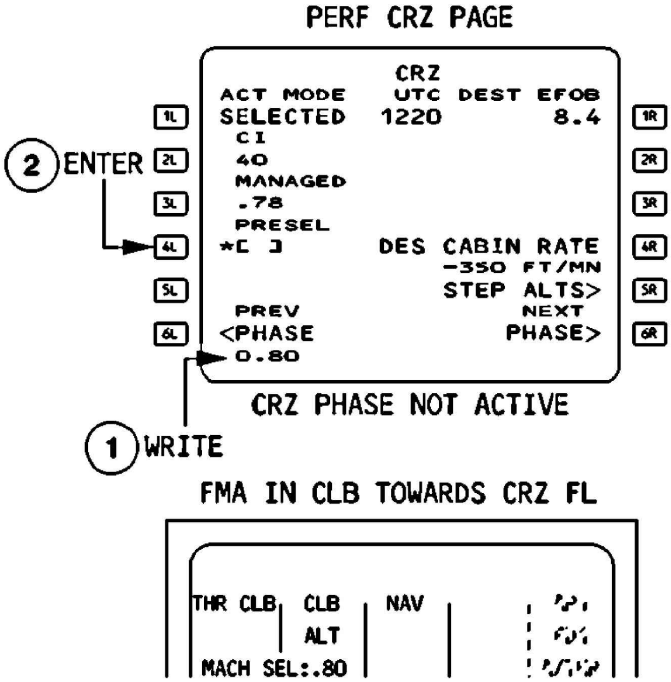
PRESS the PERF key on the MCDU.
PRESS the “NEXT PHASE” [6R] key on the MCDU, until the CRZ page is accessed.
WRITE a cruise Mach (or speed) in the scratchpad and ENTER it in [4L].
To revert to managed speed, PRESS [3L].

When the cruise phase is active, you cannot preselect a cruise Mach or speed.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

CRUISE MACH (SPEED) PRESELECTION

The pilot preselects a cruise Mach, when a Mach number other than the ECON cruise Mach number is required.
When the aircraft transitions to the cruise phase, the speed target symbol goes to the preselected value and “SELECTED” becomes the active speed mode (blue target on PFD, target MACH shown in the speed/Mach window of the FCU).



PROCEDURE

PRESS the PERF key on the MCDU.
PRESS the “NEXT PHASE” [6R] key on the MCDU, until the CRZ page is accessed.
WRITE a cruise Mach (or speed) in the scratchpad and ENTER it in [4L].
To revert to managed speed, PRESS [3L].

When the cruise phase is active, you cannot preselect a cruise Mach or speed.

Applicable to: ALL

ENTERING A HEADING/TRACK PRESET FUNCTION

The heading/track preset allows the pilot to preset a takeoff or go-around heading or track before commanding the aircraft to take up that heading or track (manual activation).
The flight crew can enter a heading or a track preset while the aircraft is on the ground and until takeoff.

PROCEDURE

- **Before takeoff :**

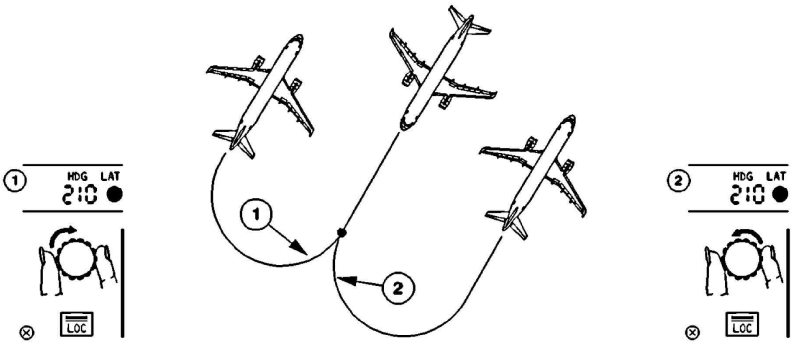
  SET the appropriate HDG or TRK in the FCU window.

  This disarms the navigation mode and allows the runway mode to remain engaged after takeoff.

- **After takeoff :**

  PULL HDG/TRK knob.

  The heading or track mode engages on the preset value.



The direction in which the pilot rotates the HDG/TRK selection knob usually determines the direction of the turn. A left rotation (decreasing heading) produces a left turn ; a right rotation produces a right turn.

However, when a heading has been preset before takeoff or go-around, the direction of the turn will be such as to cause the shortest turn at the moment of engagement.

CANCELLING THE HEADING/TRACK PRESET FUNCTION

The pilot can cancel the heading preset by pushing the HDG/TRK knob back in again. This engages or arms the NAV mode.

FMGS RE-INITIALIZATION AFTER A CANCELED FLIGHT

Applicable to: ALL

If the flight crew initially prepared a flight with all the data associated with this flight (takeoff speeds, winds, etc.), and if this flight is later canceled and replaced by another flight, the flight crew may use the following procedure to initialize the FMGS again:

PREPARE the new flight data in the secondary flight plan, using SEC INIT A, SEC INIT B, and SEC PERF pages
ACTIVATE the secondary flight plan.

Note: *When the flight crew activates the secondary flight plan, the following data of the primary flight plan is lost if the secondary flight plan does not include any replacement data:*

- *Alternate data*
- *Winds and cruise TEMP at waypoints as inserted on CRZ WIND pages*
- *Departure and arrival selection (STAR, APP, RWY) and approach parameters (QNH, TEMP, WIND, TRANS ALT, VAPP, MDA/MDH, DH, LDG CONF)*
- *Altitude, speed, and time constraints*
- *Steps*
- *CMS*
- *Offsets*
- *Flaps/THS*
- *Preselected cruise and descent speeds.*

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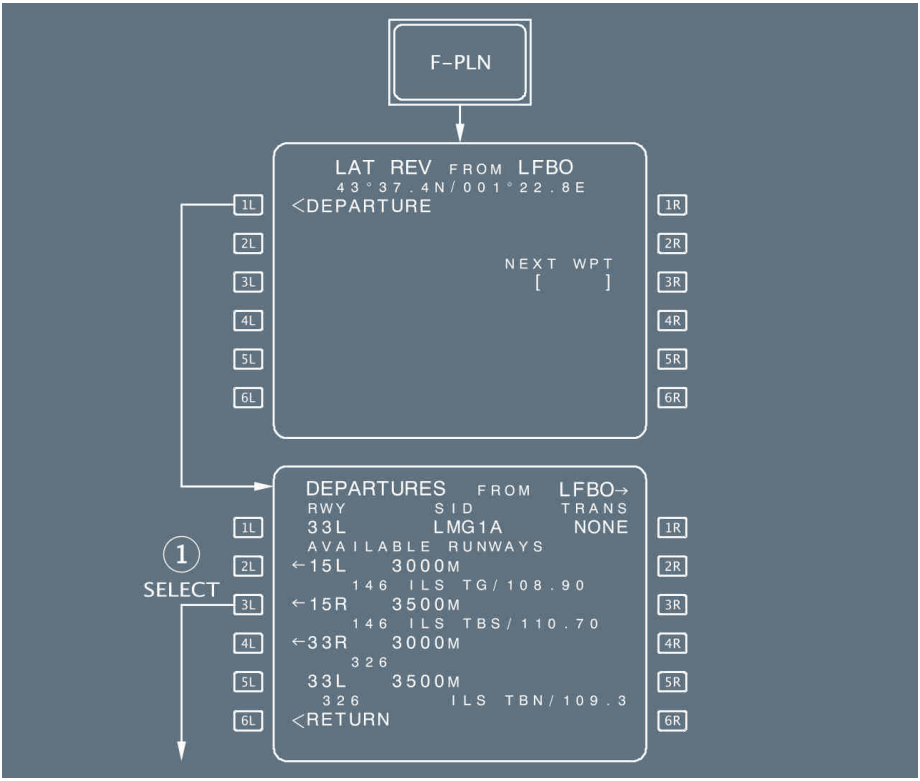
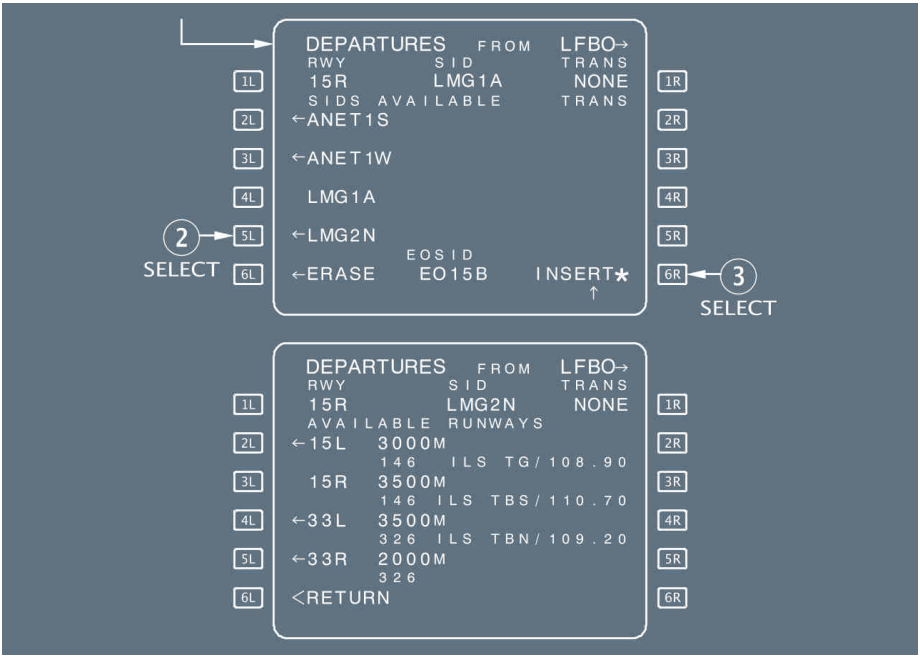
Before Pushback or Start

CHANGE OF RUNWAY

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

1





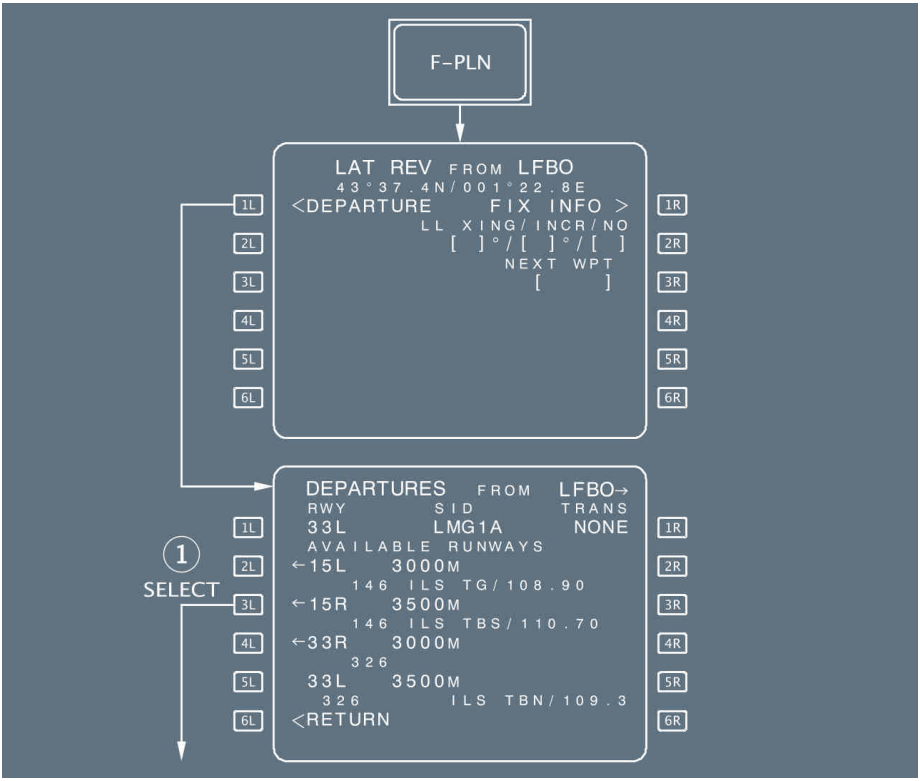
PRESS the F-PLN key on MCDU.
SELECT the LAT REV page at origin.
SELECT the DEPARTURE prompt [1L].
SELECT the new RWY in use.
SELECT the appropriate SID and TRANS.
CHECK the resulting temporary F-PLN and INSERT it.
ENTER the new V1, VR, V2, FLX TO TEMP (or derated thrust if installed) and CONFIGURATION as appropriate.

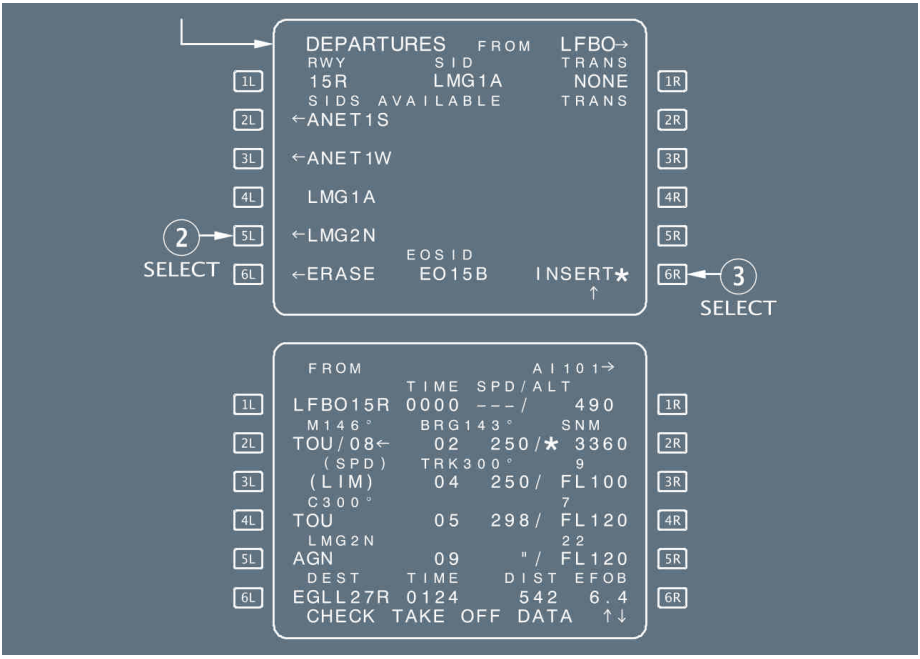
Note: *If the previously selected SID is compatible with the new runway, it automatically appears in the temporary flight plan. Any revision the pilot may have made to the previous SID will not be transferred.*
If the pilot still wants it, he has to reenter it.

CHANGE OF RUNWAY

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

2





PRESS the F-PLN key on the MCDU.
SELECT the LAT REV at origin.
SELECT the DEPARTURE prompt [1L].
SELECT the new RWY in use.
SELECT the appropriate SID and TRANS.
CHECK the resulting temporary F-PLN and INSERT it.
CHECK TAKE OFF DATA comes up in the scratchpad if the PERF TO page had been filled in.
ENTER the new V1, VR, V2, FLEX TEMP or CONF, as appropriate.

Note: *If the previously selected SID is compatible with the new runway, it automatically appears in the temporary flight plan. Any revision the pilot may have made to the previous SID will not be transferred.*
If the pilot still wants it, he has to reenter it.

TAKEOFF FROM INTERSECTION

Applicable to: ALL

Use RTOW or FCOM to revise takeoff parameters :

PRESS the [PERF] key on MCDU
ENTER the takeoff shift
ENTER the new V1, VR, V2, FLX TEMP, or CONF, as appropriate

Note: *The insertion of the shift in takeoff position permits the system to make an accurate revision to its navigation data at takeoff.*

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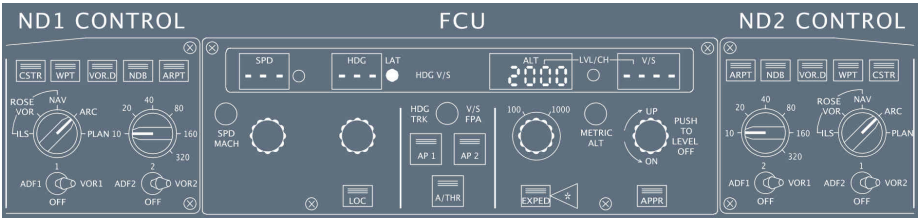
FCU SELECTION FOR TAKEOFF

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

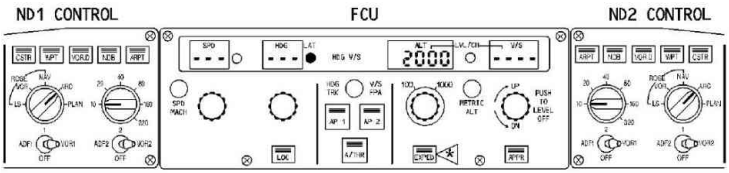


PROCEDURE

ENSURE that HDG –V/S modes are selected (change over pb).
CONFIRM or SELECT the first cleared altitude
CROSS CHECK on PFD the target altitude
CONFIRM both FDs ON

FCU SELECTION FOR TAKEOFF

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI



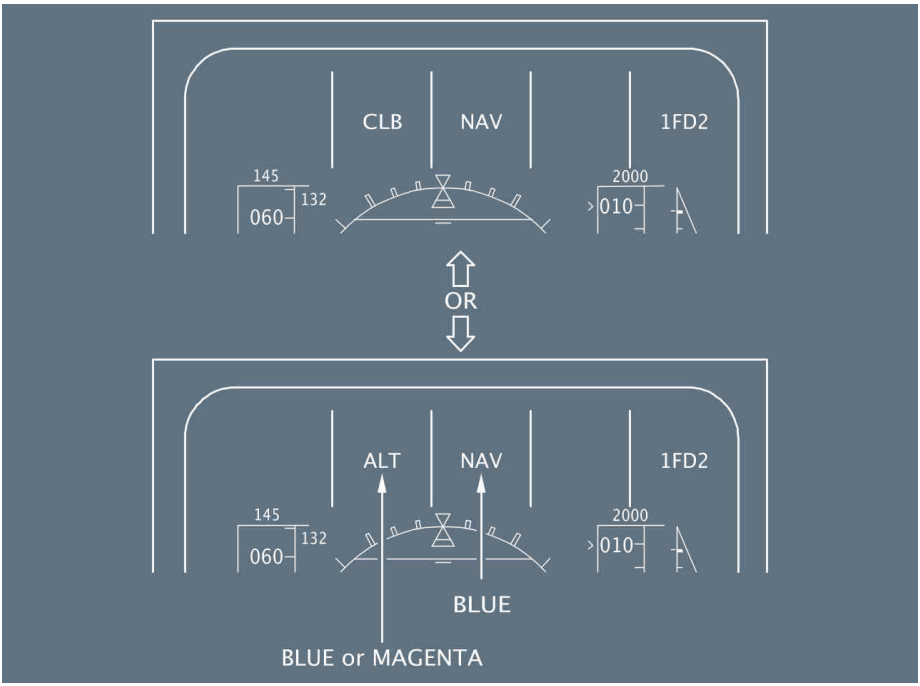
PROCEDURE

ENSURE that HDG –V/S modes are selected (change over pb).
CONFIRM or SELECT the first cleared altitude
CROSS CHECK on PFD the target altitude
CONFIRM both FDs ON

FMA MODE CHECK

Applicable to: ALL

1 CHECK that the FMA CLB (or ALT) mode is armed



Note: *ALT (in blue or magenta) may be displayed instead of CLB if the FCU altitude or a constraint is set at or below the acceleration altitude.*

If a HDG/TRK was preset, NAV is disarmed.



SELECTING A NAVIGATION DISPLAY

Applicable to: ALL

2 SET the minimum range to display the first waypoint after departure or as required for weather radar.

ARC mode
FOR DEPARTURE
IN GENERAL
DIRECTION
OF RUNWAY
HEADING

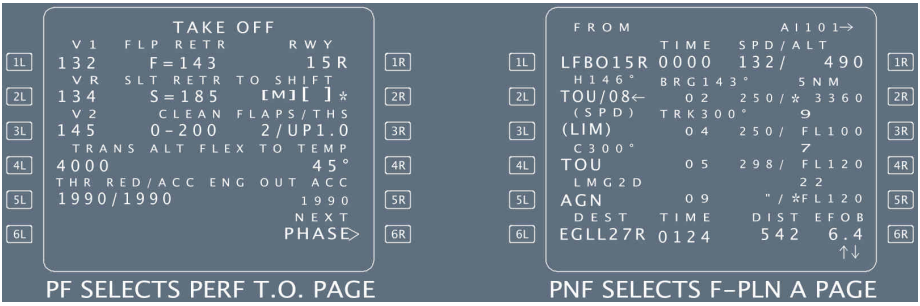


Rose NAV mode
FOR DEPARTURE
IN DIRECTION
OPPOSITE TO
THAT OF RUNWAY
HEADING



SELECTING TAKEOFF DISPLAYS FOR PILOT'S AND COPILOT'S MCDU

Applicable to: ALL



Takeoff

MONITORING THE TAKEOFF

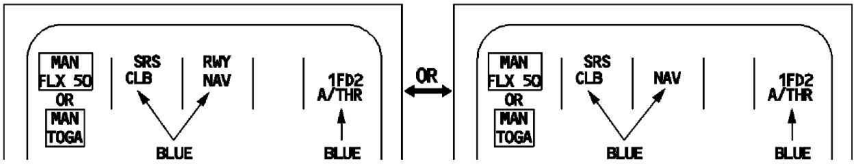
Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

- **At power set (thrust levers in FLX or TOGA position)**

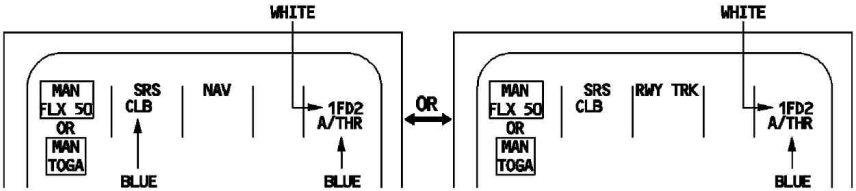
  CHECK that the navigation is updated to the runway threshold by verifying that the aircraft symbol is centered on the runway threshold of the navigation display.

  CHECK the FMA for appropriate mode selection

  Note: - *RWY mode appears if an ILS is tuned to a station corresponding to the departure runway. Otherwise no lateral mode comes up until the aircraft has lifted off.*



- **At 30 ft**
  - **If NAV is armed,** it engages automatically.
  - **If NAV is not armed,** RWY TRK mode engages and remains displayed until the crew selects another lateral mode.



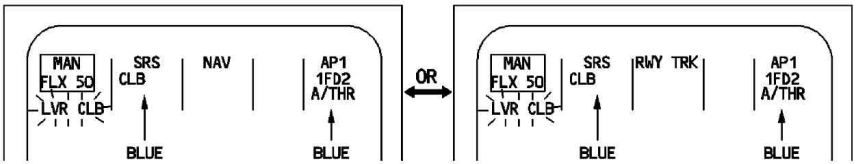
- **At 100 ft**

  Engage AP1 or AP2.

  The FMGS has an internal delay that prevents the AP to be engaged during 5 s after lift-off.

- **At thrust reduction altitude**

  "LVR CLB"flashes in the first column of the FMA



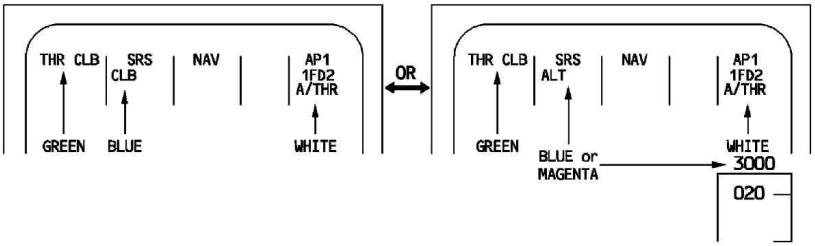
Procedure

SET the thrust levers to the CL detent

A/THR activates automatically

CHECK that A/THR turns to white in the 5th FMA column.

CHECK that THR CLB appears in green in the first column.



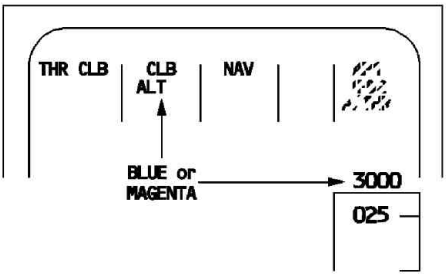
Depending on the next level off altitude, CLB or ALT is armed and displayed in the second column.

ALT is armed:

- *in blue if the next predicted level-off is the FCU-selected altitude (target altitude blue at the top of the ALT scale)*
- *in magenta if the next predicted level-off is an ALT CSTR (target altitude magenta at the top of the ALT scale)*

● **At acceleration altitude**

The vertical phase automatically switches to climb.
CLB mode engages. The target speed jumps to initial climb speed on the PFD.



Procedure

CHECK that "CLB"appears in green in the second FMA column.

- *The speed reference system (SRS) mode remains engaged until CLB phase is engaged, which occurs at ACCEL ALT or at any other vertical mode engagement, whichever comes first.*
- *If during takeoff the FCU altitude is set below the current aircraft altitude, the system ignores the FCU altitude and the aircraft remains in SRS mode until the pilot selects an altitude above the aircraft altitude or engages any other mode.*

MONITORING THE TAKEOFF

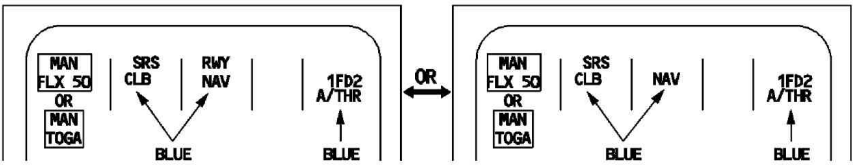
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

● **At power set (thrust levers in FLX or TOGA position)**

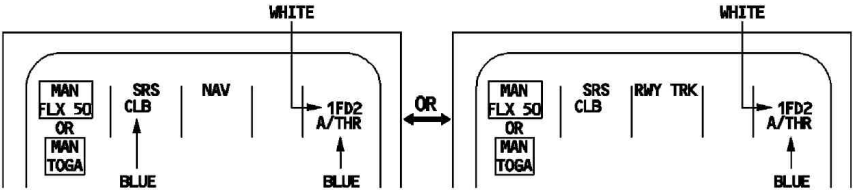
CHECK that the navigation is updated to the runway threshold by verifying that the aircraft symbol is centered on the runway threshold of the navigation display.

CHECK the FMA for appropriate mode selection

Note: - *RWY mode appears if an ILS is tuned to a station corresponding to the departure runway. Otherwise no lateral mode comes up until the aircraft has lifted off.*



- **At 30 ft**
  - **If NAV is armed,** it engages automatically.
  - **If NAV is not armed,** RWY TRK mode engages and remains displayed until the crew selects another lateral mode.



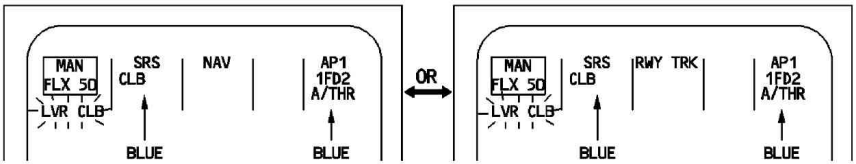
- **At 100 ft**

  Engage AP1 or AP2.

  The FMGS has an internal delay that prevents the AP from engaging 5 s after liftoff and if the aircraft is below 100 ft.

- **At thrust reduction altitude**

  "LVR CLB"flashes in the first column of the FMA



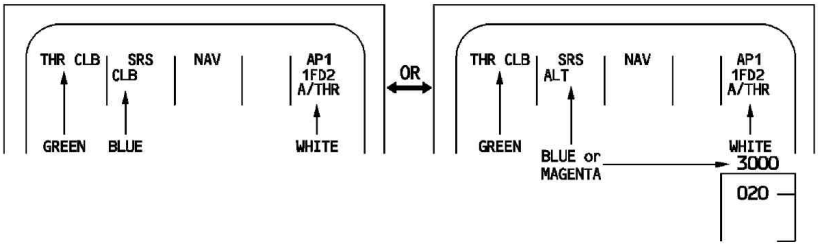
Procedure

SET the thrust levers to the CL detent

A/THR activates automatically

CHECK that A/THR turns to white in the 5th FMA column.

CHECK that THR CLB appears in green in the first column.



Depending on the next level off altitude, CLB or ALT is armed and displayed in the second column.

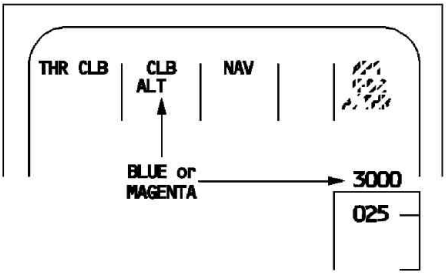
ALT is armed:

- *in blue if the next predicted level-off is the FCU-selected altitude (target altitude blue at the top of the ALT scale)*
- *in magenta if the next predicted level-off is an ALT CSTR (target altitude magenta at the top of the ALT scale)*

● **At acceleration altitude**

The vertical phase automatically switches to climb.

CLB mode engages. The target speed jumps to initial climb speed on the PFD.



Procedure

CHECK that "CLB"appears in green in the second FMA column.

- *The speed reference system (SRS) mode remains engaged until CLB phase is engaged, which occurs at ACCEL ALT or at any other vertical mode engagement, whichever comes first.*
- *If during takeoff the FCU altitude is set below the current aircraft altitude, the system ignores the FCU altitude and the aircraft remains in SRS mode until the pilot selects an altitude above the aircraft altitude or engages any other mode.*

PRESELECTING A HDG OR A TRK

Applicable to: ALL

PROCEDURE

● **If a HDG or a TRK was preselected on the ground :**

PULL OUT the HDG/TRK selector knob when required

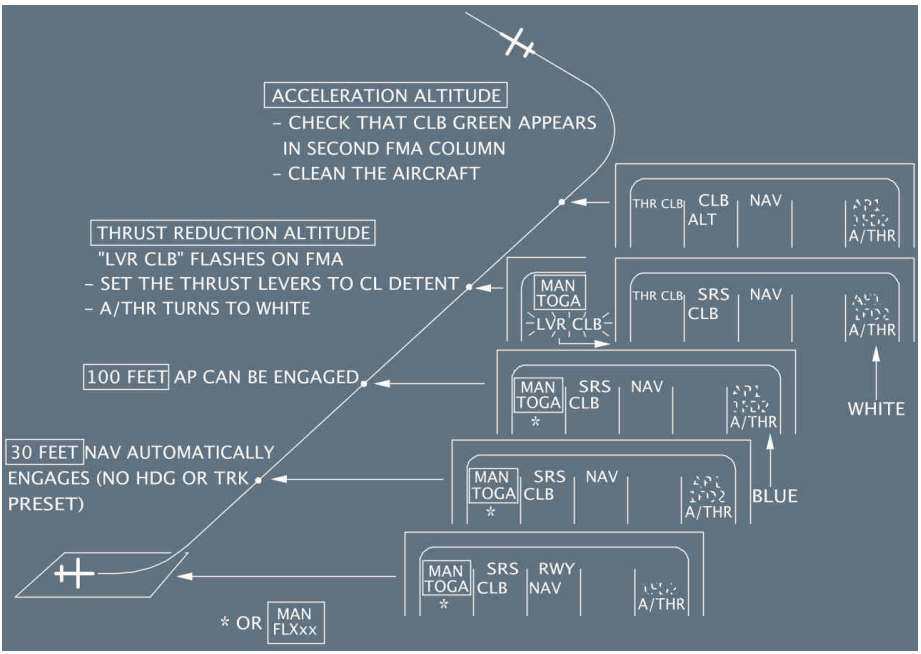
CHECK that the HDG/TRK mode is active and displayed on the FMA

When a HDG or TRK is preset, OP CLB mode will engage at the acceleration altitude. (CLB mode is not available in HDG/TRK mode).

NORMAL TAKEOFF PROFILE

Applicable to: ALL

1



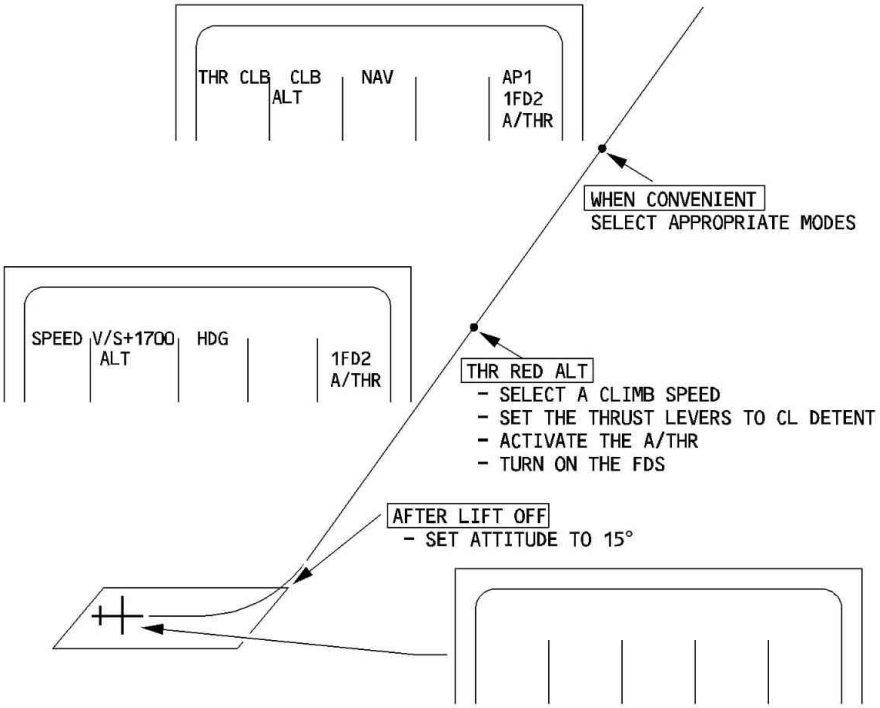
NO FLIGHT DIRECTOR TAKEOFF

Applicable to: ALL

If a takeoff is initiated without FDs, the system responds as follow:

- There are no FD bars.
- There is no A/THR arming.
- There is no guidance available.
- The target speed on the PFD is that selected on the FCU or is defaulted to 100 kt.
- Setting the thrust levers to the CL detent does not activate A/THR.

Note: *Do not engage the autothrust prior to selecting a target speed on the FCU.*



PROCEDURE

Establish initial climb of 15 °

- **When reaching the thrust reduction altitude (THR RED ALT):**

  SELECT a climb speed.

  SET the thrust levers to CL detent.

  ACTIVATE the autothrust.

  TURN ON the FDs (basic modes engage).

  SELECT appropriate mode.

  Failure of both FDs after the start of takeoff:

  - *The FD bars disappear.*
  - *The FCU window displays the target speed, which synchronizes on V2, or the current speed (if it is higher).*
  - *The autothrust remains armed.*

- *At thrust reduction altitude, LVR CLB flashes. If the pilot set the thrust levers to the CLB detent, the autothrust becomes active in selected SPD mode (no FDs selected).*
  If the current speed is greater than the target speed, the thrust decreases.
- *At acceleration altitude the target speed does not change, since it is selected.*

TAKEOFF WITH NO V2 ENTRY

Applicable to: ALL

If V2 is not inserted, the speed reference system (SRS) will not engage for takeoff.
5 s after lift off, V/S mode will engage. When V/S engages the current airspeed becomes the FCU target speed.

To regain a normal speed target, the pilot must :

SELECT the appropriate climb speed on the FCU and PULL out the knob.

- **At ACC ALT :**

  PUSH the A/THR pb on the FCU.

  SET the thrust levers to CL detent.

  PUSH in the SPD selector knob to get a managed speed target.

TAKEOFF USING THE LOCALIZER OF THE OPPOSITE RUNWAY

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

- **If the localizer, of the ILS associated with the opposite runway, must be used for takeoff:**

  SELECT the RAD NAV PAGE.

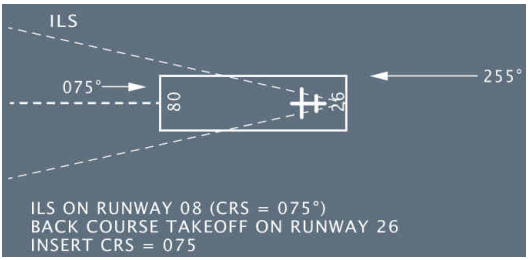
  ENTER the ILS IDENT.

  If the ILS is in the database, the system tunes the proper frequency.
  Check that the ILS front course is displayed in the CRS field.

  Note: This may trigger the "RWY/ILS MISMATCH" message. Disregard it.

- **If the ILS is not in the database:**

  SET the appropriate frequency, and SET the ILS front course in the CRS field.



DESELECT the ILS pb on the FCU.

Since the PFD displays reverse deviation.

SELECT ROSE-ILS on one ND.

TAKEOFF USING THE LOCALIZER OF THE OPPOSITE RUNWAY

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI

- **If the localizer, of the ILS associated with the opposite runway, must be used for takeoff:**

  SELECT the RAD NAV PAGE.

  ENTER the ILS IDENT.

  If the ILS is in the database, the system tunes the proper frequency.
  Check that the ILS front course is displayed in the CRS field.

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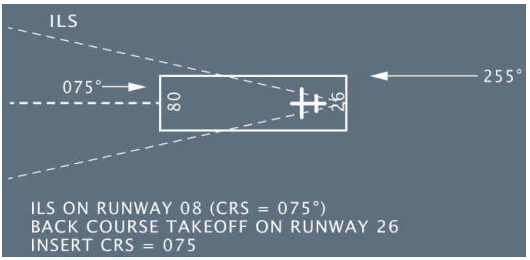


DESELECT the LS pb on the FCU.

Since the PFD displays reverse deviation.

SELECT ROSE ILS on one ND.

TAKEOFF USING THE LOCALIZER OF THE OPPOSITE RUNWAY

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

- **If the localizer, of the ILS associated with the opposite runway, must be used for takeoff:**

  SELECT the RAD NAV PAGE.

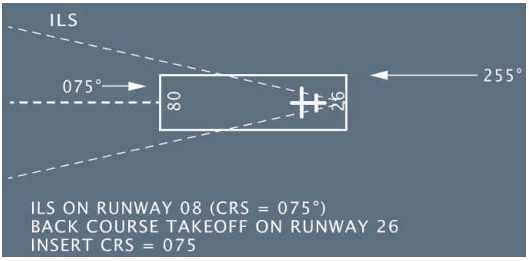
  ENTER the ILS IDENT.

  If the ILS is in the database, the system tunes the proper frequency.
  Check that the ILS front course is displayed in the CRS field.

  Note: This may trigger the "RWY/ILS MISMATCH" message. Disregard it.

- **If the ILS is not in the database:**

  SET the appropriate frequency, and SET the ILS front course in the CRS field.



DESELECT the LS pb on the FCU.

Since the PFD displays reverse deviation.

DESELECT the LS pb on ISIS.

Since ISIS displays LOC reverse deviation.

SELECT ROSE-ILS on one ND.

Intentionally left blank

Climb

MONITORING THE CLIMB PHASE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

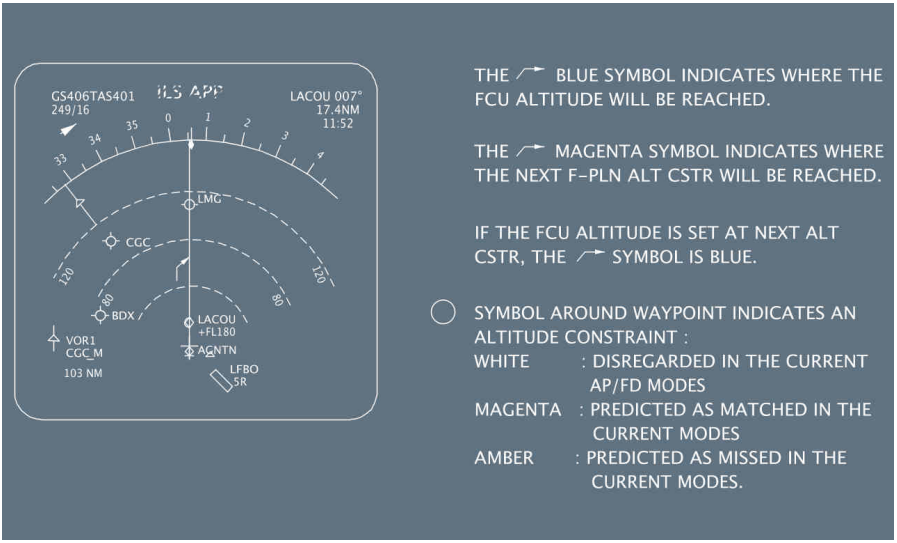
The PF MCDU should display the PERF CLB page allowing him to monitor the climb.
The PNF MCDU should display the F-PLN page to allow the pilot to monitor time, speed and altitude predictions. This page also displays matched or missed information for constraints.



CHECK vertical mode CLB if NAV is engaged.
CHECK vertical mode OP CLB if HDG/TRK is engaged.

MONITORING THE ND (ROSE NAV OR ARC)

Displays the lateral and vertical paths, in the current AP/FD active modes.

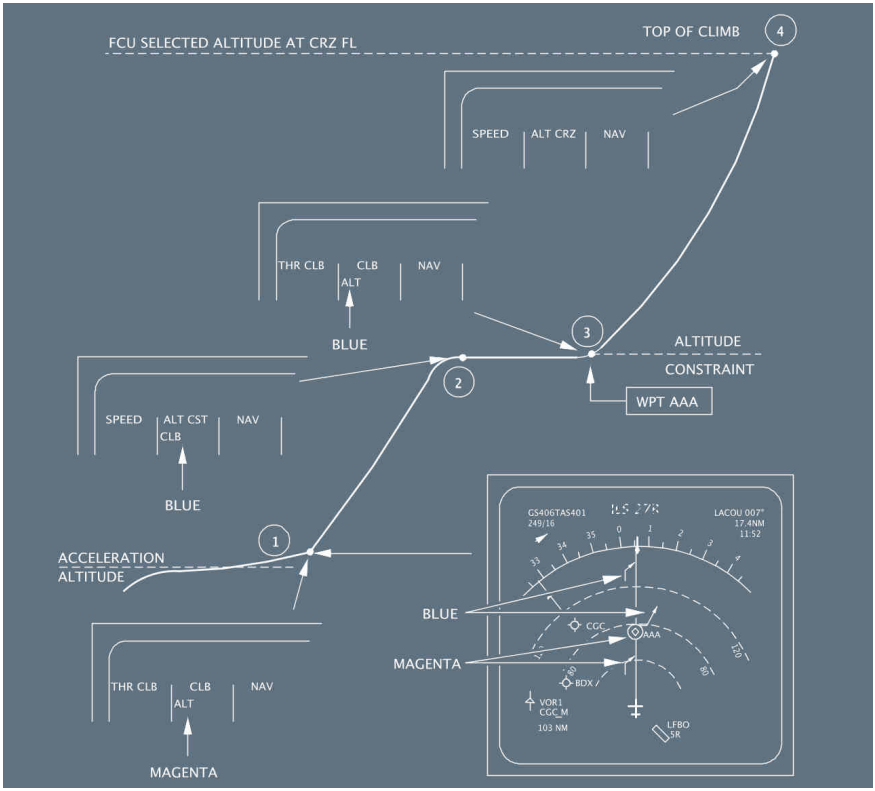


MONITORING THE AP/FD MODES AND FMA

If CLB mode is engaged, the flight mode annunciator (FMA) and the navigation display (ND) show the tactical situation as follows:

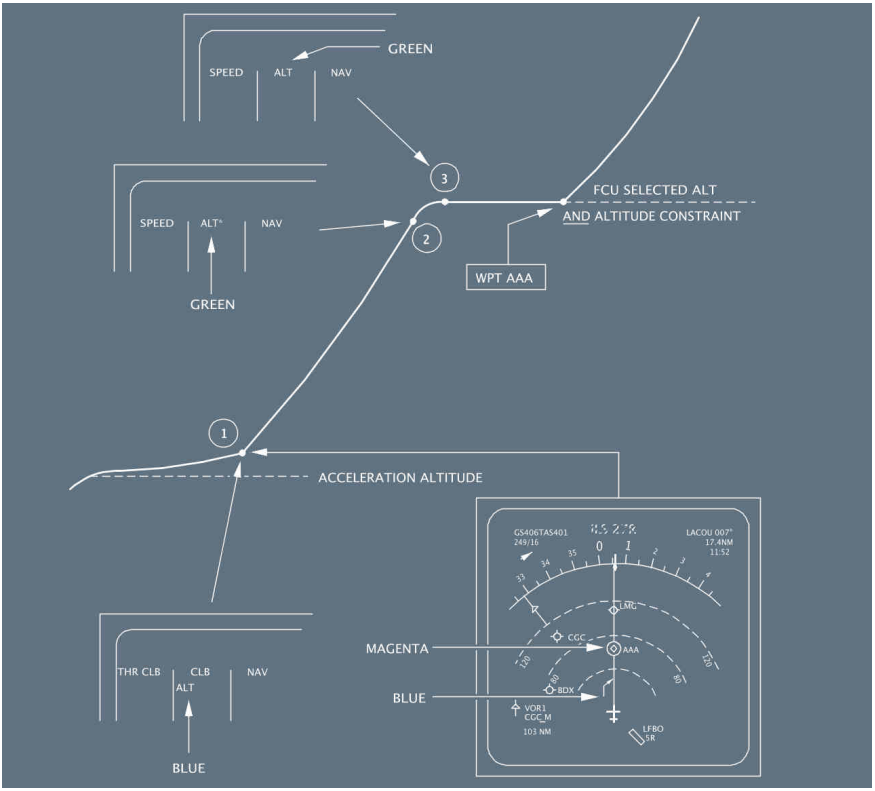
CASE 1

The FCU selected altitude is set above the next altitude constraint



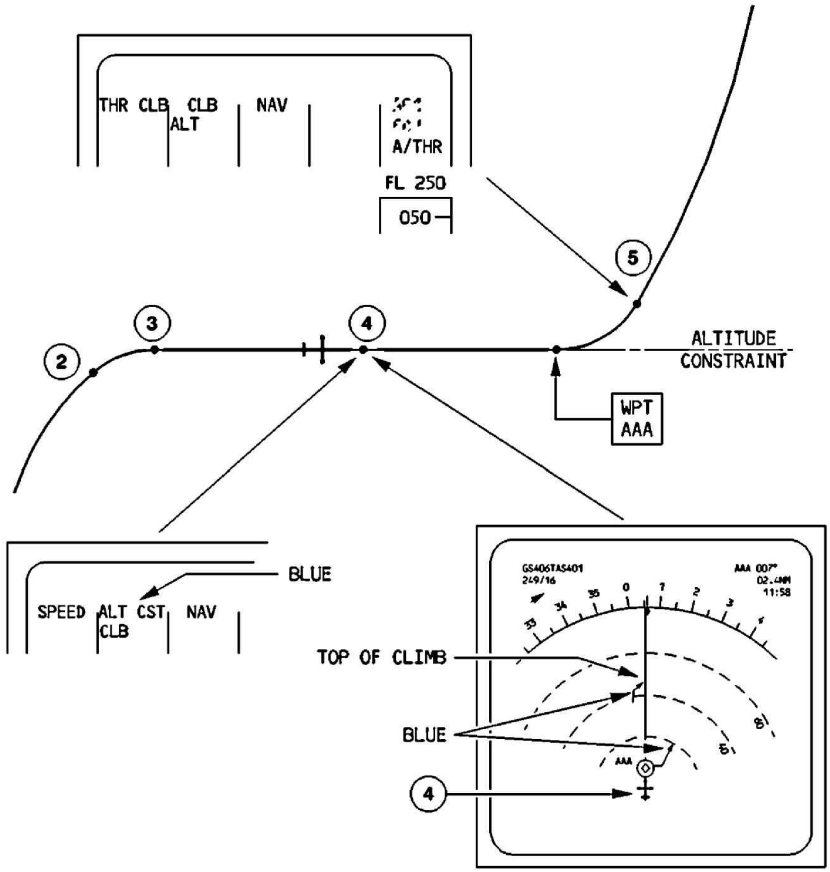
CASE 2

The FCU selected altitude is set at the next altitude constraint
The aircraft will automatically levels off at this altitude.



To resume the climb automatically when the waypoint AAA is reached, apply the following procedure during the level off (Position 4):

SELECT the FCU altitude to the next constraint (if any) or the cruise FL.
PUSH the FCU ALT selector knob to arm CLB mode.



RECOMMENDATION:

To ensure that you will not miss the next constraint, it is recommended to select the FCU altitude to the next constraint as described above.

MONITORING THE CONSTRAINTS

SPEED, ALTITUDE and TIME constraint can be checked using MCDUs. Each constraint is preceded by a star that indicates if the constraint is matched (magenta star) or missed (amber star).

ALTITUDE CONSTRAINT

- **If an altitude constraint is predicted as missed,** use the following procedure:

  SET the FCU ALT to the next ALT CSTR
  CHECK the position of the level off symbol on the ND (blue arrow) with respect to the waypoint with the constraint.
  DECREASE the target speed until the constraint is met.



SPEED CONSTRAINT

CHECK the SPD CSTR predictions on the MCDU.

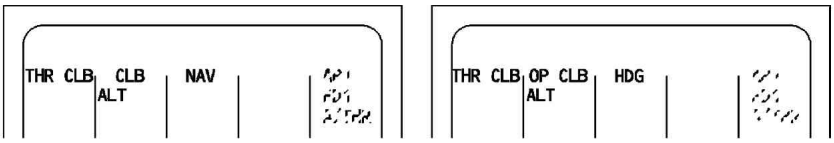
A magenta or amber star (*) indicates that the aircraft will match or miss the constraint.
If the aircraft is to miss the constraint by more than 10 kt, the MCDU scratchpad displays "SPD ERROR AT WPT ---- ".

"CHECK GW"MESSAGE.

Refer to PRO-SUP-22-10 Other Abnormal Procedures - CHECK GW Message

HDG/TRK MODE ENGAGEMENT

- **If HDG/TRK is engaged,** the guidance does not consider any F-PLN constraint. Therefore if the flight crew disengages NAV, CLB mode reverts to OP CLB.



NAV is engaged

HDG or TRK is engaged
CLB reverts to OP CLB

SPEED SELECTION

- **If a specific speed is required:**
  TURN and PULL the SPD selector knob. (This changes the target speed to blue on the PFD speed scale).
  Predictions on the F-PLN page assume that the speed remains selected until the next SPD LIM or SPD CSTR, or the next phase, whichever comes first.

MONITORING THE CLIMB PHASE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The PF MCDU should display the PERF CLB page allowing him to monitor the climb.
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CHECK vertical mode CLB if NAV is engaged.
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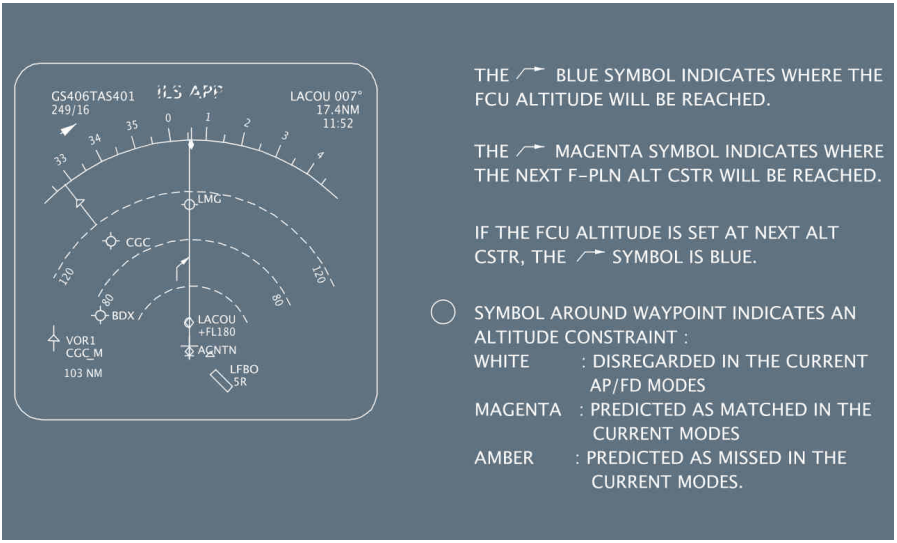
MONITORING THE ND (ROSE NAV OR ARC)

Displays the lateral and vertical paths, in the current AP/FD active modes.



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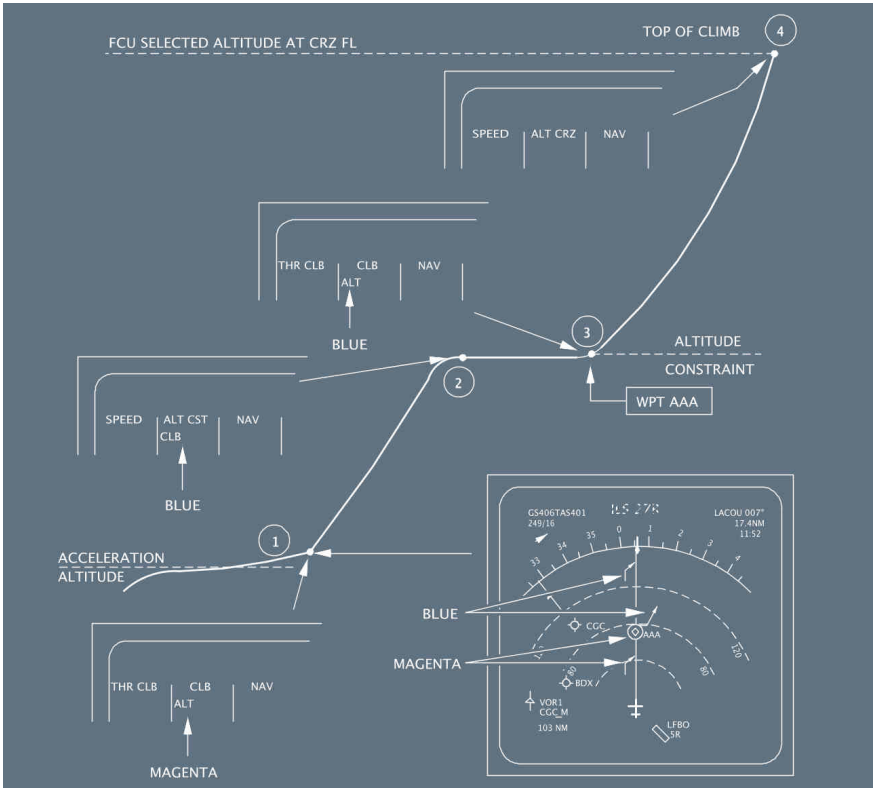

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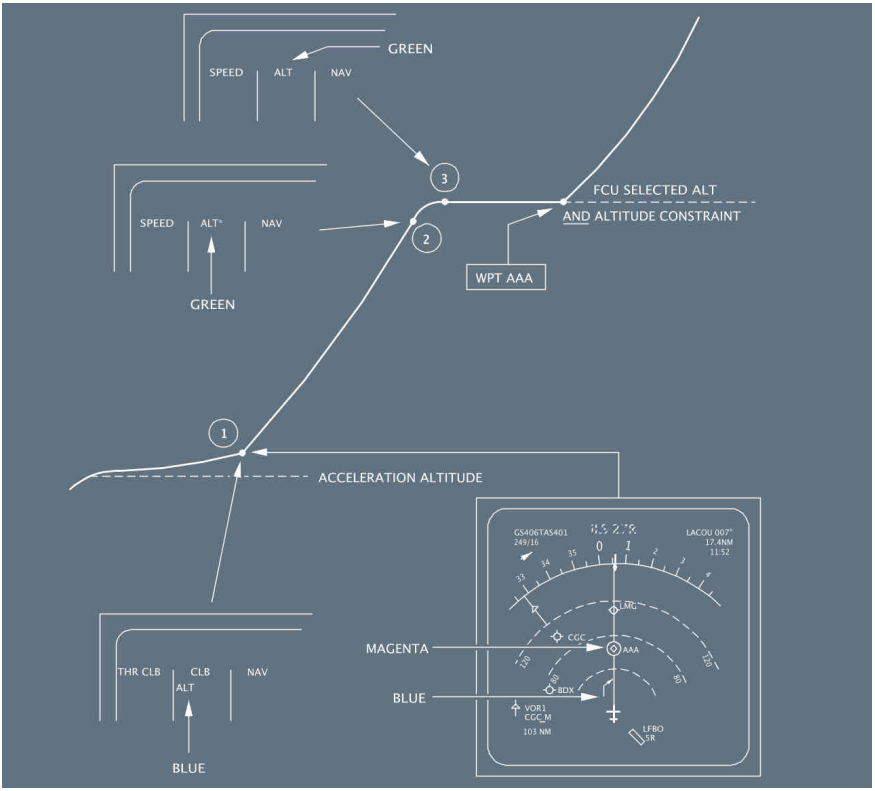
The FCU selected altitude is set at the next altitude constraint
The aircraft will automatically levels off at this altitude.



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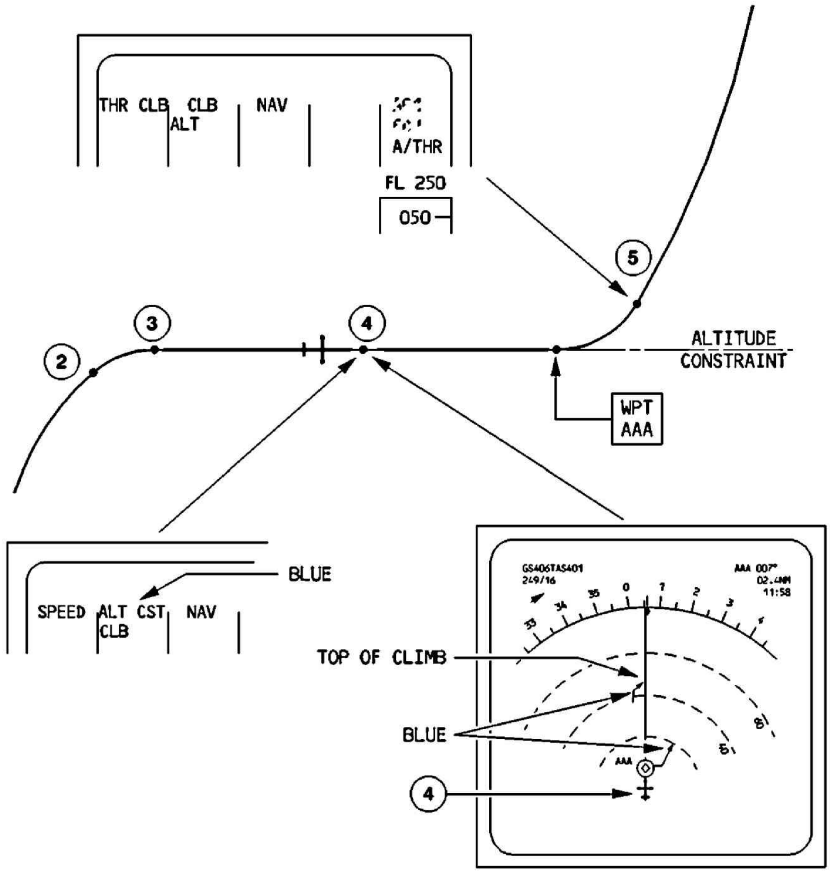
PUSH the FCU ALT selector knob to arm CLB mode.



RECOMMENDATION:

To ensure that you will not miss the next constraint, it is recommended to select the FCU altitude to the next constraint as described above.

MONITORING THE CONSTRAINTS

SPEED, ALTITUDE and TIME constraint can be checked using MCDUs. Each constraint is preceded by a star that indicates if the constraint is matched (magenta star) or missed (amber star).

ALTITUDE CONSTRAINT

- **If an altitude constraint is predicted as missed,** use the following procedure:

  SET the FCU ALT to the next ALT CSTR
  CHECK the position of the level off symbol on the ND (blue arrow) with respect to the waypoint with the constraint.
  DECREASE the target speed until the constraint is met.



SPEED CONSTRAINT

CHECK the SPD CSTR predictions on the MCDU.

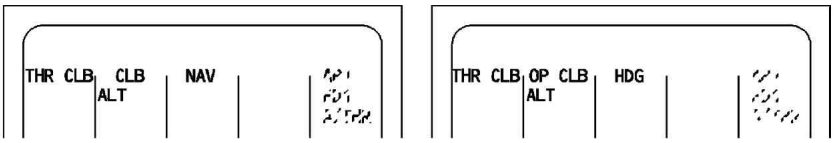
A magenta or amber star (*) indicates that the aircraft will match or miss the constraint.
If the aircraft is to miss the constraint by more than 10 kt, the MCDU scratchpad displays "SPD ERROR AT WPT ---- ".

"CHECK GW" MESSAGE.

Refer to PRO-SUP-22-10 Other Abnormal Procedures - CHECK GW Message

HDG/TRK MODE ENGAGEMENT

- **If HDG/TRK is engaged,** the guidance does not consider any F-PLN constraint. Therefore if the flight crew disengages NAV, CLB mode reverts to OP CLB.



NAV is engaged

HDG or TRK is engaged
CLB reverts to OP CLB

SPEED SELECTION

- **If a specific speed is required:**
  TURN and PULL the SPD selector knob. (This changes the target speed to blue on the PFD speed scale).
  Predictions on the F-PLN page assume that the speed remains selected until the next SPD LIM or SPD CSTR, or the next phase, whichever comes first.

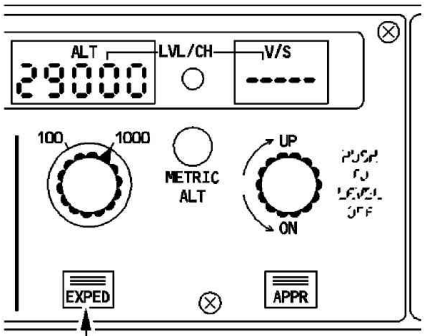
EXPEDITE CLIMB

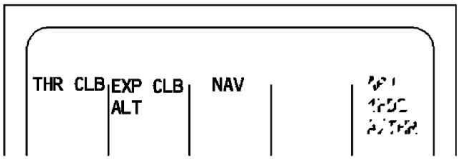
Applicable to: B-HSQ, B-HSR

The flight may use the expedite mode temporarily to clear a specified altitude or to match a constraint.

PRESS EXPED pb on the FCU.

The AP acquires and maintains Green Dot speed. There is no benefit to use expedite mode above FL 250. The mach corresponding to green dot is too low to maintain an increased vertical speed.





To revert to normal climb:
PUSH ALT knob CLB mode will engage.

Note: *Pulling ALT knob or V/S knob or SPD/MACH knob also disengages EXPEDITE. PRESSING EXPED pb never disengages the mode.*

IMMEDIATE RETURN TO ORIGIN AIRPORT

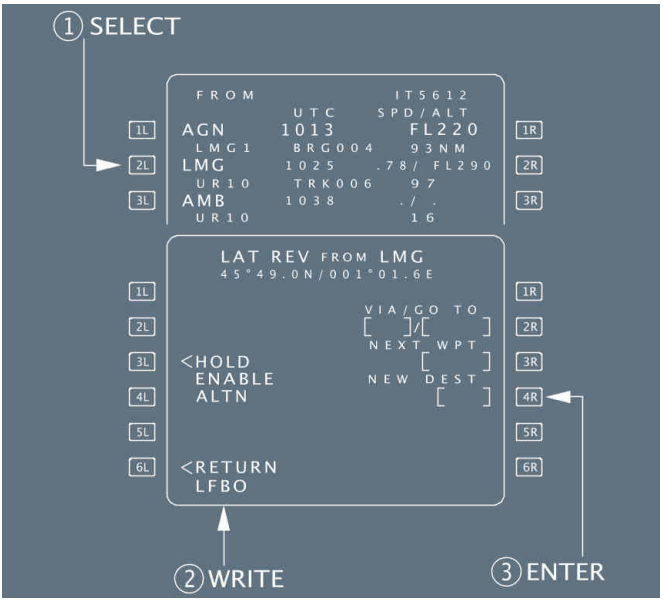
Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

■ **If the SEC F-PLN has been prepared for an immediate return to the airport of origin:**

ACTIVATE the SEC F-PLN.

PERFORM a DIR TO the appropriate waypoint.

■ **If the SEC F-PLN has not been prepared for an immediate return to the airport of origin:**



PERFORM a lateral revision at TO waypoint

ENTER the departure airport ident in the NEW DEST field and INSERT the temporary flight plan.

PERFORM a lateral revision at the new destination

SELECT: APPR –STAR –VIA – TRANS and INSERT

● **When cleared to divert:**

PERFORM a DIR TO the suitable waypoint.

ENTER QNH, WIND, MDA/MDH, LDG CONF.

CHECK RAD NAV page.

IMMEDIATE RETURN TO ORIGIN AIRPORT

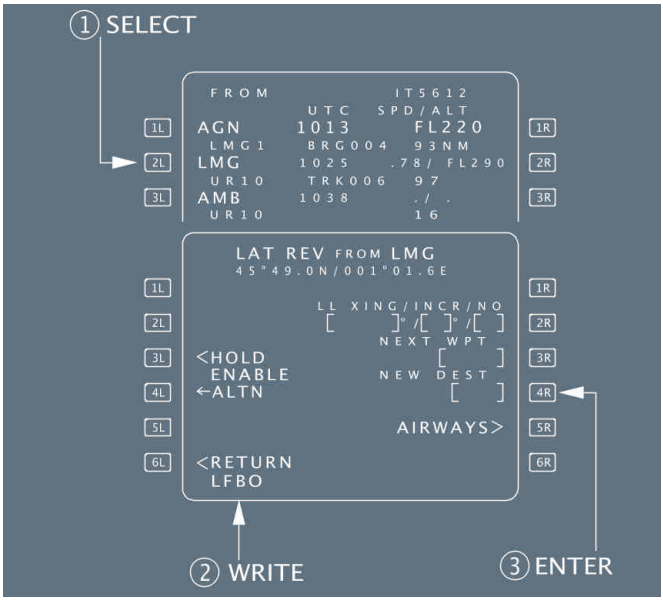
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

■ **If the SEC F-PLN has been prepared for an immediate return to the airport of origin:**

ACTIVATE the SEC F-PLN.

PERFORM a DIR TO the appropriate waypoint.

■ **If the SEC F-PLN has not been prepared for an immediate return to the airport of origin:**



PERFORM a lateral revision at TO waypoint

ENTER the departure airport ident in the NEW DEST field and INSERT the temporary flight plan.

PERFORM a lateral revision at the new destination

SELECT: APPR –STAR –VIA – TRANS and INSERT

● **When cleared to divert :**

PERFORM a DIR TO the suitable waypoint.

ENTER QNH, WIND, MDA/MDH, LDG CONF.

CHECK RAD NAV page.

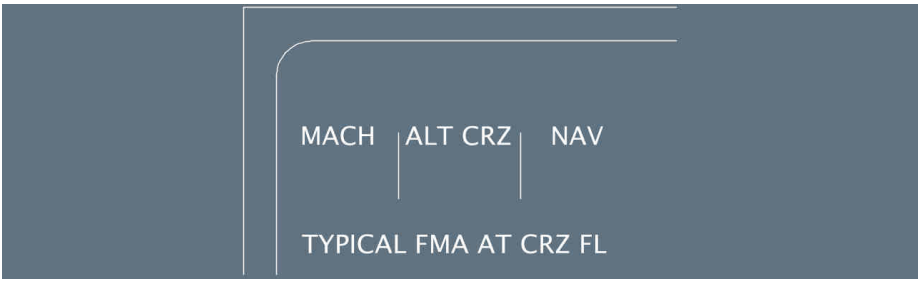
Intentionally left blank

Cruise

REACHING CRUISE FLIGHT LEVEL

Applicable to: ALL

1 On reaching the cruise flight level, the flight crew should be sure that the FMA displays “ALT CRZ”in its second column, which ensures that the aircraft is at cruise flight level and at Economy Cruise Mach (ECON CRZ MACH).



The FMGS engages the “soft altitude” (SOFT ALT) mode 2 min after the cruise flight level is captured and Mach stabilized. (SOFT ALT) mode allows the aircraft to deviate ± 50 ft from the target altitude to minimize the thrust variation and reduce the fuel consumption.

- **If the FMA does not display ALT CRZ at the assigned flight level,** soft altitude mode will not engage and the predictions will be computed at the preplanned flight level. This will occur when the ATC assigned flight level is lower than the preplanned flight level entered on the PROG page.

- **If the FMA does not display ALT CRZ at the assigned FL (as may occur when the ATC-assigned FL is lower than the preplanned FL selected initially):**

  PRESS the [PROG].

  ENTER the current cruise flight level.

  Note: If the current cruise flight level is above the preplanned FL, selecting the FCU updates it automatically.

“SET SPD AUTO” (OR “SET MANAGED SPD”)

- **If the climb phase was flown in selected speed and if the cruise phase is planned to be flown in managed speed (ECON MACH/SPEED)** , “SET SPD AUTO” (or “SET MANAGED SPEED”) appears on the PFD and MCDU as a reminder.

PRESS the FCU speed selector knob to activate the managed Mach.

MONITORING THE NAVIGATION ACCURACY

Applicable to: ALL

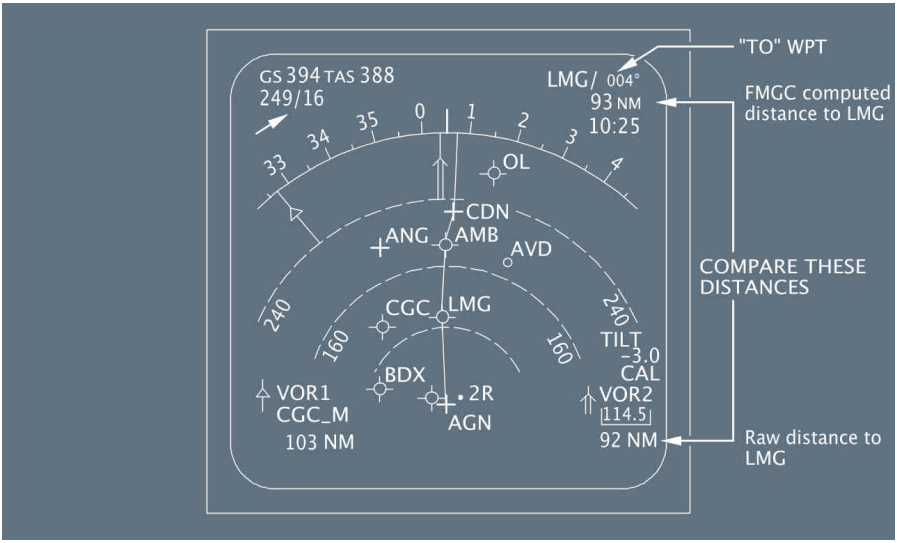
2 GENERAL

On aircraft equipped with GPS PRIMARY, the navigation accuracy check is not required as long as GPS PRIMARY ◁ is available.
Otherwise, navigation accuracy shall be checked periodically in cruise.

The PROG page displays an estimated accuracy as being high or low (center of sixth line):
- "HIGH" means that the FMGS estimates the FM position accurate enough to meet the EN ROUTE criteria,
- "LOW" means that the pilot must compare raw data from tuned navaids with corresponding data computed by FM and shown on the ND or MCDU PROG page. The appearance of the message "NAV ACCUR DOWNGRAD" on the MCDU calls for a similar crosscheck.

Note: *The pilot should make such a comparison periodically, even if the PROG page is displaying "HIGH" and navaids are available: this allows him to quantify the FM position error.*

The method for checking the accuracy is explained in the SOP and in Evaluation of position accuracy chapter (*Refer to DSC-22_20-20-20 General*).
A quick check is explained here below when the TO waypoint is a DME type. (VOR/DME or VOR/TAC or DME or TAC)



Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

POSITION DISCREPANCY

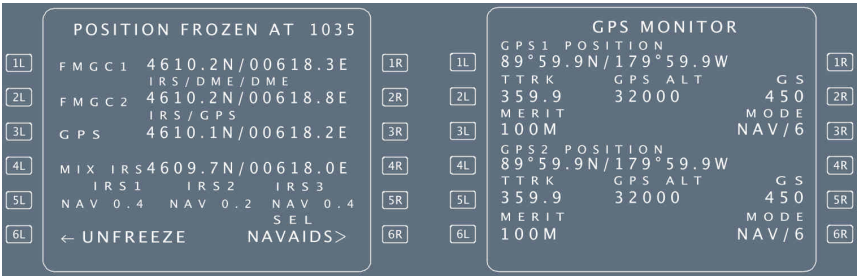
- **If there is a discrepancy between the raw data position and the FM position:**

  PRESS the DATA key on the MCDU.

  SELECT the POSITION MONITOR page.

  SELECT “FREEZE”.

  On the other MCDU: Select the GPS MONITOR page.



Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

POSITION DISCREPANCY

- **If there is a discrepancy between the raw data position and the FM position:**

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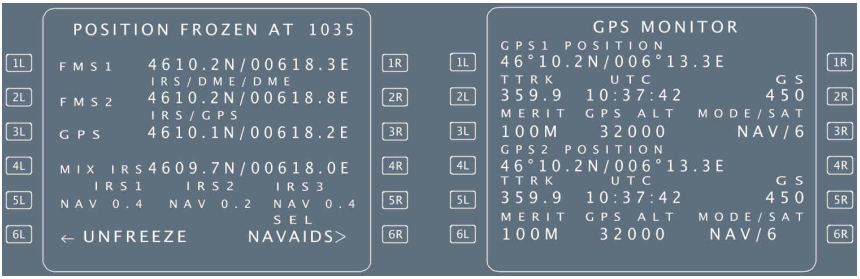
  SELECT the POSITION MONITOR page.

  SELECT "FREEZE".

  On the other MCDU : Select the GPS MONITOR page.



MONITORING THE FUEL PREDICTIONS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

The F-PLN and FUEL PRED pages display fuel and time predictions throughout the flight. These predictions are meaningful if the lateral and vertical flight plan, and the entered winds are accurate enough.

PROCEDURE

UPDATE the F-PLN to show accurate predictions.
Periodically CHECK the wind on the F-PLN B page, and update it when the current wind is significantly different.

Monitor the fuel by checking:
- Estimated fuel on board (EFOB) at destination (F-PLN page)
- EFOB at alternate and extra fuel (FUEL PRED page)

- **If the extra fuel is negative, modify successively the following data until the extra fuel becomes null or positive:**

  CHECK current cruise flight level versus the optimum level (OPT FL)

  If advisable, REQUEST reassignment to the OPT FL (or OPT FL + 2 000)

  Decrease the cost index down to zero if necessary (MIN FUEL)

SELECT another ALTN on the ALTN page and CHECK whether or not XTRA FUEL becomes positive.

Continue to check different alternates until you find one for which XTRA FUEL is null or positive.

- **When an alternate is not necessary, you may select "NO ALTN"option:**

CHECK the required conditions (weather, runways, etc.) for NO ALTN.

SELECT "NO ALTN"on the ALTN selection page.

ADJUST FINAL TIME on the FUEL PRED page.

CHECK XTRA FUEL.

MONITORING THE FUEL PREDICTIONS

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

3 The F-PLN and FUEL PRED pages display fuel and time predictions throughout the flight. These predictions are meaningful if the lateral and vertical flight plan, and the entered winds are kept accurate enough as the flight progresses.

4 **PROCEDURE**

In addition to the Fuel Management procedure described in the SOPs (*Refer to PRO-NOR-SOP-15 Cruise*), periodically apply the following actions:

KEEP ACCURATE FMS PREDICTIONS

Periodically UPDATE the F-PLN elements (F-PLN waypoints, step altitudes, predicted winds).

CHECK the MIN DEST FOB value on the FUEL PRED page

The MIN DEST FOB value is computed by the FMS and by default it is equals to ALTN + FINAL. ALTN, FINAL and MIN DEST FOB can be modified by the flight crew.
At the beginning of the CRZ phase, and/or after any change of destination or alternate airport, check that the MIN DEST FOB value is meaningful. Otherwise, update the MIN DEST FOB value, as appropriate.

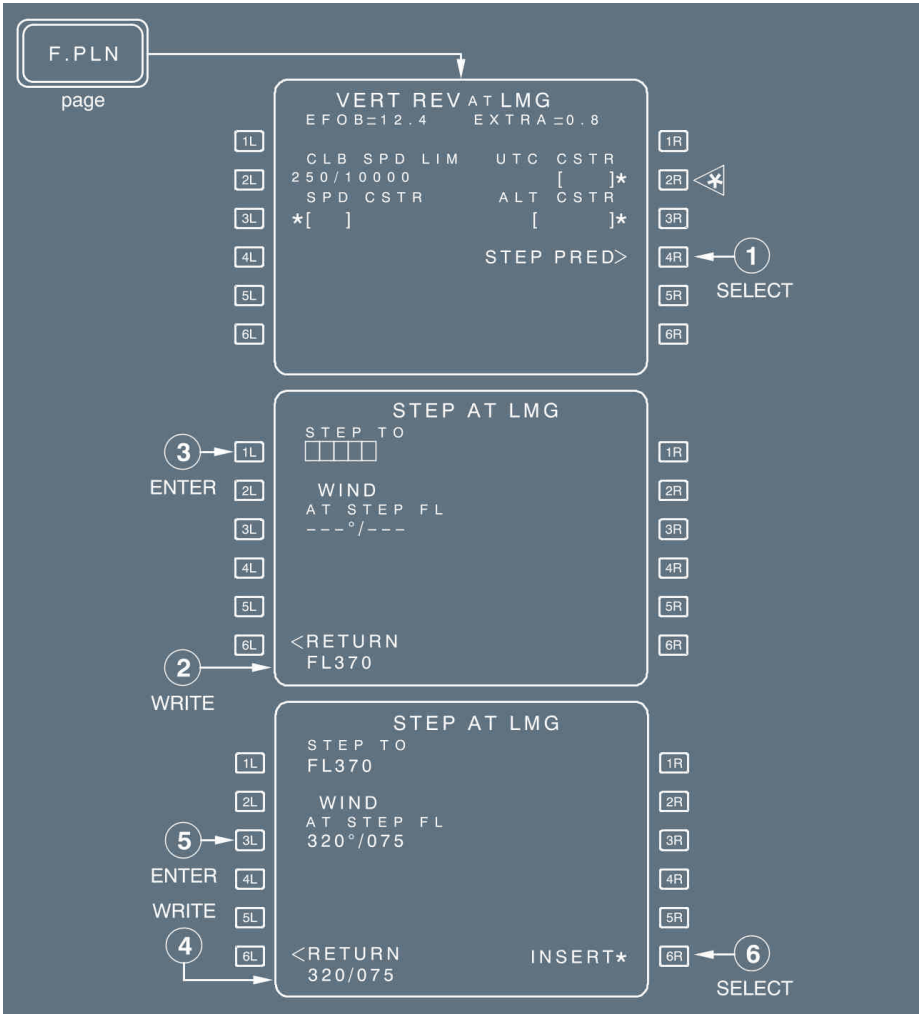
CHECK the DEST EFOB value on the F-PLN or FUEL PRED page

MONITOR the EFOB at destination on the F-PLN or FUEL PRED page. If necessary, ADAPT the flight strategy.

ENTERING A STEP CLIMB OR A STEP DESCENT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

5 The flight crew can use the STEP PREDICTION page to enter one step climb or one step descent at any waypoint of the cruise phase except the "FROM" waypoint.

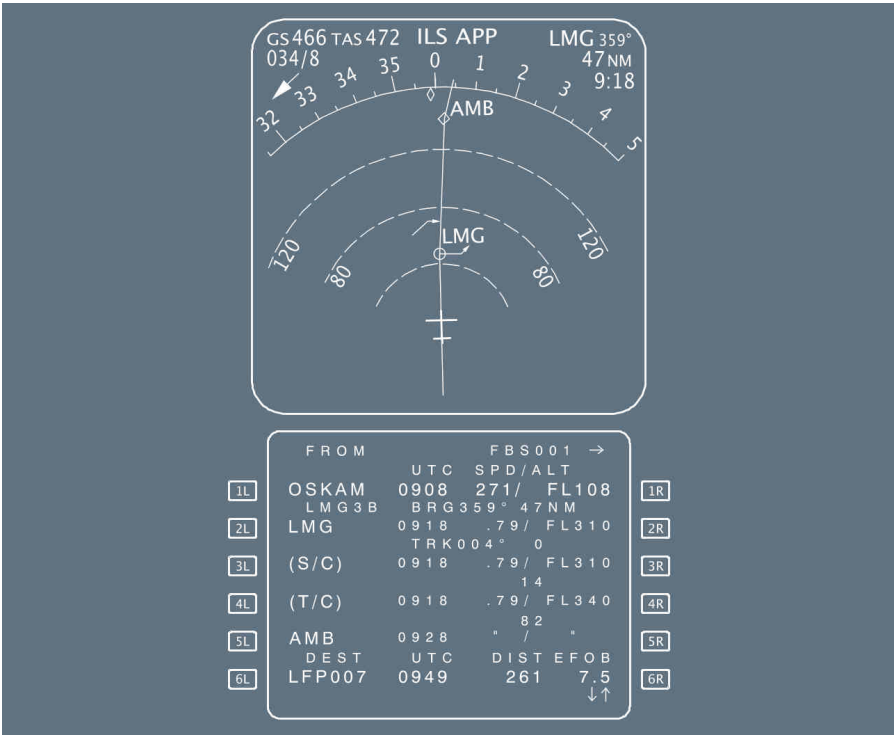


6 **PROCEDURE**

PRESS the F-PLN key.
SELECT “VERT REV”at the waypoint where you want to climb.
WRITE a step altitude into the scratchpad and ENTER it.

WRITE a wind (if it is significantly different from the initial cruise-flight-level wind) into the scratchpad and ENTER it.
INSERT the step.
CHECK the predictions.

The FM uses the step climb or the step descent to recompute the predictions.
The ND shows symbols for the start of climb (S/C) or descent and the top of climb (T/C) or bottom of descent. The MCDU shows the associated pseudo-waypoints.
The step automatically revises the cruise flight level.
The flight crew must initiate the climb or the descent by pulling out or pushing the altitude selector knob. CLB or OP CLB will engage in climb, DES or OP DES in descent.
DES mode engages with a constant vertical speed of -1 000 ft/min.
If the aircraft passes the step waypoint without beginning a climb or a descent, the system deletes the step from the vertical F-PLN automatically ("STEP DELETED" appears) and recomputes the predictions.
The system will not accept a step climb or descent if it does not ensure at least one minute of flight time at the new altitude.



If no step wind is entered, the wind used at the new CRZ FL is automatically defaulted to the wind at the previous flight level.

ENTERING A STEP CLIMB OR A STEP DESCENT

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The crew may use the STEP ALTS page to enter up to four geographic step points or one optimal step (computed by the FMGS) at any waypoint of the cruise.

PROCEDURE

PRESS the PERF key.
SELECT “STEP ALTS” prompt.

The PERF PAGE displays this prompt in cruise phase. The crew may also call up the STEP ALTS page using a vertical revision at any cruise waypoint.

7 ENTERING AN OPTIMAL STEP (ONLY STEP CLIMB)

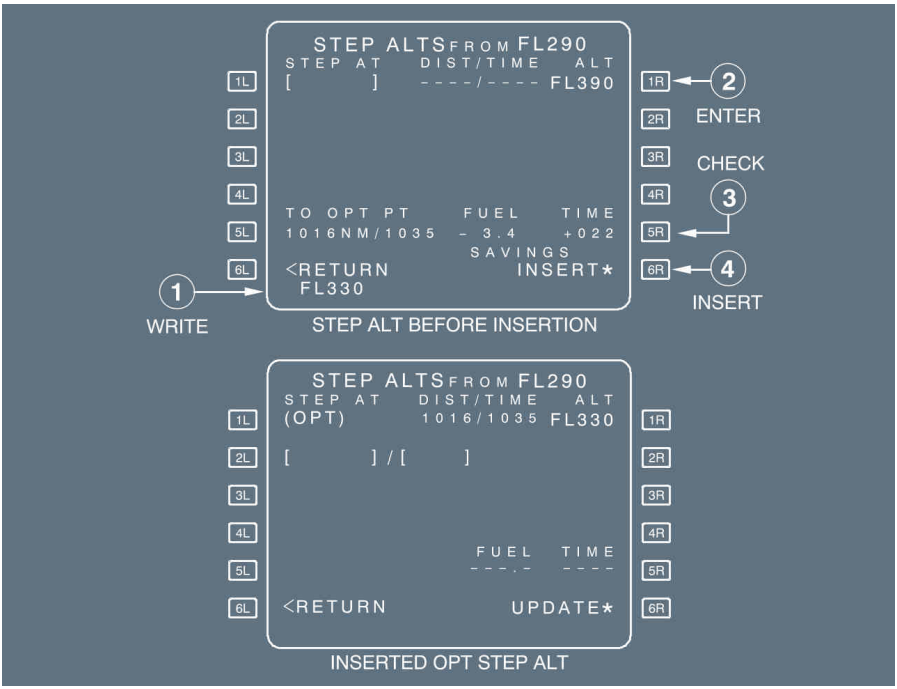
WRITE a step altitude or FL into the scratchpad.
ENTER the step altitude or FL in the [1R] field.
CHECK the FUEL and TIME SAVINGS predictions on the 5L and 5R fields.
PUSH the INSERT prompt [6R] if adequate.

After insertion, the optimum step climb is updated only when the flight crew presses the UPDATE prompt [6R].
The ND shows symbols for the start of climb (S/C) and the top of climb (T/C). The MCDU shows the associated pseudo-waypoints.
It is possible to convert an optimum step to a geographic step by overwriting the [1L] field (see geographic step).

- **When reaching the step climb pseudo-waypoint:**

  REQUEST climb clearance.

  ADJUST the FCU altitude to the STEP ALT, and PUSH.



8 **ENTERING A GEOGRAPHIC STEP**

WRITE a step altitude into the scratchpad.

The format is position/altitude (or FL). The position can be a waypoint or waypoint/distance to waypoint. The waypoint/distance is an along track offset waypoint.

ENTER it in [1L] to [4L] field.

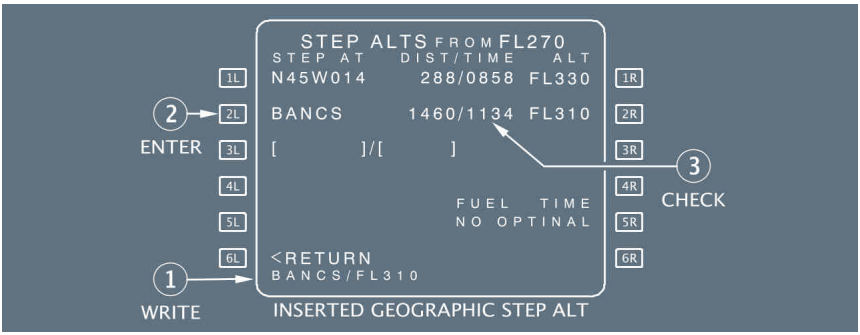
The entry of the initial geographic step point requires both a valid waypoint and altitude entries. When a step has been entered, the flight crew may change the position and the altitude independently. The flight crew cannot modify the position and the altitude in a single entry: To modify both, they should modify the position first, and then the altitude.

CHECK the predictions

- **When reaching the step climb or descent pseudo-waypoint (S/C or S/D):**

  REQUEST climb or descent clearance.

  ADJUST the FCU altitude to the STEP ALT, and PUSH.



The DIST/TIME field may display the following messages:

- ABOVE MAX if the step altitude exceeds the MAX ALT.
- IGNORED if the start step point is less than 50 nm from the top of descent.
- STEP NOW when the aircraft is within 20 nm of the step point.
  If the aircraft overflies the step waypoint without commencing a climb or a descent, the system deletes the step from the vertical F-PLN automatically (a “STEP DELETED” message is displayed on the MCDU scratchpad), and recomputes the predictions.
  A step is not deleted if the FCU altitude is moved only partially towards the step altitude.
  The flight phase remains “cruise” whenever a step is initiated.

Note: For an altitude restriction defined at a waypoint less than 50 nm before the top of descent and lower than the CRZ FL, it is recommended to enter an altitude constraint rather than a step.

IMMEDIATE CHANGE OF LEVEL IN CRUISE

Applicable to: ALL

When the pilot changes his flight level without inserting a step:

- If the FCU-selected altitude is above the previous CRZ FL, the CRZ FL on the PROG page changes to the new flight level.
- If the FCU-selected altitude is lower than the previous CRZ FL and if the distance to DEST is more than 200 nm, the CRZ FL on the PROG page changes.

  In that case Mach target is managed as follows:
  - At the start of the descent, the Mach target is the managed Mach number at the initial cruise flight level.
  - When the aircraft reaches the new flight level, the Mach target switches either to the Mach number for the lower CRZ FL, or to the speed for the lower CRZ FL if the aircraft reaches the crossover altitude. This logic prevents the aircraft from exceeding VMO during descent.
- If the FCU-selected altitude is lower than the previous CRZ FL and the aircraft is within 200 nm of its destination, the system activates the descent phase.

The pilot may reactivate the cruise phase by entering a new cruise flight level in the PROG page.

PREPARATION FOR DESCENT AND APPROACH

Applicable to: ALL

GENERAL

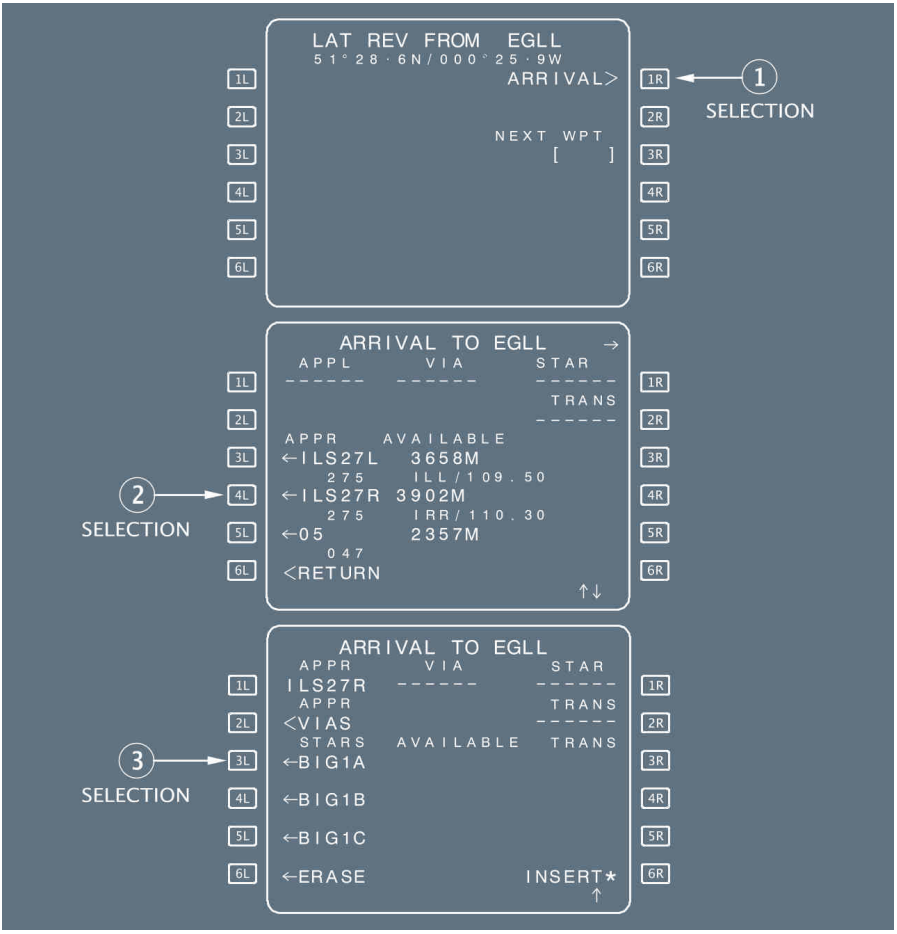
The preparation for descent and approach consists of :

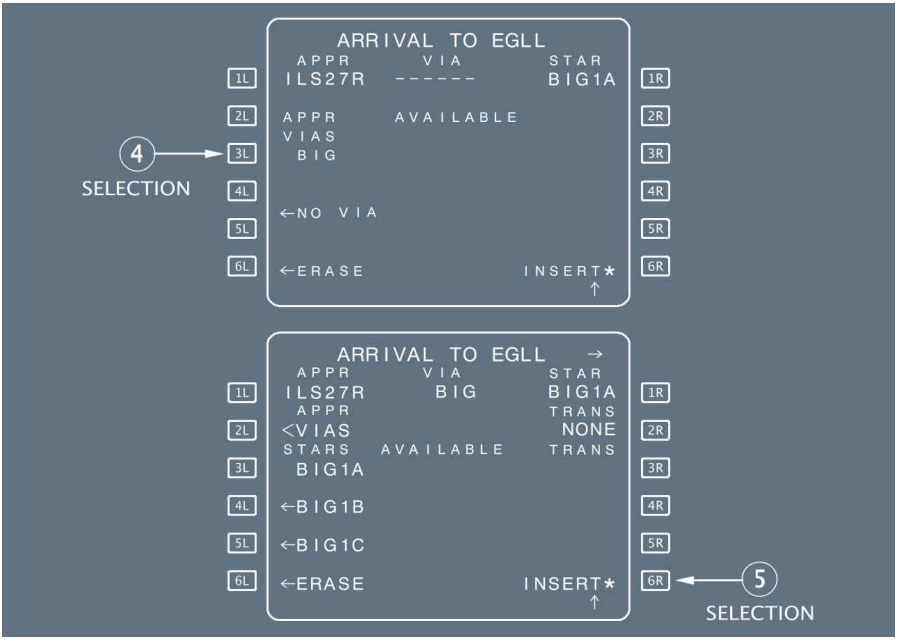
- Entering PERF and WIND data
- Defining the lateral and vertical F-PLN
- Checking the tuning (auto or manual) of the appropriate navaids

After receiving the arrival information, the flight crew should use the following procedure.

Applicable to: ALL

9 **REVISION OF LATERAL F-PLN**





PERFORM a lateral revision at destination
SELECT an ARRIVAL
SELECT an APPROACH, a STAR, a TRANSITION, a VIA.

When the pilot selects successive items, the page are automatically sequenced. But pressing "NEXT PAGE" key brings up the APPR and STAR page successively.

CHECK the temporary revision including the missed approach.
INSERT the temporary revision, [6R] key.

Applicable to: ALL

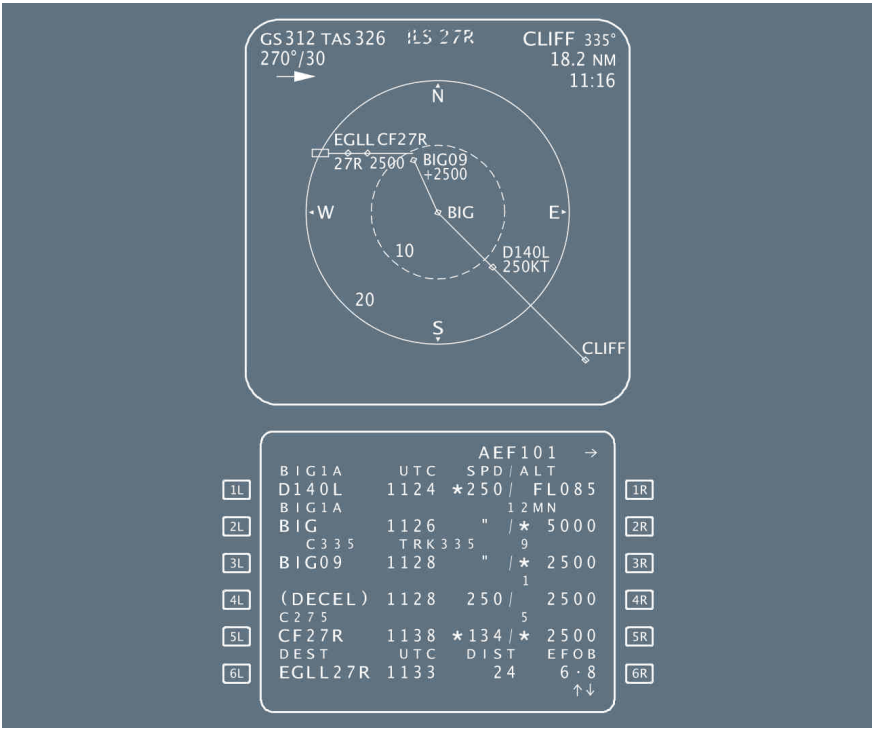
10 **REVISION OF VERTICAL FLIGHT PLAN**

CHECK that the speed and altitude constraints as displayed on the ND. (Use the CSTR pusbutton).
ENTER any additional speed or altitude constraints using the vertical revision page.

In order not to be too fast when commencing the approach, you may insert a speed constraint at the FAF (Final Approach Fix).
When all computations are completed.

REVIEW the flight plan, using the approach chart.

When the destination runway changes and if the previously selected STAR is compatible with the new runway, the system selects it automatically in the temporary F-PLN. If the flight crew has entered any revision or constraint on this STAR, it will not be transferred.
The pilot must reenter it in order to retain it for this approach.



Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

ENTERING THE WINDS FOR DESCENT

Refer to DSC-22_20-30-20-20 Wind.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

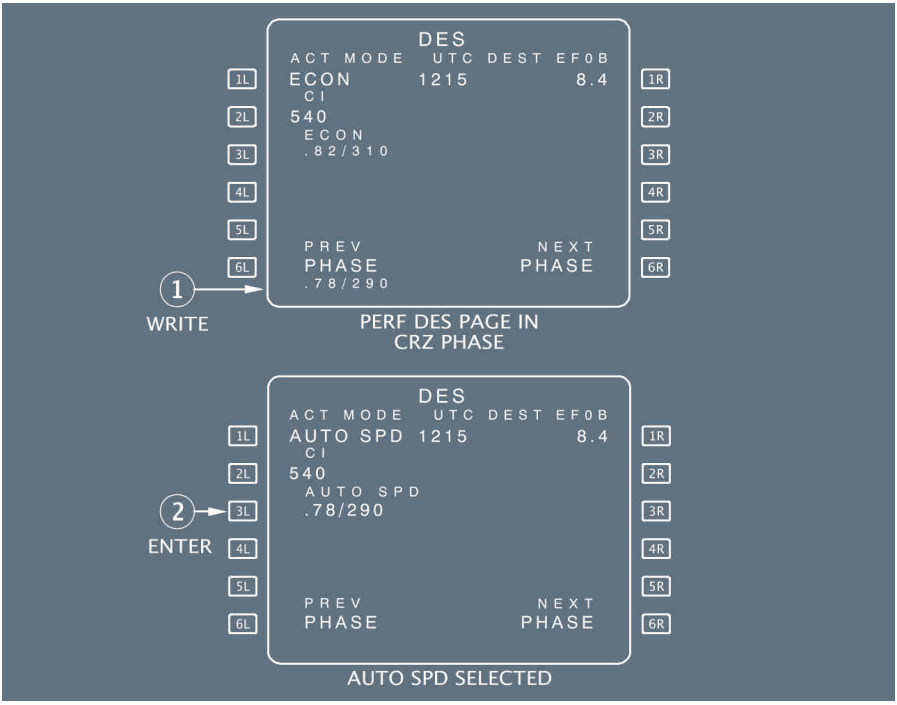
ENTERING THE WINDS FOR DESCENT

Refer to DSC-22_20-30-20-25 Wind - Temperature - QNH - General.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

11 ## ENTERING AN AUTO SPEED

As long as the descent phase is not active, the PERF DES page may either be used to select a speed, or a Mach number, or both, to replace the optimum descent speed. This speed is the called Auto speed.
The Flight Guidance Computer then uses your Auto speed instead of the ECON Speed for computing the descent profile and determining the Descent Managed Speed profile.
When the system switches to the descent phase, it sets the managed target speed to the auto speed. From there, you may modify the speed by using the FCU selector knob only.
Once in descent phase, the pilot cannot select the ECON speed again.



PROCEDURE

PRESS the PERF on MCDU.
SELECT the “NEXT PHASE” prompt.

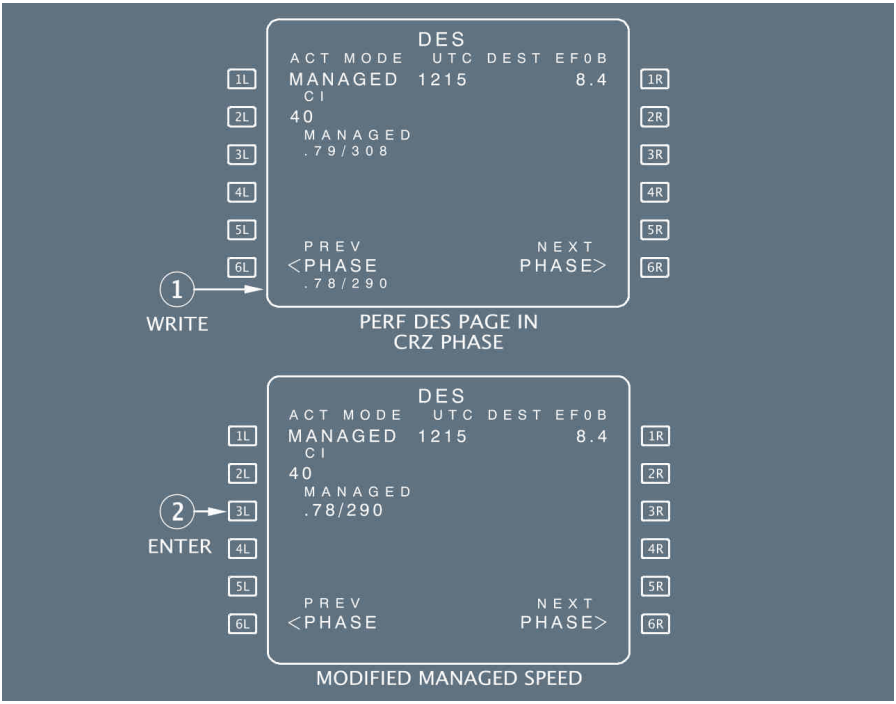
WRITE the descent speed into the scratchpad and ENTER it.

The 3L Field Displays AUTO SPD Value.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

12 **PRESELECTING A MANAGED SPEED/MACH**

As long as the descent phase is not active, the PERF DES page may either be used to select a speed, or a Mach number, or both, to replace the optimum descent speed.
The Flight Guidance Computer then uses the entered speed, instead of the optimum speed for computing the descent profile.
When the system switches to the descent phase, it sets the MANAGED target speed to the entered speed. From there, the speed may only be modified by using the FCU selector knob.
Once in descent phase, the pilot cannot modify the MANAGED speed again.



PROCEDURE

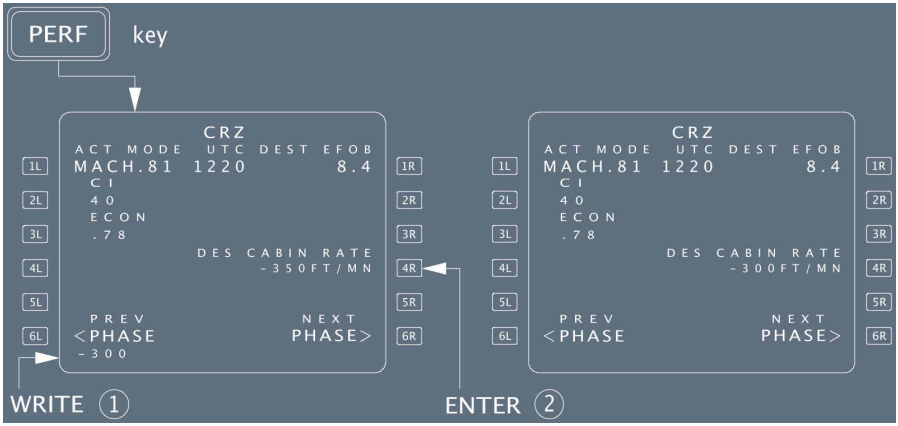
PRESS the PERF on MCDU.
SELECT the “NEXT PHASE” prompt.

WRITE the descent speed into the scratchpad and ENTER it.

The 3L field displays the imposed managed speed value.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

MODIFICATION OF THE CABIN RATE

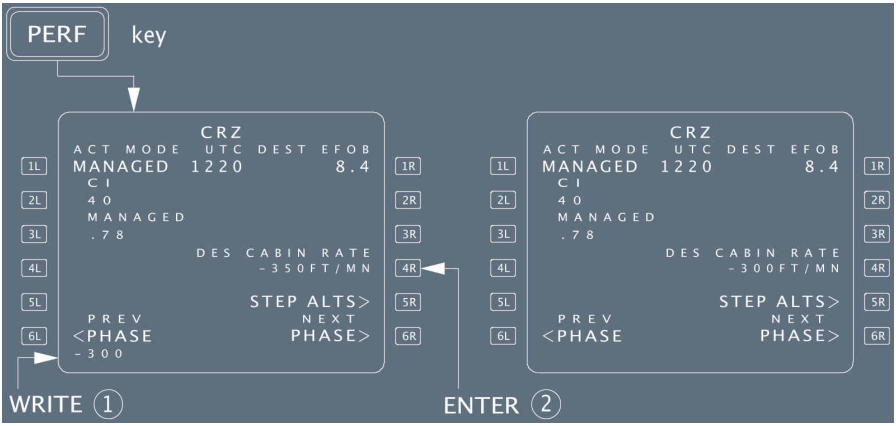


PROCEDURE

PRESS the MCDU's PERF.
WRITE the new cabin rate in the scratchpad.
ENTER it in the [4R] field.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

MODIFICATION OF THE CABIN RATE



PROCEDURE

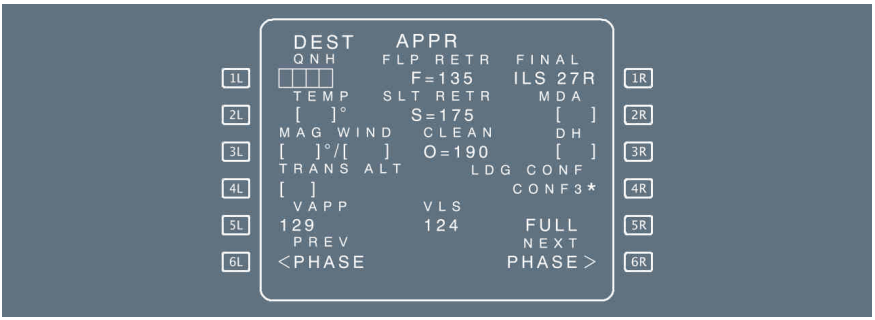
PRESS the MCDU's PERF.
WRITE the new cabin rate in the scratchpad.
ENTER it in the [4R] field.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

13 ## ENTERING THE APPROACH DATA

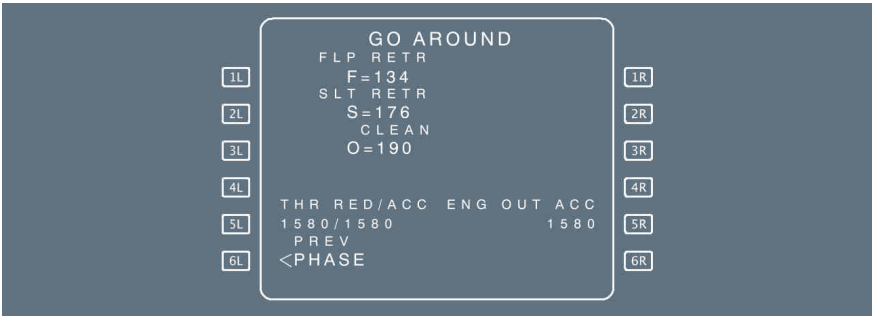
From PERF DES page, SELECT “NEXT PHASE” [6R] key to display the APPR page.
ENTER QNH, TEMP, WIND at destination (magnetic north reference), MDA/MDH or DH.
(The PFD displays the MDA/MDH or DH value, only after the descent phase has been activated.)

CHECK and, if necessary, MODIFY
- LDG CONF (landing configuration),
- VAPP (the FM-computed value may be modified),
- TRANS ALT (transition altitude).



The scratchpad displays "ENTER DEST DATA" if the approach page is not completed when the aircraft is 180 nm from destination.

SELECT "NEXT PHASE" in order to display the GO AROUND page.
CHECK and, if necessary, MODIFY the THR RED ALT and the ACC ALT.



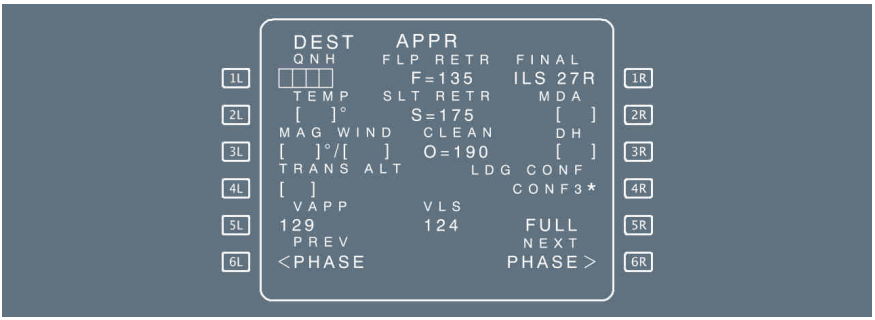
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

14 ENTERING THE APPROACH DATA

From PERF DES page, SELECT "NEXT PHASE" [6R] key to display the APPR page.
ENTER QNH, TEMP, WIND at destination (magnetic north reference), DH or MDA (MDH depending on the OPC option).

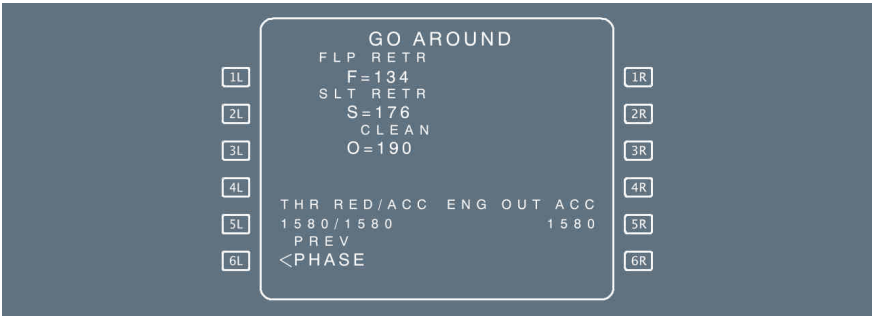
(The PFD displays the MDA/MDH or DH only when the distance to destination is less than 250 nm).

CHECK and, if necessary, MODIFY
- LDG CONF (landing configuration),
- VAPP (the FM-computed value may be modified),
- TRANS ALT (transition altitude).



The scratchpad displays "ENTER DEST DATA" if the approach page is not completed when the aircraft is 180 nm from destination.

SELECT "NEXT PHASE" in order to display the GO AROUND page.
CHECK and, if necessary, MODIFY the THR RED ALT and the ACC ALT.



Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

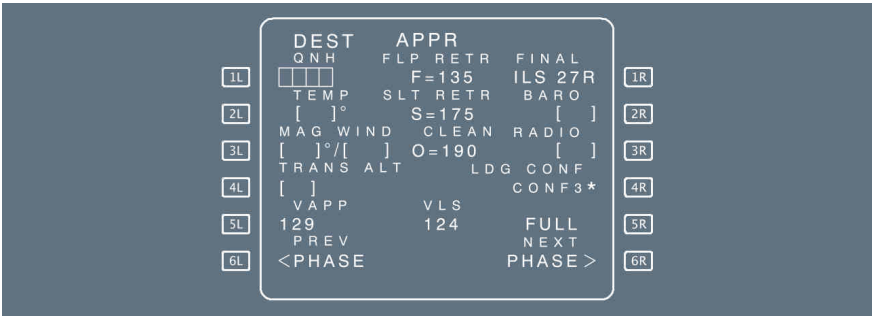
15

ENTERING THE APPROACH DATA

From PERF DES page, SELECT "NEXT PHASE" [6R] key to display the APPR page.
ENTER QNH, TEMP, WIND at destination (magnetic north reference), minimum in the RADIO or BARO fields.

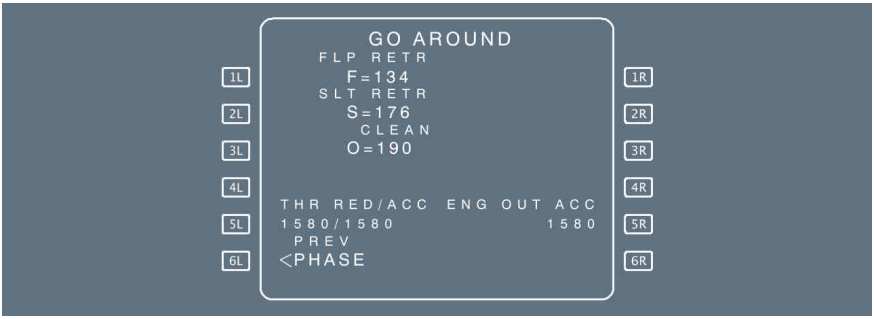
(The PFD displays the entered BARO or RADIO minimum value, only when the distance to destination is less than 250 nm).

CHECK and, if necessary, MODIFY
- LDG CONF (landing configuration),
- VAPP (the FM-computed value may be modified),
- TRANS ALT (transition altitude).



The scratchpad displays "ENTER DEST DATA" if the approach page is not completed when the aircraft is 180 nm from destination.

SELECT "NEXT PHASE" in order to display the GO AROUND page.
CHECK and, if necessary, MODIFY the THR RED ALT and the ACC ALT.



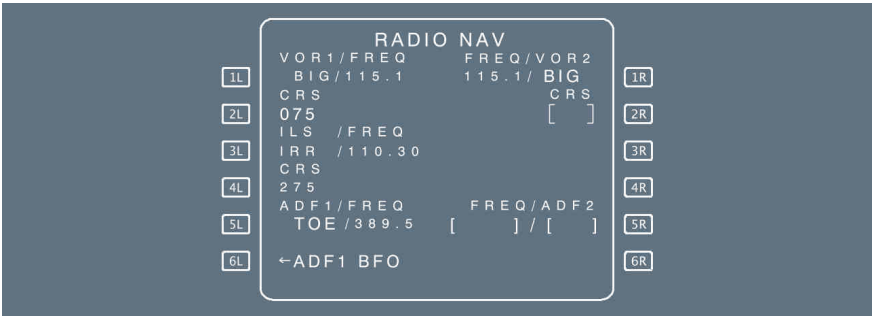
Applicable to: ALL

16 **SELECTING THE RADIO NAVAIDS**

CHECK or SELECT the NAVAIDS appropriate for the approach.

For an ILS procedure, the ILS will be autotuned.
NDBs must be manually entered.

Note: *When the destination has a VOR/DME, ENTER it manually in the VOR field. ENTER its identifier in the BRG/DIST field of the PROG page. This allows you to perform a permanent NAV accuracy check.*



Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

COST INDEX FOR LONG-RANGE CRUISE

The flight crew can use the table below to find an approximate Cost Index value that is calculated for cruise at long-range cruise speed. This value is valid for CRZ FL = OPT ALT ±10 000 ft.

AIRCRAFT	ENGINE	CILRC	
		kg/min	100 lb/h
A318/A319/A320/A321	CFM 56-5-A4/A5	20	30
	CFM 56-5-A1/A3	45	60
	CFM 56-5-B1/B2/B3	65	85
	CFM 56-5-B4 (A321)	65	85
	CFM 56-5-B4 (A320)	25	35
	CFM 56-5-B4/P	5	10
	CFM 56-5-B5/B6/B7	5	10
	CFM 56-5-B8/B9	15	20
	PW6122/PW6124	20	30
	V2522-A5/V2524-A5/V2527M-A5	30	40
	V2527-A5/V2527E-A5	40	55
	V2500-A1	45	60
	V2530-A5/V2533-A5	50	70

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

COST INDEX FOR LONG-RANGE CRUISE

The flight crew can use the table below to find an approximate Cost Index value that is calculated for cruise at long-range cruise speed. This value is valid for CRZ FL = OPT ALT ±10 000 ft.

AIRCRAFT	ENGINE	CILRC	
		kg/min	100 lb/h
A318/A319/A320/A321	CFM 56-5-A1/A3	45	60
	CFM 56-5-A4/A5	40	55
	CFM 56-5-B1/B2/B3	65	85
	CFM 56-5-B4 (A321)	65	85
	CFM 56-5-B4 (A320)	55	75
	CFM 56-5-B4/P	25	35
	CFM 56-5-B5/B6/B7	25	35
	CFM 56-5-B5/2P CFM 56-5-B6/2P CFM 56-5-B7/2P	30	40
	CFM 56-5-B8/B9	15	20
	PW6122/PW6124	20	30
	V2500-A1	45	60
	V2522-A5/V2524-A5/ V2527M-A5	50	70
	V2530-A5/V2533-A5	50	70
	V2527-A5/V2527E-A5	40	55

Intentionally left blank

Descent

DESCENT INITIATION

Applicable to: ALL

The top of descent, displayed on the F-PLN page (T/D) and on the ND ( ), is a position that the system calculates, assuming that the aircraft will begin its descent in DES mode with managed speed, and that the system will guide the aircraft along the descent profile computed with all the vertical F-PLN data (ALT CSTR, ECON or AUTO MACH/SPD, SPD CSTR, SPD LIMIT) to reach VAPP at 1 000 ft AGL.

Note: The ND does not display the top of descent when HDG (or TRACK) mode is engaged.

PROCEDURES

- **When the aircraft reaches the top of descent (F/D) :**

  SELECT the altitude target.

  PUSH the ALT selector knob. DES mode engages.

  CHECK the FMA annunciators.

DESCENT MONITORING

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

1 ### DES MODE ENGAGED

When DES mode is engaged, NAV mode is engaged, and the system takes into account all altitude and speed constraints.
The key parameter for monitoring the descent is the vertical deviation (VDEV) displayed on the PFD and on the PROG page, which indicates whether the aircraft is on, above, or below the descent profile.

PROCEDURE

SET the ATC-cleared altitude on the FCU (considering also what is the safe altitude).

If the lowest safe altitude is higher than the ATC-cleared altitude, check with ATC that this constraint applies.
If it is confirmed, SET the FCU altitude to the safe altitude until it is safe to go to the ATC-cleared altitude.

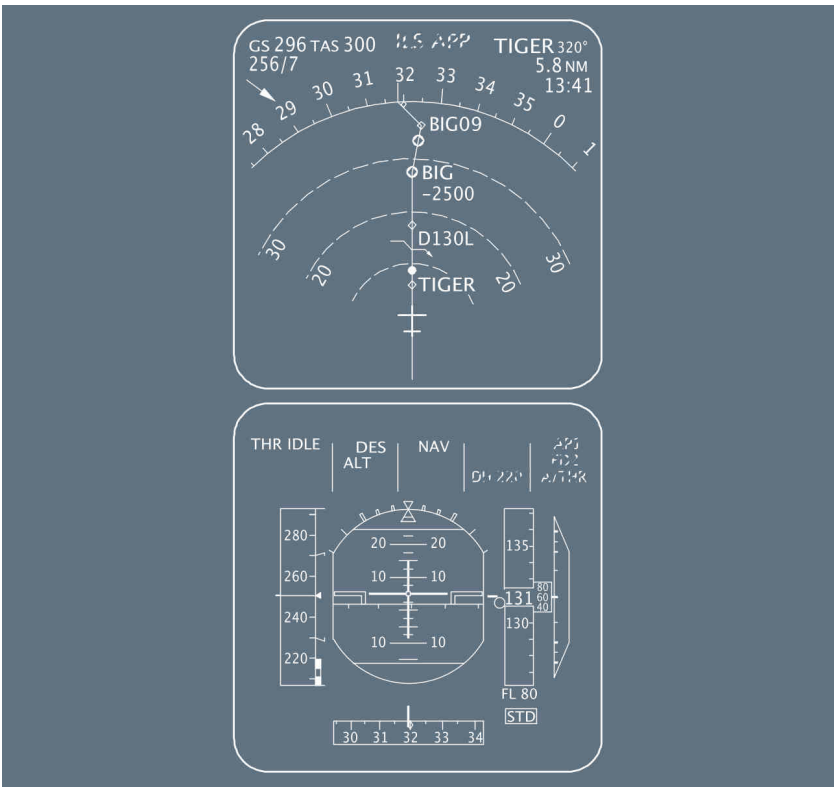
MONITOR vertical deviation (VDEV) on the PFD and the PROG page.
MONITOR the speed change that occurs, when the aircraft reaches a speed change symbol (magenta ball) under managed speed.
MONITOR the FMA (ALT*, ALT CST*, ALT, ALT CST), when the aircraft reaches level symbols.

■ **If the aircraft is on the descent profile:**

The aircraft is considered to be on the vertical profile, when it is within 50 ft of it. VDEV is close to zero, and the system predicts that it will match constraints until the aircraft levels off at the next FCU altitude.

MONITOR the predicted descent point after the next level-off.

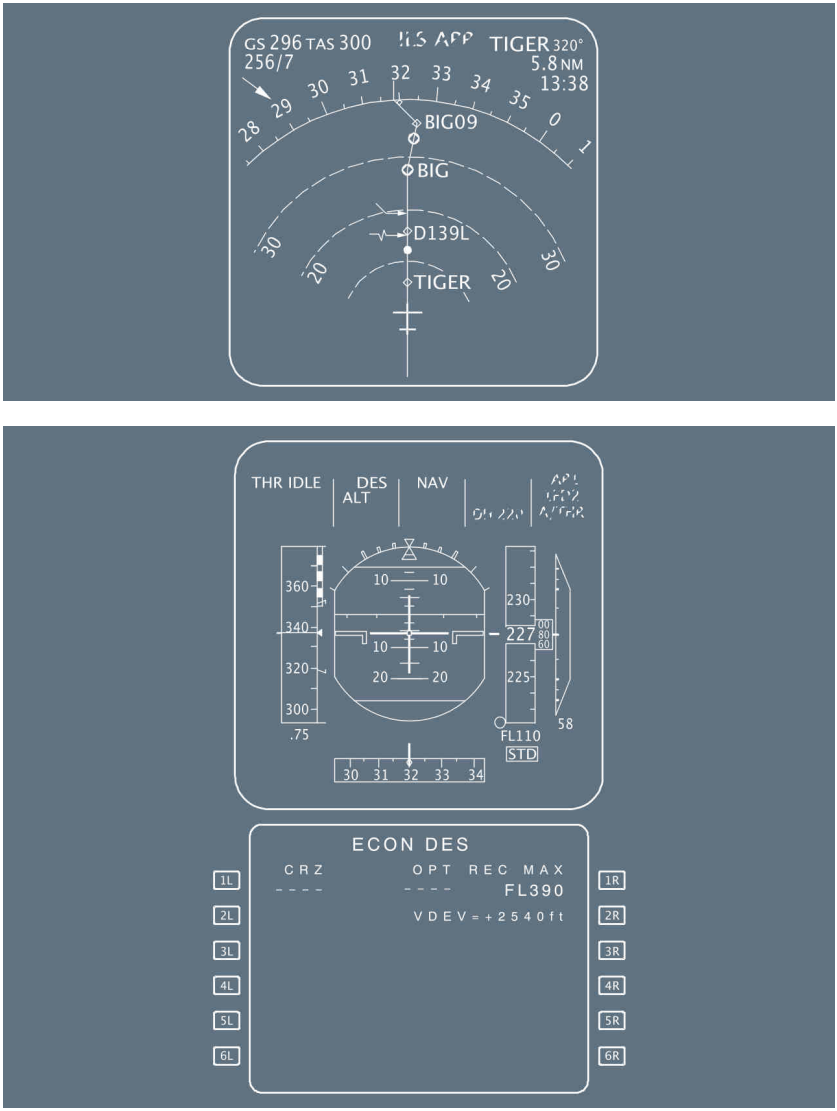
The A/THR adjusts the thrust for the particular segment. The first FMA column may display "THR IDLE" or "SPEED".



■ **If the aircraft is above the descent profile:**

VDEV is down on the PFD and positive on the PROG page.

The A/THR sets IDLE thrust and the AP increases speed by calling for down elevator. If the aircraft reaches the upper limit of the managed speed range, the aircraft diverges and maintains the upper limit speed.



Procedure

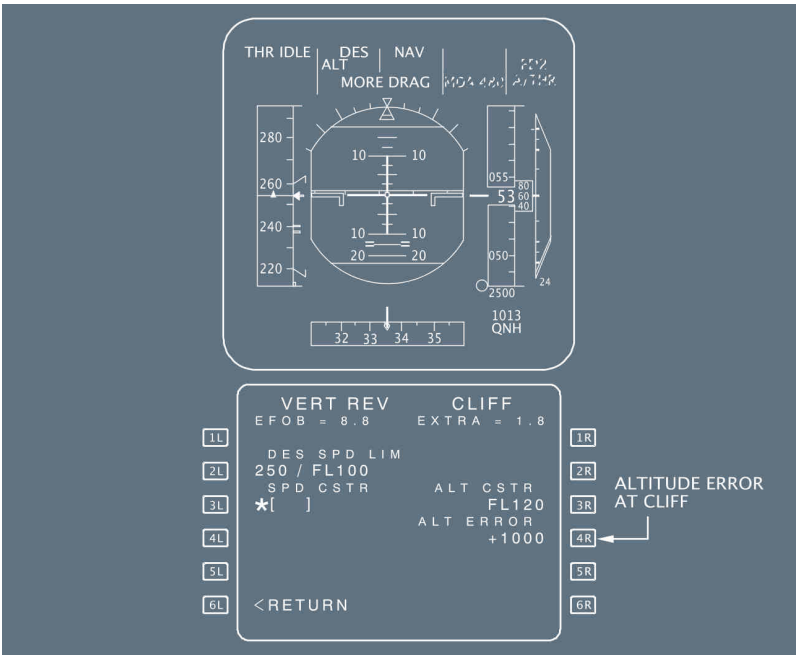
SELECT a descent speed higher than the upper limit when possible.

MONITOR the intercept symbol.

When this symbol reaches the next ALT CSTR waypoint, "MORE DRAG" appears on the PFD, indicating that speedbrakes must be extended in order to match the next altitude constraint. This is an advisory message.

Note: When DES mode is engaged, speed brake extension will not necessarily increase the descent rate. It does so, if the aircraft is above the profile.
If the aircraft is on or below the profile: The system will add thrust to keep the aircraft on profile and within the speed target range.

- **If an altitude constraint is predicted to be missed by more than 250 ft,** the vertical revision page shows ALT ERROR at the waypoint.



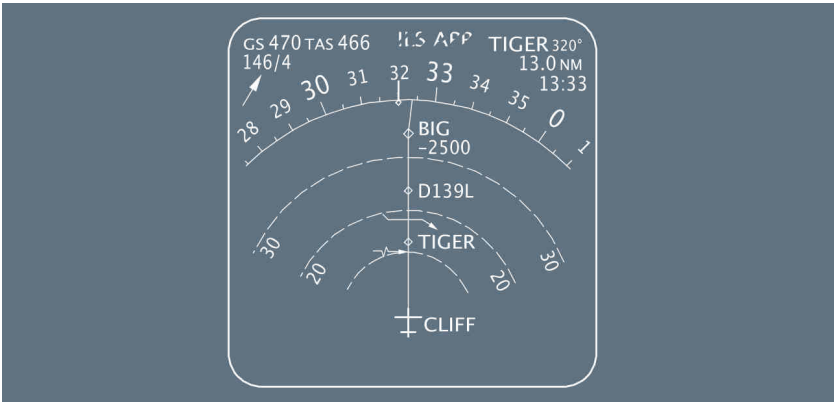
- **If a speed constraint is predicted to be missed by more than 10 kt:**
  SELECT an appropriate speed.
  RESUME managed speed when the aircraft is back on the descent path.

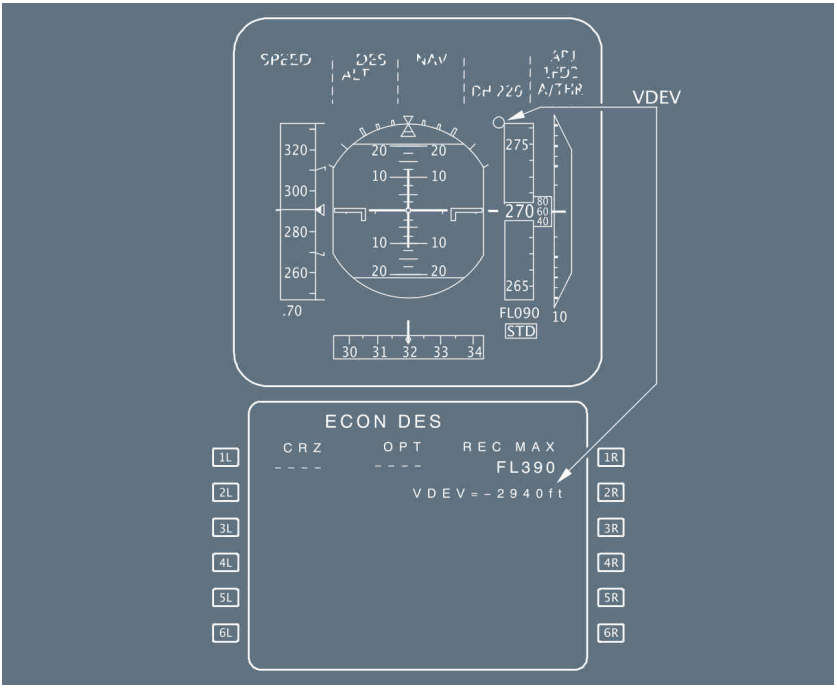
■ **If the aircraft is below the descent profile:**

VDEV is up on the PFD and negative on the PROG page. The system maintains the target speed (managed or selected speed).

MONITOR the intercept symbol ([ ]) on the ND and any leveling off at the next ALT CSTR.

The A/THR is in speed mode with a -1 000 ft/min rate of descent (if the aircraft is flying an idle segment) or half the theoretical FPA of the descent profile (if the aircraft is flying a geometric segment), until the profile is regained.





- **If the rate of descent has to be increased (ATC requirement):**

  SELECT OP DES mode

  Increase the target speed or extend the speedbrakes.

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI

2 **DES MODE ENGAGED**

When DES mode is engaged, NAV mode is engaged, and the system takes into account all altitude and speed constraints.
The key parameter for monitoring the descent is the vertical deviation (VDEV) displayed on the PFD and on the PROG page, which indicates whether the aircraft is on, above, or below the descent profile.

PROCEDURE

SET the ATC-cleared altitude on the FCU (considering also what is the safe altitude).

If the lowest safe altitude is higher than the ATC-cleared altitude, check with ATC that this constraint applies.

If it is confirmed, SET the FCU altitude to the safe altitude until it is safe to go to the ATC-cleared altitude.

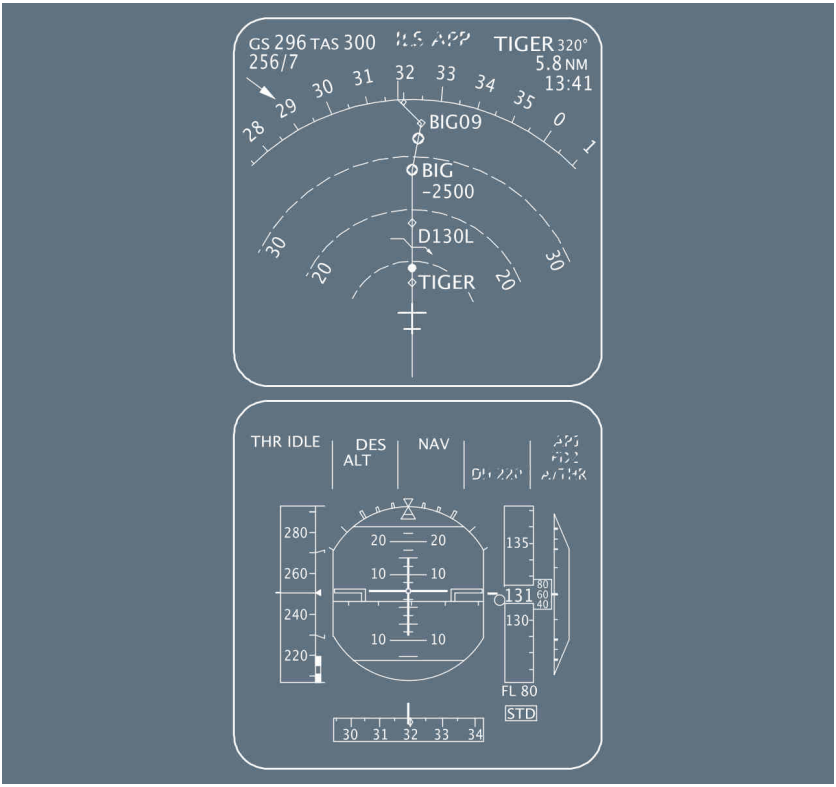
MONITOR the vertical deviation (VDEV) on the PFD and the PROG page.
MONITOR the speed change that occurs, when the aircraft reaches a speed change symbol (magenta ball) under managed speed.
MONITOR the FMA (ALT*, ALT CST*, ALT, ALT CST) when the aircraft reaches level symbols.

■ **If the aircraft is on the descent profile:**

The aircraft is considered to be on the vertical profile, when it is within 50 ft of it. VDEV is close to zero, and the system predicts that it will match constraints until the aircraft levels off at the next FCU altitude.

MONITOR the predicted descent point after the next level-off.

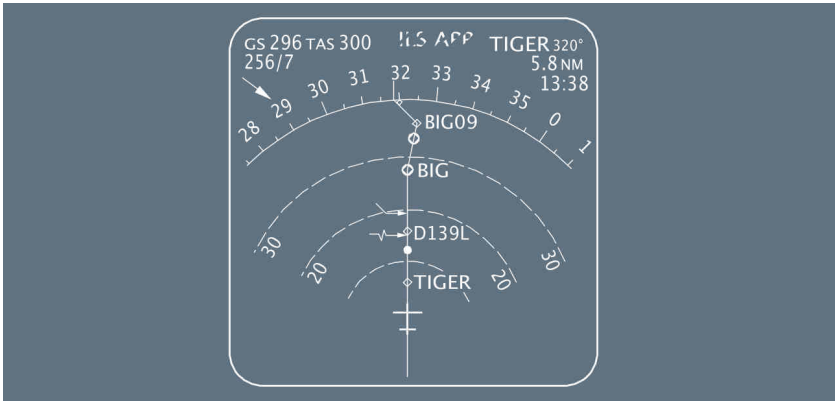
The A/THR adjusts the thrust for the particular segment. The first FMA column may display "THR IDLE" or "SPEED".

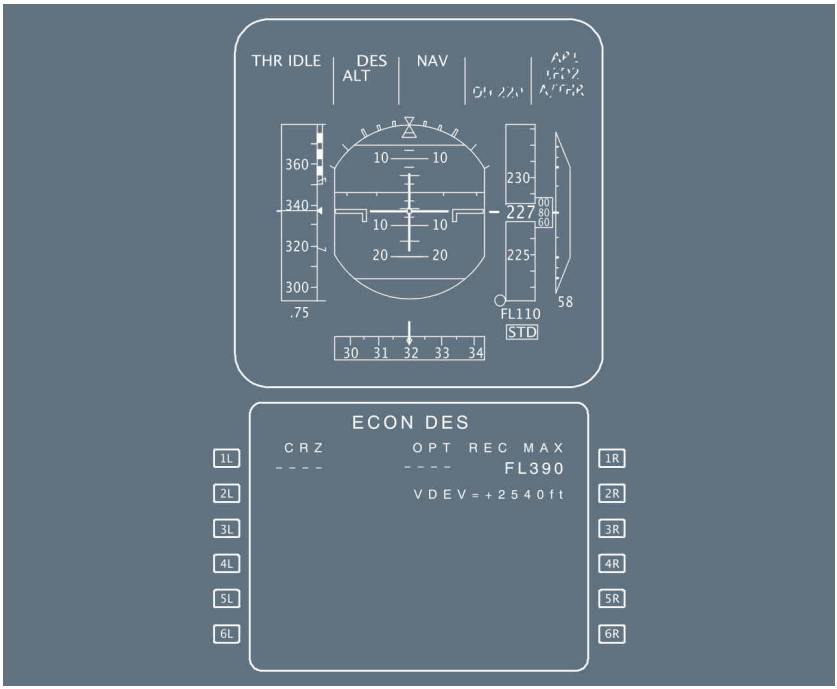


■ **If the aircraft is above the descent profile:**

VDEV is down on the PFD and positive on the PROG page.

The A/THR sets IDLE thrust and the AP increases speed by calling for down elevator. If the aircraft reaches the upper limit of the managed speed range, the aircraft diverges and maintains the upper limit speed.





Procedure

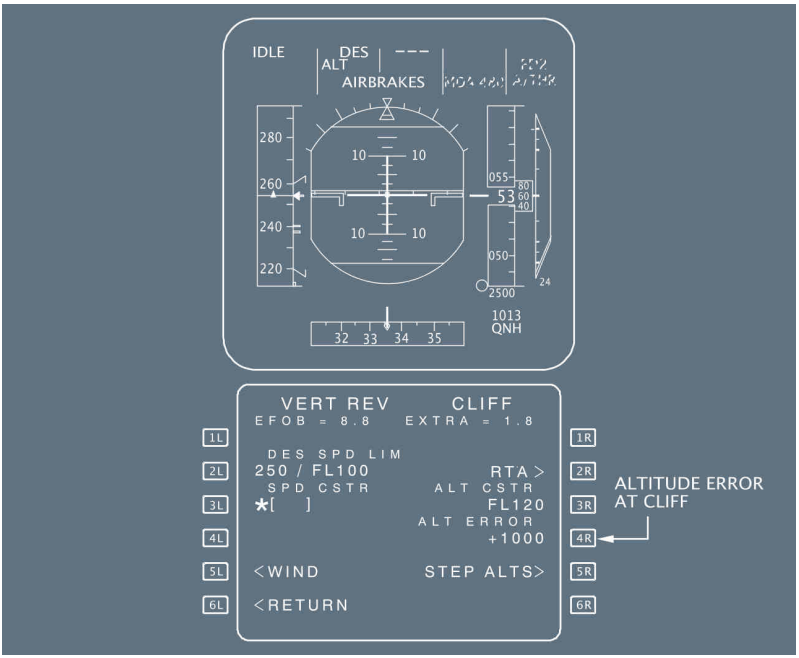
SELECT a descent speed higher than the upper limit when possible.

MONITOR the intercept symbol.

When this symbol reaches the next ALT CSTR waypoint "MORE DRAG" appears on the PFD indicating that speedbrakes must be extended in order to match the next altitude constraint. This is an advisory message.

Note: When DES mode is engaged, the speed brake extension will not necessarily increase the descent rate. It does so only, if the aircraft is above the profile. If the aircraft is on or below the profile: The system will add thrust to keep the aircraft on profile and within the speed target range.

- **If an altitude constraint is predicted to be missed by more than 250 ft,** the vertical revision page shows ALT ERROR at the waypoint.



- **If a speed constraint is predicted to be missed by more than 10 kt:**

  SELECT an appropriate speed.

  RESUME managed speed when the aircraft is back on the descent path.

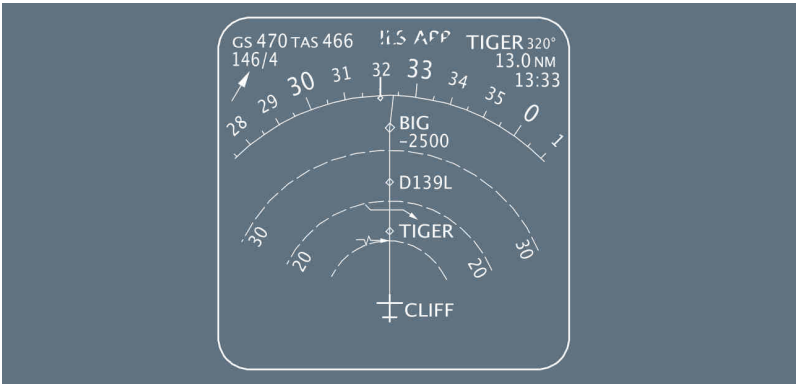
■ **If the aircraft is below the descent profile:**
VDEV is up on the PFD and negative on the PROG page. The system maintains the target speed (managed or selected speed).

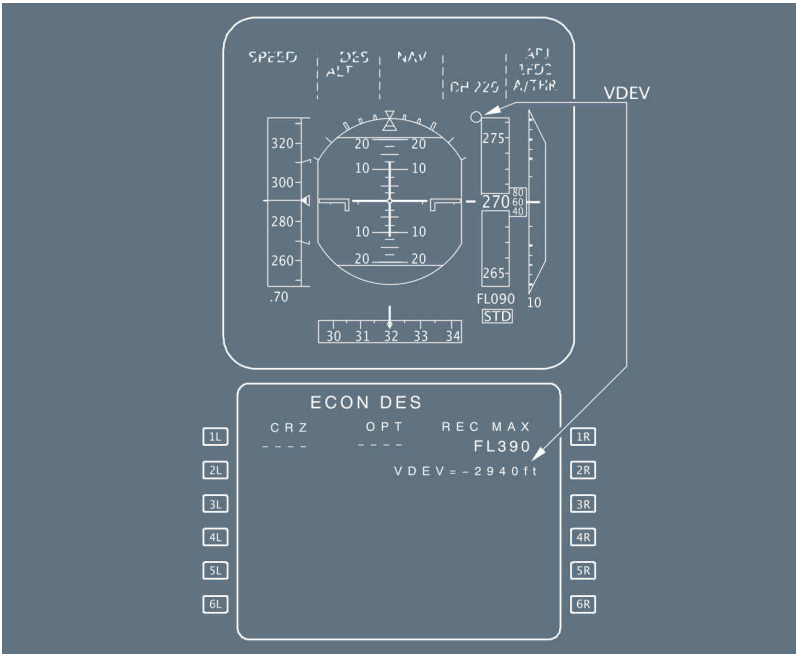
MONITOR the intercept symbol ([ ]) on the ND and any leveling off at the next ALT CSTR.

- **If the aircraft is flying at an altitude that is higher than both the descent speed limit altitude and the destination elevation +5 000 ft:**

  The FMGS maintains the V/S at -1 000 ft/min and the target speed, until the aircraft reaches the altitude constraint or intercepts the descent profile.

- **If the aircraft is flying at an altitude that is lower than either the descent speed limit altitude, or the destination elevation +5 000 ft:**
  The FMGS maintains the V/S at - 500 ft/min and the target speed, until the aircraft reaches the altitude constraint or intercepts the descent profile.





- **If the rate of descent has to be increased (ATC requirement):**

  SELECT OP DES mode

  Increase the target speed or extend the speedbrakes.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

3 **DES MODE ENGAGED**

When DES mode is engaged, NAV mode is engaged, and the system takes into account all altitude and speed constraints.
The key parameter for monitoring the descent is the vertical deviation (VDEV) displayed on the PFD and on the PROG page, which indicates whether the aircraft is on, above, or below the descent profile.

PROCEDURE

SET the ATC-cleared altitude on the FCU (considering also what is the safe altitude).

If the lowest safe altitude is higher than the ATC-cleared altitude, check with ATC that this constraint applies.

If it is confirmed, SET the FCU altitude to the safe altitude until it is safe to go to the ATC-cleared altitude.

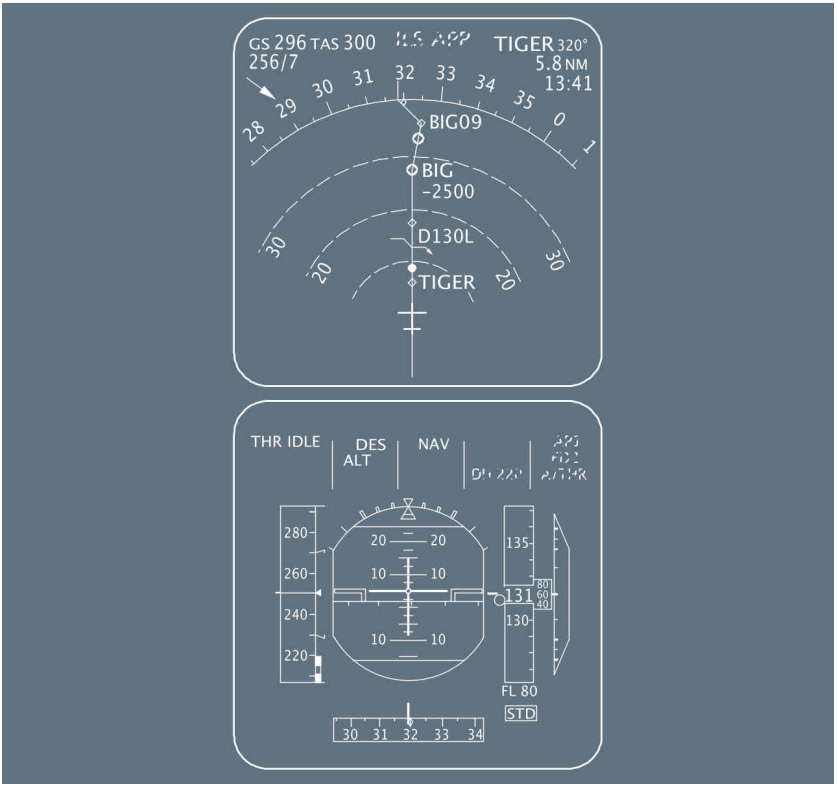
MONITOR vertical deviation (VDEV) on the PFD and the PROG page.
MONITOR the speed change that occurs, when the aircraft reaches a speed change symbol (magenta ball) under managed speed.
MONITOR the FMA (ALT*, ALT CST*, ALT, ALT CST), when the aircraft reaches level symbols.

■ **If the aircraft is on the descent profile:**

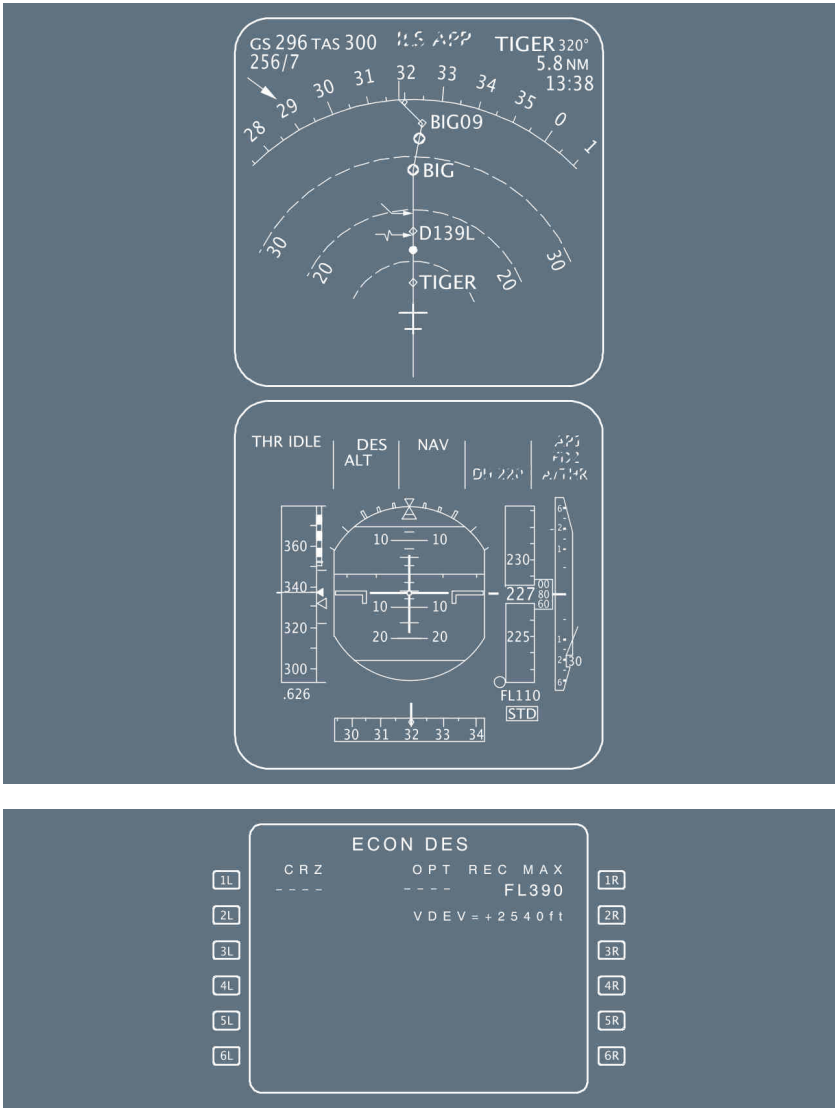
The aircraft is considered to be on the vertical profile, when it is within 50 ft of it. VDEV is close to zero, and the system predicts that it will match constraints until the aircraft levels off at the next FCU altitude.

MONITOR the predicted descent point after the next level-off.

A/THR adjusts thrust for the particular segment. The first FMA column may display "THR IDLE" or "SPEED".



■ **If the aircraft is above the descent profile:**
VDEV is down on the PFD and positive on the PROG page.
A/THR sets IDLE thrust and the AP increases speed by calling for down elevator. If the aircraft reaches the upper limit of the managed speed range, the aircraft diverges and maintains the upper limit speed.



Procedure

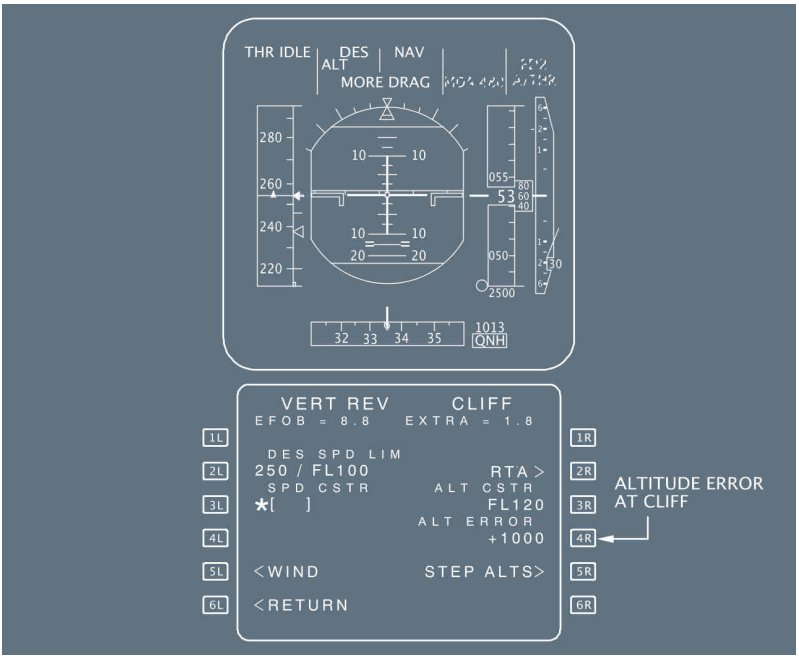
SELECT a descent speed higher than the upper limit when possible.

MONITOR the intercept symbol

When this symbol reaches the next ALT CSTR waypoint, "MORE DRAG" appears on the PFD, indicating that speedbrakes must be extended in order to match the next altitude constraint. This is an advisory message.

Note: When DES mode is engaged, speed brake extension will not necessarily increase the descent rate. It does so, if the aircraft is above the profile.
If the aircraft is on or below the profile: The system will add thrust to keep the aircraft on profile and within the speed target range.

- **If an altitude constraint is predicted to be missed by more than 250 ft,** the vertical revision page shows ALT ERROR at the waypoint.



- **If a speed constraint is predicted to be missed by more than 10 kt:**
  SELECT an appropriate speed.
  RESUME managed speed when the aircraft is back on the descent path.

■ **If the aircraft is below the descent profile:**

VDEV is up on the PFD and negative on the PROG page. The system maintains the target speed (managed or selected speed).

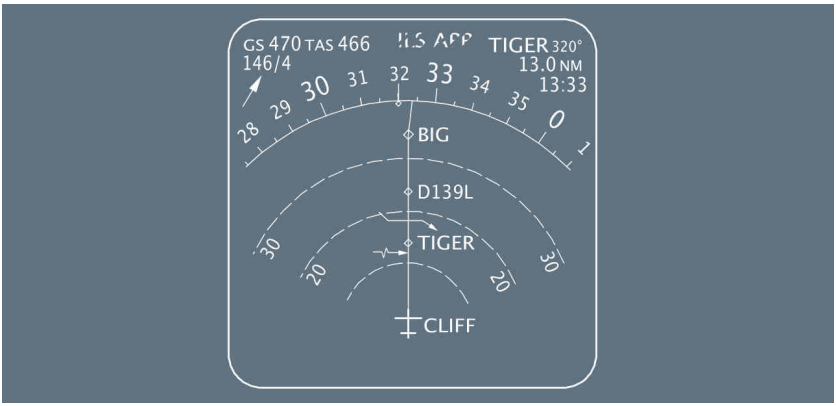
MONITOR the intercept symbol ([ ]) on the ND and any leveling off at the next ALT CSTR.

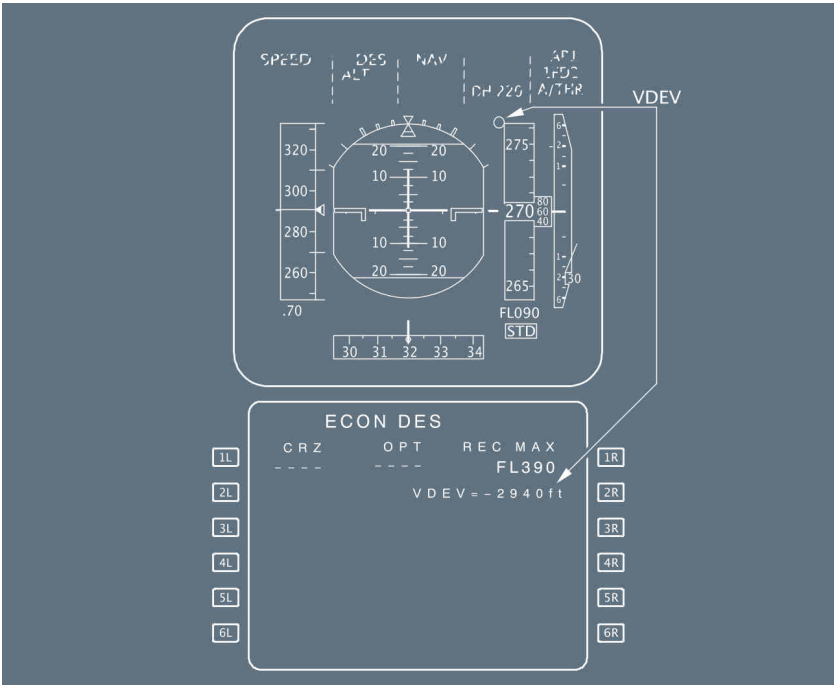
- **If the aircraft is flying at an altitude that is higher than both the descent speed limit altitude and the destination elevation +5 000 ft:**

  The FMGS maintains the V/S at -1 000 ft/min and the target speed, until the aircraft reaches the altitude constraint or intercepts the descent profile.

- **If the aircraft is flying at an altitude that is lower than either the descent speed limit altitude, or the destination elevation +5 000 ft:**

  The FMGS maintains the V/S at - 500 ft/min and the target speed, until the aircraft reaches the altitude constraint or intercepts the descent profile.



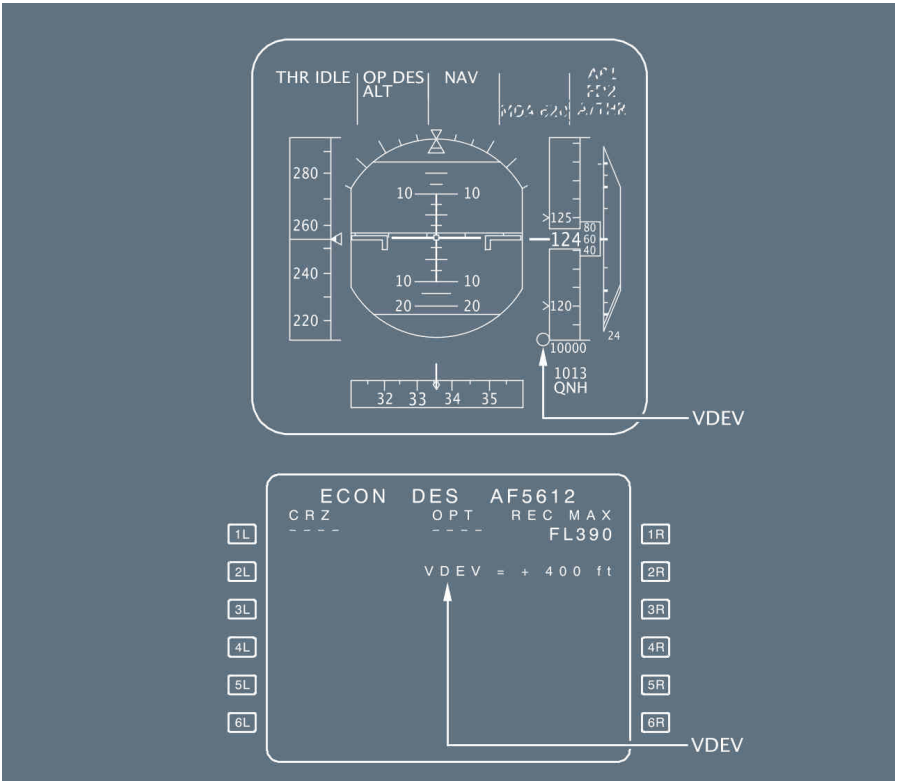


- **If the rate of descent has to be increased (ATC requirement):**
  SELECT OP DES mode
  Increase the target speed or extend the speedbrakes.

Applicable to: B-HSD, B-HSE

4 **OP DES, V/S OR FPA MODE ENGAGED**

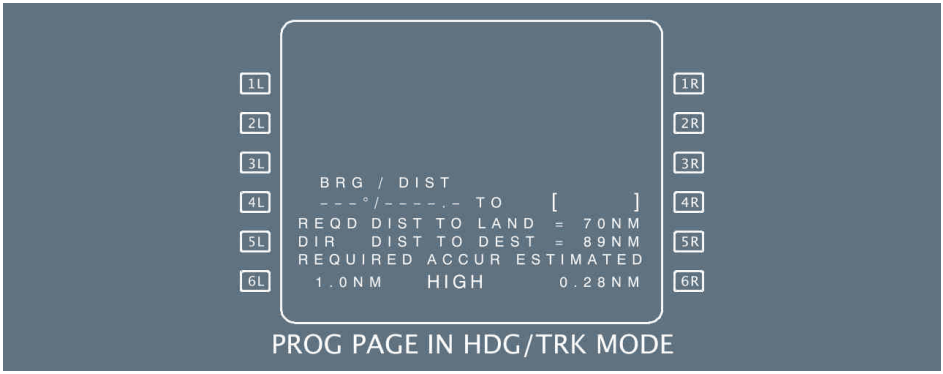
- In either case, the aircraft is no longer guided on the descent profile and altitude constraints are disregarded. If NAV mode is engaged the ND displays a white circle on waypoint with an altitude constraint. If NAV mode is disengaged, the circle is removed.
- The PFD still shows VDEV for reference purposes.
- The target altitude is always the FCU selected altitude (shown in blue).
  On the ND, level-off symbol is blue (no constraint). If NAV mode is engaged and the speed target managed, speed constraints are considered.



Vertical position may also be assessed by comparing the required distance to land and the distance to destination. The required distance to land is the distance to descend from the present level down to VAPP at destination elevation, taking into account current speed, speed limit (if any) wind compensation and an approach segment at VAPP.

Depending on aircraft configuration, the required distance to land is displayed:

- On the MCDU progress page, when HDG or TRK mode is engaged.



PROG PAGE IN HDG/TRK MODE

- On the ND by the energy circle, when HDG or TRK mode is engaged. It is displayed as a green arc oriented on the current track and centered on the aircraft current position.

Note: *Altitude and speed predictions displayed on the F-PLN page assume an immediate return to DES mode.*

PROCEDURE

SET the FCU altitude as cleared by ATC, while considering the applicable safe altitude.

If the next safe altitude is higher than the ATC-cleared altitude, check with the ATC to verify that this constraint applies.

If confirmed, set the FCU altitude to the safe altitude, until it is safe to fly at the cleared altitude.

MONITOR the speed target, when the aircraft reaches the speed change symbol.

MONITOR the FMA ALT*, ALT, upon reaching the level symbol.

When in HDG/TRK mode, MONITOR the energy circle on the ND.

The MCDU F-PLN page presents SPD/ALT constraint-matching predictions, which assume that DES mode is immediately re-engaged.

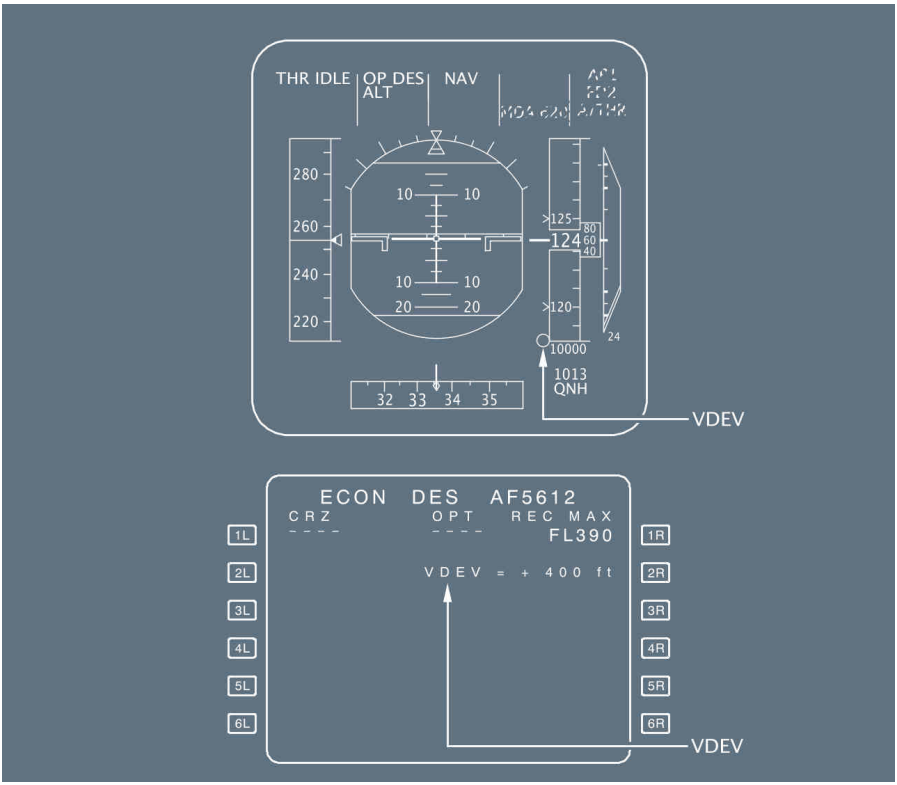
CHECK the predictions before re-engaging DES mode (in order to resume the descent profile).

Note: *VDEV is available on the PFD even in HDG mode; it is a valuable tool for monitoring the descent, as long as crosstrack error (XTK) is less than 5 nm.*
The aircraft automatically decelerates for approach, only if it flies over the DECEL pseudo waypoint with NAV mode engaged (or LOC, LOC).*

Applicable to: ALL 321, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

5 **OP DES, V/S OR FPA MODE ENGAGED**

- In either case, the aircraft is no longer guided on the descent profile and altitude constraints are disregarded. If NAV mode is engaged the ND displays a white circle on waypoint with an altitude constraint. If NAV mode is disengaged, the circle is removed.
- The PFD still shows VDEV for reference purposes.
- The target altitude is always the FCU selected altitude (shown in blue).
  On the ND, level-off symbol is blue (no constraint). If NAV mode is engaged and the speed target managed, speed constraints are considered.



When HDG or TRK mode is engaged, vertical position may also be assessed on the ND using the energy circle. It is displayed as a green arc oriented on the current track and centered on the aircraft current position.

Note: Altitude and speed predictions displayed on the F-PLN page assume an immediate return to DES mode.

PROCEDURE

SET the FCU altitude as cleared by ATC, while considering the applicable safe altitude.

If the next safe altitude is higher than the ATC-cleared altitude, check with the ATC to verify that this constraint applies.
If confirmed, set the FCU altitude to the safe altitude, until it is safe to fly at the cleared altitude.

MONITOR the speed target, when the aircraft reaches the speed change symbol.
MONITOR the FMA ALT*, ALT, upon reaching the level symbol.
When in HDG/TRK mode, MONITOR the energy circle on the ND.

The MCDU F-PLN page presents SPD/ALT constraint-matching predictions, which assume that DES mode is immediately re-engaged.

CHECK the predictions before re-engaging DES mode (in order to resume the descent profile).

Note: VDEV is available on the PFD even in HDG mode; it is a valuable tool for monitoring the descent, as long as crosstrack error (XTK) is less than 5 nm.
The aircraft automatically decelerates for approach, only if it flies over the DECEL pseudo waypoint with NAV mode engaged (or LOC, LOC).*

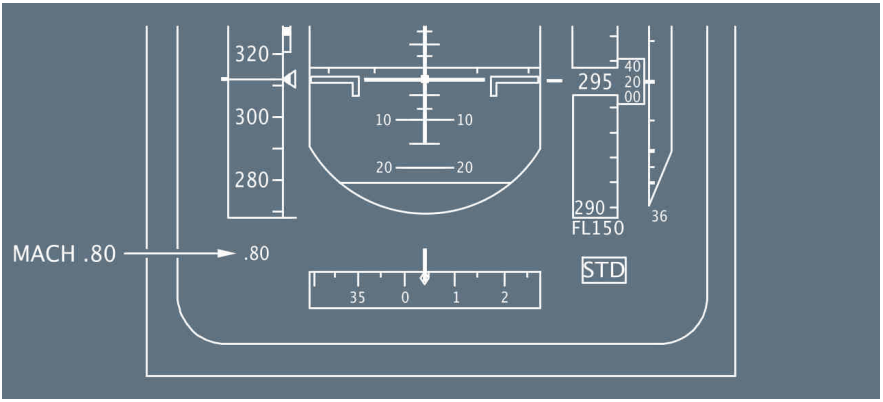
EXPEDITE DESCENT (IF INSTALLED)

Applicable to: ALL

6 ● **When ATC requires a rapid descent:**

DEPRESS THE EXPED pushbutton

Flight guidance (FG) pitches the aircraft to acquire and maintain 0.80/340. FG orders a pitch rate that produces no more than 0.15 g. The pilot can use this mode to initiate an emergency descent. To resume normal descent, PUSH the ALT selection knob or engage any other vertical mode.



MONITORING THE NAVIGATION IN THE TERMINAL CONTROL AREA

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

If the MCDU "SYSTEM RNP IS XX.X" message is displayed, the pilot will verify the manually-entered RNP value in the REQUIRED field of the PROG page and clear or modify it, if it is not in accordance with the RNP value specified in the area (NAV or approach chart).

MONITORING THE NAVIGATION IN THE TERMINAL CONTROL AREA

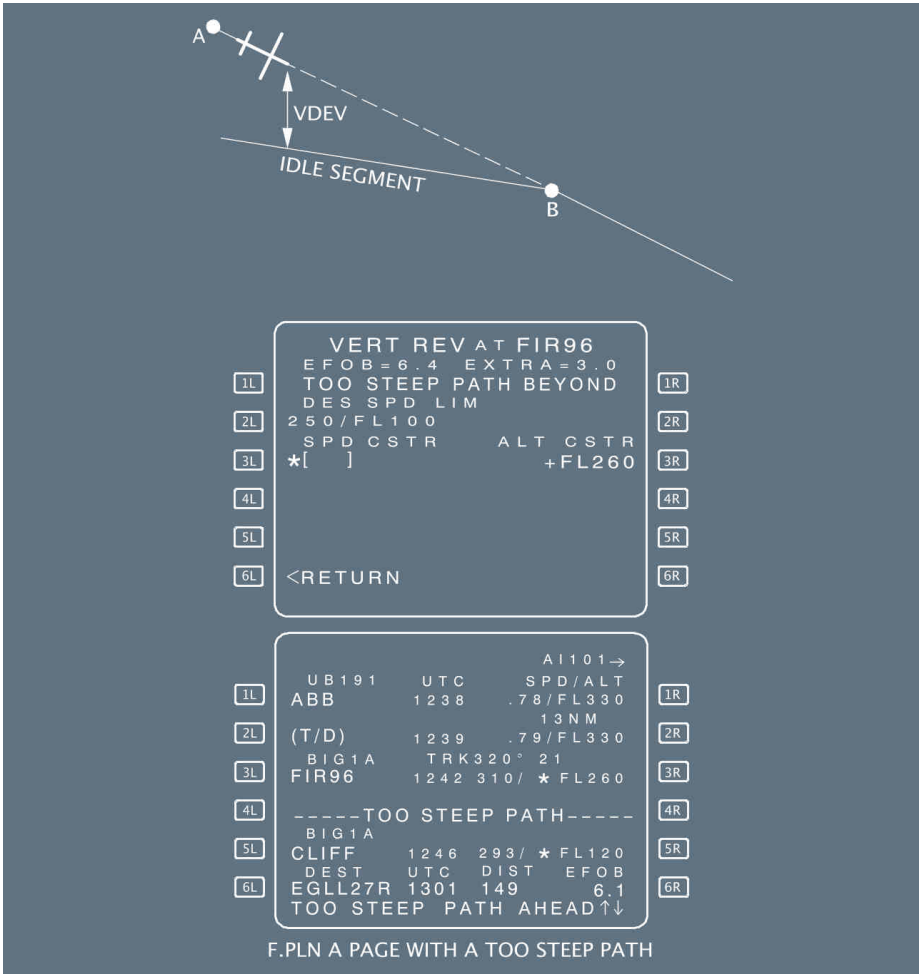
Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

If the MCDU "AREA RNP IS XX.X" message or "PROCEDURE RNP IS XX.X" message is displayed, the pilot will manually-entered RNP value in the REQUIRED field of the PROG page and clear or modify it, if it is not in accordance with the RNP value specified in the area (NAV or approach chart).

TOO STEEP PATH

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

7 "TOO STEEP PATH AHEAD" appears on the MCDU scratchpad, when the system predicts this situation, and TOO STEEP PATH is displayed on the F-PLN page.
When the aircraft is crossing the first waypoint of a TOO STEEP PATH, the system computes a flyable descent profile (with an idle segment). The VDEV makes a jump because it is related to a new profile.



F.PLN A PAGE WITH A TOO STEEP PATH

PROCEDURE

- **When passing the first waypoint of the TOO STEEP PATH:**

  MONITOR VDEV and predictions at the next CSTR waypoint.

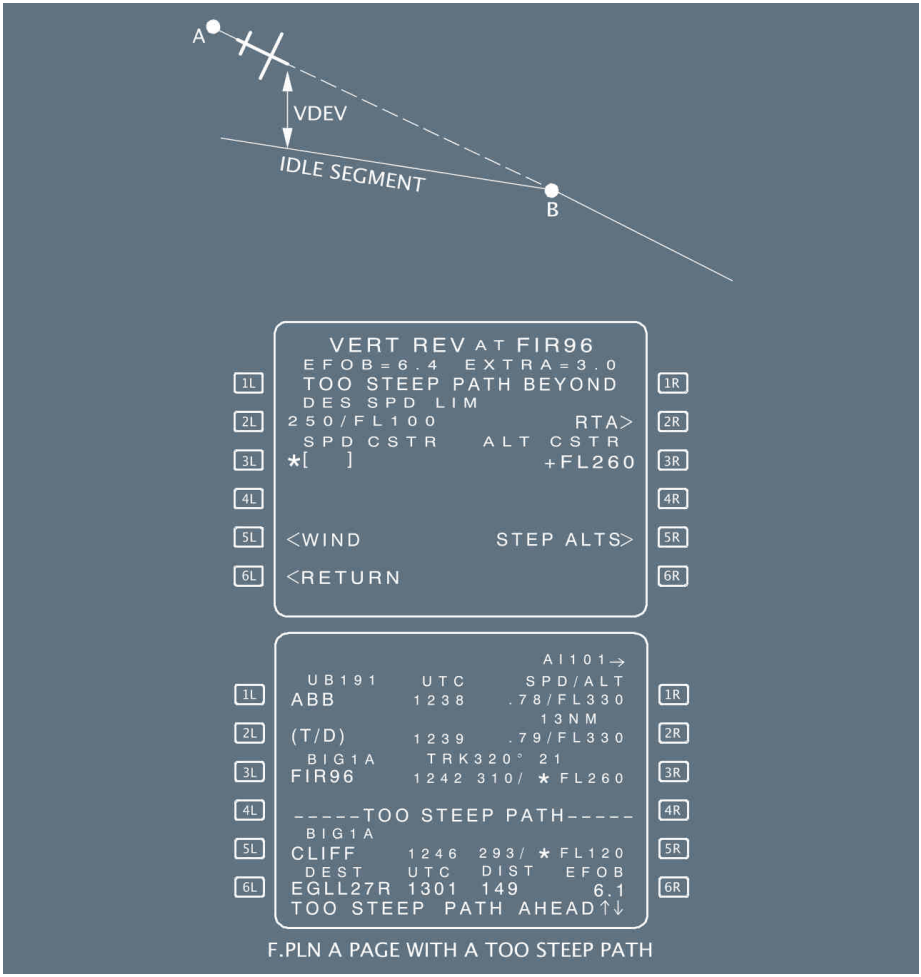
  If required, EXTEND the speedbrakes before seeing the “MORE DRAG” (or “AIRBRAKES”) message.

CONSIDER using a holding pattern, if necessary.

TOO STEEP PATH

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

8 "TOO STEEP PATH AHEAD" appears on the MCDU scratchpad, when the system predicts this situation, and TOO STEEP PATH is displayed on the F-PLN page.
When the aircraft is crossing the first waypoint of a TOO STEEP PATH, the system computes a flyable descent profile (with an idle segment). The VDEV makes a jump because it is related to a new profile.



F.PLN A PAGE WITH A TOO STEEP PATH

PROCEDURE

- **When passing the first waypoint of the TOO STEEP PATH:**

  MONITOR VDEV and predictions at the next CSTR waypoint.

  If required, EXTEND the speedbrakes before seeing the “MORE DRAG” message.

  CONSIDER using a holding pattern, if necessary.

HOLDING PATTERN

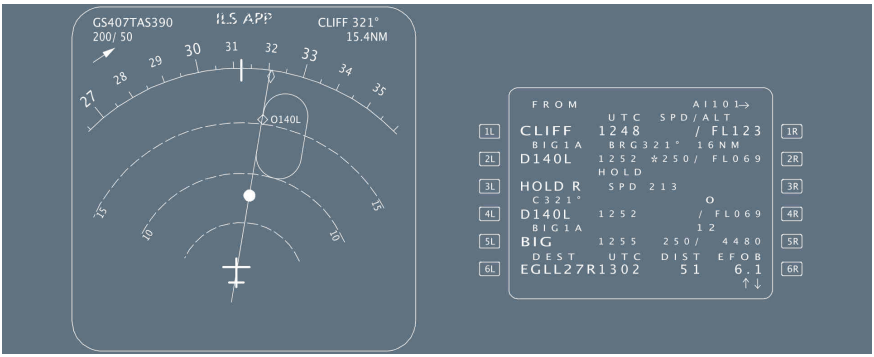
Applicable to: ALL

A hold may be required during the descent, and may be manually inserted.

PROCEDURE

PRESS the F-PLN key.
SELECT the lateral revision page.
SELECT the HOLD prompt.
CHECK the HOLDING data, and MODIFY it if necessary.
CHECK the temporary flight plan and INSERT the holding pattern in it.

Note: If the holding fix is close to the DECEL pseudo waypoint and the speed is managed, manually activate the approach phase to change the managed target speed to approach speed (VAPP). This will avoid having an increase of speed not appropriate.



MANUAL TERMINATION

Applicable to: ALL

You should not use DES mode when entering a leg with manual termination. Manual termination, which is defined as a track or a heading with no termination, is always part of a database procedure. The computed descent flight profile may not be adequate when flying this type of leg.

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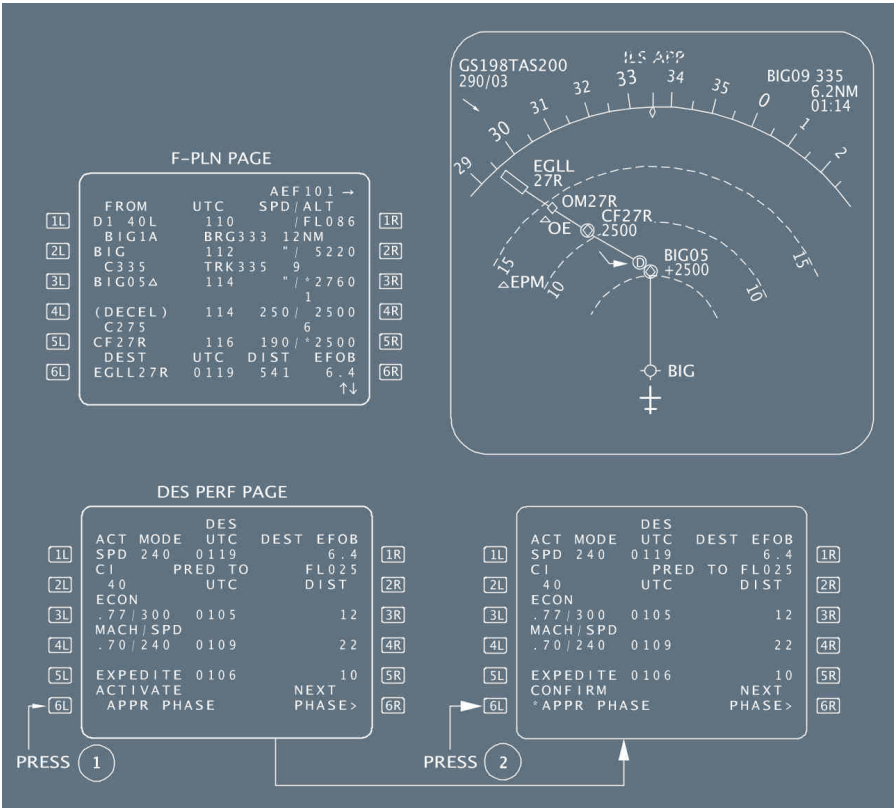
Approach

INITIAL APPROACH

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

UPON REACHING THE INITIAL APPROACH AREA

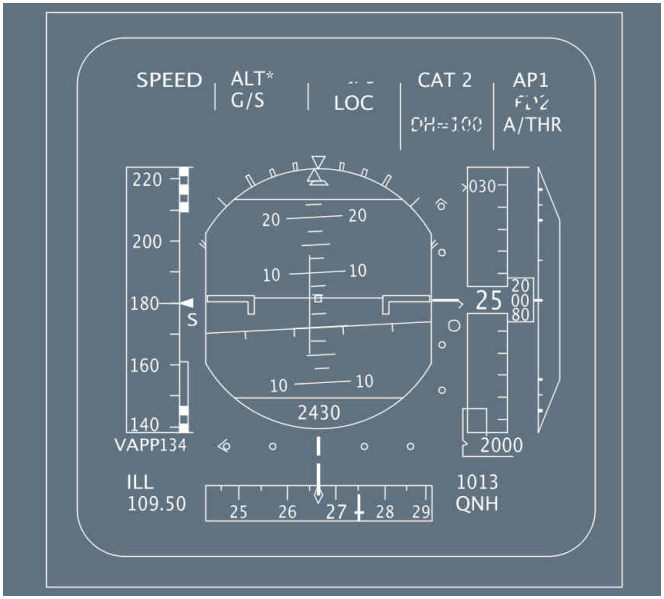
- Approach phase will activate automatically when flying over the DECEL pseudo waypoint with NAV, APPR NAV or LOC* or LOC mode engaged.
- You will activate manually the approach phase on the PERF page if:
  - HDG or TRK mode is engaged, or
  - You are flying a go around, or
  - An early deceleration is required



MANAGED SPEED

CHECK that managed speed is active: MONITOR the target speed.

During the approach, the autothrust limits the speed of the current configuration. (GD, S, F, VAPP).



- **If ATC requires a specific speed:**
  SWITCH to selected speed (turn and pull the speed selector knob on the FCU).
  ADJUST the aircraft configuration accordingly.
- **If ATC orders successive step descents down to the final approach flight path:**
  Use the V/S or FPA mode.
  MONITOR VDEV.

NAV ACCURACY

As required by the SOP.
Without installed GPS and when no DME is available for the accuracy check, use HIGH/LOW on the PROG page.
In this case, consider a "HIGH" to be equivalent to a positive crosscheck.

ATC CLEARANCE

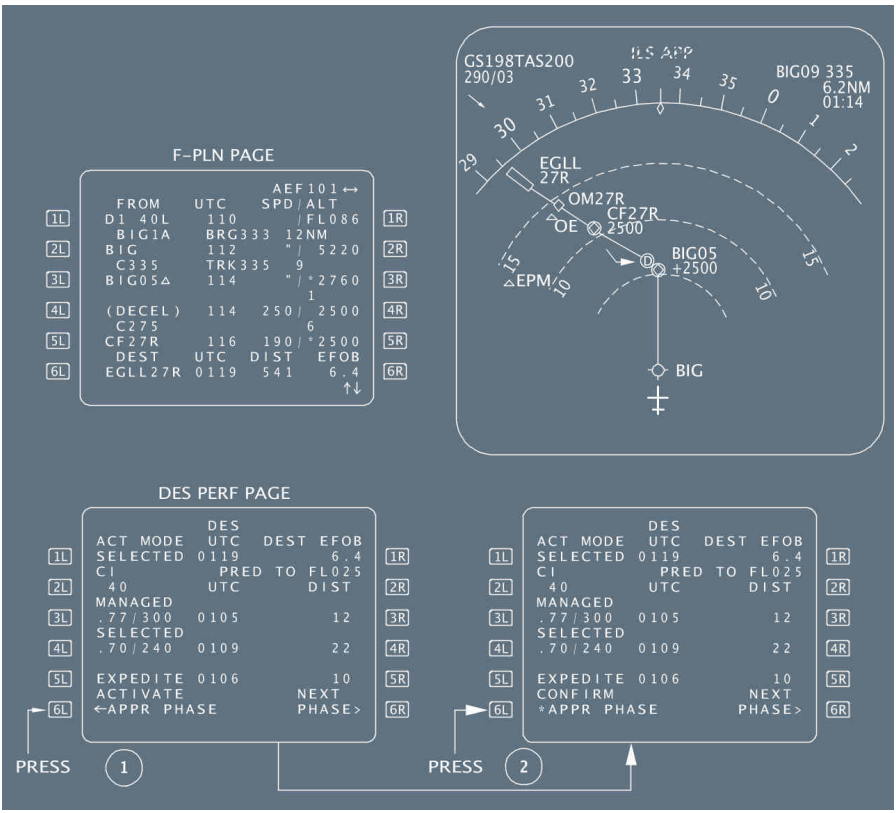
MODIFY the F-PLN, RAD NAV, and PERF APPR data to agree with the latest clearance and landing information.

INITIAL APPROACH

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

UPON REACHING THE INITIAL APPROACH AREA

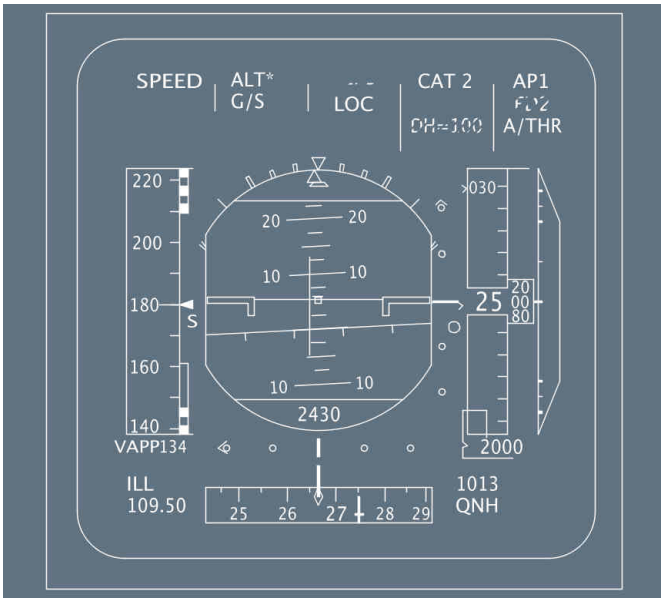
- Approach phase will activate automatically when flying over the DECEL pseudo waypoint with NAV, APPR NAV or LOC* or LOC mode engaged.
- You will activate manually the approach phase on the PERF page if:
  - HDG or TRK mode is engaged, or
  - You are flying a go around, or
  - An early deceleration is required



MANAGED SPEED

CHECK that managed speed is active: MONITOR the target speed.

During the approach, the autothrust limits the speed of the current configuration. (GD, S, F, VAPP).



- **If ATC requires a specific speed:**

  SWITCH to selected speed (turn and pull the speed selector knob on the FCU).

  ADJUST the aircraft configuration accordingly.

- **If ATC orders successive step descents down to the final approach flight path:**

  Use the V/S or FPA mode.

  MONITOR VDEV.

NAV ACCURACY

As required by the SOP.

Without installed GPS and when no DME is available for the accuracy check, use HIGH/LOW on the PROG page.

In this case, consider a “HIGH” to be equivalent to a positive crosscheck.

ATC CLEARANCE

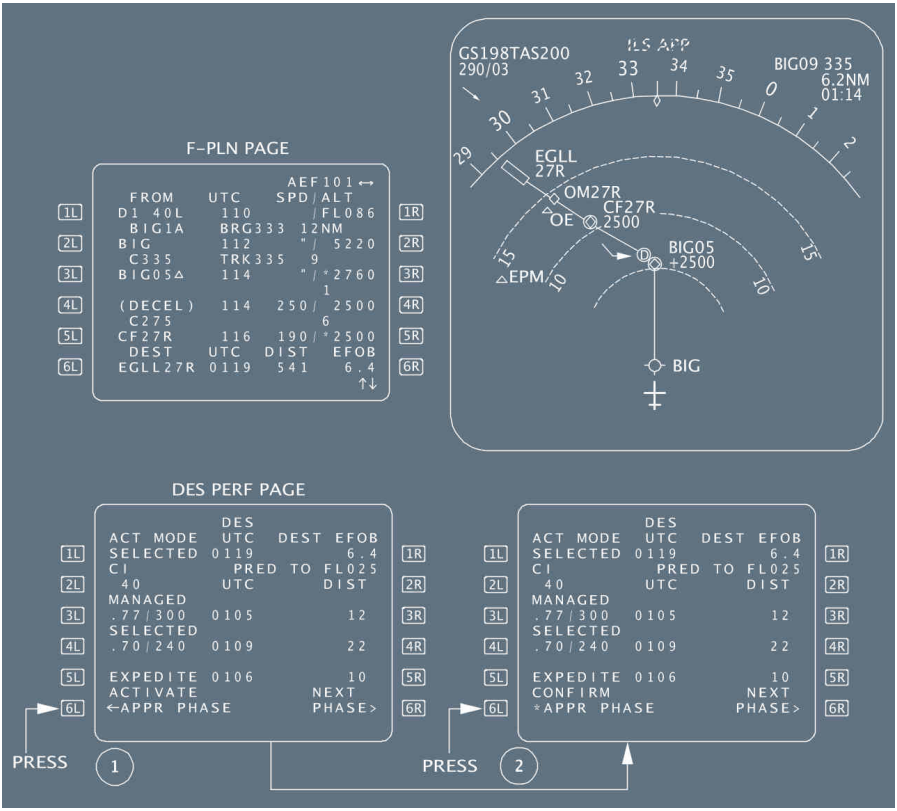
MODIFY the F-PLN, RAD NAV, and PERF APPR data to agree with the latest clearance and landing information.

INITIAL APPROACH

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

UPON REACHING THE INITIAL APPROACH AREA

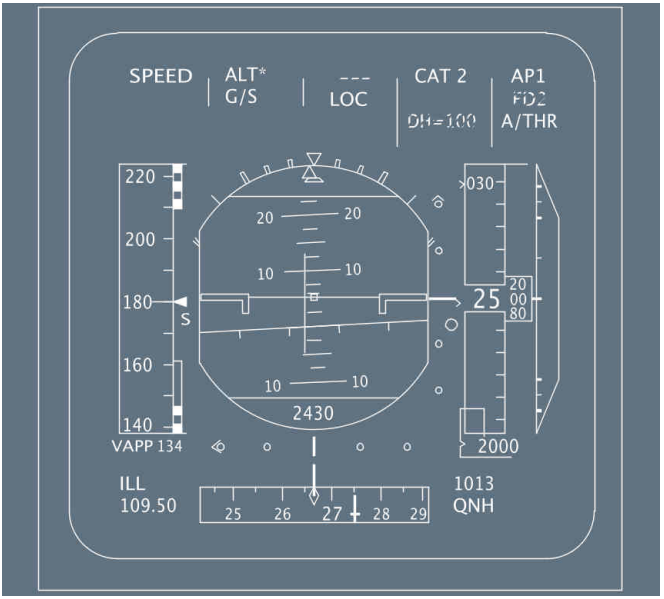
- Approach phase will activate automatically when flying over the DECEL pseudo waypoint with NAV, LOC*, LOC, F-LOC* or F-LOC mode engaged.
- You will activate manually the approach phase on the PERF page if:
  - HDG or TRK mode is engaged, or
  - You are flying a go around, or
  - An early deceleration is required



MANAGED SPEED

CHECK that managed speed is active: MONITOR the target speed.

During the approach, the autothrust limits the speed of the current configuration. (GD, S, F, VAPP).



- **If ATC requires a specific speed:**

  SWITCH to selected speed (turn and pull the speed selector knob on the FCU).

  ADJUST the aircraft configuration accordingly.

- **If ATC orders successive step descents down to the final approach flight path:**

  Use the V/S or FPA mode.

  MONITOR VDEV.

NAV ACCURACY

As required by the SOP.

For Non Precision Approaches flown with the FLS function, the flight crew must check the FLS capability.

Without installed GPS and when no DME is available for the accuracy check, use HIGH/LOW on the PROG page.

In this case, consider a "HIGH" to be equivalent to a positive crosscheck.

ATC CLEARANCE

MODIFY the F-PLN, RAD NAV, and PERF APPR data to agree with the latest clearance and landing information.

ILS/MLS/GLS/FLS APPROACH

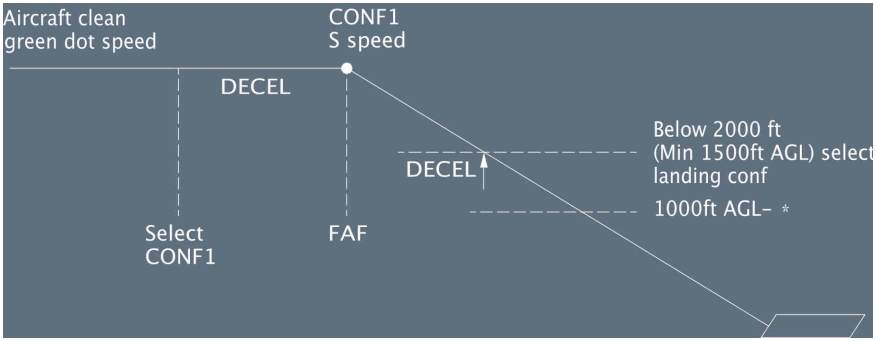
Applicable to: ALL

INTERMEDIATE/FINAL APPROACH (ILS APPROACH ENTERED IN THE F-PLN)

The preferred technique for flying an ILS approach is to fly a decelerated approach using the AP/FDs, the LOC and G/S modes, A/THR in the SPEED mode, managed speed target is recommended.

DECELERATED APPROACH

The decelerated approach technique brings the aircraft down to 1 000 ft, at VAPP. In most cases, the interception of the final descent path is achieved with CONF 1 at S speed.



(*) The approach must be stabilized at approach speed (minimum ground speed) in the landing configuration before reaching 1 000 ft AGL.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

APPROACH MODE ACTIVATION (LOC-G/S)

- **When cleared by ATC and when appropriate:**

  DEPRESS the APPR pushbutton to arm the APPR mode for the approach entered in the flight plan.

  Note: If a NON PRECISION approach is selected in the active flight plan and if the flight crew manually tunes an ILS on the RAD NAV page, the MCDU displays "CHECK APPR GUIDANCE" and the PFD displays "CHECK APP GUIDANCE" or "CHECK APP SEL" (if CPIP3 installed). These messages are a reminder to the flight crew that, although an ILS is tuned on RAD NAV page, the available approach guidance modes are APP NAV-FINAL when the APPR pushbutton is pressed in on the FCU.

The FCU APPR pushbutton arms or engages LOC and G/S modes, if:
- An ILS approach is entered in the flight plan, or
- No approach, or only a runway, is entered in the flight plan, and an ILS is manually-tuned on the RAD NAV page, or
- Both RMPs are set to NAV, and an ILS is selected.

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI

APPROACH MODE ACTIVATION (LOC-G/S)

● **When cleared by ATC and when appropriate:**

DEPRESS the APPR pushbutton to arm the APPR mode for the approach entered in the flight plan.

Note: *If a NON PRECISION approach is selected in the active flight plan and if the flight crew manually tunes an ILS on the RAD NAV page, the MCDU displays "CHECK APPR SELECTION" and the PFD displays "CHECK APP GUIDANCE" or "CHECK APP SEL" (if CPIP3 installed). These messages are a reminder to the flight crew that, although an ILS is tuned on RAD NAV page, the available approach guidance modes are APP NAV-FINAL when the APPR pushbutton is pressed in on the FCU.*

The FCU APPR pushbutton arms or engages LOC and G/S modes, if:
- An ILS approach is entered in the flight plan, or
- No approach, or only a runway, is entered in the flight plan, and an ILS is manually-tuned on the RAD NAV page, or
- Both RMPs are set to NAV, and an ILS is selected.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

APPROACH MODE ACTIVATION (LOC-G/S)

● **When cleared by ATC and when appropriate:**

DEPRESS the APPR pushbutton to arm the APPR mode for the approach entered in the flight plan.

Note: *If a NON PRECISION approach is selected in the active flight plan and if the flight crew manually tunes an ILS on the RAD NAV page, the MCDU and the PFD display "CHECK APPR SELECTION". This message is a reminder to the flight crew that, although an ILS is tuned on RAD NAV page, the available approach guidance modes are APP NAV-FINAL when the APPR pushbutton is pressed in on the FCU.*

The FCU APPR pushbutton arms or engages LOC and G/S modes, if:
- An ILS approach is entered in the flight plan, or
- No approach, or only a runway, is entered in the flight plan, and an ILS is manually-tuned on the RAD NAV page, or
- Both RMPs are set to NAV, and an ILS is selected.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

AUTOLAND

CHECK that the FMA displays the aircraft capability (CAT 2 or CAT 3) for the intended ILS approach.
MONITOR the radio automatic callout.

- **At 350 ft RA:**

  CHECK that "LAND" is displayed on the FMA.

  CHECK ILS course.

  If LAND is not displayed or if the ILS course is not correct, do not perform an autoland. The flight crew should perform a go-around, if visual references are not sufficient.

- **Between 50 and 40 ft RA:**

  CHECK that "FLARE" is displayed on the FMA.

- **At approximately 30 ft RA:**

  CHECK that "IDLE" is displayed on the FMA, and that autothrust starts to reduce thrust toward IDLE.

- **At 10 ft, "RETARD" callout comes up:**

  MOVE the thrust levers to IDLE.

  Autothrust disconnects.

- **At touchdown:**

  CHECK that "ROLL OUT" appears on the FMA.

  Note: In the case of tailwind during an automatic rollout, it is recommended to use manual braking without delay or automatic braking for an optimised runway centerline tracking.

- **At the end of the Rollout:**

  Disengage the autopilot.

  If an AP is not disengaged at the end of the rollout, and the pilot uses the nosewheel steering tiller to taxi the aircraft off the runway, the autopilot will steer the aircraft back to the localizer when the tiller is released.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

AUTOLAND

CHECK that the FMA displays the aircraft capability (CAT 2 or CAT 3) for the intended ILS approach.
MONITOR the radio automatic callout.

- **At 350 ft RA:**

  CHECK that "LAND" is displayed on the FMA.

  CHECK ILS course.

  If LAND is not displayed or if the ILS course is not correct, do not perform an autoland. The flight crew should perform a go-around, if visual references are not sufficient.

- **Between 50 and 40 ft RA:**

  CHECK that "FLARE" is displayed on the FMA.

- **At approximately 30 ft RA:**

  CHECK that "IDLE" is displayed on the FMA, and that autothrust starts to reduce thrust toward IDLE.

- **At 10 ft, "RETARD" callout comes up:**

  MOVE the thrust levers to IDLE.

  Autothrust disconnects.

- **At touchdown:**

  CHECK that "ROLL OUT" appears on the FMA.

  Note: In the case of tailwind during an automatic rollout, it is recommended to use manual braking without delay or automatic braking for an optimised runway centerline tracking.

- **At the end of the Rollout:**

  Disconnect the autopilot.

  If the flight crew does not disconnect the AP at the end of the rollout, and uses the nosewheel steering handwheel to taxi the aircraft off the runway, the following will occur:
  - *The AP will try to steer the aircraft back to the runway centerline, if the nosewheel steering handwheel is released and the aircraft heading is less than 20 ° off the runway centerline.*
  - *The AP will automatically disconnect, if the aircraft heading is 20 ° or more off the runway centerline.*

Applicable to: B-HTD, B-HTE, B-HTF

AUTOLAND

CHECK that the FMA displays the aircraft capability (CAT 2 or CAT 3) for the intended ILS approach.
MONITOR the radio automatic callout.

- **At 350 ft RA:**
  CHECK that "LAND" is displayed on the FMA.
  CHECK ILS course.
  If LAND is not displayed or if the ILS course is not correct, do not perform an autoland. The flight crew should perform a go-around, if visual references are not sufficient.
- **Between 50 and 40 ft RA:**
  CHECK that "FLARE" is displayed on the FMA.
- **At approximately 30 ft RA:**
  CHECK that "IDLE" is displayed on the FMA, and that autothrust starts to reduce thrust toward IDLE.
- **At 10 ft, "RETARD" callout comes up:**
  MOVE the thrust levers to IDLE.
  Autothrust disconnects.
- **At touchdown:**
  CHECK that "ROLL OUT" appears on the FMA.
- **At the end of the Rollout:**
  Disengage the autopilot.
  If an AP is not disengaged at the end of the rollout, and the pilot uses the nosewheel steering tiller to taxi the aircraft off the runway, the autopilot will steer the aircraft back to the localizer when the tiller is released.

Applicable to: B-HTG, B-HTH, B-HTI

AUTOLAND

CHECK that the FMA displays the aircraft capability (CAT 2 or CAT 3) for the intended ILS approach.
MONITOR the radio automatic callout.

- **At 350 ft RA:**
  CHECK that "LAND" is displayed on the FMA.

CHECK ILS course.

If LAND is not displayed or if the ILS course is not correct, do not perform an autoland. The flight crew should perform a go-around, if visual references are not sufficient.

- **Between 50 and 40 ft RA:**

  CHECK that "FLARE" is displayed on the FMA.

- **At approximately 30 ft RA:**

  CHECK that "IDLE" is displayed on the FMA, and that autothrust starts to reduce thrust toward IDLE.

- **At 10 ft, "RETARD" callout comes up:**

  MOVE the thrust levers to IDLE.

  Autothrust disconnects.

- **At touchdown:**

  CHECK that "ROLL OUT" appears on the FMA.

- **At the end of the Rollout:**

  Disconnect the autopilot.

  If the flight crew does not disconnect the AP at the end of the rollout, and uses the nosewheel steering handwheel to taxi the aircraft off the runway, the following will occur:
  - *The AP will try to steer the aircraft back to the runway centerline, if the nosewheel steering handwheel is released and the aircraft heading is less than 20 ° off the runway centerline.*
  - *The AP will automatically disconnect, if the aircraft heading is 20 ° or more off the runway centerline.*

Applicable to: ALL

MANUAL LANDING

- **At DH:**

  DISCONNECT the APs. SPEED mode remains engaged.

- **At 20 ft "RETARD" automatic call out comes up:**

  MOVE the thrust levers to IDLE if they are not there already. (The A/THR disconnects).

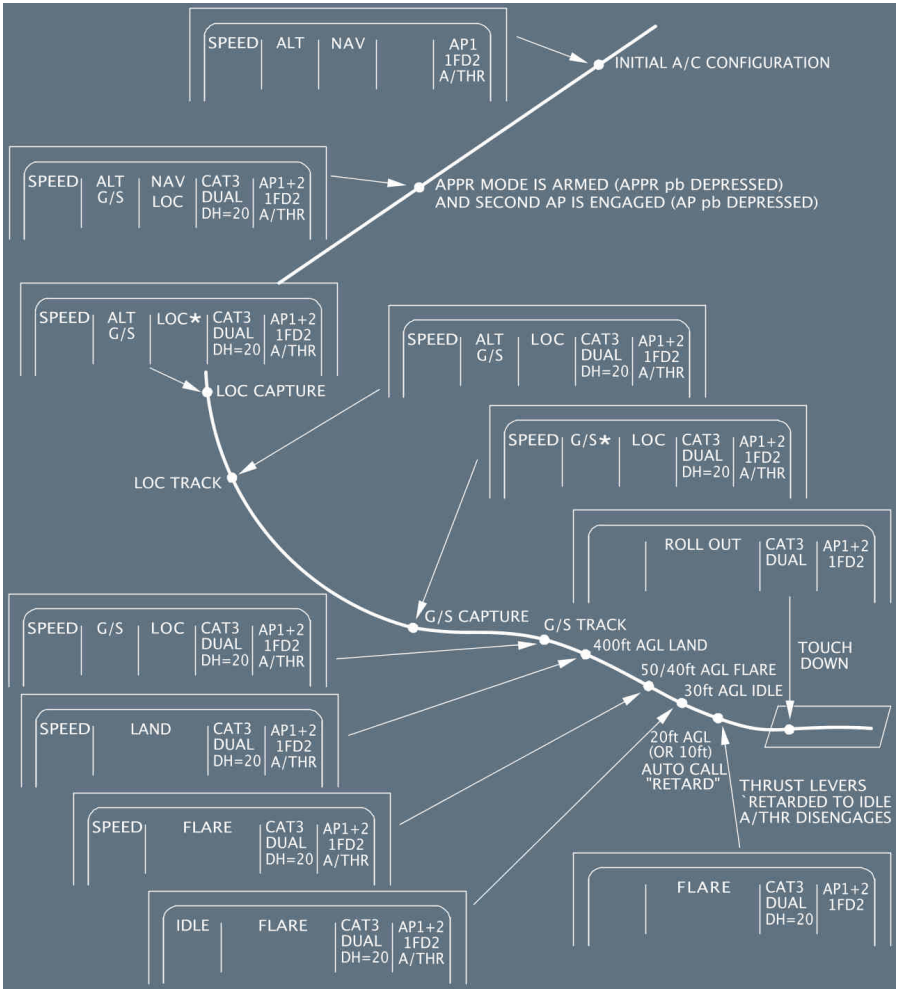
- **At touch down:**

  "ROLL OUT" appears on the FMA and the yaw bar comes up on the PFD.

  Note: *The retard call out is only a reminder when a manual landing is performed.*

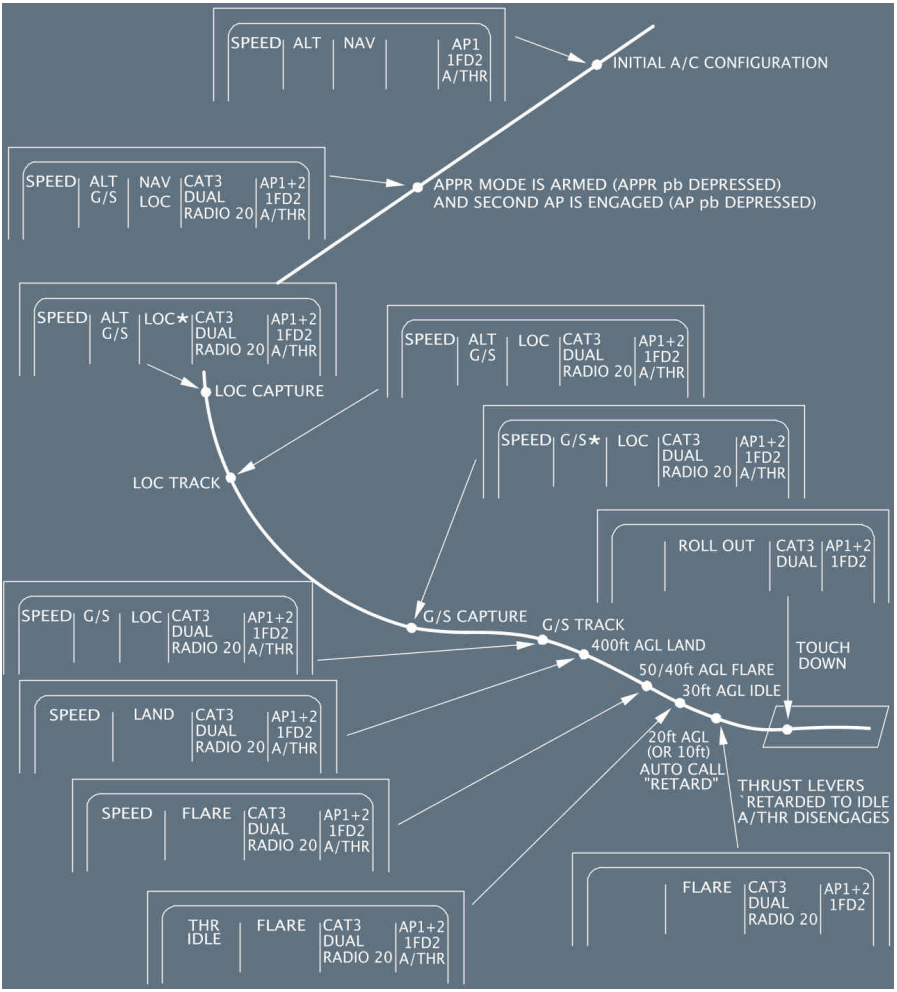
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

1 STANDARD ILS AUTOMATIC APPROACH



Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

2 **STANDARD ILS AUTOMATIC APPROACH**



Applicable to: ALL

EARLY SELECTION OF APPROACH MODE LOC-G/S

Pressing the APPR pushbutton arms LOC and G/S.

The RA signal is not valid above 8 200 ft AGL (TRT), or 5 000 ft AGL (Collins) or 7 900 ft AGL (Honeywell).

- **If the aircraft is cleared for an ILS approach, when it is higher than 8 200 ft AGL (TRT), or 5 000 ft AGL (Collins), or 7 900 ft AGL (Honeywell), proceed as follows:**
  PRESS the APPR pushbutton on the FCU.

- **When aligned on the localizer, check LOC and G/S engagement:**
  CAT 1 is displayed on the FMA. (Radio altimeters not yet valid).
  Check that the FMA displays the correct capability for the intended approach, when the aircraft is below 5 000 ft AGL.

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

3 **GLIDESLOPE INTERCEPTION FROM ABOVE**

If the aircraft is above the glideslope, the system will not capture the G/S automatically.
The pilot must bring the aircraft onto the glideslope beam, and select an appropriate V/S to intercept it. *Refer to FCTM/NO-120 FINAL APPROACH.*

CAUTION	If the pilot selects too great a V/S, he could increase the current speed to VMAX (VFE), which will result in a mode reversion. If this occurs, with an FCU altitude set above the aircraft altitude, then OPEN CLB will engage.

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

GLIDESLOPE INTERCEPTION FROM ABOVE

If the aircraft is above the glideslope, the system will not capture the G/S automatically.
The pilot must bring the aircraft onto the glideslope beam, and select an appropriate V/S to intercept it. *Refer to PRO-NOR-SOP-18 Initial Approach - General.*

Applicable to: ALL

DATA LOCK

When the aircraft reaches 700 ft RA with APPR mode (LOC and G/S) armed or engaged, the ILS FREQ and course are frozen in the receiver.
This function (ILS tune inhibit) is available, when at least one AP/FD is engaged. Any attempt to change the ILS frequency or CRS, via the MCDU or RMP, does not affect the receiver.
If the speed is managed, the system does not accept any modifications the pilot may enter on the PERF APPR page (surface wind, selected landing configuration, or VAPP) for speed guidance purposes below this altitude.
When the aircraft reaches 400 ft RA, LAND mode engages. The flight crew can only disengage this mode by engaging the GO AROUND mode.

Applicable to: ALL

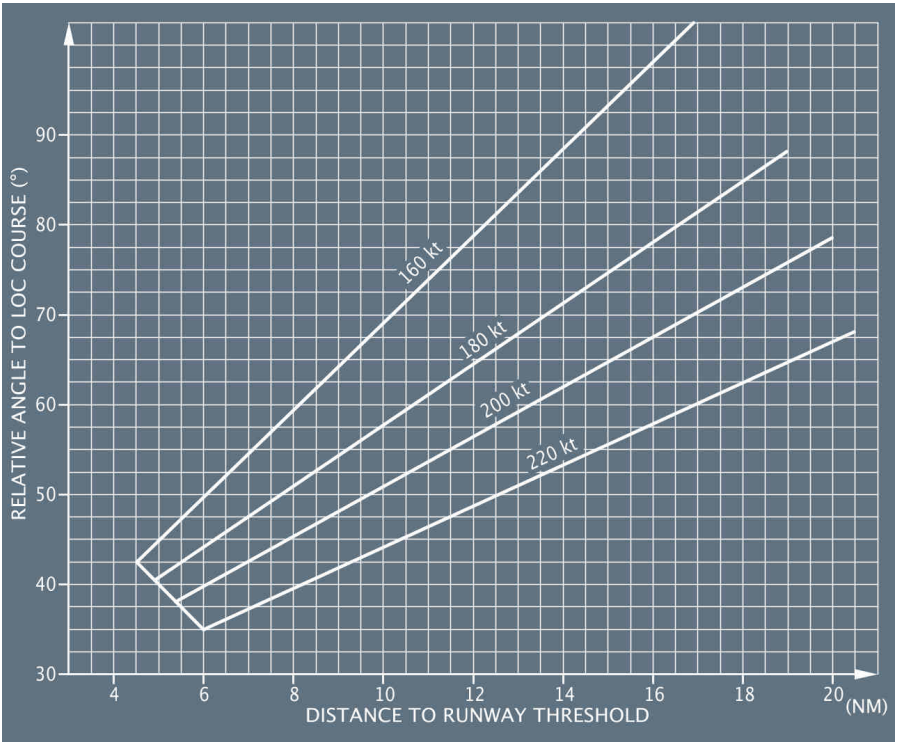
USE OF RMPS FOR ILS/DME

If both FMGCs fail, the flight crew can use the RMPs (Radio Management Panels 1 and 2) for back up tuning. Either RMP controls ILS. Prior to select an ILS frequency on one of the RMPs, the flight crew has to select “NAV”button from RMP 1 and RMP 2.
If the ILS has a DME, the PFD will not display the DME distance. In this situation, the flight crew will fly without DME information. If necessary, increase the Decision height (DH) accordingly.

Applicable to: ALL

4 LOCALIZER (LOC) BEAM CAPTURE

The flight crew must always monitor the capture of a LOC beam. During this evolution, the PFD and ND must indicate that associated deviation indications move toward the centre of the scale.
To avoid performing a false capture, the flight crew must be careful not to arm the LOC too early. The following graph shows the angle of interception versus distance to the runway threshold that ensures that the aircraft will not overshoot the axis by more than one and a half dot.



The capture begins when the deviation is two dots or less. It is programmed to line the aircraft up on the beam with a single overshoot, even if the intercept angle is large.

Note: *ICAO requires LOC beam to ensure a normal capture within 10 nm and plus or minus 35 ° from the course centerline. Some ILS systems just meet the requirement and are subject to false capture outside these limits.*

SWITCHING FROM NON ILS TO ILS APPROACH

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

If an ILS approach is possible when a non ILS was previously scheduled, use one of the following procedures:

USE OF SECOND FLIGHT PLAN

Use a secondary flight plan to prepare the alternate ILS approach, time permitting.

COPY the ACTIVE flight plan.
REVISE the ARRIVAL: insert the ILS approach and the applicable STAR/VIA.
On the RAD NAV page, TUNE in the ILS manually.
REVISE the PERF APPR page.

CHANGE OF THE CLEARANCE

ATC changes the clearance from the non-ILS to the ILS approach.

- **If a secondary flight plan has been prepared:**

  ACTIVATE the SEC F-PLN and adjust.

  Follow subsequent standard procedures.

- **If a secondary flight plan has not been prepared:**

  REVISE the ARRIVAL on the primary F-PLN, inserting the ILS approach.

  REVISE the PERF APPR page.

  Follow subsequent standard procedures.

CAUTION	If the pilot decides to fly the ILS approach without revising the arrival of the primary flight plan (a non ILS approach is in the F-PLN), LOC and G/S modes will not be available when he presses the APPR pushbutton. Consequently, he should: • Manually TUNE in the ILS on the RAD NAV page: CHECK that the "CHECK APPR GUIDANCE" message comes up. • Press the ILS pushbutton and select ROSE ILS on the EIS CONTROL panel. • Use HDG, V/S or TRK, FPA modes to fly the ILS.

SWITCHING FROM NON ILS TO ILS APPROACH

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

If an ILS approach is possible when a non ILS was previously scheduled, use one of the following procedures:

USE OF SECOND FLIGHT PLAN

Use a secondary flight plan to prepare the alternate ILS approach, time permitting.

COPY the ACTIVE flight plan.
REVISE the ARRIVAL: insert the ILS approach and the applicable STAR/VIA.
On the RAD NAV page, TUNE in the ILS manually.
REVISE the PERF APPR page.

CHANGE OF THE CLEARANCE

ATC changes the clearance from the non-ILS to the ILS approach.

- **If a secondary flight plan has been prepared:**
  ACTIVATE the SEC F-PLN and adjust.
  Follow subsequent standard procedures.
- **If a secondary flight plan has not been prepared:**
  REVISE the ARRIVAL on the primary F-PLN, inserting the ILS approach.
  REVISE the PERF APPR page.
  Follow subsequent standard procedures.

CAUTION	If the pilot decides to fly the ILS approach without revising the arrival of the primary flight plan (a non ILS approach is in the F-PLN), LOC and G/S modes will not be available when he presses the APPR pushbutton. Consequently, he should: • Manually TUNE in the ILS on the RAD NAV page: CHECK that the "CHECK APPR SELECTION" message comes up. • Press the ILS pushbutton and select ROSE ILS on the EIS CONTROL panel. • Use HDG, V/S or TRK, FPA modes to fly the ILS.

TASK SHARING DURING CAT I, CAT II AND CAT III APPROACH AND LANDING

Applicable to: ALL 320

LIM-22-20 section of this FCOM provides all limitations regarding CAT I, CAT II, and CAT III approaches and landings. This includes precautions to be taken when performing autoland on CAT I ILS beam with good visibility.

Anytime a precision approach is performed the PM must announce that a flight parameter is being exceeded, if:

- During glide beam capture:
  - Pitch attitude becomes less than -2.5 ° or greater than +10 ° (nose up).
  - Vertical speed exceeds + 500 ft/min or -1 250 ft/min.
- During final approach:
  - Speed goes below speed target - 5 kt or above speed target + 10 kt (“SPEED”)
  - Pitch attitude goes below -2.5 ° or above 10 ° (“PITCH”)
  - Bank angle becomes greater than 7 ° (“BANK”)
  - Descent rate becomes greater than 1 000 ft/min (“SINK RATE”)
  - There is too much LOC or GLIDE deviation (“LOCALIZER”or “GLIDE”).

If the flight crew suspects that autopilot guidance is not effective, they should:
- Use the instinctive disconnect pushbutton to disconnect the autopilot, or
- Perform an automatic go-around.

The flight crew may perform a CAT II/CAT III approach, if:
- The FMA displays the corresponding category
- The required systems and functions are operative
- The airport is approved for the intended operations
- They are qualified to perform the specific approach.

CAT III APPROACH

AUTO CALL OUT RA is mandatory.
A/THR in SPEED MODE is mandatory.

Note: *AUTO CALL OUT is not mandatory for CAT 2 approach: The PM may perform this function.*

TASK SHARING DURING CAT I, CAT II AND CAT III APPROACH AND LANDING

Applicable to: ALL 321

LIM-22-20 section of this FCOM provides all limitations regarding CAT I, CAT II, and CAT III approaches and landings. This includes precautions to be taken when performing autoland on CAT I ILS beam with good visibility.

Anytime a precision approach is performed the PM must announce that a flight parameter is being exceeded, if:
- During glide beam capture:
  - Pitch attitude becomes less than -2.5 ° or greater than +7.5 ° (nose up).
  - Vertical speed exceeds + 500 ft/min or -1 250 ft/min.
- During final approach:
  - Speed goes below speed target - 5 kt or above speed target + 10 kt (“SPEED”).
  - Pitch attitude goes below -2.5 ° or above +7.5 ° (“PITCH”)
  - Bank angle becomes greater than 7 ° (“BANK”)
  - Descent rate becomes greater than 1 000 ft/min (“SINK RATE”)
  - There is too much LOC or GLIDE deviation (“LOCALIZER”or “GLIDE”).

If the flight crew suspects that autopilot guidance is not effective, they should:
- Use the instinctive disconnect pushbutton to disconnect the autopilot, or
- Perform an automatic go-around.

The flight crew may perform a CAT II/CAT III approach, if:
- The FMA displays the corresponding category
- The required systems and functions are operative
- The airport is approved for the intended operations
- They are qualified to perform the specific approach.

CAT III APPROACH

AUTO CALL OUT RA is mandatory.
A/THR in SPEED MODE is mandatory.

Note: AUTO CALL OUT is not mandatory for CAT 2 approach: The PM may perform this function.

TASK SHARING FOR CAT I APPROACH (OR BETTER)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

PF	PM
•At 350 ft AGL (or RA)	
Check ILS course on PFD ″LAND GREEN″when displayed on FMA	"Check"
•At Decision Altitude (or Decision height, if QFE is used) + 100 ft	
	″HUNDRED ABOVE"(1)
•At Decision Altitude (or Decision Height, if QFE is used)	
	″MINIMUM″(1)
•If external visual references are sufficient	
″CONTINUE″	
• <u>If automatic landing not performed</u>	
Disconnect the APs and perform the landing	Monitor auto callouts or announce as appropriate: 500 ft 100 ft 50 ft 30 ft 10 ft
At ″RETARD″ annunciation, retard thrust levers to IDLE if not yet performed	
• <u>If automatic landing performed</u>	
Refer to PRO-NOR-SRP-01-70 Task Sharing for CAT III Approach/Landing without DH : From 40 ft RA to Touchdown	

Continued on the following page

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PF	PM
•If external visual references are not sufficient	
″GO AROUND, FLAPS″and execute	

(1)
- *CAT I minimum (DH or DA) is always BARO referenced and should be entered in the MDA/MDH field of the PERF APPR page. Auto callouts "HUNDRED ABOVE" and "MINIMUM" will not be provided.*
- *These auto callouts "HUNDRED ABOVE" and "MINIMUM" are activated by the radio altimeter only when a DH is entered into the DH field of the PERF APPR page for precision approaches (CAT II, CAT III).*

TASK SHARING FOR CAT I APPROACH (OR BETTER)

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

PF	PM
•At 350 ft AGL (or RA)	
Check ILS course on PFD	
″LAND GREEN″when displayed on FMA	"Check"
•At Decision Altitude (or Decision height, if QFE is used) + 100 ft	
	Monitor or ″HUNDRED ABOVE" *(1)*
•At Decision Altitude (or Decision Height, if QFE is used)	
	Monitor or ″MINIMUM″ *(1)*
•If external visual references are sufficient	
″CONTINUE″	
• <u>If automatic landing not performed</u>	
Disconnect the APs and perform the landing	Monitor CALL OUT or announce as appropriate: 500 ft 100 ft 50 ft 30 ft 10 ft
At ″RETARD″ annunciation, retard thrust levers to IDLE if not yet performed	
• <u>If automatic landing performed</u>	
Refer to PRO-NOR-SRP-01-70 Task Sharing for CAT III Approach/Landing without DH : From 40 ft RA to Touchdown	
•If external visual references are <u>not</u> sufficient	
″GO AROUND, FLAPS″and execute	

(1)
- *CAT I minimum (DH or DA) is always BARO-referenced and should be entered in the MDA/MDH field of the PERF APPR page.*
- *Pin programming enables operators to select the required callouts.*

TASK SHARING FOR CAT I APPROACH (OR BETTER)

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

PF	PM
•At 350 ft AGL (or RA)	
Check ILS course on PFD ″LAND GREEN″when displayed on FMA	 “Check”
•At Decision Altitude (or Decision height, if QFE is used) + 100 ft	
	Monitor or ″HUNDRED ABOVE″*(1)*
•At Decision Altitude (or Decision Height, if QFE is used)	
	Monitor or ″MINIMUM″*(1)*
•If external visual references are sufficient	
″CONTINUE″	
•<u>If automatic landing not performed</u>	
Disconnect the APs and perform the landing	Monitor CALL OUT or announce as appropriate: 500 ft 100 ft 50 ft 30 ft 10 ft
At ″RETARD″ annunciation, retard thrust levers to IDLE if not yet performed	
•<u>If automatic landing performed</u>	
Refer to PRO-NOR-SRP-01-70 Task Sharing for CAT III Approach/Landing without DH : From 40 ft RA to Touchdown	
•If external visual references are <u>not</u> sufficient	
″GO AROUND, FLAPS″and execute	

(1)
- *CAT I minimum (DH or DA) is always BARO-referenced and must be entered in the BARO field of the PERF APPR page.*
- *Pin programming enables operators to select the required callouts.*

TASK SHARING FOR CAT II APPROACH

Applicable to: ALL

PF	PM
•At 350 ft RA	
Check ILS course on PFD Commence outside scanning ″LAND GREEN″when displayed on FMA	 “Check”
•At Decision Height + 100 ft	
	Monitor auto callout ″HUNDRED ABOVE″

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PF	PM
•At Decision Height	
	Monitor auto callout ″MINIMUM″.
•If external visual references are sufficient	
″CONTINUE″	
• <u>If Automatic landing not performed</u>	
Disconnect the AP's and perform the landing	Monitor auto callouts or announce as appropriate: 500 ft 100 ft 50 ft 30 ft
At ″RETARD″ annunciation, retard thrust levers to IDLE if not yet performed	10 ft ″RETARD″ auto callout (1)
• <u>If Automatic landing is performed</u>	
Refer to PRO-NOR-SRP-01-70 Task Sharing for CAT III Approach/Landing without DH : From 40 ft RA to Touchdown	
•If external visual references are <u>not</u> sufficient	
″GO-AROUND, FLAPS″and execute	

(1) *"RETARD" auto callout comes up at 10 ft if LAND mode is engaged with one or two APs engaged. Otherwise it is announced at 20 ft.*

TASK SHARING FOR CAT III APPROACH WITH DH

Applicable to: ALL

PF	PM
•At 350 ft RA	
Check ILS course on PFD Commence outside scanning ″LAND GREEN″when displayed on FMA	 "Check"
•At Decision Height + 100 ft	
	Monitor auto callout ″HUNDRED ABOVE″
•At Decision Height	
	Monitor auto callout ″MINIMUM″.
•If external visual references are sufficient	
″CONTINUE″	
•At 40 ft RA	
	Check FLARE on FMA and announce
•At 30 ft RA	
Monitor thrust reduction and flare by flight instruments	Monitor auto callouts
•At 10 ft RA	
Auto callout ″RETARD″	
RETARD both thrust levers to IDLE Monitor lateral guidance by external reference	Monitor engines parameters

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PF	PM
• **At TOUCH DOWN**	
	Check ROLL OUT on FMA and announce
Select and control reverse thrust	Check reverse green and announce
	Announce 70 kt
Disengage the APs at the end of the Roll out (when leaving the runway at the latest)	
•If external visual references are not sufficient	
″GO-AROUND, FLAPS″and execute	

TASK SHARING FOR CAT III APPROACH/LANDING WITHOUT DH

Applicable to: ALL

PF	PM
•At 350 ft RA	
Check ILS course on PFD	
″LAND GREEN″when displayed on FMA	"Check"
•At 100 ft RA	
If no failure is detected, ″CONTINUE″	Monitor auto callout *(1)*
•At 40 ft RA	
	Check FLARE on FMA and announce
•At 30 ft RA	
Monitor thrust reduction and flare by flight instruments	Monitor auto callout *(1)*
•At 10 ft RA	
AUTO CALL OUT ″RETARD″	
RETARD both thrust levers to IDLE	Monitor engines parameters
Monitor lateral guidance by external reference	
• **At TOUCH DOWN**	
	CHECK ROLL OUT on FMA and announce
Select and control reverse thrust	Check reverse green and announce
	Announce 70 kt
Disengage the APs at the end of the Roll out (when leaving the runway at the latest)	

(1) In case of CAT III without DH, the pilot should enter "NO" in the DH field of the MCDU to avoid false "HUNDRED ABOVE" or "MINIMUM" auto callouts which would not be applicable.

LANDING CATEGORIES

Applicable to: ALL

Each FMGC computes its own landing category : CAT1, CAT2, CAT3 single, and CAT3 dual and displays the corresponding landing category on the FMAs.
Each category depends upon the availability of aircraft systems and functions.
When the landing capability downgrades, a triple click aural warning is activated.

FAIL-OPERATIONAL AUTOMATIC LANDING SYSTEM

An automatic landing system is fail-operational if, in the event of a failure below alert height, the remaining part of the automatic system allows the aircraft to complete the approach, flare, and landing. A CAT 3 DUAL system is a fail-operational automatic landing system.

Note: *In the event of a failure, the automatic landing system operates as a fail-passive system.*

FAIL-PASSIVE AUTOMATIC LANDING SYSTEM

An automatic landing system is fail-passive if, in the event of a failure, there is no significant out-of-trim condition or deviation of flight path or attitude, but the landing is not completed automatically. A CAT3 single system is a fail-passive automatic landing system.

Note: *With a fail-passive automatic landing system the pilot assumes control of the aircraft after a failure.*

Below 100 ft (radio altimeter), the FMGS freezes the landing capability until LAND mode is disengaged or both APs are off.
Therefore a failure occurring below 100 ft does not change the category of the system.

ALERT HEIGHT

The alert height is the height above touch down, above which a CAT3 autoland would be discontinued and a missed approach executed, if a failure occurred in either the airplane systems or the relevant ground equipments.
Below the alert height, if such a failure occurs, the flare, touchdown and roll out may be accomplished using the remaining automatic system.

WARNINGS FOR ILS APPROACH

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

AUTOLAND WARNING

With “LAND” or “FLARE” green on the FMA and at least one AP engaged, the AUTOLAND red light appears on the glareshield when the aircraft is below 200 ft RA and one of the following events occurs:
- The autopilots are lost, or
- The aircraft gets too far off the beam (LOC or G/S flash on PFD), or
- Loss of LOC signal above 15 ft, or loss of glide signal above 100 ft (transmitter or receivers).
- The difference between both radio altimeter indications is greater than 15 ft.

When the Autoland light comes on, Autoland must be discontinued (*Refer to PRO-NOR-SRP-01-70 Failures and Associated Actions Below 1 000 ft During A CAT II Approach, Refer to PRO-NOR-SRP-01-70 FAILURES AND ASSOCIATED ACTIONS BELOW 1000 FT CAT III WITH DH*,

Refer to PRO-NOR-SRP-01-70 Failures and Associated Actions Below 1 000 ft for CAT III without DH).

WARNING OF EXCESSIVE BEAM DEVIATION

This warning is a flashing of the LOC and G/S scales on the PFD and ND ROSE ILS. It occurs whenever:
- G/S deviation is greater than 1 dot (above 100 ft RA).
- LOC deviation is greater than 1/4 dot (above 15 ft RA).

WARNING ASSOCIATED WITH ILS "LANDING CAPABILITY"

Any downgrading in the aircraft's capability for automatic approach and landing sounds a triple-click aural warning.

FAILURE OF BOTH LOCALIZER AND GLIDESLOPE RECEIVERS

The PFD and ND (rose ILS mode) display red LOC and G/S flags (if the ILS pushbutton has been pressed green). LOC and G/S scales disappear from the PFD.

If LOC or G/S modes are engaged and at least one AP/FD is engaged
- The AP disengages.
- The FD reverts to its HDG-V/S or TRK-FPA modes.

FAILURE OF LOCALIZER OR GLIDESLOPE TRANSMITTER (WHEN CAPTURED)

- The corresponding index is lost.
- The LOC and G/S scales flash.
- The corresponding FD bar flashes.

The FMA retains the LOC and G/S modes: If the transmitter failure is temporary, the APs are able to regain these modes. If the failure is long-term, or if it occurs when the aircraft is below 200 ft RA, this allows the aircraft to perform a GO AROUND with one or 2 autopilots engaged.

WARNINGS FOR ILS APPROACH

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

AUTOLAND WARNING

With "LAND" or "FLARE" green on the FMA and at least one AP engaged, the AUTOLAND red light appears on the glareshield when the aircraft is below 200 ft RA and one of the following events occurs:
- The autopilots are lost, or
- The aircraft gets too far off the beam (LOC or G/S flash on PFD), or
- Loss of LOC signal above 15 ft, or loss of glide signal above 100 ft (transmitter or receivers).
- The difference between both radio altimeter indications is greater than 15 ft.

When the Autoland light comes on, Autoland must be discontinued (*Refer to PRO-NOR-SRP-01-70 Failures and Associated Actions Below 1 000 ft During A CAT II Approach*, *Refer to PRO-NOR-SRP-01-70 FAILURES AND ASSOCIATED ACTIONS BELOW 1000 FT CAT III WITH DH*,
Refer to PRO-NOR-SRP-01-70 Failures and Associated Actions Below 1 000 ft for CAT III without DH).

WARNING OF EXCESSIVE BEAM DEVIATION

This warning is a flashing of the LOC and G/S scales on the PFD and ND ROSE ILS. It occurs whenever:
- G/S deviation is greater than 1 dot (above 100 ft RA).
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WARNING ASSOCIATED WITH ILS "LANDING CAPABILITY"

Any downgrading in the aircraft's capability for automatic approach and landing sounds a triple-click aural warning.

FAILURE OF BOTH LOCALIZER AND GLIDESLOPE RECEIVERS

The PFD and ND (rose ILS mode) display red LOC and G/S flags (if the ILS pushbutton has been pressed green). LOC and G/S scales disappear from the PFD.

If LOC or G/S modes are engaged and at least one AP/FD is engaged
- The AP disengages.
- The FD reverts to its HDG-V/S or TRK-FPA modes.

FAILURE OF LOCALIZER OR GLIDESLOPE TRANSMITTER (WHEN CAPTURED)

- The corresponding index is lost.
- The LOC and G/S scales flash.
- The corresponding FD bar flashes.

Above 200 ft RA, if the transmitter failure lasts less than 7 s, the FMA retains the LOC and G/S modes (or the LAND mode) and the APs are able to regain these modes. If the failure lasts longer than 7 s, the AP disengages and the FD reverts to its basic modes. Below 200 ft RA, if the transmitter failure occurs, the AUTOLAND warning appears, indicating that the crew must perform a GO AROUND (if insufficient visual references) with one or 2 APs engaged.

FAILURES AND ASSOCIATED ACTIONS ABOVE 1 000 FT FOR CAT II OR CAT III

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

FAILURE (for multiple failures, the most limiting applies)	ACTION TO BE PERFORMED ABOVE 1 000 ft	LANDING CATEGORY
ONE ENGINE OUT	Complete ECAM procedure.	CAT III SINGLE
LANDING CAPABILITY DECREASE	Try to recover	As displayed on FMA
LOSS OF A/THR	Switch AP, and try to reengage	CAT II (if A/THR not recovered)
NOSE WHEEL STEERING		CAT III SINGLE (DH = 50 ft) Disengage AP at touch down
ANTI SKID		CAT III SINGLE Disengage AP at touch down
AMBER "CHECK ATT"ON TWO PFDs	Check with standby horizon, use switching to recover (no switching below 1 000 ft)	CAT III SINGLE (if the warning disappears) CAT I (if not)
AMBER "CHECK HDG"ON TWO PFDs AND TWO NDs	Check with standby compass, use switching to recover (no switching below 1 000 ft)	
RED "HDG"ON ONE PFD AND ONE ND	Use switching to recover (no switching below 1 000 ft)	
RED "ATT"ON ONE PFD		
RED "SPD"ON ONE PFD		
DIAGONAL LINE ON ONE PFD AND ONE ND	Use switching to recover (no switching below 1 000 ft)	CAT III DUAL (if the diagonal line disappears) CAT I (if not)
RED "RA"ON TWO PFDs	AP and FD not available	CAT I (minimum RVR as per regulation)
SLATS/FLAPS FAILURE (LESS THAN CONF 3)		CAT I Disengage AP at or above 500 ft

FAILURES AND ASSOCIATED ACTIONS ABOVE 1 000 FT FOR CAT II OR CAT III

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

FAILURE (for multiple failures, the most limiting applies)	ACTION TO BE PERFORMED ABOVE 1 000 ft	LANDING CATEGORY
ONE ENGINE OUT	Complete ECAM procedure.	CAT III SINGLE
LANDING CAPABILITY DECREASE	Try to recover	As displayed on FMA

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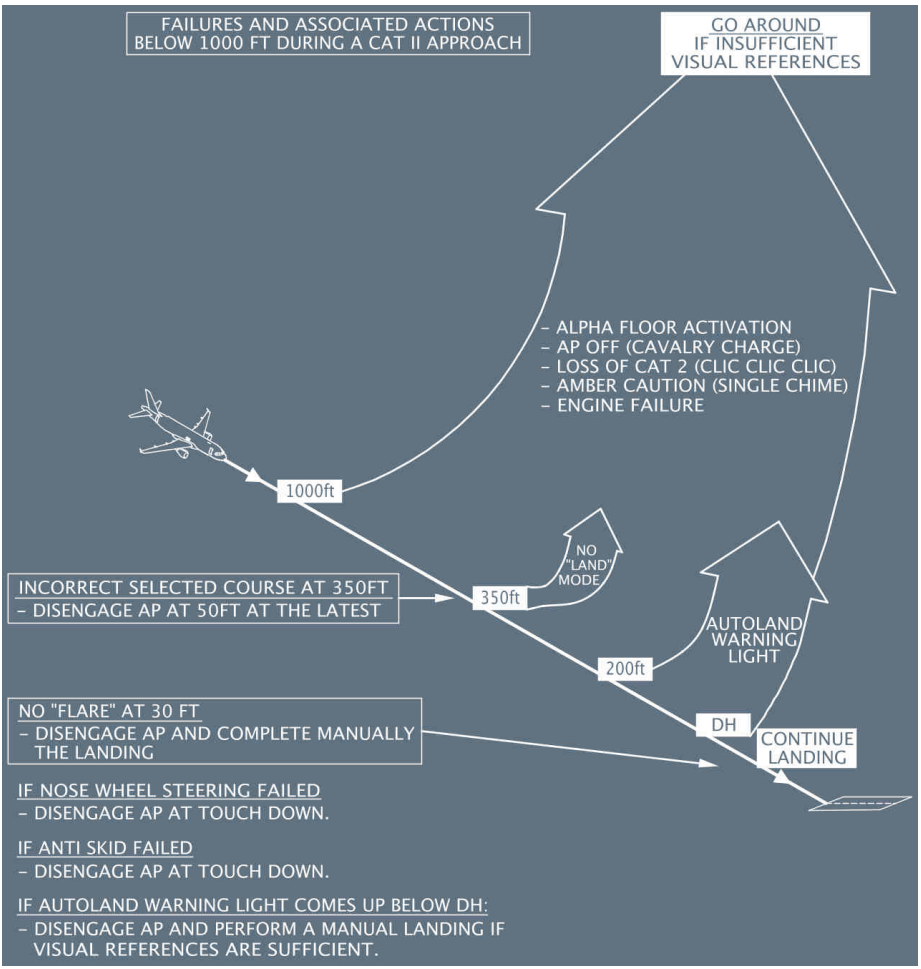
FAILURE (for multiple failures, the most limiting applies)	ACTION TO BE PERFORMED ABOVE 1 000 ft	LANDING CATEGORY
LOSS OF A/THR	Switch AP, and try to reengage	CAT II (if A/THR not recovered)
NOSE WHEEL STEERING		CAT III SINGLE (DH = 50 ft) Disengage AP at touch down
ANTI SKID		CAT III SINGLE Disengage AP at touch down
AMBER "CHECK ATT"ON TWO PFDs	Check with standby horizon, use switching to recover (no switching below 1 000 ft)	CAT III SINGLE (if the warning disappears) CAT I (if not)
AMBER "CHECK HDG"ON TWO PFDs AND TWO NDs	Check with standby compass, use switching to recover (no switching below 1 000 ft)	
RED "HDG"ON ONE PFD AND ONE ND	Use switching to recover (no switching below 1 000 ft)	
RED "ATT"ON ONE PFD		
RED "SPD"ON ONE PFD		
"INVALID DATA" ON ONE PFD AND ONE ND	Use switching to recover (no switching below 1 000 ft)	CAT III DUAL (if the diagonal line disappears) CAT I (if not)
RED "RA"ON TWO PFDs	AP and FD not available	CAT I (minimum RVR as per regulation)
SLATS/FLAPS FAILURE (LESS THAN CONF 3)		CAT I Disengage AP at or above 500 ft

FAILURES AND ASSOCIATED ACTIONS BELOW 1 000 FT DURING A CAT II APPROACH

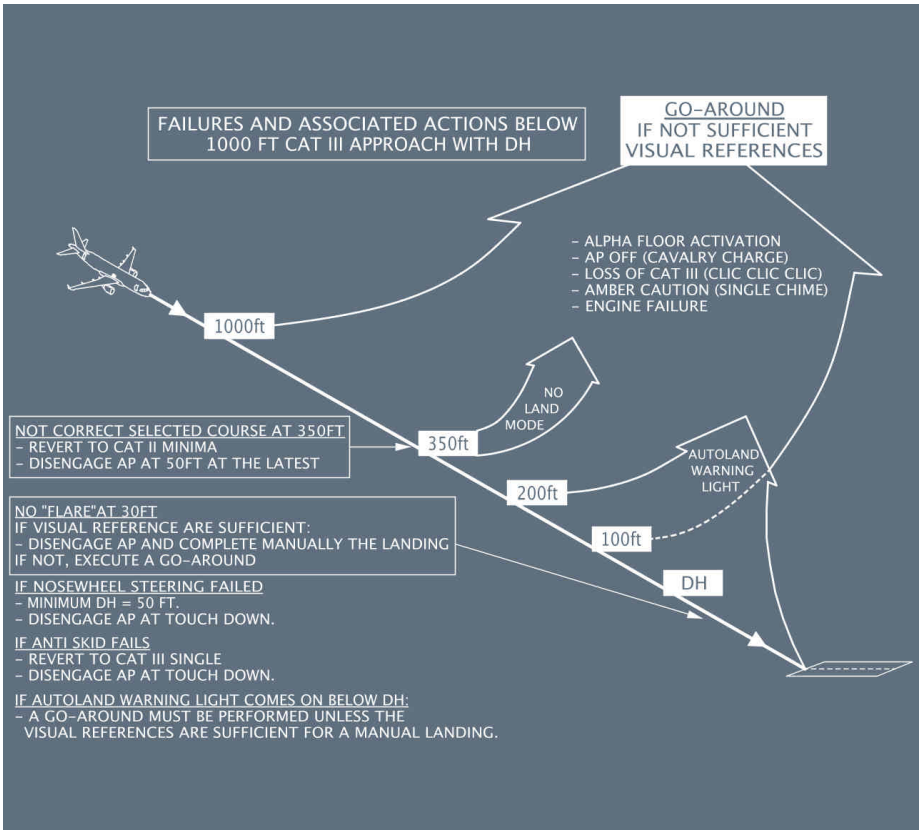
Applicable to: ALL

5



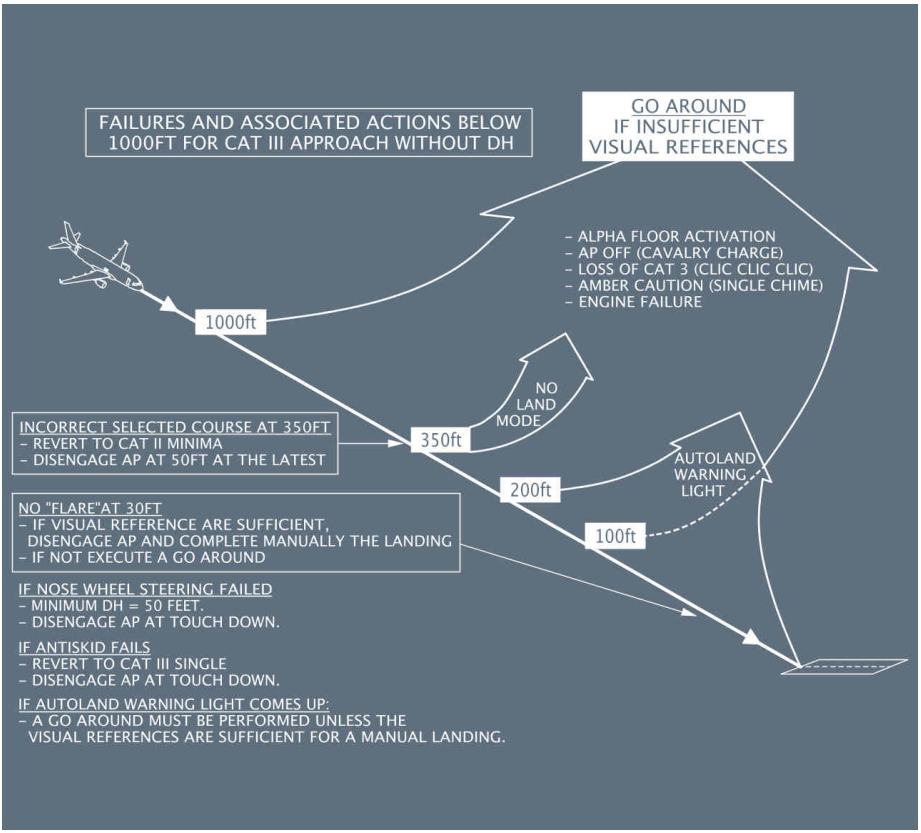
FAILURES AND ASSOCIATED ACTIONS BELOW 1000 FT CAT III WITH DH

Applicable to: ALL



FAILURES AND ASSOCIATED ACTIONS BELOW 1 000 FT FOR CAT III WITHOUT DH

Applicable to: ALL



BACK-COURSE LOCALIZER APPROACH - PROCEDURE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

The pilot must fly a back-course localizer approach with the ND in its ILS rose mode.

6 **PROCEDURE**

PRESS the RAD NAV key.

ENTER the ILS IDENT.

If the ILS is in the database, the system tunes the proper frequency and the front course.

Note: This may trigger the "RWY/ILS MISMATCH" message. Disregard it.

- **If the ILS is not in the database:**

SET the appropriate frequency and SET the FRONT CRS in the CRS field.

On the EFIS control panel, SELECT the ILS ROSE mode.

The display shows the correct LEFT/RIGHT information for the beam deviation.

CAUTION	*DO NOT select ILS via the ILS pushbutton: Doing so makes the PFD show reverse deviations.* *DO NOT arm the LOC or APPR modes.*

The flight director may be used with the TRK-FPA or HDG-V/S modes.



BACK-COURSE LOCALIZER APPROACH - PROCEDURE

Applicable to: B-HSJ, B-HSK, B-HTG, B-HTH, B-HTI

The pilot must fly a back-course localizer approach with the ND in its ILS rose mode.

7 **PROCEDURE**

PRESS the RAD NAV key.
ENTER the ILS IDENT.

If the ILS is in the database, the system tunes the proper frequency and the front course.

Note: This may trigger the "RWY/ILS MISMATCH" message. Disregard it.

- **If the ILS is not in the database:**

SET the appropriate frequency and SET the FRONT CRS in the CRS field.

On the EFIS control panel, SELECT the ILS ROSE mode.

The display shows the correct LEFT/RIGHT information for the beam deviation.

CAUTION	*DO NOT select ILS via the LS pushbutton: Doing so makes the PFD show reverse deviations.* *DO NOT arm the LOC or APPR modes.*

The flight director may be used with the TRK-FPA or HDG-V/S modes.



BACK-COURSE LOCALIZER APPROACH - PROCEDURE

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

The pilot must fly a back-course localizer approach with the ND in its ILS rose mode.

8 **PROCEDURE**

PRESS the RAD NAV key.
ENTER the ILS IDENT.
If the ILS is in the database, the system tunes the proper frequency and the front course.

Note: This may trigger the "RWY/ILS MISMATCH" message. Disregard it.

- **If the ILS is not in the database:**

  SET the appropriate frequency and SET the FRONT CRS in the CRS field.
  On the EFIS control panel, SELECT the ILS ROSE mode.
  The display shows the correct LEFT/RIGHT information for the beam deviation.

CAUTION	*DO NOT select ILS via the LS pushbutton: Doing so makes the PFD show reverse deviations.* *DO NOT arm the LOC or APPR modes.* *DO NOT select the LS pushbutton on ISIS, since it displays the LOC deviations in the wrong sense.*

  The flight director may be used with the TRK-FPA or HDG-V/S modes.



NON PRECISION APPROACH

Applicable to: ALL

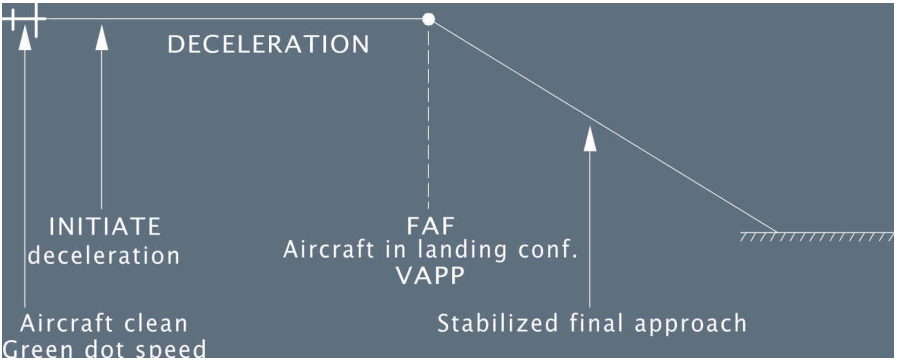
APPROACH SPEED TECHNIQUE

A stabilized approach procedure may be used to perform non precision approaches.

Applicable to: ALL

STABILIZED APPROACH

The “stabilized approach” brings the aircraft to intercept the final descent path in the landing configuration and at VAPP.
Managed speed is best for the stabilized approach and VAPP should be inserted as a speed constraint at the final approach fix.



Applicable to: B-HSD, B-HSE

MANAGED NON PRECISION APPROACH

The Non Precision Approach (NPA) can be flown in lateral and vertical managed guidance (FINAL APP), or in lateral managed guidance (NAV) associated with selected vertical guidance (FPA of V/S).

Note: *For the conditions for using these AP modes, Refer to LIM-22-10 Auto Pilot Function and Refer to PRO-NOR-SOP-19-Introduction - guidance for Non Precision Approaches, other than LOC and RNAV Non Precision Approaches.*

APPROACH PREPARATION

SELECT the intended approach on the F-PLN page.

Check the FM lateral and vertical flight path against the published approach chart, using the MCDU and the ND PLAN mode with constraints displayed.

ENTER VAPP as SPD constraint at the FAF, with a vertical revision of the F-PLN page.

For an approach in overlay to a conventional approach with radio NAVAID:
SELECT/CHECK that the appropriate NAVAID is selected on the RAD NAV page.

INTERMEDIATE APPROACH

SELECT ROSE NAV or MAP mode and VOR or ADF raw data, as appropriate on the ND.
SELECT TRK/FPA display, when established on the final approach course.
USE managed speed.
KEEP A/THR active.

Note: *For additional recommendations, refer to the dedicated FCOM Bulletin on the use of the FINAL APP mode.*

FINAL APPROACH

- **When cleared for approach:**
  - **If managed lateral and vertical guidance is intended:**

    SELECT APPR pushbutton on the FCU.

    CHECK APP NAV green and FINAL blue on the FMA.

    CHECK that blue descent arrow is displayed on ND at the FAF.

    CHECK that the F-PLN on ND and the V-DEV on PFD are correct.

    After sequencing the FAF:

    CHECK that FINAL APP green is displayed on the FMA.

    CHECK on the ND the TO waypoint, the F-PLN to the MAP and the missed approach procedure (blue line).

    SELECT the go-around altitude on the FCU.

    MONITOR the approach lateral and vertical flight path with the available raw data.

  - **If managed lateral and selected vertical guidance is intended:**

    CHECK NAV and FPA on the FMA.

    Upon reaching the FAF:

    Select a FPA to the final descent path.

    Anticipate the selection of the FPA to smoother the interception of the final descent path.

    After sequencing the FAF:

    CHECK, on the ND, the TO waypoint, the F-PLN to the MAP, and the missed approach procedure (blue line).

    SELECT the go-around altitude on the FCU.

    ADJUST the FPA to fly the intended vertical flight path.

- **At MDA/MDH:**
  - **If visual references are acquired and confirmed by both crewmembers:**

    DISCONNECT the AP and FD and continue visually.

  - **If visual references are not acquired:**

    INITIATE a go-around.

Applicable to: ALL 321, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

MANAGED NON PRECISION APPROACH

The Non Precision Approach (NPA) can be flown in lateral and vertical managed guidance (FINAL APP), or in lateral managed guidance (NAV) associated with selected vertical guidance (FPA of V/S).

Note: *For the conditions for using these AP modes, Refer to LIM-22-10 Auto Pilot Function and Refer to PRO-NOR-SOP-19-Introduction - guidance for Non Precision Approaches, other than LOC and RNAV Non Precision Approaches.*

APPROACH PREPARATION

SELECT the intended approach on the F-PLN page.

Check the FM lateral and vertical flight path against the published approach chart, using the MCDU and the ND PLAN mode with constraints displayed.

ENTER VAPP as SPD constraint at the FAF, with a vertical revision of the F-PLN page.

For an approach in overlay to a conventional approach with radio NAVAID:
SELECT/CHECK that the appropriate NAVAID is selected on the RAD NAV page.

For RNAV or GPS approach, GPS PRIMARY must be available at the ETA at destination. For more information about this check, *Refer to PRO-NOR-SOP-19-Introduction - guidance for Non Precision Approaches, other than LOC and RNAV Non Precision Approaches*.

INTERMEDIATE APPROACH

SELECT ROSE NAV or MAP mode and VOR or ADF raw data, as appropriate on the ND.

For RNAV or GPS approach:
CHECK that both GPS receivers are operative in NAV mode on the GPS MONITOR page.
CHECK that GPS PRIMARY is available on the PROG PAGE.

SELECT TRK/FPA display, when established on the final approach course.
USE managed speed.
KEEP A/THR active.

Note: *For additional recommendations, refer to the dedicated FCOM Bulletin on the use of the FINAL APP mode.*

FINAL APPROACH

- **When cleared for approach:**
  - **If managed lateral and vertical guidance is intended:**

    SELECT APPR pushbutton on the FCU.

    CHECK APP NAV green and FINAL blue on the FMA.

    CHECK that blue descent arrow is displayed on ND at the FAF.

CHECK that the F-PLN on ND and the V-DEV on PFD are correct.

After sequencing the FAF:

CHECK that FINAL APP green is displayed on the FMA.

CHECK on the ND the TO waypoint, the F-PLN to the MAP and the missed approach procedure (blue line).

SELECT the go-around altitude on the FCU.

MONITOR the approach lateral and vertical flight path with the available raw data.

■ **If managed lateral and selected vertical guidance is intended:**

CHECK NAV and FPA on the FMA.

Upon reaching the FAF:

Select a FPA to the final descent path.

Anticipate the selection of the FPA to smoother the interception of the final descent path.

After sequencing the FAF:

CHECK, on the ND, the TO waypoint, the F-PLN to the MAP, and the missed approach procedure (blue line).

SELECT the go-around altitude on the FCU.

ADJUST the FPA to fly the intended vertical flight path.

● **At MDA/MDH:**

■ **If visual references are acquired and confirmed by both crewmembers:**

DISCONNECT the AP and FD and continue visually.

■ **If visual references are not acquired:**

INITIATE a go-around.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

MANAGED NON PRECISION APPROACH

The Non Precision Approach (NPA) can be flown in lateral and vertical managed guidance (FINAL APP), or in lateral managed guidance (NAV) associated with selected vertical guidance (FPA of V/S).

Note: For the conditions for using these AP modes, Refer to LIM-22-10 Auto Pilot Function and Refer to PRO-NOR-SOP-19-Introduction - guidance for Non Precision Approaches, other than LOC and RNAV Non Precision Approaches.

APPROACH PREPARATION

SELECT the intended approach on the F-PLN page.

Check the FM lateral and vertical flight path against the published approach chart, using the MCDU and the ND PLAN mode with constraints displayed.

ENTER VAPP as SPD constraint at the FAF, with a vertical revision of the F-PLN page.

For an approach in overlay to a conventional approach with radio NAVAID:
SELECT/CHECK that the appropriate NAVAID is selected on the RAD NAV page.

For RNAV or GPS approach, GPS PRIMARY must be available at the ETA at destination. For more information about this check, *Refer to PRO-NOR-SOP-19-Introduction - guidance for Non Precision Approaches, other than LOC and RNAV Non Precision Approaches.*

INTERMEDIATE APPROACH

SELECT ROSE NAV or MAP mode and VOR or ADF raw data, as appropriate on the ND.

For RNAV or GPS approach:
CHECK that both GPS receivers are operative in NAV mode on the GPS MONITOR page.
CHECK that GPS PRIMARY is available on the PROG PAGE.

SELECT TRK/FPA display, when established on the final approach course.
USE managed speed.
KEEP A/THR active.

Note: *For additional recommendations, refer to the dedicated FCOM Bulletin on the use of the FINAL APP mode.*

FINAL APPROACH

- **When cleared for approach:**
  - **If managed lateral and vertical guidance is intended:**

    SELECT APPR pushbutton on the FCU.

    CHECK APP NAV green and FINAL blue on the FMA.

    CHECK that blue descent arrow is displayed on ND at the FAF.

    CHECK that the F-PLN on ND and the V-DEV on PFD are correct.

    After sequencing the FAF:

    CHECK that FINAL APP green is displayed on the FMA.

    CHECK on the ND the TO waypoint, the F-PLN to the MAP and the missed approach procedure (blue line).

    SELECT the go-around altitude on the FCU.

    MONITOR the approach lateral and vertical flight path with the available raw data.

■ **If managed lateral and selected vertical guidance is intended:**

CHECK NAV and FPA on the FMA.

Upon reaching the FAF:

Select a FPA to the final descent path.

Anticipate the selection of the FPA to smoother the interception of the final descent path.

After sequencing the FAF:

CHECK, on the ND, the TO waypoint, the F-PLN to the MAP, and the missed approach procedure (blue line).

SELECT the go-around altitude on the FCU.

ADJUST the FPA to fly the intended vertical flight path.

● **At minimum:**

■ **If visual references are acquired and confirmed by both crewmembers:**

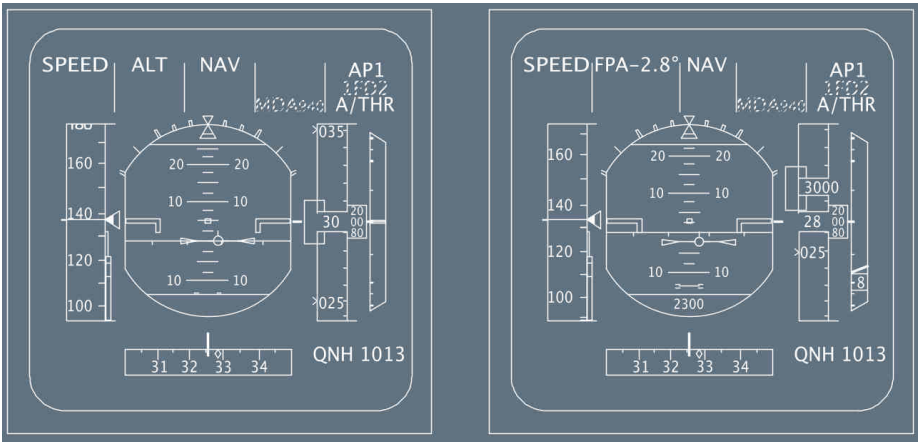
DISCONNECT the AP and FD and continue visually.

■ **If visual references are not acquired:**

INITIATE a go-around.

Applicable to: ALL

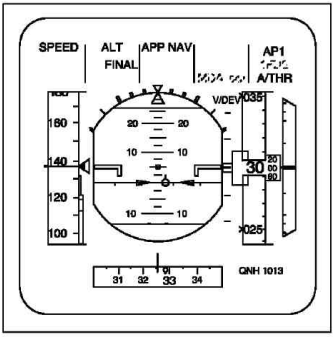
9



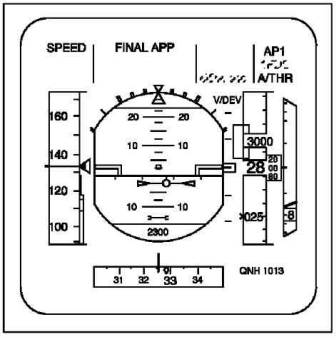
PFD in intermediate approach, FPD and FPV selected. The pilot did not press the APPR pushbutton, the V DEV scale is not displayed. (If GPS is installed, the V DEV scale is displayed when the approach phase is active).

PFD when established on final path:
The vertical guidance is the final path angle, as selected by the pilot (FPA); the lateral guidance is computed by the FM (NAV).

Applicable to: ALL



PFD in intermediate approach, FPD and FPV selected. The pilot has pressed the APPR pushbutton, the FINAL managed mode is armed, the V DEV scale is displayed.(If GPS is installed, the V DEV scale is displayed when the approach phase is active).
Each V DEV graduation indicates 100 feet, the rectangle shows the computed vertical path versus the aircraft position.



PFD when established on final path:
The lateral and vertical guidances are managed by the FM (FINAL APP).

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

SELECTED NON PRECISION APPROACH

The non precision approach is flown in selected modes (TRK-FPA or HDG-V/S) when:

- The approach is not stored in the database or
- GPS PRIMARY is lost and the NAV accuracy check is negative.

INTERMEDIATE APPROACH

Procedure

USE TRK-FPA mode
SELECT ND in the ROSE VOR mode
KEEP the autothrust active
USE managed speed

FINAL APPROACH

Upon reaching the final approach fix

SELECT a final approach track on the FCU
SELECT an FPA (flight path angle) to the final descent path angle

Anticipate the selection of FPA to smooth the interception of the final path.

Note: If the pilot is using the AP, select the final FPA approximately 0.3 nm before the final approach fix.

SELECT a go around altitude on FCU.
USE raw data to monitor aircraft position and flight path.

- **AT MDA/MDH:**
  - **If visual references are acquired**
    DISCONNECT the autopilot and continue the approach visually.
  - **If visual references are not acquired**
    INITIATE a go around

NON DIRECTIONAL BEACON (NDB) APPROACH TYPE

When the flight plan calls for an NDB approach, the system automatically tunes the ADF, only when the aircraft is passing the first fix of the approach. Therefore, it is convenient to manually tune the ADF earlier (before activating the approach phase).
Fly a Non Directional Beacon (NDB) approach as any non precision approach.

LOC APPROACH TYPE

SELECT the LOC pushbutton in intermediate approach, to arm the LOC mode.

CAUTION	*Do not select the APPR pushbutton.*

SELECT the ND in ROSE ILS mode.

- **Upon reaching the final approach fix:**
  MONITOR LOC engagement.
  SELECT the FPA to the final descent path angle.

Note: In case of a dual Radio Altimeter (RA) failure, the LOC pb can still be used to arm the LOC mode, as it does not depend on the RA signal.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

SELECTED NON PRECISION APPROACH

The non precision approach is flown in selected modes (TRK-FPA or HDG-V/S) when:
- The approach is not stored in the database or
- GPS PRIMARY is lost and the NAV accuracy check is negative.

INTERMEDIATE APPROACH

Procedure

USE TRK-FPA mode

SELECT ND in the ROSE VOR mode
KEEP the autothrust active
USE managed speed

FINAL APPROACH

Upon reaching the final approach fix

SELECT a final approach track on the FCU
SELECT an FPA (flight path angle) to the final descent path angle

Anticipate the selection of FPA to smooth the interception of the final path.

Note: *If the pilot is using the AP, select the final FPA approximately 0.3 nm before the final approach fix.*

SELECT a go around altitude on FCU.
USE raw data to monitor aircraft position and flight path.

- **AT MDA/MDH:**
  - **If visual references are acquired**

    DISCONNECT the autopilot and continue the approach visually.
  - **If visual references are not acquired**

    INITIATE a go around

NON DIRECTIONAL BEACON (NDB) APPROACH TYPE

When the flight plan calls for an NDB approach, the system automatically tunes the ADF, only when the aircraft is passing the first fix of the approach. Therefore, it is convenient to manually tune the ADF earlier (before activating the approach phase).
Fly a Non Directional Beacon (NDB) approach as any non precision approach.

LOC APPROACH TYPE

SELECT the LOC pushbutton in intermediate approach, to arm the LOC mode.

CAUTION	*Do not select the APPR pushbutton.*

SELECT the ND in ROSE LS mode.

- **Upon reaching the final approach fix:**

  MONITOR LOC engagement.

  SELECT the FPA to the final descent path angle.

Note: *In case of a dual Radio Altimeter (RA) failure, the LOC pb can still be used to arm the LOC mode, as it does not depend on the RA signal.*

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

SELECTED NON PRECISION APPROACH

The non precision approach is flown in selected modes (TRK-FPA or HDG-V/S) when:
- The approach is not stored in the database or
- GPS PRIMARY is lost and the NAV accuracy check is negative.

INTERMEDIATE APPROACH

Procedure

USE TRK-FPA mode
SELECT ND in the ROSE VOR mode
KEEP the autothrust active
USE managed speed

FINAL APPROACH

Upon reaching the final approach fix

SELECT a final approach track on the FCU
SELECT an FPA (flight path angle) to the final descent path angle

Anticipate the selection of FPA to smooth the interception of the final path.

Note: *If the pilot is using the AP, select the final FPA approximately 0.3 nm before the final approach fix.*

SELECT a go around altitude on FCU.
USE raw data to monitor aircraft position and flight path.

- **At minimum:**
  - **If visual references are acquired**

    DISCONNECT the autopilot and continue the approach visually.
  - **If visual references are not acquired**

    INITIATE a go around

NON DIRECTIONAL BEACON (NDB) APPROACH TYPE

When the flight plan calls for an NDB approach, the system automatically tunes the ADF, only when the aircraft is passing the first fix of the approach. Therefore, it is convenient to manually tune the ADF earlier (before activating the approach phase).
Fly a Non Directional Beacon (NDB) approach as any non precision approach.

LOC APPROACH TYPE

SELECT the LOC pushbutton in intermediate approach, to arm the LOC mode.

CAUTION	*Do not select the APPR pushbutton.*

SELECT the ND in ROSE LS mode.

- **Upon reaching the final approach fix:**

  MONITOR LOC engagement.

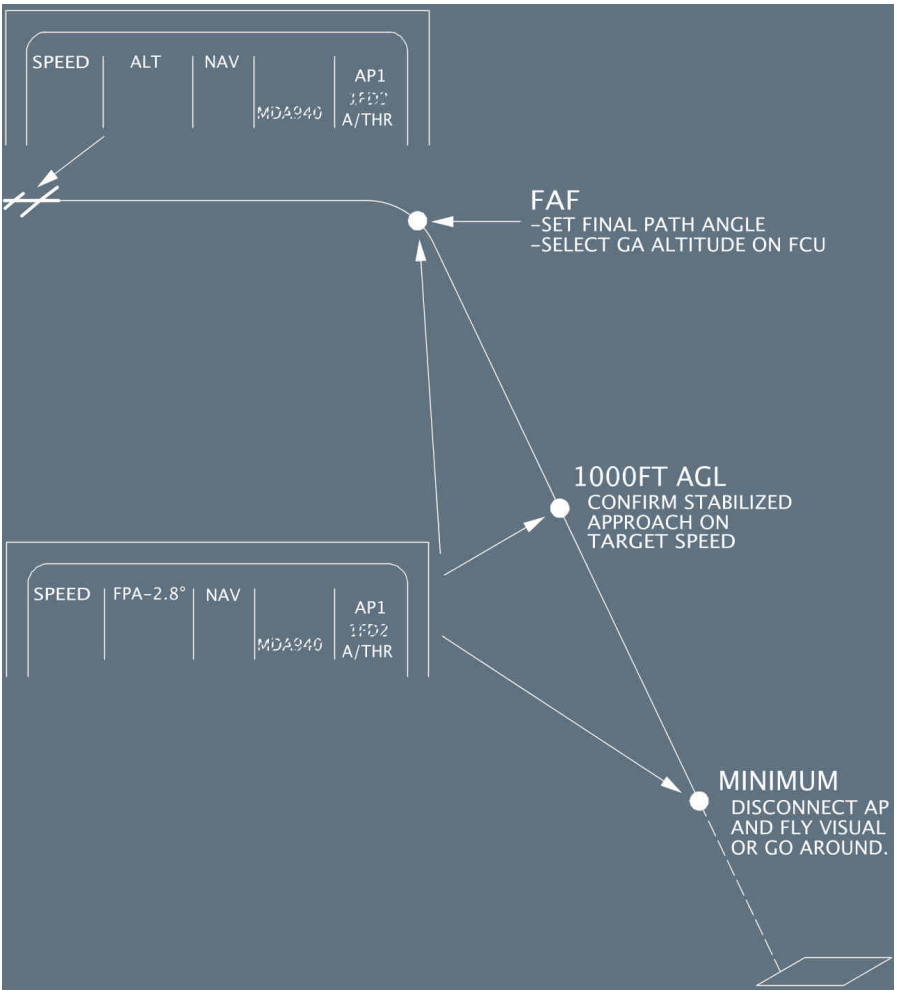
  SELECT the FPA to the final descent path angle.

Note: *In case of a dual Radio Altimeter (RA) failure, the LOC pb can still be used to arm the LOC mode, as it does not depend on the RA signal.*

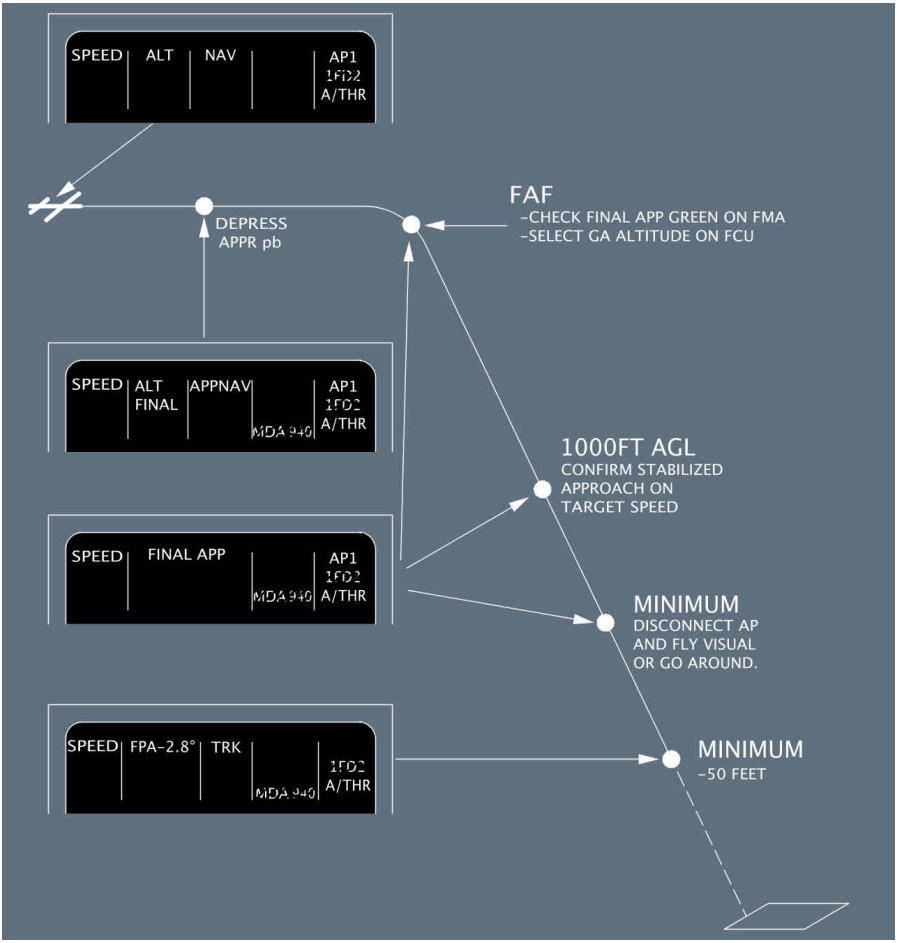
NON PRECISION APPROACH PROFILE

Applicable to: ALL

10 ## MANAGED LATERAL AND SELECTED VERTICAL GUIDANCE

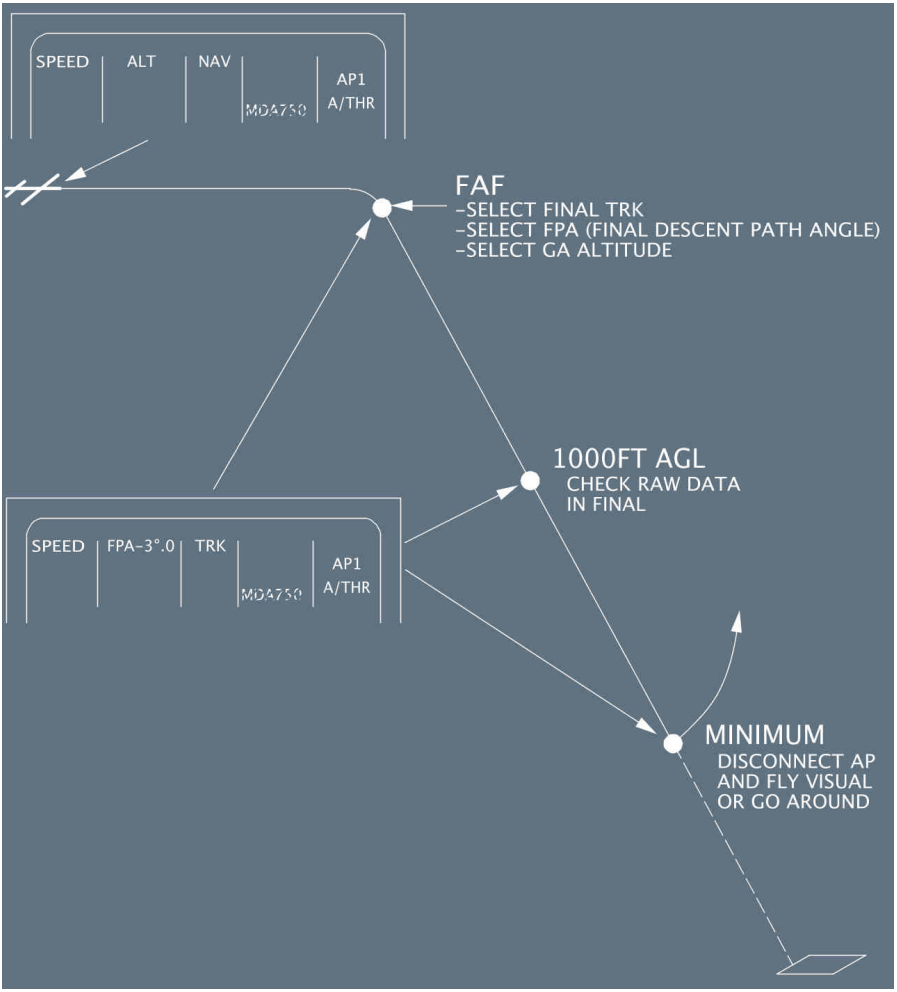


LATERAL AND VERTICAL MANAGED GUIDANCE



CAUTION	When FINAL APP modes are engaged, the AP/FD will disengage: - At the minimum - 50 ft (if entered) or at 400 ft AGL (if no minimum is entered), or - At the Missed Approach Point (MAP), depending on which one comes first. The FDs will revert to basic modes (HDG-V/S or TRK-FPA).

11 **SELECTED GUIDANCE**



Note: *If the distance to the runway is not properly assessed, a step descent approach may be considered and a level-off at minimum may be performed while searching for visual references. If the pilot has no visual reference at the MAP, at the latest, he must initiate a go-around.*

CIRCLING APPROACH

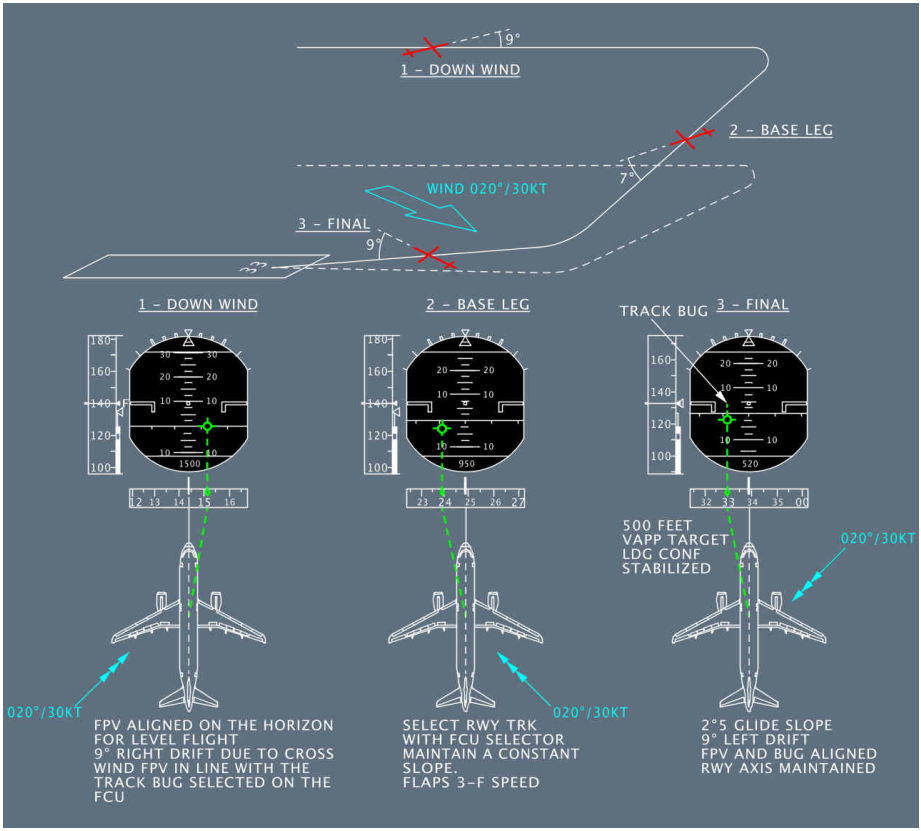
Applicable to: ALL

If the pilot chooses not to follow the SOP procedure, select both FDs OFF and fly visually.
If the runway in use is not the flight plan runway, the ground speed and the VAPP will not be computed properly, and the speed on final may be higher than excepted.
Therefore, select the approach speed directly on the FCU.

VISUAL APPROACH

Applicable to: ALL

When flying visual, the pilot may select an appropriate STAR and RWY in use on the MCDU.
The ND displays the extended runway centerline five nautical miles out from the runway.
This helps the pilot during the final turn.
Along with the FPV, the PFD displays a track bug that may help the pilot to fly the downwind leg and intercept final. The FPV should be flown laterally with reference to the track bug.


9°
1 – DOWN WIND
2 – BASE LEG
7°
WIND 020°/30KT
3 – FINAL
9°
1 – DOWN WIND
2 – BASE LEG
TRACK BUG
3 – FINAL
020°/30KT
FPV ALIGNED ON THE HORIZON
FOR LEVEL FLIGHT
9° RIGHT DRIFT DUE TO CROSS
WIND FPV IN LINE WITH THE
TRACK BUG SELECTED ON THE
FCU
SELECT RWY TRK
WITH FCU SELECTOR
MAINTAIN A CONSTANT
SLOPE.
FLAPS 3–F SPEED
020°/30KT
500 FEET
VAPP TARGET
LDG CONF
STABILIZED
020°/30KT
2°5 GLIDE SLOPE
9° LEFT DRIFT
FPV AND BUG ALIGNED
RWY AXIS MAINTAINED

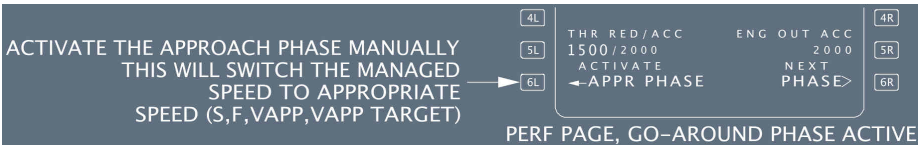
Go-Around

MONITORING THE GO-AROUND

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

Engage the GO-AROUND phase and GO-AROUND modes by setting the thrust levers to the TOGA position, if at least CONF1 is selected.
When the GO-AROUND phase is engaged, the previously-flown approach is automatically strung back into the flight plan at the end of the missed approach procedure.
In the GO-AROUND phase, the system makes no predictions. Consequently, CLB and DES modes are not available, and the flight crew must monitor constraints.
When the aircraft leaves the GO-AROUND phase, all predictions and modes become available again. During a GO-AROUND phase, the managed speed is Green Dot.

CAUTION	If ALT* engages, as the aircraft emerges from SRS mode, and an engine-out occurs more or less simultaneously, the aircraft may loose airspeed as it tries to capture altitude. There is no mode reversion in ALT*.



HEADING/TRACK PRESET FUNCTION IN GO-AROUND PHASE

The flight crew can use the heading/track preset, when LOC*, LOC, LAND, FINAL or GA is engaged.

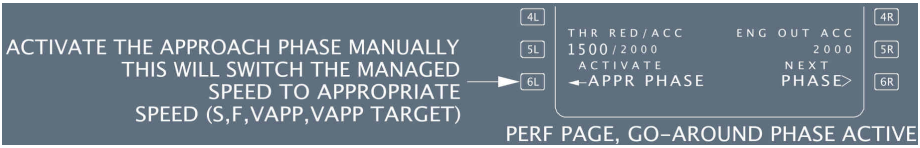
SET the appropriate heading, or track value, in the window of the FCU.
When necessary, PULL the HDG/TRK selection knob to engage the mode on the preset value.

MONITORING THE GO-AROUND

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

Engage the GO-AROUND phase and GO-AROUND modes by setting the thrust levers to the TOGA position, if at least CONF1 is selected.
When the GO-AROUND phase is engaged, the previously-flown approach is automatically strung back into the flight plan at the end of the missed approach procedure.
In the GO-AROUND phase, the system makes no predictions. Consequently, CLB and DES modes are not available, and the flight crew must monitor constraints.

When the aircraft leaves the GO-AROUND phase, all predictions and modes become available again. During a GO-AROUND phase, the managed speed is Green Dot.



HEADING/TRACK PRESET FUNCTION IN GO-AROUND PHASE

The flight crew can use the heading/track preset, when LOC*, LOC, LAND, FINAL or GA is engaged.

SET the appropriate heading, or track value, in the window of the FCU.
When necessary, PULL the HDG/TRK selection knob to engage the mode on the preset value.

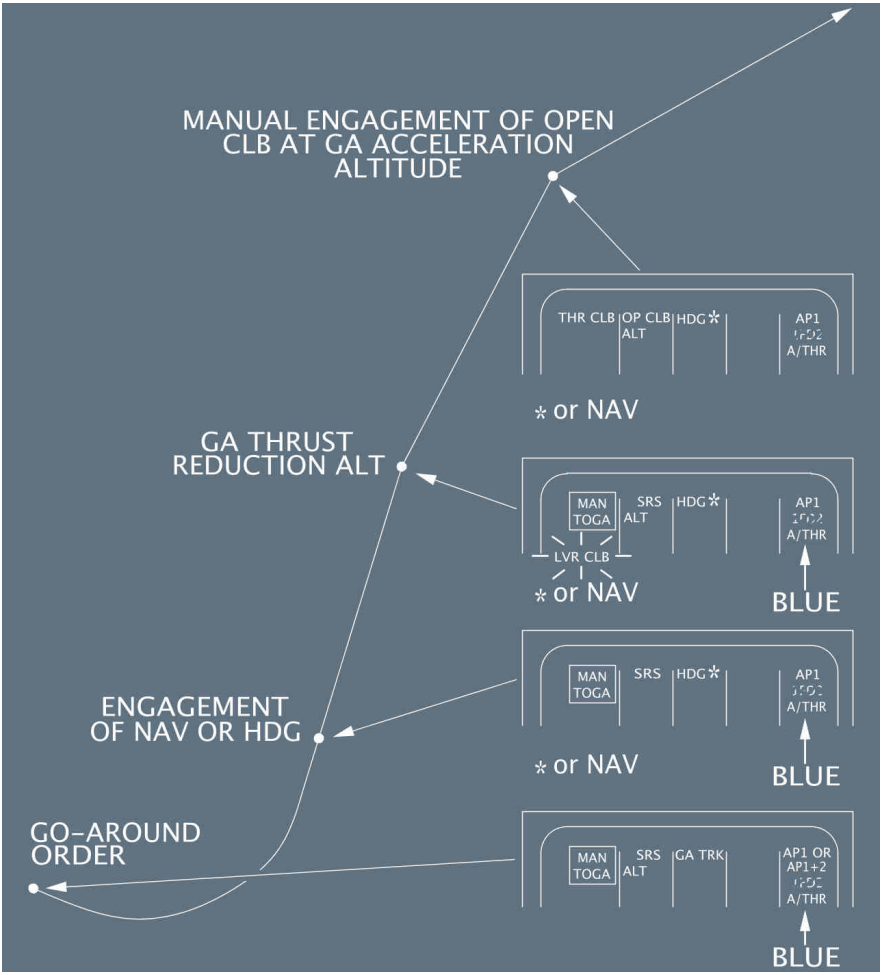
GO-AROUND PROFILE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

1

- **WITH FD ON:**

  Apply SOP procedures



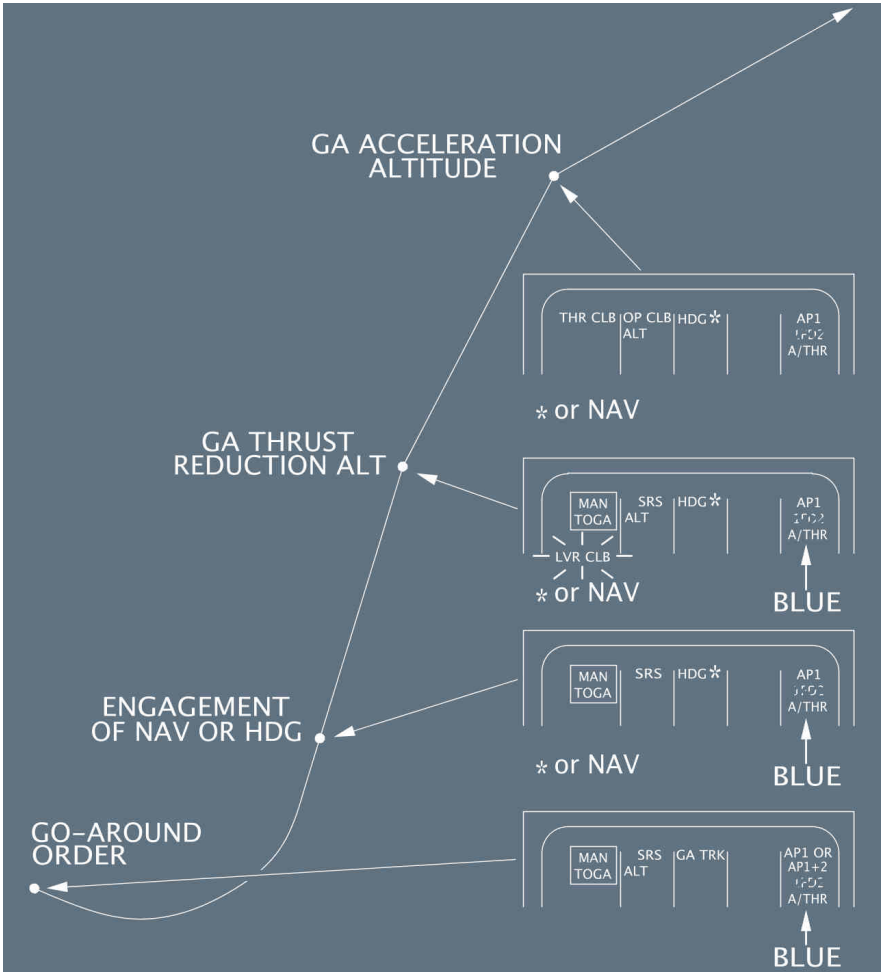
GO-AROUND PROFILE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HTG, B-HTH, B-HTI

2

- **WITH FD ON:**

  Apply SOP procedures



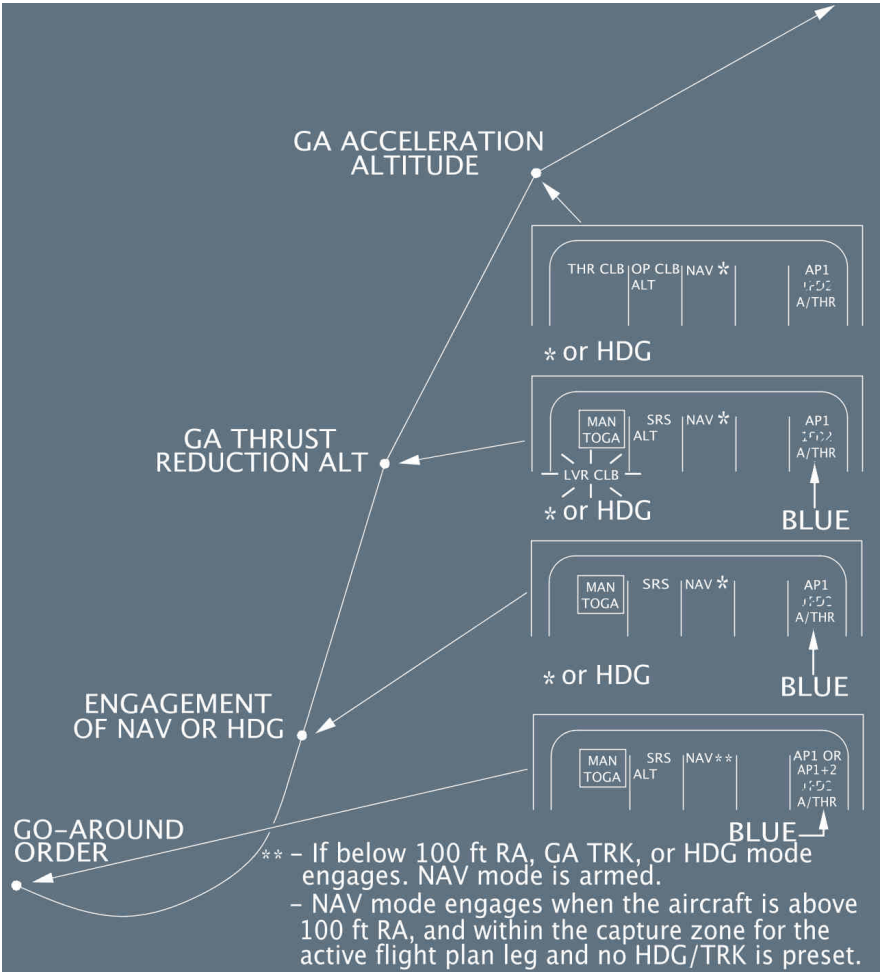
GO-AROUND PROFILE

Applicable to: B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

3

- **WITH FD ON:**

  Apply SOP procedures



MISSED APPROACH: TRY AGAIN

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

If the pilot intends to fly another approach to the destination:

- The flight plan has all the necessary data for the missed approach
- Green Dot is the target speed.

- **When cleared by the ATC to follow the missed approach procedure:**
  ENGAGE NAV mode, or
  TURN and PULL the HDG selector knob to set a heading
  HDG, or TRK, or NAV modes can only be engaged above 100 ft.

- **When entering the initial approach area:**
  Activate the approach phase on the MCDU's PERF GO AROUND page
  - **If the APPR phase is not activated:**
    - Managed approach speed will not be available
    - The system will not furnish predictions
    - MDA/MDH/DH displays will not appear on the PFD.

MISSED APPROACH: TRY AGAIN

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

If the pilot intends to fly another approach to the destination:
- The flight plan has all the necessary data for the missed approach
- Green Dot is the target speed.

- **When cleared by the ATC to follow the missed approach procedure:**
  ENGAGE NAV mode, or
  TURN and PULL the HDG selector knob to set a heading
  HDG, or TRK, or NAV modes can only be engaged above 100 ft.

- **When entering the initial approach area:**
  Activate the approach phase on the MCDU's PERF GO AROUND page
  - **If the APPR phase is not activated:**
    - Managed approach speed will not be available
    - The system will not furnish predictions
    - BARO/RADIO minima displays will not appear on the PFD.

MISSED APPROACH: DIVERT

Applicable to: ALL

- **If the crew decides to divert to the alternate:**
  ENABLE ALTN, preferably at the TO waypoint.

- **When cleared to a waypoint:**
  PERFORM a DIRECT TO.

The system automatically reverts to CLB phase, and modifies the target speed from Green Dot to initial speed.

The system automatically sets the CRZ FL to the defaulted alternate CRZ FL (FL 220 or 310), and retains the previous cost index.

The pilot may adjust these as necessary.

Note: *Diversion may also be initiated by entering a NEW DEST in the LAT REV page at the TO waypoint, or by using the secondary F-PLN, if prepared. Refer to DSC-22_20-60-30 General.*

TASK SHARING DURING A GO-AROUND

Applicable to: ALL

4

PF	PM
-Announce "GO AROUND, FLAPS". Simultaneously set thrust levers to TO GA.	-Announce "SPEED CHECKS , FLAPS___"
-Monitor the flight path.	-Retract flaps one step, and monitor engine parameters.



When rate of climb is positive:

-Announce "GEAR UP"	-Announce "POSITIVE CLIMB". -Repeat "GEAR UP". -Retract the gear and confirm "GEAR UP ".

When LVR CLB flashes on FMA:

-Set thrust levers to CL detent.	
-Push or Turn/pull HDG/TRK sel knob on FCU, according to ATC clearance.	



At go-around acceleration altitude:

-Monitor that the target speed increases to Green Dot.



● If the speed target does not increase to Green Dot:
-CHECK and PULL the altitude selector knob to engage OP CLB
The speed target increases to Green Dot
-Retract flaps on schedule.

PROCEDURES

SPECIAL OPERATIONS

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Localization Title	Toc Index	ID	Reason
PRO-SPO-25-40 Gross Ceilings at Long Range and Green Dot Speeds - One Engine Out	M	1	Improvement of illustration quality.
PRO-SPO-25-40 Gross Ceilings at Long Range and Green Dot Speeds - One Engine Out	M	2	Improvement of illustration quality.
PRO-SPO-50 Procedures - General	D	1	Update of the technical wording
PRO-SPO-50 Procedures - Flight Preparation	D	2	Update of the procedure in order to reflect the system configuration.
PRO-SPO-52 Schedule 8 Navigation Areas	A	1	Effectivity update: The information no longer applies to MSN 5024, 5030.
			Effectivity update: The information no longer applies to MSN 5362, 5429.
			Effectivity update: The information now also applies to MSN 5024, 5030, 5362, 5429.
PRO-SPO-52 Schedule 8 Navigation Areas	A	2	Moved from PRO-SUP-34 Update of the technical wording
PRO-SPO-52 Schedule 8 Navigation Areas	A	3	Moved from PRO-SUP-34 Update of the technical wording
			Update of the technical wording
PRO-SPO-52 Schedule 8 Navigation Areas	A	4	Moved from PRO-SUP-34 Update of the technical wording
PRO-SPO-60 Performance	D	1	Update of the technical wording

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GENERAL

Applicable to: ALL

Flight without cabin pressurization can result of:
- Dispatch under MEL
- Departure following a structural damage
- Depressurization in flight

The flight crew must decide the flight level and the airspeed depending on:
- The cause of the depressurization
- The distance to fly
- The topographic conditions
- The meteorological conditions, and
- The passengers on board the aircraft.

Revenue flight is permitted without cabin pressurization, provided that the oxygen requirements below are achieved.

FUEL TRANSFER

Applicable to: ALL 321

Automatic fuel transfer from the ACT(s) to the center tank will not occur during flight without cabin pressurization. At the time when the automatic fuel transfer from the ACT(s) should start, the “ACT XFR FAULT” ECAM caution will be triggered to indicate that the automatic transfer will not occur. The flight crew should follow the ECAM caution to perform a manual fuel transfer.

OXYGEN REQUIREMENTS

Applicable to: ALL

CREW MEMBERS

See FAR 121.329 or JAR-OPS 1.770

PASSENGERS

For flight at cabin pressure altitudes above 10 000 ft, up to and including 14 000 ft, there must be enough oxygen to supply 10 % of the passengers for the flight at those altitudes that lasts more than 30 min.
For flight at cabin pressure altitudes above 14 000 ft, up to and including 15 000 ft, there must be enough oxygen for 30 % of the passengers.
For flight at cabin pressure altitudes above 15 000 ft, there must be enough oxygen for all passengers.

FLIGHT PLANNING AND EXECUTION

Applicable to: ALL

ALTITUDE

Flight route planning should consider the above-stated restriction in cabin altitude. If cabin altitude exceeds 9 550 ±350 ft, the EXCESS CAB ALT warning on the ECAM will be activated. When above 14 000 ft, the passenger oxygen masks will drop automatically. Therefore, the recommended maximum altitude for prolonged flight is FL 100. The minimum altitude should be selected by respecting :

- The Minimum Safe Altitude (MSA),
- Turbulence, which is uncomfortable for passengers and,
- Low Outside Air Temperature (OAT), which can be uncomfortable for passengers when the cabin is ventilated by ram air only.

AIRSPEED

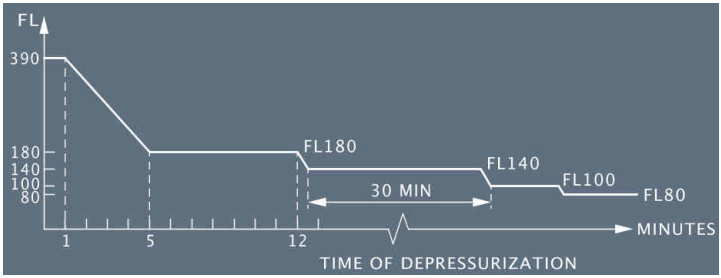
If decompression is due to structural damage, consider airspeed reduction. Use slats and flaps, as necessary, to establish low speed conditions. In addition, turbulent conditions are uncomfortable for passengers, and gust response should be minimized by reducing airspeed.

CLIMB AND DESCENT RATE

Takeoff must be performed normally, and the rate of climb must be limited to about 500 ft/min, to ease the pressure change felt by passengers and crew.
Likewise, the rate of descent must be limited to about 1 000 ft/min, except for the final approach which must be performed normally. Notify the ATC of any performance deficiency by a remark in the flight plan.

EMERGENCY DESCENT IN CASE OF RAPID DEPRESSURIZATION

In the event of depressurization, oxygen is supplied to passengers through an individual mask. The capacity of the units is such that the aircraft must descend and remain below the following profile.



SYSTEMS

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

FAILURE OCCURRING IN FLIGHT

Apply the abnormal and emergency procedures required by ECAM.

FAILURE PRESENT AT DISPATCH

- **If flight with both packs inoperative**

  PACK 1 and 2.....OFF
  RAM AIR..... ON

  Note: *If the "AVIONICS SMOKE" procedure has to be applied, the following flight time limitations have to be considered to protect the avionic equipment :*
  At ISA +40 : 0.5 h
  At ISA +30 : 1.5 h
  At ISA +20 : 4 h
  At ISA +10 and below : No limitation.

  Between FL 80 and FL 150, oxygen must be provided for 2 % of the passengers. This is provided by the portable oxygen system. When it is no longer available, descend to FL 80. For performance at FL 80/250 kt : Use data for FL 100/LRC (*Refer to PER-CRZ-CRT-30 LONG RANGE CRUISE - ISA*) and increase fuel consumption by 6 %.

- **If both CAB PRESS systems are inoperative, or if there is structural damage :**

  PACK 1 and 2.....ON
  MODE SEL..... MAN
  V/S CTL..... AS RQRD

  Use V/S CTL pb to set the outflow valve opening to 50 %.

  OUTFLOW VALVE HALF OPEN.....CHECK

  The outflow valve opening is limited to 50 %, to prevent the cabin air suction effect.

MAX FL.....100 or MSA

TAKEOFF

Limit the aircraft's rate of climb to about 500 ft/min.

CLIMB

Note: The EXCESS CAB ALT warning may occur.
Use the ECAM CLR pb to clear the warning.

DESCENT

Limit the aircraft's rate of descent to about 1 000 ft/min. Perform the final approach normally.

SYSTEMS

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

FAILURE OCCURRING IN FLIGHT

Apply the abnormal and emergency procedures required by ECAM.

FAILURE PRESENT AT DISPATCH

- **If flight with both packs inoperative:**

PACK 1 and 2.....OFF
RAM AIR..... ON

Note: If the "AVIONICS SMOKE" procedure has to be applied, the following flight time limitations have to be considered to protect the avionic equipment :
At ISA +40 : 0.5 h
At ISA +30 : 1.5 h
At ISA +20 : 4 h
At ISA +10 and below : No limitation.

MAX FL.....100 or MSA

Between FL 80 and FL 150, oxygen must be provided for 2 % of the passengers. This is provided by the portable oxygen system. When it is no longer available, descend to FL 80. For performance at FL 80/250 kt : Use data for FL 100/LRC (Refer to PER-CRZ-CRT-30 LONG RANGE CRUISE - ISA) and increase fuel consumption by 6 %.

- **If both CAB PRESS systems are inoperative, or if there is structural damage:**

TEST OF THE MANUAL OPERATION OF THE OUTFLOW VALVE ON GROUND:

PACK 1 pb-sw and PACK 2 pb-sw..... OFF
OUTFLOW VALVE FULLY OPEN.....CHECK

Check that the outflow valve is fully open on the CAB PRESS SD page

RPCU C/B (X23 ON 122VU)..... PULL
MODE SEL pb ..... MAN
MAN V/S CTL..... DN

Check that the outflow valve is fully open on the CAB PRESS SD page

MAN V/S CTL..... UP

Check that the outflow valve is fully open on the CAB PRESS SD page

MODE SEL pb ..... AUTO
RPCU C/B (X23 ON 122VU)..... PUSH
PACK 1 pb-sw and PACK 2 pb-sw..... ON
MAX FL..... 100 or MSA

Between FL 80 and FL 150, oxygen must be provided for 2 % of the passengers. This is provided by the portable oxygen system. When it is no longer available, descend to FL 80. For performance at FL 80/250 kt : Use data for FL 100/LRC (Refer to PER-CRZ-CRT-30 LONG RANGE CRUISE - ISA) and increase fuel consumption by 6 %.

TAKEOFF

Limit the aircraft's rate of climb to about 500 ft/min.

- **If both CAB PRESS systems one inoperative, or if there is structural damage:**
  - **WHEN IN CLEAN CONFIGURATION:**

MODE SEL pb ..... MAN
V/S CTL sw ..... AS RQRD

Use V/S CTL pb to set the outflow valve opening to 50 %.

OUTFLOW VALVE HALF OPEN..... CHECK

The outflow valve opening is limited to 50 %, to prevent the cabin air suction effect.

CLIMB

Note: The EXCESS CAB ALT warning may occur.
Use the ECAM CLR pb to clear the warning.

DESCENT

Limit the aircraft's rate of descent to about 1 000 ft/min. Perform the final approach normally.

PERFORMANCE DATA

Applicable to: ALL 320

The following table enables the fuel consumption and the time needed from takeoff to landing to be determined in case of flight without cabin pressurization.

The table is established for :
- Takeoff
- Climb from 1 500 ft at 250 kt
- Long range cruise speed at FL 100
- Descent to 1 500 ft at 250 kt
- Approach and landing : IMC procedure 120 kg or 260 lb (6 min)
- ISA temperature
- CG = 25 %
- Normal air conditioning
- Anti ice OFF

The table (*Refer to PRO-SPO-20 Ground Distance/Air Distance Conversion*) gives the conversion from ground distance to air distance

Note: *For each degree Celcius above ISA temperature apply a correction of 0.01 (kg/°C/NM) or 0.022 (lb/°C/NM).*

PERFORMANCE DATA

Applicable to: ALL 321

The following table enables the fuel consumption and the time needed from takeoff to landing to be determined in case of flight without cabin pressurization.

The table is established for :
- Takeoff
- Climb from 1 500 ft at 250 kt
- Long range cruise speed at FL 100
- Descent to 1 500 ft at 250 kt
- Approach and landing : IMC procedure 140 kg or 310 lb (6 min)
- ISA temperature
- CG = 25 %
- Normal air conditioning
- Anti ice OFF

The table (*Refer to PRO-SPO-20 Ground Distance/Air Distance Conversion*) gives the conversion from ground distance to air distance

Note: *For each degree Celcius above ISA temperature apply a correction of 0.01 (kg/°C/NM) or 0.022 (lb/°C/NM).*

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING

Applicable to: ALL 320

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250 KT - CRUISE : LONG RANGE - DESCENT : 250KT
IMC PROCEDURE : 120 KG (6MIN)

FL 100

NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG = 25.0%		FUEL CONSUMED (KG) TIME (H.MIN)		
AIR DIST. (NM)	INITIAL WEIGHT (1000KG)						
	50	**55**	**60**	**65**	**70**	**75**	**80**
220	1883 0.55	1955 0.54	2033 0.53	2119 0.53	2211 0.52	2306 0.50	2392 0.50
240	2025 0.59	2103 0.58	2187 0.57	2279 0.57	2378 0.55	2480 0.54	2571 0.53
260	2166 1.04	2251 1.02	2341 1.01	2440 1.00	2545 0.59	2653 0.57	2750 0.56
280	2307 1.08	2399 1.07	2495 1.05	2600 1.04	2711 1.03	2827 1.01	2928 0.59
300	2448 1.13	2546 1.11	2649 1.09	2760 1.08	2878 1.07	3000 1.04	3106 1.02
320	2589 1.17	2693 1.15	2802 1.13	2919 1.12	3044 1.10	3173 1.07	3284 1.06
340	2729 1.21	2840 1.19	2956 1.17	3079 1.16	3210 1.14	3345 1.11	3462 1.09
360	2870 1.26	2987 1.24	3109 1.21	3238 1.20	3376 1.18	3518 1.14	3640 1.12
380	3010 1.30	3133 1.28	3262 1.26	3397 1.24	3542 1.22	3690 1.18	3818 1.15
400	3150 1.35	3279 1.32	3414 1.30	3556 1.28	3707 1.25	3862 1.21	3995 1.19
420	3290 1.39	3426 1.36	3567 1.34	3714 1.32	3872 1.29	4034 1.25	4173 1.22
440	3429 1.44	3572 1.40	3719 1.38	3872 1.36	4037 1.33	4205 1.28	4350 1.25
460	3569 1.48	3717 1.45	3871 1.42	4031 1.39	4202 1.37	4376 1.32	4527 1.29
480	3708 1.53	3863 1.49	4023 1.46	4188 1.43	4367 1.41	4547 1.35	4704 1.32
500	3847 1.57	4008 1.53	4175 1.50	4346 1.47	4531 1.44	4718 1.39	4880 1.35
520	3986 2.01	4153 1.57	4326 1.54	4503 1.51	4695 1.48	4889 1.42	5057 1.38
540	4125 2.06	4298 2.02	4478 1.58	4661 1.55	4859 1.52	5059 1.46	5233 1.42
560	4264 2.10	4443 2.06	4629 2.02	4818 1.59	5023 1.56	5229 1.49	5410 1.45
580	4402 2.15	4588 2.10	4780 2.06	4974 2.03	5187 1.59	5399 1.53	5586 1.48
600	4541 2.19	4733 2.15	4931 2.10	5131 2.07	5350 2.03	5568 1.57	5762 1.52
620	4679 2.24	4877 2.19	5081 2.14	5288 2.11	5513 2.07	5738 2.00	5938 1.55
640	4817 2.28	5021 2.23	5232 2.19	5444 2.15	5676 2.11	5907 2.04	6113 1.58
660	4955 2.33	5165 2.27	5382 2.23	5600 2.19	5839 2.15	6076 2.07	6289 2.02
680	5092 2.37	5309 2.32	5532 2.27	5756 2.23	6001 2.19	6245 2.11	6464 2.05
700	5230 2.42	5452 2.36	5682 2.31	5912 2.27	6164 2.22	6413 2.15	6639 2.08
AIR CONDITIONING OFF △FUEL = – 1.5 %			**ENGINE ANTI ICE ON** △FUEL = + 3 %		**TOTAL ANTI ICE ON** △FUEL = + 6 %		

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING

Applicable to: ALL 321

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250 KT - CRUISE : LONG RANGE - DESCENT : 250KT
IMC PROCEDURE : 140 KG (6MIN)

FL 100

NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG = 25.0%		FUEL CONSUMED (KG) TIME (H.MIN)		
AIR DIST. (NM)	INITIAL WEIGHT (1000KG)						
	65	**70**	**75**	**80**	**85**	**90**	**95**
220	2318 0.52	2404 0.51	2488 0.50	2567 0.50	2647 0.49	2729 0.48	2819 0.49
240	2494 0.56	2586 0.54	2674 0.54	2758 0.53	2842 0.52	2927 0.51	3021 0.52
260	2670 1.00	2767 0.58	2860 0.57	2949 0.56	3038 0.55	3126 0.54	3222 0.55
280	2845 1.03	2948 1.01	3047 1.00	3140 1.00	3233 0.58	3324 0.57	3423 0.58
300	3020 1.07	3129 1.05	3232 1.04	3330 1.03	3428 1.02	3523 1.00	3624 1.01
320	3195 1.11	3309 1.09	3418 1.07	3521 1.06	3622 1.05	3721 1.03	3825 1.04
340	3370 1.15	3490 1.12	3604 1.11	3711 1.10	3817 1.08	3919 1.06	4026 1.07
360	3545 1.19	3670 1.16	3789 1.14	3901 1.13	4012 1.11	4117 1.09	4226 1.09
380	3720 1.23	3850 1.19	3975 1.17	4091 1.16	4206 1.14	4315 1.12	4427 1.12
400	3894 1.26	4030 1.23	4160 1.21	4281 1.19	4400 1.18	4513 1.15	4627 1.15
420	4068 1.30	4209 1.27	4345 1.24	4471 1.23	4594 1.21	4711 1.18	4827 1.18
440	4242 1.34	4389 1.30	4529 1.28	4660 1.26	4788 1.24	4908 1.21	5028 1.21
460	4416 1.38	4568 1.34	4714 1.31	4849 1.29	4981 1.28	5106 1.24	5228 1.24
480	4589 1.42	4747 1.38	4898 1.35	5038 1.33	5175 1.31	5303 1.27	5428 1.27
500	4763 1.46	4926 1.41	5082 1.38	5227 1.36	5368 1.34	5501 1.30	5627 1.30
520	4936 1.49	5104 1.45	5266 1.42	5416 1.39	5562 1.38	5698 1.33	5827 1.33
540	5109 1.53	5283 1.49	5450 1.45	5605 1.43	5755 1.41	5895 1.36	6027 1.36
560	5281 1.57	5461 1.52	5633 1.49	5793 1.46	5948 1.44	6092 1.39	6226 1.39
580	5454 2.01	5639 1.56	5817 1.52	5981 1.49	6140 1.48	6289 1.42	6426 1.42
600	5626 2.05	5817 2.00	6000 1.55	6169 1.53	6333 1.51	6486 1.45	6625 1.45
620	5799 2.09	5994 2.03	6183 1.59	6357 1.56	6525 1.54	6682 1.48	6824 1.48
640	5971 2.13	6172 2.07	6366 2.02	6545 1.59	6717 1.57	6879 1.51	7023 1.51
660	6142 2.17	6349 2.11	6548 2.06	6733 2.03	6909 2.01	7075 1.54	7222 1.54
680	6314 2.20	6526 2.14	6731 2.09	6920 2.06	7101 2.04	7272 1.57	7421 1.57
700	6485 2.24	6703 2.18	6913 2.13	7107 2.10	7292 2.07	7468 2.00	7620 2.00
AIR CONDITIONING OFF △FUEL = − 2 %			**ENGINE ANTI ICE ON** △FUEL = + 3.5 %		**TOTAL ANTI ICE ON** △FUEL = + 5.5 %		

GROUND DISTANCE/AIR DISTANCE CONVERSION

Applicable to: ALL 320

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
40	27	30	35	40	48	59	76
60	41	46	52	60	71	88	115
80	54	61	69	80	95	117	153
100	68	76	86	100	119	146	191
120	81	91	104	120	143	176	229
140	95	106	121	140	166	205	267
160	108	121	138	160	190	234	305
180	122	137	155	180	214	264	344
200	135	152	173	200	238	293	382
220	149	167	190	220	261	322	420
240	163	182	207	240	285	352	458
260	176	197	224	260	309	381	496
280	190	213	242	280	333	410	534
300	203	228	259	300	357	439	573
320	217	243	276	320	380	469	611
340	230	258	293	340	404	498	649
360	244	273	311	360	428	527	687
380	257	288	328	380	452	557	725
400	271	304	345	400	475	586	763
420	285	319	362	420	499	615	802
440	298	334	380	440	523	645	840
460	312	349	397	460	547	674	878
480	325	364	414	480	571	703	916
500	339	380	432	500	594	732	954
520	352	395	449	520	618	762	992
540	366	410	466	540	642	791	1031
560	379	425	483	560	666	820	1069
580	393	440	501	580	689	850	1107
600	406	455	518	600	713	879	1145

GROUND DISTANCE/AIR DISTANCE CONVERSION

Applicable to: ALL 321

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND			WIND COMPONENTS (KT)			HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
40	27	31	35	40	47	58	74
60	41	46	52	60	71	87	112
80	55	61	69	80	95	116	149
100	68	76	87	100	118	145	186
120	82	92	104	120	142	173	223
140	96	107	121	140	166	202	260
160	109	122	139	160	189	231	298
180	123	138	156	180	213	260	335
200	137	153	173	200	236	289	372
220	150	168	191	220	260	318	409
240	164	183	208	240	284	347	446
260	178	199	225	260	307	376	484
280	191	214	243	280	331	405	521
300	205	229	260	300	355	434	558
320	219	245	277	320	378	463	595
340	232	260	295	340	402	492	633
360	246	275	312	360	426	520	670
380	260	290	329	380	449	549	707
400	274	306	347	400	473	578	744
420	287	321	364	420	497	607	781
440	301	336	381	440	520	636	819
460	315	352	399	460	544	665	856
480	328	367	416	480	567	694	893
500	342	382	433	500	591	723	930
520	356	397	451	520	615	752	967
540	369	413	468	540	638	781	1005
560	383	428	485	560	662	810	1042
580	397	443	503	580	686	839	1079
600	410	459	520	600	709	867	1116

GENERAL

Applicable to: ALL

This Chapter applies to dispatch with landing gear down. However, the limitations and inflight performance also apply in case of an inflight landing gear retraction failure.
Revenue flight is permitted, with the landing gear down and the gear doors closed, in the conditions stated below.

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LIMITATIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

- Do not fly into expected icing conditions.
- Ditching with the landing gear down has not been demonstrated.
- Disregard FM fuel predictions. Other predictions should also be disregarded (altitude, speed and time), except time predictions at waypoints when in cruise.
- Do not use managed speed (except in approach) and CLB and DES autopilot modes.
- ALTITUDE ALERT is not available.
- The APU must run during the whole flight. APU GEN must be available.
- Select TCAS "TA only" mode.

LIMITATIONS

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

- Do not fly into expected icing conditions.
- Ditching with the landing gear down has not been demonstrated.
- Disregard FM fuel predictions. Other predictions should also be disregarded (altitude, speed and time), except time predictions at waypoints when in cruise.
- Do not use managed speed (except in approach) and CLB and DES autopilot modes.
- ALTITUDE ALERT is not available.
- Select TCAS "TA only" mode.

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PREFLIGHT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

- VMO/MMO with the landing gear down is 235 kt/M .60. In the avionics compartment, on 188 VU, the VMO-MMO switch must be set to the "L/G DOWN" position.
- The check of ELAC 2 standby power supply availability, in case of BLUE hydraulic pressure loss must be performed during cockpit preparation, if not already done by maintenance. This ensures that, if the crew forgets to reset the LGCIU 1C/B during approach in EMER ELEC configuration, ELAC 2 will be supplied by Battery 2, should the RAT stall during flare.

YELLOW ELEC PUMP.....ON
PTU.....Check AUTO
BLUE PUMP OVRD.....ON
LGCIU 1 C/B (C09).....PULL
LGCIU/SYS 1/GND SPLY (Q34 if installed).....PULL

This simulates the L/G in retracted position.
Check that the "ELAC 2" indication is green on the ECAM F/CTL page.

ELAC 2/NORM/SPLY (R20 on rear panel).....PULL

Check that the ELAC 2 indication changes to amber.

THS ACTR/MOT 1 (Q16 on rear panel).....PULL

This simulates the EMER ELEC configuration.
Check that the ELAC 2 indication is again green for about 30 s, and that it then changes to amber.

BLUE ELEC PUMP OVRD.....OFF

This simulates a RAT stall in EMER ELEC configuration.

- *BLUE hydraulic system is depressurized.*
- *Check ELAC 2 indication changes to green.*

C/Bs.....RESET

Reset	*LGCIU 1 C/B :*	*C09,*
		Q34 (if installed)
	ELAC 2 C/B :	*R20*
THS ACTR/MOT 1 C/B :		*Q16*

YELLOW ELEC PUMP.....OFF

PREFLIGHT

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

VMO/MMO with the landing gear down is 235 kt/M .60. In the avionics compartment, on 188 VU, the VMO-MMO switch must be set to the "L/G DOWN" position.

NORMAL PROCEDURES

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

- **After engine start :**

  APU.....KEEP ON

  Keep the APU running for the duration of the flight.

ABN AND EMER PROCEDURES

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

FLIGHT CONTROLS

Failure cases, which would normally lead to ALTN law, will degrade F/CTL laws down to DIRECT law, if the landing gear is extended.

ALL GENERATOR FAILURE

- **The aircraft is supplied by batteries only.**

  To recover the emergency generator

  LGCIU 1 C/B (C09).....PULL
  EMER ELEC PWR.....MAN ON

CAUTION	*Minimum speed is 180 kt instead of 140 kt given by ECAM.*

- **During deceleration (before reaching 200 kt) :**

  LGCIU 1 C/B (C09).....PUSH

  Emergency generator will be deactivated.
  Minimum speed is 140 kt.

ABN AND EMER PROCEDURES (CONT'D)

- **In case of go-around, when above 200 kt**

  LGCIU 1 C/B (C09).....PULL
  EMER ELEC PWR.....MAN ON

FAILURE OF BOTH ENGINES

When both engines are failed, to ease the handling of all the different ECAM procedures resulting from this all engine flame out situation, it is recommended to use the ENG DUAL FAILURE QRH paper procedure, and if time permits, to clear the ECAM.
Follow all the steps of the QRH paper procedure, except those that are modified by the procedure below :

- **If APU is available** : perform an assisted relight when below FL 200.
- **If APU is not available**
  - Do not attempt to start the APU (APU start is inhibited in this configuration)
  - Windmilling relight can be performed, as long as the speed is above 260 kt (corresponding N2 above 18 %). In this case, increase aircraft speed and disregard VMO warning.
  - Flight controls are in direct laws. Use manual pitch trim as necessary (not indicated on PFD if APU GEN not available).
  - Do not use LGCIU 1 C/B.
- **In approach, above 200 kt :**
  FLAPS 1..... SELECT
  Set FLAPS 1 above 200 kt to avoid RAT stall.
- **For landing :**
  FOR LDG..... USE FLAPS 1
  APPR SPD..... VREF + 25 kt / 150 kt
  The approach speed is the maximum between Vref + 25 kt / 150 kt

AVIONICS SMOKE

If smoke persists more than 5 min, the LGCIU 1 C/B (C09 on 49 VU) must be pulled before RAT extension. Minimum speed is 180 kt (instead of 140 kt given by ECAM).
During approach :

GEN 2..... ON
EMER ELEC GEN 1 LINE..... ON
LGCIU 1 C/B (C09 on 49 VU)..... PUSH

ABN AND EMER PROCEDURES

Applicable to: ALL 321, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

FLIGHT CONTROLS

Failure cases, which would normally lead to ALTN law, will degrade F/CTL laws down to DIRECT law, if the landing gear is extended.

FAILURE OF BOTH ENGINES

When both engines are failed, to ease the handling of all the different ECAM procedures resulting from this all engine flame out situation, it is recommended to use the ENG DUAL FAILURE QRH paper procedure, and if time permits, to clear the ECAM.
Follow all the steps of the QRH paper procedure, except those that are modified by the procedure below :

■ **If APU is not available**

- Attempt an APU start
- . If APU start is unsuccessful, a windmilling relight can be performed, as long as the speed is above 260 kt (corresponding N2 above 18 %). In this case, increase the aircraft speed and disregard VMO warning.

■ **If APU is available** : perform an assisted relight, when below FL 200.

- Flight controls are in direct laws. Use manual pitch trim as necessary (not indicated on PFD if APU GEN not available).

GENERAL

Applicable to: ALL

Consider the increase in drag to determine the takeoff weight and fuel consumption.
CONF 1 + F is the recommended takeoff configuration.

Note: *Takeoff with tail wind is not recommended.*

Penalties on takeoff performance affect second segment gradient condition, final takeoff condition and en-route conditions. The takeoff weight to be retained is the most limiting of these three conditions.

SECOND SEGMENT GRADIENT CONDITION

Applicable to: ALL 321

The RTOW charts or the quick reference tables give the basic information for normal takeoff. To simplify, a constant weight reduction is applied whatever the limitation. This weight reduction covers the most critical case presented for flying over an obstacle.

Takeoff configuration	1 + F	2	3
Weight reduction	21 %	19 %	17 %

METHOD

Use the RTOW chart or the quick-reference tables to define the maximum takeoff weight for the conditions on the airport (temperature, pressure, wind, runway...), then apply the above weight reduction.

SECOND SEGMENT GRADIENT CONDITION

Applicable to: ALL 320

The RTOW charts or the quick reference tables give the basic information for normal takeoff. To simplify, a constant weight reduction is applied whatever the limitation. This weight reduction covers the most critical case presented for flying over an obstacle.

Takeoff configuration	1 + F	2	3
Weight reduction	22 %	18 %	18 %

METHOD

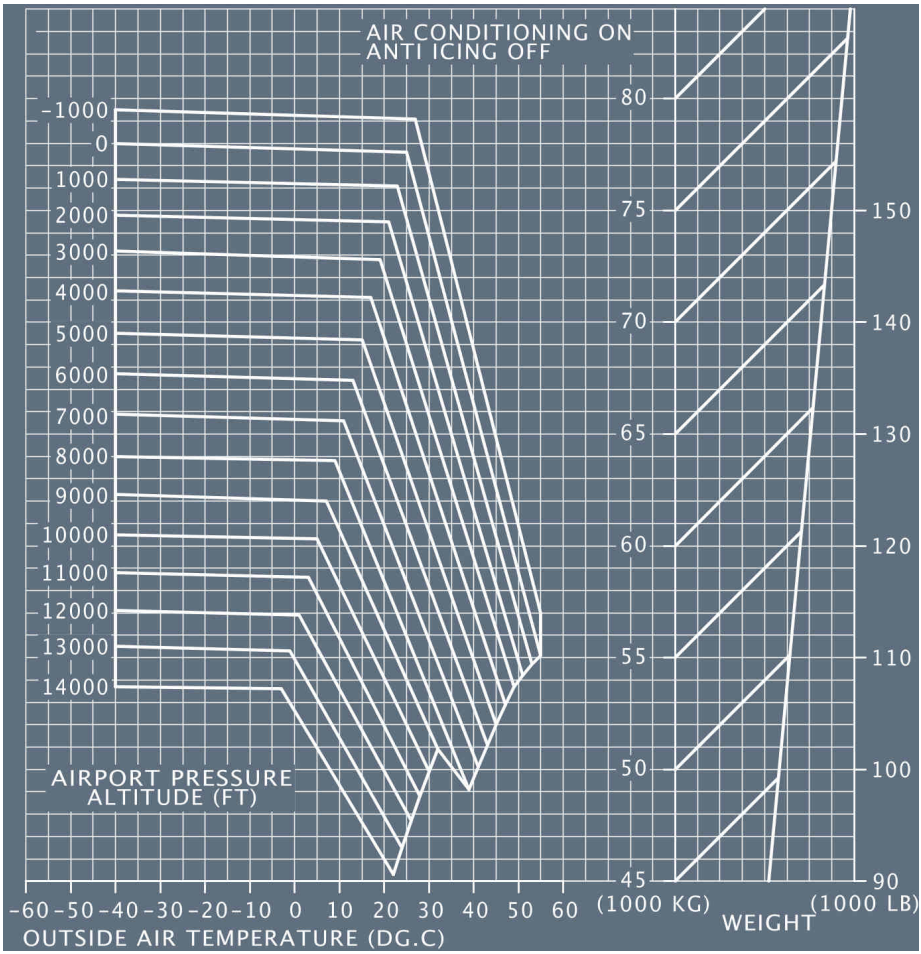
Use the RTOW chart or the quick-reference tables to define the maximum takeoff weight for the conditions on the airport (temperature, pressure, wind, runway...), then apply the above weight reduction.

FINAL TAKEOFF CONDITION

Applicable to: ALL 321

The final takeoff speed is VLS.

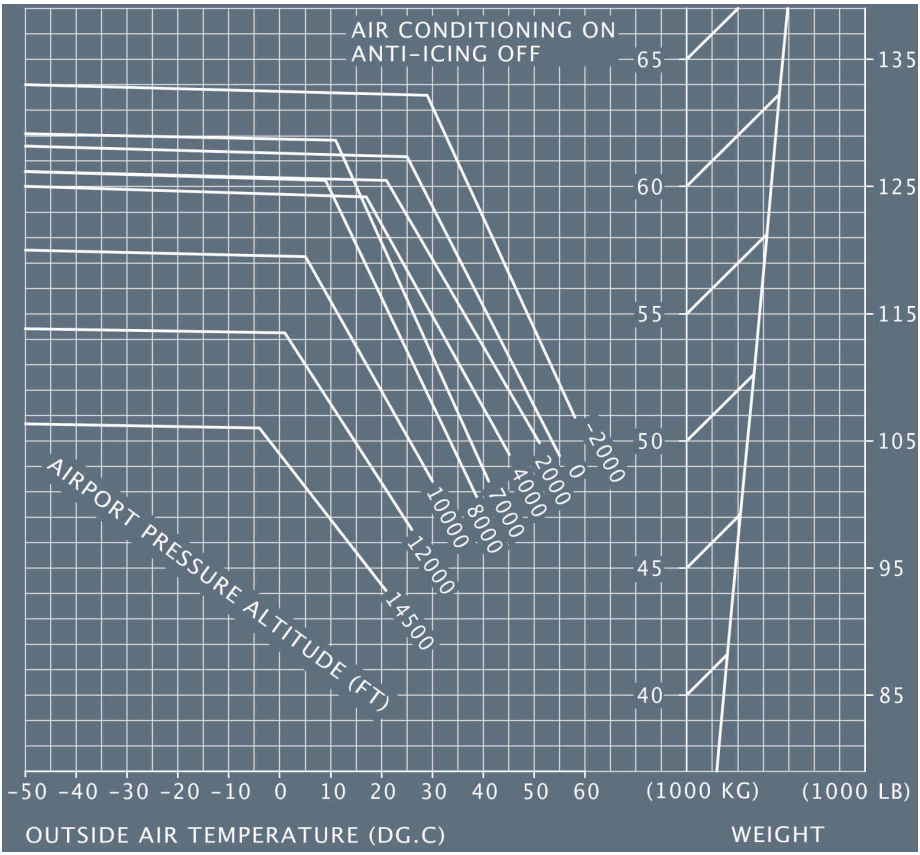
Use the graph below to determine the maximum takeoff weight associated with the final takeoff condition.



FINAL TAKEOFF CONDITION

Applicable to: ALL 320

The final takeoff speed is VLS.
Use the graph below to determine the maximum takeoff weight associated with the final takeoff condition. This graph is established for 25 % CG location.
In case of forward CG the weight must be decreased by 600 kg (1 350 lb).



EN ROUTE CONDITION

Applicable to: ALL

Retain the lowest weight according to the most limiting condition (second segment or final takeoff). Use the en route net flight path (*Refer to PRO-SPO-25-40 En Route Net Flight Plan*) to check that in case of engine failure the aircraft can clear the terrain on the route by 1 000 ft (climbing) or 2 000 ft (descending). If necessary, reduce the takeoff weight. Read the speeds corresponding to this weight in the RTOW chart or in the quick reference tables.

GO AROUND PERFORMANCE

Applicable to: ALL 320

Refer to PER-GOA-GEN GENERAL for go-around requirements.
Further decrease the basic limiting weight by 15 %.

GO AROUND PERFORMANCE

Applicable to: ALL 321

Refer to PER-GOA-GEN GENERAL for go-around requirements.
Further decrease the basic limiting weight by 12 %.

FLIGHT PLANNING

Applicable to: ALL

Note: *The performance tables are established at ISA. For each degree Celsius above ISA temperature and per NM of air distance apply a fuel correction of 0.05 kg/°C/NM (0.11 lb/°C/NM).*

CLIMB

Climb at 230 kt/M 0.50 with both engines at maximum climb thrust. The table (*Refer to PRO-SPO-25-40 Climb*) gives the time, distance and fuel consumption according to takeoff weight.

CRUISE/DESCENT

The recommended cruise/descent speed is 230 kt/M 0.50.
The ceiling on one engine may be a limiting factor, and the choice of the route should reflect this concern.

ENGINE FAILURE

In case of engine failure, the airplane will drift down to the ceiling shown (*Refer to PRO-SPO-25-40 Gross Ceilings at Long Range and Green Dot Speeds - One Engine Out*).
The thrust for drift down will be Maximum Continuous.

The drift down speed is equal to green dot speed.

HOLDING

For the holding parameters with slats out, this configuration being the least penalizing for holding:
Refer to PRO-SPO-25-40 Race Track Holding Pattern.

CLIMB

Applicable to: ALL 320

CLIMB 230KT/M.50 - ALL ENGINES - L/G DOWN

MAX. CLIMB THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=25.0%

FROM BRAKE RELEASE
TIME (MIN) FUEL (KG)
DISTANCE (NM) TAS (KT)

	WEIGHT AT BRAKE RELEASE (1000KG)								
FL	50	52	54	56	58	60	62	64	66
290	22 1759 104 280	24 1889 113 281	26 2037 123 281	29 2206 135 282	31 2404 148 283				
270	20 1604 91 277	21 1713 98 278	23 1835 105 279	24 1972 114 280	27 2129 124 281	29 2314 137 282	32 2532 151 283		
250	17 1456 79 274	18 1550 84 275	20 1651 90 276	21 1763 97 277	23 1890 105 277	25 2036 114 278	27 2206 125 279	29 2404 137 280	
240	16 1384 73 272	17 1469 78 273	18 1562 83 274	20 1664 89 275	21 1778 96 275	23 1909 104 276	24 2058 113 277	27 2231 124 278	29 2433 136 280
220	14 1234 62 268	15 1306 66 268	16 1383 70 269	17 1466 74 269	18 1557 79 270	19 1661 85 271	20 1776 92 272	22 1906 99 273	24 2052 107 274
200	12 1082 51 261	12 1142 54 261	13 1205 57 262	14 1272 60 262	15 1345 64 263	16 1426 68 264	17 1515 73 264	18 1612 78 265	19 1719 84 266
180	10 921 40 251	10 969 42 251	11 1020 45 252	11 1073 47 252	12 1130 50 253	13 1193 53 253	13 1260 56 254	14 1332 59 255	15 1410 63 255
160	8 785 32 241	8 825 34 242	9 866 35 242	9 910 37 243	10 956 39 243	10 1006 41 244	11 1059 44 244	11 1115 46 245	12 1175 49 245
140	7 668 25 232	7 702 27 232	7 736 28 233	8 772 29 233	8 810 31 234	8 850 33 234	9 893 34 235	9 938 36 235	10 985 38 236
120	5 565 20 222	6 593 21 223	6 621 22 223	6 651 23 224	7 682 24 224	7 715 26 225	7 750 27 225	8 787 28 226	8 824 30 226
100	4 472 16 212	5 494 16 213	5 518 17 213	5 542 18 214	5 567 19 214	6 594 20 215	6 622 21 215	6 652 22 216	6 682 23 216
50	2 261 7 175	3 273 7 176	3 285 8 177	3 298 8 178	3 311 9 178	3 325 9 179	3 340 9 180	3 355 10 180	3 370 10 181
15	1 123 2 108	1 128 2 109	1 133 2 110	1 139 2 110	1 145 3 111	1 151 3 112	1 157 3 113	2 163 3 113	2 170 3 114

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CLIMB

Applicable to: ALL 321

CLIMB - 230KT/M.50 - ALL ENGINES - L/G DOWN

MAX. CLIMB THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=25.0%

FROM BRAKE RELEASE
TIME (MIN) **FUEL (KG)**
DISTANCE (NM) **TAS (KT)**

	WEIGHT AT BRAKE RELEASE (1000KG)								
FL	**58**	**62**	**66**	**70**	**74**	**78**	**82**	**86**	**90**
290	24 2036 110 281	28 2396 133 283							
270	20 1826 94 279	24 2110 110 280	28 2482 133 282						
250	18 1642 80 275	20 1875 93 277	24 2166 109 279	28 2551 132 281					
240	16 1554 74 273	19 1765 85 275	22 2025 99 277	25 2358 118 279					
220	14 1384 63 268	16 1558 71 270	18 1766 82 271	21 2021 95 273	25 2349 113 276				
200	12 1218 52 262	13 1360 58 263	15 1525 66 264	17 1721 76 266	20 1959 87 268				
180	10 1045 41 253	11 1158 46 254	12 1286 52 255	14 1432 58 256	15 1601 65 257	17 1802 75 259	20 2048 86 261		
160	8 898 33 244	9 990 37 245	10 1093 41 246	11 1207 45 247	12 1337 51 248	14 1486 57 249	15 1660 64 251	17 1863 73 252	20 2101 83 254
140	7 772 27 235	7 848 29 236	8 932 32 237	9 1024 36 238	10 1127 40 239	11 1243 44 240	12 1376 49 242	14 1526 55 243	15 1695 62 244
120	6 659 21 226	6 722 23 227	7 790 26 228	7 865 28 229	8 948 31 230	9 1039 34 231	10 1142 38 233	11 1257 42 234	12 1384 47 235
100	5 555 17 217	5 606 18 217	5 662 20 218	6 722 22 220	7 788 24 221	7 860 26 222	8 940 29 223	9 1029 32 224	9 1125 36 226
50	2 320 7 182	3 347 8 183	3 375 9 184	3 406 10 186	3 439 11 187	4 475 12 189	4 513 13 190	4 555 14 192	5 599 15 194
15	1 166 2 118	1 178 2 118	1 191 3 119	1 204 3 121	2 218 3 122	2 233 3 124	2 248 4 126	2 264 4 128	2 280 4 130

CRUISE

Applicable to: ALL 320

CRUISE - 230KT/M.50 - ALL ENGINES - L/G DOWN

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=25.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL200		FL220		FL240		FL270		FL290	
48	1.162	.417	1.320	.500	1.329	.500	1.340	.500	1.366	.500	1.390	.500
	1864	230	1849	228	1717	219	1599	210	1453	197	1370	188
	71.3	266	83.1	307	88.7	305	94.5	302	102.7	298	108.0	296
50	1.164	.417	1.323	.500	1.333	.500	1.347	.500	1.376	.500	1.402	.500
	1880	230	1861	228	1731	219	1618	210	1475	197	1396	188
	70.7	266	82.5	307	88.0	305	93.4	302	101.2	298	106.0	296
52	1.166	.417	1.327	.500	1.338	.500	1.354	.500	1.386	.500	1.414	.500
	1897	230	1874	228	1747	219	1639	210	1499	197	1422	188
	70.1	266	81.9	307	87.2	305	92.2	302	99.5	298	104.0	296
54	1.168	.417	1.331	.500	1.344	.500	1.362	.500	1.397	.500	1.427	.500
	1914	230	1888	228	1766	219	1660	210	1525	197	1449	188
	69.5	266	81.3	307	86.3	305	91.0	302	97.8	298	102.1	296
56	1.171	.417	1.336	.500	1.351	.500	1.370	.500	1.408	.500	1.440	.500
	1934	230	1904	228	1786	219	1682	210	1551	197	1478	188
	68.8	266	80.7	307	85.3	305	89.8	302	96.2	298	100.1	296
58	1.174	.417	1.341	.500	1.358	.500	1.378	.500	1.419	.500		
	1957	230	1922	228	1808	219	1706	210	1578	197		
	67.9	266	79.9	307	84.3	305	88.6	302	94.6	298		
60	1.177	.417	1.347	.500	1.365	.500	1.388	.500				
	1982	230	1942	228	1830	219	1731	210				
	67.1	266	79.1	307	83.3	305	87.3	302				
62	1.180	.417	1.353	.500	1.373	.500						
	2009	230	1963	228	1852	219						
	66.2	266	78.2	307	82.2	305						
64	1.184	.417	1.360	.500								
	2036	230	1985	228								
	65.3	266	77.4	307								
66	1.187	.417										
	2064	230										
	64.4	266										
68	1.191	.417										
	2084	230										
	63.8	266										

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CRUISE

Applicable to: ALL 321

CRUISE - 230KT/M.50 - ALL ENGINES - L/G DOWN

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=25.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL180		FL200		FL220		FL240		FL270	
50	1.189	.417	1.332	.485	1.372	.500	1.384	.500	1.401	.500	1.435	.500
	1939	230	1934	230	1912	228	1782	219	1669	210	1525	197
	68.6	266	77.7	300	80.3	307	85.5	305	90.5	302	97.8	298
54	1.194	.417	1.341	.485	1.382	.500	1.398	.500	1.419	.500	1.459	.500
	1964	230	1963	230	1943	228	1821	219	1715	210	1579	197
	67.7	266	76.5	300	79.0	307	83.6	305	88.1	302	94.5	298
58	1.200	.417	1.352	.485	1.395	.500	1.414	.500	1.438	.500	1.485	.500
	1997	230	2001	230	1983	228	1867	219	1764	210	1639	197
	66.6	266	75.0	300	77.5	307	81.6	305	85.6	302	91.0	298
62	1.209	.417	1.365	.485	1.409	.500	1.432	.500	1.460	.500	1.515	.500
	2039	230	2044	230	2027	228	1916	219	1820	210	1710	197
	65.2	266	73.5	300	75.8	307	79.5	305	83.0	302	87.3	298
66	1.219	.417	1.379	.485	1.425	.500	1.451	.500	1.483	.500		
	2085	230	2091	230	2075	228	1969	219	1881	210		
	63.8	266	71.8	300	74.0	307	77.4	305	80.3	302		
70	1.229	.417	1.394	.485	1.442	.500	1.471	.500				
	2134	230	2141	230	2127	228	2029	219				
	62.3	266	70.1	300	72.2	307	75.1	305				
74	1.240	.417	1.410	.485								
	2185	230	2195	230								
	60.8	266	68.4	300								
78	1.251	.417	1.427	.485								
	2239	230	2252	230								
	59.4	266	66.7	300								
82	1.263	.417										
	2286	230										
	58.1	266										

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DESCENT

Applicable to: ALL 320

DESCENT - M.50/230KT - ALL ENGINES - L/G DOWN									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=25.0%		MAXIMUM CABIN RATE OF DESCENT 350FT/MIN				
WEIGHT (1000KG)	45				55				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	IAS (KT)
290	7.6	83	35	IDLE	8.9	97	41	IDLE	188
270	7.0	77	32	IDLE	8.2	91	38	IDLE	197
250	6.4	72	29	IDLE	7.6	84	34	IDLE	205
240	6.2	69	28	IDLE	7.3	81	33	IDLE	210
220	5.7	64	25	IDLE	6.7	76	30	IDLE	219
200	5.2	59	23	IDLE	6.2	70	27	IDLE	228
180	4.7	55	21	IDLE	5.6	64	25	IDLE	230
160	4.2	49	18	IDLE	5.0	58	22	IDLE	230
140	3.7	43	16	IDLE	4.3	51	19	IDLE	230
120	3.1	37	13	IDLE	3.7	44	16	IDLE	230
100	2.6	31	11	IDLE	3.0	36	13	IDLE	230
50	1.1	14	4	IDLE	1.3	16	5	IDLE	230
15	.0	0	0	IDLE	.0	0	0	IDLE	230

DESCENT

Applicable to: ALL 321

DESCENT - M.50/230KT - ALL ENGINES - L/G DOWN

IDLE THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=25.0%

MAXIMUM CABIN RATE OF DESCENT 350FT/MIN

WEIGHT (1000KG)	60				80				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	IAS (KT)
290	8.7	94	40	IDLE	10.0	108	46	IDLE	188
270	8.0	88	37	IDLE	9.3	102	43	IDLE	197
250	7.4	82	34	IDLE	8.6	95	39	IDLE	205
240	7.1	79	32	IDLE	8.3	92	38	IDLE	210
220	6.5	74	29	IDLE	7.6	86	34	IDLE	219
200	6.0	68	27	IDLE	7.0	80	31	IDLE	228
180	5.5	63	24	IDLE	6.4	73	28	IDLE	230
160	4.9	57	21	IDLE	5.7	66	25	IDLE	230
140	4.2	50	18	IDLE	4.9	58	21	IDLE	230
120	3.6	43	15	IDLE	4.2	50	18	IDLE	230
100	3.0	36	12	IDLE	3.4	42	14	IDLE	230
50	1.2	16	5	IDLE	1.5	18	6	IDLE	230
15	.0	0	0	IDLE	.0	0	0	IDLE	230

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RACE TRACK HOLDING PATTERN

Applicable to: ALL 320

RACE TRACK HOLDING PATTERN - S SPEED - ALL ENGINES - L/G DOWN								
MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=25.0%		EPR FF (KG/H/ENG)	
WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
46	1.060 1239	1.074 1245	1.100 1252	1.113 1249	1.129 1240	1.147 1237	1.166 1242	1.188 1249
48	1.064 1299	1.079 1306	1.107 1312	1.122 1303	1.138 1296	1.157 1295	1.177 1304	1.200 1310
50	1.069 1360	1.084 1367	1.115 1367	1.130 1357	1.148 1354	1.167 1358	1.188 1365	1.212 1370
52	1.073 1421	1.090 1429	1.122 1420	1.139 1413	1.157 1411	1.177 1421	1.199 1427	1.225 1424
54	1.078 1482	1.095 1489	1.130 1474	1.147 1471	1.166 1474	1.187 1482	1.211 1489	1.238 1478
56	1.082 1544	1.101 1549	1.138 1531	1.156 1528	1.175 1538	1.197 1544	1.222 1543	1.251 1533
58	1.087 1606	1.107 1609	1.146 1589	1.164 1590	1.184 1599	1.207 1608	1.234 1598	1.264 1590
60	1.092 1668	1.113 1665	1.154 1646	1.173 1656	1.194 1662	1.218 1664	1.246 1652	1.278 1643
62	1.097 1728	1.120 1720	1.161 1705	1.181 1717	1.203 1724	1.229 1718	1.258 1710	1.292 1696
64	1.102 1789	1.126 1774	1.169 1771	1.190 1779	1.213 1785	1.240 1772	1.271 1763	1.307 1749
66	1.107 1850	1.133 1829	1.177 1834	1.198 1842	1.223 1840	1.251 1829	1.283 1818	1.321 1801
68	1.113 1906	1.139 1887	1.185 1897	1.207 1906	1.233 1896	1.262 1886	1.296 1871	1.336 1853
70	1.119 1963	1.146 1944	1.193 1960	1.216 1963	1.243 1949	1.274 1940	1.310 1924	1.351 1907
72	1.124 2018	1.152 2001	1.201 2023	1.225 2019	1.254 2008	1.286 1994	1.323 1976	1.366 1961
74	1.130 2072	1.158 2059	1.209 2087	1.235 2075	1.264 2064	1.298 2048	1.337 2029	
76	1.136 2128	1.165 2124	1.218 2143	1.244 2128	1.275 2118	1.310 2101	1.351 2083	
78	1.141 2184	1.171 2191	1.226 2199	1.254 2187	1.286 2172	1.322 2153		

RACE TRACK HOLDING PATTERN

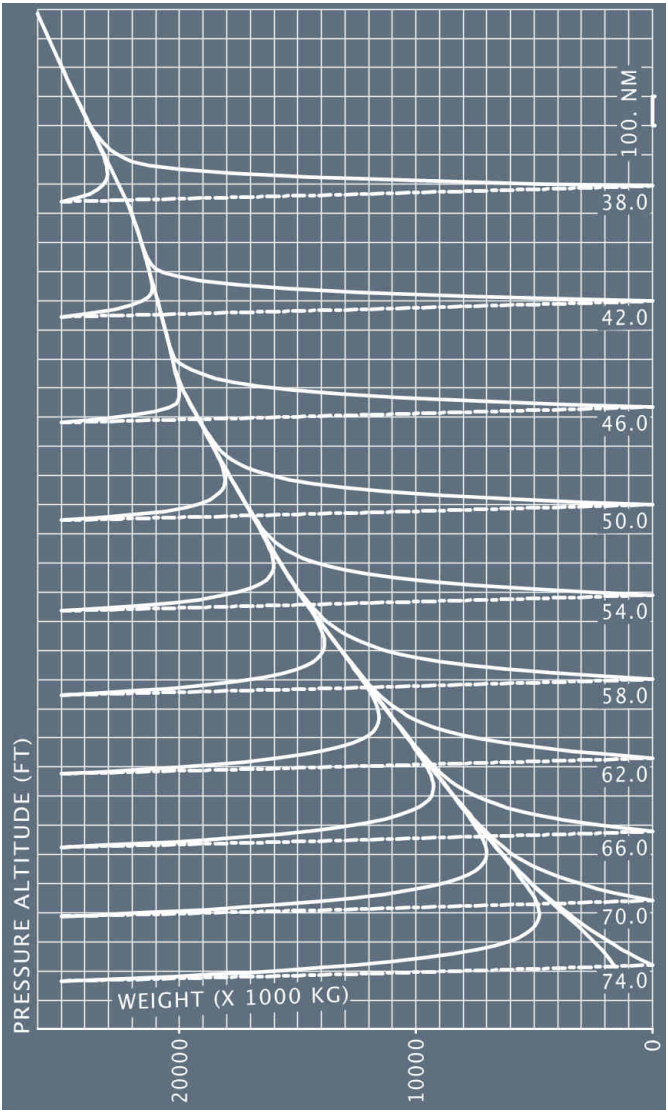
Applicable to: ALL 321

RACE TRACK HOLDING PATTERN - S SPEED - ALL ENGINES - L/G DOWN								
MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=25.0%		EPR FF (KG/H/ENG)	
WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
58	1.106 1692	1.127 1652	1.168 1638	1.188 1629	1.211 1619	1.239 1610	1.273 1599	1.312 1594
62	1.116 1780	1.140 1772	1.185 1752	1.207 1740	1.234 1732	1.266 1720	1.304 1713	1.347 1713
66	1.127 1899	1.154 1889	1.203 1863	1.228 1853	1.259 1842	1.295 1833	1.336 1829	1.383 1836
70	1.139 2021	1.168 2008	1.221 1976	1.251 1966	1.285 1955	1.324 1949	1.369 1956	1.419 1960
74	1.151 2139	1.182 2120	1.242 2090	1.274 2077	1.312 2070	1.354 2073	1.402 2078	1.457 2088
78	1.163 2260	1.196 2232	1.263 2202	1.299 2193	1.339 2190	1.384 2198	1.436 2206	
82	1.175 2373	1.211 2346	1.285 2316	1.324 2309	1.367 2318	1.415 2322		
86	1.188 2485	1.227 2462	1.308 2433	1.349 2435	1.395 2442			
90	1.201 2600	1.244 2578	1.332 2552	1.375 2563				
94	1.214 2717	1.262 2693	1.355 2683					

EN ROUTE NET FLIGHT PLAN

Applicable to: ALL 321

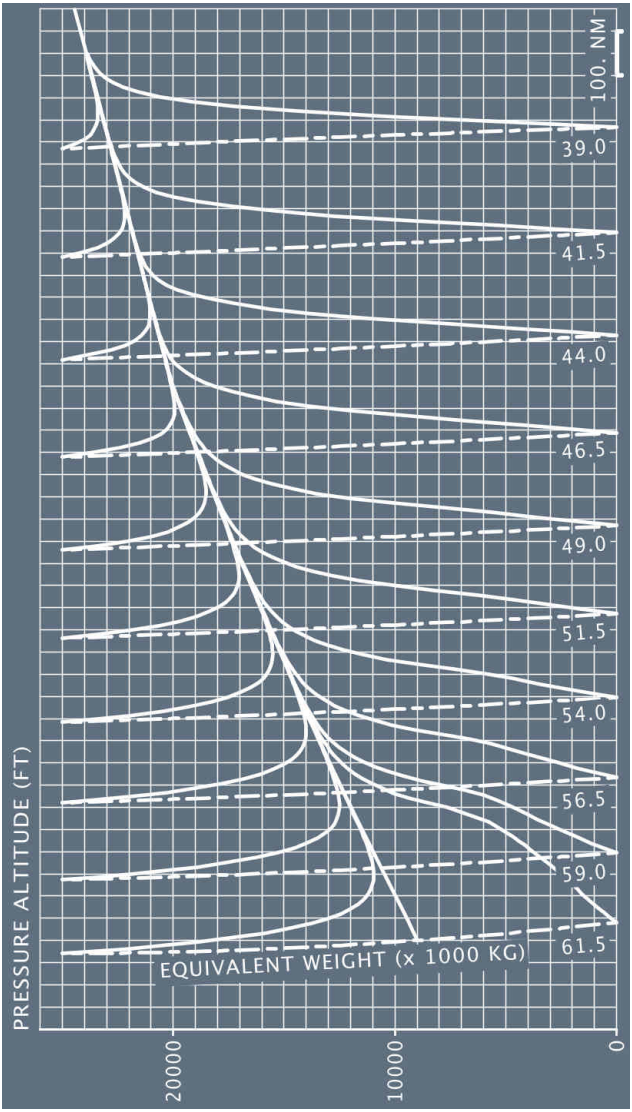
EN ROUTE NET FLIGHT PATH-L/G DOWN-ONE ENGINE OUT		
MAX. CONTINUOUS THRUST HIGH AIR CONDITIONING ANTI ICE OFF	ISA CG = 25 %	MINIMUM ENGINE


100. NM
38.0
42.0
46.0
50.0
54.0
58.0
62.0
66.0
70.0
74.0
PRESSURE ALTITUDE (FT)
WEIGHT (X 1000 KG)
20000
10000
0

EN ROUTE NET FLIGHT PLAN

Applicable to: ALL 320

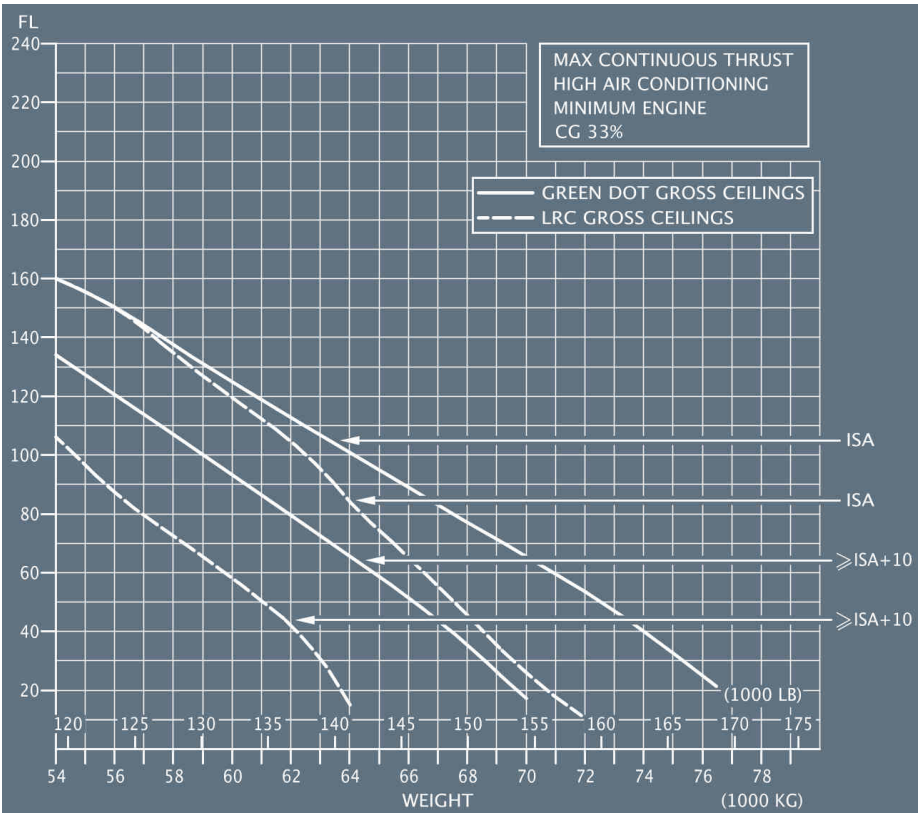
EN ROUTE NET FLIGHT PATH-L/G DOWN-ONE ENGINE OUT		
MAX. CONTINUOUS THRUST HIGH AIR CONDITIONING ANTI ICE OFF	ISA CG = 23 %	MINIMUM ENGINE


100. NM
39.0
41.5
44.0
46.5
49.0
51.5
54.0
56.5
59.0
61.5
PRESSURE ALTITUDE (FT)
EQUIVALENT WEIGHT (x 1000 KG)
20000
10000
0

GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS - ONE ENGINE OUT

Applicable to: ALL 321

1



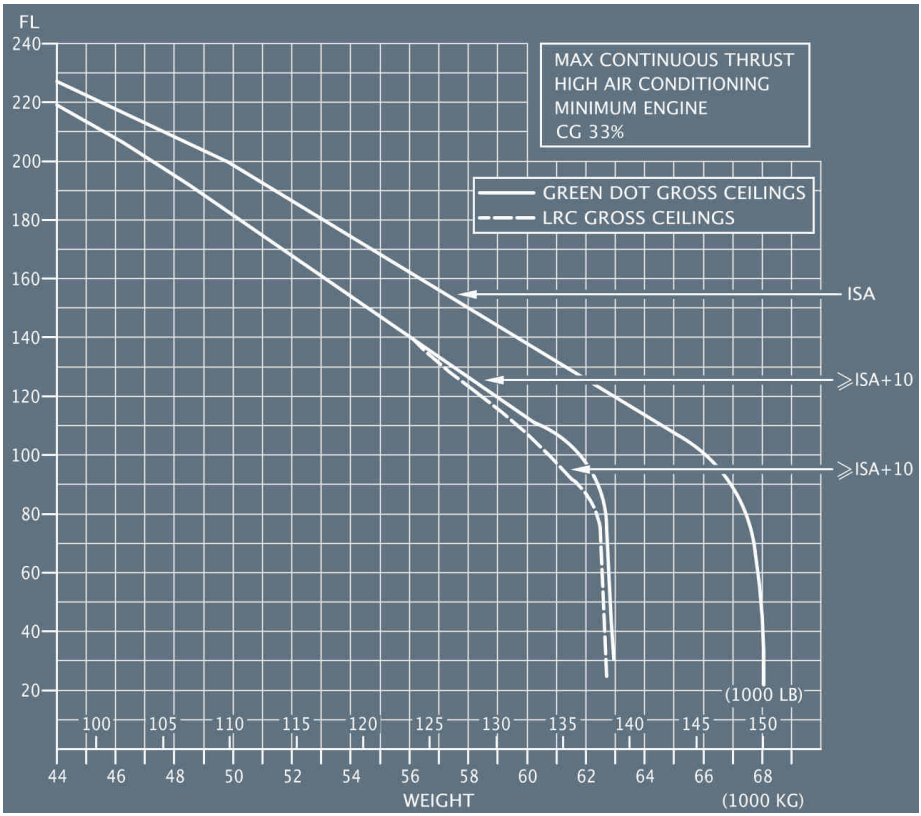
BLEED CORRECTIONS

		ISA	≥ISA +10
LONG RANGE	ENGINE ANTI ICE ON	-2 100 ft	-3 100 ft
	TOTAL ANTI ICE ON	-4 200 ft	-5 200 ft
GREEN DOT	ENGINE ANTI ICE ON	-1 500 ft	-1 900 ft
	TOTAL ANTI ICE ON	-2 600 ft	-3 200 ft

GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS - ONE ENGINE OUT

Applicable to: ALL 320

2



BLEED CORRECTIONS

		ISA	≥ISA +10
LONG RANGE	ENGINE ANTI ICE ON	-9 200 ft	-9 200 ft
	TOTAL ANTI ICE ON	-10 500 ft	-10 500 ft
GREEN DOT	ENGINE ANTI ICE ON	-1 200 ft	-1 600 ft
	TOTAL ANTI ICE ON	-9 100 ft	-9 700 ft

INTRODUCTION

Applicable to: ALL

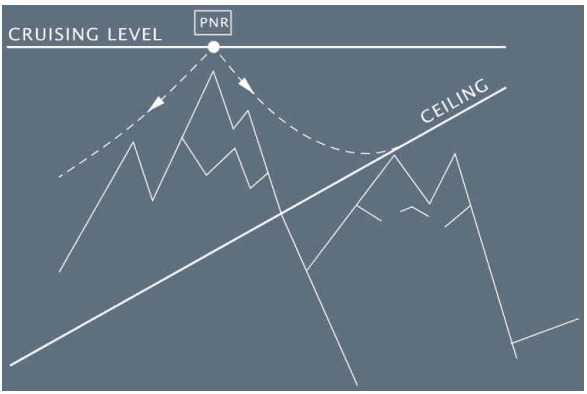
Two failures must be taken into consideration for en route obstacle clearance over mountainous area :

- Engine failure that forces a descent to a lower cruise level
- Depressurization which, due to the passenger oxygen system, requires a descent to 10 000 ft before supplementary oxygen is exhausted.

ENGINE FAILURE

Applicable to: ALL

If the standard strategy does not allow the aircraft to clear obstacles, the pilot must use a drift down procedure. If an engine failure occurs at any point on the route, the net flight path must clear the obstacles on the drift-down part by 2 000 ft and on the climb part by 1 000 ft.
If the aircraft cannot clear the en route obstacles, a point of no return (PNR) must be determined.



If an engine failure occurs after the PNR, the aircraft must drift down on course. If the failure occurs before the PNR, the aircraft must turn back.
For en route net flight paths, refer to the Aircraft Flight Manual.

DEPRESSURIZATION

Applicable to: ALL

In case of depressurization, the passengers receive oxygen through individual modules. An emergency descent in accordance with a certain profile has to be performed:*Refer to PRO-SPO-20 General*

CONCLUSION

Applicable to: ALL

A detailed study of each route over mountainous area must show that single-engine net flight path and passenger oxygen system performance allow the aircraft to clear the obstacles by 1 000 ft in climb and by 2 000 ft in cruise or descent.

If the aircraft in these circumstances cannot clear the obstacles on the route, a PNR must be determined and diversion procedures must be established.

GENERAL

Applicable to: ALL

The system design and the reliability of the engine installation of this airplane comply with the criteria for Extended Twin Operations (ETOPS) flights set forth in AMC 20-6 rev. 2 (EASA) or FAR 25.1535 (FAA), when the aircraft is configured, maintained and operated in accordance with the Airbus CMP (Configuration, Maintenance and Procedure) document.

This statement of ability does not constitute an approval to conduct Extended-Range Operations.

The ETOPS EXTENDED OPERATIONS Chapter of the AFM APPENDICES AND SUPPLEMENTS Section refers to the approved Standard for Extended-Range Operations and the applicable limitations, procedures and performance references.

The operator is responsible for showing that he is complying with the regulation of his nation and for obtaining operational approval from his national authorities. The operator may amend this chapter, as needed.

The airplane must be configured in accordance with the Airbus Standard for Extended-Range Operations. However, the authorities may under certain conditions allow the operator to conduct ETOPS flights with limited maximum diversion time (for example, 75 min diversion time in a benign area of operation) without showing full compliance with these standards.

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DEFINITIONS

Applicable to: ALL

For the purpose of EU-OPS 1-245 and FAR 121-161, Extended-Range Operations are those intended to be conducted over a route that contains a point beyond 60 min from an adequate airport at the selected one-engine-inoperative speed in still air and ISA (or prevailing delta ISA) conditions.
An adequate airport is an airport which satisfies the aircraft performance requirements applicable at the expected landing weight, and sufficiently equipped to be safely used. In particular, at the anticipated time of use, it should be available and equipped with the necessary services, including ATC, weather information, navaids and emergency services.
An ETOPS (en-route) alternate airport is a confirmed adequate airport which satisfies the dispatch weather minima requirements for ceiling and visibility within the required validity period.

AREA OF OPERATION

Applicable to: ALL

The ETOPS area of operations is the airspace within which the distance to an ETOPS adequate airport is less than the ETOPS Max Diversion distance.
The ETOPS maximum diversion distance from an adequate airport must be determined for ISA (or prevailing delta ISA) and no-wind conditions, taking into account aircraft performance with one engine inoperative and the remaining engine operating at MCT.
To determine the ETOPS maximum diversion distance from an adequate airport, the operator must define a One Engine Inoperative diversion speed for performance computation.

The same approved one-engine-inoperative diversion speed (*Refer to PER-OEI-GEN-05 STRATEGY*) must be considered for :
- Establishing the area of operation,
- Calculating the single-engine fuel planning,
- Conducting the diversion in case of engine failure (conditions permitting).

The operator has to define an aircraft weight at diversion that is considered for the ETOPS Maximum Diversion Distance calculation. This aircraft weight can be taken as a representative but conservative value of the aircraft gross weight at the critical point of the route or at the various critical points of all the routes included in a given sector.
The approved one-engine-inoperative descent and cruise speed must be chosen so that the associated net flight path clears the en-route obstacles with the regulatory margin. However, a speed other than the approved one-engine-inoperative speed may be used as the basis for obstacle clearance as long as the fuel required with that speed is covered by the critical fuel scenario.
Refer to PER-OEI-GEN-15 PROCEDURE for these two one-engine-inoperative speeds.

When the one-engine-inoperative diversion speed is chosen, the maximum distance from a diversion airport, can be directly determined for different maximum diversion times, with the help of the tables provided in this section. The area of possible ETOPS operation can then be drawn on plotting charts.
Another way to determine the maximum distance to a diversion airport is to read the one-engine-inoperative cruise TAS (for the reference gross weight and at the FL for best TAS) in the cruise tables (*Refer to PER-OEI-GEN-05 STRATEGY*) taking into consideration the appropriate speed strategy and the minimum altitude for clearing possible obstacles. The maximum distance the aircraft can travel to a diversion airport is this one-engine-inoperative-TAS multiplied by the maximum allowed diversion time granted to the operator.
Operators whose authorities require that an approved one-engine-inoperative speed be published in the Flight Manual must use this approved speed.

MMEL

Applicable to: ALL

The MMEL has been approved taking into consideration the duration of the average ETOPS flight and the maximum diversion time granted to the airframe/engine combination.
The MMEL published by Airbus and approved by the French DGAC can be used to establish the airline MEL, which must be approved by the operator's national authorities.
This MEL will probably be adapted to the airline network, environment and organization.

Other determining parameters will be :

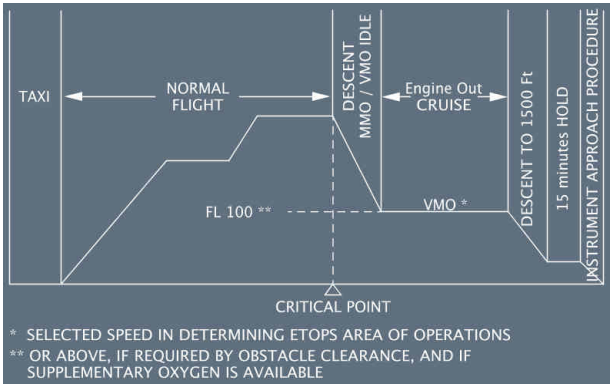
- The maximum and the average diversion times on the route.
- The equipment of the enroute alternates.
- The navigation and communication facilities.
- The average meteorological conditions.

ETOPS FUEL SCENARIOS

Applicable to: ALL

According to EASA AMC 20-6 rev 2 and FAA 121.646 for establishing the ETOPS critical fuel reserves, the operator must consider three diversion scenarios:

- Pressurization Failure + Engine Failure



- Pressurization Failure
  Same Flight Profile as above, but all engines operating and Diversion Cruise Speed* set to LRC.

- Engine Failure
  Same Flight Profile as above, but standard descent speed and Diversion Cruise at the FL** appropriate to gross engine out ceiling at the selected ETOPS diversion speed.
- FAA Fuel Requirements
  For the first two scenarios, involving depressurization, the required block fuel must be calculated in accordance with the operator's ETOPS fuel policy and using the regulatory ETOPS critical fuel reserves *Refer to PRO-SPO-40-30 ETOPS Critical Fuel Reserves*.
  Depending on the approved one-engine-inoperative speed selected for the single-engine diversion strategy, either of these two scenarios may result in the higher fuel requirement.
  The scenario resulting in the higher fuel requirement is called the ETOPS critical fuel scenario, and the associated minimum block fuel requirement is the ETOPS critical fuel plan.
  Note that, it is not necessary to calculate the 3rd scenario (engine failure), as this scenario is never critical, due to the higher diversion flight level.

ETOPS CRITICAL FUEL RESERVES

Applicable to: ALL

For the computation of the ETOPS critical fuel reserves and of the complete ETOPS critical fuel planning according to EASA AMC 20-6 rev 2 and FAR 121.646, the diversion fuel must include the following fuel provisions:

- Fuel burn-off from the critical point to the end of descent at the alternate airport
- Fuel for 15 min of holding at 1 500 ft and green dot speed at the alternate
- Fuel for an instrument approach and landing
- Fuel to account for errors in wind forecasting (5 % wind speed factor on actual forecast wind speeds or 5 % fuel if actual forecast wind speeds are not used)
- Fuel to account for aircraft deterioration (use a demonstrated performance factor or 5 %)
- Fuel to account for any Configuration Deviation List (CDL) or MEL item
- Fuel to account for Icing Effects (if forecast) for the critical mission
- Fuel to account for APU use (only for the one-engine-inoperative scenario, if APU is operative)

WIND ERRORS

A 5 % wind speed factor (i.e. an increment to headwind or a decrement to tailwind) on the actual forecast wind should be used to account for potential errors. However if the operator is not using the actual forecast wind based on a wind model acceptable to the certification authorities then 5 % of the fuel for the critical scenario is required as a reserve fuel.

ICING

The most critical scenario must be compensated for the greater of:

A. The effect of airframe icing during 10 % of the time during which icing is forecast, including ice accumulation on unprotected surfaces, and the fuel used by engine and wing anti-ice during this period.

B. Fuel for engine and wing anti-ice for the entire time during which icing is forecast.

Note: The ETOPS icing fuel reserve is always limited by (B)

Unless a reliable icing forecast is available, icing may be presumed to occur when the Total Air Temperature (TAT) is less than +10 °C, or if the outside air temperature is between 0 °C and -20 °C with a relative humidity of 55 % or more.

APU

Fuel consumption of 80 kg/h / or 176 lb/h (APU GEN ON, APU BLEED OFF).
In view of our experience, Airbus recommends that the operator includes a contingency fuel provision from departure to the Critical Point (CP), when computing the ETOPS critical fuel planning.

ETOPS FUEL REQUIREMENTS

Applicable to: ALL

The operator must compare the entire ETOPS critical fuel planning for the ETOPS critical fuel scenario with the standard fuel planning computed in accordance with the company fuel policy and applicable operational requirements. The higher of the two fuel requirements must be considered as the minimum required block fuel for the flight.

WEATHER MINIMA

Applicable to: ALL

Weather forecasts for en-route alternates must meet the operator's applicable weather minimum requirements.
This paragraph provides the applicable minima required by EASA (EU-OPS 1/ AMC 20-6 rev. 2) and FAA (AC120-42B).

A. EASA DISPATCH WEATHER MINIMA (EU-OPS 1/ AMC 20-6 REV. 2)

An airplane cannot be dispatched unless the meteorological forecasts at ETOPS en-route alternate airports meet the weather minima listed here for a period commencing at the earliest potential time of landing and ending one hour after the latest expected time of landing:

Approach Type	Min ETOPS Ceiling	Min ETOPS Visibility
Precision approach	DH/DA +200 ft	Authorised visibility +800 m
Non-Precision or Circling approach	MDH/MDA +400 ft	Authorised visibility +1 500 m
CAT II/CAT III approach	Specific approval required	Specific approval required

B. FAA DISPATCH WEATHER MINIMA (AC 120-42B)

An airplane cannot be dispatched unless the meteorological forecasts at ETOPS en-route alternate airports meet the weather minima listed here for a period commencing at the earliest potential time of landing and ending at the latest expected time of landing:

Approach Type	Min ETOPS Ceiling	Min ETOPS Visibility
Two or more instrument approaches	Higher of the two (M)DH/DA +200 ft	Higher of the two authorised visibility +800 m
Single Precision approach or Non-Precision approach or Circling approach	(M)DH/DA +400 ft	Authorised visibility +1 600 m
CAT II approach	300 ft	1 200 m or RVR 1 200 m
CAT III approach	200 ft	800 m or RVR 550 m

DIVERSION DECISION MAKING

Applicable to: ALL

The technical criteria governing a re-routing or diversion decision can be classified into four categories, as follows :

- Loss of MNPS capability, before entering the MNPS area (as applicable).
- Weather minima at diversion airport(s) going below the company/crew en-route minima, before reaching the ETOPS Entry Point, or diversion airport(s) becoming unsuitable for any reason.
- Failure cases requiring a diversion to the nearest airport (cases leading to a LAND ASAP message on the ECAM and/or in the QRH).
- Failure cases resulting in increased fuel consumption, exceeding the available fuel reserves.

Comments and Recommendations

- Electrical generation

  If one IDG fails, a diversion is required in case of :
  - Blue hydraulic circuit low level, low air pressure or overheat, or
  - APU no start, or
  - APU or APU generator inoperative, or
  - Second IDG failure.

- Fuel system
  Some failure cases may lead to fuel gravity feeding which implies flight at lower altitude or to some fuel being unusable. The flight crew's evaluation of the actual situation and the fuel remaining may lead to the decision that a diversion is required.
- Hydraulic system :

  If low level, low air pressure or overheat on blue hydraulic circuit, a diversion is required in case of :
  - One IDG failure, or
  - APU no start, or
  - APU/APU GEN failure.

- APU :

  If APU/APU GEN fails, a diversion is required in case of :
  - Blue hydraulic circuit low level, low air pressure or overheat, or
  - One IDG failure.

DIVERSION PERFORMANCE DATA

Applicable to: ALL

Chapter PER-OEI-GEN contains three single engine descent and cruise procedures:
1. The standard strategy,
2. The obstacle strategy,
3. Fixed speed strategies (ETOPS).

For ETOPS operations, any one of the above diversion strategies can be used provided that the selected strategy and speed schedule are used in :
- Establishing the area of operation (maximum diversion distance),
- Calculating the diversion fuel requirements for the single-engine ETOPS fuel scenario,
- Demonstrating the applicable obstacle clearance requirements (net flight path and net ceiling).

During the diversion, the flight crew is expected to use the planned speed schedule.
However, based on the evaluation of the actual situation, the pilot in command has the authority to deviate from this planned one-engine-inoperative speed.

GUIDELINES FOR DIVERSION PROCEDURE

Applicable to: ALL

- Complete the related failure procedure,
- Inform ATC,
- Initiate the descent,
- Determine which en route alternate is the most suitable (per company procedure),
- Divert to the chosen en route alternate,
- Comply with the pre-planned diversion strategy and speed schedule, or adjust the speed schedule, as dictated by the evaluation of the actual situation.

Note: For detailed guidelines and procedures for conducting the diversion (lateral and vertical navigation), Refer to DSC-22_20-60-60 Pilots/Stored Route Function, the FMGS Pilot's Guide.

GENERAL

Applicable to: ALL

The SOP (refer to chapter PRO-NOR-SOP) and the ABNORMAL and EMERGENCY procedures (refer to chapter PRO-ABN) to apply. For ETOPS flights, the flight crew must complete them using the procedure (*Refer to PRO-SPO-40-50 Cockpit Preparation*).

COCKPIT PREPARATION

Applicable to: B-HSD, B-HSE, B-HSG, B-HTF

FUEL

Before each flight, the flight crew must check that the fuel crossfeed valve is operating correctly :

FUEL X FEED .....ON

On the ECAM FUEL page, check that the fuel crossfeed valve is open (indication is inline green).

FUEL X FEED..... OFF

Check that the fuel crossfeed valve is closed.

AIR CONDITIONING

Packs flow selector must be on NORM or HI (LO selection is forbidden). This is to improve pressurization, if the normal electrical supply is lost.

COCKPIT PREPARATION

Applicable to: B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

FUEL

Before each flight, the flight crew must check that the fuel crossfeed valve is operating correctly :

FUEL X FEED .....ON

On the ECAM FUEL page, check that the fuel crossfeed valve is open (indication is inline green).

FUEL X FEED..... OFF

Check that the fuel crossfeed valve is closed.

ABN AND EMER PROCEDURES

Applicable to: ALL

ELECTRICAL EMERGENCY CONFIGURATION

In case of electrical emergency configuration, it may be better to study the STATUS on the paper checklist, after having applied ECAM actions.

The flight crew must complete the ECAM procedure using the following:

AIR CONDITIONING

As cockpit and cabin temperature control is lost, it is recommended to open the cockpit door.

FUEL

As all fuel pumps are lost, the engines are fed by gravity. *Refer to GRVTY FUEL FEEDING Procedure*.

ENGINE ANTI-ICE

Engine anti-ice valves are permanently open, although the ECAM memo ENG A. ICE is not displayed on the ECAM (except if the ENG A. ICE pb is at ON).

WING ANTI-ICE

If only one ENG BLEED is available, PACK 1 must be switched OFF, to avoid having both packs and wing anti-ice supplied by a single bleed source.

ENGINE

As the engines are in N1 unrated mode, the power setting has to be done using tables given in *Refer to PER-THR-N1 N1 MODE THRUST CONTROL*and following.

BLUE HYDRAULIC LOW LEVEL

Start the APU to ensure availability of the APU generator.

ENGINE OR IDG FAILURE

Start the APU and use the APU electrical channel.

GENERAL

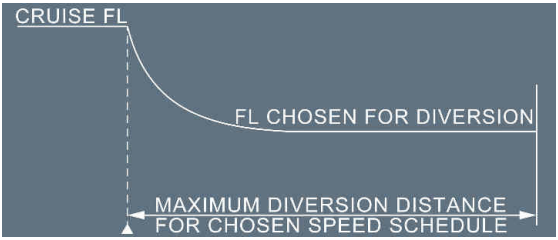
Applicable to: ALL

In case of electrical emergency configuration, the remaining engine reverts to N1 unrated mode. Consequently the penalties on net ceilings (*Refer to PER-THR-N1 MAXIMUM TAKEOFF N1*) must be taken into account for ETOPS part of the flight.

The two following cases result in a fuel consumption increase:
- RAT extended (*Refer to PRO-ABN-24 ELEC EMER CONFIG*)
- In electrical emergency configuration, the engine anti-ice valves are permanently open.

MAXIMUM DIVERSION DISTANCE

Applicable to: ALL 321



The following computation conditions have been used in accordance with the interpretation of the EU-OPS 1.245 and FAR 121.161:

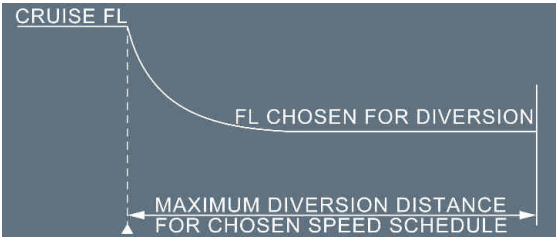
- ISA conditions
- No wind
- Optimum diversion level after engine failure
- Single engine diversion speed schedule.

Note: Obstacles have not to be considered to determine if a route is or is not an ETOPS route.

MAXIMUM DIVERSION DISTANCE								
SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	DIVERSION TIME (MIN)					
			60	75	90	120	150	180
MCT/VMO	60 000	150	414	514	613	813	1 014	1 215
	65 000	150	412	510	609	807	1 006	1 205
	70 000	140	410	508	605	802	998	1 196
	75 000	120	409	506	603	797	991	1 186
	80 000	110	407	503	599	791	983	1 176
	85 000	100	405	500	594	784	975	1 166
	90 000	100	401	495	588	775	964	1 153
MCT/320 kt	60 000	160	411	510	610	809	1 010	1 210
	65 000	150	409	507	606	804	1 001	1 199
	70 000	150	406	503	601	797	994	1 192
	75 000	140	403	500	596	790	985	1 180
	80 000	130	400	496	591	783	975	1 167
	85 000	120	398	492	586	775	965	1 154
	90 000	110	395	488	581	767	954	1 141

MAXIMUM DIVERSION DISTANCE

Applicable to: ALL 320



The following computation conditions have been used in accordance with the interpretation of the EU-OPS 1.245 and FAR 121.161:

- ISA conditions
- No wind
- Optimum diversion level after engine failure
- Single engine diversion speed schedule.

Note: Obstacles have not to be considered to determine if a route is or is not an ETOPS route.

MAXIMUM DIVERSION DISTANCE							
SPEED SCHEDULE	A/C WEIGHT AT CRITICAL POINT (KG)	FL FOR DIVERSION	DIVERSION TIME (MIN)				
			60	90	120	150	180
MCT/VMO	50 000	210	427	637	847	1 057	1 267
	55 000	200	428	636	845	1 054	1 263
	60 000	200	426	634	841	1 049	1 257
	65 000	180	427	633	840	1 046	1 253
	70 000	170	427	631	836	1 042	1 247
	75 000	150	427	630	833	1 037	1 241
	80 000	130	426	628	830	1 032	1 235
MCT/320 kt	50 000	210	427	637	847	1 057	1 267
	55 000	200	426	635	843	1 053	1 262
	60 000	200	425	632	840	1 048	1 256
	65 000	190	423	629	835	1 042	1 249
	70 000	180	421	626	831	1 036	1 242
	75 000	170	419	622	825	1 029	1 232
	80 000	160	416	617	817	1 018	1 219

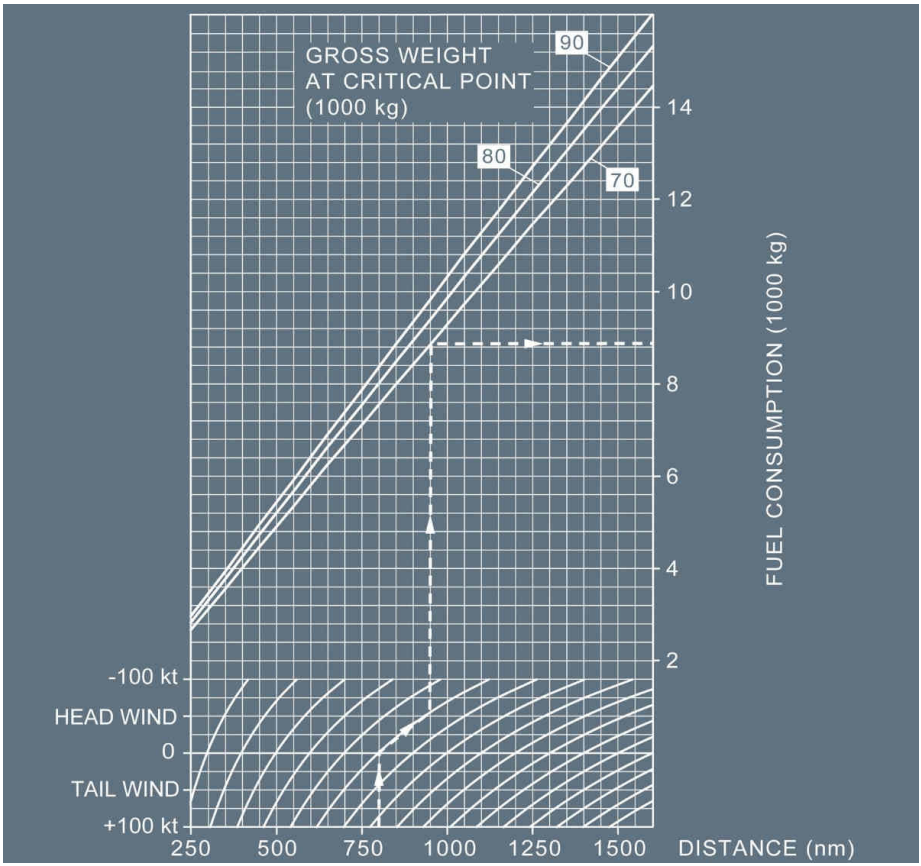
ETOPS FUEL FROM CRITICAL POINT TO LANDING - ALL ENGINES - CRUISE AT LRC

Applicable to: ALL 321

Assumptions:

- Emergency descent
- Long range cruise at FL 100
- Final descent 250 kt
- Holding 15 min at FL 15
- IFR procedure

Not included: 5 % correction on wind value - Anti icing if icing is forecast - performance factor.



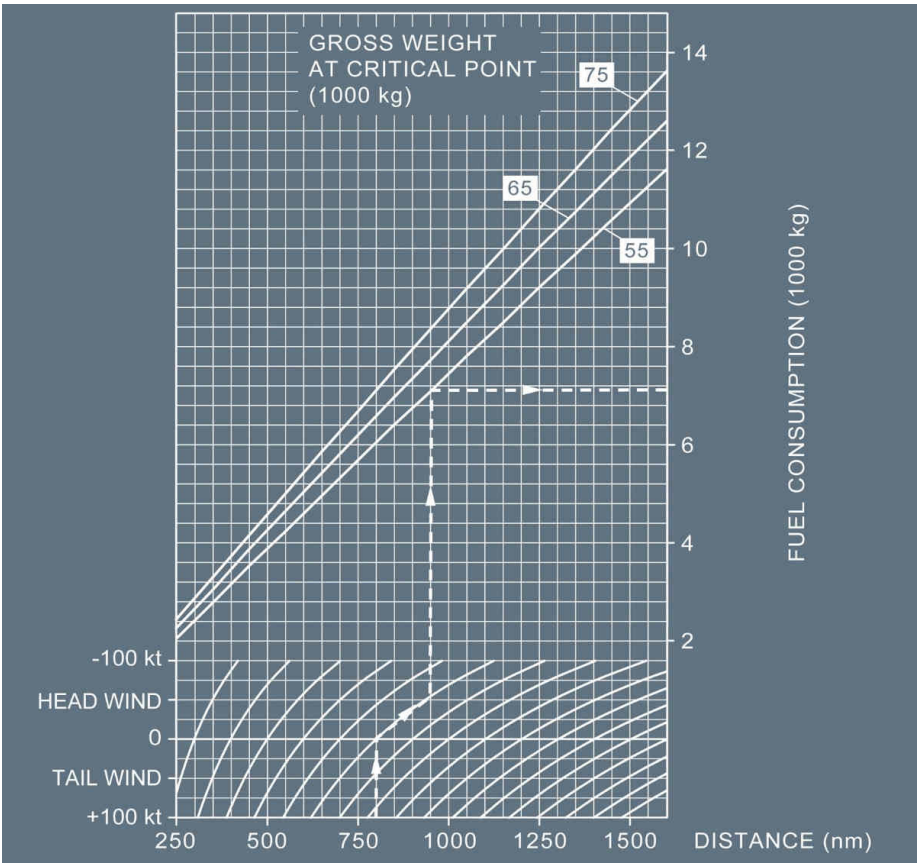
ETOPS FUEL FROM CRITICAL POINT TO LANDING - ALL ENGINES - CRUISE AT LRC

Applicable to: ALL 320

Assumptions:

- Emergency descent
- Long range cruise at FL 100
- Final descent 250 kt
- Holding 15 min at FL 15
- IFR procedure

Not included: 5 % correction on wind value - Anti icing if icing is forecast - performance factor.



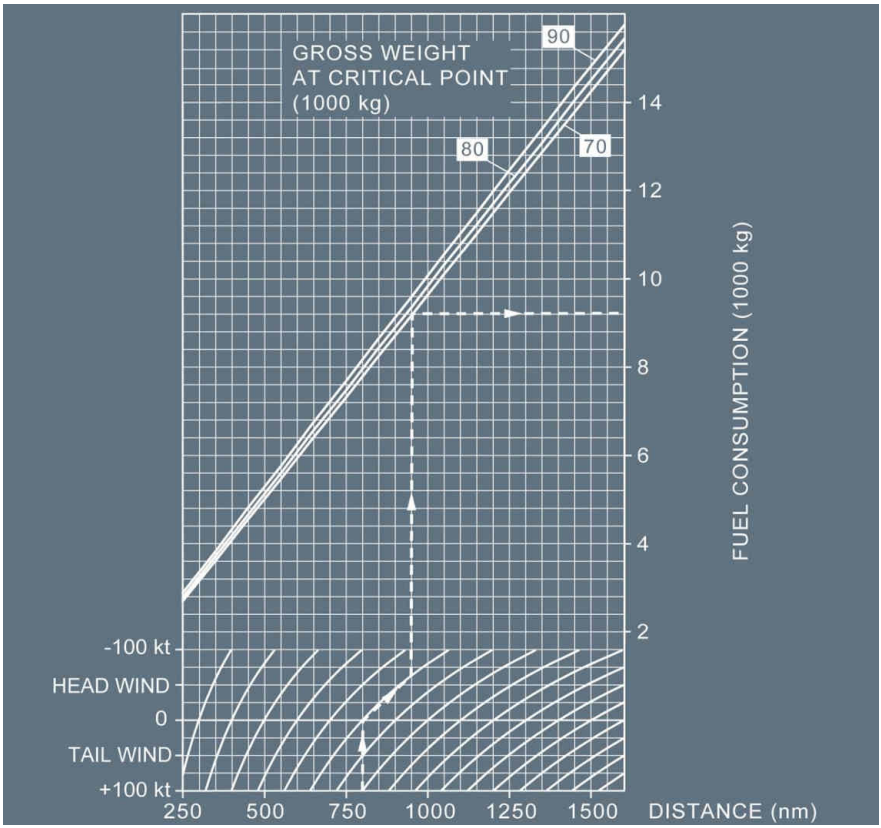
ETOPS FUEL FROM CRITICAL POINT TO LANDING - ONE ENGINE OUT - CRUISE AT 350KT

Applicable to: ALL 321

Assumptions:

- Emergency descent
- Cruise 350 kt at FL 100
- Final descent 250 kt
- Holding 15 min at FL 15
- IFR procedure
- APU fuel burn.

Not included: 5 % correction on wind value - Anti icing if icing is forecast - performance factor.



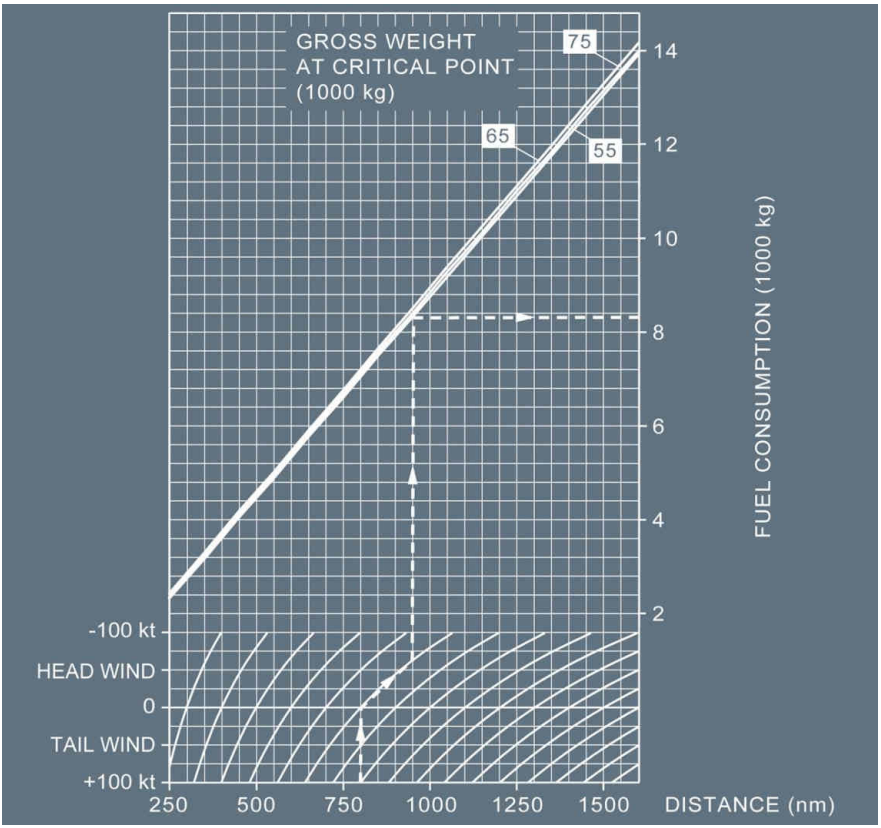
ETOPS FUEL FROM CRITICAL POINT TO LANDING - ONE ENGINE OUT - CRUISE AT 350KT

Applicable to: ALL 320

Assumptions:

- Emergency descent
- Cruise 350 kt at FL 100
- Final descent 250 kt
- Holding 15 min at FL 15
- IFR procedure
- APU fuel burn.

Not included: 5 % correction on wind value - Anti icing if icing is forecast - performance factor.



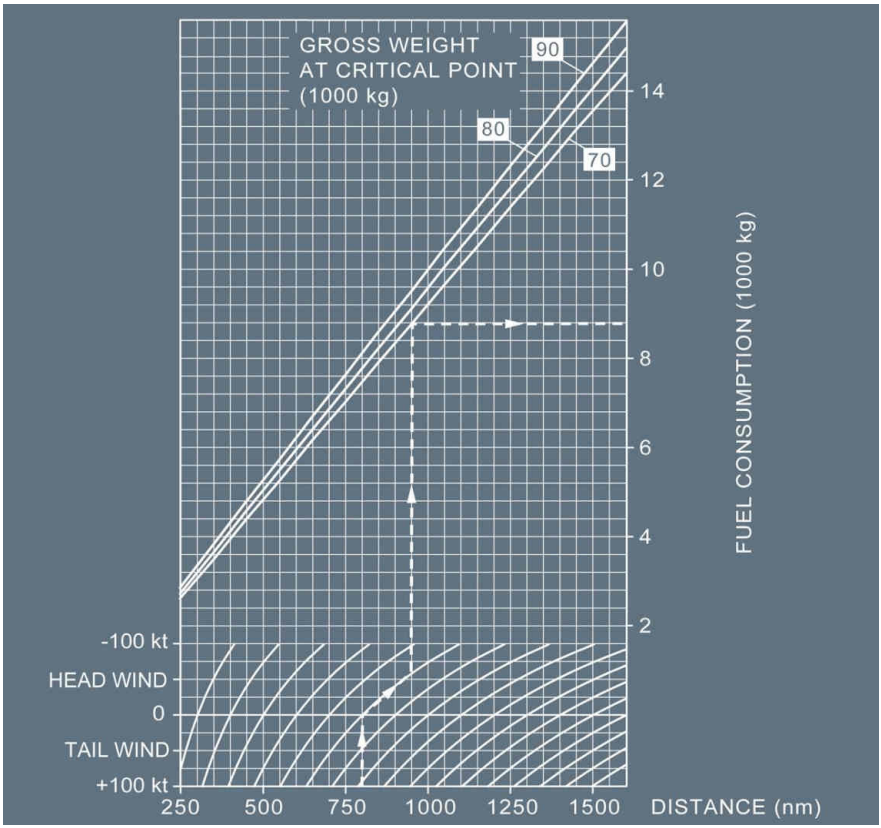
ETOPS FUEL FROM CRITICAL POINT TO LANDING - ONE ENGINE OUT - CRUISE AT 320KT

Applicable to: ALL 321

Assumptions:

- Emergency descent
- Cruise 320 kt at FL 100
- Final descent 250 kt
- Holding 15 min at FL 15
- IFR procedure
- APU fuel burn.

Not included: 5 % correction on wind value - Anti icing if icing is forecast - performance factor.



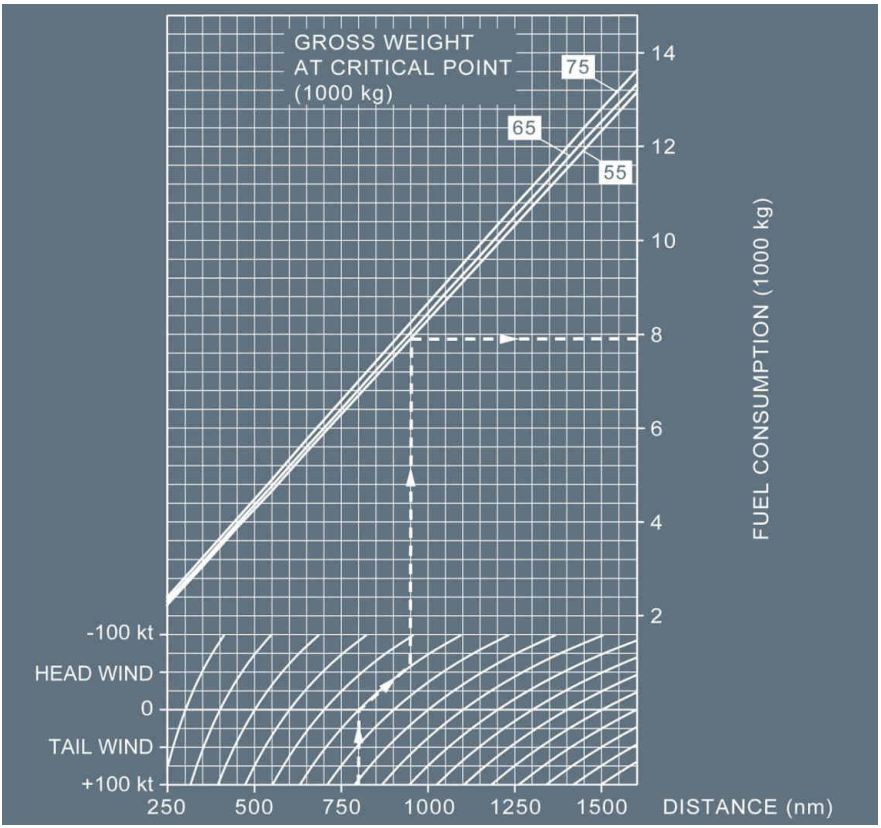
ETOPS FUEL FROM CRITICAL POINT TO LANDING - ONE ENGINE OUT - CRUISE AT 320KT

Applicable to: ALL 320

Assumptions:

- Emergency descent
- Cruise 320 kt at FL 100
- Final descent 250 kt
- Holding 15 min at FL 15
- IFR procedure
- APU fuel burn.

Not included: 5 % correction on wind value - Anti icing if icing is forecast - performance factor.



ETOPS FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING - EXAMPLE

Applicable to: ALL 321

Assumptions:
- Aircraft weight at critical point: 70 000 kg
- Diversion speed: 320 kt
- Diversion time: 120 min
- Distance from Critical point to diversion airport: 700 nm
- Wind: 50 kt headwind
- Forecast icing condition on diversion: 40 min
- Aircraft perf factor: 5 %

For the determination of the ETOPS fuel requirement, the greatest fuel quantity of the two following scenarios must be considered (the scenario Engine failure only is never limiting):

1. Pressurization failure - One Engine Inoperative - 320 kt

- Determine the corrected wind for diversion taking into account the 5 % wind speed factor: 50 x 1.05 = 52.5 kt
- Enter the following ETOPS fuel requirement graph: *Refer to PRO-SPO-40-60 ETOPS Fuel from Critical Point to Landing - One Engine Out - Cruise at 320kt*
  Determine the corresponding fuel consumption: 7 600 kg
- Determine the final ETOPS fuel requirement, sum of perf factor fuel, icing fuel and fuel determined the step before:
  - Fuel for icing condition (Total anti-ice scenario is limiting): 4 % x 40 / 120 = 1.33 %
  - Fuel for perf factor: 5 %
  - Final ETOPS fuel requirement: 7 600 x 1.0133 x 1.05 = 8 087 kg

2. Pressurization failure - All Engines Operative - LRC speed

- Determine the corrected wind for diversion taking into account the 5 % wind speed factor: 50 x 1.05 = 52.5 kt
- Enter the following ETOPS fuel requirement graph: *Refer to PRO-SPO-40-60 ETOPS Fuel from Critical Point to Landing - All Engines - Cruise at LRC*
  Determine the corresponding fuel consumption: 7 800 kg
- Determine the final ETOPS fuel requirement, sum of perf factor fuel, icing fuel and fuel determined the step before:
  - Fuel for icing condition (total anti-ice scenario is limiting): 5 % x 40 / 120 = 1.67 %
  - Fuel for perf factor: 5 %
  - Final ETOPS fuel requirement: 7 800 x 1.0167 x 1.05 = 8 327 kg

The final ETOPS fuel requirement for this diversion is 8 327 kg. The limiting scenario is a pressurization failure and All Engines Operative at a diversion speed of LRC.

ETOPS FUEL REQUIREMENT FROM CRITICAL POINT TO LANDING - EXAMPLE

Applicable to: ALL 320

Assumptions:
- Aircraft weight at critical point: 65 000 kg
- Diversion speed: 320 kt
- Diversion time: 120 min
- Distance from Critical point to diversion airport: 700 nm
- Wind: 50 kt headwind
- Forecast icing condition on diversion: 40 min
- Aircraft perf factor: 5 %

For the determination of the ETOPS fuel requirement, the greatest fuel quantity of the two following scenarios must be considered (the scenario Engine failure only is never limiting):

1. Pressurization failure - One Engine Inoperative - 320 kt

   - Determine the corrected wind for diversion taking into account the 5 % wind speed factor: 50 x 1.05 = 52.5 kt
   - Enter the following ETOPS fuel requirement graph: *Refer to PRO-SPO-40-60 ETOPS Fuel from Critical Point to Landing - One Engine Out - Cruise at 320kt*
     Determine the corresponding fuel consumption: 6 900 kg
   - Determine the final ETOPS fuel requirement, sum of perf factor fuel, icing fuel and fuel determined the step before:

     • Fuel for icing condition (Total anti-ice scenario is limiting): 5 % x 40 / 120 = 1.67 %
     • Fuel for perf factor: 5 %
     • Final ETOPS fuel requirement: 6 900 x 1.0167 x 1.05 = 7 366 kg

2. Pressurization failure - All Engines Operative - LRC speed

- Determine the corrected wind for diversion taking into account the 5 % wind speed factor: 50 x 1.05 = 52.5 kt
- Enter the following ETOPS fuel requirement graph: *Refer to PRO-SPO-40-60 ETOPS Fuel from Critical Point to Landing - All Engines - Cruise at LRC*
  Determine the corresponding fuel consumption: 6 800 kg
- Determine the final ETOPS fuel requirement, sum of perf factor fuel, icing fuel and fuel determined the step before:
  - Fuel for icing condition (total anti-ice scenario is limiting): 5 % x 40 / 120 = 1.67 %
  - Fuel for perf factor: 5 %
  - Final ETOPS fuel requirement: 6 800 x 1.0167 x 1.05 = 7 260 kg

The final ETOPS fuel requirement for this diversion is 7 366 kg. The limiting scenario is a pressurization failure and One Engine Inoperative at a diversion speed of 320 kt.

GENERAL

Applicable to: ALL

Reduced Vertical Separation Minimum (RVSM) airspace is any airspace or route between FL 290 and FL 410 (inclusive), where aircraft are vertically separated by 1 000 ft, instead of 2 000 ft. The aircraft system design complies with the design criteria of the JAA Information Leaflet N° 6, and the FAA 91-RVSM Interim Guidance Material for RVSM operations.
The statement of RVSM capability is also indicated in the AFM.

OPERATIONAL APPROVAL

Applicable to: ALL

The above capability statement does not constitute an approval to fly RVSM. Operational approval is to be granted by the Operator's national authorities, after assessment of the airline's capability to meet RVSM requirements. The above-mentioned JAA and FAA documents also cover requirements for obtaining operational approval.

REQUIRED EQUIPMENT/FUNCTIONS FOR RVSM

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HTD, B-HTE, B-HTF

RVSM regulations require the following equipment/functions in order to be operative :
- ADR1 + ADR2 + 2 DMC
- 1 transponder
- 1 Autopilot function
- 1 FCU channel (for altitude target selection and OP CLB/OP DES mode engagement)
- 2 PFD functions (for altitude indication)
- 1 FWC (for altitude alert function)

REQUIRED EQUIPMENT/FUNCTIONS FOR RVSM

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

RVSM regulations require the following equipment/functions in order to be operative:
- 2 ADR + 2 DMC
- 1 transponder
- 1 Autopilot function
- 1 FCU channel (for altitude target selection and OP CLB/OP DES mode engagement)
- 2 PFD functions (for altitude indication)
- 1 FWC (for altitude alert function)

PROCEDURES

Applicable to: ALL

1 The SOPs (*Refer to PRO-NOR-SOP-01 Introduction*) and the ABN and EMER (*Refer to PRO-ABN-01 Operational Recommendations*) procedures apply. In addition, flights in RVSM airspace must be completed by the following:

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HTD, B-HTE, B-HTF

FLIGHT PREPARATION

The crew must pay particular attention to conditions that may affect operation in RVSM airspace. These include, but may not be limited to :

Verifying that the airframe is approved for RVSM operations.
Reported and forecast weather on the flight route.
Review of maintenance logs and forms to determine the condition of equipment required for flight in RVSM airspace. Ensure that maintenance action has been taken to correct any defects of required equipment.
Check that the PFD altitude indication (QNH reference) of ADR1, and also of ADR2, does not differ from the airport elevation by more than 75 ft.
Check, on ground, that the difference between the altitude indications from ADR1 and ADR2 is less than the tolerance specified in paragraph *Refer to PRO-SUP-34 Flight Instrument Tolerances - General* "Maximum Differences Between Altitude Indications".

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

2 ## FLIGHT PREPARATION

The crew must pay particular attention to conditions that may affect operation in RVSM airspace. These include, but may not be limited to :

Verifying that the airframe is approved for RVSM operations.
Reported and forecast weather on the flight route.
Review of maintenance logs and forms to determine the condition of equipment required for flight in RVSM airspace. Ensure that maintenance action has been taken to correct any defects of required equipment.
Check each PFD altitude indication (QNH reference) does not differ from the airport elevation by more than 75 ft.
Check, on ground, that the difference between the two primary altitude indications is less than the tolerance specified in paragraph *Refer to PRO-SUP-34 Flight Instrument Tolerances - General* "Maximum Differences Between Altitude Indications".

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HTD, B-HTE, B-HTF

PRIOR TO RVSM AIRSPACE ENTRY

The above-listed equipment for RVSM must be operating normally. Should any of this equipment fail prior entering the RVSM airspace, the crew must request new clearance, to avoid flight in this airspace. The two primary altitude indications (PFD indications from ADR1 and ADR2) should be in accordance with the instrument tolerance (*Refer to PRO-SUP-34 Flight Instrument Tolerances - General*). If only two ADRs are operative, the altimeter indications on the PFD and standby altimeters should be recorded. This information may be useful in case of subsequent PFD altitude discrepancies, or the loss of both remaining ADRs.

WITHIN RVSM AIRSPACE

- Autopilot should be engaged within RVSM airspace for cruise and flight level changes.
- During cleared transitions between flight levels, the aircraft should not overshoot or undershoot the cleared flight levels by more than 150 ft.
- At intervals of approximately one hour, check that PFD altimeter indications agree in accordance with the instrument tolerance (*Refer to PRO-SUP-34 Flight Instrument Tolerances - General*). The usual scan of flight deck instruments should be sufficient.
- Use the transponder and the autopilot, associated with one of the ADRs which is within tolerance.

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

PRIOR TO RVSM AIRSPACE ENTRY

The above-listed equipment, for RVSM, must be operating normally. Should any of this equipment fail prior entering the RVSM airspace, the crew must request new clearance, to avoid flight in this airspace. The two primary altitude indications (PFD indications from the onside ADR, or ADR 3) should be in accordance with the instrument tolerance (*Refer to PRO-SUP-34 Flight Instrument Tolerances - General*). If only two ADRs are operative, the altimeter indications on the PFD and standby altimeters should be recorded. This information may be useful in case of subsequent PFD altitude discrepancies, or the loss of both remaining ADRs.

WITHIN RVSM AIRSPACE

- Autopilot should be engaged within RVSM airspace for cruise and flight level changes.
- During cleared transitions between flight levels, the aircraft should not overshoot or undershoot the cleared flight levels by more than 150 ft.
- At intervals of approximately one hour, check that PFD altimeter indications agree in accordance with the instrument tolerance (*Refer to PRO-SUP-34 Flight Instrument Tolerances - General*). The usual scan of flight deck instruments should be sufficient.
- Use the transponder and the autopilot, associated with one of the ADRs which is within tolerance.

Applicable to: ALL

The crew must report any malfunction of the height-keeping systems, including the:
- Malfunction or loss of any required equipment.
- Altimeter readings outside the tolerances of *Refer to PRO-SUP-34 Flight Instrument Tolerances - General*, and provide sufficient details to enable maintenance to troubleshoot and repair the system.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HTD, B-HTE, B-HTF

When in RVSM airspace, the ATC will be notified of any of the following contingencies which affect the ability to maintain the cleared flight level.
- Failure of both autopilots,
- Loss of altimeter system redundancy (only one PFD indication remaining), or excessive altimeter discrepancy (200 ft).
- Failure of any other equipment affecting the ability to maintain the cleared flight level, or
- Encountering greater than moderate turbulence.
- Loss of ADR1 or ADR2. If ADR1 fails, use the AP2, if ADR2 fails, use AP1.
  If the AP is unable to maintain the assigned altitude, select the other AP.
- Loss of RVSM capability.

Note: *The flight crew can obtain the contingency procedures for flying in Minimum Navigation Performance Specification (MNPS) airspace by referring to specific manuals, such as, for example, the North Atlantic (NAT) MNPS Manual.*

If unable to notify ATC and obtain ATC clearance prior to deviating from the assigned cleared flight level, the crew should follow the established contingency procedure and obtain ATC clearance as soon as possible.

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

When in RVSM airspace, the following contingencies which affect the ability to maintain the cleared flight level will be notified to ATC.
- failure of both autopilots,
- loss of altimeter system redundancy (only one PFD indication remaining), or excessive altimeter discrepancy (200 ft).
- failure of any other equipment affecting the ability to maintain the cleared flight level, or
- encountering greater than moderate turbulence.
- Loss of RVSM capability.

Note: *The flight crew can obtain the contingency procedures for flying in Minimum Navigation Performance Specification (MNPS) airspace by referring to specific manuals, such as, for example, the North Atlantic (NAT) MNPS Manual.*

If unable to notify ATC and obtain ATC clearance prior to deviating from the assigned cleared flight level, the crew should follow the established contingency procedure and obtain ATC clearance as soon as possible.

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GENERAL

Applicable to: ALL

GENERAL

The aircraft navigation system, required by regulation to fly within a Required Navigation Performance (RNP) airspace, shall comply with RNAV functionality criteria and with navigation position accuracy and integrity criteria.
When referring to RNP-X, the value of X is the navigation accuracy expressed in NM, which has to be met with a probability of 95 %.
An RNP value can be associated with an airspace, a route, a SID, a STAR, a RNAV approach, or an RNAV missed approach procedure.
Depending on the RNP value, and on the airspace environment (ground radio navaid), different navigation equipment may be necessary.
An operational approval from the airline's national authorities may be necessary.

Applicable to: ALL

NAVIGATION SYSTEM CAPABILITY (FOR REFERENCE ONLY)

European BRNAV (RNP-5) and P-RNAV (RNP-1) capability meets the certification requirements of JAA TGL 2 and TGL 10. Terminal and en-route RNAV operations comply with the certification requirements of the FAA Advisory Circular 90-100.
RNP-4 capability in oceanic or remote areas complies with FAA Notice 8400.33.
RNP-10 capability in oceanic or remote areas complies with paragraph 12.b (1) of FAA Notice 8400.12a., or with paragraph 12.a. or 12.b (5), if GPS is installed and is operative.
Navigation system with the GPS PRIMARY function (if GPS installed) meets the certification requirements of FAA AC 20-130A and TSO C 129A in class C1 (for navigation system with multiple sensor inputs including GPS).

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

RNP CAPABILITY

In order to match a given RNP value, the FMS-estimated position accuracy (also called Estimated Position Error) must be better than the RNP value. Obviously, this is dependent on the FMS navigation-updating mode (GPS/DME/DME, VORDME, or IRS).
On the MCDU PROG page, the required and the estimated position accuracy are displayed, and determine the HIGH/LOW accuracy indication (*Refer to DSC-22_20-20-20 Estimated Position Uncertainty*).
The required accuracy can be a default value, which is either a function of the flight phase, or a value manually-entered by the crew.
When flying in an RNP environment, the crew can insert the appropriate RNP value in the REQUIRED ACCUR field of the PROG page.

■ **When HIGH is displayed**

The RNP requirement is estimated to be fulfilled.

■ **When LOW is displayed**

The RNP requirement is estimated not to be fulfilled. In this case:
- The crew crosschecks navigation with raw data, if available,
- If the crosscheck is negative, or if raw data is unavailable, the crew informs the ATC.

When leaving the RNP environment, the crew will clear the manually-entered required accuracy.

WITHOUT GPS PRIMARY FUNCTION

RNP accuracy criteria are met, provided radio navaid coverage supports it for:
- RNP-1 en route and in the terminal area, provided a required accuracy of 1 nm See (1) is checked, or manually entered in the MCDU.
- RNP-0.3 in approach, provided a required accuracy of 0.3 nm See (1) is checked, or manually entered in the MCDU.

Note: *(1) It is possible to enter the radial equivalent to the specified Crosstrack (XTK) accuracy, that is the RNP multiplied by 1.2, the EPE being an estimated radial position error.*

WITH THE GPS PRIMARY FUNCTION

RNP requirements are met, provided GPS PRIMARY is available, for:
- RNP-1 en route
- RNP-0.5 in the terminal areas, provided the AP or FD in NAV mode is used.
- RNP-0.3 in approach, provided the AP or FD in NAV mode is used.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

RNP CAPABILITY

In order to match a given RNP value, the FMS-estimated position accuracy (also called Estimated Position Error) must be better than the RNP value. Obviously, this is dependent on the FMS navigation-updating mode (GPS/DME/DME, VORDME, or IRS).
On the MCDU PROG page, the required and the estimated position accuracy are displayed, and determine the HIGH/LOW accuracy indication (*Refer to DSC-22_20-20-20 Estimated Position Uncertainty*).
The required accuracy can be a default value, which is either a function of the flight phase, or a navigation database procedure value, or a value manually-entered by the crew.
When flying in an RNP environment, the crew can insert the appropriate RNP value in the REQUIRED ACCUR field of the PROG page.

■ **When HIGH is displayed**

The RNP requirement is estimated to be fulfilled.

■ **When LOW is displayed**

The RNP requirement is estimated not to be fulfilled. In this case :

- The crew crosschecks navigation with raw data, if available,
- If the crosscheck is negative, or if raw data is unavailable, the crew informs the ATC.

When leaving the RNP environment, the crew will clear the manually-entered required accuracy.

WITHOUT GPS PRIMARY FUNCTION

RNP accuracy criteria are met, provided radio navaid coverage supports it for :

- RNP-1 en route and in the terminal area, provided a required accuracy of 1 nm See (1) is checked, or manually entered in the MCDU.
- RNP-0.3 in approach, provided a required accuracy of 0.3 nm See (1) is checked, or manually entered in the MCDU.

Note: *(1) It is possible to enter the radial equivalent to the specified Crosstrack (XTK) accuracy, that is the RNP multiplied by 1.2, the EPE being an estimated radial position error.*

WITH THE GPS PRIMARY FUNCTION

RNP requirements are met, provided GPS PRIMARY is available, for :

- RNP-1 en route
- RNP-0.5 in the terminal areas, provided the AP or FD in NAV mode is used.
- RNP-0.3 in approach, provided the AP or FD in NAV mode is used.

BRNAV IN EUROPEAN AIRSPACE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

In this airspace, radio navaid coverage is assumed to support RNP-5 accuracy.

The minimum required equipment to enter BRNAV airspace is :

- One RNAV system, which means :
  - One FMGC
  - One MCDU
  - One VOR for FM navigation update
  - One DME for FM navigation update
  - One IRS
- In addition:
  - On the PF side : PFD and ND must be operative.
  - On the PNF side : at least one of the two EFIS must be operative (to enable temporary display of ND information through the PFD/ND switch).

PROCEDURES

When GPS PRIMARY is not available, periodically crosscheck the FM position with navaid raw data.
Manual selection of a required accuracy on the MCDU is optional.

- **If manual entry of a required accuracy is desired** enter 5 nm or use the radial equivalent to 5 nm XTK accuracy, that is 6.1 nm.
  - **When leaving RNP-5 airspace, or when entering the terminal area** revert to the default required accuracy, or enter the appropriate value on the MCDU.
- **If one of the following MCDU or ECAM messages is displayed**

  check navigation accuracy with navaid raw data, or with the GPS MONITOR page (if GPS installed) :
  - NAV ACCUR DOWNGRAD
  - FMS1/FMS2 POS DIFF
  - CHECK A/C POSITION
  - ECAM : FM/GPS POS DISAGREE (if GPS installed)
- **If the accuracy check confirms that RNP-5 capability is lost, or if both FMGCs have failed** Inform the ATC, and revert to conventional navigation.
- **If the accuracy check confirms that only one FMGC position is incorrect** , resume navigation with the other FMGC.

In inertial navigation, BRNAV capability is maintained for 2 h, independently of the estimated accuracy displayed on the MCDU.

BRNAV IN EUROPEAN AIRSPACE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

In this airspace, radio navaid coverage is assumed to support RNP-5 accuracy.

The minimum required equipment to enter BRNAV airspace is :

- One RNAV system, which means :
  - One FMGC
  - One MCDU
  - One VOR for FM navigation update
  - One DME for FM navigation update
  - One IRS
- In addition:
  - On the PF side : PFD and ND must be operative.
  - On the PNF side : at least one of the two EFIS must be operative (to enable temporary display of ND information through the PFD/ND switch).

PROCEDURES

When GPS PRIMARY is not available, periodically crosscheck the FM position with navaid raw data.
Manual selection of a required accuracy on the MCDU is optional.

- **If manual entry of a required accuracy is desired** enter 5 nm or use the radial equivalent to 5 nm XTK accuracy, that is 6.1 nm.
  - **When leaving RNP-5 airspace, or when entering the terminal area** revert to the default required accuracy, or enter the appropriate value on the MCDU.
- **If one of the following MCDU or ECAM messages is displayed**

  check navigation accuracy with navaid raw data, or with the GPS MONITOR page (if GPS installed) :
  - NAV ACCUR DOWNGRAD
  - FMS1/FMS2 POS DIFF
  - CHECK IRS 1(2)(3)/FM POSITION
  - ECAM : FM/GPS POS DISAGREE (if GPS installed)
- **If the accuracy check confirms that RNP-5 capability is lost, or if both FMGCs have failed** Inform the ATC, and revert to conventional navigation.
- **If the accuracy check confirms that only one FMGC position is incorrect** , resume navigation with the other FMGC.

In inertial navigation, BRNAV capability is maintained for 2 h, independently of the estimated accuracy displayed on the MCDU.

RNP-4 OR RNP-10 IN OCEANIC OR REMOTE AREAS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

In this kind of airspace, the aircraft is expected to fly for a long period of time outside radio navaid coverage.

The minimum required equipment to enter a RNP-4/RNP-10 airspace is:

- Two long range navigation systems, which means:
  - Two FMGC (or 1 FMGC + 1 BACK UP NAV)
  - Two MCDU
  - For RNP-10, one GPS if required by flight time outside radio navaid coverage. For aircraft without GPS the flight time outside radio navaid coverage is limited. According to FAA Notice 8400.12A, this limitation is:
    - 6.2 h since IRS ground alignment, or
    - 5.7 h since last FM radio update.

    There is no limitation for aircraft fitted with the GPS.
    For RNP-4, one GPS is required.
  - Two IRS
  - Two NDs to display Flight Plan Data.

Refer also to Regional Supplementary Procedures of ICAO Doc 7030 for specific requirements in a particular airspace.

PROCEDURES

The Manual selection of a required accuracy on the MCDU is optional.

- **If manual entry of a required accuracy is desired, the flight crew must manually enter:**
  For RNP-10, enter 10 nm or use the radial equivalent to 10 nm XTK accuracy that is 12.2 nm.
  For RNP- 4, enter 4 nm or use the radial equivalent to 4 nm XTK accuracy that is 4.9 nm.
- **When leaving RNP airspace,** revert to the default required accuracy or enter the appropriate value.
- **If one of the following MCDU or ECAM messages is displayed,**

  check navigation with POSITION MONITOR page, ISDU and GPS MONITOR page (if GPS installed) :
  - FMS1/FMS2 POS DIFF
  - CHECK A/C POSITION
  - ECAM : FM/GPS POS DISAGREE (if GPS installed)

Use the AP, with the navigation system checked correct.

- **If unable to determine which system is correct,** inform the ATC, and look for navaid raw data confirmation as soon as possible.

In inertial navigation, the RNP -10 capability is maintained for 5.7 h, since the last radio update (according to FAA Notice 8400.12A), independently of the estimated accuracy displayed on the MCDU.
For RNP-4 with GPS PRIMARY LOST, the RNP-4 capability is maintained until NAV ACCUR DOWNGRAD appears.

RNP-4 OR RNP-10 IN OCEANIC OR REMOTE AREAS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

In this kind of airspace, the aircraft is expected to fly for a long period of time outside radio navaid coverage.

The minimum required equipment to enter a RNP-4/RNP-10 airspace is:
- Two long range navigation systems, which means:
  - Two FMGC (or 1 FMGC + 1 BACK UP NAV)
  - Two MCDU
  - For RNP-10, one GPS if required by flight time outside radio navaid coverage. For aircraft without GPS the flight time outside radio navaid coverage is limited. According to FAA Notice 8400.12A, this limitation is:
    - 6.2 h since IRS ground alignment, or
    - 5.7 h since last FM radio update.

    There is no limitation for aircraft fitted with the GPS.
    For RNP-4, one GPS is required.
  - Two IRS
  - Two NDs to display Flight Plan Data.

Refer also to Regional Supplementary Procedures of ICAO Doc 7030 for specific requirements in a particular airspace.

PROCEDURES

Manual selection of a required accuracy on the MCDU is optional.

- **If manual entry of a required accuracy is desired, the flight crew must manually enter:**
  For RNP-10, enter 10 nm or use the radial equivalent to 10 nm XTK accuracy that is 12.2 nm.
  For RNP- 4, enter 4 nm or use the radial equivalent to 4 nm XTK accuracy that is 4.9 nm.
- **When leaving RNP airspace** revert to the default required accuracy or enter the appropriate value.

- **If one of the following MCDU or ECAM messages is displayed,**

  check navigation with POSITION MONITOR page, ISDU or IRS 1(2)(3) pages, and GPS MONITOR page (if GPS installed) :
  - FMS1/FMS2 POS DIFF
  - CHECK IRS 1(2)(3)/FM POSITION
  - ECAM : FM/GPS POS DISAGREE (if GPS installed)

  Use the AP, with the navigation system checked correct.

- **If unable to determine which system is correct,** inform the ATC, and look for navaid raw data confirmation as soon as possible.

In inertial navigation, the RNP -10 capability is maintained for 5.7 h, since the last radio update (according to FAA Notice 8400.12A), independently of the estimated accuracy displayed on the MCDU.
For RNP-4 with GPS PRIMARY LOST, the RNP-4 capability is maintained until NAV ACCUR DOWNGRAD appears.

P-RNAV/RNP-1 TERMINAL PROCEDURES

Applicable to: ALL

For terminal procedures requiring P-RNAV or RNP-1 capability, the flight crew can assume that the radio navaid coverage supports the RNP-1 accuracy. Otherwise, the procedure may specify that GPS equipment is required (refer to the published procedure chart).

The minimum equipment required to fly a P-RNAV or RNP-1 procedure is:
- One RNAV system, which includes:
  - One FMGC
  - One MCDU
  - One GPS receiver, or one VOR and one DME, for FM navigation update See *
  - Two IRS, and
  - One FD in NAV mode.
- In addition:
  - On the PF side : PFD and ND must be operative.
  - On the PNF side : at least one of the two EFIS must be operative (to enable temporary display of ND information through the PFD/ND switch).

*GPS may be required for RNP-1 terminal procedures.
For terminal procedures with legs below the MSA, or with legs that may not have sufficient radar coverage, two RNAV systems may be mandated by the procedure chart.

PROCEDURES

The terminal procedure (RNAV SID, RNAV STAR, RNAV TRANSITION, ...) must be loaded from the FM navigation database and checked for reasonableness, by comparing the waypoints, tracks, distances and altitude constraints (displayed on the F-PLN page), with the procedure chart.
The flight crew must not modify the procedure, that is loaded from the navigation database, unless instructed to do so by the ATC (DIR TO, radar vectoring, insertion of waypoints loaded from the navigation database).

■ **If GPS is required for the P-RNAV/RNP-1 procedure :**

Before starting the departure/approach procedure, check that GPS PRIMARY is available (GPS PRIMARY displayed on the MCDU PROG page).

- **If GPS PRIMARY is not available before starting the procedure** inform the ATC, and request another departure/arrival procedure that does not require GPS.
- **If GPS PRIMARY is lost while flying the procedure** inform the ATC of this loss of capability, and follow ATC instructions.

■ **If GPS is NOT required for the P-RNAV/RNP-1 procedure :**

Check that GPS PRIMARY is available (GPS PRIMARY displayed on the MCDU PROG page).

- **IF GPS PRIMARY is not available:**
  Crosscheck the FM position with the navaid raw data, before starting the procedure. Check or enter RNP-1 in the REQUIRED field of the MCDU PROG page, and check that HIGH accuracy is available. When completing the terminal procedure, revert to the default value or enter the appropriate value on the MCDU PROG page.
- **If one of the following messages appears,**

  while flying the procedure:
  - "NAV ACCUR DOWNGRAD" (on MCDU and ND) on both sides, or
  - "FMS1/FMS2 POS DIFF" (on MCDU), or
  - "CHECK IRS 1(2)(3)/FM POSITION" (on MCDU), or
  - "NAV FM/GPS POS DISAGREE" (on ECAM, if GPS installed)

Then:

Inform the ATC of the loss of P-RNAV/RNP-1 capability, and follow ATC instructions.

Note: *If the "NAV ACCUR DOWNGRAD" message is displayed on one side only, navigation may be continued using the other FMGC.*

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SCHEDULE 8 NAVIGATION AREAS

1 **Applicable to: ALL**

2 ## BACKGROUND

These instructions apply to all flights within the areas specified in Schedule 8 of the AN(HK)O which fall in Dragonair's AOC region. Dragonair are authorised by HK CAD to operate within these areas provided minimum navigation equipment requirements and procedures are specified for varying stages of flight.

Applicable routes are specified below:
HKG – XIY – HKG

3 ## NAVIGATION PROCEDURES

PRE-DISPATCH – ENTERING A SCHEDULE 8 NAVIGATION AREA

The following equipment shall be serviceable:
Two FMS.
Two GPS or Two MMR (as installed).
Two DME.
Two VOR.
One ADF (Two ADF for any route with NDB only segments).
One Weather Radar.

PRE-DISPATCH – LEAVING A SCHEDULE 8 NAVIGATION AREA

Normal provisions of the MEL apply.

IN-FLIGHT – BEFORE ENTERING A SCHEDULE 8 NAVIGATION AREA

Ensure that the navigation equipment specified above is serviceable, otherwise refer to "Unreliable Navigation Capability" below.

IN-FLIGHT – AFTER ENTERING A SCHEDULE 8 NAVIGATION AREA

If the navigation equipment specified above becomes unserviceable to the extent that it affects navigation accuracy, refer to "Unreliable Navigation Capability" below.

4 ## UNRELIABLE NAVIGATION CAPABILITY

The Commander is to adopt a course of action that will ensure the aircraft is navigated to an area where normal navigation can be resumed as expeditiously as possible. In practice this may include continuing on the flight planned route provided ATC can confirm appropriate navigation by radar.

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GENERAL

Applicable to: ALL

This chapter gives the limitations, procedures and performance for operations from/to runways with a width below 45 m .
This chapter does not constitute an operational approval to operate on narrow runways.
Such authorization must be obtained by the operator from the appropriate authorities.

LIMITATIONS

Applicable to: ALL

Minimum runway width..... 30 m

The dispatch from/to narrow runways is not allowed in case of :
- Nose wheel steering inoperative
- One brake or more inoperative

Autoland is not allowed.

PROCEDURES

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

Diversion to a 45 m wide runway is recommended in case of :
- Rudder jam
- Rudder pedal jam
- Yaw damper system fault
- All failures leading to the loss of the nose wheel steering (HYD Green system loss, double hydraulic failure, double BSCU fault, double LGCIU fault)

Maximum demonstrated crosswind for takeoff and landing:

Dry runway.....38 kt (gust included) for takeoff and landing
Wet runway.....33 kt (gust included) for takeoff and landing
Contaminated runway..... 10 kt (gust included) for takeoff and landing

Note: *These maximum demonstrated crosswind values are based on the assumption that the crew have been trained accordingly.*

Operations on icy runways have not been demonstrated.

PROCEDURES

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

Diversion to a 45 m wide runway is recommended in case of :

- Rudder jam
- Rudder pedal jam
- Yaw damper system fault
- All failures leading to the loss of the nose wheel steering (HYD Yellow system loss, double hydraulic failure, double BSCU fault, double LGCIU fault)

Maximum demonstrated crosswind for takeoff and landing:

Dry runway.....38 kt (gust included) for takeoff and landing
Wet runway.....33 kt (gust included) for takeoff and landing
Contaminated runway..... 10 kt (gust included) for takeoff and landing

Note: *These maximum demonstrated crosswind values are based on the assumption that the crew have been trained accordingly.*

Operations on icy runways have not been demonstrated.

PERFORMANCE

Applicable to: ALL

1 For runways with a width above or equal to 40 m, the basic takeoff performance remains unchanged. For runways with a width below 40 m, ACARS performance will increase the minimum Vmcg and associated minimum V1.

GENERAL

Applicable to: ALL

ILS Precision Runway Monitoring (PRM) approaches can be performed when the airport is equipped with the PRM system. This system enables the ATC to control simultaneous close parallel ILS approaches. The air traffic controllers use the PRM system to monitor the flight path of aircraft that fly parallel approaches. They can check that aircraft do not penetrate the Non Transgression Zone (NTZ) located between the two localizers. If an aircraft penetrates this NTZ, the ATC orders the other parallel aircraft to breakout.

REQUIREMENTS

Applicable to: ALL

- 2 VHF must be operative
- The flight crew must be trained
- Before the approach, the flight crew has to review the ILS PRM approach chart and procedures, and in particular the “Attention All Users” pages for the flight safety.
- The flight crew must know specific breakout phraseology and be ready to apply specific breakout procedures.

BREAKOUT PROCEDURE

Applicable to: ALL

- When the ATC orders so, the breakout is mandatory for the flight safety, considering adjacent aircraft position and trajectory. It requires an immediate response.
- Breakout must be hand-flown
- Breakout orders always include a turn order, and a “climb” or “descent” order depending on what is the most suitable.

BREAKOUT TURN AND CLIMB PROCEDURE

Simultaneously

AP.....OFF
BREAKOUT LEFT (RIGHT), HDGxxx, ALTyyy.....ANNOUNCE
THR LEVERS.....TOGA and back to CL

The SRS GA and GA TRK modes engage. The THR CLB mode engages. The speed is managed. The speed target is the aircraft speed at SRS GA engagement. The FMS GO-AROUND phase becomes active. Thus, the FMS reinserts the approach.

TURN LEFT (RIGHT) AND CLIMB
As the situation is urgent, the flight crew should temporarily not follow the FD orders.

Then

HDGxxx.....TURN & PULL

The GA TRK mode disengages, and the HDG mode engages.

ALTyyy.....TURN & PULL

The SRS GA mode disengages, and the OP CLB mode engages. The speed target becomes the FMS speed target of the CLIMB phase.

SPEED.....PULL AND ADJUST

For the initial breakout procedure, adjust the speed (e.g. 160 kt), in order to avoid an important acceleration, and an increase of workload.

- **When established on the breakout path:**

  AP.....ON

  Before engaging the AP, ensure that the FD bar orders approximately correspond to the aircraft current path.

  SPEED.....SELECT AS RQRD
  FLAPS.....AS RQRD
  GEAR.....AS RQRD
  TCAS MODE SEL.....TA/RA

BREAKOUT TURN AND DESCENT PROCEDURE

Simultaneously

AP.....OFF
TURN LEFT (RIGHT) AND MAINTAIN RATE OF DESCENT
BREAKOUT LEFT (RIGHT), HDGxxx, ALTyyy.....ANNOUNCE

As the situation is urgent, the flight crew should temporarily not follow the FD orders.

Then

HDGxxx.....TURN & PULL

The HDG mode engages. The vertical mode reverts to V/S. The vertical speed target is the aircraft vertical speed at V/S engagement.

ALTyyy..... TURN & PULL

This action defines an altitude target. The OP DES mode and the THR IDLE mode engage. The speed target does not change.

V/S.....MONITOR

CAUTION	*Depending on the speed target, the vertical speed may become excessive. If the rate of descent exceeds 1 000 ft/min, engage the V/S mode and limit the rate of descent to 1 000 ft/min.*

- **When established on the breakout path:**

  AP.....ON

  Before engaging the AP, ensure that the FD bar orders approximately correspond to the aircraft current path.

- **When cleared by ATC:**

  ALTyyy.....TURN

  Select an altitude target for go-around, in accordance with the ATC clearance.

  THR LEVERS.....TOGA and back to CL

  The SRS GA and GA TRK modes engage. The THR CLB mode engages. The speed is managed. The speed target is the aircraft speed at SRS GA engagement. The FMS GO-AROUND phase becomes active.

  HDGxxx ..... PULL

  The GA TRK mode disengages, and the HDG mode engages. The SRS GA mode remains engaged, until ALT engagement.*

  SPEED.....SELECT AS RQRD
  FLAPS.....AS RQRD
  GEAR.....AS RQRD
  TCAS MODE SEL.....TA/RA

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PROCEDURES

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Localization Title	Toc Index	ID	Reason
PRO-SUP-22-10 Other Abnormal Procedures - Crossload of NAV Database	C	1	Improvement of illustration quality.
PRO-SUP-22-20-10 Undue Reversion to V/S during Climb and Descent	D	1	Documentation update: Addition of "Undue Reversion to V/S during Climb and Descent" documentary unit
PRO-SUP-22-20-10 Secondary Flight Plan Erroneous Vapp	E	2	Effectivity update: The information no longer applies to MSN 1253, 1695, 1721, 1984, 2021, 2229, 2238, 2428, 4023, 4247, 5024, 5030, 5362, 5429.
PRO-SUP-22-20-10 Secondary Flight Plan Erroneous Vapp	E	3	Documentation update: Addition of "Secondary Flight Plan Erroneous Vapp" documentary unit
PRO-SUP-22-20-15 Dual FMS Reset After a "CLEAR FROM" in the F-PLN	A	1	HL: Improvement of illustration quality.
PRO-SUP-22-20-15 Misalignment Of FMS F-PLN Legs For ILS Approaches	C	2	Documentation update: Addition of "Misalignment Of FMS F-PLN Legs For ILS Approaches" documentary unit
PRO-SUP-22-20-15 Incorrect Management Of ETA Entry On Predictive GPS Page	E	3	Documentation update: Addition of "Incorrect Management Of ETA Entry On Predictive GPS Page" documentary unit
PRO-SUP-22-20-15 Flight Number Erased Upon AOC Flight Plan Uplink	F	4	Documentation update: Addition of "Flight Number Erased Upon AOC Flight Plan Uplink" documentary unit
PRO-SUP-22-20-15 Undue Reversion to V/S during Climb and Descent	L	5	Documentation update: Addition of "Undue Reversion to V/S during Climb and Descent" documentary unit
PRO-SUP-22-20-15 Undue AP Disconnection or Reversion to V/S during Climb and Descent	M	6	Documentation update: Addition of "Undue AP Disconnection or Reversion to V/S during Climb and Descent" documentary unit
PRO-SUP-22-20-15 VOR/DME and VOR/TACAN Not Automatically Tuned	N	7	Documentation update: Addition of "VOR/DME and VOR/TACAN Not Automatically Tuned" documentary unit
PRO-SUP-24 Computer Reset Table - 26 - Fire	C	9	Update of the technical wording
PRO-SUP-24 Computer Reset Table - 27 - Flight Controls	C	1	Incorporation of DU ref link to flight control check procedure during SOP TAXI for ELAC or SEC.
			Addition of information for the ELAC or SEC reset malfunction.
PRO-SUP-24 Computer Reset Table - 27 - Flight Controls	C	2	Addition of information regarding the SEC reset on ground after the flight control check.

Localization Title	Toc Index	ID	Reason
PRO-SUP-30 Operations in Icing Conditions	B	1	Following introduction of In Flight Landing Distance, new reference added for landing performance assessment.
PRO-SUP-34 TCAS - Operational Recommendations	F	1	Improvement of illustration quality.
PRO-SUP-34 TCAS - Operational Recommendations	F	2	Documentation update: Addition of "TCAS - Operational Recommendations" documentary unit
PRO-SUP-34 Automatic Dependent Surveillance - Broadcast (ADS-B)	L	3	Documentation update: Addition of "Automatic Dependent Surveillance - Broadcast (ADS-B)" documentary unit
PRO-SUP-45 USE OF CFDS FOR DISPATCH	A	1	Documentation update: Deletion of information.
PRO-SUP-46-20 ACARS PROCEDURES	A	1	Documentation update: Addition of "ACARS PROCEDURES" documentary unit
PRO-SUP-46-20 DRAGONAIR AOC MENU PAGES	B	2	Documentation update: Addition of "DRAGONAIR AOC MENU PAGES" documentary unit
PRO-SUP-46-20 AOC APPLICATIONS SUMMARY	C	3	Documentation update: Addition of "AOC APPLICATIONS SUMMARY" documentary unit
PRO-SUP-46-20 ACARS SYSTEMS AND AIRCRAFT EQUIPMENT - Messages	D	4	Documentation update: Addition of "ACARS SYSTEMS AND AIRCRAFT EQUIPMENT - Messages" documentary unit
PRO-SUP-46-20 ACARS SYSTEMS AND AIRCRAFT EQUIPMENT - SYSTEMS	D	5	Documentation update: Addition of "ACARS SYSTEMS AND AIRCRAFT EQUIPMENT - SYSTEMS" documentary unit
PRO-SUP-46-20 ACARS SYSTEMS AND AIRCRAFT EQUIPMENT - ACARS EQUIPMENT	D	6	Documentation update: Addition of "ACARS SYSTEMS AND AIRCRAFT EQUIPMENT - ACARS EQUIPMENT" documentary unit
PRO-SUP-46-20 OPERATING INSTRUCTIONS - Initialisation	E	7	Documentation update: Addition of "OPERATING INSTRUCTIONS - Initialisation" documentary unit
PRO-SUP-46-20 OPERATING INSTRUCTIONS - DSP FREQUENCIES	E	8	Documentation update: Addition of "OPERATING INSTRUCTIONS - DSP FREQUENCIES" documentary unit
PRO-SUP-46-20 OPERATING INSTRUCTIONS - Manual tune	E	9	Documentation update: Addition of "OPERATING INSTRUCTIONS - Manual tune" documentary unit
PRO-SUP-46-20 OPERATING INSTRUCTIONS - OOOI TIMES	E	10	Documentation update: Addition of "OPERATING INSTRUCTIONS - OOOI TIMES" documentary unit
PRO-SUP-46-20 OPERATING INSTRUCTIONS -TRANSIT PROCEDURE	E	11	Documentation update: Addition of "OPERATING INSTRUCTIONS -TRANSIT PROCEDURE" documentary unit

Localization Title	Toc Index	ID	Reason
PRO-SUP-46-20 COMMANDER'S ADMINISTRATIVE REPORT - AOC INIT PAGE	F	12	Documentation update: Addition of "COMMANDER'S ADMINISTRATIVE REPORT - AOC INIT PAGE " documentary unit
PRO-SUP-46-20 COMMANDER'S ADMINISTRATIVE REPORT - AOC CREW INFO PAGE	F	13	Documentation update: Addition of "COMMANDER'S ADMINISTRATIVE REPORT - AOC CREW INFO PAGE " documentary unit
PRO-SUP-46-20 COMMANDER'S ADMINISTRATIVE REPORT - AOC CAR 1/4 PAGE	F	14	Documentation update: Addition of "COMMANDER'S ADMINISTRATIVE REPORT - AOC CAR 1/4 PAGE " documentary unit
PRO-SUP-46-20 COMMANDER'S ADMINISTRATIVE REPORT - AOC CAR 2/4 PAGE	F	15	Documentation update: Addition of "COMMANDER'S ADMINISTRATIVE REPORT - AOC CAR 2/4 PAGE " documentary unit
PRO-SUP-46-20 COMMANDER'S ADMINISTRATIVE REPORT - AOC CAR 3/4 PAGE	F	16	Documentation update: Addition of "COMMANDER'S ADMINISTRATIVE REPORT - AOC CAR 3/4 PAGE" documentary unit
PRO-SUP-46-20 COMMANDER'S ADMINISTRATIVE REPORT - AOC CAR 4/4 PAGE	F	17	Documentation update: Addition of "COMMANDER'S ADMINISTRATIVE REPORT - AOC CAR 4/4 PAGE " documentary unit
PRO-SUP-46-20 COMMANDER'S ADMINISTRATIVE REPORT - AOC CAR COMMENT 1/2 PAGE	F	18	Documentation update: Addition of "COMMANDER'S ADMINISTRATIVE REPORT - AOC CAR COMMENT 1/2 PAGE" documentary unit
PRO-SUP-46-20 POST FLIGHT ACTIONS	G	19	Documentation update: Addition of "POST FLIGHT ACTIONS" documentary unit
PRO-SUP-46-20 AOC FLIGHT PLAN REQUEST	H	20	Documentation update: Addition of "AOC FLIGHT PLAN REQUEST" documentary unit
PRO-SUP-46-20 COMMUNICATION	I	21	Documentation update: Addition of "COMMUNICATION" documentary unit
PRO-SUP-46-20 MEDLINK	J	22	Documentation update: Addition of "MEDLINK" documentary unit
PRO-SUP-46-20 LOADSHEETS	K	23	Documentation update: Addition of "LOADSHEETS" documentary unit
PRO-SUP-46-20 ATC INTERFACE	L	24	Documentation update: Addition of "ATC INTERFACE" documentary unit
PRO-SUP-46-20 SYSTEM TROUBLE SHOOTING	M	25	Documentation update: Addition of "SYSTEM TROUBLE SHOOTING" documentary unit
PRO-SUP-46-20 ACARS ADMINISTRATION	N	26	Documentation update: Addition of "ACARS ADMINISTRATION" documentary unit
PRO-SUP-70 CROSSBLEED ENGINE START	D	1	Update of the technical wording
PRO-SUP-70 Start Valve Manual Operation	E	2	Caution introduced to ensure the security of the ground crew in case of start valve manual operation.

Localization Title	Toc Index	ID	Reason
PRO-SUP-91-10 Thrust and Airspeed	D	1	Improvement of illustration quality.
PRO-SUP-91-10 Thrust and Airspeed	D	2	Improvement of illustration quality.
PRO-SUP-91-30 GENERAL	A	1	Update of the technical wording
PRO-SUP-91-60 LOW WEATHER MINIMA OPERATIONS - DESCENT	A	1	Update of the technical wording
PRO-SUP-91-60 LOW WEATHER MINIMA OPERATIONS - AUTOLAND OPERATIONS ON RUNWAYS NOT APPROVED FOR LVO, OR WHEN LVP ARE NOT IN FORCE	A	2	Update of the technical wording
PRO-SUP-91-60 LOW WEATHER MINIMA OPERATIONS - TASK SHARING FOR LVO	A	3	Update of the technical wording

IN-FLIGHT VIBRATION REPORTING

Applicable to: ALL

CAUTION	There is no requirement to carry out any specific manoeuvre to ascertain the effect of flight control inputs on airframe vibrations. Completion of the Vibration Reporting form should be based on observations made during normal flight conditions. The autopilot should not be disconnected to fascilitate the assessment process.

In-flight vibration events whether transient or continuous need to be actioned by Engineering in a timely fashion. Under normal circumstances an initial AML entry triggers Engineering troubleshooting and rectification.
To expedite the process and ensure detailed event information is reported, a “Vibration Reporting Sheet” form [ENG/MC/VIB] is carried in the ENG documents folder.

For all vibration events, an AML entry must be made detailing the basic event details.
- Make use of the form to detail the parameters required to allow timely follow-up action from Engineering.
- At the end of the flight, any completed forms must be left in the AML for the receiving Engineer’s action.
- If nil forms are present, raise a AML entry to that effect and record the following parameters:

  • Aircraft Speed (kts)
  • Flight Phase (INITIAL/CLIMB/CRUISE/DESCENT/APPROACH)
  • Slat/Flap Position (0, 1, 2, 3 or FULL)
  • Flight Control Oscillations visible on ECAM (YES/NO). If “YES”, detail which flight control surface.
  • Affected Area (Cockpit, FWD, MID or AFT Cabin)
  • Audible Noise (YES/NO)

VIBRATION REPORTING FORM

A320/A321/A330/A340 VIBRATION REPORTING SHEET — CATHAY PACIFIC

IMPORTANT

(ALL FIELDS MARKED (*) ARE MANDATORY)
HOWEVER, PLEASE COMPLETE ALL FIELDS TO ALLOW FOR INCISIVE FOLLOW-UP ACTIONS ON AIRFRAME VIBRATION.

*AIRCRAFT: | *FLIGHT NO.: | *DATE: | *CAPTAIN:

IN EACH BOX, PLEASE ANNOTATE THE RELEVANT DETAILS:

GROSS WEIGHT: | ALTITUDE: FT | *SPEED: KTS

ENG VIBRATION PARAMETERS: #1: | #2: | #3: | #4:

AUTOPILOT CONFIGURATION: AP1: ON / OFF | AP2: ON / OFF

*FLIGHT PHASE: INITIAL CLIMB | CLIMB | CRUISE | DESCENT | APPROACH

TURBULENCE: YES / NO | LANDING GEAR: UP / DOWN

*SLAT/FLAP: 0 | 1 | 2 | 3 | FULL

- *FLIGHT CONTROL OSCILLATIONS VISIBLE ON ECAM: YES / NO
  - →IF YES? ON: RUDDER | AILERON: LH / RH | ELEVATOR: LH / RH
- *CREW NOTICED VIBRATIONS CHANGED/CEASED WITH NORMAL FLIGHT CONTROL INPUTS WITH THE AUTOPILOT ENGAGED OR IN MANUAL FLIGHT: YES / NO
  - →IF YES? ON: ROLL: YES / NO | YAW: YES / NO | PITCH: YES / NO | SPEED BRAKE: YES / NO
- *VIBRATION CAN BE STOPPED BY THE FOLLOWING PARAMETER CHANGE:
  - THRUST: YES / NO | ALTITUDE: YES / NO | SPEED: YES / NO
- *AFFECTED AREA:
  - COCKPIT | FWD CABIN | MID CABIN | AFT CABIN
  - SPECIFIC LOCATION:
- *AUDIBLE NOISE: YES / NO
- VIBRATION INTENSITY: LIGHT | MODERATE | STRONG
- VIBRATION FELT IN: LATERAL | VERTICAL | UNKNOWN
- GENERAL CREW COMMENTS (I.E. FREQUENCY, ORIGIN, NOISE, SPEED CHANGE EFFECTS, VIBRATION STOPS AT THE END OF CLIMB, VIBRATION STARTS AT BEGINNING OF THE DESCENT, ..., AND ANY OTHER COMMENTS):

.....
.....
.....
.....
.....
.....

FOP: LEAVE COMPLETED FORMS IN THE TECH LOG FOR ATTENTION ENG.
ENG: FAX ALL COMPLETED FORMS TO CX MC: +852 2362 7416.

FORM No: ENG/MC/VIB Rev 00

GENERAL

Applicable to: ALL

This chapter shows the speed symbols and definitions.
The source of the computation is also given, when applicable.

CHARACTERISTIC SPEEDS

Applicable to: ALL 320

The characteristic speeds displayed on the PFD are computed by the Flight Augmentation Computer (FAC), according to the FMS weight data (for PFD/MCDU display consistency and accuracy purposes), and aerodynamic data as a backup.
VLS (of normal landing configuration: CONF 3 or FULL), F, S, and Green Dot speeds are also displayed on the MCDU TAKEOFF and/or APPR pages.
These values are computed by the FMS, based on the aircraft gross weight (which is computed according to the entered ZFW and the FOB), or the predicted grossweight (for approach or go-around).

VS : Stalling speed.
Not displayed.
For a conventional aircraft, the reference stall speed, VSmin, is based on a load factor that is less than 1 g. This gives a stall speed that is lower than the stall speed at 1 g. All operating speeds are expressed as functions of this speed (for example, VREF = 1.3 VSmin).
Because aircraft of the A320 family have a low-speed protection feature (alpha limit) that the flight crew cannot override, Airworthiness Authorities have reconsidered the definition of stall speed for these aircraft.
All the operating speeds must be referenced to a speed that can be demonstrated fight tests. This speed is designated VS1g.

Airworthiness Authorities have agreed that a factor of 0.94 represents the relationship between VS1g for aircraft of the A320 family and VSmin for conventional aircraft types. As a result, Authorities allow aircraft of the A320 family to use the following factors:
- V2 = 1.2 × 0.94 VS1g = 1.13 VS1g
- VREF = 1.3 × 0.94 VS1g = 1.23 VS1g

These speeds are identical to those that the conventional 94 % rule would have defined for these aircraft. The A318, A319, A320, and A321 have exactly the same maneuver margin that a conventional aircraft would have at its reference speeds.
The FCOM uses VS for VS1g.

VLS : Lowest Selectable Speed.
Represented by the top of an amber strip along the airspeed scale on the PFD.
Computed by the FAC, based on aerodynamic data, and corresponds to 1.13 VS during takeoff, or after a touch and go.
Becomes 1.23 VS, after retraction of one step of flaps.
Becomes 1.28 VS, when in clean configuration.

Note: *If in CONF 0 VLS were 1.23 VS (instead of 1.28 VS), the alpha protection strip would hit the VLS strip on the PFD.*

Above 20 000 ft, VLS is corrected for Mach effect to maintain a buffet margin of 0.2 g.
In addition, VLS increases with speed brakes extension.

F : Minimum speed at which the flaps may be retracted at takeoff.
In approach, used as a target speed when the aircraft is in CONF 2 or CONF 3.
Represented by "F" on the PFD speed scale. Equal to about 1.23 VS of CONF 1 + F.

S : Minimum speed at which the slats may be retracted at takeoff.
In approach, used as a target speed when the aircraft is in CONF 1.
Represented by "S" on the PFD airspeed scale.
Equal to about 1.29 VS of clean configuration.

O : Green dot speed.
Engine-out operating speed in clean configuration.
(Best lift-to-drag ratio speed).
Also corresponds to the final takeoff speed.
Represented by a green dot on the PFD scale.
Below 20 000 ft equal to 2 × weight (tons) +80
Above 20 000 ft, add 1 kt per 1 000 ft

CHARACTERISTIC SPEEDS

Applicable to: ALL 321

The characteristic speeds displayed on the PFD are computed by the Flight Augmentation Computer (FAC), according to the FMS weight data (for PFD/MCDU display consistency and accuracy purposes), and aerodynamic data as a backup.
VLS (of normal landing configuration: CONF 3 or FULL), F, S, and Green Dot speeds are also displayed on the MCDU TAKEOFF and/or APPR pages.
These values are computed by the FMS, based on the aircraft gross weight (which is computed according to the entered ZFW and the FOB), or the predicted grossweight (for approach or go-around).

VS : Stalling speed.
Not displayed.
For a conventional aircraft, the reference stall speed, VSmin, is based on a load factor that is less than 1 g. This gives a stall speed that is lower than the stall speed at 1 g. All operating speeds are expressed as functions of this speed (for example, VREF = 1.3 VSmin).
Because aircraft of the A320 family have a low-speed protection feature (alpha limit) that the flight crew cannot override, Airworthiness Authorities have reconsidered the definition of stall speed for these aircraft.
All the operating speeds must be referenced to a speed that can be demonstrated fight tests. This speed is designated VS1g.

Airworthiness Authorities have agreed that a factor of 0.94 represents the relationship between VS1g for aircraft of the A320 family and VSmin for conventional aircraft types. As a result, Authorities allow aircraft of the A320 family to use the following factors:
- V2 = 1.2 × 0.94 VS1g = 1.13 VS1g
- VREF = 1.3 × 0.94 VS1g = 1.23 VS1g

These speeds are identical to those that the conventional 94 % rule would have defined for these aircraft. The A318, A319, A320, and A321 have exactly the same maneuver margin that a conventional aircraft would have at its reference speeds.
The FCOM uses VS for VS1g.

VLS : Lowest Selectable Speed.
Represented by the top of an amber strip along the airspeed scale on the PFD.
Computed by the FAC, based on aerodynamic data, and corresponds to 1.13 VS during takeoff, or after a touch and go.
Becomes 1.23 VS, after retraction of one step of flaps.
Becomes 1.28 VS, when in clean configuration.

Note: *If in CONF 0 VLS were 1.23 VS (instead of 1.28 VS), the alpha protection strip would hit the VLS strip on the PFD.*

Above 20 000 ft, VLS is corrected for Mach effect to maintain a buffet margin of 0.2 g.
In addition, VLS increases with speed brakes extension.

F : Minimum speed at which the flaps may be retracted at takeoff.
In approach, used as a target speed when the aircraft is in CONF 2 or CONF 3.
Represented by “F” on the PFD speed scale. Equal to about 1.19 VS of CONF 1 + F.

S : Minimum speed at which the slats may be retracted at takeoff.
In approach, used as a target speed when the aircraft is in CONF 1.
Represented by “S” on the PFD airspeed scale.
Equal to about 1.25 VS of clean configuration.

O : Green dot speed.
Engine-out operating speed in clean configuration.
(Best lift-to-drag ratio speed).
Also corresponds to the final takeoff speed.
Represented by a green dot on the PFD scale.
Below 20 000 ft equal to 1.5 × weight (tons) + 110
Above 20 000 ft, add 1 kt per 1 000 ft

PROTECTION SPEEDS

Applicable to: ALL

Vα PROT, Vα MAX and VSW are computed by the FAC, based on aerodynamic data. They are only used for display on the PFD, and not for flight control protection (the activation of the protections is computed by the ELAC).

Vα PROT : Angle of attack protection speed.
Corresponds to the angle of attack at which the angle of attack protection becomes active.
Represented by the top of a black and amber strip along the PFD speed scale, in normal law.

Vα MAX : Maximum angle of attack speed.
Corresponds to the maximum angle of attack that may be reached in pitch normal law.
Represented by the top of a red strip along the PFD speed scale, in normal law.

VSW : Stall warning speed.
Represented by a red and black strip along the speed scale when the flight control normal law is inoperative.

VMAX : Represented by the bottom of a red and black strip along the speed scale.
Determined by the FAC according to the aircraft configuration.
Is equal to VMO (or speed corresponding to MMO), VLE or VFE.

LIMIT SPEEDS

Applicable to: ALL

VA : Maximum design maneuvering speed. This corresponds to the maximum structural speed permitted for full control deflection, if alternate or direct law is active.

VMCG : Minimum speed, on the ground during takeoff, at which the aircraft can be controlled by only using the primary flight controls, after a sudden failure of the critical engine, the other engine remaining at takeoff power.

VMCA : Minimum control speed in flight at which the aircraft can be controlled with a maximum bank of 5 °, if one engine fails, the other engine remaining at takeoff power (takeoff flap setting, gear retracted).

VMCL : Minimum control speed in flight, at which the aircraft can be controlled with a maximum bank of 5 °, if one engine fails, the other engine remaining at takeoff power (approach flap setting).

VFE : Maximum speed for each flap configuration.

VLE : Maximum speed with landing gear extended.

VLO : Maximum speed for landing gear operation.

VMO : Maximum speed.

VFE NEXT : Maximum speed for the next (further extended) flap lever position.

OTHER SPEEDS

Applicable to: ALL 321

V1 : The highest speed, during takeoff, at which the flight crew has a choice between continuing the takeoff or stopping the aircraft.
Represented by "1" on the airspeed scale (or the V1 value when it is off the airspeed scale).
Inserted manually through the MCDU by the flight crew.
Displayed on the MCDU TAKEOFF page.

VR : The speed at which the pilot rotates in order to reach V2 at an altitude of 35 ft at the latest after an engine failure.
Inserted manually through the MCDU by the flight crew.
Displayed on the MCDU TAKEOFF page.

V2 : Takeoff safety speed that the aircraft attains at the latest at an altitude of 35 ft with one engine failed, and maintains during the second segment of the takeoff.
Represented by the SPEED SELECT symbol on the speed scale.
Minimum value equal to 1.13 VS for the corresponding configuration.
Inserted manually through the MCDU by the flight crew.
Displayed on the MCDU TAKEOFF page.

VREF : Reference speed used for normal final approach.
Equal to 1.23 × VS of CONF FULL.
Displayed on the MCDU APPR page, if landing is planned in CONF FULL (VLS CONF FULL).

VAPP : Final approach speed.
Displayed on MCDU APPR page.
Calculated by the FMGCs.
Represents : VAPP = VLS + wind correction.
The wind correction is limited to a minimum of 5 kt and a maximum of 15 kt.
The flight crew may modify VAPP through the MCDU.

- During autoland or when A/THR is on or in case of ice accretion or gusty crosswing greater than 20 kt, VAPP must not be lower than VLS +5 kt.
- For landing in configuration 3 with ice accretion VAPP must not be lower than VLS +10 kt.

VAPP TARGET : Represented by a magenta triangle.
Calculated by the FMGCs
Gives efficient speed guidance in approach during various windy conditions.
Represents :
VAPP TARGET = GS mini + actual headwind (measured by ADIRS)
GS mini = VAPP – TOWER WIND (headwind component along runway axis calculated by FMGC from tower wind entered on MCDU).

OTHER SPEEDS

Applicable to: ALL 320

V1 : The highest speed, during takeoff, at which the flight crew has a choice between continuing the takeoff or stopping the aircraft.
Represented by "1" on the airspeed scale (or the V1 value when it is off the airspeed scale).
Inserted manually through the MCDU by the flight crew at the latest.
Displayed on the MCDU TAKEOFF page.

VR : The speed at which the pilot rotates in order to reach V2 at an altitude of 35 ft at the latest after an engine failure.
Inserted manually through the MCDU by the flight crew.
Displayed on the MCDU TAKEOFF page.

V2 : Takeoff safety speed that the aircraft attains at the latest at an altitude of 35 ft with one engine failed, and maintains during the second segment of the takeoff.
Represented by the SPEED SELECT symbol on the speed scale.
Minimum value equal to 1.13 VS for the corresponding configuration.
Inserted manually through the MCDU by the flight crew.
Displayed on the MCDU TAKEOFF page.

VREF : Reference speed used for normal final approach.
Equal to 1.23 × VS of CONF FULL.
Displayed on the MCDU APPR page, if landing is planned in CONF FULL (VLS CONF FULL).

VAPP : Final approach speed.
Displayed on MCDU APPR page.
Calculated by the FMGCs.
Represents : VAPP = VLS + wind correction
The wind correction is limited to a minimum of 5 kt and a maximum of 15 kt.

The flight crew may modify VAPP through the MCDU.
- During autoland or when A/THR is on or in case of ice accretion or gusty crosswind greater than 20 kt, VAPP must not be lower than VLS +5 kt.

VAPP TARGET : Represented by a magenta triangle.
Calculated by the FMGCs
Gives efficient speed guidance in approach during various windy conditions.
Represents :
VAPP TARGET = GS mini + actual headwind (measured by ADIRS)
GS mini = VAPP – TOWER WIND (headwind component along runway axis calculated by FMGC from tower wind entered on MCDU).

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AIR CONDITIONING

Applicable to: ALL

An external HP source may be used for air conditioning, provided the air supply is confirmed to be free from oil contamination.

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AUTOMATIC FMGS RESET AND RESYNCHRONIZATION

Applicable to: ALL

FM RESET

When the FM software cannot work properly or receives instructions to perform impossible operations, it automatically resets itself. A resynchronization with the other FM always follows. When the reset is a minor one, the system will recover by itself. One single reset lasts 2 to 3 s maximum followed by 25 s of resynchronization.

When the reset is a major one:

- Resets recur at short intervals (several in 2 or 3 min)
- The memories are cleared, leading to the loss of F-PLN, GW, CI, CRZ FL, MCDU-entered speeds and NAVAIDs and to database switching.

Applicable to: ALL

FM RESYNCHRONIZATION

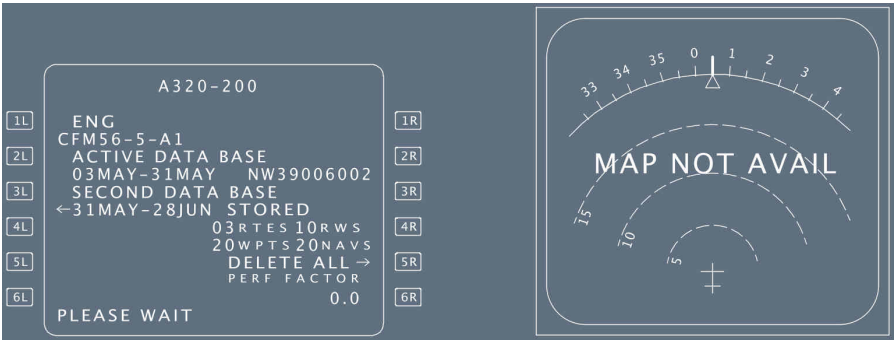
An FM resynchronization automatically occurs after an FM reset but it may occur independently each time self comparisons between FM1 and FM2 reveal discrepancies.
One single resynchronization lasts approximately 25 s.
If 5 several resynchronizations occur within 5 min, independent mode commences.

Applicable to: ALL

FMGC STATUS DURING A RESET/RESYNCHRONIZATION

While a RESET/RESYNCH occurs:

- The ND shows “MAP NOT AVAIL”
- The MCDU reverts to the A/C STATUS page, with “PLEASE WAIT” displayed in the scratchpad
- Autotuning of Navaids (VOR, DME, ADF) are lost on the failed side
- AP and managed modes may be transiently lost (reversion to HDG/V/S or TRK/FPA)
- If the pilot presses a key while the scratchpad is showing “PLEASE WAIT”, there is no change at MCDU level. This is normal, and the crew should no respond by pulling the MCDU circuit breaker.



Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

SINGLE RESET OR DUAL RESET WITH AUTORECOVERY

If the RESET/RESYNCH succeeds, all functions are recovered.

Note: *When an FMGC is recovered, its FD if previously engaged, is also recovered and its status is displayed on the FMA.*

PROCEDURE

RESELECT the convenient MCDU page.
REENGAGE managed modes and the AP.
WAIT 1 min after the "PLEASE-WAIT" message has disappeared, before engaging the AP/FD of the failed FMGC.
If "MAP NOT AVAIL" remains displayed, along with "SET OFFSIDE RNG/MODE" on one ND, temporarily SELECT a different mode on the corresponding EIS control panel.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

SINGLE RESET OR DUAL RESET WITH AUTORECOVERY

If the RESET/RESYNCH succeeds, all functions are recovered.

Note: *When an FMGC is recovered, its FD if previously engaged, is also recovered and its status is displayed on the FMA.*

PROCEDURE

RESELECT the convenient MCDU page.
REENGAGE managed modes and the AP.
WAIT 1 min after the "PLEASE-WAIT" message has disappeared, before engaging the AP/FD of the failed FMGC.

If both "MAP NOT AVAIL" and "SET OFFSIDE RNG/MODE" remain displayed on one ND, or if "OFFSIDE FM CONTROL" remains displayed, temporarily SELECT a different mode or range on the corresponding EIS control panel.

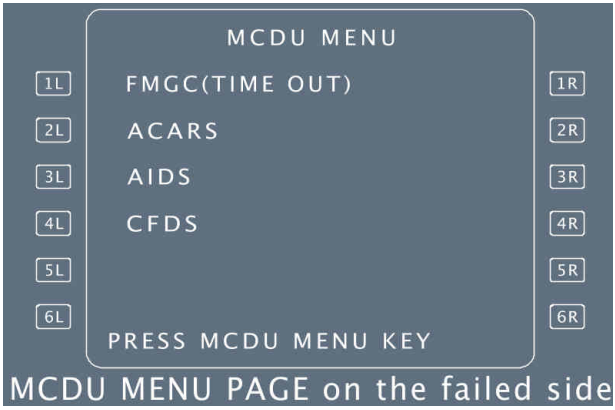
Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

SINGLE LATCH

If five successive resets occur, the failing FMGC will latch, and single mode operation will start.

While failed, the following occurs:

- The failed ND side displays "MAP NOT AVAIL" and "SELECT OFFSIDE RNG/MODE" (if the NDs are not both in the same mode or range)
- The MCDU reverts to the MENU PAGE and shows an "FMGC TIME OUT" prompt
- If the AP and FD were previously engaged on the failed side, the AP and FD disengage and the right-hand column of the FMA shows that the operating FD is offside. The ECAM displays the "AP OFF" warning, and the master warning light and audio remind the pilot of the AP disengagement
- All functions are restored on the operative side.



MCDU MENU PAGE on the failed side

PROCEDURE

Select the same range and mode on both NDs to give the failed ND side something to display.
Select any function key on the affected FMGC MCDU. (The page will display "OPP FMGC IN PROGRESS").

Both MCDUs are now driven by the other FMGC, and only one AP/FD is available. The system works in SINGLE Mode.

Perform a manual reset of the failed FMGC, when convenient.

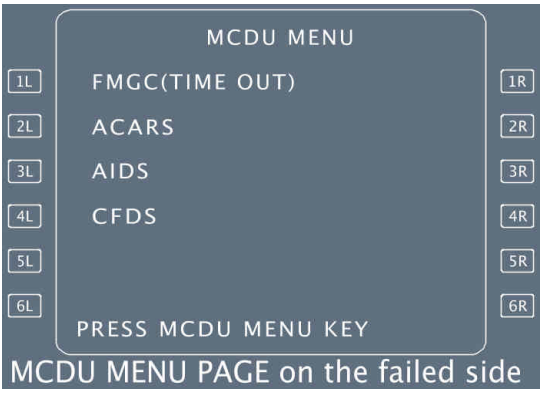
Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

SINGLE LATCH

If five successive resets occur, the failing FMGC will latch, and single mode operation will start.

While failed, the following occurs:

- On the ND usually associated with the failed FMGC:
  If the NDs are not both in the same mode or range, the associated ND displays "MAP NOT AVAIL" and "SET OFFSIDE RNG/MODE". If the NDs are in the same mode and range, the associated ND displays the "OFFSIDE FM CONTROL" amber message
- The MCDU reverts to the MENU PAGE and shows an "FMGC TIME OUT" prompt
- If the AP and FD were previously engaged on the failed side, the AP and FD disengage and the right-hand column of the FMA shows that the operating FD is offside. The ECAM displays the "AP OFF" warning, and the master warning light and audio remind the pilot of the AP disengagement.
- All functions are restored on the operative side.



MCDU MENU PAGE on the failed side

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Select the same range and mode on both NDs to give the failed ND side something to display.
Select any function key on the affected FMGC MCDU. (The page will display "OPP FMGC IN PROGRESS").

Both MCDUs are now driven by the other FMGC, and only one AP/FD is available. The system works in SINGLE Mode.

Perform a manual reset of the failed FMGC, when convenient.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

DUAL RESET WITH LOSS OF DATA AND AUTORECOVERY

Three successive dual resets without result erases all pilot-entered data (F-PLN, GW, CRZ FL, CI...).

When FMGS recovery is obtained:
- Database cycle may have switched
- The FM position bias is lost. The FM position returns to the MIX IRS position
- Autotuning the VOR/DME is restored, based on the aircraft's IRS position
- FMGS tuning of the ILS and ADF is not possible
- Lateral and vertical managed mode cannot reengage
- The "CAB PR LDG ELEV FAULT" ECAM message is displayed
- A map display may be lost on one ND.

PROCEDURE

When the system has recovered:

SELECT the initial database.
SELECT DIR TO the required downpath waypoint.
SELECT LAT REV at the downpath waypoint, and redefine the DESTINATION.
SELECT the FUEL PRED page, and enter GW.
SELECT the PROG page, and enter CRZ FL.
SELECT the PERF page, and enter CI.
CHECK or reengage (as appropriate) the relevant speed/Mach target and vertical mode.

Redefine the flight plan for the remainder of the flight, as the opportunity presents itself.

If "MAP NOT AVAIL" remains displayed, along with "SET OFFSIDE RNG/MODE" on one ND, temporarily SELECT a different mode on the corresponding EFIS control panel.
PERFORM a NAV accuracy check, when possible.

A manual FM position update should be considered, if MIX IRS and actual positions differ by more than 20 nm.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

DUAL RESET WITH LOSS OF DATA AND AUTORECOVERY

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SELECT DIR TO the required downpath waypoint.
SELECT LAT REV at the downpath waypoint, and redefine the DESTINATION.
SELECT the FUEL PRED page, and enter GW.
SELECT the PROG page, and enter CRZ FL.
SELECT the PERF page, and enter CI.
CHECK or reengage (as appropriate) the relevant speed/Mach target and vertical mode.

Redefine the flight plan for the remainder of the flight, as the opportunity presents itself.

If both "MAP NOT AVAIL" and "SET OFFSIDE RNG/MODE" remain displayed on one ND, or if "OFFSIDE FM CONTROL" remains displayed, temporarily SELECT a different mode or range on the corresponding EFIS control panel.
PERFORM a NAV accuracy check, when possible.

A manual FM position update should be considered, if MIX IRS and actual positions differ by more than 20 nm.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

DUAL LATCH

- Both FMGCs are inoperative. FM and FG capability are lost
- Both NDs display "MAP NOT AVAILABLE". NAVAID tuning is not performed
- AP/FD, A/THR are lost
- FMGC (TIME OUT) subsystem page is displayed on both MCDUs
- The following messages are displayed on the ECAM:
  "CAB PR LDG ELEV FAULT"
  "AUTO FLT AP OFF", if AP was engaged
  "AUTO FLT A/THR OFF", if A/THR was engaged.

PROCEDURE

FLY raw data.
TUNE necessary NAVAIDs using the RMPs.
PERFORM a manual reset of both FMGCs.

Note: *A recovery will result in the loss of all pilot-entered data.*

Note for all FMGS automatic resets

- A single or double FM auto-reset does not affect an ILS approach below 700 ft AGL. ILS frequency is locked and AP/FDs remain engaged
- Above 700 ft , the loss of ILS tuning due to a dual reset will cause a loss of LOC and G/S, and the disengagement of APs and FDs
- During a non ILS approach, if the master FMGC fails, AP/FD and managed modes are lost and FDs engage in basic modes.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

DUAL LATCH

- Both FMGCs are inoperative. FM and FG capability are lost
- Both NDs display "MAP NOT AVAILABLE". NAVAID tuning is not performed
- AP/FD, A/THR are lost
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- The following messages are displayed on the ECAM:
  "CAB PR LDG ELEV FAULT"
  "AUTO FLT AP OFF", if AP was engaged
  "AUTO FLT A/THR OFF", if A/THR was engaged.

PROCEDURE

FLY raw data.
TUNE necessary NAVAIDs using the RMPs.
PERFORM a manual reset of both FMGCs.

■ **If successful, refer to dual reset with loss of data and auto recovery:**

Note: *A recovery will result in the loss of all pilot-entered data.*

■ **If unsuccessful:**

FLY raw data.

Select the NAV B/UP prompt on both MCDU DATA pages.

(Refer to DSC-22_20-60-130 General HOW TO USE, concerning navigation backup operation).

SET the landing elevation of the destination on the overhead panel.

Note for all FMGS automatic resets

- A single or double FM auto-reset does not affect an ILS approach below 700 ft AGL. ILS frequency is locked and AP/FDs remain engaged
- Above 700 ft , the loss of ILS tuning due to a dual reset will cause a loss of LOC and G/S, and the disengagement of APs and FDs
- During a non ILS approach, if the master FMGC fails, AP/FD and managed modes are lost and FDs engage in basic modes.

MANUAL FMGS RESET

Applicable to: ALL

On rare occasions, the FMGC may require manual resetting.
If this occurs in flight, reset one FMGC at a time.

MANUAL RESET OF ONE FMGC

- Before resetting FMGC 1 (or 2), SWITCH OFF FD 1 (or 2)
  After applying external power or APU generator power, wait 2 min before resetting the FMGC circuit breakers
- Pull the CB of the affected FMGC and reset it after 5 s. The FMGC circuit breakers are:
  - AUTO FLT/FMGC 1 B2 ON 49 VU
  - AUTO FLT/FMGC 2 M17 ON 121 VU.

CAUTION	Always wait 1 min after the “PLEASE WAIT” message disappears from the MCDU, before engaging or reengaging the FDs and the AP of the reset FMGC.

MANUAL RESET OF BOTH FMGCS

When the aircraft is on ground with the engines stopped, the flight crew may attempt a double and simultaneous CB reset when a single CB reset has failed.
Apply the above-mentioned procedure to both FMGCs.

OTHER ABNORMAL PROCEDURES

Applicable to: ALL

ERRONEOUS PREDICTIONS

The FMGS may display temporary erroneous predictions that can affect such data as ECON speed/Mach, optimum flight level, fuel or time predictions.
If erroneous predictions are observed:

ON GROUND, OR IN FLIGHT

Check the cruise temperature (sign and value), the gross weight, and the cruise flight level.
REENTER the same cost index to restart a computation (In descent or approach, a cost index change does not restart a computation), or
MAKE a COPY ACTIVE, then activate the secondary, or
MAKE a DIR TO the "TO"waypoint.

Applicable to: ALL

SPURIOUS ENGINE OUT INDICATION

If a spurious engine-out is detected:

PROCEDURE

PRESS the EO CLR prompt of the MCDU PERF page
RE-ENGAGE previous vertical mode
RE-ENTER preselected speeds (if any). No other consequences are to be expected.

Applicable to: ALL

"FM/GPS ⧏ POS DISAGREE" MESSAGE

This ECAM message is triggered when either one of the FM positions differs from either of the GPS positions by more than 0.5 min of latitude or longitude. This may occur when an update of the FM positions is performed automatically by the FM (Takeoff update or LOC update in approach with unprecise airfield or NAVAID position within the database), or manually by the pilot (manual update). For procedure, Refer to FCOM ABN 34 / NAV FM/GPS POS DISGREE and *Refer to QRH/ABN-34 NAV FM/GPS POS DISAGREE*.

Applicable to: ALL

"CHECK GW"MESSAGE

The "CHECK GW MESSAGE" appears on the MCDU when the Gross Weight (GW) computed by the FMGC and the GW computed by the FAC disagree by more than 7 t (16 055 lb).
When this message appears:

FMS FOB.....CHECK

CALL UP the MCDU FUEL PRED page and compare the FOB to the FOB from the Computerized F-PLN. Correct it if necessary.

FMS GW value.....CHECK

CALL UP the MCDU FUEL PRED page and compare the FMS GW to the GW computed from the loadsheet (ZFW + FOB).

- **If the FMS GW on the MCDU is not correct:**

  FMS GW.....CORRECT/RE-INSERT

  The entry of a correct GW will clear the MCDU message.

- **If the FMS GW on the MCDU is correct:**

  VLS, F, S, GREEN DOT (PFD).....DISREGARD

  If the FMS GW is correct, the characteristic speeds computed by the FAC (displayed on PFD) are not correct.

  QRH OPERATING SPEEDS.....USE

  Refer to QRH/FPE-SPD Speeds

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

"CHECK WEIGHT" MESSAGE

The "CHECK WEIGHT" message appears on the MCDU when the Gross Weight (GW) computed by the FMGC and the GW computed by the FAC disagree by more than 7 t (16 055 lb).
When this message appears:

FMS FOB.....CHECK

CALL UP the MCDU FUEL PRED page and compare the FOB to the FOB from the Computerized F-PLN. Correct it if necessary.

FMS ZFW value.....CHECK

CALL UP the MCDU FUEL PRED page and compare the ZFW to the ZFW on the loadsheet (ZFW + FOB).

- **If the FMS ZFW on the MCDU is not correct:**

  FMS ZFW.....CORRECT/RE-INSERT

  The entry of a correct ZFW will clear the MCDU message.

- **If the FMS ZFW on the MCDU is correct:**

  VLS, F, S, GREEN DOT (PFD).....DISREGARD

  If the FMS GW is correct, the characteristic speeds computed by the FAC (displayed on PFD) are not correct.

  QRH OPERATING SPEEDS.....USE

  Refer to QRH/FPE-SPD Speeds

Applicable to: ALL

"AUTO FLT A/THR OFF" MESSAGE

"AUTO FLT A/THR OFF message" may be displayed on the ECAM during cockpit preparation when the FCU A/THR pb has been used on ground to arm and disarm the A/THR. (It is sometimes performed for maintenance purpose).

PROCEDURE BEFORE ENGINE START

ARM the A/THR with the FCU pushbutton to clear the message.
DISARM the A/THR with the instinctive disconnect pushbutton on the thrust levers.

If one engine is started, the FCU pushbutton is inhibited until takeoff and the crew cannot clear the message.

PROCEDURE AFTER ENGINE START

WAIT until takeoff initiation, the warning will automatically disappear when the thrust levers are set to FLX or TOGA.

Note: If the warning comes up after engine start, envisage an A/THR failure.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

MCDU LOCKED OR BLANK

PROCEDURE

- **When one MCDU locks up, or becomes blank, all FMGS functions remain available, but the pilot cannot enter information into the MCDU, and cannot call up any MCDU pages for display:**

  PULL the CB for the locked or blank MCDU, and PUSH it back in after 10 s.

  Note: During a RESET/RESYNC, if the crew presses a key while the scratchpad is showing "PLEASE WAIT", there is no change at the MCDU level. This is normal, and the pilot should not respond by pulling the MCDU CB.

- **When both MCDUs are simultaneously locked up, the failure is usually due to an FMGC software anomaly:**

  Pull the FMGC1 CB and push it back in after 10 s. If unsuccessful, reset the FMGC2 CB.

  The FMGC circuit breakers are:
  - AUTO FLT/FMGC 1 B2 ON 49 VU.
  - AUTO FLT/FMGC 2 M17 ON 121 VU.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

MCDU LOCKED OR BLANK

When an MCDU locks up, or becomes blank, all functions of the FMGS remain available. But, the pilot cannot enter information into the MCDU, and cannot call up any MCDU pages for display.

PROCEDURE

PULL the CB for the locked or blank MCDU, and PUSH it back in after 10 s.

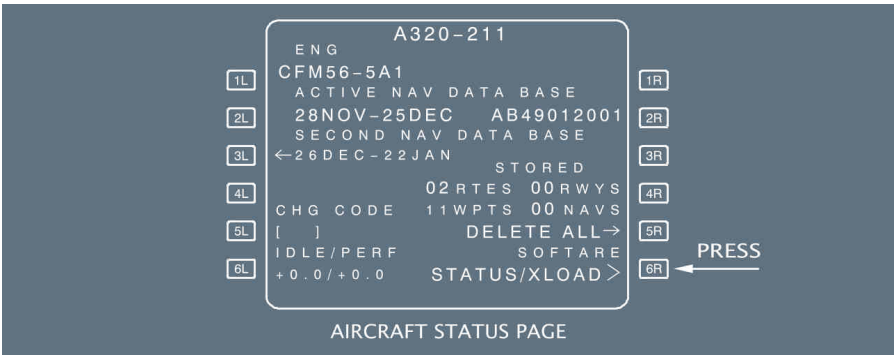
Note: During a RESET/RESYNC, if the crew presses a key while the scratchpad is showing "PLEASE WAIT", there is no change at the MCDU level. This is normal, and the pilot should not respond by pulling the MCDU CB.

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

1 CROSSLOAD OF NAV DATABASE

Both FMGCs are sometimes loaded with 2 different NAV databases. The DUAL mode of operation is not possible until both FMGCs receive the same database. The MCDU displays "FMS 1/FMS 2 A/C STS DIFF".
This may occur when a spare FMGC is loaded on an aircraft very lately before the flight.
The crossload procedure will be applied to restore the DUAL mode of operations.
CROSSLOAD can be initiated during preflight or done phase only.

CAUTION	The MCDU to be used is the MCDU of the FMGC loaded with the correct NAV database.



AIRCRAFT STATUS PAGE

PROCEDURE

PRESS the "SOFTWARE STATUS/XLOAD"key, on the field [6R].

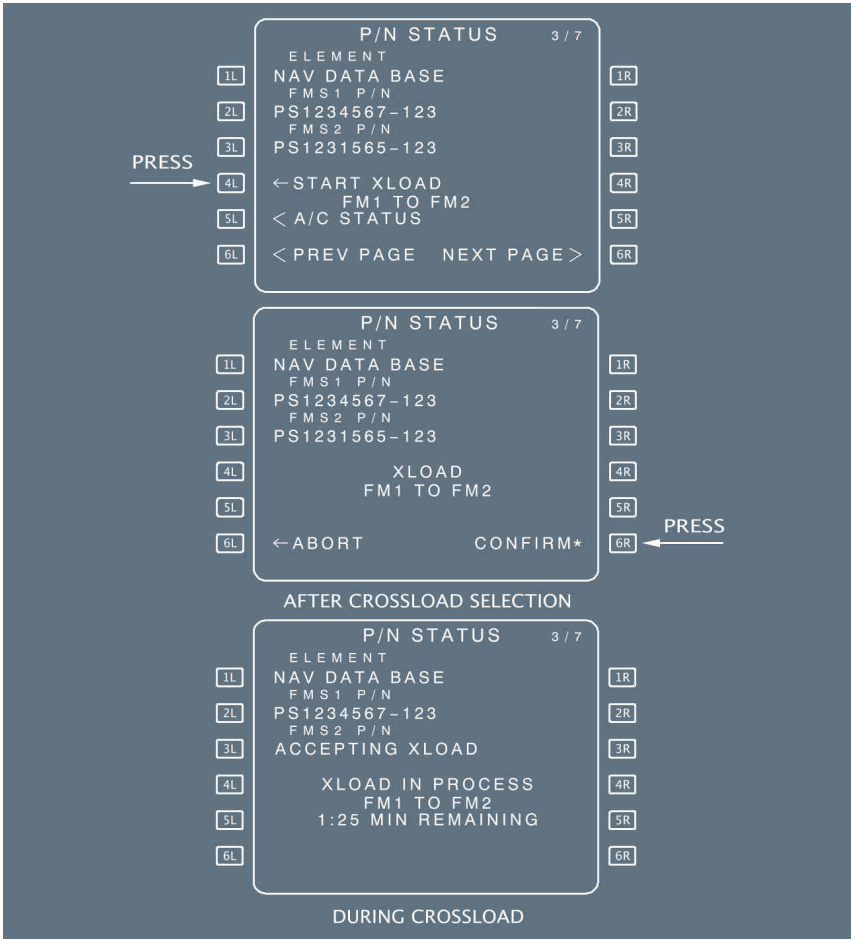
The P/N STATUS page appears.

SELECT "P/N STATUS" page 3.

The navigation database part numbers are displayed.

PRESS "START XLOAD"key, on the field [4L].
PRESS "CONFIRM"key on the field [6R].

Crossloading is initiated and "XLOAD IN PROCESS" is displayed on both MCDUs.



Note: *If flight phase transitions from PREFLIGHT or DONE while crossload is in process, the crossload is aborted. If crossload is unsuccessful "CROSSLOAD ABORTED" is displayed on both MCDU's scratchpad. This message is also displayed following a failed or incomplete data base loader operation.*

Upon successful completion of the crossload, "CROSSLOAD COMPLETE" message is displayed on each MCDUs scratchpad. A RESYNCH occurs and both MCDUs return to the AIRCRAFT STATUS page.

Applicable to: ALL

FMGC RESPONSE TO FAILURES CASES

This table shows how the FMGC responds to failures in other parts of the system.

FAILURE CASE	AP/FD	A/THR	LANDING CAPACITIES
FIRST IRS FAILURE	NO EFFECT	NO EFFECT	CAT 3 SINGLE
SECOND IRS FAILURE	TOTAL LOSS	TOTAL LOSS	RAW DATA
FIRST ADC FAILURE	NO EFFECT	NO EFFECT	CAT 3 SINGLE
SECOND ADC FAILURE	TOTAL LOSS	TOTAL LOSS	RAW DATA ONLY
FIRST LGCIU FAILURE	NO EFFECT	NO EFFECT	NO EFFECT
SECOND LGCIU FAILURE	TOTAL LOSS EXCEPT IN LAND MODE	TOTAL LOSS	RAW DATA ONLY EXCEPT IN LAND MODE (CAT 2 MAX)
LOSS OF ONE FMS COMPUTATION	LOSS OF ONE AP/FD/ATS EXCEPT IN APPR MODE BELOW 700 ft AND GO-AROUND MODES		NO EFFECT BELOW 700 ft
FIRST SFCC FAILURE	NO EFFECT	NO EFFECT	NO EFFECT
SECOND SFCC FAILURE	TOTAL LOSS EXCEPT IN LAND MODE	TOTAL LOSS	RAW DATA EXCEPT IN LAND MODE (CAT 2 MAX)
FIRST RADIOALTIMETER FAILURE	NO EFFECT	NO EFFECT	CAT 2
SECOND RADIOALTIMETER FAILURE	TOTAL LOSS OF ILS APPR MODE	NO EFFECT	ILS APPR (1)MODE INOP
TOTAL LOSS OF THE FCU	TOTAL LOSS EXCEPT IN LAND AND GO AROUND	TOTAL LOSS	RAW DATA EXCEPT IN LAND MODE (CAT 2 MAX)
FIRST ILS RECEIVER FAILURE	NO EFFECT	NO EFFECT	CAT 1
SECOND ILS RECEIVER FAILURE	TOTAL LOSS IN APPR MODE (ILS)	NO EFFECT	(ILS) APPR MODE INOP
FIRST ELAC FAILURE	NO EFFECT	NO EFFECT	CAT 3 SINGLE
SECOND ELAC FAILURE	TOTAL LOSS OF AP	NO EFFECT	CAT 1
FIRST FAC FAILURE	NO EFFECT	NO EFFECT	CAT 3 SINGLE
SECOND FAC FAILURE	TOTAL LOSS, EXCEPT IN LAND MODE BELOW 100 ft AND BEFORE ROLLOUT	TOTAL LOSS	CAT 1 NOEFFECT BELOW 100 ft , IF PREVIOUSLY CAT 2/3

Continued on the following page

Continued from the previous page

FAILURE CASE	AP/FD	A/THR	LANDING CAPACITIES
FIRST YAW DAMPER OR RUDDER TRIM FAILURE	NO EFFECT	NO EFFECT	CAT 3 SINGLE
SECOND YAW DAMPER OR RUDDER TRIM FAILURE	TOTAL LOSS OF AP, EXCEPT IN LAND MODE BELOW 100 ft AND BEFORE ROLLOUT	NO EFFECT	CAT 1 NO EFFECT BELOW 100 ft , IF PREVIOUSLY CAT 2/3
FIRST BSCU FAILURE	NO EFFECT	NO EFFECT	NO EFFECT
SECOND BSCU FAILURE	NO EFFECT	NO EFFECT	CAT 3 SINGLE
TOTAL LOSS OF ONE FADEC	NO EFFECT	TOTAL LOSS	CAT 2
LOSS OF EPR (IAE ONLY)	NO EFFECT	LOSS OF A/THR	CAT 2
FIRST FWC FAILURE	NO EFFECT	NO EFFECT	CAT 3 SINGLE
SECOND FWC FAILURE	NO EFFECT	NO EFFECT	CAT 1
LOSS OF PFD DATA ON ONE SIDE	NO EFFECT	NO EFFECT	CAT 1
TOTAL LOSS OF ONE FMGC	LOSS OF ONE AP/FD	LOSS OF ONE ATS	CAT 3 SINGLE
DOUBLE HYDRAULIC FAILURE	TOTAL LOSS OF AP	NO EFFECT	CAT 1

(1) LOC mode can be armed through the LOC pb.

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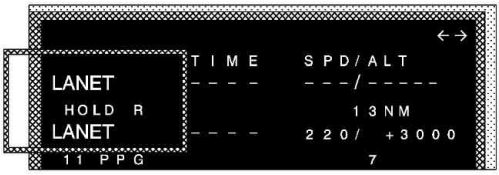
FMS1 Honeywell Specificities

INCORRECT MANAGEMENT OF SPEED CONSTRAINT FOR ARRIVAL PROCEDURE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

A procedure Holding Pattern (HOLD) is part of a navigation database procedure. The flight crew cannot manually insert it in the flight plan.
The aircraft flies the HOLD one time, and exits it automatically at the HOLD fix.



Procedure HOLD on the F-PLN MCDU page

The FMS computes procedure HOLDs based on the predicted speed of the aircraft at the pattern entry. For an arrival procedure HOLD, the FMS-predicted speed takes into account:

- The ICAO-fixed speed limit for the hold,
- Any speed constraint coded at the hold entry fix.

Some operators reported the following misbehaviour : if charts indicate a speed constraint for a procedure HOLD, the FMS erroneously applies this speed constraint only at the exit fix, instead of the entry fix. As a consequence, the FMS-predicted HOLD speed does not take the speed constraint into account.
As a result, the FMS may compute the HOLD based on a speed that is higher than required. In such a case, the HOLD will have a size larger than expected.

Note: *If the flight crew reverts to selected speed to reduce the speed at the HOLD entry, the FMS will not re-compute the size of the HOLD.*

OPERATIONAL RECOMMENDATION

During descent preparation :

- Use the charts to CHECK if the arrival procedure includes a HOLD that has a speed constraint.
- If the arrival procedure includes a HOLD that has a speed constraint : ENTER MANUALLY the speed constraint at the hold entry fix.

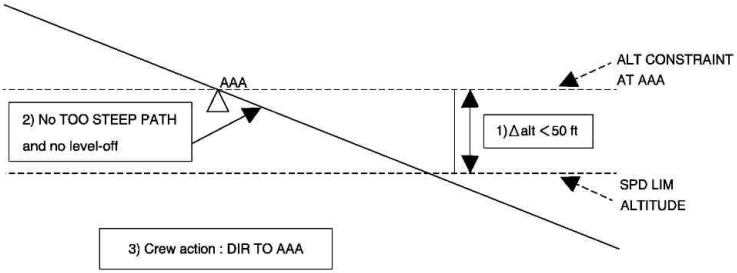
SEVERE RESET WHEN THE DESCENT LIMIT ALT IS CLOSE TO AN ALT CSTR

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

Severe resets with loss of flight plan occur in the following conditions :

1. A waypoint with a descent altitude constraint is located at less than 50 ft from the descent speed limit altitude,
2. This altitude-constrained waypoint is not followed by a too steep path or a level-off,
3. The flight crew performs a DIR TO this altitude-constrained waypoint.

Note: The altitude constraint on the waypoint may come from the Navigation database coding or from a flight crew's entry.



As of today, these resets happen systematically in case of DIR TO on several STARs located in Ukraine. The reason is that in this area, procedures often contain by design an altitude constraint that is very close to the speed limit altitude.
Moreover, these resets may also happen anywhere, in cases where the flight crew has manually entered an altitude constraint that is very close to the speed limit altitude.

OPERATIONAL RECOMMENDATION

Do not perform a DIR TO a waypoint that has an altitude constraint located at less than 50 ft from the descent speed limit altitude.

Note: The pseudo-waypoint "(LIM)" represents the descent speed limit on the F-PLN page.

ERRONEOUS FUEL PREDICTIONS IN THE CASE OF DESCENT WITH TWO ALTITUDE CONSTRAINTS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

DESCRIPTION

If the flight plan has two altitude constraints for the descent, the flight crew may notice erroneous FMS fuel predictions.

EXPLANATION

If the flight plan has two altitude constraints for the descent, the FMS may define a geometric segment between both altitude constraints. If there is a deceleration required within the geometric segment, the FMS may consider that the geometric segment is too steep to fly without speedbrakes. In this case, the FMS tags the entire geometric segment as a speedbrake segment : The FMS assumes that during the entire segment half of the speedbrakes are extended, even for the parts where no deceleration is planned. As a consequence, the FMS will predict an increased thrust for the entire geometric segment. This may lead to erroneous fuel predictions. (a long geometric segment (e.g. above 100 nm) may lead to an error of 1.5 t for the fuel prediction at destination).

Note: When flying the geometric segment, the predictions become better as the aircraft approaches the end of the geometric segment, and turn back to normal when the aircraft has sequenced the second altitude constraint.

PROCEDURE

If the flight crew suspects this behavior in preflight, or during the flight, they can delete and enter again one altitude constraint in descent and compare the fuel predictions of the flight plan with and without the geometric segment. This allows the flight crew to evaluate the impact of the geometric segment on the fuel predictions.
It is not recommended to permanently delete altitude constraints that are stored in the navigation database.

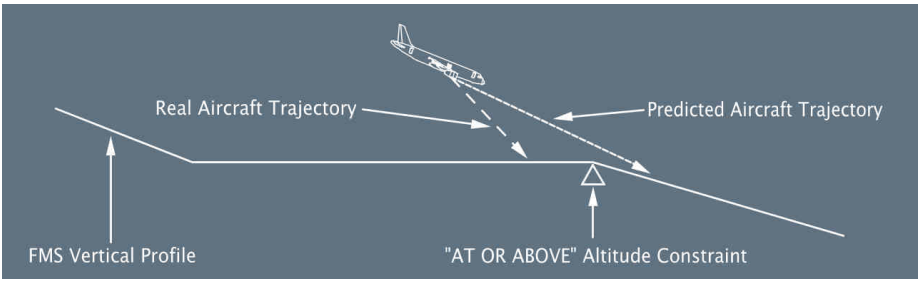
UNDUE REVERSION TO V/S DURING CLIMB AND DESCENT

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

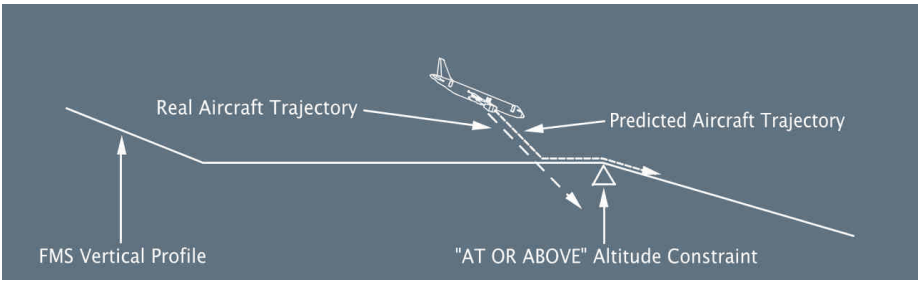
1

A reversion to the V/S mode may occur when the aircraft reaches an altitude constraint in the CLB or DES mode, while above the vertical profile.
When the aircraft is not on the vertical profile, the FMS makes assumptions in order to compute the FMS predictions. For example, if the aircraft flies in selected speed, the FMS considers an immediate return to managed speed.

These assumptions can result in FMS predictions that are not consistent with the real trajectory of the aircraft. Therefore, the FMS may not anticipate the need to level off, when the FCU selected altitude is above the altitude constraint in climb or below the altitude constraint in descent.



However, the FMS requests the ALT CST* mode, when the aircraft reaches the altitude constraint, in order to level off and comply with the altitude constraint.
Due to problem of communication between the FMS and the FG, the FMGC may unduly revert to the V/S mode. The FWC triggers a triple-click aural warning , and the aircraft goes beyond the altitude constraint.



OPERATIONAL RECOMMENDATIONS

Understand your FMA at all times.

- **If the FMGC reverts to the V/S mode:**

  Adjust the vertical speed or level off in order to comply with the altitude constraint.

SECONDARY FLIGHT PLAN ERRONEOUS VAPP

2 **Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF**

3

The secondary flight plan Performance page can retain a pilot modified Vapp (large font) from a previous sector leading to an incorrect Vapp being displayed when the secondary flight plan is activated.
A manually entered Vapp (large font) on the SEC F-PLN will remain, even if a subsequent COPY ACTIVE action is performed with a default Vapp (small font) on the primary F-PLN.

OPERATIONAL RECOMMENDATION

When setting up the secondary Performance page or after activating the secondary flight plan the flight crew must check if the Vapp is rational.

If the Vapp is erroneous then the following actions will restore the Vapp to the appropriate value.
- Over write the Vapp with a new pilot modified manual entry, or
- Revert to FMGC default Vapp via a CLR action on the Vapp

Intentionally left blank

FMS2 Honeywell Specificities

DUAL FMS RESET AFTER A "CLEAR FROM" IN THE F-PLN

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

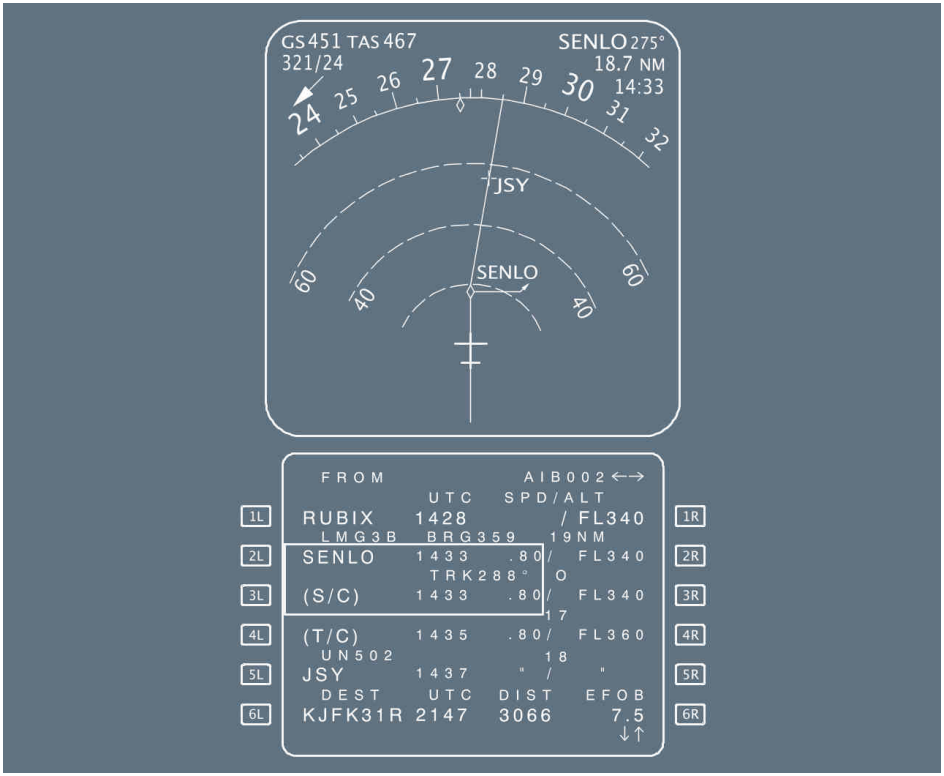
1

A dual FMS reset, with loss of all pilot-entered data, may occur when the following conditions are met:

- 2 steps (at least) are defined in the active F-PLN, and the first step is defined at the current “TO”waypoint
- The flight crew clears the “FROM” waypoint (or “PPOS”) on the active F-PLN (by a CLR action on 1L key on the F-PLN page), to force a F-PLN sequencing.

A step defined at the “TO”waypoint can be identified by the flight crew:

- On the ND : A white climb/descent arrow is displayed next to the “TO”waypoint, or
- On the F-PLN page : The TO waypoint is followed by a Step Climb (S/C), or Step Descent (S/D) pseudo-waypoints in the F-PLN waypoint list.



The reset can occur, in all flight phases, except DESCENT, APPROACH and GO AROUND phases (where no step can be defined).

PROCEDURE

- **If there is a step defined on the current "TO"waypoint of the active F-PLN:**

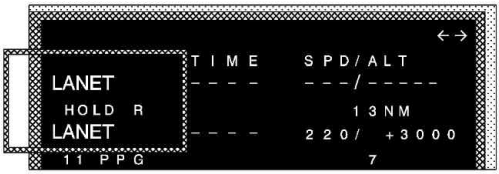
  Do not clear the "FROM" waypoint.

  In order to sequence the F-PLN, the flight crew may either:
  - *Delete the STEP at the "TO"waypoint, prior to clearing the "FROM" waypoint, or*
  - *Perform a "DIR TO"or "DIR TO RADIAL IN", as appropriate.*

INCORRECT MANAGEMENT OF SPD CSTR FOR ARRIVAL PROCEDURE HOLDS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

A procedure Holding Pattern (HOLD) is part of a navigation database procedure. The flight crew cannot manually insert it in the flight plan.
The aircraft flies the HOLD one time, and exits it automatically at the HOLD fix.



Procedure HOLD on the F-PLN MCDU page

The FMS computes procedure HOLDs based on the predicted speed of the aircraft at the pattern entry. For an arrival procedure HOLD, the FMS-predicted speed takes into account:

- The ICAO-fixed speed limit for the hold,
- Any speed constraint coded at the hold entry fix.

Some operators reported the following misbehaviour : if charts indicate a speed constraint for a procedure HOLD, the FMS erroneously applies this speed constraint only at the exit fix, instead of the entry fix. As a consequence, the FMS-predicted HOLD speed does not take the speed constraint into account.
As a result, the FMS may compute the HOLD based on a speed that is higher than required. In such a case, the HOLD will have a size larger than expected.

Note: If the flight crew reverts to selected speed to reduce the speed at the HOLD entry, the FMS will not re-compute the size of the HOLD.

OPERATIONAL RECOMMENDATION

During descent preparation :

- Use the charts to CHECK if the arrival procedure includes a HOLD that has a speed constraint.
- If the arrival procedure includes a HOLD that has a speed constraint : ENTER MANUALLY the speed constraint at the hold entry fix.

MISALIGNMENT OF FMS F-PLN LEGS FOR ILS APPROACHES

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

2

For the F-PLN legs belonging to an ILS approach, the FMS incorrectly uses its own Magnetic Variation table instead of the Magnetic Variation of the ILS associated to the approach (coded in the Navigation Data Base). This misbehaviour occurs when the Navaid used for the ILS approach is a DME.

In some cases, it may happen that magnetic variation of the airport differs by a few degrees from the ILS navaid. Thus, the FMS F-PLN does not match with the actual beam of the ILS beam.

When the ILS approach is coded with successive legs, these legs may also appear as not matching with intermediate approach waypoint.

For all approaches affected by this behaviour, the FMS will display an incorrect trajectory on ND for the LS approach. The guidance would also be wrong if the approach legs are flown in NAV instead of LOC mode.

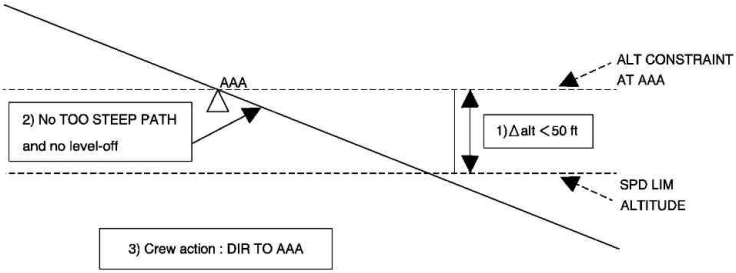
SEVERE RESET WHEN THE DESCENT SPD LIMIT ALT IS CLOSE TO AN ALT CSTR

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

Severe resets with loss of flight plan occur in the following conditions :

1. A waypoint with a descent altitude constraint is located at less than 50 ft from the descent speed limit altitude,
2. This altitude-constrained waypoint is not followed by a too steep path or a level-off,
3. The flight crew performs a DIR TO this altitude-constrained waypoint.

Note: *The altitude constraint on the waypoint may come from the Navigation database coding or from a flight crew's entry.*



As of today, these resets happen systematically in case of DIR TO on several STARs located in Ukraine. The reason is that in this area, procedures often contain by design an altitude constraint that is very close to the speed limit altitude.
Moreover, these resets may also happen anywhere, in cases where the flight crew has manually entered an altitude constraint that is very close to the speed limit altitude.

OPERATIONAL RECOMMENDATION

Do not perform a DIR TO a waypoint that has an altitude constraint located at less than 50 ft from the descent speed limit altitude.

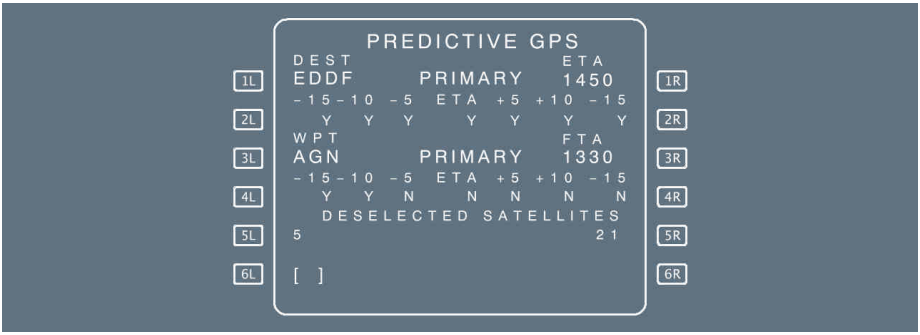
Note: The pseudo-waypoint "(LIM)" represents the descent speed limit on the F-PLN page.

INCORRECT MANAGEMENT OF ETA ENTRY ON PREDICTIVE GPS PAGE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

3

During pre-flight, when a destination airport exists but the FMS does not compute predictions, amber boxes are displayed in the MCDU field ETA of the predicitve GPS page. When the flight crew manually enters an ETA, the value should be displayed in large cyan font.
With the current H2 standard, the FMS does not take into account the manual entry of an ETA (field 1R) for the destination (DEST, field 1L).
The FMS validates the manual entry only when an ETA is already computed by the FMS, when predictions are available (necessary conditions to have some predictions are : entry of a GW, CRZ FL, CI and F-PLN).
This anomaly does not impact the ETA of the WPT field (3L and 3R). An ETA can be entered in the field 3L even if no predictions are computed.



FLIGHT NUMBER ERASED UPON AOC FLIGHT PLAN UPLINK

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

4

When a Flight Plan (F-PLN) uplink is performed, if the uplinked F-PLN is inserted as the active F-PLN but does not contain a Flight Number, the previously entered Flight Number is erased. In such a case, the flight crew needs to re-enter the correct Flight Number on the INIT A page.

LOSS OF PREDICTIONS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

A loss of FMS predictions may be encountered upon the following conditions :

- The Flight Plan (F-PLN) contains an ILS approach
- There is an AT or ABOVE altitude constraint at a waypoint before the Final Approach Fix (FAF)
- The flight crew modifies the AT or ABOVE constraint into an AT altitude constraint.

In such a case, the FMS prediction algorithm may not succeed to compute the predictions, depending on A/C type, A/C weight and ILS approach geometry. This is not systematic and this is related to the performance of the A/C (GW, geometric conditions).

PROCEDURE

- REENTER the AT or ABOVE constraint to launch new predictions computation.

LOSS OF FMS POSITION FURTHER TO IRS LOSS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

The loss or the failure of an Inertial Reference System (IRS) could result in the loss of the FMS position with the following cockpit effects :

- MAP NOT AVAIL GPS, PRIMARY LOST displayed on ND
- The DIR TO page is unavailable on both MCDU
- During approach, transient ATHR thrust variations at autopilot disconnection (Only applicable in case of IR 1 FAULT).

Technical explanation :

The FMS needs valid data from the IRS in order to compute a position.
The FMS checks the IRS data with a specific parameter coming from the Flight Guidance (FG) part of the FMGC. When an IRS is lost or off (dispatched inoperative), the onside FG erroneously indicates to the FMS that the IRS DATA is still valid.
As a result, the FMS position is lost on the same side than the IRS inoperative (IRS1 for FMS1 and IRS for FMS2). The manual switching on IRS 3 (ATT HDG on CAPT 3 or F/O 3) does not enable to recover the data.

PROCEDURE:

In case of an IR x FAULT ECAM warning in flight with the above mentioned cockpit effects, apply the following procedure :
De-activate (do not perform a reset) the FMS on the same side than the IRS inoperative :

- For IR 1 FAULT : pull FMGC 1 CB B2 (VU 49)
- For IR 2 FAULT : pull FMGC 2 CB M17 (VU 121)

ERRONEOUS FUEL PREDICTION IN THE CASE OF DESCENT WITH TWO ALTITUDE CONSTRAINTS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

DESCRIPTION:

If the flight plan has two altitude constraints for the descent, the flight crew may notice erroneous FMS fuel predictions.

EXPLANATION

If the flight plan has two altitude constraints for the descent, the FMS may define a geometric segment between both altitude constraints. If there is a deceleration required within the geometric segment, the FMS may consider that the geometric segment is too steep to fly without speedbrakes. In this case, the FMS tags the entire geometric segment as a speedbrake segment : The FMS assumes that during the entire segment half of the speedbrakes are extended, even for the parts where no deceleration is planned. As a consequence, the FMS will predict an increased thrust for the entire geometric segment. This may lead to erroneous fuel predictions. (a long geometric segment (e.g. above 100 nm) may lead to an error of 1.5 t for the fuel prediction at destination).

Note: When flying the geometric segment, the predictions become better as the aircraft approaches the end of the geometric segment, and turn back to normal when the aircraft has sequenced the second altitude constraint.

PROCEDURE:

If the flight crew suspects this behavior in preflight, or during the flight, they can delete and enter again one altitude constraint in descent and compare the fuel predictions of the flight plan with and without the geometric segment. This allows the flight crew to evaluate the impact of the geometric segment on the fuel predictions.
It is not recommended to permanently delete altitude constraints that are stored in the navigation database.

UNEXPECTED SWITCH OF SPEED TARGET WHEN RTA IS USED

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

An anomaly could be experienced when the RTA (Requested Time of Arrival) function is used.
The MCDU and the PFD could suddenly display an erroneous speed target at the transition altitude when a RTA is entered and if the flight crew performs an action (Vapp entry or altitude constraint modification) that causes a F-PLN profile recomputation.
This scenario could also occur if the flight crew has inserted a RTA and then deleted this RTA (the FMS may erroneously retain the RTA target).
Some cases could happen while the aircraft is in descent (DES mode) in managed speed. This speed target change is significant at high altitude if the RTA speed target is lower than the speed target used before the beginning of the descent.

PROCEDURE

If an erroneous speed target is displayed at high altitude, the flight crew can manually select a speed to continue the descent.

EOSID F-PLN LIMITED TO 10 LEGS

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

When the EOSID contains more than 10 legs :

- The ND Display in PLAN mode only shows the first 10 legs of the EOSID.
- In the case an engine out occurs before the diversion point, the TMPY flight plan ends at the end of the 10th leg.

To avoid that the EOSID ends after the 10th leg, the flight crew must insert the EOSID as a SID in the secondary flight plan (SEC F-PLN).

PROCEDURE

During Cockpit Preparation :

- CREATE a SEC F-PLN (e.g. using COPY ACTIVE)
- SELECT the EOSID as a SID in the SEC F-PLN.
- REVIEW the display on the ND of the SID for Engine Out (white line) as SEC F-PLN.

In the case of engine failure before the Engine Out Diversion Point :

- ACTIVATE the SEC F-PLN (EOSID)
  If the Navigation Database has not been changed, the automatic proposal of Temporary F-PLN for EOSID must be erased before activating the SEC F-PLN.

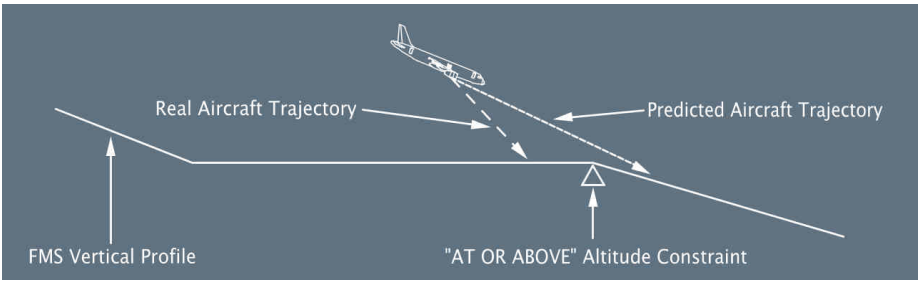
Note: To avoid that the flight crew needs to reject the automatic proposed TMPY F-PLN (EOSID limited to 10 legs) in case of engine failure, Airbus recommends that the EOSID is coded in the Navigation Database as a SID and not as an EOSID.

UNDUE REVERSION TO V/S DURING CLIMB AND DESCENT

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

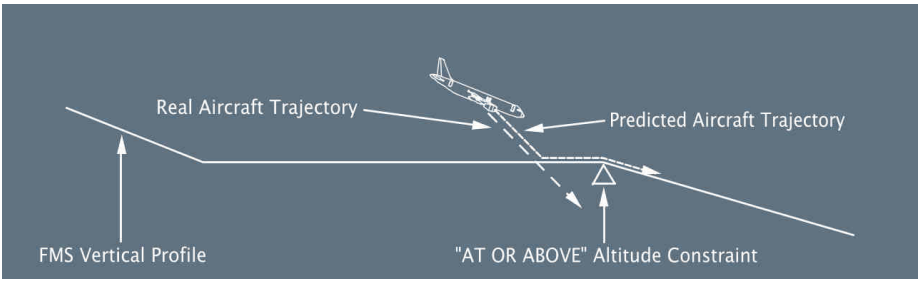
5

A reversion to the V/S mode may occur when the aircraft reaches an altitude constraint in the CLB or DES mode, while above the vertical profile.
When the aircraft is not on the vertical profile, the FMS makes assumptions in order to compute the FMS predictions. For example, if the aircraft flies in selected speed, the FMS considers an immediate return to managed speed.
These assumptions can result in FMS predictions that are not consistent with the real trajectory of the aircraft. Therefore, the FMS may not anticipate the need to level off, when the FCU selected altitude is above the altitude constraint in climb or below the altitude constraint in descent.



However, the FMS requests the ALT CST* mode, when the aircraft reaches the altitude constraint, in order to level off and comply with the altitude constraint.

Due to problem of communication between the FMS and the FG, the FMGC may unduly revert to the V/S mode. The FWC triggers a triple-click aural warning ⋖⋖ , and the aircraft goes beyond the altitude constraint.



OPERATIONAL RECOMMENDATIONS

Understand your FMA at all times.

- **If the FMGC reverts to the V/S mode:**

  Adjust the vertical speed or level off in order to comply with the altitude constraint.

UNDUE AP DISCONNECTION OR REVERSION TO V/S DURING CLIMB AND DESCENT

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

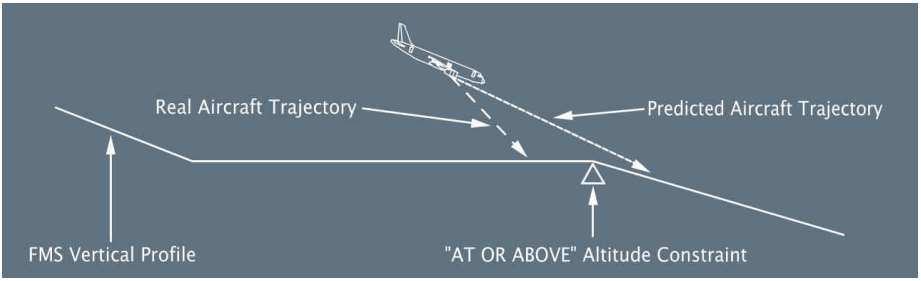
6

An AP disconnection or a reversion to the V/S mode may occur when the aircraft reaches an altitude constraint in the CLB or DES mode. The following are two situations in which this behavior may occur.

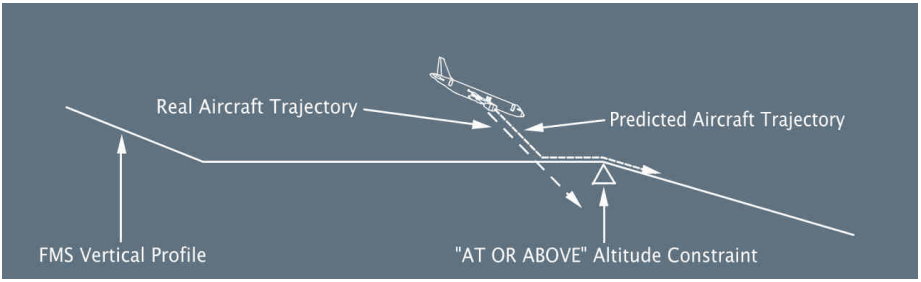
Situation 1: The aircraft is above the vertical profile.

When the aircraft is not on the vertical profile, the FMS makes assumptions in order to compute the FMS predictions. For example, if the aircraft flies in selected speed, the FMS considers an immediate return to managed speed.

These assumptions can result in FMS predictions that are not consistent with the real trajectory of the aircraft. Therefore, the FMS may not anticipate the need to level off, when the FCU selected altitude is above the altitude constraint in climb or below the altitude constraint in descent.



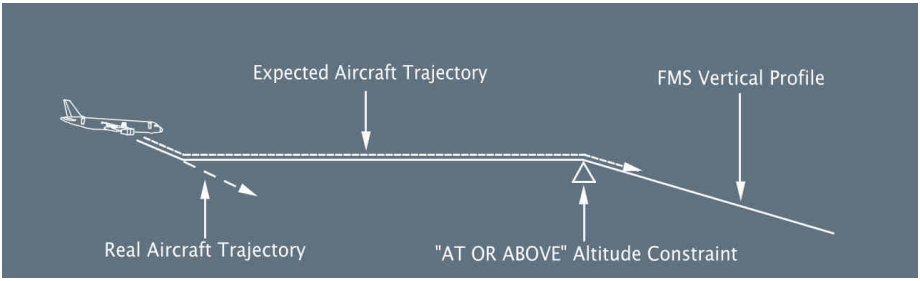
However, the FMS requests the ALT CST* mode, when the aircraft reaches the altitude constraint, in order to level off and comply with the altitude constraint.
Due to problem of communication between the FMS and the FG, the FMGC may unduly revert to the V/S mode. The FWC triggers a triple-click aural warning , and the aircraft goes beyond the altitude constraint.



Situation 2: The aircraft levels off at an altitude constraint in descent.
When the aircraft reaches an altitude constraint with the DES mode engaged and the FCU selected altitude below the altitude constraint, the FG engages the ALT CST* mode. The FG also arms the DES mode, in order to resume the descent beyond the waypoint with the altitude constraint.

In very rare cases, the FMS does not see that the FG arms the DES mode:
- If the FINAL APP mode is armed, the FMGC may unduly:
  - Disconnect the AP, or
  - Disconnect the AP and revert to the V/S mode, or
  - Revert to the V/S mode.
- If the FINAL APP mode is not armed, the FMGC may unduly revert to the V/S mode.

In both of the above-mentioned cases, the FWC triggers a triple-click aural warning , and the aircraft goes beyond the altitude constraint.
If the AP disconnects, the FWC triggers a cavalry-charge aural warning.



OPERATIONAL RECOMMENDATIONS

Understand your FMA at all times.

- **If the AP disconnects, or if the FMGC reverts to the V/S mode:**

  Adjust the vertical speed or level off in order to comply with the altitude constraint.

VOR/DME AND VOR/TACAN NOT AUTOMATICALLY TUNED

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

7

In case there is no NAVAID in the flight plan, nor any recommended NAVAID coded in the inserted procedure, the FMS may not automatically tune the expected Terminal or Low Altitude VOR/DME or VOR/TACAN.
The FMS may not automatically tune the expected NAVAID, if the aircraft is above 12 000 ft for a Terminal VOR/DME or VOR/TACAN, and above 18 000 ft for a Low Altitude NAVAID.
As a consequence, the ND and the MCDU RAD NAV page may not display the NAVAID information.

OPERATIONAL RECOMMENDATIONS

If the flight crew encounters the misbehavior during the flight, the flight crew can manually tune the expected VOR/DME or VOR/TACAN to recover the display on the ND.
As a manual tuning overrides any automatic tuning, the flight crew must clear the manual tuning, when the NAVAID is no longer required, in order to revert to the automatic NAVAID tuning.

VHF, HF UTILIZATION

Applicable to: ALL

Note: 1. Reception of some frequencies could be noisy, on one or more VHFs. In such cases, try selecting an unaffected one.
2. If two frequencies are closer than 2 MHz (between VHF1 and 2, or between VHF3 and 2), or closer than 6 MHz (between VHF1 and 3), some interference may occur.

Applicable to: B-HSQ, B-HSR

TUNING

The pilot should normally use his onside RMP to tune any one of the VHF or HF radios. If the SEL lights come on, when tuning the radio, the pilot should turn them off by selecting the appropriate radio system dedicated to his RMP.



ON/OFF switch..... CHECK ON
VHF or HF key..... PRESS

The green light comes on.
ACTIVE and STBY/CRS windows display active and preset frequencies, respectively.

Note: When an RMP tunes a transceiver that is normally associated with another RMP, the SEL lights on both RMPs come on.

TO CHANGE FREQUENCY

Rotating knob..... TURN
Make the STBY/CRS window display the new frequency.
Outer knob is for units, inner knob for decimals.

Transfer key..... PRESS
This interchanges the ACTIVE and STBY frequencies.
The receiver is now tuned to the new ACTIVE frequency.

AM key (if necessary)..... PRESS
Green light comes on.

SEL lt..... CHECK OFF

If SEL light is on, select the appropriate radio systems dedicated to the on side RMP.

FAILURE CASES

When an RMP fails :

- The affected RMP no longer controls the selected receiver.
- The frequency displays disappear and the green VHF or HF lights go out.

Affected RMP..... SWITCH OFF

One RMP can control all receivers.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

TUNING

The pilot should normally use his onside RMP to tune any one of the VHF or HF radios. If the SEL lights come on, when tuning the radio, the pilot should turn them off by selecting the appropriate radio system dedicated to his RMP.



ON/OFF switch..... CHECK ON
VHF or HF key..... PRESS

The green light comes on.
ACTIVE and STBY/CRS windows display active and preset frequencies, respectively.

Note: *When an RMP tunes a transceiver that is normally associated with another RMP, the SEL lights on both RMPs come on.*

TO CHANGE FREQUENCY

Rotating knob..... TURN

Make the STBY/CRS window display the new frequency.
Outer knob is for units, inner knob for decimals.

Transfer key..... PRESS

This interchanges the ACTIVE and STBY frequencies.
The receiver is now tuned to the new ACTIVE frequency.

AM key (if necessary).....PRESS

Green light comes on.

SEL lt..... CHECK OFF

If SEL light is on, select the appropriate radio systems dedicated to the on side RMP.

FAILURE CASES

When an RMP fails :

- The affected RMP no longer controls the selected receiver.
- The frequency displays disappear and the green VHF or HF lights go out.

Affected RMP..... SWITCH OFF

One RMP can control all receivers.

- *if RMP 1 fails tune VHF 1 through RMP 3*
- *if RMP 2 fails tune VHF 2 through RMP 3*
- *if RMP 3 fails tune, HF 1 ◁ through RMP 1, HF 2 ◁ through RMP 2*
- *if two RMP's fail, tune all receivers through the remaining RMP.*

Applicable to: B-HSQ, B-HSR

TRANSMISSION AND RECEPTION

Note: If the VHF3 VOICE DIRECTORY page is customized with user frequencies:

- *Use it as a pure directory*
- *Do not press the key adjacent to the desired frequency for direct turning*
- *VHF3 in VOICE mode should either be tuned using the MANUAL FREQ field, or using the RMP.*



VHF or HF transmission key.....PRESS

Green bars on the selected system key light up.

Microphones and PTT command are connected to the selected system.

VHF or HF reception key..... PRESS

The integrated white light comes on.
The receiver brings in the selected system.
To adjust the volume, turn the key.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

TRANSMISSION AND RECEPTION

Note: If the VHF3 VOICE DIRECTORY page is customized with user frequencies:
- *Use it as a pure directory*
- *Do not press the key adjacent to the desired frequency for direct turning*
- *VHF3 in VOICE mode should either be tuned using the MANUAL FREQ field, or using the RMP.*



VHF or HF transmission key..... PRESS

Green bars on the selected system key light up.
Microphones and PTT command are connected to the selected system.

VHF or HF reception key..... PRESS

The integrated white light comes on.
The receiver brings in the selected system.
To adjust the volume, turn the key.

Note: Do not use VHF 3 for communications with ATC, if ACARS is installed, unless VHF 1 and VHF 2 are inoperative.

CAPT- ATT CALL

Applicable to: ALL

PROCEDURE FOR CALLING ATT STATION WHEN PREVIOUS CALL HAS NOT BEEN RESET

If, after a call from cockpit to the attendant's station, the attendant does not press the RESET key on the attendant's panel, the pilot must use the following procedure to call the station :

CAB transmission key (on audio control panel)..... PRESS

Green lines light up.

INT/RAD (on ACP)..... MAINTAIN IN RAD POSITION for 2 s.

Wait 60 s for automatic cancellation of previous CAPT-ATT calls, then :

CAB transmission key..... PRESS

Note: This procedure will no longer be necessary after the introduction of CIDS Mark II standard, which includes a function to reset the system automatically after 60 s if no one has pressed the RESET key.

FROZEN RMP

Applicable to: ALL

A frozen RMP can be evidenced by the impossibility to interchange the ACTIVE and STBY radio navigation or communication frequencies.
In order to recover the normal operation of the RMP, all the RMP's have to be reset, as the problem on one RMP can be due to an other RMP.

PROCEDURE

All the RMP's have to be resetted, one after the other.

- **On the RMP control panel :**

  ON/OFF switch.....OFF

  Wait 5 s then.

  ON/OFF switch.....ON

Intentionally left blank

TRIPPED C/B REENGAGEMENT

Applicable to: ALL

In flight, do not reengage a circuit breaker (C/B) that has tripped by itself, unless the Captain judges it necessary to do so for the safe continuation of the flight. This procedure should be adopted only as a last resort, and only one reengagement should be attempted.
On ground, do not reengage the C/B of the fuel pump(s) of any tank. For all other C/Bs, if the flight crew coordinates the action with maintenance, the flight crew may reengage a tripped C/B, provided that the cause of the tripped C/B is identified.
Refer to Part A 8.3.14.1 for circuit breaker reset policy.

COMPUTER RESET

Applicable to: ALL

The normal purpose of a circuit breaker (C/B) is to protect wiring against short circuits, and to isolate equipment for maintenance.
Another C/B function involves digital computers : The reset function. When a digital computer behaves abnormally due to an electrical transient, for example, the abnormal behavior can be stopped by briefly interrupting the power supply to its processor.
The flight crew can reset most of this aircraft's computers with a normal cockpit control (selector or pushbutton). However, for some systems, the only way to cut off electrical power is to pull the associated C/B.

PROCEDURE

To perform a computer reset:
- Set the related normal cockpit control to OFF, or pull the corresponding circuit breaker
- Wait 3 s if a normal cockpit control is used, or 5 s if a circuit breaker is used (unless a different time is indicated)
- Set the related normal cockpit control to ON, or push the corresponding circuit breaker
- Wait 3 s for the end of the reset.

WARNING	Do not reset more than one computer at the same time, unless instructed to do so.

Note: *In flight, before taking any action on the cockpit C/Bs, both the PF and PNF must:*
- *Consider and fully understand the consequences of taking action*
- *Crosscheck and ensure that the C/B label corresponds to the affected system.*

COMPUTER RESET TABLE

Applicable to: ALL 321

ATA	System malfunction or ECAM warning/caution	Affected system	Reset
21	VENT AVNCS SYS FAULT	AEVC	**On ground only:** - Pull C/B Y 17 on 122VU. - Wait 1 s before pushing the C/B.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
22	AUTO FLT FCU 1(2) FAULT	FCU	**In flight:** - Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. - Push it after 5 s. - CHECK the displayed targets and the barometer reference, and correct them if necessary. **On ground:** - Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. - Push it after 5 s. - If FCU1(2) FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) - If FCU1(2) FAULT remains, pull both C/B B05 on 49VU and M21 on 121VU - Push them after 7 min, with a delay of less than 5 s between side 1 and 2 - Wait at least 30 s for FCU1 and FCU2 safety tests completion - CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful)
	AUTO FLT FCU 1 + 2 FAULT	FCU	**In flight:** - Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. - Push them after 5 s. - CHECK the displayed targets and the barometer reference, and correct them if necessary. **On ground:** - Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. - Push the C/Bs after 5 s. - If FCU 1+2 FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) - If FCU 1+2 FAULT remains, pull again both C/B B05 on 49VU and M21 on 121VU - Push them after 7 min, with a delay of less than 5 s between side 1 and 2

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
			- Wait at least 30 seconds for FCU1 and FCU2 safety tests completion - CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) FCU targets are synchronized on current aircraft values and displayed as selected targets. - RE–ENTER the barometer altimeter setting value, if necessary.
	AUTO FLT YAW DAMPER 1(2) FAULT	FAC 1(2)	*Refer to PRO-ABN-22 AUTO FLT YAW DAMPER 1(2)*, if applicable.
	WINDSHEAR DET FAULT or REAC W/S DET FAULT ◁	FAC 1 + 2	
	One MCDU locked or blank Both MCDU locked or blank FMGC malfunction	MCDU FMGC FMGC	*Refer to PRO-SUP-22-10 Other Abnormal Procedures - MCDU Locked or Blank.*

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
23	COM CIDS 1+2 FAULT	CIDS	**On ground, or in flight:** - Pull the C/Bs in the following order: G01 on 49VU, M06 on 121VU. G02 on 49VU, M07 on 121VU. - Wait 10 s, then - Push the C/Bs in the following order: M06, M07, G01, G02. - After CIDS reset, wait approximately 4 min, before recovering normal operation.
	Uncommanded EVAC horn actuation	CIDS	**On ground, or in flight:** Press the EVAC HORN SHUT OFF pb. Set the EVAC CAPT & PURS/CAPT sw to the CAPT only position. Wait for 3 s - IF UNSUCCESSFUL: • Pull the C/Bs for DIR2 in the following order: G02 on 49VU, M07 on 121VU. - IF UNSUCCESSFUL: • Pull the C/Bs for DIR1 in the following order: G01 on 49VU, M06 on 121VU. • Wait for 1 min, then: • Push the C/Bs for DIR2 in the following order: M07, G02. • After CIDS reset, wait approximately 4 min, before recovering normal operation.
	Frozen RMP	RMP	*Refer to PRO-SUP-23 Frozen RMP*
	FAP freezing	FAP or Tape reproducer/PRAM	**On ground, or in flight:** - Pull C/B M14 (or Q14 ◁⋇) of the FAP in the 121VU. - Wait 10 s before pushing the C/B. IF UNSUCCESSFUL: - Pull the tape reproducer/PRAM C/B F07 on 2000VU (cabin) - Wait 10 s before pushing the C/B.
26	SMOKE DET FAULT	SDCU	**On ground only:** - Pull C/B C06 on 49VU, and C/B T18 on 122VU. - Wait 60 s before pushing the C/Bs.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
1 27	F/CTL ELAC 1(2) FAULT F/CTL ALTN LAW F/CTL ELAC 1(2) PITCH FAULT	ELAC	*Refer to PRO-ABN-27 section for associated procedure, if applicable.*
27	ELAC or SEC malfunction	ELAC or SEC	ELAC or SEC may be reset. **WARNING** Do not reset more than one computer at a time. It is possible to reset flight control computers in flight, event if not requested by the ECAM, provided only one reset is performed at a time: For the ELAC only, in case of uncommanded maneuvers during the flight, it is not recommended to reset the ELAC. *Note: When an ELAC reset is performed on ground the crew must check the pitch trim position. If a reset is performed on ground, the flight crew must then perform a flight control check, Refer to PRO-NOR-SOP-10-TAXI.*
Impacted DU: NONE			
2 27	F/CTL SPLR FAULT, triggered on ground after the flight control check.	SEC	**On ground** - All the three SEC may be reset - A flight control check must be performed after the reset - If the ECAM triggers again the F/CTL SPLR FAULT, maintenance action is due. **WARNING** Do not reset more than one computer at a time.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
28	Loss of fuel quantity indication	FQIC	**On ground, or in flight:** - Pull the C/B of the affected channel: • Channel 1 (A13 on 49VU) • Channel 2 (M27 on 121VU) - Wait 5 s, before pushing both C/B. *Note: The fuel quantity indication will be re-established within 1 min.*
31	FWS FWC 1(2) FAULT	FWC	**On ground:** Pull, then push, the C/B of the affected FWC: - FWC 1 (F01 on 49VU) - FWC 2 (Q7 on 121VU) Wait 50 s after pushing the C/Bs. **In flight:** Pull, then push, the C/B of the affected FWC: - FWC 1 (F01 on 49VU) - FWC 2 (Q7 on 121VU)
32	Braking malfunction	BSCU	*Refer to PRO-SUP-32 BSCU Reset - On Ground*
	L/G LGCIU 1(2) FAULT	LGCIU 1(2)	**On ground only:** The flight crew must depressurize the green hydraulic system before resetting the LGCIU. - ENG 1 PUMP OFF - PTU OFF When there is no green hydraulic pressure: - To reset LGCIU 1: • Pull C/B Q34 on 121VU, then C09 on 49VU • Wait for 15 s , then push the C/Bs - To reset LGCIU 2: • Pull C/B Q35 on 121VU • Wait for 15 s , then push the C/B
34	NAV TCAS FAULT	TCAS	**On ground only:** - Pull C/B K10 on 121VU. - Wait 5 s, then push the C/B.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
38	Failure messages on the CIDS FAP in the cabin	Vacuum System Controller	**On ground, or in flight:** - Pull C/B 35 MG on 2001VU, aft cabin, - Wait 30 s , then push the C/B.
46	ATSU Malfunction	ATSU	An ATSU reset should be attempted, if: key selection has no effect on any of the MCDU ATSU DATALINK submenus. **On ground, or in flight:** - Pull the C/Bs in the following order: L16, L15 on 121VU - Wait 5 s , then:. - Push the C/Bs in the following order: L15, L16.
70	ENG IGN A+B FAULT	FADEC and EIU	*Refer to PRO ABN 70 ENG 1(2) IGN FAULT (IGN A +B FAULT)*, if applicable.
	ENG 1(2) FADEC A(B) FAULT	FADEC	*Refer to PRO-ABN-70 ENG 1(2) FADEC A(B) FAULT*, if applicable.

COMPUTER RESET TABLE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

ATA	System malfunction or ECAM warning/caution	Affected system	Reset
21	VENT AVNCS SYS FAULT	AEVC	**On ground only:** - Pull C/B Y 17 on 122VU. - Wait 1 s before pushing the C/B.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
22	AUTO FLT FCU 1(2) FAULT	FCU	**In flight:** - Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. - Push it after 5 s. - CHECK the displayed targets and the barometer reference, and correct them if necessary. **On ground:** - Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. - Push it after 5 s. - If FCU1(2) FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) - If FCU1(2) FAULT remains, pull both C/B B05 on 49VU and M21 on 121VU - Push them after 7 min, with a delay of less than 5 s between side 1 and 2 - Wait at least 30 s for FCU1 and FCU2 safety tests completion - CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful)
	AUTO FLT FCU 1 + 2 FAULT	FCU	**In flight:** - Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. - Push them after 5 s. - CHECK the displayed targets and the barometer reference, and correct them if necessary. **On ground:** - Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. - Push the C/Bs after 5 s. - If FCU 1+2 FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) - If FCU 1+2 FAULT remains, pull again both C/B B05 on 49VU and M21 on 121VU - Push them after 7 min, with a delay of less than 5 s between side 1 and 2

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
			- Wait at least 30 seconds for FCU1 and FCU2 safety tests completion - CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) FCU targets are synchronized on current aircraft values and displayed as selected targets. - RE–ENTER the barometer altimeter setting value, if necessary.
	AUTO FLT YAW DAMPER 1(2) FAULT	FAC 1(2)	*Refer to PRO-ABN-22 AUTO FLT YAW DAMPER 1(2)*, if applicable.
	WINDSHEAR DET FAULT or REAC W/S DET FAULT ◁✻	FAC 1 + 2	
	One MCDU locked or blank Both MCDU locked or blank FMGC malfunction	MCDU FMGC FMGC	*Refer to PRO-SUP-22-10 Other Abnormal Procedures - MCDU Locked or Blank.*

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
23	COM CIDS 1+2 FAULT	CIDS	**On ground, or in flight:** - Pull the C/Bs in the following order: G02 on 49VU, M05 and N11 on 121VU. - Wait 10 s, then - Push the C/B in the following order: N11, M05, G02. - After CIDS reset, wait approximately 4 min, before recovering normal operation.
	Uncommanded EVAC horn actuation	CIDS	**On ground, or in flight:** Press the EVAC HORN SHUT OFF pb. Set the EVAC CAPT & PURS/CAPT sw to the CAPT only position. Wait for 3 s - IF UNSUCCESSFUL: • Pull the C/Bs in the following order: G02 on 49VU, M05 and N11 on 121VU. • Wait for 1 min, then: • Push the C/Bs in the following order: N11, M05, G02. • After CIDS reset, wait approximately 4 min, before recovering normal operation.
	Frozen RMP	RMP	*Refer to PRO-SUP-23 Frozen RMP*
	FAP freezing	FAP or Tape reproducer/PRAM	**On ground, or in flight:** - Pull C/B M14 (or Q14 ◁) of the FAP in the 121VU. - Wait 10 s before pushing the C/B. IF UNSUCCESSFUL: - Pull the tape reproducer/PRAM C/B F07 on 2000VU (cabin) - Wait 10 s before pushing the C/B.
26	SMOKE DET FAULT	SDCU	**On ground only:** - Pull C/B C06 on 49VU, and C/B T18 on 122VU. - Wait 60 s before pushing the C/Bs.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
3 27	F/CTL ELAC 1(2) FAULT F/CTL ALTN LAW F/CTL ELAC 1(2) PITCH FAULT	ELAC	*Refer to PRO-ABN-27 section for associated procedure, if applicable.*
	ELAC or SEC malfunction	ELAC or SEC	ELAC or SEC may be reset. **WARNING** Do not reset more than one computer at a time. It is possible to reset flight control computers in flight, event if not requested by the ECAM, provided only one reset is performed at a time: For the ELAC only, in case of uncommanded maneuvers during the flight, it is not recommended to reset the ELAC. Note: *When an ELAC reset is performed on ground the crew must check the pitch trim position. If a reset is performed on ground, the flight crew must then perform a flight control check, Refer to PRO-NOR-SOP-10-TAXI.*
Impacted DU: NONE			
4 27	F/CTL SPLR FAULT, triggered on ground after the flight control check.	SEC	**On ground** - All the three SEC may be reset - A flight control check must be performed after the reset - If the ECAM triggers again the F/CTL SPLR FAULT, maintenance action is due. **WARNING** Do not reset more than one computer at a time.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
28	Loss of fuel quantity indication or Simultaneous triggering of FUEL L XFR VALVE CLOSED and FUEL R XFR VALVE CLOSED, although FUEL SD indicates no anomaly.	FQIC	**On ground, or in flight:** - Pull the 3 C/B: • Channel 1 (A13 on 49VU) • Channel 2 (M27 on 121VU) • Channel 1 and 2 (L26 on 121VU) - Wait 5 s, before pushing the 3 C/B. *Note: The fuel quantity indication will be re-established within 1 min.*
31	FWS FWC 1(2) FAULT	FWC	**On ground:** Pull, then push, the C/B of the affected FWC: - FWC 1 (F01 on 49VU) - FWC 2 (Q7 on 121VU) Wait 50 s after pushing the C/Bs. **In flight:** Pull, then push, the C/B of the affected FWC: - FWC 1 (F01 on 49VU) - FWC 2 (Q7 on 121VU)
32	Braking malfunction	BSCU	*Refer to PRO-SUP-32 BSCU Reset - On Ground*
	L/G LGCIU 1(2) FAULT	LGCIU 1(2)	**On ground only:** The flight crew must depressurize the green hydraulic system before resetting the LGCIU. - ENG 1 PUMP OFF - PTU OFF When there is no green hydraulic pressure: - To reset LGCIU 1: • Pull C/B Q34 on 121VU, then C09 on 49VU • Wait for 15 s , then push the C/Bs - To reset LGCIU 2: • Pull C/B Q35 on 121VU • Wait for 15 s , then push the C/B
34	NAV TCAS FAULT	TCAS	**On ground only:** - Pull C/B K10 on 121VU. - Wait 5 s, then push the C/B.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
38	Failure messages on the CIDS FAP in the cabin	Vacuum System Controller	**On ground, or in flight:** - Pull C/B 35 MG on 2001VU, aft cabin, - Wait 30 s , then push the C/B.
46	ATSU Malfunction	ATSU	An ATSU reset should be attempted, if: key selection has no effect on any of the MCDU ATSU DATALINK submenus. **On ground, or in flight:** - Pull the C/Bs in the following order: L16, L15 on 121VU - Wait 5 s , then:. - Push the C/Bs in the following order: L15, L16.
70	ENG IGN A+B FAULT	FADEC and EIU	*Refer to PRO ABN 70 ENG 1(2) IGN FAULT (IGN A +B FAULT)*, if applicable.
	ENG 1(2) FADEC A(B) FAULT	FADEC	*Refer to PRO-ABN-70 ENG 1(2) FADEC A(B) FAULT*, if applicable.

COMPUTER RESET TABLE

Applicable to: B-HSL, B-HSM

ATA	System malfunction or ECAM warning/caution	Affected system	Reset
21	VENT AVNCS SYS FAULT	AEVC	**On ground only:** - Pull C/B Y 17 on 122VU. - Wait 1 s before pushing the C/B.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
22	AUTO FLT FCU 1(2) FAULT	FCU	**In flight:** - Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. - Push it after 5 s. - CHECK the displayed targets and the barometer reference, and correct them if necessary. **On ground:** - Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. - Push it after 5 s. - If FCU1(2) FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) - If FCU1(2) FAULT remains, pull both C/B B05 on 49VU and M21 on 121VU - Push them after 7 min, with a delay of less than 5 s between side 1 and 2 - Wait at least 30 s for FCU1 and FCU2 safety tests completion - CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful)
	AUTO FLT FCU 1 + 2 FAULT	FCU	**In flight:** - Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. - Push them after 5 s. - CHECK the displayed targets and the barometer reference, and correct them if necessary. **On ground:** - Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. - Push the C/Bs after 5 s. - If FCU 1+2 FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) - If FCU 1+2 FAULT remains, pull again both C/B B05 on 49VU and M21 on 121VU - Push them after 7 min, with a delay of less than 5 s between side 1 and 2

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
			- Wait at least 30 seconds for FCU1 and FCU2 safety tests completion - CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) FCU targets are synchronized on current aircraft values and displayed as selected targets. - RE–ENTER the barometer altimeter setting value, if necessary.
	AUTO FLT YAW DAMPER 1(2) FAULT	FAC 1(2)	*Refer to PRO-ABN-22 AUTO FLT YAW DAMPER 1(2)*, if applicable.
	WINDSHEAR DET FAULT or REAC W/S DET FAULT ◁✻	FAC 1 + 2	
	One MCDU locked or blank Both MCDU locked or blank FMGC malfunction	MCDU FMGC FMGC	*Refer to PRO-SUP-22-10 Other Abnormal Procedures - MCDU Locked or Blank.*

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
23	COM CIDS 1+2 FAULT	CIDS	**On ground, or in flight:** - Pull the C/Bs in the following order: G02 on 49VU, M05 and N11 on 121VU. - Wait 10 s, then - Push the C/B in the following order: N11, M05, G02. - After CIDS reset, wait approximately 4 min, before recovering normal operation.
	Uncommanded EVAC horn actuation	CIDS	**On ground, or in flight:** Press the EVAC HORN SHUT OFF pb. Set the EVAC CAPT & PURS/CAPT sw to the CAPT only position. Wait for 3 s - IF UNSUCCESSFUL: • Pull the C/Bs in the following order: G02 on 49VU, M05 and N11 on 121VU. • Wait for 1 min, then: • Push the C/Bs in the following order: N11, M05, G02. • After CIDS reset, wait approximately 4 min, before recovering normal operation.
	Frozen RMP	RMP	*Refer to PRO-SUP-23 Frozen RMP*
	FAP freezing	FAP or Tape reproducer/PRAM	**On ground, or in flight:** - Pull C/B M14 (or Q14 ◁) of the FAP in the 121VU. - Wait 10 s before pushing the C/B. IF UNSUCCESSFUL: - Pull the tape reproducer/PRAM C/B F07 on 2000VU (cabin) - Wait 10 s before pushing the C/B.
26	SMOKE DET FAULT	SDCU	**On ground only:** - Pull C/B C06 on 49VU, and C/B T18 on 122VU. - Wait 60 s before pushing the C/Bs.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
5 27	F/CTL ELAC 1(2) FAULT F/CTL ALTN LAW F/CTL ELAC 1(2) PITCH FAULT	ELAC	*Refer to PRO-ABN-27 section for associated procedure, if applicable.*
	ELAC or SEC malfunction	ELAC or SEC	ELAC or SEC may be reset. **WARNING** Do not reset more than one computer at a time. It is possible to reset flight control computers in flight, event if not requested by the ECAM, provided only one reset is performed at a time: For the ELAC only, in case of uncommanded maneuvers during the flight, it is not recommended to reset the ELAC. Note: *When an ELAC reset is performed on ground the crew must check the pitch trim position. If a reset is performed on ground, the flight crew must then perform a flight control check, Refer to PRO-NOR-SOP-10-TAXI.*
Impacted DU: NONE			
6 27	F/CTL SPLR FAULT, triggered on ground after the flight control check.	SEC	**On ground** - All the three SEC may be reset - A flight control check must be performed after the reset - If the ECAM triggers again the F/CTL SPLR FAULT, maintenance action is due. **WARNING** Do not reset more than one computer at a time.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
28	Loss of fuel quantity indication or Simultaneous triggering of FUEL L XFR VALVE CLOSED and FUEL R XFR VALVE CLOSED , although FUEL SD indicates no anomaly.	FQIC	**On ground, or in flight:** - Pull the 3 C/B: • Channel 1 (A13 on 49VU) • Channel 2 (M27 on 121VU) • Channel 1 and 2 (L26 on 121VU) - Wait 5 s, before pushing the 3 C/B. *Note: The fuel quantity indication will be re-established within 1 min.* **CAUTION** The FUEL AUTO FEED FAULT caution will be lost for the remainder of the flight. In flight: - If center tank is not empty, while one inner tank contains less than 5 000 kg (11 000 lb) of fuel: • FUEL MODE SEL (MAN) - When center tank is empty: • CTR TK PUMP 1 and 2 (OFF) • FUEL MODE SEL (MAN)
31	FWS FWC 1(2) FAULT	FWC	**On ground:** Pull, then push, the C/B of the affected FWC: - FWC 1 (F01 on 49VU) - FWC 2 (Q7 on 121VU) Wait 50 s after pushing the C/Bs. **In flight:** Pull, then push, the C/B of the affected FWC: - FWC 1 (F01 on 49VU) - FWC 2 (Q7 on 121VU)

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
32	Braking malfunction	BSCU	*Refer to PRO-SUP-32 BSCU Reset - On Ground*
	L/G LGCIU 1(2) FAULT	LGCIU 1(2)	**On ground only:** The flight crew must depressurize the green hydraulic system before resetting the LGCIU. - ENG 1 PUMP OFF - PTU OFF When there is no green hydraulic pressure: - To reset LGCIU 1: • Pull C/B Q34 on 121VU, then C09 on 49VU • Wait for 15 s , then push the C/Bs - To reset LGCIU 2: • Pull C/B Q35 on 121VU • Wait for 15 s , then push the C/B
34	NAV TCAS FAULT	TCAS	**On ground only:** - Pull C/B K10 on 121VU. - Wait 5 s, then push the C/B.
	ISIS malfunction	ISIS	**On ground only:** With aircraft not moving: - Pull C/B F12 on 49VU, - Wait 5 s, then push the C/B, - Normal operation is expected after approximately 2 min. Note: *In the case of small aircraft motion during the C/B reset (refueling, cargo loading conditions, etc.), the ATT red flag may appear on the ISIS. In this case, press the RST P/B for 2 s wait 2 min additional to recover normal operation.*
38	Failure messages on the CIDS FAP in the cabin	Vacuum System Controller	**On ground, or in flight:** - Pull C/B 35 MG on 2001VU, aft cabin, - Wait 30 s , then push the C/B.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
46	ATSU Malfunction	ATSU	An ATSU reset should be attempted, if: key selection has no effect on any of the MCDU ATSU DATALINK submenus. **On ground, or in flight:** - Pull the C/Bs in the following order: L16, L15 on 121VU - Wait 5 s , then:. - Push the C/Bs in the following order: L15, L16.
70	ENG IGN A+B FAULT	FADEC and EIU	*Refer to PRO ABN 70 ENG 1(2) IGN FAULT (IGN A +B FAULT)*, if applicable.
	ENG 1(2) FADEC A(B) FAULT	FADEC	*Refer to PRO-ABN-70 ENG 1(2) FADEC A(B) FAULT*, if applicable.

COMPUTER RESET TABLE

Applicable to: B-HSN

ATA	System malfunction or ECAM warning/caution	Affected system	Reset
21	VENT AVNCS SYS FAULT	AEVC	**On ground only:** - Pull C/B Y 17 on 122VU. - Wait 1 s before pushing the C/B.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
22	AUTO FLT FCU 1(2) FAULT	FCU	**In flight:** - Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. - Push it after 5 s. - CHECK the displayed targets and the barometer reference, and correct them if necessary. **On ground:** - Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. - Push it after 5 s. - If FCU1(2) FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) - If FCU1(2) FAULT remains, pull both C/B B05 on 49VU and M21 on 121VU - Push them after 7 min, with a delay of less than 5 s between side 1 and 2 - Wait at least 30 s for FCU1 and FCU2 safety tests completion - CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful)
	AUTO FLT FCU 1 + 2 FAULT	FCU	**In flight:** - Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. - Push them after 5 s. - CHECK the displayed targets and the barometer reference, and correct them if necessary. **On ground:** - Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. - Push the C/Bs after 5 s. - If FCU 1+2 FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) - If FCU 1+2 FAULT remains, pull again both C/B B05 on 49VU and M21 on 121VU - Push them after 7 min, with a delay of less than 5 s between side 1 and 2

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
			- Wait at least 30 seconds for FCU1 and FCU2 safety tests completion - CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) FCU targets are synchronized on current aircraft values and displayed as selected targets. - RE–ENTER the barometer altimeter setting value, if necessary.
	AUTO FLT YAW DAMPER 1(2) FAULT	FAC 1(2)	*Refer to PRO-ABN-22 AUTO FLT YAW DAMPER 1(2)*, if applicable.
	WINDSHEAR DET FAULT or REAC W/S DET FAULT ◁✻	FAC 1 + 2	
	One MCDU locked or blank Both MCDU locked or blank FMGC malfunction	MCDU FMGC FMGC	*Refer to PRO-SUP-22-10 Other Abnormal Procedures - MCDU Locked or Blank.*

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
23	COM CIDS 1+2 FAULT	CIDS	**On ground, or in flight:** - Pull the C/Bs in the following order: G02 on 49VU, M05 and N11 on 121VU. - Wait 10 s, then - Push the C/B in the following order: N11, M05, G02. - After CIDS reset, wait approximately 4 min, before recovering normal operation.
	Uncommanded EVAC horn actuation	CIDS	**On ground, or in flight:** Press the EVAC HORN SHUT OFF pb. Set the EVAC CAPT & PURS/CAPT sw to the CAPT only position. Wait for 3 s - IF UNSUCCESSFUL: • Pull the C/Bs in the following order: G02 on 49VU, M05 and N11 on 121VU. • Wait for 1 min, then: • Push the C/Bs in the following order: N11, M05, G02. • After CIDS reset, wait approximately 4 min, before recovering normal operation.
	Frozen RMP	RMP	*Refer to PRO-SUP-23 Frozen RMP*
	FAP freezing	FAP or Tape reproducer/PRAM	**On ground, or in flight:** - Pull C/B M14 (or Q14 ◁) of the FAP in the 121VU. - Wait 10 s before pushing the C/B. IF UNSUCCESSFUL: - Pull the tape reproducer/PRAM C/B F07 on 2000VU (cabin) - Wait 10 s before pushing the C/B.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
24	GPU cannot be connected to the aircraft	GAPCU	**On ground only:** The GPU cannot be connected to the electrical network of the aircraft (AVAIL light is OFF) - If at least one power source (IDG 1 or 2, APU GEN or batteries) is connected to the electrical network of the aircraft. • Reset the EXT PWR pb switch on 35VU (Press and release) - If no power source is connected to the electrical network of the aircraft. • Set the BAT 1 pb-sw and BAT 2 pb-sw to AUTO.
26	SMOKE DET FAULT	SDCU	**On ground only:** - Pull C/B C06 on 49VU, and C/B T18 on 122VU. - Wait 60 s before pushing the C/Bs.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
7 27	F/CTL ELAC 1(2) FAULT F/CTL ALTN LAW F/CTL ELAC 1(2) PITCH FAULT	ELAC	*Refer to PRO-ABN-27 section for associated procedure, if applicable.*
	ELAC or SEC malfunction	ELAC or SEC	ELAC or SEC may be reset. **WARNING** Do not reset more than one computer at a time. It is possible to reset flight control computers in flight, event if not requested by the ECAM, provided only one reset is performed at a time: For the ELAC only, in case of uncommanded maneuvers during the flight, it is not recommended to reset the ELAC. Note: *When an ELAC reset is performed on ground the crew must check the pitch trim position. If a reset is performed on ground, the flight crew must then perform a flight control check, Refer to PRO-NOR-SOP-10-TAXI.*
Impacted DU: NONE			
8 27	F/CTL SPLR FAULT, triggered on ground after the flight control check.	SEC	**On ground** - All the three SEC may be reset - A flight control check must be performed after the reset - If the ECAM triggers again the F/CTL SPLR FAULT, maintenance action is due. **WARNING** Do not reset more than one computer at a time.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
28	Loss of fuel quantity indication or Simultaneous triggering of FUEL L XFR VALVE CLOSED and FUEL R XFR VALVE CLOSED , although FUEL SD indicates no anomaly.	FQIC	**On ground, or in flight:** - Pull the 3 C/B: • Channel 1 (A13 on 49VU) • Channel 2 (M27 on 121VU) • Channel 1 and 2 (L26 on 121VU) - Wait 5 s, before pushing the 3 C/B. *Note:* *The fuel quantity indication will be re-established within 1 min.* **CAUTION** The FUEL AUTO FEED FAULT caution will be lost for the remainder of the flight. In flight: - If center tank is not empty, while one inner tank contains less than 5 000 kg (11 000 lb) of fuel: • FUEL MODE SEL (MAN) - When center tank is empty: • CTR TK PUMP 1 and 2 (OFF) • FUEL MODE SEL (MAN)
31	FWS FWC 1(2) FAULT	FWC	**On ground:** Pull, then push, the C/B of the affected FWC: - FWC 1 (F01 on 49VU) - FWC 2 (Q7 on 121VU) Wait 50 s after pushing the C/Bs. **In flight:** Pull, then push, the C/B of the affected FWC: - FWC 1 (F01 on 49VU) - FWC 2 (Q7 on 121VU)

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
32	Braking malfunction	BSCU	*Refer to PRO-SUP-32 BSCU Reset - On Ground*
	L/G LGCIU 1(2) FAULT	LGCIU 1(2)	**On ground only:** The flight crew must depressurize the green hydraulic system before resetting the LGCIU. - ENG 1 PUMP OFF - PTU OFF When there is no green hydraulic pressure: - To reset LGCIU 1: • Pull C/B Q34 on 121VU, then C09 on 49VU • Wait for 15 s , then push the C/Bs - To reset LGCIU 2: • Pull C/B Q35 on 121VU • Wait for 15 s , then push the C/B
34	NAV TCAS FAULT	TCAS	**On ground only:** - Pull C/B K10 on 121VU. - Wait 5 s, then push the C/B.
	ISIS malfunction	ISIS	**On ground only:** With aircraft not moving: - Pull C/B F12 on 49VU, - Wait 5 s, then push the C/B, - Normal operation is expected after approximately 2 min. *Note: In the case of small aircraft motion during the C/B reset (refueling, cargo loading conditions, etc.), the ATT red flag may appear on the ISIS. In this case, press the RST P/B for 2 s wait 2 min additional to recover normal operation.*
38	Failure messages on the CIDS FAP in the cabin	Vacuum System Controller	**On ground, or in flight:** - Pull C/B 35 MG on 2001VU, aft cabin, - Wait 30 s , then push the C/B.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
46	ATSU Malfunction	ATSU	An ATSU reset should be attempted, if: key selection has no effect on any of the MCDU ATSU DATALINK submenus. **On ground, or in flight:** - Pull the C/Bs in the following order: L16, L15 on 121VU - Wait 5 s , then:. - Push the C/Bs in the following order: L15, L16.
70	ENG IGN A+B FAULT	FADEC and EIU	*Refer to PRO ABN 70 ENG 1(2) IGN FAULT (IGN A +B FAULT)*, if applicable.
	ENG 1(2) FADEC A(B) FAULT	FADEC	*Refer to PRO-ABN-70 ENG 1(2) FADEC A(B) FAULT*, if applicable.

COMPUTER RESET TABLE

Applicable to: B-HSO, B-HSP

ATA	System malfunction or ECAM warning/caution	Affected system	Reset
Impacted by TDU: 00014123 Computer Reset Table - 21 - Air Conditioning/Ventilation/Pressurization			
21	VENT AVNCS SYS FAULT	AEVC	**On ground only:** - Pull C/B Y 17 on 122VU. - Wait 1 s before pushing the C/B.
Impacted DU: 00012647 Computer Reset Table - 21 - Air Conditioning/Ventilation/Pressurization			
21	VENT AVNCS SYS FAULT	AEVC	**On ground only:** - Pull C/B Y 17 on 122VU. - Wait 1 s before pushing the C/B.
	AIR PACK 1(2) REGUL FAULT	ACSC	**On ground only:** - Pull C/B W21 and W22 on 122VU. - Pull C/B X21 and X22 on 122VU. - Pull C/B Y18, Y20 and Y21 on 122VU. - Pull C/B D8 on 49VU. - Wait 5 s before pushing all the C/Bs.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
22	AUTO FLT FCU 1(2) FAULT	FCU	**In flight:** - Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. - Push it after 5 s. - CHECK the displayed targets and the barometer reference, and correct them if necessary. **On ground:** - Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. - Push it after 5 s. - If FCU1(2) FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) - If FCU1(2) FAULT remains, pull both C/B B05 on 49VU and M21 on 121VU - Push them after 7 min, with a delay of less than 5 s between side 1 and 2 - Wait at least 30 s for FCU1 and FCU2 safety tests completion - CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful)
	AUTO FLT FCU 1 + 2 FAULT	FCU	**In flight:** - Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. - Push them after 5 s. - CHECK the displayed targets and the barometer reference, and correct them if necessary. **On ground:** - Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. - Push the C/Bs after 5 s. - If FCU 1+2 FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) - If FCU 1+2 FAULT remains, pull again both C/B B05 on 49VU and M21 on 121VU - Push them after 7 min, with a delay of less than 5 s between side 1 and 2

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
			- Wait at least 30 seconds for FCU1 and FCU2 safety tests completion - CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) FCU targets are synchronized on current aircraft values and displayed as selected targets. - RE–ENTER the barometer altimeter setting value, if necessary.
	AUTO FLT YAW DAMPER 1(2) FAULT	FAC 1(2)	*Refer to PRO-ABN-22 AUTO FLT YAW DAMPER 1(2)*, if applicable.
	WINDSHEAR DET FAULT or REAC W/S DET FAULT ◁✻	FAC 1 + 2	
	One MCDU locked or blank Both MCDU locked or blank FMGC malfunction	MCDU FMGC FMGC	*Refer to PRO-SUP-22-10 Other Abnormal Procedures - MCDU Locked or Blank.*

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
23	COM CIDS 1+2 FAULT and/or Loss of Passenger Adress and/or Loss of Cabin Interphone	CIDS	**On ground, or in flight:** - Pull the C/Bs in the following order: P13 ◁ and P14 ◁ on 121VU, G01 and G02 on 49VU, M05 and M06 on 121VU. - Wait 10 s, then: - Push the C/Bs in the following order: M05, M06, G01, G02, P13 ◁ , P14 ◁ . - After CIDS reset, wait approximately 4 min, before recovering normal operation.
	Uncommanded EVAC horn actuation	CIDS	**On ground, or in flight:** Press the EVAC HORN SHUT OFF pb. Set the EVAC CAPT & PURS/CAPT sw to the CAPT only position. Wait for 3 s - IF UNSUCCESSFUL: • Pull the C/Bs for DIR2 in the following order: G02 on 49VU, M06 on 121VU. - IF UNSUCCESSFUL: • Pull the C/Bs for DIR1 in the following order: G01 on 49VU, M05 on 121VU. • Wait for 1 min, then: • Push the C/Bs for DIR2 in the following order: M06 , G02 . • After CIDS reset, wait approximately 4 min, before recovering normal operation.
	Frozen RMP	RMP	*Refer to PRO-SUP-23 Frozen RMP*
	FAP freezing	FAP	**On ground, or in flight:** - Pull FAP C/Bs in the following order: H01 C/B on 49VU, Q14 on 121VU. - Wait 10 s, then: - Push the C/Bs in the following order: Q14, H01 C/B.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
24	GPU cannot be connected to the aircraft	GAPCU	**<u>On ground only:</u>** The GPU cannot be connected to the electrical network of the aircraft (AVAIL light is OFF) - If at least one power source (IDG 1 or 2, APU GEN or batteries) is connected to the electrical network of the aircraft. • Reset the EXT PWR pb switch on 35VU (Press and release) - If no power source is connected to the electrical network of the aircraft. • Set the BAT 1 pb-sw and BAT 2 pb-sw to AUTO.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
9 26	SMOKE DET FAULT	CIDS-SDF	**On ground, or in flight:** Apply the following actions in the presented order: - Pull the C/Bs C05 and C06 on 49VU. T17 and T18 on 122VU - Wait 5 s, then - Push simultaneously the C/Bs C05 and C06 on 49VU. - Within 2 s push simultaneously the C/Bs T17 and T18 on 122VU.
	SMOKE LAVATORY DET FAULT with all lavatories declared inoperative on the FAP	CIDS or CIDS-SDF	**On ground, or in flight:** Apply the following actions in the presented order: - Pull the C/Bs P13 and P14 ⋖ ; on 121VU, G01 and G02 and 49VU, M05 or M06 and M06 or M07 on 121VU. - Wait 5 s, then - Push the C/Bs in the following order : M05 or M06 and M06 or M07 on 121VU, G01 and G02 on 49VU, P13 and P14 ⋖ on 121VU. **If unsuccessful, on ground only:** Apply the following actions in the presented order: - Pull the C/Bs C06 and C05 on 49VU, T17 and T18 on 122VU. - Wait 5 s, then - Push simultaneously the C/Bs C06 and C05 on 49VU. - Within 2 s push simultaneously the C/Bs T17 and T18 on 122VU.
	SMOKE FWD (AFT) CARGO DET FAULT SMOKE FWD (AFT) CRG 1/2 BTL FAULT	CIDS-SDF	**On ground:** Apply the following actions in the presented order: - Pull the C/Bs C06 and C05 on 49VU, T17 and T18 on 122VU. - Wait 5 s, then - Push simultaneously the C/Bs C06 and C05 on 49VU. - Within 2 s push simultaneously the C/Bs T17 and T18 on 122VU.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
10	F/CTL ELAC 1(2) FAULT F/CTL ALTN LAW F/CTL ELAC 1(2) PITCH FAULT	ELAC	*Refer to PRO-ABN-27 section for associated procedure, if applicable.*
27	ELAC or SEC malfunction	ELAC or SEC	ELAC or SEC may be reset. **WARNING** Do not reset more than one computer at a time. It is possible to reset flight control computers in flight, event if not requested by the ECAM, provided only one reset is performed at a time: For the ELAC only, in case of uncommanded maneuvers during the flight, it is not recommended to reset the ELAC. Note: *When an ELAC reset is performed on ground the crew must check the pitch trim position. If a reset is performed on ground, the flight crew must then perform a flight control check, Refer to PRO-NOR-SOP-10-TAXI.*
Impacted DU: NONE			
11 27	F/CTL SPLR FAULT, triggered on ground after the flight control check.	SEC	**On ground** - All the three SEC may be reset - A flight control check must be performed after the reset - If the ECAM triggers again the F/CTL SPLR FAULT, maintenance action is due. **WARNING** Do not reset more than one computer at a time.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
28	Loss of fuel quantity indication or Simultaneous triggering of FUEL L XFR VALVE CLOSED and FUEL R XFR VALVE CLOSED , although FUEL SD indicates no anomaly.	FQIC	**On ground, or in flight:** - Pull the 3 C/B: • Channel 1 (A13 on 49VU) • Channel 2 (M27 on 121VU) • Channel 1 and 2 (L26 on 121VU) - Wait 5 s, before pushing the 3 C/B. *Note:* *The fuel quantity indication will be re-established within 1 min.* **CAUTION** The FUEL AUTO FEED FAULT caution will be lost for the remainder of the flight. In flight: - If center tank is not empty, while one inner tank contains less than 5 000 kg (11 000 lb) of fuel: • FUEL MODE SEL (MAN) - When center tank is empty: • CTR TK PUMP 1 and 2 (OFF) • FUEL MODE SEL (MAN)
31	FWS FWC 1(2) FAULT	FWC	**On ground:** Pull, then push, the C/B of the affected FWC: - FWC 1 (F01 on 49VU) - FWC 2 (Q7 on 121VU) Wait 50 s after pushing the C/Bs. **In flight:** Pull, then push, the C/B of the affected FWC: - FWC 1 (F01 on 49VU) - FWC 2 (Q7 on 121VU)

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
32	Braking malfunction	BSCU	*Refer to PRO-SUP-32 BSCU Reset - On Ground*
	L/G LGCIU 1(2) FAULT	LGCIU 1(2)	**On ground only:** The flight crew must depressurize the green hydraulic system before resetting the LGCIU. - ENG 1 PUMP OFF - PTU OFF When there is no green hydraulic pressure: - To reset LGCIU 1: • Pull C/B Q34 on 121VU, then C09 on 49VU • Wait for 15 s , then push the C/Bs - To reset LGCIU 2: • Pull C/B Q35 on 121VU • Wait for 15 s , then push the C/B
34	NAV TCAS FAULT	TCAS	**On ground only:** - Pull C/B K10 on 121VU. - Wait 5 s, then push the C/B.
	ISIS malfunction	ISIS	**On ground only:** With aircraft not moving: - Pull C/B F12 on 49VU, - Wait 5 s, then push the C/B, - Normal operation is expected after approximately 2 min. Note: *In the case of small aircraft motion during the C/B reset (refueling, cargo loading conditions, etc.), the ATT red flag may appear on the ISIS. In this case, press the RST P/B for 2 s wait 2 min additional to recover normal operation.*

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
46	ATSU Malfunction	ATSU	An ATSU reset should be attempted, if: key selection has no effect on any of the MCDU ATSU DATALINK submenus. **On ground, or in flight:** - Pull the C/Bs in the following order: L16, L15 on 121VU - Wait 5 s , then:. - Push the C/Bs in the following order: L15, L16.
70	ENG IGN A+B FAULT	FADEC and EIU	*Refer to PRO ABN 70 ENG 1(2) IGN FAULT (IGN A +B FAULT)*, if applicable.
	ENG 1(2) FADEC A(B) FAULT	FADEC	*Refer to PRO-ABN-70 ENG 1(2) FADEC A(B) FAULT*, if applicable.

COMPUTER RESET TABLE

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

ATA	System malfunction or ECAM warning/caution	Affected system	Reset
Impacted by TDU: 00014123 Computer Reset Table - 21 - Air Conditioning/Ventilation/Pressurization			
21	VENT AVNCS SYS FAULT	AEVC	**On ground only:** - Pull C/B Y 17 on 122VU. - Wait 1 s before pushing the C/B.
Impacted DU: 00012647 Computer Reset Table - 21 - Air Conditioning/Ventilation/Pressurization			
21	VENT AVNCS SYS FAULT	AEVC	**On ground only:** - Pull C/B Y 17 on 122VU. - Wait 1 s before pushing the C/B.
	AIR PACK 1(2) REGUL FAULT	ACSC	**On ground only:** - Pull C/B W21 and W22 on 122VU. - Pull C/B X21 and X22 on 122VU. - Pull C/B Y18, Y20 and Y21 on 122VU. - Pull C/B D8 on 49VU. - Wait 5 s before pushing all the C/Bs.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
22	AUTO FLT FCU 1(2) FAULT	FCU	**In flight:** - Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. - Push it after 5 s. - CHECK the displayed targets and the barometer reference, and correct them if necessary. **On ground:** - Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. - Push it after 5 s. - If FCU1(2) FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) - If FCU1(2) FAULT remains, pull both C/B B05 on 49VU and M21 on 121VU - Push them after 7 min, with a delay of less than 5 s between side 1 and 2 - Wait at least 30 s for FCU1 and FCU2 safety tests completion - CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful)
	AUTO FLT FCU 1 + 2 FAULT	FCU	**In flight:** - Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. - Push them after 5 s. - CHECK the displayed targets and the barometer reference, and correct them if necessary. **On ground:** - Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. - Push the C/Bs after 5 s. - If FCU 1+2 FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) - If FCU 1+2 FAULT remains, pull again both C/B B05 on 49VU and M21 on 121VU - Push them after 7 min, with a delay of less than 5 s between side 1 and 2

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
			- Wait at least 30 seconds for FCU1 and FCU2 safety tests completion - CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) FCU targets are synchronized on current aircraft values and displayed as selected targets. - RE–ENTER the barometer altimeter setting value, if necessary.
	AUTO FLT YAW DAMPER 1(2) FAULT	FAC 1(2)	*Refer to PRO-ABN-22 AUTO FLT YAW DAMPER 1(2)*, if applicable.
	WINDSHEAR DET FAULT or REAC W/S DET FAULT ◁✻	FAC 1 + 2	
	One MCDU locked or blank Both MCDU locked or blank FMGC malfunction	MCDU FMGC FMGC	*Refer to PRO-SUP-22-10 Other Abnormal Procedures - MCDU Locked or Blank.*

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
Impacted by TDU: 00013849 Computer Reset Table - 23 - Communications			
23	COM CIDS 1+2 FAULT and/or Loss of Passenger Adress and/or Loss of Cabin Interphone	CIDS	**On ground, or in flight:** - Pull the C/Bs in the following order: P13 ◁ and P14 ◁ on 121VU, G01 and G02 on 49VU, M05 and M06 on 121VU. - Wait 10 s, then: - Push the C/Bs in the following order: M05, M06, G01, G02, P13 ◁, P14 ◁. - After CIDS reset, wait approximately 4 min, before recovering normal operation.
	Uncommanded EVAC horn actuation	CIDS	**On ground, or in flight:** Press the EVAC HORN SHUT OFF pb. Set the EVAC CAPT & PURS/CAPT sw to the CAPT only position. Wait for 3 s - IF UNSUCCESSFUL: • Pull the C/Bs for DIR2 in the following order: G02 on 49VU, M06 on 121VU. - IF UNSUCCESSFUL: • Pull the C/Bs for DIR1 in the following order: G01 on 49VU, M05 on 121VU. • Wait for 1 min, then: • Push the C/Bs for DIR2 in the following order: M06 , G02 . • After CIDS reset, wait approximately 4 min, before recovering normal operation.
	Frozen RMP	RMP	*Refer to PRO-SUP-23 Frozen RMP*
	FAP freezing	FAP	**On ground, or in flight:** - Pull FAP C/Bs in the following order: H01 C/B on 49VU, Q14 on 121VU. - Wait 10 s, then: - Push the C/Bs in the following order: Q14, H01 C/B.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
Impacted DU: 00012649 Computer Reset Table - 23 - Communications			
23	COM CIDS 1+2 FAULT and/or Loss of Passenger Adress and/or Loss of Cabin Interphone	CIDS	**Confirm if spurious:** - Check PA function - Check cabin Interphone function - Check cabin Lighting function If spurious, reset the CIDS when aircraft is self powered (APU or engine). **On ground or in flight:** - Pull the C/Bs in the following order: P13 ◁ and P14 ◁ on 121VU, G01 and G02 on 49VU, M05 and M06 on 121VU. - Wait 10 s, then - Push the C/Bs in the following order: M05, M06, G01, G02, P13 ◁ ,P14 ◁ . - After CIDS reset, wait approximately 4 min before recovering normal operation.
	Uncommanded EVAC horn actuation	CIDS	**On ground, or in flight:** Press the EVAC HORN SHUT OFF pb. Set the EVAC CAPT & PURS/CAPT sw to the CAPT only position. Wait for 3 s - IF UNSUCCESSFUL: • Pull the C/Bs for DIR2 in the following order: G02 on 49VU, M06 on 121VU. - IF UNSUCCESSFUL: • Pull the C/Bs for DIR1 in the following order: G01 on 49VU, M05 on 121VU. • Wait for 1 min, then: • Push the C/Bs for DIR2 in the following order: M06 , G02 . • After CIDS reset, wait approximately 4 min, before recovering normal operation.
	Frozen RMP	RMP	*Refer to PRO-SUP-23 Frozen RMP*
	FAP freezing	FAP	**On ground, or in flight:** - Pull FAP C/Bs in the following order: H01 C/B on 49VU, Q14 on 121VU. - Wait 10 s, then:

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
			- Push the C/Bs in the following order: Q14, H01 C/B.
24	GPU cannot be connected to the aircraft	GAPCU	**On ground only:** The GPU cannot be connected to the electrical network of the aircraft (AVAIL light is OFF) - If at least one power source (IDG 1 or 2, APU GEN or batteries) is connected to the electrical network of the aircraft. • Reset the EXT PWR pb switch on 35VU (Press and release) - If no power source is connected to the electrical network of the aircraft. • Set the BAT 1 pb-sw and BAT 2 pb-sw to AUTO.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
12 26	SMOKE DET FAULT	CIDS-SDF	**On ground, or in flight:** Apply the following actions in the presented order: - Pull the C/Bs C05 and C06 on 49VU. T17 and T18 on 122VU - Wait 5 s, then - Push simultaneously the C/Bs C05 and C06 on 49VU. - Within 2 s push simultaneously the C/Bs T17 and T18 on 122VU.
	SMOKE LAVATORY DET FAULT with all lavatories declared inoperative on the FAP	CIDS or CIDS-SDF	**On ground, or in flight:** Apply the following actions in the presented order: - Pull the C/Bs P13 and P14 ◁ ; on 121VU, G01 and G02 and 49VU, M05 or M06 and M06 or M07 on 121VU. - Wait 5 s, then - Push the C/Bs in the following order : M05 or M06 and M06 or M07 on 121VU, G01 and G02 on 49VU, P13 and P14 ◁ on 121VU. **If unsuccessful, on ground only:** Apply the following actions in the presented order: - Pull the C/Bs C06 and C05 on 49VU, T17 and T18 on 122VU. - Wait 5 s, then - Push simultaneously the C/Bs C06 and C05 on 49VU. - Within 2 s push simultaneously the C/Bs T17 and T18 on 122VU.
	SMOKE FWD (AFT) CARGO DET FAULT SMOKE FWD (AFT) CRG 1/2 BTL FAULT	CIDS-SDF	**On ground:** Apply the following actions in the presented order: - Pull the C/Bs C06 and C05 on 49VU, T17 and T18 on 122VU. - Wait 5 s, then - Push simultaneously the C/Bs C06 and C05 on 49VU. - Within 2 s push simultaneously the C/Bs T17 and T18 on 122VU.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
13 27	F/CTL ELAC 1(2) FAULT F/CTL ALTN LAW F/CTL ELAC 1(2) PITCH FAULT	ELAC	*Refer to PRO-ABN-27 section for associated procedure, if applicable.*
	ELAC or SEC malfunction	ELAC or SEC	ELAC or SEC may be reset. **WARNING** Do not reset more than one computer at a time. It is possible to reset flight control computers in flight, event if not requested by the ECAM, provided only one reset is performed at a time: For the ELAC only, in case of uncommanded maneuvers during the flight, it is not recommended to reset the ELAC. Note: *When an ELAC reset is performed on ground the crew must check the pitch trim position. If a reset is performed on ground, the flight crew must then perform a flight control check, Refer to PRO-NOR-SOP-10-TAXI.*
Impacted DU: NONE			
14 27	F/CTL SPLR FAULT, triggered on ground after the flight control check.	SEC	**On ground** - All the three SEC may be reset - A flight control check must be performed after the reset - If the ECAM triggers again the F/CTL SPLR FAULT, maintenance action is due. **WARNING** Do not reset more than one computer at a time.

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
28	Loss of fuel quantity indication or Simultaneous triggering of FUEL L XFR VALVE CLOSED and FUEL R XFR VALVE CLOSED , although FUEL SD indicates no anomaly.	FQIC	**On ground, or in flight:** - Pull the 3 C/B: • Channel 1 (A13 on 49VU) • Channel 2 (M27 on 121VU) • Channel 1 and 2 (L26 on 121VU) - Wait 5 s, before pushing the 3 C/B. *Note: The fuel quantity indication will be re-established within 1 min.* **CAUTION** The FUEL AUTO FEED FAULT caution will be lost for the remainder of the flight. In flight: - If center tank is not empty, while one inner tank contains less than 5 000 kg (11 000 lb) of fuel: • FUEL MODE SEL (MAN) - When center tank is empty: • CTR TK PUMP 1 and 2 (OFF) • FUEL MODE SEL (MAN)
31	FWS FWC 1(2) FAULT	FWC	**On ground:** Pull, then push, the C/B of the affected FWC: - FWC 1 (F01 on 49VU) - FWC 2 (Q7 on 121VU) Wait 50 s after pushing the C/Bs. **In flight:** Pull, then push, the C/B of the affected FWC: - FWC 1 (F01 on 49VU) - FWC 2 (Q7 on 121VU)

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
32	Braking malfunction	BSCU	*Refer to PRO-SUP-32 BSCU Reset - On Ground*
	L/G LGCIU 1(2) FAULT	LGCIU 1(2)	**On ground only:** The flight crew must depressurize the green hydraulic system before resetting the LGCIU. - ENG 1 PUMP OFF - PTU OFF When there is no green hydraulic pressure: - To reset LGCIU 1: • Pull C/B Q34 on 121VU, then C09 on 49VU • Wait for 15 s , then push the C/Bs - To reset LGCIU 2: • Pull C/B Q35 on 121VU • Wait for 15 s , then push the C/B
34	NAV TCAS FAULT	TCAS	**On ground only:** - Pull C/B K10 on 121VU. - Wait 5 s, then push the C/B.
	ISIS malfunction	ISIS	**On ground only:** With aircraft not moving: - Pull C/B F12 on 49VU, - Wait 5 s, then push the C/B, - Normal operation is expected after approximately 2 min. Note: *In the case of small aircraft motion during the C/B reset (refueling, cargo loading conditions, etc.), the ATT red flag may appear on the ISIS. In this case, press the RST P/B for 2 s wait 2 min additional to recover normal operation.*

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ATA	System malfunction or ECAM warning/caution	Affected system	Reset
46	ATSU Malfunction	ATSU	An ATSU reset should be attempted, if: key selection has no effect on any of the MCDU ATSU DATALINK submenus. **On ground, or in flight:** - Pull the C/Bs in the following order: L16, L15 on 121VU - Wait 5 s , then:. - Push the C/Bs in the following order: L15, L16.
70	ENG IGN A+B FAULT	FADEC and EIU	*Refer to PRO ABN 70 ENG 1(2) IGN FAULT (IGN A +B FAULT)*, if applicable.
	ENG 1(2) FADEC A(B) FAULT	FADEC	*Refer to PRO-ABN-70 ENG 1(2) FADEC A(B) FAULT*, if applicable.

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GENERAL

Applicable to: ALL

The secured cockpit door operation is controlled by a toggle sw, located on the COCKPIT DOOR central pedestal.

DOOR OPENING FROM THE COCKPIT

To allow access the cockpit, the COCKPIT DOOR has to be pulled and maintained in the UNLOCK position until the door is fully opened (once the door is fully opened it can be released to the NORM position).

DOOR CLOSING

Close the door and check that the OPEN indicator goes off. If the toggle sw is in the NORM position the door is locked and emergency access is possible for the cabin crew. If the toggle sw is in the LOCK position the door is locked and the emergency access, the buzzer and the keypad are inhibited for a preselected time (5 to 20 min).

Note: If the OPEN indicator is on with the door closed, the door may be unlocked. Repeat the above opening/closing sequence.

COCKPIT DOOR OPERATION

Applicable to: ALL

GENERAL

The cockpit door should be closed and locked immediately following the report from the FA1 that all passengers are on board and aircraft door closed. Except for crew entry/exit, the cockpit door should remain closed and locked until engine shutdown. Refer to Volume 7.1.15.7 Flight Deck Security.

Applicable to: ALL

BEFORE PUSHBACK OR ENGINE START

COCKPIT DOOR..... CLOSE

With the cockpit door selector at NORM, the cockpit door is closed and locked.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

AFTER ENGINE START

- **If ROUTINE ACCESS is requested from the cabin:**
  The buzzer sounds in the cockpit for 1 to 9 s (3 s by default).

  CAMERA 1 DISPLAY ON CDSS..... CHECK

CAMERA 2 DISPLAY ON CDSS..... CHECK
CAMERA 3 DISPLAY ON CDSS..... CHECK

Prior to unlocking the door, the flight crew should identify the person requesting entry.

- **If entry is NOT authorized by the flight crew:**
  COCKPIT DOOR sw ..... LOCK

- **If entry is authorized by the flight crew:**
  COCKPIT DOOR sw ..... UNLOCK

  Note: If the flight crew does not take any action after a routine cabin request, the cabin crew will be able to open the door by using the emergency access procedure.

- **If EMERGENCY ACCESS is initiated from the cabin:**
  The buzzer will sound continuously in the cockpit, and the OPEN light flashes on the center pedestal's cockpit door panel.

  Note: If the flight crew does not take any action, the door will unlock after a preselected time between 15 and 120 s.

COCKPIT DOOR sw ..... LOCK
CAMERA 1 DISPLAY ON CDSS..... CHECK
CAMERA 2 DISPLAY ON CDSS..... CHECK
CAMERA 3 DISPLAY ON CDSS..... CHECK

Prior to unlocking the door, the flight crew should identify the person requesting entry.

- **If entry is authorized by the flight crew:**
  COCKPIT DOOR sw ..... UNLOCK

Applicable to: B-HSQ, B-HSR

AFTER ENGINE START

- **If ROUTINE ACCESS is requested from the cabin :**
  The buzzer sounds in the cockpit for 1 to 9 s (3 s by default).

CAMERA 1 DISPLAY..... CHECK

Camera 1 is automatically displayed upon entry request.

VIDEO CAMERA pushbutton..... PRESS
CAMERA 2 and 3 DISPLAY..... CHECK

Prior to unlocking the door, the flight crew should identify the person requesting entry.

- **If entry is NOT authorized by the flight crew:**
  COCKPIT DOOR sw ..... LOCK

- **If entry is authorized by the flight crew:**
  COCKPIT DOOR sw ..... UNLOCK

Note: *If the flight crew does not take any action after a routine cabin request, the cabin crew will be able to open the door by using the emergency access procedure.*

- **If EMERGENCY ACCESS is initiated from the cabin:**
  The buzzer will sound continuously in the cockpit, and the OPEN light flashes on the center pedestal's cockpit door panel.

  Note: *If the flight crew does not take any action, the door will unlock after a preselected time between 15 and 120 s.*

  COCKPIT DOOR sw ..... LOCK
  CAMERA 1 DISPLAY ..... CHECK

  Camera 1 is automatically displayed upon entry request.

  VIDEO CAMERA pushbutton ..... PRESS
  CAMERA 2 and 3 DISPLAY ..... CHECK

  Prior to unlocking the door, the flight crew should identify the person requesting entry.

  - **If entry is authorized by the flight crew:**
    COCKPIT DOOR sw ..... UNLOCK

Applicable to: B-HSO, B-HSP, B-HST, B-HSU

AFTER ENGINE START

- **If ROUTINE ACCESS is requested from the cabin:**
  The buzzer sounds in the cockpit for 1 to 9 s (3 s by default).

  VIDEO LWR ECAM rotary selector ..... CKPT ENTRY
  CAMERA 1 DISPLAY ..... CHECK

  Camera 1 is automatically displayed (on the lower ECAM display) upon entry request.

  VIDEO CAMERA SEL pb ..... PRESS
  CAMERA 2 and 3 DISPLAY ..... CHECK

  Prior to unlocking the door, the flight crew should identify the person requesting entry.

  - **If entry is NOT authorized by the flight crew:**
    COCKPIT DOOR sw ..... LOCK

  - **If entry is authorized by the flight crew:**
    COCKPIT DOOR sw ..... UNLOCK
    VIDEO LWR ECAM rotary selector ..... OFF

    Note: *If the flight crew does not take any action after a routine cabin request, the cabin crew will be able to open the door by using the emergency access procedure.*

● **If EMERGENCY ACCESS is initiated from the cabin:**

The buzzer will sound continuously in the cockpit, and the OPEN light flashes on the center pedestal's cockpit door panel.

Note: If the flight crew does not take any action, the door will unlock after a preselected time between 15 and 120 s.

COCKPIT DOOR sw ..... LOCK
VIDEO LWR ECAM rotary selector ..... CKPT ENTRY
CAMERA 1 DISPLAY..... CHECK

Camera 1 is automatically displayed (on the lower ECAM display) upon entry request.

VIDEO CAMERA SEL pb..... PRESS
CAMERA 2 and 3 DISPLAY..... CHECK

Prior to unlocking the door, the flight crew should identify the person requesting entry.

● **If entry is authorized by the flight crew:**

COCKPIT DOOR toggle switch..... UNLOCK
VIDEO LWR ECAM rotary selector ..... OFF

OPENING THE COCKPIT DOOR FROM THE CABIN - CABIN CREW ROUTINE ACCESS

Applicable to: ALL

CABIN CREW ROUTINE ACCESS..... REQUEST ON KEYPAD
CABIN CREW..... PRESS #, or N+#

"N"represents an Operator-defined figure between 0 and 7 digits.

CABIN CREW..... STAND IN COCKPIT DOOR AXIS

The cabin crew should stand in the axis of the CKPT door. A buzzer sounds in the CKPT.

● **If entry is NOT authorized by the flight crew:**

- The flight crew locks the door via the COCKPIT DOOR sw (LOCK position).
- The keypad's red light comes on steady, and indicates that the door is locked.

● **If entry is authorized by the flight crew:**

- The flight crew unlocks the door via the COCKPIT DOOR sw (UNLOCK position).
- The keypad's green light comes on steady, and indicates that the door is unlocked.

CABIN CREW..... PUSH DOOR TO OPEN

● **If there is no reaction from the flight crew:**

CABIN CREW SECOND ACCESS..... REQUEST ON KEYPAD

Repeat the above procedure.

- **If there is no reaction from the flight crew, after a second request:**
  CABIN CREW.....CALL THE COCKPIT
  To establish contact with the flight crew and request access to the cockpit.

- **If there is no reaction from the flight crew, after a cabin crew interphone call:**
  CABIN CREW..... APPLY THE FOLLOWING EMERGENCY ACCESS PROCEDURE
  EMERGENCY ENTRY CODE.....ENTER and PRESS #
  The emergency entry code is an Operator-defined figure between 2 and 7 digits. A buzzer will sound continuously in the cockpit and the keypad's green light flashes. After a preselected time between 15 s and 120 s, the keypad's green light comes on steady, and the cabin crew can then push the door open.
  CABIN CREW.....PUSH DOOR TO OPEN
  The cockpit door unlocks for 5 s.
  The buzzer stops and indicates that the door is unlocked.

ISOLATION OF AIRWORKS CDSS MONITOR

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

Overheating of a component in the Airworks CDSS monitor may result in smoke and a burning smell in the cockpit.
Should smoke and/or a burning smell be experienced in the cockpit and the source is identified as the Airworks CDSS monitor, it is recommended that power be removed from the system as follows:

CDSS pb-sw .....OFF

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GENERAL

Applicable to: ALL

The fly-by-wire system has been designed and certificated to make the new generation of aircraft more cost effective and safer and smoother to fly or ride in than a conventional aircraft.

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GENERAL

Applicable to: ALL

The pilot uses the sidestick to fly the aircraft in pitch and roll (and indirectly, through turn coordination, in yaw).
The computers interpret the pilot's inputs and move the control surfaces as necessary.

However, regardless of the pilot's inputs the computers will prevent :
- excessive load factor
- loss of control leading to excursions outside the safe flight envelope.

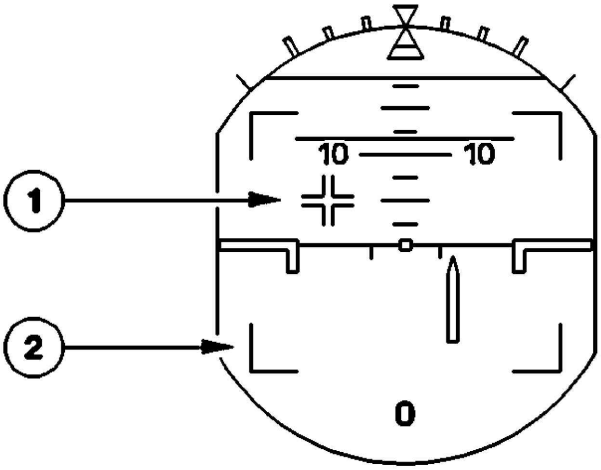
AIRCRAFT ON THE GROUND

Applicable to: ALL

At ground speeds below 70 kt, the sidesticks have full authority over the controls in pitch and roll to permit control checks.
At ground speeds above 70 kt, the authority in pitch is reduced from 30 ° up to 20 ° up.
In this ground mode, movements of the control surfaces in pitch and roll correspond directly to the stick inputs.

With the aircraft in the normal configuration and engines running on the ground :
- when the wheel brakes are released, the aircraft usually rolls with no added thrust.
- nose wheel steering is "fly.by.wire", with no mechanical connection between the nose wheel and the steering tiller. The control forces are light : the flight crew should be careful to move the tiller gently to avoid unnecessarily high-rate turns.

The aircraft can make very tight turns, but the flight crew should resist any tendency to overcontrol. When making tight turns at low ground speed, the crew should hold the selected tiller position, even if the turn radius is shorter than intended, so as to maintain a smooth turn.



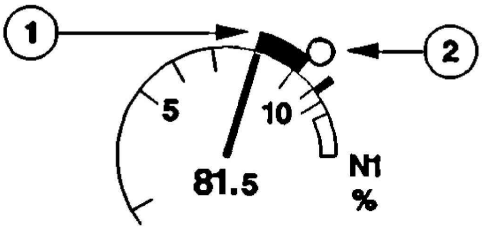
(1) The PFD includes this symbol that is the sum of sidestick positions given to the computers. It permits the PNF to check that the PF is making an appropriate control input during takeoff roll.

(2) Small limit marks indicate the limits of stick travel (±16 ° in pitch, ±20 ° in roll).
They are only displayed with the aircraft on ground. The flight crew must not use this display for control checks, because it does not necessarily indicate the control position in failure cases. The flight crew must use the ECAM flight controls page for making that check.

IN FLIGHT

Applicable to: ALL

TAKEOFF MODE



Thrust management is very easy. The pilot selects a FLX thrust by stopping the thrust levers in the FLX/MCT detent, and by checking that the resulting N1 (or EPR) (1) is compatible with N1 (or EPR) target (2). For maximum takeoff thrust, the pilot moves the thrust levers fully forward and performs the same thrust check (N1 or EPR).

To counter the nose-up effect of setting engine takeoff thrust, the pilot should apply half forward stick, until the airspeed reaches 80 kt. Then, he should release the stick gradually to reach neutral at 100 kt (refer to PRO-NOR-SOP-12 Takeoff for additional information).

Rotation is conventional. It takes about 1/3 to 1/2 back stick. The Pilot Flying (PF) continues the rotation in order to bring the all–engine attitude value towards approximately 15 °. During rotation, the PF must not attempt to reach the FD pitch bar, because it does not provide a pitch rate order, and may lead to overreaction. As soon as the aircraft becomes airborne only, the PF must adjust the pitch attitude using the FD bar, which is then representative of the SRS order. As the attitude changes and stabilizes, the control laws change to those for the flight mode in pitch, allowing the sidestick to return to the neutral position to maintain 1 g at the chosen attitude. Pitch trim can begin to work at 50 ft.

For crosswind takeoffs, routine use of into wind aileron is not recommended. In strong crosswind conditions, some lateral control may be used, but care should be taken to avoid using large deflections, resulting in excessive spoiler deployment which increases the tendency to turn into wind, reduces lift and increases drag. Spoiler deflection starts to become significant with more than one third sidestick deflection. As the aircraft lifts off, any lateral control applied will result in a roll rate demand.

FLIGHT MODE

Normally the sidestick is in the neutral position, with the aircraft stable in pitch and roll at the chosen altitude in straight or turning flight within certain limits. As a result, even in turbulence, the aircraft is flown best with little or no stick input.

Hands off, the system maintains 1 g in pitch, corrected for pitch and roll attitude, and zero roll rate, within certain limits (+30 °, –15 ° in pitch and ± 33 ° roll). Hands off, within these limits the aircraft resists disturbance from the atmosphere and rides well even in heavy turbulence.

The system compensates almost 100 % for changes of trim due to changes in speed and configuration. Changes of trim due to changes in thrust can be too large for the system to compensate, and the aircraft may respond to them in pitch in the conventional sense and then hold the new attitude at which it has stabilized after the trim change.

The pitch trim wheel moves as the control law compensates for these changes.

The control laws also make turning easier. They protect against overbanking, and at the chosen bank attitude (less than 33 ° of bank) the system maintains zero roll rate, stick free.

Steep turns can be made at up to 67 ° of bank. This is the steepest bank at which it is possible to maintain level flight at 2.5 g.

Beyond 33 ° of bank, the pitch trim stops working and a lateral stability term is introduced. This term becomes progressively stronger as bank angle increases, so that it equals a full sidestick demand at 67 ° of bank, hence forming the limiting system.

The lack of pitch trim makes it necessary for the pilot to hold the nose up in a steep turn. If he releases the stick, the nose drops and the aircraft eases its roll angle to less than 33 ° of bank and stabilizes at the pitch and bank angles it achieves at less than 33 ° of bank.

During a normal entry into a turn, the pilot must make an intentional initial change to the pitch attitude in order to maintain level flight. Once he has done this, he can release the stick. The system then maintains a level turn.

In climb, cruise, descent, and approach all these basic rules remain in effect.

LANDING MODE

The system's landing mode gives the aircraft a stabilized flight path and makes a conventional flare and touchdown. It carries out the initial approach as this manual described earlier. At 50 ft, the system memorizes the attitude, usually 3 ° or 4 ° nose up. From 30 ft down, this value washes out over eight seconds to –2 °. The result is that the pilot has to exert a progressive pull to increase pitch gently in the flare. He should pull the thrust levers back at or above 20 ft, and the landing should occur without a long flare. Touchdown quality is better and more repeatable at fairly flat attitudes. An audible "RETARD" callout reminds the pilot if he has not pulled back the thrust levers when the aircraft has reached 20 ft.

Crosswind landings are conventional. The preferred technique is to use the rudder to align the aircraft with the runway heading, during the flare, while using lateral control to maintain the aircraft on the runway centerline (*Refer to PRO-NOR-SOP-21-LANDING-FLARE*). The lateral control

mode does not change until the wheels are on the ground, so there is no discontinuity in the control laws. The aircraft tends to roll gently in the conventional sense as drift decreases, and the pilot may have to use some normal cross control to maintain roll attitude.
Even during an approach in considerable turbulence, the control system resists the disturbances quite well without pilot inputs. In fact, the pilot should try to limit his control inputs to those necessary to correct the flight path trajectory and leave the task of countering air disturbances to the flight control system.
Derotation is conventional. The pilot releases the back pressure he was holding for the flare and the nose wheel comes down nicely.
Pitch trim then resets to zero.

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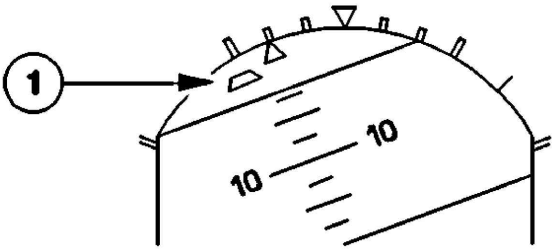
ENGINE FAILURE AT TAKEOFF

Applicable to: ALL



On the ground the aircraft is conventional. The pilot uses rudder to maintain direction. He should rotate to about 12.5 ° of pitch and adjust as required. The sideslip indication (1) changes to the engine-out mode (blue). When it is centered, the aircraft is close to the zero aileron position (best drag condition). It is therefore important to zero the slip indication accurately.

Trim the rudder conventionally.

When time permits, the pilot should check the ECAM's FLT CTL page, and refine the rudder trim to give neutral lateral control, and also trim the rudder toward the spoilers that are up or toward the aileron that is farthest up to bring the lateral controls back to neutral.

ENGINE-OUT LANDING

Applicable to: ALL

The engine-out landing is basically a conventional landing. The pilot should trim to maintain the slip indication centered. It is yellow, as long as N1 is less than 80 %. Between 100 and 50 ft, the pilot can reset rudder trim to make the landing run easier, and to recover full rudder travel in both directions.

BOUNCE AT LANDING

Applicable to: ALL

In case of a light bounce, maintain the current pitch attitude and complete the landing, while maintaining the thrust at idle. In case of a high bounce, initiate a go-around, initially maintaining the pitch attitude. Retract the flaps one step, and then the landing gear, once the aircraft is properly

established on the go-around segment. In all cases, do not attempt to soften the (potential) second touchdown by increasing the pitch attitude.

TRAINING TOUCH-AND-GO

Applicable to: ALL

With the nosewheel on ground, pitch trim automatically resets to zero. The pilot should select CONF 2 and add thrust. He must always move the thrust levers to TOGA to bring up the speed reference system (SRS), and then reduce to a lower thrust (not less than CL), if he chooses. Takeoff may be a little out of trim, which may affect the rotation slightly, but once the aircraft is off the ground, the control law holds the “out of trim”, then retrims at 50 ft.

STALL WARNING

Applicable to: ALL

The applicable procedures have been moved in FCOM PRO-ABN-10 (Operating Techniques) section and in the QRH ABN 80.07.

STALL WARNING AT LIFT-OFF

Refer to PRO-ABN-10 Stall Warning At Lift-Off

STALL RECOVERY PROCEDURE

Refer to PRO-ABN-10 Stall Recovery

ABNORMAL CONTROL LAWS - GENERAL

Applicable to: ALL

ALTERNATE LAW

Pitch alternate and roll direct is the first level of degraded control law, resulting from some double failures.
The autopilot may be available, depending on the cause and type of failure(s).

DIRECT LAW

The sidestick is directly coupled to the controls via the computers, but without any of the stabilization feedbacks. In effect, this law turns the aircraft into a conventional aircraft, but is compensated for configuration and CG. The pilot must use manual pitch trim, as is signaled on the PFD. The autopilot is not available.

MECHANICAL BACKUP

The pilot can use the pitch trim and rudder to control the aircraft for short periods of total loss of fly-by-wire.

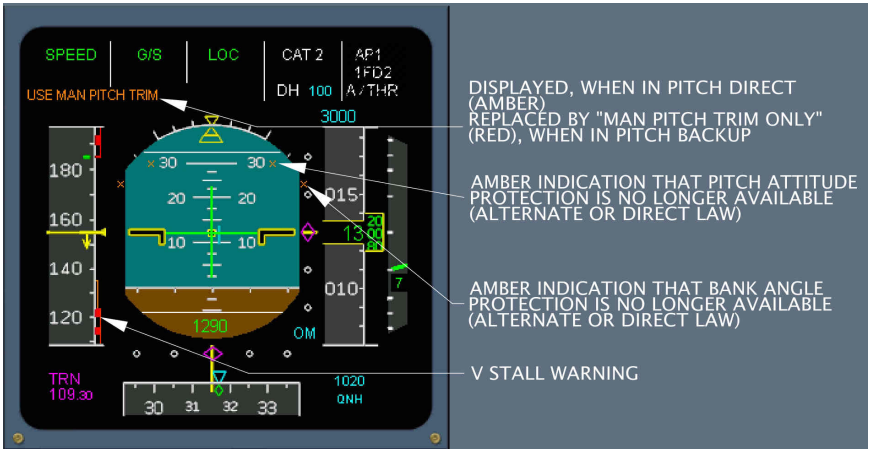
ABNORMAL CONTROL LAWS - IN DETAIL

Applicable to: ALL

ALTERNATE LAW

PITCH

Alternate law in pitch is almost the same (for the pilot) as the normal control laws. However, alternate law does not maintain any of the protections, except for the load factor limitation. As a result, the pilot must fly the aircraft more attentively to avoid inadvertently exceeding the normal limits.
Alternate law reduces VMO to 320 kt to restore a normal aircraft speed margin in case of upset. This is not necessary in the Mach range, because the margin there is, in any case, conventional.



At low speed the change in the speed scale is very noticeable. VLS remains, but Vα PROT and Vα MAX disappear, replaced by a single black and red strip the top of which is stall warning speed. Unlike VLS which is stable, VSW is g sensitive so as to give additional margin in turns. As mentioned above, ALTERNATE reverts to DIRECT law for landing when the flight crew lowers the landing gear.

ROLL

Roll control is direct. The rate of roll is generally higher than with normal law and at first the aircraft appears to be very sensitive.
Bank stability and protections are no longer active and the flight crew should take care to stay within normal limits.

DIRECT LAW

Normally direct law in pitch is transitory, due to undetected failures of, for example, a second IRS. Once the flight crew has isolated the failed system, it can reset the ELACs to acquire alternate law in pitch.
When the system goes into direct law, “USE MAN PITCH TRIM” appears on the PFDs. This message flashes for 5 s, then becomes steady.
The pilot should use small control inputs when the aircraft is in direct law at high speed, because the controls are powerful. Good trimming in pitch is required.
The pilot should avoid using large thrust changes or sudden speedbrake movements, particularly if the center of gravity is aft. If the speedbrakes are out and the aircraft has been retrimmed, the pilot should retract the speedbrakes gently, giving time to retrim so as to avoid a large nose-down trim change.
The flight crew must fly the aircraft carefully at all times. Control is precise, but there are no protections.
The aural stall warning for alternate law also serves direct law, and the technique for recovery is the same.
Any tendency to roll stick free can be corrected by conventional use of rudder. Residual rudder forces can be trimmed out by using rudder trim in the direction of the applied force.
After trimming, the sideslip index will be slightly displaced from center. With some failure conditions the asymmetric rolling tendency may be increased. It will always be possible to trim the aircraft to fly straight, hands off. There may then be an asymmetry in roll response, but the roll rate achieved is always adequate.
Landing in direct law is like landing a conventional aircraft. Trim changes to compensate for configuration changes are small, as is the trim change with speed change. Trim change with a large thrust change is quite large, so the pilot should make smooth thrust changes. The flare height for landing is the same (refer to PRO-NOR-SOP-22 Landing), and the pilot uses conventional techniques. (The controls remain light and powerful).
Pilots have landed this aircraft in direct law in moderate to heavy turbulence with gusting winds without undue difficulty.
Direct law works with or without the yaw damper. The aircraft is always convergent in dutch roll, so if an oscillation begins it will stop itself if not excited. To stop dutch roll the pilot should use lateral inputs, not rudder.

GENERAL

Applicable to: ALL

The aircraft has a comprehensive flight envelope protection system.
This system increases safety if the pilot has to make an extreme maneuver or the aircraft enters a very violent meteorological situation.
In either of these situations, the pilot can make full sidestick inputs in normal laws at any speed. The rudder is not protected in this way, but is not normally used during symmetrical flight.
The pilot will never see any aspect of this envelope protection take effect as long as he flies the aircraft normally.

Note: The normal flight envelope is not different from that of a conventional aircraft, and is defined as VLS to VMO. Pilots should not deliberately fly at a speed that is lower than VLS except for properly authorized training or testing.

PITCH ATTITUDE PROTECTION

Applicable to: ALL

The system limits the aircraft to 67 ° of bank, which corresponds approximately to the bank angle needed for a level 2.5 g turn.
The system limits pitch attitude to +30 ° and –15 °. The +30 ° limit decreases to 25 ° at low speed. If the aircraft attitude approaches these limits, the pitch and roll rates start to decrease 5 ° before the limit so that it will stop at the limit without overshooting.

LOAD FACTOR LIMITATION

Applicable to: ALL

The aircraft is structurally designed to the same limits as any other large aircraft. The 2.5 g limit (2 g with flaps extended) allows the aircraft to make an abrupt maneuver without structural risk if such a maneuver becomes necessary.
When this occurs (after a ground proximity warning, for example), the pilot should quickly apply full control and hold it until the flight path is safe. Response time is a vital factor in avoidance : the system allows maneuvers that the pilot would not normally be able to perform safely at any altitude, low or high.

EXCEEDING VMO/MMO

Applicable to: ALL

During climb, cruise or descent the aircraft may slightly exceed VMO/MMO with the autopilot (AP) engaged. This may occur when adverse conditions are encountered.

Using the following procedure prevents such an exceedance :

1. In case of turbulence, adapt speed or Mach target. If severe turbulence is known, or forecasted, consider the use of turbulence speed.
2. The current speed is close to the VMO (maximum operating speed) :
   - Monitor the speed trend symbol on the PFD :
     - If the speed trend reaches, or slightly exceeds, the VMO limit :
       - Use the FCU immediately to select a lower speed target.
     - If the speed trend significantly exceeds the VMO red band, without high speed protection activation :
       - Select a lower target speed on the FCU and, if the aircraft continues to accelerate, consider disconnecting the AP.
       - Before re-engaging the AP, smoothly establish a shallower pitch attitude.
3. If the aircraft accelerates above VMO with the AP engaged :

   The AP will disengage on reaching the high speed protection. The high speed protection will apply a nose-up order up to 1.75 g, in addition to pilot input during VMO recovery. Therefore :
   - Make a smooth pitch correction, to recover proper speed.

In all events :

- Speedbrakes may be used if the aircraft exceeds VMO/MMO. However, use speedbrakes with caution when close to the ceiling.
- Check the AP engagement status and re-engage it when appropriate. It may have tripped, if VMO/MMO was significantly exceeded. The associated aural warning may have been superseded by the overspeed aural warning.

HIGH SPEED PROTECTION

Applicable to: ALL 321

The aircraft automatically recovers following a high speed upset. Depending on the flight conditions (high acceleration, low pitch attitude) the high speed protection is activated at/or above VMO/MMO. When it is activated, the pitch trim is frozen, spiral static stability is introduced to 0 ° bank angle (instead of 33 ° in normal law), and the bank angle limit is reduced from 67 ° to 40 °.
As the speed increases above VMO/MMO, the sidestick nose-down authority is progressively reduced, and a permanent nose-up order is applied to aid recovery to normal flight conditions.
The High Speed Protection is deactivated when the aircraft speed decreases below VMO/MMO, where the usual normal control laws are recovered.
The flight crew should never deliberately fly the aircraft beyond VMO/MMO, unless absolutely necessary for operational reasons, such as avoiding another aircraft.
The pilot should, as soon as possible, reduce resistance to the High Speed Protection and allow the aircraft to return to a speed below VMO/MMO, by smoothly relaxing the forward stick force to attain a comfortable nose-up pitch rate. It is not usually necessary to apply a pull force to recover. If a quicker

recovery is required for operational reasons, the pilot should pull back smoothly and progressively, monitoring the g indication on the ECAM.

HIGH SPEED PROTECTION

Applicable to: ALL 320

The aircraft automatically recovers following a high speed upset. Depending on the flight conditions (high acceleration, low pitch attitude), the High Speed Protection is activated at, or above, VMO/MMO.
When it is activated, spiral static stability is introduced to 0 ° bank angle (instead of 33 ° in normal law), and the bank angle limit is reduced from 67 ° to 40 °.
As the speed increases above VMO/MMO, the sidestick nose-down authority is progressively reduced, and a permanent nose-up order is applied to aid recovery to normal flight conditions.
The High Speed Protection is deactivated when the aircraft speed decreases below VMO/MMO, where the usual normal control laws are recovered.
The flight crew should never deliberately fly the aircraft beyond VMO/MMO, unless absolutely necessary for operational reasons, such as avoiding another aircraft.
The pilot should, as soon as possible, reduce resistance to the High Speed Protection and allow the aircraft to return to a speed below VMO/MMO, by smoothly relaxing the forward stick force to attain a comfortable nose-up pitch rate. It is not usually necessary to apply a pull force to recover. If a quicker recovery is required for operational reasons, the pilot should pull back smoothly and progressively, monitoring the g indication on the ECAM.

HIGH ANGLE OF ATTACK PROTECTION

Applicable to: ALL

The aircraft resists attempts by either a pilot or the atmosphere to stall it. If a pilot attempts a stall, he feels the aircraft trying to pitch down as speed approaches the amber and black strip. The pilot can resist this tendency until speed reaches the red band (alpha maximum), and then further nose-up control is not available. Between these two points, αfloor automatically sets go around thrust. The pilot can hold full back stick, if it is needed (see windshear), and the aircraft stabilizes at an angle of attack close to but short of the 1 g stall.
WHEN FLYING AT αmax, THE PILOT CAN MAKE GENTLE TURNS, IF NECESSARY.
As the aircraft enters protection at the amber and black strip. (αprot), the system inhibits further nose-up trim beyond the point already reached. Nose-down trim remains available if the pilot pushes the stick forward.
The pilot should not deliberately fly the aircraft in αprot except for brief periods when maximum maneuvering is required. If the pilot enters αprot inadvertently, he should get out of it as quickly as possible by easing forward on the sidestick to reduce the angle of attack while simultaneously adding power (if αfloor has not already been activated or has been cancelled). The system will regain the

normal load factor law if the stick is pushed forward of neutral, but it will re-enter αprot if the stick is released with the angle of attack still greater than the value set for αprot. Thus to exit αprot properly, the pilot should reduce angle attack to a value less than the value set for αprot.
The PFD shows this clearly, because the indicated speed is above the black and amber strip.
The pilot should now increase speed above VLS (clear of the amber strip) as soon as other considerations (ground clearance, for example) allow him to do so.
αfloor will usually be triggered just after αprot is entered, and go around thrust will automatically be applied. Thus, if the sidestick is held aft, either inadvertently or deliberately, the aircraft will start to climb at a relatively constant low airspeed. To recover to a normal flight condition, αprot should be exited by easing forward on the sidestick, as described above, and the αfloor should be cancelled by using the disconnect pushbutton on either thrust lever as soon as a safe speed is regained.
The aircraft can also enter αprot at a high level, where it protects the aircraft from the buffet boundary. As at low speed or low level, if the sidestick is merely released to neutral, the aircraft maintains the alpha for αprot. (However, this value of alpha is not the same as the value used at low speed : Alpha for αprot is reduced as a function of Mach, so that a typical cruise value is about 3.5 ° for the A318 and A321 aircraft, or 4.5 ° for the A319 and A320 aircraft). Therefore, the aircraft may climb, with the sidestick free, when leaving a turn after entering αprot. If the pilot has flown into αprot, he should leave it as soon as other considerations allow, by easing forward on the sidestick to reduce alpha below the value of αprot, while simultaneously increasing thrust or speed as appropriate.

WINDSHEAR

Applicable to: ALL

Most of the recommended techniques for flight in windshear also apply to the A320 aircraft family. But for these aircraft, the techniques are somewhat simpler.

The aircraft can only survive windshear, if it has enough energy to carry it through the loss-of-performance field. The aircraft can sustain this energy level in the following three ways :
- Carry extra speed. The aircraft does this automatically in some cases.
- Add maximum thrust. The aircraft does this automatically.
- Trade height energy for speed. Any aircraft can do this.

Proper pilot technique helps in this survival process. The pilot must follow orders from the Speed Reference System (SRS) or, if the FD is not available or is switched OFF for a visual approach, maintain 17.5 ° of pitch, even if he has to use full backstick in order to do so. At this stage, maintain full backstick until the shear is passed. The aircraft will automatically hold close to the maximum Angle-Of-Attack. The speed should stay near to the beginning of the red strip. However, in turbulence, the speed can be temporarily below the red strip without significant effect. As speed

begins to recover, the pilot can reduce backstick, while still following SRS orders until well clear of the shear.

ABNORMAL CONFIGURATIONS

Applicable to: ALL

In some flight control failure cases, such as loss of control of both elevators, or loss of flaps or slats, the landing configuration is Configuration 3.
With the horizontal stabilizer jammed, control is much easier than it is on a conventional aircraft, because the integrator holds the elevator required to maintain the 1 g flight path.
The control laws remain normal to touchdown.

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AIRCRAFT TRIMMING

Applicable to: ALL

When the aircraft is :

- In normal cruise range (around M .77),
- In straight flight,
- With the autopilot engaged,
- With symmetrical engine thrust, and
- With fuel in the wing tanks distributed symmetrically,

the rudder trim should stay between 1 ° right and 2.3 ° left.

Note: *This indication corresponds to a true rudder deflection within ± 1.5 °, taking into account the permanent offset of rudder trim indication, when the aircraft is in cruise conditions. (average 0.5 ° right, 0.8 ° left).*
An indicated, rudder trim above 1 ° right or 2.3 ° left is acceptable, if maintenance personnel establishes that the corresponding real rudder position is within 1.5 ° left, and 1.5 ° right.

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FQI IN DEGRADED MODE

Applicable to: ALL 320

If, on upper ECAM display the FOB indication is displayed with two dashes across the two least significant digits, the FQI is in degraded mode.
In this case, the ECAM FUEL page must be called on ECAM lower display to determine which tank is affected.

The loss of accuracy resulting from the loss of FQI normal mode is as follows :

wing outer cell affected	:	+20 kg (+44 lb), –200 kg (–440 lb).
wing inner cell affected	:	±110 kg (240 lb).
center tank affected	:	±130 kg (290 lb).
all tanks affected	:	+ 390 kg (+ 860 lb), –750 kg (–1660 lb).

FQI IN DEGRADED MODE

Applicable to: ALL 321

If, on upper ECAM display the FOB indication is displayed with two dashes across the two least significant digits, the FQI is in degraded mode.
In this case, the ECAM FUEL page must be called on ECAM lower display to determine which tank is affected.

The loss of accuracy resulting from the loss of FQI normal mode is as follows :

wing tank affected	:	+ 130 kg (+ 290 lb), –310 kg (–690 lb).
center tank affected	:	±130 kg (290 lb).
all tanks affected	:	+ 390 kg (+ 860 lb), –750 kg (–1660 lb).

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ICING CONDITIONS

Applicable to: ALL

Icing conditions may be expected when the OAT (on ground and for takeoff), or when the TAT (in flight) is at or below 10 °C, and there is visible moisture in the air (such as clouds, fog with low visibility of one mile or less, rain, snow, sleet, ice crystals) or standing water, slush, ice or snow is present on the taxiways or runways.

WARNING	Pilots must turn on the engine anti-ice system, when temperature and visible moisture meet these criteria, and should not wait until they see ice building up.

OPERATIONS IN ICING CONDITIONS

Applicable to: ALL

1 **FLIGHT IN ICING CONDITIONS**

- **Engine anti-ice**

  ENGINE ANTI ICE must be ON during all ground and flight operations, when icing conditions exist, or are anticipated, except during climb and cruise when the SAT is below -40 °C.

  ENGINE ANTI ICE must be ON before and during a descent in icing conditions, even if the SAT is below -40 °C.

- **Wing anti-ice**

  WING ANTI ICE may either be used to prevent ice formation, or to remove ice accumulation from the wing leading edges.

  WING ANTI ICE should be selected ON, whenever there is an indication that airframe icing exists. This can be evidenced by ice accumulation on the visual ice indicator (located between the two cockpit windshields), or on the windshield wipers.

CAUTION	1. Extended flight, in icing conditions with the slats extended, should be avoided. 2. If there is evidence of significant ice accretion and to take into account ice formation on non heated structure, the minimum speed should be : - In configuration full, VLS +5 kt. - In configuration lower than FULL, VLS +10 kt. For Landing Performance assessment, refer to QRH FPE-IFL. 3. If there is evidence of ice accretion on de-iced parts (WING ANTI ICE inoperative) of the airframe, the minimum speeds should be : - In clean configuration, VLS + 15 kt. - In CONF 1, 2, 3, FULL, VLS + 10 kt. For Landing Performance assessment, refer to QRH FPE-IFL.

SEVERE ICE ACCRETION

Applicable to: ALL

Icing conditions are severe when there is approximately 5 mm of ice accretion on the airframe.

RAIN REPELLENT (IF INSTALLED)

Applicable to: ALL

If the rain repellent is operative, the flight crew should only use the rain repellent in moderate to heavy rain.

GROUND OPERATIONS IN HEAVY RAIN

Applicable to: ALL

When the aircraft is parked on the ground during heavy rain, it can take rainwater into the avionics ventilation system via the open skin air inlet valve.
To prevent this, the following procedure must be applied :

- **After landing :**
  EXTRACT.....OVRD
  This closes the avionics ventilation system, preventing rainwater from entering.

PACKS 1 and 2..... CHECK ON

This adds air from the air conditioning system to ventilation air. If bleed air is not available, the arrangement can function for a limited time, as follows :

- *OAT ≤39 °C : no limit*
- *39 °C ≤OAT ≤45 °C : 3 h*
- *OAT ≥45 °C : 30 min*

● **After takeoff :**

EXTRACT..... AUTO

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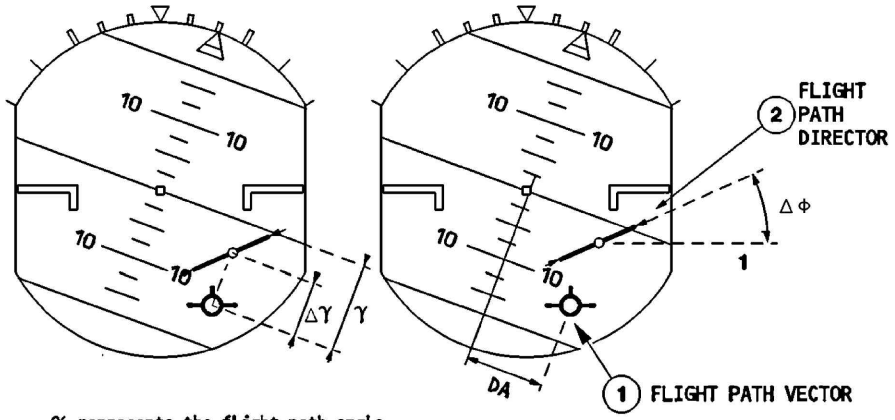
USE OF FLIGHT PATH VECTOR

Applicable to: ALL



Υ represents the flight path angle
DA represents the drift angle
ΔΥ represents the difference between the ordered flight path angle and the actual one
Δ Φ represents the difference between the ordered roll angle and the actual one

The flight path vector (FPV) indicates performance and does not direct or command. Because there is always a slight lag between an attitude change and the change in flight path that results from it, when the pilot uses the FPV he should make an attitude change first, then use the FPV to check the resulting flight path.

Vertically the FPV indicates the aircraft's flight path angle.

The FPV is particularly useful when the aircraft is doing visual circuits. For example, when the aircraft is flying downwind the pilot simply adjusts the aircraft attitude to put the FPV symbol on the horizon. This establishes the aircraft in level flight. On the final approach, the pilot puts the FPV three degrees below the horizon to establish the aircraft at a normal angle of descent. If this results in the aircraft going below the chosen approach path (undershooting the touchdown point), the pilot can reduce the angle of descent by raising the FPV. As soon as the aircraft regains the correct descent path, he should bring the FPV back to -3 °.

Laterally, the FPV indicates the aircraft's track and its drift angle. It has the same displacement as the drift diamond on the heading scale and thus appears directly above it. It shows on the PFD the drift the aircraft is experiencing.

The pilot must take care when making a go-around with the FPV selected. There is inevitably some lag between the pilot's raising the nose to commence the go-around and the aircraft's responding by changing its trajectory. For the same reason the pilot does not use the FPV on takeoff: the primary parameter for rotation, either on takeoff or on go-around, is attitude.

The TRK-FPA Flight Director is particularly useful for guiding the aircraft during non-precision approaches, although it can also be used at other times. When using this mode of the FD, the pilot places the FPV symbol in the center of the flight path director (FPD) symbol. This is similar to using the FD in HDG-V/S, when the pilot puts the center of the fixed aircraft symbol at the center of the crossed bars of the FD. If the FCU is set on the correct track and flight path angle, and if the FPV and the FPD are aligned, they will guide the aircraft along a trajectory that is stabilized with respect to the ground, whereas when the pilot is using HDG-V/S the trajectory is stabilized with respect to the air. However, if the aircraft is disturbed from this ideal trajectory, merely following the FPD will result in its following a trajectory that is parallel to the intended trajectory. Thus, when the aircraft is disturbed from the original trajectory, the pilot must adjust either its track or its flight path angle or both in order to obtain guidance back to the original trajectory. Likewise, when the pilot uses the FPA to create a synthetic glide path, it will be positioned correctly only if it commences at the right point in space.

BSCU RESET - ON GROUND

Applicable to: B-HSD, B-HSK, B-HTH, B-HTI
Impacted by TDU: 00014191 BSCU Reset - On Ground

Before any BSCU reset, the flight crew must stop the aircraft, apply the parking brake and confirm that the towing bar is not connected. The flight crew must reset the BSCU by setting the A/SKID & N/W STRG sw to OFF then ON.

- Only if the ECAM triggers either the WHEEL N.W STEER FAULT or the WHEEL N/W STRG FAULT alert, can the flight crew attempt a BSCU reset. If the BSCU reset is successful, the flight crew are still required to go back to the gate for troubleshooting. The flight crew must taxi with care, at a taxi speed of 10 kt.
- Only if the ECAM triggers either the BRAKES SYS 1(2) FAULT or the BRAKES BSCU CH 1(2) FAULT alert, can the flight crew attempt a BSCU reset. If the BSCU reset is not successful, the flight crew may attempt a further reset by using the BSCU circuit breakers. After a successful reset, the flight crew can continue the flight.
- On ground, after any BSCU reset, the flight crew must perform all of the following:
  - Check the braking efficiency of the normal braking system, as soon as the aircraft starts moving again (the aircraft must slow down when pressing the brake pedals).
  - Record the BSCU reset in the logbook to ensure that troubleshooting is systematically done, in order to investigate the failure.

BSCU RESET - ON GROUND

Applicable to: B-HSE, B-HSG, B-HSI, B-HSJ, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTF, B-HTG

Before any BSCU reset, the flight crew must stop the aircraft, apply the parking brake and confirm that the towing bar is not connected. The flight crew must reset the BSCU by setting the A/SKID & N/W STRG sw to OFF then ON.

- Only if the ECAM triggers either the WHEEL N.W STEER FAULT or the WHEEL N/W STRG FAULT alert, can the flight crew attempt a BSCU reset. If the BSCU reset is successful, the flight crew are still required to go back to the gate for troubleshooting. The flight crew must taxi with care, at a taxi speed of 10 kt.
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  - Check the braking efficiency of the normal braking system, as soon as the aircraft starts moving again (the aircraft must slow down when pressing the brake pedals).
  - Record the BSCU reset in the logbook to ensure that troubleshooting is systematically done, in order to investigate the failure.

BSCU RESET - ON GROUND

Applicable to: B-HSD, B-HSK, B-HTH, B-HTI
Impacted DU: 00002184 BSCU Reset - On Ground

Before any BSCU reset, the flight crew must stop the aircraft, apply the parking brake and confirm that the towing bar is not connected. The flight crew must reset the BSCU by setting the A/SKID & N/W STRG sw to OFF then ON.

- Only if the ECAM triggers either the WHEEL N.W STEER FAULT or the WHEEL N/W STRG FAULT alert, can the flight crew attempt a BSCU reset. If the BSCU reset is successful, the flight crew are still required to go back to the gate for troubleshooting. The flight crew must taxi with care, at a taxi speed of 10 kt.

  Note: If during taxi, when the aircraft is moving, the ECAM displays the NW STRG DISC amber memo along with the WHEEL N.W STEER FAULT or WHEEL N/W STRG FAULT ECAM alert, the flight crew may attempt to perform only one BSCU reset. The flight crew can continue the flight if the above-mentioned ECAM alert and memo are no longer displayed after this BSCU reset.

- Only if the ECAM triggers either the BRAKES SYS 1(2) FAULT or the BRAKES BSCU CH 1(2) FAULT alert, can the flight crew attempt a BSCU reset. If the BSCU reset is not successful, the flight crew may attempt a further reset by using the BSCU circuit breakers. After a successful reset, the flight crew can continue the flight.
- On ground, after any BSCU reset, the flight crew must perform all of the following:
  - Check the braking efficiency of the normal braking system, as soon as the aircraft starts moving again (the aircraft must slow down when pressing the brake pedals).
  - Record the BSCU reset in the logbook to ensure that troubleshooting is systematically done, in order to investigate the failure.

BSCU RESET - IN FLIGHT

Applicable to: ALL

Only if the ECAM triggers either the BRAKES SYS 1(2) FAULT or the BRAKES BSCU CH 1(2) FAULT alert, can the flight crew attempt a BSCU reset. The flight crew must reset the BSCU, landing gear retracted, by setting the A/SKID & N/W STRG sw to OFF then ON.

Note: Extending the landing gear initiates an automatic test of the main braking components, in order to detect any failures. If the flight crew resets the BSCU with the main landing gear already extended, the failures and associated ECAM indications that are already detected are erased, even if the BSCU reset does not necessarily correct the failure. Therefore, in order to detect any remaining failures, the flight crew must reset the BSCU before landing gear extension.

If required, the flight crew must rearm the autobrake. In flight, after any BSCU reset, the flight crew must record the BSCU reset in the logbook to ensure that troubleshooting is systematically done, in order to investigate the failure before the next flight.

BRAKING IN ALTERNATE MODE

Applicable to: ALL

Apply brakes with care, because initial pedal force or displacement produces more braking action in alternate mode than in normal mode. If antiskid is lost, modulate brake pressure at, or below, 1 000 PSI.

THRUST APPLICATION ON BRAKES

Applicable to: ALL

The braking system is not designed to hold the aircraft in a stationary position when a high thrust level is applied on at least one engine.

The thrust level from which the aircraft starts to move (with parking brake ON, or with manual braking applied) depends on several factors such as:
- Ground surface conditions
- Environment
- The aircraft weight
- Etc...

During ground procedures that require a thrust increase with braking, the flight crew must ensure that the aircraft remains stationary, and one flight crew must keep his hands on the thrust levers to be ready to immediately retard the thrust levers to IDLE if the aircraft starts to move.

BRAKE TEMPERATURE LIMITATIONS REQUIRING MAINTENANCE ACTIONS

Applicable to: ALL 320

Maintenance action is required in the following cases:
- The temperature difference between the 2 brakes on the same gear is greater than 150 C, and the temperature of either one of the brakes is higher than, or equal to 600 C, or
- The temperature difference between the 2 brakes on the same gear is greater than 150 C, and the temperature of one brake is lower than, or equal to 60 C, or
- The difference between the average temperature of the left gear brakes and the average temperature of the right gear brakes is 200 C or more, or
- A fuse plug has melted, or
- One brake's temperature exceeds 900 C.

BRAKE TEMPERATURE LIMITATIONS REQUIRING MAINTENANCE ACTIONS

Applicable to: ALL 321

Maintenance action is required in the following cases:

- The temperature difference between the 2 brakes on the same gear is greater than 150 C, and the temperature of either one of the brakes is higher than, or equal to, 600 C or
- The temperature difference between the 2 brakes on the same gear is greater than 150 C, and the temperature of one brake is lower than, or equal to 60 C,or
- The difference between the average temperature of the left gear brakes and the average temperature right gear brakes is 200 C or more,or
- A fuse plug has melted, or
- One brake's temperature exceeds 800 C.

OPERATION WITH NOSEWHEEL STEERING OFFSET

Applicable to: ALL

GENERAL

During taxi, the crew may notice an aircraft veering tendency. This can be due to some external conditions (crosswind, slope....), or it can be due to the nosewheel steering system itself. The latter case is identifiable due to flight crews' consecutive reports of permanent aircraft veering tendency. Such reports enable maintenance to determine when corrective action or troubleshooting is required.

A veering aircraft may still be operated before corrective action is taken, provided nosewheel steering deviation is within the values specified in the following table.

NWS OFFSET OPERATIONAL LIMITATION

NWS Offset	Offset ≤ 0.5 °	0.5 °<Offset ≤ 1.5 °	Offset >1.5 °
Rudder trim to taxi straight	Trim ≤ 3 °	3 °<Trim ≤ 8.8 °	Trim >8.8 °
Procedures	No operational limitation	Apply the following procedure : Autoland: - MAX X WIND ...10 kt	Immediate maintenance action is due

CAUTION	The tolerance required by maintenance guidelines (± 0.5 ° NWS offset, corresponding to the ± 3 ° rudder trim necessary to taxi straight) remains valid. Operating the aircraft outside the maintenance tolerance is possible by using the applicable procedure. However, in such cases, the flight crew must accurately and systematically make logbook entries (indicating the rudder trim input value to taxi straight) to ensure that maintenance can take corrective action within the applicable timeframe. When using rudder trim to taxi straight for NWS offset identification, takeoff must only be performed after a rudder trim reset.

TIRE PRESSURE

Applicable to: ALL

Tyre pressures are checked according to a regulated maintenance schedule.

BRAKE AND TIRE WEAR LIMITS

Applicable to: ALL

Brake and tire checking are primarily maintenance functions. However, if a brake wear indicator is observed to be flush or a tire has no evidence of tread, has deep cuts or flat spots, then the dispatching engineer or IOC MC if the station is unmanned, should be consulted for confirmation the component is serviceable for the intended flight.

BRAKE COOLING

Applicable to: ALL

When brake temperatures are above 400 C and the turn-around time is short, use brake cooling with the parking brake off. The parking brake should only be released after confirmation the wheel chocks are in place.

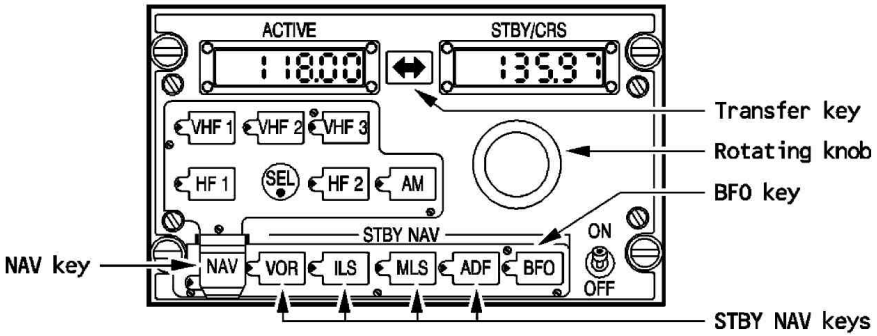
- Temperature >450 C may result in smoke from the brake due to fluid contamination in the vicinity of or on the brake unit.
- Temperature >500 C, confirm chocks in place, release park brake and apply brake cooling to prevent acidification of hydraulic fluid in brake pistons due to heat transference.
- Temperature rising above 600 C may indicate a brake fire. Immediate clarification must be sought from ATC, other aircraft or fire services.

PROCEDURES FOR TUNING STANDBY NAVIGATION RADIOS

Applicable to: ALL

GENERAL

CAUTION	Pilots should use these procedures only when both FMGCs or both MCDUs are inoperative. In this case they must press both RMP NAV keys (lighting the green lights).



FOR BOTH RMPS

ON/OFF Switch.....CHECK ON
NAV key (guarded).....PRESS

Green light comes on.
A lighted STBY NAV key shows which system had been selected earlier in the radio-nav standby mode, and the windows show which frequencies had been used.

ON THE RMP ASSOCIATED WITH THE RECEIVER TO BE TUNED

Select a STBY NAV system :

● **ADF tuning :**

ADF key.....PRESS

The green light comes on.
The windows show the previously selected frequencies.

Rotating knob..... TURN

Watch the STBY/CRS window to set a frequency.
The outer knob changes units, inner knob decimals.

Transfer key..... PRESS

This interchanges the ACTIVE and STBY frequencies. The ADF receiver is now tuned to the new ACTIVE frequency.

BFO key (if necessary)..... PRESS

Green light comes on.

● **VOR (or ILS) tuning :**

VOR (or ILS) key..... PRESS

Green light comes on.
Both windows display previously selected frequencies.

Rotating knob..... TURN

Set the frequency in the STBY/CRS window.

Transfer key..... PRESS

The ACTIVE window displays the selected frequency.
The STBY/CRS window displays the frequency that had been displayed in the ACTIVE window.

Rotating knob..... TURN

Set the course on the STBY/CRS window.
The receiver is now tuned to the frequency of the new station, and the course is selected.
To select another station, press the transfer (making both windows display the previously selected frequency) before retuning the VOR (or ILS).

Note: When the radio-nav standby mode is active (NAV ON) and VHF or HF tuning is required, select the VHF key or the HF key on the RMP (normal radio communications use). The NAV key, which has no effect on the selection of a radio communication frequency, must remain in the ON position in order to prevent radio navigation aid tuning from changing NAV receiver frequencies.

AUTOMATIC IDENTIFICATION OF ADF/VOR/ILS

Applicable to: ALL

Although the navigation display automatically identifies the tuned ADF, VOR, or ILS station (auto ident decoded), the flight crew must, in the following cases, confirm the correct tuning of the desired station via the audio system :

- A station has either been autotuned or tuned manually by a crew member's entering the associated ident on the MCDU RAD NAV page, and the decoded ident appearing on the ND is the wrong one.
- A crew member has tuned the station manually on an RMP or by entering the frequency on the MCDU RAD NAV page.

WEATHER RADAR

Applicable to: ALL

Refer to FCTM/SI-70 USE OF RADAR

FLIGHT INSTRUMENT TOLERANCES

Applicable to: ALL

GENERAL

The values below apply to aircraft in symmetrical flight (no sideslip), in the clean configuration, and in straight and level flight.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK

ALTITUDE TOLERANCES

- PFD 1 or 2 at ground check : plus or minus 25 ft (8 m)
- standby altimeter at ground check : plus or minus 300 ft (91 m)

Note: On ground, as the standby altimeter's vibrator is off, the standby altimeter's tolerance value is high. In flight, the vibrator is on and the value is lower.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

ALTITUDE TOLERANCES

PFD 1 or 2 at ground check : plus or minus 25 ft (8 m)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HTD, B-HTE, B-HTF

MAXIMUM DIFFERENCES BETWEEN ALTITUDE INDICATIONS

FL/SPEED	ALTITUDE (ft) COMPARISON BETWEEN		
	ADR 1 and ADR 2 (on PFD)	ADR 3 and ADR 1, or ADR 3 and ADR 2 (on PFD)	STBY ALTI and any ADR 1, or 2, or 3
GND CHECK	20 (6 m)	20 (6 m)	(1)
FL 50/250 kt	50 (15 m)	80 (24 m)	130 (40 m)
FL 100/250 kt	55 (17 m)	80 (24 m)	185 (56 m)
FL 200/300 kt	90 (27 m)	145 (44 m)	295 (90 m)
FL 300/.78	130 (40 m)	355 (108 m)	390 (119 m)
FL 390/.78	130 (40 m)	365 (111 m)	445 (136 m)

(1) On ground, the check is meaningless because the standby altimeter's vibrator is off.

Applicable to: B-HSK, B-HTG, B-HTH, B-HTI

MAXIMUM DIFFERENCES BETWEEN ALTITUDE INDICATIONS

FL/SPEED	ALTITUDE (ft) COMPARISON BETWEEN		
	ADR 1 and ADR 2 (on PFD)	ADR 3 and ADR 1, or ADR 3 and ADR 2 (on PFD)	STBY ALTI and any ADR 1, or 2, or 3
GND CHECK	20 (6 m)	20 (6 m)	(1)
FL 50/250 kt	50 (15 m)	65 (20 m)	130 (40 m)
FL 100/250 kt	55 (17 m)	80 (24 m)	185 (56 m)
FL 200/300 kt	90 (27 m)	135 (41 m)	295 (90 m)
FL 300/.78	130 (40 m)	195 (59 m)	390 (119 m)
FL 390/.78	130 (40 m)	195 (59 m)	445 (136 m)

(1) On ground, the check is meaningless because the standby altimeter's vibrator is off.

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

MAXIMUM DIFFERENCES BETWEEN ALTITUDE INDICATIONS

FL/SPEED	ALTITUDE (ft) COMPARISON BETWEEN		
	ADR 1 and ADR 2 (on PFD)	ADR 3 and ADR 1, or ADR 3 and ADR 2 (on PFD)	ISIS and any ADR 1, or 2, or 3
GND CHECK	20 (6 m)	20 (6 m)	100 (30 m)
FL 50/250 kt	50 (15 m)	65 (20 m)	130 (40 m)
FL 100/250 kt	55 (17 m)	80 (24 m)	185 (56 m)
FL 200/300 kt	90 (27 m)	135 (41 m)	295 (90 m)
FL 300/.78	130 (40 m)	195 (59 m)	390 (119 m)
FL 390/.78	130 (40 m)	195 (59 m)	445 (136 m)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HTD, B-HTE, B-HTF

AIRSPEED/MACH TOLERANCES

Maximum differences between Speed/Mach indications :

FL/SPEED	SPEED (kt) MACH COMPARISON BETWEEN					
	ADR 1 and ADR 2 (on PFD)		ADR 3 and ADR 1, or ADR 3 and ADR 2		STBY ASI and any ADR 1, or 2, or 3	
	SPEED	MACH	SPEED	MACH	SPEED	MACH
GND CHECK	6	0.008	6	0.008	6	-
FL 50/250 kt	4	0.005	5	0.011	7	-
FL 100/250 kt	4	0.005	4	0.011	8	-
FL 200/300 kt	3	0.007	4	0.008	9	-
FL 300/0.78	3	0.010	7	0.017	9	-
FL 390/0.78	3	0.010	6	0.019	8	-

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

AIRSPEED/MACH TOLERANCES

Maximum differences between Speed/Mach indications :

FL/SPEED	SPEED (kt) MACH COMPARISON BETWEEN					
	ADR 1 and ADR 2 (on PFD)		ADR 3 and ADR 1, or ADR 3 and ADR 2		STBY ASI and any ADR 1, or 2, or 3	
	SPEED	MACH	SPEED	MACH	SPEED	MACH
GND CHECK	6	0.008	6	0.008	6	-
FL 50/250 kt	4	0.005	4	0.007	7	-
FL 100/250 kt	4	0.005	5	0.008	8	-
FL 200/300 kt	3	0.007	5	0.011	9	-
FL 300/0.78	3	0.010	5	0.014	9	-
FL 390/0.78	3	0.010	4	0.014	8	-

Applicable to: ALL

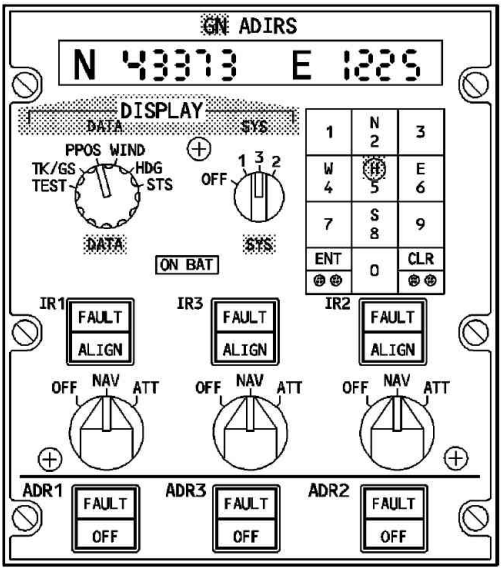
HEADING TOLERANCES

Maximum differences between magnetic heading indications on the NDs : 4 °.

ADIRS OPERATION

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

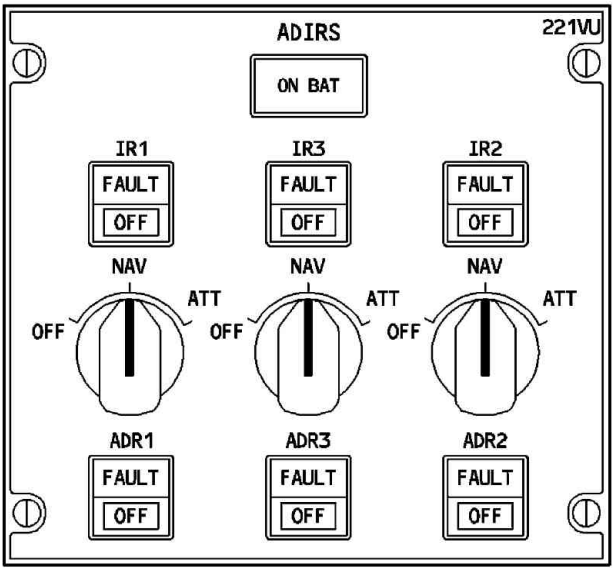
GENERAL



The ADIRS must be aligned : This allows them to operate in NAV mode, to continuously provide the aircraft's position. To complete the alignment, the ADIRS must be initialized to a navigation starting point, from which the ADIRS determine subsequent aircraft positions during flight.
The pilot may check the ADIRS status, and the ADIRS drift, at any moment on the MCDU POSITION MONITOR page.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

GENERAL



The ADIRS must be aligned : This allows them to operate in NAV mode, to continuously provide the aircraft's position. To complete the alignment, the ADIRS must be initialized to a navigation starting point, from which the ADIRS determine subsequent aircraft positions during flight.
The pilot may check the ADIRS status, and the ADIRS drift, at any moment on the MCDU POSITION MONITOR page.

Applicable to: ALL

COMPLETE OR FAST ALIGNMENT

For alignment, the aircraft must be stationary on ground. Any aircraft motion will automatically restart the alignment. Avoid alignment during an engine start, or while the engines are running.
The pilot may choose to perform a complete alignment (this takes about 10 min) or a fast alignment (this takes about 30 s). In both cases, the ADIRS must be initialized to a navigation starting point.
During a complete alignment, the ADIRS uses gravity to determine the aircraft attitude. It then determines true heading, and estimates the present latitude.
During a fast alignment, the ADIRS resets the ground speed to 0. Therefore, the ADIRS will start the position computation with an accurate initial speed. The ADIRS does not estimate the latitude.

The procedure for ADIRS complete or fast alignment is the following :

All 3 ADIRS Control Panel mode selectors.....OFF

The ALIGN light remains OFF.

All 3 ADIRS Control Panel mode selectors..... NAV

If the mode selectors are set back to NAV within 5 s, the ADIRS perform a fast alignment. Otherwise, the ON BAT light comes ON for 5 s, and the ADIRS then start a complete alignment.

The ALIGN light comes ON, and remains steady until the alignment is complete.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

POSITION INITIALIZATION

The alignment phase is completed, when the ADIRS is initialized to an appropriate position. Perform this initialization as soon as possible, to prevent delays if an alignment error occurs.

MCDU coordinates..... CHECK/MODIFY

When the pilot enters or modifies the origin airport (FROM) or the CO RTE, the MCDU INIT coordinates are reset to the airport reference point (extracted from the FMS database). The pilot may also manually modify these coordinates.
If the MCDU coordinates change, when the ADIRS are already in NAV mode, the RESET IRS TO NAV message is triggered on the MCDU : Crosscheck the MCDU INIT coordinates against the IRS position on the MCDU POSITION MONITOR page.
When the GPS is available, or for flights in good radio navigation coverage airspace, initialize the ADIRS to the airport reference point extracted from the FMS database. This reduces the risk of entering incorrect values.
If the GPS is not available, and long segments in poor radio navaid coverage airspace are expected, initialize the ADIRS to the gate coordinates. This increases the accuracy of the ADIRS position computation.
If the airport reference point is not stored in the FMS database, and the gate coordinates are not available, use the airport reference point coordinates from the airport chart.

ALIGN IRS prompt.....PRESS

The MCDU INIT page coordinates are sent to the ADIRS, and their navigation starting point is set.

Applicable to: B-HSO, B-HSP

POSITION INITIALIZATION

The alignment phase is completed, when the ADIRS is initialized to an appropriate position.
If the GPS is available, initialization is automatic, using the GPS position. Pilot intervention is not necessary.

However, automatic initialization may be manually overriden by pilot entry, at any moment during the alignment phase. In this case, perform the following procedure as soon as possible, to prevent delays if an alignment error occurs :

MCDU coordinates..... CHECK/MODIFY

When the pilot enters or modifies the origin airport (FROM) or the CO RTE, the MCDU INIT coordinates are reset to the airport reference point (extracted from the FMS database). The pilot may also manually modify these coordinates.
If the MCDU coordinates change, when the ADIRS are already in NAV mode, the RESET IRS TO NAV message is triggered on the MCDU : Crosscheck the MCDU INIT coordinates against the IRS position on the MCDU POSITION MONITOR page.
When the GPS is available, or for flights in good radio navigation coverage airspace, initialize the ADIRS to the airport reference point extracted from the FMS database. This reduces the risk of entering incorrect values.
If the GPS is not available, and long segments in poor radio navaid coverage airspace are expected, initialize the ADIRS to the gate coordinates. This increases the accuracy of the ADIRS position computation.
If the airport reference point is not stored in the FMS database, and the gate coordinates are not available, use the airport reference point coordinates from the airport chart.

ALIGN IRS prompt.....PRESS

The MCDU INIT page coordinates are sent to the ADIRS, and their navigation starting point is set.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

POSITION INITIALIZATION

The alignment phase is completed, when the ADIRS is initialized to an appropriate position.
If the GPS is available, initialization is automatic, using the GPS position. Pilot intervention is not necessary.
However, automatic initialization may be manually overriden by pilot entry, at any moment during the alignment phase. In this case, perform the following procedure as soon as possible, to prevent delays if an alignment error occurs :

MCDU coordinates..... CHECK/MODIFY

When the pilot enters or modifies the origin airport (FROM) or the CO RTE, the reference coordinates on MCDU IRS INIT page are reset to the airport reference point (extracted from the FMS database). The pilot may also manually modify these coordinates.
If the MCDU coordinates change, when the ADIRS are already in NAV mode, the ALIGN ON REF prompt is displayed : Crosscheck the reference coordinates on MCDU IRS INIT page against the IRS position on the MCDU POSITION MONITOR page.

When the GPS is available, or for flights in good radio navigation coverage airspace, initialize the ADIRS to the airport reference point extracted from the FMS database. This reduces the risk of entering incorrect values.
If the GPS is not available, and long segments in poor radio navaid coverage airspace are expected, initialize the ADIRS to the gate coordinates. This increases the accuracy of the ADIRS position computation.
If the airport reference point is not stored in the FMS database, and the gate coordinates are not available, use the airport reference point coordinates from the airport chart.

ALIGN ON REF prompt.....PRESS and CONFIRM

The reference coordinates on MCDU IRS INIT page are sent to the ADIRS, and their navigation starting point is set.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

ALIGNMENT/INITIALIZATION ERROR

The ADIRS keeps a record of the last position it had the last time it was in NAV mode. It is also able to estimate the present latitude after a complete alignment. The ADIRS may use this information to detect coarse initialization errors.
If the ADIRS alignment or initialization is not correct, the ALIGN light will flash. If any of the 3 ADIRS indicates an alignment error, the prompt REALIGN IRS appears on the INIT page (instead of ALIGN IRS).

- **If the IR FAULT light flashes:**

  The affected ADIRS can only be used in ATT mode.

- **If the ALIGN light flashes before the alignment phase is completed:**

  DISPLAY DATA switch.....STS

  If the CDU does not display any message, the position sent to the ADIRS disagrees with the last memorized position, or with the ADIRS estimated latitude. Check the initialization position, and reenter it.
  If the CDU displays a message, take the appropriate action.

- **If the ALIGN light flashes at the end of the alignment phase:**

  Check the ALIGN IRS prompt on the MCDU. If it is present, press it to initialize the ADIRS.

  - **If the REALIGN IRS prompt is present:**

    The position sent to the ADIRS disagrees with the last memorized position, or with the ADIRS estimated latitude.

    ADIRS.....PERFORM FAST ALIGNMENT
    POSITION INITIALIZATION.....CHECK & ENTER AGAIN

    If the ALIGN light still flashes, perform a complete alignment of the affected ADIRS.

Applicable to: B-HSO, B-HSP

ALIGNMENT/INITIALIZATION ERROR

The ADIRS keeps a record of the last position it had the last time it was in NAV mode. It is also able to estimate the present latitude after a complete alignment. The ADIRS may use this information to detect coarse initialization errors.
If the pilot manually initializes the ADIRS, and a GPS position is available, the GPS position is used to crosscheck the pilot entry.
If any of the 3 ADIRS indicates an alignment error, the prompt REALIGN IRS appears on the INIT page (instead of ALIGN IRS).

- **If the IR FAULT light flashes:**

  The affected ADIRS can only be used in ATT mode.

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

ALIGNMENT/INITIALIZATION ERROR

The ADIRS keeps a record of the last position it had the last time it was in NAV mode. It is also able to estimate the present latitude after a complete alignment. The ADIRS may use this information to detect coarse initialization errors.
If the pilot manually initializes the ADIRS, and a GPS position is available, the GPS position is used to crosscheck the pilot entry.
If any of the 3 ADIRS detects an alignment or initialization error, the prompt ALIGN ON REF is displayed on the IRS INIT page. If the flight crew has previously entered a REF position and the MCDU scratchpad messages REF/GPS POS DIFF or REF/LAST IRS POS DIFF are displayed, the flight crew has to reenter the REF position. When the REF position is entered again, the prompt ALIGN ON REF is displayed on the IRS INIT page.

- **If the IR FAULT light flashes:**

  The affected ADIRS can only be used in ATT mode.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

SHUTDOWN

Mode selectors.....OFF

Pull and turn the 3 mode selectors to OFF.
The message screen displays REALN DESN 5 s (realign decision) for 5 s, then a 5 s countdown to off (OFF TIME 5 s displayed). Flight crew must not pull the circuit breakers until the final countdown is completed.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

STATUS MESSAGES

Status messages appear, when the DISPLAY DATA switch is set to STS. If there is more than one condition calling for a message, the display scrolls to the next message every 2 s.

MESSAGE	DESCRIPTION
STS IR FAULT	Hard failure. Select ATT (if corresponding message is displayed) or refer to MMEL or remove ADIRU for maintenance.
STS-DELAY MAINT	Failure not affecting IR functioning. Service ADIRU when convenient.
STS-ENTER PPOS	Enter present position or check entered position is correct. *Note: The confirmation of an erroneous longitude at the present position entry will create a wrong position of the aircraft symbol on the NDs.*
STS-SELECT ATT	Hard IRU failure, select ATT mode.
STS-EXCESS MOTION	Excess motion detected during alignment. ADIRU will automatically restart alignment. Ensure aircraft is not moving.
STS-SWITCH ADR	ADR invalid.
STS-CHECK CK/BK	Check circuit breakers (1)
STS-CDU FAULT	Remove CDU for maintenance.
STS-ENT MAG HDG	Enter magnetic heading.

(1) *If a corresponding FAULT light comes on, check BAT 1 load.*

TCAS

Applicable to: ALL

GENERAL

For System Description, *Refer to DSC-34-80-10 General*.
For Operational Procedures, *Refer to PRO-ABN-34 TCAS WARNINGS*.
Refer to Part A 8.3.1.4 Policy and Procedures for the use of TCAS.

Applicable to: ALL

CONFLICT RESOLUTION PRINCIPLES

- **Traffic Advisory (TA)**
  If an intruder represents a potential collision threat, a visual and aural Traffic Advisory will be given. This advisory helps the crew to visually situate the intruder. It also prepares the crew for a possible Resolution Advisory. However, not every RA is preceded by a TA.
- **Resolution Advisory (RA)**
  If the intruder is considered to be a real collision threat, an aural and visual Resolution Advisory is given.
  TCAS determines the optimum vertical maneuver that ensures effective separation, with a minimum change in vertical speed.

  Depending on each situation, TCAS generates a :
  - Preventive Advisory (i.e. the actual vertical speed may be maintained). It displays the vertical speed range to be avoided.
  - Corrective Advisory i.e. the actual vertical speed is within the range to be avoided and a recommended vertical speed (fly to) range is displayed.
  - Modified Corrective Advisory, which changes already displayed RA (i.e if the intruder changes their vertical speed).

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

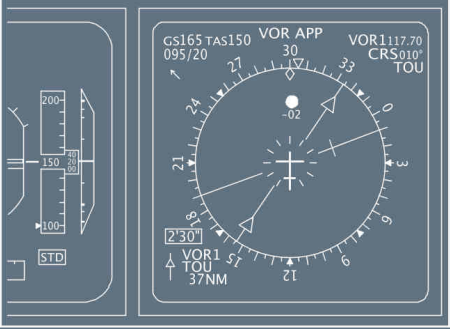
1 OPERATIONAL RECOMMENDATIONS

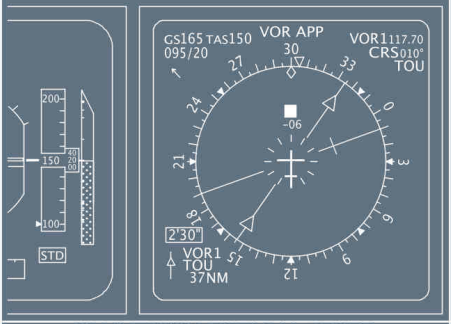
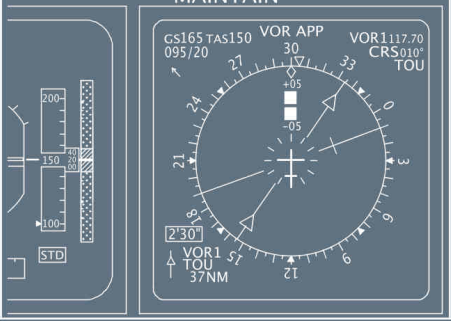
- **Avoidance generalities:**
  Always follow the RAs orders, even if they lead to cross the altitude of the intruders, as they ensure the best global separation.

CAUTION	If a pilot does not follow a RA, he should be aware that the intruder may be TCAS equipped and may be maneuvering toward his aircraft in response to a coordinated RA. This could compromise safe separation.

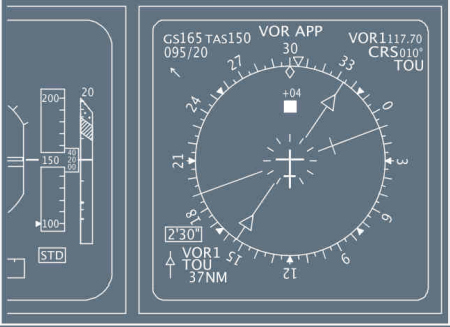
Pilots should comply with the vertical speed limitations during the last 2 000 ft of climb or descent. In particular, pilots should limit vertical speeds to 1 500 ft/min during the last 2 000 ft of a climb or descent, especially when they are aware of traffic that is converging in altitude and intending to level off 1 000 ft above or below the pilot's assigned altitude.

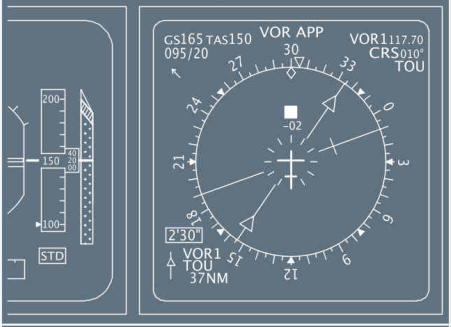
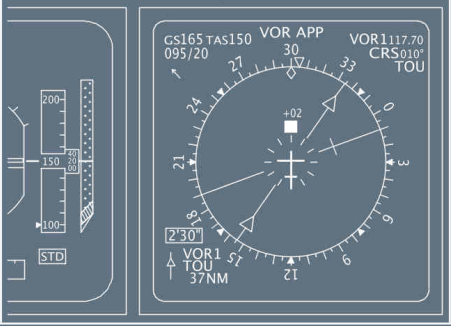
- **Select TA only mode in the following cases:**
  - Engine failure.
  - Dispatch with landing gear down (if applicable).
  - At particular airports and during particular procedures identified by an operator as having a significant potential for unwanted a inappropriate RAs (closely-spaced parallel runways, converging runways, low terrain along the final approach...)

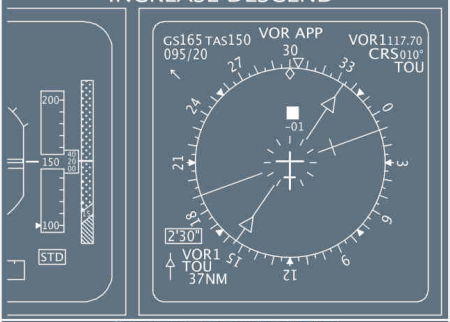
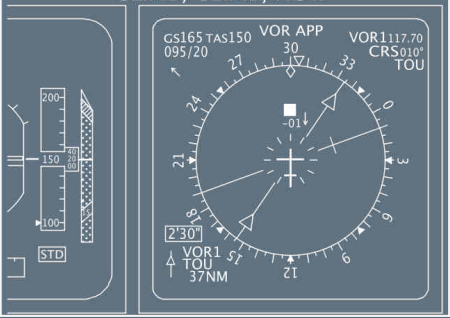
SCENARIO	AURAL WARNING and TYPICAL DISPLAY PFD | ND	CREW RESPONSE
TRAFFIC ADVISORY – One intruder is ahead at 12:00 o'clock beyond 6 NM, 200 ft below your altitude.	"TRAFFIC, TRAFFIC" 	– Do not maneuver on the traffic advisory symbol. – Attempt to visually acquire the intruder. – Be prepared to maneuver if the TA changes to an RA.

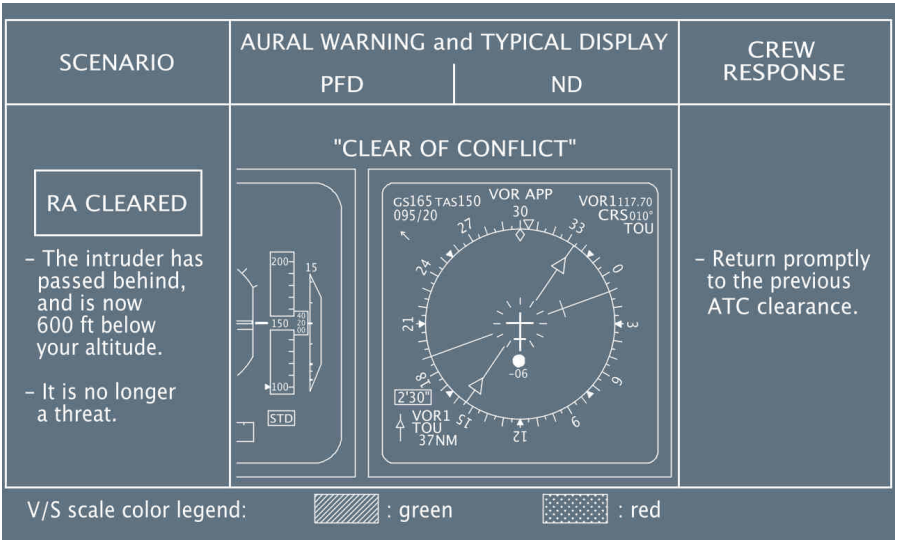
SCENARIO	AURAL WARNING and TYPICAL DISPLAY PFD | ND	CREW RESPONSE
RESOLUTION ADVISORY (PREVENTIVE) – One intruder is ahead at 12:00 o'clock, 600 ft below your altitude.	"MONITOR VERTICAL SPEED" 	– Do not descend.
RESOLUTION ADVISORY (CORRECTIVE) – Two intruders are ahead at 12:00 o'clock. . one, at 500 ft above your altitude. . the other, at 500 ft below your altitude.	MAINTAIN VERTICAL SPEED MAINTAIN 	– Remain in level flight. – Do not climb or descend.

V/S scale color legend: : green : red

SCENARIO	AURAL WARNING and TYPICAL DISPLAY PFD / ND	CREW RESPONSE
RESOLUTION ADVISORY (CORRECTIVE) – The intruder is ahead at 12:00 o'clock, 400 ft above your altitude. – You are already climbing at 2000 ft/mn.	"ADJUST VERTICAL SPEED ADJUST" 	– Adjust vertical speed so as to be in the green area of the PFD's speed scale by reducing climb vertical speed as appropriate.

SCENARIO	AURAL WARNING and TYPICAL DISPLAY PFD | ND	CREW RESPONSE
– The intruder is ahead at 12:00 o'clock, 200 ft below your altitude.	"CLIMB, CLIMB" 	– Promptly (within 5 seconds) smoothly establish a climb rate of 1500 ft/mn.
– The intruder is ahead at 12:00 o'clock, 200 ft above your altitude.	"DESCEND, DESCEND" 	– Promptly (within 5 seconds) and smoothly establish a descent rate of 1500 ft/mn.
V/S scale color legend: : green : red		

SCENARIO	AURAL WARNING and TYPICAL DISPLAY PFD | ND	CREW RESPONSE
RESOLUTION ADVISORY (ADDITIONAL CORRECTIVE) - The intruder ahead has stopped its climb. - It is now 100 ft below your altitude.	"INCREASE DESCEND INCREASE DESCEND" 	- Immediately (within 2.5 seconds) and smoothly increase your descent rate to 2500 ft/mn.
- The intruder has changed from level flight to a rapid descent, after TCAS issued a DESCEND RA. - TCAS is now changing that to a CLIMB RA.	"CLIMB, CLIMB, NOW CLIMB, CLIMB, NOW" 	- Initiate a change from a descent to a climb maneuver, within 2.5 seconds.



Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

2

OPERATIONAL RECOMMENDATIONS

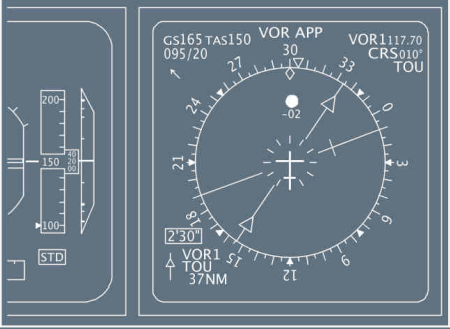
- **Avoidance generalities:**
  Always follow the RAs orders, even if they lead to cross the altitude of the intruders, as they ensure the best global separation.

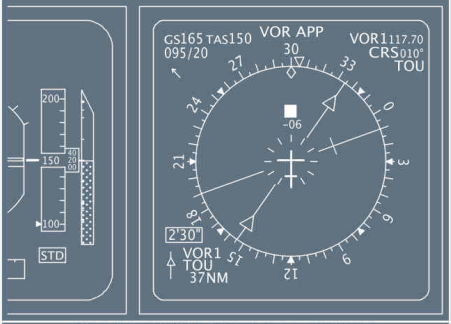
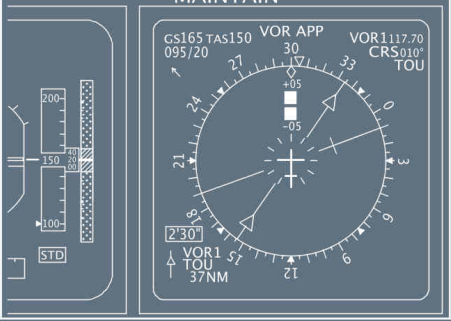
CAUTION	If a pilot does not follow a RA, he should be aware that the intruder may be TCAS equipped and may be maneuvering toward his aircraft in response to a coordinated RA. This could compromise safe separation.

  Pilots should comply with the vertical speed limitations during the last 2 000 ft of climb or descent. In particular, pilots should limit vertical speeds to 1 500 ft/min during the last 2 000 ft of a climb or descent, especially when they are aware of traffic that is converging in altitude and intending to level off 1 000 ft above or below the pilot's assigned altitude.

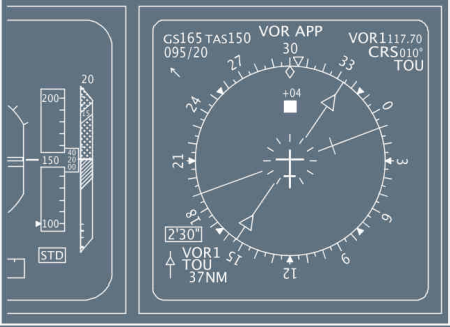
- **Select TA only mode in the following cases:**
  - Engine failure.
  - Flight with landing gear down (if applicable).

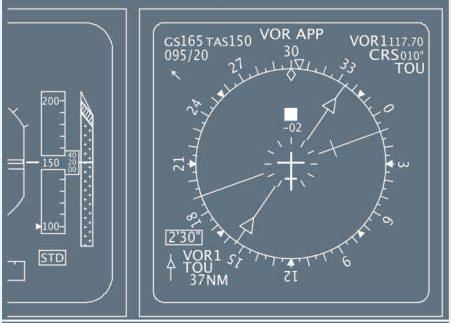
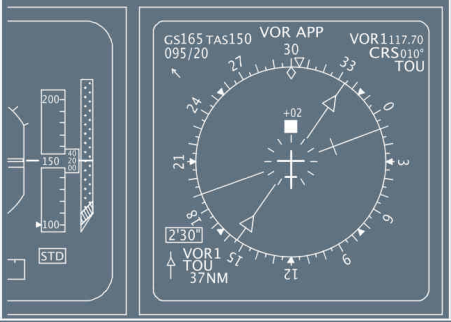
- In case of known nearby traffic, which is in visual contact.
- At particular airports and during particular procedures identified by an operator as having a significant potential for unwanted a inappropriate RAs (closely-spaced parallel runways, converging runways, low terrain along the final approach...)

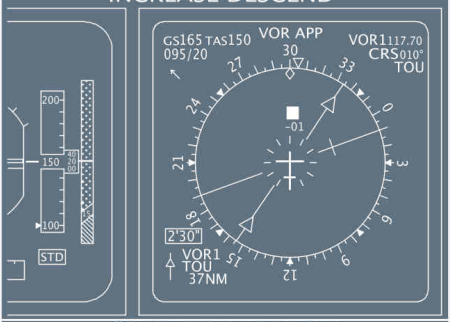
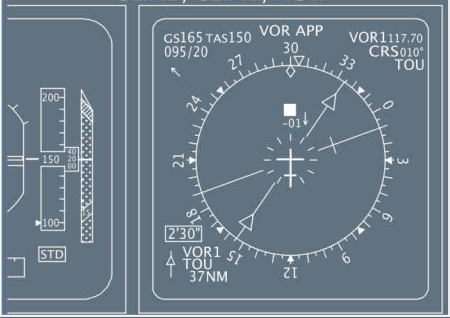
SCENARIO	AURAL WARNING and TYPICAL DISPLAY PFD | ND	CREW RESPONSE
TRAFFIC ADVISORY – One intruder is ahead at 12:00 o'clock beyond 6 NM, 200 ft below your altitude.	"TRAFFIC, TRAFFIC" 	– Do not maneuver on the traffic advisory symbol. – Attempt to visually acquire the intruder. – Be prepared to maneuver if the TA changes to an RA.

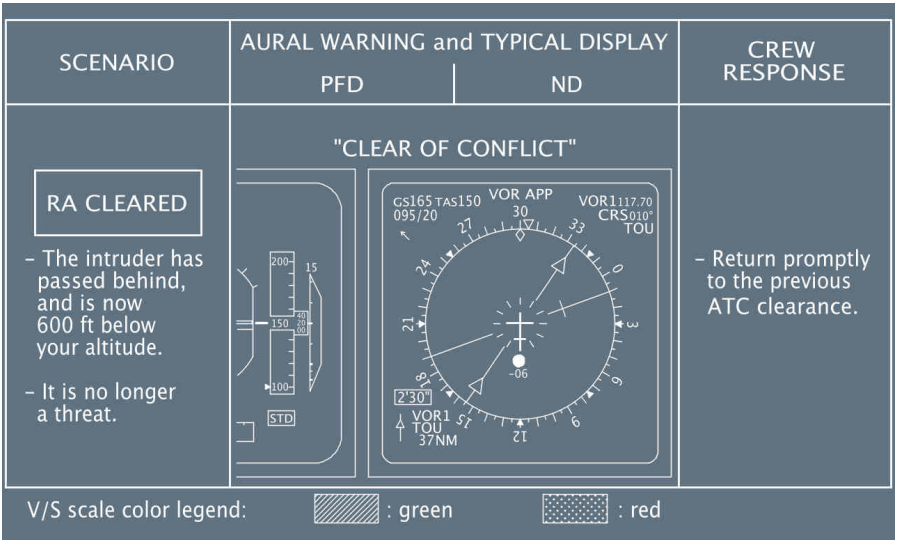
SCENARIO	AURAL WARNING and TYPICAL DISPLAY PFD | ND	CREW RESPONSE
RESOLUTION ADVISORY (PREVENTIVE) – One intruder is ahead at 12:00 o'clock, 600 ft below your altitude.	"MONITOR VERTICAL SPEED" 	– Do not descend.
RESOLUTION ADVISORY (CORRECTIVE) – Two intruders are ahead at 12:00 o'clock. . one, at 500 ft above your altitude. . the other, at 500 ft below your altitude.	MAINTAIN VERTICAL SPEED MAINTAIN 	– Remain in level flight. – Do not climb or descend.

V/S scale color legend: : green : red

SCENARIO	AURAL WARNING and TYPICAL DISPLAY PFD | ND	CREW RESPONSE
RESOLUTION ADVISORY (CORRECTIVE) - The intruder is ahead at 12:00 o'clock, 400 ft above your altitude. - You are already climbing at 2000 ft/mn.	"LEVEL OFF" 	- Set the Vertical Speed to 0.

SCENARIO	AURAL WARNING and TYPICAL DISPLAY PFD / ND	CREW RESPONSE
- The intruder is ahead at 12:00 o'clock, 200 ft below your altitude.	"CLIMB, CLIMB" 	- Promptly (within 5 seconds) smoothly establish a climb rate of 1500 ft/mn.
- The intruder is ahead at 12:00 o'clock, 200 ft above your altitude.	"DESCEND, DESCEND" 	- Promptly (within 5 seconds) and smoothly establish a descent rate of 1500 ft/mn.
V/S scale color legend: : green : red		

SCENARIO	AURAL WARNING and TYPICAL DISPLAY PFD | ND	CREW RESPONSE
RESOLUTION ADVISORY (ADDITIONAL CORRECTIVE) - The intruder ahead has stopped its climb. - It is now 100 ft below your altitude.	"INCREASE DESCEND INCREASE DESCEND" 	- Immediately (within 2.5 seconds) and smoothly increase your descent rate to 2500 ft/mn.
- The intruder has changed from level flight to a rapid descent, after TCAS issued a DESCEND RA. - TCAS is now changing that to a CLIMB RA.	"CLIMB, CLIMB, NOW CLIMB, CLIMB, NOW" 	- Initiate a change from a descent to a climb maneuver, within 2.5 seconds.



APPROACH ON PAPI OR TVASI

Applicable to: ALL

Eye to wheel height on approach is 25 ft and minimum recommended wheel clearance over the threshold is 20 ft. Do not follow Precision Approach Path Indicator (PAPI) or "T"-Visual Approach Slope Indicator (TVASI) guidance below 200 ft when PAPI or TVASI Minimum Eye Height over Threshold (MEHT) is less than 45 ft.

QFE USE FOR TO/APPR/LDG ON AIRCRAFT WITH QNH ONLY PIN PROGRAMMING

Applicable to: ALL

The crew should not use QFE on aircraft with a “QNH only” pin programming (incorrect profile computation of the managed vertical modes CLB, DES and FINAL APPR, possible false GPWS warnings in mountainous areas).

ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS)

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

The Flight Management System (FMS) provides aircraft position inputs to the EGPWS for enhanced function processing purpose.

The TERR pb-sw located on the overhead panel enables the activation or deactivation of the enhanced functions of the EGPWS.
If the TERR ON ND is not selected, and a terrain alert is generated, the terrain is automatically displayed on the ND.
The brightness of the terrain indication on the ND is controlled via the weather radar brightness control knob. If the weather radar brightness was set to low (due to bad weather) and a terrain alert occurs, then the terrain display brightness will also be low.
Therefore, when a terrain alert occurs, the ND weather/terrain image brightness may need to be adjusted.

CLOCK

Applicable to: ALL

CLOCK ADJUSTMENT

For guidelines on adjustment procedures, refer to DSC-31-55-20.

If the clock requires adjustment , the following time references may be used:

- For MNPS Navigation (Minimum Navigation Performance Specification) an accurate UTC time check should be completed. This may be done by using:
  - WWV - National Institute Of Standards (NIST - Fort Collins, Colorado). WWV operates continually H24 on 2,500, 5,000, 10,000, 15,000 and 20,000 kHz
  - CHU - National Research Council (NRC - Ottawa, Canada) - CHU operates H24 on 3,330, 7,335 and 14,670 kHz (SSB).
  - BBC - British Broadcasting Corporation (United Kingdom). Details in Volume 5.
  - Or any other suitable means.

SPECIALIZED MEANS OF NAVIGATION REQUIREMENTS

Applicable to: ALL

GENERAL

Certain routes may be listed in MEL 01-34 which cross areas designated in Schedule 8 of the Air Navigation (Hong Kong) Order, 1995. Navigation within these areas is dictated by a minimum list of equipment, detailed in the MEL under Specialized Means of Navigation Sectors (SMNS). Normal navigation is accomplished with the use of the FMGS. When available, the aircraft's position should be monitored with reference to radio navigation facilities.

MINIMUM SERVICEABLE EQUIPMENT

The minimum serviceable equipment for all designated SMNS will be listed in MEL 01-34.

For all the routes designated in MEL 01-34, the equipment specified is to be operable at the outbound gateway.

GATEWAY

This is the term given to a recognized exit/entry point with defined coordinates and with fixing capability over which aircraft are normally re-routed from/to an area requiring Specialized Means of Navigation.

AUTOMATIC DEPENDENT SURVEILLANCE - BROADCAST (ADS-B)

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

3

ADS-B OUT :

When the Air Traffic Controller requests to stop transmitting ADS-B OUT surveillance data or altitude (e.g. when she/he requests "STOP ADS-B TRANSMISSION"or "STOP ADS-B ALTITUDE TRANSMISSION"), do not switch off the ATC transponder or the altitude reporting, in order to maintain TCAS operations or Air Traffic Controller radar surveillance and refer to Aeronautical Information Publication (AIP) for alternate procedure.

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INADVERTENT OXYGEN MASK DEPLOYMENT

Applicable to: ALL

If the oxygen masks drop inadvertently, and

- **If the oxygen masks have been pulled down and oxygen flow has been activated (oxygen generator condition indicator is normally yellow; it turns black after activation):**
  - The passenger(s) in that row should be reseated to vacant passenger seat(s) if possible.
  - The masks are not to be re-stowed in the PSU.
  - The PSU is to be left open and the tubing of the oxygen masks taped to the PSU compartment/ceiling of the aircraft.
  - Any passenger who could not be reseated must be given a portable oxygen bottle and briefed on its use in case of decompression.
- **If the oxygen masks have not been pulled down and oxygen flow has not been activated (oxygen generator condition indicator is normally yellow; it turns black after activation):**
  - The passenger(s) in that row should be reseated to vacant passenger seat(s) if possible.
  - The masks are not to be re-stowed in the PSU.
  - The PSU is to be left open and the tubing of the oxygen masks taped to the PSU compartment/ceiling of the aircraft.
  - Any passenger who could not be reseated must be able to reach the taped masks should oxygen be subsequently required.
- **An AML entry must be made to ensure that maintenance action is undertaken.**

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USE OF CFDS FOR DISPATCH

Applicable to: ALL

1 GENERAL

The purpose of this chapter is to provide procedures for use by CFDS qualified flight crew at stations where no suitably qualified maintenance personnel are available.
These CFDS procedures provide an alternative but complementary method for completing the corresponding Maintenance Procedure as described in the MEL.
Cathay Pacific Engineering must be consulted and will have the final say as to whether the aircraft may be dispatched.

The following MUST be complied with when using CFDS procedures:

- Both engines must be shut down and the Park Brake SET,
- One pilot is to read the procedures while the other pilot uses the MCDU,
- Only one MCDU should be used at a time or a 'TIME OUT' message will appear in the scratch pad,
- When using the RETURN line select key (LSK 6L), pause after each selection until the 'WAIT FOR SYSTEM RESPONSE' message in the scratch pad has cleared. It sometimes takes a few seconds for the system components to reconnect whilst the CFDS facility extracts itself from deep inside a complex system. If the RETURN key is selected too quickly, or the MCDU p/b is pressed, the various system components may not reconnect correctly - in which case the aircraft must be de-powered completely to reset all the on board systems,
- A Maintenance Log entry must be made by the flight crew. If the unserviceability subsequently clears itself then a "FOR INFO" entry is sufficient. If the unserviceability remains then the Aircraft Maintenance Log must be completed as per Ops Part A 8.6.1,
- Cathay Engineering must be consulted prior to dispatch,
- Dispatch using the CFDS procedures must be recorded on the CAR. Refer to Ops Part A 8.6.1.19.

These procedures may be used when one of the following defects is present.

Inoperative Item (and associated ECAM warning)	Procedure	Page Reference	MEL Reference
1. Engine IDG Channel or, Engine Generator (ECAM warning ELEC IDG 1(2) OIL LO PR/OVHT or ELEC GEN 1(2) FAULT)	IDG Fuel Recirculation Test	PRO-SUP-45 1. IDG Fuel Recirculation Test	MEL/MI-24-22-01A
2. Galley Supply Shed System (ECAM warning ELEC GEN 1(2) OVER LOAD or ELEC APU GEN OVER LOAD)	Galley Supply System Loads Disconnection	PRO-SUP-45 2. Galley Supply System Loads Disconnection	MEL/MI-24-26-01B or MEL/MI-24-26-02A

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Inoperative Item (and associated ECAM warning)	Procedure	Page Reference	MEL Reference
3. Rudder Pedal Transducer (ECAM warning F/CTL AIL SERVO FAULT)	Rudder Pedal Transducer Failure Confirmation	PRO-SUP-45 3. Rudder Pedal Transducer Failure Confirmation	MEL/MI-27-14-01A or MEL/MI-27-14-02A or MEL/MI-27-14-03A or MEL/MI-27-14-04A
4. SFCS 2 - Flap Channel (ECAM warning F/CTL FLAP SYS 2 FAULT)	SFCS 1 Flap Channel Test Procedure	PRO-SUP-45 4. SFCS 1 Flap Channel Test Procedure	MEL/MI-27-51-01A
5. SFCS 2 – Slat Channel (ECAM warning F/CTL SLAT SYS 2 FAULT)	SFCS 1 Slat Channel Test Procedure	PRO-SUP-45 5. SFCS 1 Slat Channel Test Procedure	MEL/MI-27-51-02A
6. SFCS 2 – Flap WTB Solenoid (ECAM warning F/CTL FLAP TIP BRK FAULT)	SFCS 1 Flap WTB Solenoid Test Procedure	PRO-SUP-45 6. SFCS 1 Flap WTB Solenoid Test Procedure	MEL/MI-27-51-03A
7. SFCS 2 – Slat WTB Solenoid (ECAM warning F/CTL SLAT TIP BRK FAULT)	SFCS 1 Slat WTB Solenoid Test Procedure	PRO-SUP-45 7. SFCS 1 Slat WTB Solenoid Test Procedure	MEL/MI-27-81-01A
8. ELAC 1 (ECAM warning F/CTL ELAC 1 FAULT or F/CTL ELAC 1 PITCH FAULT)	Elevator Aileron Computer Test Procedure	PRO-SUP-45 8. Elevator Aileron Computer Test Procedure	MEL/MI-27-93-01A
9. SEC 1 or 2 (ECAM warning F/CTL SEC 1(2) FAULT) *Note: NOT applicable to SEC 3!*	Spoiler Elevator Computer Test Procedure	PRO-SUP-45 9. Spoiler Elevator Computer Test Procedure	MEL/MI-27-94-01A or MEL/MI-27-94-02A
10. Probe Heat Computer (ECAM warning ANTI ICE (F/O) (STBY) PROBES)	Probe Heat Computer Heating Test	PRO-SUP-45 10. Probe Heat Computer Heating Test	MEL/MI-30-31-01A or MEL/MI-30-31-01B or MEL/MI-30-31-01C
11. Pitot Heater (ECAM warning ANTI ICE CAPT (F/O) (STBY) PITOT)	Pitot Heater – Test of the Two Operative Probe Heat Systems	PRO-SUP-45 11. Pitot Heater – Test of the Two Operative Probe Heat Systems	MEL/MI-30-31-02A or MEL/MI-30-31-02B or MEL/MI-30-31-02C
12. Static Port Heater (ECAM warning ANTI ICE CAPT (F/O) (STBY) L (R) STAT)	Static Port Heater – Test of Two Operative Probe Heat Systems	PRO-SUP-45 12. Static Port Heater – Test of the Two Operative Probe Heat Systems	MEL/MI-30-31-03B or MEL/MI-30-31-03C or MEL/MI-30-31-03D
13. AOA Probe Heater (ECAM warning ANTI ICE CAPT (F/O) (STBY) AOA)	AOA Probe Heater – Test of Two Operative Probe Heat Systems	PRO-SUP-45 13. AOA Probe Heater – Test of Two Operative Probe Heat Systems	MEL/MI-30-31-04A or MEL/MI-30-31-04B or MEL/MI-30-31-04C

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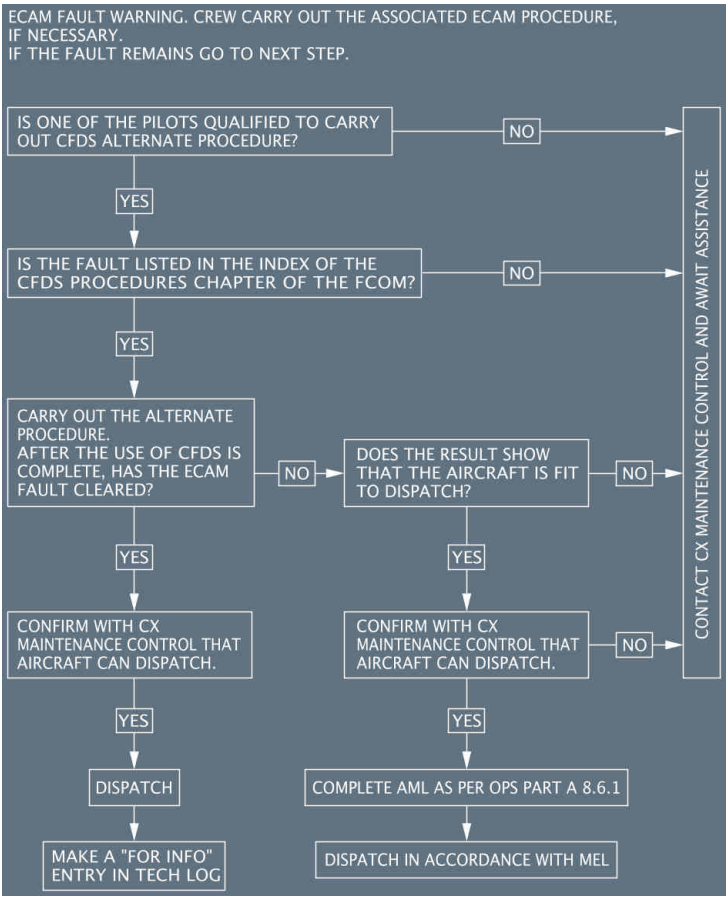
Inoperative Item (and associated ECAM warning)	Procedure	Page Reference	MEL Reference
14. Window Heat Computer (ECAM warning ANTI ICE L (R) WINDOW and ANTI ICE L (R) WINDSHIELD displayed together)	Window Heat Computer – Test of the Operative Window Heat Systems	PRO-SUP-45 14. Window Heat Computer – Test of the Operative Window Heat Systems	MEL/MI-30-42-01A
15. Red down arrow light on landing gear selector panel	Test of the L/G GEAR NOT DOWN ECAM warning	PRO-SUP-45 15. Test of the L/G GEAR NOT DOWN ECAM warning	MEL/MI-32-61-02A

Note: For the initial issue of PRO-SUP-45 and all subsequent revisions by Airbus Industrie, approval must first be obtained from HDA Engineering in accordance with EOMP 14–9 of the amendments prior to PRO-SUP-45 issuance by Airbus Industrie.

GENERALIZED FLOW CHART FOR USE IN CONJUNCTION WITH PRO–SUP–45 PILOT APPROVED PROCEDURES



1. IDG FUEL RECIRCULATION TEST

Applicable to: ALL

In the event of an ECAM warning ELEC GEN 1(2) FAULT or ELEC IDG 1(2) OIL LOPR/OVHT, the following procedure is used to check the IDG of the operational generator:

1. Energize the aircraft.

2. Refer to MEL/MI-24-22-01A AC Main Generation (IDG, GCU, Line Contactor) and check that the items listed under paragraphs 3), 4), 7), 8) and 9) are operative and the limitation listed under paragraphs 1), 2) and 5) can be complied with.

The item listed under paragraph 6) is covered by continuing below.
- If engine generator 1 is operational, go to step 3.
- If engine generator 2 is operational, go to step 6.

ENGINE GENERATOR 1 OPERATIONAL

3. On the panel 50 VU, release the ENG FADEC GND POWER 1 (ON legend illuminated).

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L)	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L)	SYSTEM REPORT/TEST page appears.
Press NEXT PAGE P/B.	Second SYSTEM REPORT/TEST page appears.
Select ENG line key (LSK 1R).	SYSTEM REPORT/TEST ENG page appears.
Select FADEC 1 A line key (LSK 2L).	FADEC 1A menu page appears.
Select LAST LEG REPORT line key (LSK 1L)	FADEC 1A LAST LEG REPORT page appears. Check if any of the following failure messages are displayed: - ACOC OIL TEMP TC/HC/EEC 1 - IDG OIL TEMP TC/HC/EEC 1 - ACOC AIR MOD VLV/HC/EEC 1 - FUEL DIV RET VLV/HC/EEC 1 - HMS FUEL OVTMP 1 - HMS ENG OIL OVTMP 1 - HMS IDG OIL OVTMP 1 - HMS IDG OVTMP W/RECIRC 1 - FUEL DIV RET VLV/EEC 1. If one or more of these messages are displayed maintenance is required – NO DISPATCH.
Select RETURN line key twice (LSK 6L).	SYSTEM REPORT/TEST ENG page appears.
Select FADEC 1B line key (LSK 2R).	FADEC 1B page appears.

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ACTIONS	RESULTS
Select LAST LEG REPORT line key (LSK 1L)	FADEC 1B LAST LEG REPORT page appears. Check if any of the following failure messages are displayed: - ACOC OIL TEMP TC/HC/EEC 1 - IDG OIL TEMP TC/HC/EEC 1 - ACOC AIR MOD VLV/HC/EEC 1 - FUEL DIV RET VLV/HC/EEC 1 - HMS FUEL OVTMP 1 - HMS ENG OIL OVTMP 1 - HMS IDG OIL OVTMP 1 - HMS IDG OVTMP W/RECIRC 1 - FUEL DIV RET VLV/EEC 1. If one or more of these messages are displayed maintenance is required – NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
PressMCDU MENU key.	MCDU MENU page appears.

4. On the panel 50VU, push the ENG 1 FADEC GND PWR pb-sw (ON legend extinguished).
5. Go to step 8.

ENGINE GENERATOR 2 OPERATIONAL

6. On the panel 50 VU, release the ENG 2 FADEC GND POWER pb-sw (ON legend illuminated).

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU menu page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Press NEXT PAGE P/B.	Second SYSTEM REPORT/TEST page appears.
Select ENG line key(LSK 1R).	SYSTEM REPORT/TEST ENG page appears.
Select FADEC 2A line key (LSK 3L).	FADEC 2A page appears.

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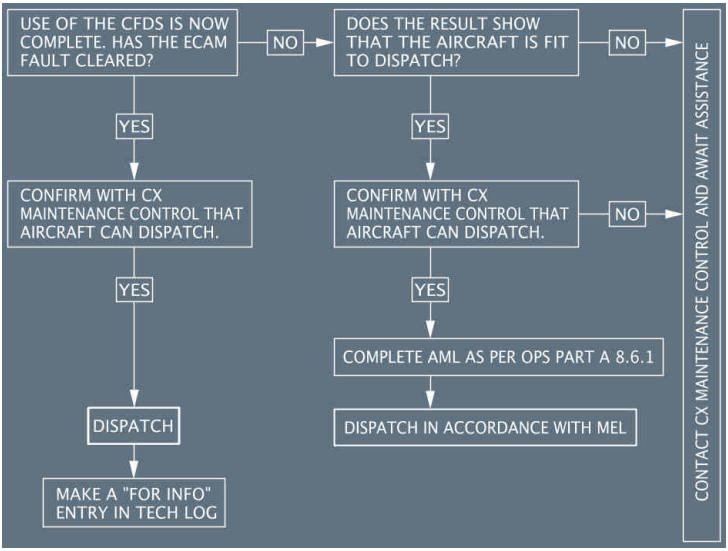
ACTIONS	RESULTS
Select LAST LEG REPORT line key (LSK 1L)	FADEC 2A LAST LEG REPORT page appears. Check if any of the following failure messages are displayed: - ACOC OIL TEMP TC/HC/EEC 2 - IDG OIL TEMP TC/HC/EEC 2 - ACOC AIR MOD VLV/HC/EEC 2 - FUEL DIV RET VLV/HC/EEC 2 - HMS FUEL OVTMP 2 - HMS ENG OIL OVTMP 2 - HMS IDG OIL OVTMP 2 - HMS IDG OVTMP W/RECIRC 2 - FUEL DIV RET VLV/EEC 2. If one or more of these messages are displayed maintenance is required – NO DISPATCH.
Select RETURN line key twice (LSK 6L).	SYSTEM REPORT/TEST ENG page appears.
Select FADEC 2B line key (LSK 3R)	FADEC 2B page appears.
Select LAST LEG REPORT line key (LSK 1L)	FADEC 2B LAST LEG REPORT page appears. Check if any of the following failure messages are displayed: - ACOC OIL TEMP TC/HC/EEC 2 - IDG OIL TEMP TC/HC/EEC 2 - ACOC AIR MOD VLV/HC/EEC 2 - FUEL DIV RET VLV/HC/EEC 2 - HMS FUEL OVTMP 2 - HMS ENG OIL OVTMP 2 - HMS IDG OIL OVTMP 2 - HMS IDG OVTMP W/RECIRC 2 - FUEL DIV RET VLV/EEC 2. If one or more of these messages are displayed maintenance is required – NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

7. On the panel 50 VU, push the ENG 2 FADEC GND PWR pb-sw (ON legend extinguished).
8. Check the applicable MEL Operational Procedures have been complied with then exit the procedure using the flow chart below.



2. GALLEY SUPPLY SYSTEM LOADS DISCONNECTION

Applicable to: ALL

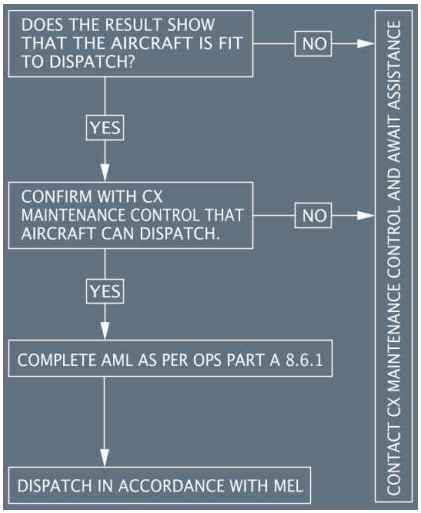
In the event of an ECAM warning ELEC GEN 1(2) OVERLOAD or ELEC APU GEN OVERLOAD, completion of the ECAM actions would normally clear the warning. If the ECAM warning remains displayed, then both the automatic and the manual load shed systems are inoperative, and the following procedure must be used to de-energize the galleys before the aircraft can be dispatched.

1. Energize the aircraft.
2. Open the following circuit breakers.

FIN	DESIGNATION	LOCATION
1XA	ELEC/GALLEY/CTL	122 VU 26S
7MC	ELECT/GALLEY/CNTOR	122 VU 28S
3MC	MAIN GALLEY A	123 VU 04AF
12MC	GALLEY B ◁	123 VU 09AD
1MC	MAIN GALLEY C or FWD &AFT GALLEY	123 VU 10AE or 3AE
2MC	GALLEY D	123 VU 04AD or 2AE
14MC	MAIN GALLEY E	123 VU 09AF
16MC	MAIN GALLEY F	123 VU 10AC

3. On the panel 35 VU, release the GALLEY pb-sw (OFF legend illuminated).

4. Check no power is available to any of the galley equipment by going to the galleys and attempting to switch on the galley systems.
5. Dispatch the aircraft with the above circuit breakers open and with the GALLEY pb-sw in the OFF position (OFF legend illuminated).
6. There are no applicable MEL Operational Procedures or limitations. Exit the procedure using the flow chart below.



3. RUDDER PEDAL TRANSDUCER FAILURE CONFIRMATION

Applicable to: ALL

In the event of an ECAM warning F/CTL AIL SERVO FAULT, the following procedure is used to check if the fault is caused by the rudder pedal transducer.

1. Energize the aircraft.
2. Make sure that the following C/B are closed.

FIN	DESIGNATION	LOCATION
15CE1	FLIGHT CONTROLS/ELAC 1/NORM/SPLY	49 VU 11B
20CE1	FLIGHT CONTROLS/FCDC 1/SPLY	49 VU 10B
21CE1	FLIGHT CONTROLS/SEC 1/NORM/SPLY	49 VU 08B
2TW	CFDS/CFDIU/SPLY	121 VU 18J
8TW	CFDS/CFDIU/BACK-UP	121 VU 17J
20CE2	FLIGHT CONTROLS/FCDC 2/SPLY	121 VU 20Q

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FIN	DESIGNATION	LOCATION
21CE3	FLIGHT CONTROLS/SEC 3/SPLY	121 VU 19Q
21CE2	FLIGHT CONTROL/SEC 2/SPLY	121 VU 18Q
15CE2	FLIGHT CONTROLS/ELAC 2/NORM/SPLY	121 VU 20R
16CE1	FLT CTL/ELAC 1 pb/STBY/SPLY	105 VU 01AS
16CE2	FLT CTL/ELAC 2 pb/STBY/SPLY	105 VU
22CE	FLT CTL/SEC 1/STBY/SPLY	105 VU

Note: Circuit breaker panel 105 VU is located in the avionics compartment under the cockpit floor.

3. On the panel 23 VU check that the ELAC 1 pb and SEC 1 pb are pressed in (FAULT and OFF legends extinguished).
4. On the panel 24 VU check that the ELAC 2 pb, SEC 2 pb and SEC 3 pb are pressed in (FAULT and OFF legends extinguished).
5. Select ADIRS 1, 2 and 3 to the NAV position.
6. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU menu page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select F/CTL line key (LSK 1R).	SYSTEM REPORT/TEST F/CTL page appears.
Select EFCS 1 line key (LSK 1L).	EFCS 1 page appears.
Select GROUND SCAN line key (LSK 4L).	EFCS 1 GROUND SCAN page appears with this message displayed: - START GROUND SCAN - WAIT 2 MINUTES - STOP GROUND SCAN <START GROUND SCAN STOP> <GROUND REPORT>
Select START GROUND SCAN key (LSK 4L)	The page disappears and comes up again *Note: The same page is displayed without any complementary information about the test progress.*
Wait for 2 min minimum.	
Select GROUND SCAN STOP line key (LSK 4R).	The page disappears and comes up again.

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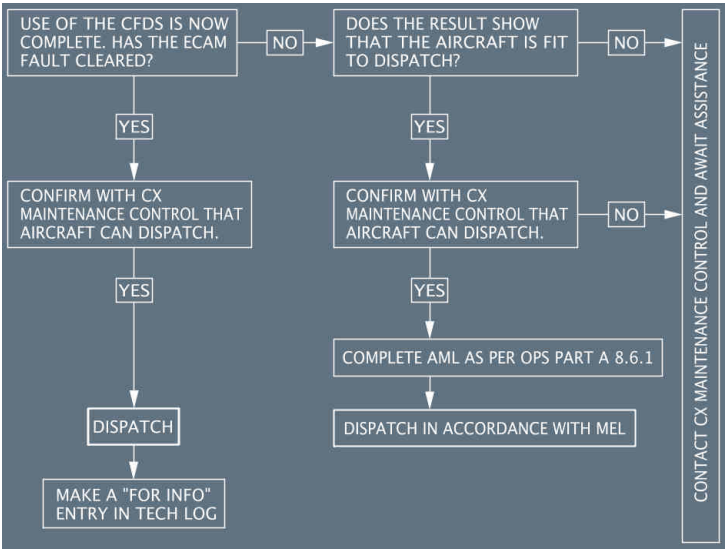
ACTIONS	RESULTS
Select the GROUND REPORT line key (LSK 5L)	EFCS 1 GROUND REPORT page appears. 1. Check the following messages are displayed: - NO FAULTS RECORDED ! or - RUDDER PEDAL XDCR ● **If the above "RUDDER PEDAL XDCR" message is displayed by itself then the aircraft can be dispatched as is.** ● **If there are any other failure messages present maintenance is required - NO DISPATCH.**
Select RETURN line key (LSK 6L) until the CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

7. Check the applicable MEL Operational Procedures have been complied with then exit the procedure using the flow chart below.



4. SFCS 1 FLAP CHANNEL TEST PROCEDURE

Applicable to: ALL

In the event of an ECAM warning F/CTL FLAP SYS 2 FAULT the following procedure is used to check the SFCS 1 flap channel and its associated Wing Tip Brake solenoids.

1. Energize the aircraft
2. *Refer to MEL/MI-27-51 SFCC Flap Channel* and check the items listed under paragraph 3) are operative. The requirements listed under paragraphs 1), 2), are covered by continuing below.

SFCC 1 TEST PROCEDURE

3. Do the following procedure:

ACTIONS	RESULTS
On the RH or LH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu appears.
Select SYSTEM REPORT/TEST line key (LSK 5L)	SYSTEM REPORT/TEST page appears.
Select F/CTL line key (LSK 1R)	SYSTEM REPORT/TEST F/CTL page appears.
Select SFCC 1 line key (LSK 3L)	SFCC-1 page appears.
Select SYSTEM STATUS FLP line key (LSK 4R)	SFCC-1 SYSTEM STATUS FLP page appears 1. Check the following messages are displayed: - NO FAULTS or - SLT 1 NO SFCC 2 DATA and/or - FLP 1 NO SFCC 2 DATA ● **If there are any other failure messages present maintenance is required - NO DISPATCH.**
Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST F/CTL page appears.
Select SFCC 2 line key (LSK 4L).	SFCC-2 page appears.
Select SYSTEM STATUS FLP line key (LSK 4R).	SFCC-2 SYSTEM STATUS FLP page appears. 1. Check for the following message: - FLP SYS LOCKED

- *If the message "FLP SYS LOCKED" is present, SFCC 2 has applied the Wing Tip Brakes and they have to be reset, go to step 4 (See step 4).*
- *If there is no "FLP SYS LOCKED" message go to step 7 (See step 7).*

WTB RESET PROCEDURE

4. Do the following procedure:

Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST F/CTL page appears.
Select SFCC 2 line key (LSK 4L).	SFCC-2 page appears.
Press NEXT PAGE key	Second SFCC-2 page appears.
Select TEST/RESET FLP line key (LSK 1R).	SFCC-2 FLAP TEST/RESET page appears.
Select WTB-RESET line select key (LSK 1R).	SFCC-2 FLAP WTB-RESET instructions page appears.

CAUTION	CHECK THE AREA AROUND THE FLAPS AND SLATS IS CLEAR OF OBSTACLES.

Select START WTB RESET line select key (LSK 5L).	SFCC-2 FLAP WTB-RESET PERFORMED message appears.

5. Open the following circuit breaker:

FIN	DESIGNATION	LOCATION
8CV	FLIGHT CONTROLS/FLP/CTL AND MONG/SYS 2	121 VU Q21

Select RETURN line key (LSK 6L) once.	SFCC-2 FLAP TEST/RESET page appears.

Note: If the ECAM warning F/CTL FLAPS LOCKED is still present after performing the WTB reset procedure a mechanical failure of the slat system may have occurred. NO DISPATCH.

6. Go to step 7 (See step 7).

SFCC 1 FLAP WTB TEST PROCEDURE

7. Do the following procedure:

Note: Paragraph 2) under MEL reference 27-51-01A requires the SFCC 1 WTB's operation to be confirmed by test before each flight.

8. On the panel 50 VU, push the BLUE PUMP OVRD pb-sw (ON legend illuminated)
9. On the panel 40 VU, push the YELLOW ELEC PUMP pb-sw (ON legend illuminated)

Note: Wait until the hydraulic power has stabilized before entering CFDS.

10. Open the following circuit breakers:

FIN	DESIGNATION	LOCATION
7CV	FLIGHT CONTROLS/SLT/CTL/SYS 2	121 VU R21
8CV	FLIGHT CONTROLS/FLP/CTL AND MONG/SYS 2	121 VU Q21

CAUTION	*CHECK THE AREA AROUND THE FLAPS AND SLATS IS CLEAR OF OBSTACLES.*

11. Set the flap lever to position 3; the slats and flaps move to position 3.
12. Do the following procedure:

ACTIONS	RESULTS
Select RETURN line key (LSK 6L) twice	SYSTEM REPORT/TEST F/CTL page appears.
Select SFCC 1 line key (LSK 3L).	SFCC-1 page appears.
Press NEXT PAGE key	Second SFCC-1 page appears.
Select TEST/RESET FLP line key (LSK 1R).	SFCC-1 FLAP TEST/RESET page appears.
Select WTB/POB TEST line key (LSK 2L).	SFCC-1 FLAP WTB/POB TEST instructions page appears.

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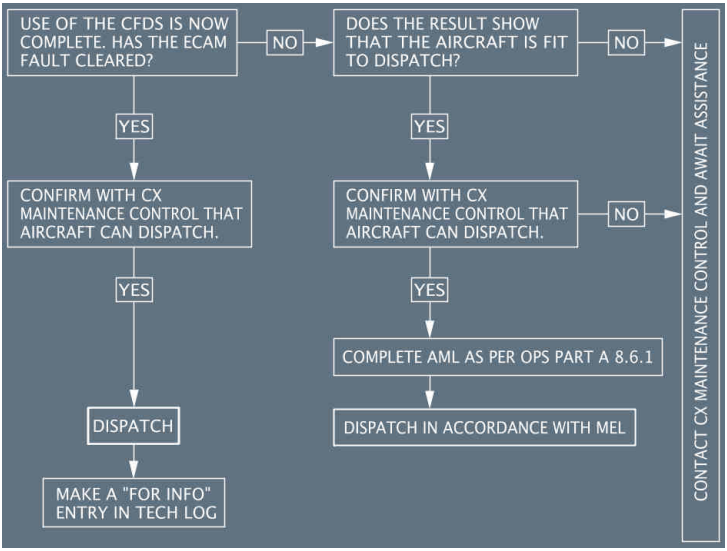
ACTIONS	RESULTS
Select CONTINUE line key (LSK 5L).	Second SFCC-1 FLAP WTB/POB TEST instructions page appears. Note: *The page normally flashes on and off periodically.*
Select START TEST line key (LSK 5L).	SFCC-1 FLAP WTB/POB TEST IN PROGRESS message appears. 1. Check that the following message is displayed within approximately 2 min, otherwise - NO DISPATCH: PERFORMED NO FAULTS Note: *If the test is unsuccessful after 3 attempts ("CFDS TEST INVALID"), try another test with a ground power cart connected, or with the engine driven hydraulic pumps on, and cranking the related engine 2.*
Select RETURN line key (LSK 6L) until the CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key	MCDU MENU appears.

13. Close circuit breaker 7 CV (121 VU R21)

Note: *Circuit breaker 8CV (121 VU Q21) remains tripped for DISPATCH.*

14. Set the flap lever to position 0, the slats and flaps move to position 0.
15. On the panel 50 VU, release the BLUE PUMP OVRD pb-sw (ON legend extinguished).
16. On the panel 40 VU, release the YELLOW ELEC PUMP pb-sw (ON legend extinguished)
17. Check the applicable MEL limitations have been complied with then exit the procedure using the flow chart below.



5. SFCS 1 SLAT CHANNEL TEST PROCEDURE

Applicable to: ALL

In the event of an ECAM warning F/CTL SLAT SYS 2 FAULT the following procedure is used to check the SFCC 1 slat channel and its associated Wing Tip Brake solenoids.

1. Energize the aircraft
2. *Refer to MEL/MI-27-51 SFCC Slat Channel* and check the items listed under paragraph 3) are operative. The requirements listed under paragraphs 1), 2), are covered by continuing below.

SFCC 1 TEST PROCEDURE

3. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key	MCDU menu page appears.
Select CFDS line key (LSK 4L)	CFDS main page menu appears.
Select SYSTEM REPORT/TEST line key (LSK 5L)	SYSTEM REPORT/TEST page appears.
Select F/CTL line key (LSK 1R).	SYSTEM REPORT/TEST F/CTL page appears
Select SFCC 1 line key (LSK 3L).	SFCC-1 page appears.

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ACTIONS	RESULTS
Select SLT SYSTEM STATUS line key (LSK 4L)	SFCC-1 SYSTEM STATUS SLT page appears 1. Check the following messages are displayed: - NO FAULTS or - SLT 1 NO SFCC 2 DATA. ● **If there are any other failure messages present maintenance is required - NO DISPATCH.**
Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST F/CTL page appears.
Select SFCC 2 line key (LSK 4L).	SFCC-2 page appears.
Select SLT SYSTEM STATUS line key (LSK 4L).	SFCC-2 SYSTEM STATUS SLT page appears. 1. Check for the following messages: - SLT SYS LOCKED

- If the message “SLT SYS LOCKED” is present, SFCC 2 has applied the Wing Tip Brakes and they have to be reset, See step 4.
- If there is no “SLT SYS LOCKED” message See step 7.

WTB RESET PROCEDURE

4. Do the following procedure:

Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST F/CTL page appears.
Select SFCC 2 line key (LSK 4L).	SFCC-2 page appears.
Press NEXT PAGE key.	Second SFCC-2 page appears.
Select SLT TEST/RESET line key (LSK 1L).	SFCC-2 SLAT TEST/RESET page appears.
Select WTB-RESET line select key (LSK 1R).	SFCC-2 SLAT WTB-RESET instructions page appears.

CAUTION	CHECK THE AREA AROUND THE FLAPS AND SLATS IS CLEAR OF OBSTACLES.

Select START WTB RESET line select key (LSK 5L).	SFCC-2 SLAT WTB-RESET PERFORMED message appears.

5. Open, secure and tag, the following circuit breaker:

FIN	DESIGNATION	LOCATION
7CV	FLIGHT CONTROLS/SLT/CTL/SYS 2	121 VU R21

Select RETURN line key (LSK 6L) once.	SYSTEM REPORT/TEST F/CTL page appears.

Note: If the ECAM warning F/CTL SLATS LOCKED is still present after performing the WTB reset procedure a mechanical failure of the slat system may have occurred. NO DISPATCH.

6. Go to step 7 (See step 7).

SFCC 1 SLAT WTB TEST PROCEDURE

7. Do the following procedure :

Note: Paragraph 2) under MEL reference 27-51-01B requires the SFCC 1 WTB's operation to be confirmed by test before each flight.

8. On the panel 50 VU, push the BLUE PUMP OVRD pb-sw (ON legend illuminated).
9. On the panel 40 VU, push the YELLOW ELEC PUMP pb-sw (ON legend illuminated).

Note: Wait until hydraulic power has stabilized before entering CFDS.

10. Open the following circuit breakers:

FIN	DESIGNATION	LOCATION
7CV	FLIGHT CONTROLS/SLT/CTL/SYS 2	121 VU R21
8CV	FLIGHT CONTROLS/FLP/CTL AND MONG/SYS 2	121 VU Q21

CAUTION	CHECK THE AREA AROUND THE FLAPS AND SLATS IS CLEAR OF OBSTACLES.

11. Set the flap lever to position 3 ; the slats and flaps move to position 3.
12. Do the following procedure:

ACTIONS	RESULTS
Select RETURN line key (LSK 6L) twice	SYSTEM REPORT/TEST F/CTL page appears.
Select SFCC 1 line key (LSK 3L).	SFCC-1 page appears.
Press NEXT PAGE key.	Second SFCC-1 page appears.
Select SLT TEST/RESET line key (LSK 1L).	SFCC-1 SLAT TEST/RESET page appears.
Select WTB/POB TEST line key (LSK 2L).	SFCC-1 SLAT WTB/POB TEST instructions page appears.
Select CONTINUE line key (LSK 5L).	Second SFCC-1 SLAT WTB/POB TEST instructions page appears. *Note: The page normally flashes on and off periodically.*
Select START TEST line key (LSK 5L).	SFCC-1 SLAT WTB/POB TEST IN PROGRESS message appears. 1. Check that the following message is displayed within approximately 2 min, otherwise - NO DISPATCH: PERFORMED NO FAULTS *Note: If the test is unsuccessful after 3 attempts ("CFDS TEST INVALID"), try another test with a ground power cart connected, or with the engine driven hydraulic pumps on, and cranking the related engine 2.*

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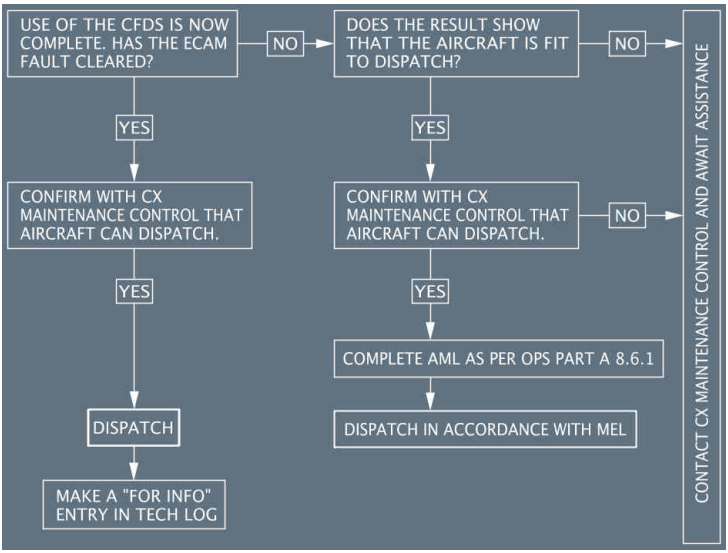
ACTIONS	RESULTS
Select RETURN line key (LSK 6L) until the CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key	MCDU MENU page appears.

13. Close circuit breaker 8CV (121 VU Q21).

Note: *Circuit breaker 7CV (121 VU R21) remains open for DISPATCH.*

14. Set the flap lever to position 0, the slats and flaps move to position 0.
15. On the panel 50 VU, release the BLUE PUMP OVRD pb-sw (ON legend extinguished).
16. On the panel 40 VU, release the YELLOW ELEC PUMP pb-sw (ON legend extinguished).
17. Check the applicable MEL limitations have been complied with then exit the procedure using the flow chart below.



6. SFCS 1 FLAP WTB SOLENOID TEST PROCEDURE

Applicable to: ALL

In the event of an ECAM warning F/CTL FLAP TIP BRK FAULT the following procedure checks the operation of the SFCS 1 flap Wing Tip Brake solenoids.

1. Energize the aircraft

2. Refer to MEL/MI-27-51-03A Flap Wing Tip Brakes Solenoid and check for any limitations that apply.
3. On the panel 50 VU, push the BLUE PUMP OVRD pb-sw (ON legend illuminated).
4. On the panel 40 VU, push the YELLOW ELEC PUMP pb-sw (ON legend illuminated).

Note: *Wait until the hydraulic pressure has stabilized before entering CFDS.*

5. Open following circuit breakers:

FIN	DESIGNATION	LOCATION
7CV	FLIGHT CONTROLS/SLT/CTL/SYS 2	121 VU R21
8CV	FLIGHT CONTROLS/FLP/CTL AND MONG/SYS 2	121 VU Q21

CAUTION	CHECK THE AREA AROUND THE FLAPS AND SLATS IS CLEAR OF OBSTACLES.

6. Set the flap lever to the position 3, the slats and flaps move to the position 3.
7. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L)	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select F/CTL line key (LSK 1R).	SYSTEM REPORT/TEST F/CTL page appears.
Select SFCC 1 line key (LSK 3L).	SFCC-1 page appears
Press NEXT PAGE P/B.	Second SFCC-1 page appears
Select TEST/RESET FLP line key (LSK 1R).	SFCC-1 FLAP TEST/RESET page appears.
Select WTB/ POB TEST line key (LSK 2L).	SFCC-1 FLAP WTB/POB TEST instructions page appears.
Select CONTINUE line key (LSK 5L)	Second SFCC-1 FLAP WTB/POB TEST instructions page appears. Note: *The page normally flashes off and on periodically.*
Select START TEST line key (LSK 5L).	SFCC-1 FLAP WTB/POB TEST IN PROGRESS message appears. 1. Check the following message is displayed within approximately 2 min, otherwise - NO DISPATCH: PERFORMED NO FAULTS Note: *If the test is unsuccessful after 3 attempts (˝CFDS TEST INVALID˝), try another test with a ground power cart connected or with the engine driven hydraulic pumps on and cranking the related engine 2.*

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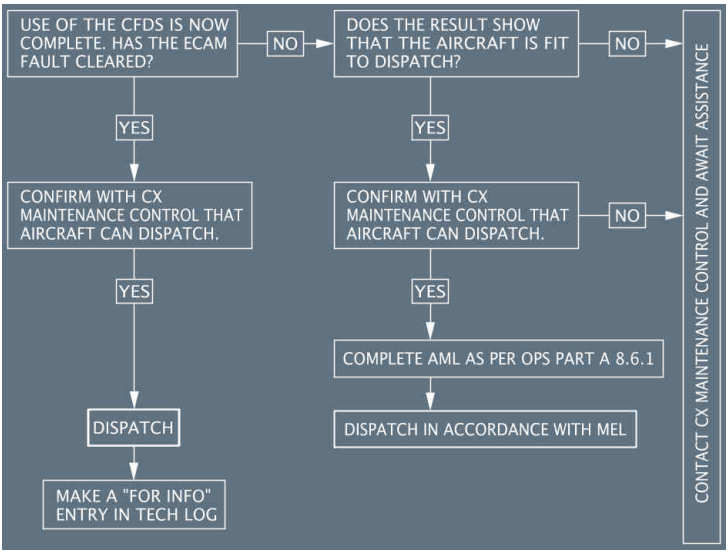
ACTIONS	RESULTS
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key	MCDU MENU page appears.

8. Close circuit breakers 7CV (121 VU R21) and 8CV (121 VU Q21).
9. Set the flap lever to position 0, the slats and flaps move to position 0.
10. On the panel 50VU, release the BLUE PUMP OVRD pb-sw (ON legend extinguished).
11. On the panel 40VU, release the YELLOW ELEC PUMP pb-sw (ON legend extinguished).
12. Check the applicable MEL limitations have been complied with then exit the procedure using the flow chart below.



7. SFCS 1 SLAP WTB SOLENOID TEST PROCEDURE

Applicable to: ALL

In the event of an ECAM warning F/CTL SLAT TIP BRK FAULT the following procedure checks the operation of the SFCS 1 slat Wing Tip Brake solenoids.

1. Energize the aircraft
2. Refer to MEL/MI-27-81-01A Slat Wing Tip Brakes Solenoid and check for any limitations that apply.

3. On the panel 50 VU, push the BLUE PUMP OVRD pb-sw (ON legend illuminated).
4. On the panel 40 VU, push the YELLOW ELEC PUMP pb-sw (ON legend illuminated).

Note: *Wait until the hydraulic pressure has stabilized before entering CFDS.*

5. Open following circuit breakers:

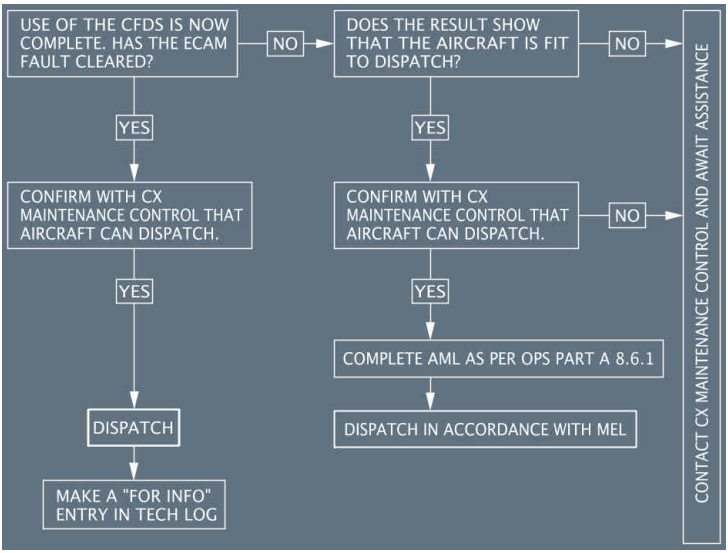
FIN	DESIGNATION	LOCATION
7CV	FLIGHT CONTROLS/SLT/CTL/SYS 2	121 VU R21
8CV	FLIGHT CONTROLS/FLP/CTL AND MONG/SYS 2	121 VU Q21

CAUTION	CHECK THE AREA AROUND THE FLAPS AND SLATS IS CLEAR OF OBSTACLES.

6. Set the flap lever to the position 3, the slats and flaps move to the position 3.
7. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key	MCDU MENU page appears.
Select CFDS line key (LSK 4L)	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select F/CTL line key (LSK 1R).	SYSTEM REPORT/TEST F/CTL page appears.
Select SFCC 1 line key (LSK 3L).	SFCC-1 page appears
Press NEXT PAGE P/B	Second SFCC-1 page appears
Select SLT TEST/RESET line key (LSK 1L).	SFCC-1 SLAT TEST/RESET page appears.
Select WTB/POB TEST line key (LSK 2L).	SFCC-1 SLAT WTB/POB TEST instructions page appears.
Select CONTINUE line key (LSK 5L)	Second SFCC-1 SLAT WTB/POB TEST instructions page appears. Note: *The page normally flashes off and on periodically.*
Select START TEST line key (LSK 5L).	SFCC-1 SLAT WTB/POB TEST IN PROGRESS message appears. 1. Check the following message is displayed within approximately 2 min, otherwise - NO DISPATCH: PERFORMED NO FAULTS Note: *If the test is unsuccessful after 3 attempts (˝CFDS TEST INVALID˝), try another test with a ground power cart connected or with the engine driven hydraulic pumps on and cranking the related engine 2.*
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key	MCDU MENU page appears.

8. Close circuit breakers 7CV (121 VU R21) and 8CV (121 VU Q21).
9. Set the flap lever to position 0, the slats and flaps move to position 0.
10. On the panel 50 VU, release the BLUE PUMP OVRD pb-sw (ON legend extinguished)
11. On the panel 40 VU, release the YELLOW ELEC PUMP pb-sw (ON legend extinguished).
12. Check the applicable MEL limitations have been complied with then exit the procedure using the flow chart below.



8. ELEVATOR AILERON COMPUTER TEST PROCEDURE

Applicable to: ALL

In the event of an ECAM warning F/CTL ELAC 1 FAULT or F/CTL ELAC 1 PITCH FAULT the following procedure is used to check systems associated with ELAC 2 and the three SECs.

Note: ELAC 1 must be fully functional for ER operations, otherwise : NO DISPATCH.

1. Energize the aircraft
2. Refer to MEL/MI-27-93-01A ELAC 1 and check the items listed under paragraphs 5), 6), 7) are operative and the requirement of paragraph 8), is complied with. The items listed under paragraphs 2), 3), 4) are covered by continuing below.
3. On the panel 23 VU, release the ELAC 1 pb (OFF legend illuminated).

4. On the panel 24 VU, check the ELAC 2 pb is pushed in (OFF and FAULT legends extinguished).
5. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select F/CTL line key (LSK 1R).	SYSTEM REPORT/TEST F/CTL page appears.
Select EFCS 1 line key (LSK 1L).	EFCS 1 page appears.
Select GROUND SCAN line key (LSK 4L).	EFCS 1 GROUND SCAN page appears with this message displayed: - START GROUND SCAN - WAIT 2 MINUTES - STOP GROUND SCAN <START GROUND SCAN STOP> <GROUND REPORT
Select START GROUND SCAN line key (LSK 4L).	The page disappears and comes up again. Note: *The same page is displayed without any complementary information about the test progress.*
Wait for 2 min minimum.	
Select GROUND SCAN STOP line key (LSK 4R).	The page disappears and comes up again.

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ACTIONS	RESULTS
Select GROUND REPORT line key (LSK 5L).	EFCS 1 GROUND REPORT page appears. 1. Check for the following messages: - ELAC2 MON OR WIRING FROM ACCLRM3 12CE3 - ELAC2 COM OR WIRING FROM ACCLRM3 12CE3 - ACCLRM3 12 CE3 - SEC2 OR WIRING FROM ACCLRM3 12CE3 - ELAC2 MON OR WIRING FROM ACCLRM4 12CE4 - ELAC2 COM OR WIRING FROM ACCLRM4 12CE4 - ACCLRM4 12CE4 - SEC2 OR WIRING FROM ACCLRM4 12CE4 - ELAC2 OR INPUT OF CAPT ROLL CTL SSTU 4CE1 - ELAC2 OR INPUT F/O ROLL CTL SSTU 4CE2 - ELAC2 OR INPUT OF CAPT PITCH CTL SSTU 4CE3 - ELAC2 OR INPUT OF F/O PITCH CTL SSTU 4CE4 - SEC1 OR INPUT OF CAPT ROLL CTL SSTU 4CE1 - SEC2 OR INPUT OF CAPT ROLL CTL SSTU 4CE1 - SEC3 OR INPUT OF CAPT ROLL CTL SSTU 4CE1 - SEC1 OR INPUT OF F/O ROLL CTL SSTU 4CE2 - SEC2 OR INPUT OF F/O ROLL CTL SSTU 4CE2 - SEC3 OR INPUT OF F/O ROLL CTL SSTU 4CE2 - SEC1 OR INPUT OF CAPT PITCH CTL SSTU 4CE3 - SEC2 OR INPUT OF CAPT PITCH CTL SSTU 4CE3 - SEC1 OR INPUT OF F/O PITCH CTL SSTU 4CE4 - SEC2 OR INPUT OF F/O PITCH CTL SSTU 4CE4 - CAPT ROLL CTL SSTU 4CE1 - F/O ROLL CTL SSTU 4CE2 - CAPT PITCH CTL SSTU 4CE3 - F/O PITCH CTL SSTU 4CE4 ● **If any of the above failure messages are present maintenance is required - NO DISPATCH.** *Note:* *The ″ELAC 1″ failure message is displayed because ELAC 1 is switched OFF.*
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key	MCDU MENU page appears.

In addition to the above test procedure, do the following:

- If the ECAM warning was F/CTL ELAC 1 FAULT, go to step 6.
- If the ECAM warning was F/CTL ELAC 1 PITCH FAULT, go to step 9.

F/CTL ELAC 1 FAULT

6. Open following circuit breakers:

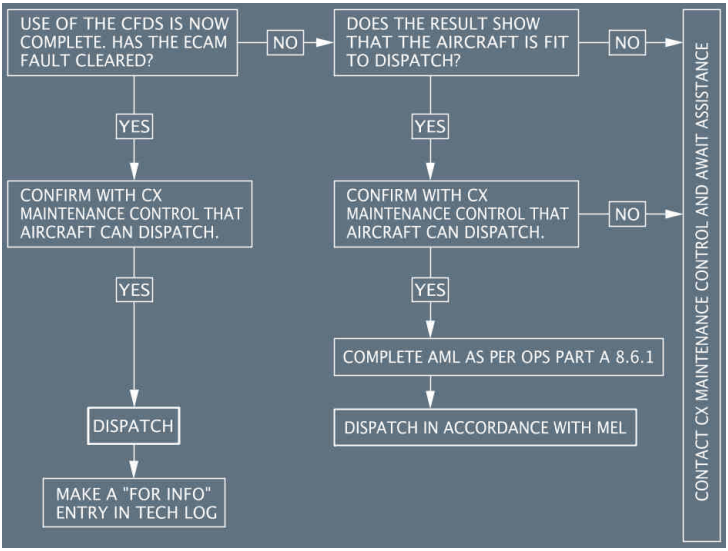
FIN	DESIGNATION	LOCATION
15 CE1	FLIGHT CONTROLS/ELAC 1/NORM/SPLY	49 VU B11
16 CE1	FLIGHT CONTROLS/ELAC 1/STBY/SPLY	105 VU AS01 (or S04)

Note: *Circuit breaker panel 105 VU is located in the avionics compartment under the cockpit floor.*

7. Dispatch the aircraft with circuit breakers 15 CE1 and 16 CE1 open and with ELAC 1 pb on the panel 23 VU released (OFF legend illuminated).
8. Go to step 18.

F/CTL ELAC 1 PITCH FAULT

9. On the panel 23 VU, release the SEC 1 pb (OFF legend illuminated).
10. On the panel 24 VU, release the SEC 2 pb and ELAC 2 pb (OFF legends illuminated).
11. On the panel 40 VU, push the YELLOW ELEC PUMP pb-sw (ON legend illuminated).
12. Select the FLAPS lever to position 0.
13. Move the THS with the handwheel out of the zero setting by at least one unit.
14. On the panel 24 VU, engage SEC 2. The THS must return to zero otherwise — NO DISPATCH.
15. On the panel 23 VU, engage SEC 1 (OFF legend extinguished).
16. On the panel 24 VU, engage ELAC 2 (OFF legend extinguished).
17. On the panel 40 VU, release the YELLOW ELEC PUMP pb-sw (ON legend extinguished).
18. Check the applicable MEL Operational Procedures have been completed then exit the procedure using the flow chart below.



9. SPOILER ELEVATOR COMPUTER TEST PROCEDURE

Applicable to: ALL

In the event of an ECAM warning F/CTL SEC 1(2) FAULT , the following procedure is used to check the sidestick transducers for both ELACs and the operative SECs.

Note: SEC 1 must be fully operational for ER operations, otherwise NO DISPATCH.

1. Energize the aircraft.
2. On the 23 VU panel, check ELAC 1 pb is pressed in (OFF legend extinguished).
3. On the 24VU panel, check ELAC 2 pb is pressed in (OFF legend extinguished).

- If the ECAM warning is F/CTL SEC 1 FAULT, go to step 4.
- If the ECAM warning is F/CTL SEC 2 FAULT, go to step 7.

SEC 1 FAULT

4. Refer to MEL/MI-27-94-01A SEC 1 and check that the items listed under paragraphs 3), 4), 5), 6), 7) are operative and that the requirements of paragraphs 9) and 11) are complied with. The items listed under paragraphs 8) and 10) are covered by applying the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU, press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select F/CTL line key (LSK 1R).	SYSTEM REPORT/TEST F/CTL page appears.
Select EFCS 1 line key (LSK 1L).	EFCS 1 page appears.
Select GROUND SCAN line key (LSK 4L).	EFCS 1 GROUND SCAN page appears with this message displayed: - START GROUND SCAN - WAIT 2 MINUTES - STOP GROUND SCAN <START GROUND SCAN STOP> <GROUND REPORT
Select START GROUND SCAN line key (LSK 4L).	The page disappears and comes up again. Note: *The same page is displayed without any complementary information about the test progress.*
Wait for a minimum of 2 min	
Select GROUND SCAN STOP line key (LSK 4R)	The page disappears and comes up again.

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ACTIONS	RESULTS
Select GROUND REPORT line key (LSK 5L).	EFCS 1 GROUND REPORT page appears. 1. Check for the following messages: - ELAC1 OR INPUT OF CAPT ROLL CTL SSTU 4CE1 - ELAC2 OR INPUT OF CAPT ROLL CTL SSTU 4CE1 - ELAC1 OR INPUT OF F/O ROLL CTL SSTU 4CE2 - ELAC2 OR INPUT OF F/O ROLL CTL SSTU 4CE2 - ELAC1 OR INPUT OF CAPT PITCH CTL SSTU 4CE3 - ELAC2 OR INPUT OF CAPT PITCH CTL SSTU 4CE3 - ELAC1 OR INPUT OF F/O PITCH CTL SSTU 4CE4 - ELAC2 OR INPUT OF F/O PITCH CTL SSTU 4CE4 - SEC2 OR INPUT OF CAPT ROLL CTL SSTU 4CE1 - SEC3 OR INPUT OF CAPT ROLL CTL SSTU 4CE1 - SEC2 OR INPUT OF F/O ROLL CTL SSTU 4CE2 - SEC3 OR INPUT OF F/O ROLL CTL SSTU 4CE2 - SEC2 OR INPUT OF CAPT PITCH CTL SSTU 4CE3 - SEC2 OR INPUT OF F/O PITCH CTL SSTU 4CE4 - CAPT ROLL CTL SSTU 4CE1 - F/O ROLL CTL SSTU 4CE2 - CAPT PITCH CTL SSTU 4CE3 - F/O PITCH CTL SSTU 4CE4 ● **If any of the above failure messages are present maintenance is required - NO DISPATCH.**
Select RETURN line (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key	MCDU MENU page appears.

5. Dispatch the aircraft with the following circuit breakers open :

FIN	DESIGNATION	LOCATION
21 CE1	FLIGHT CONTROLS/SEC 1/NORM/SPLY	49 VU B08
22 CE	FLT/CTL/SEC 1/STBY/SPLY	105 VU AS01

Note: Circuit breaker panel 105 VU is located in the avionics compartment under the cockpit floor

6. Go to step 10.

SEC 2 FAULT

7. Refer to MEL/MI-27-94-02A SEC 2 and check that the items listed under paragraphs 2), 3) and 4) are operative. The items listed under paragraphs 5) and 6) are covered by applying the following procedure.

ACTIONS	RESULTS
On the LH or RH MCDU, press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select F/CTL line key (LSK 1R).	SYSTEM REPORT/TEST F/CTL page appears.
Select EFCS 1 line key (LSK 1L).	EFCS 1 page appears.
Select GROUND SCAN line key (LSK 4L).	EFCS 1 GROUND SCAN page appears with this message displayed: - START GROUND SCAN - WAIT 2 MINUTES - STOP GROUND SCAN <START GROUND SCAN STOP> <GROUND REPORT>
Select START GROUND SCAN line key (LSK 4L).	The page disappears and comes up again. Note: *The same page is displayed without any complementary information about the test progress.*
Wait for a minimum of 2 min.	
Select GROUND SCAN STOP line key (LSK 4R).	The page disappears and comes up again.

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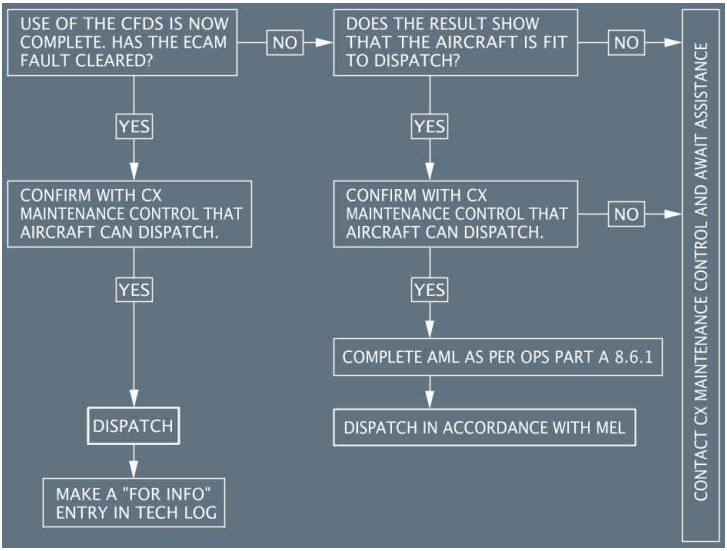
ACTIONS	RESULTS
Select GROUND REPORT line key (LSK 5L).	EFCS 1 GROUND REPORT page appears. 1. Check for the following messages: - ELAC1 OR INPUT OFCAPT ROLL CTL SSTU 4CE1 - ELAC2 OR INPUT OF CAPT ROLL CTL SSTU 4CE1 - ELAC1 OR INPUT OF F/O ROLL CTL SSTU 4CE2 - ELAC2 OR INPUT OF F/O ROLL CTL SSTU 4CE2 - ELAC1 OR INPUT OF CAPT PITCH CTL SSTU 4CE3 - ELAC2 OR INPUT OF CAPT PITCH CTL SSTU 4CE3 - LACE1 OR INPUT OF F/O PITCH CTL SSTU 4CE4 - ELAC2 OR INPUT OF F/O PITCH CTL SSTU 4CE4 - SEC1 OR INPUT OF CAPT ROLL CTL SSTU 4CE1 - SEC3 OR INPUT OF CAPT ROLL CTL SSTU 4CE1 - SEC1 OR INPUT OF F/O ROLL CTL SSTU 4CE2 - SEC3 OR INPUT OF F/O ROLL CTL SSTU 4CE2 - SEC1 OR INPUT OF CAPT PITCH CTL SSTU 4CE3 - SEC1 OR INPUT OF F/O PITCH CTL SSTU 4CE4 - CAPT ROLL CTL SSTU 4CE1 - F/O ROLL CTL SSTU 4CE2 - CAPT PITCH CTL SSTU 4CE3 - F/O PITCH CTL SSTU 4CE4 ● **If any of the above failure messages are present maintenance is required - NO DISPATCH.**
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key	MCDU MENU page appears.

8. Dispatch the aircraft with the following circuit breaker open:

FIN	DESIGNATION	LOCATION
21 CE2	FLIGHT CONTROLS/SEC 2/SPLY	121 VU Q18

9. Go to step 10.
10. Check the applicable MEL Operational Procedures have been complied with then exit the procedure using the flow chart below.



10. PROBE HEAT COMPUTER HEATING TEST

Applicable to: ALL

In the event of an ECAM warning ANTI ICE CAPT (F/O) (STBY) PROBES the first part of the following procedure is used to check the pitots are heated. (It should be noted that the Probe Heat Computers are designed so that if they fail, they do so in the on position). The second part of the procedure is used to check the operation of the Probe Heat Computers.

1. Energize the aircraft.
2. Check the following circuit breakers are closed:

FIN	DESIGNATION	LOCATION
4 DA1	ANTI ICE/PROBES/AOA/1	49 VU D04
2 DA1	ANTI ICE/PROBES/PHC/1	49 VU D03
3 DA1	ANTI ICE/PROBES/PITOT/1	49 VU D02
3 DA3	ANTI ICE/PROBES/PHC/3	122 VU Y16
1 DA2	ANTI ICE/PROBES/2/TAT	122 VU Y15
3 DA2	ANTI ICE/PROBES/2/PITOT	122 VU Y14
4 DA2	ANTI ICE/PROBES/2/AOA	122 VU Y13
2 DA2	ANTI ICE/PROBES/2/PHC	122 VU Y12
5 DA2	ANTI ICE/PROBES/2/STATIC	122 VU Y11
3 DA3	ANTI ICE/PROBES/3/PITOT	122 VU Z16

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FIN	DESIGNATION	LOCATION
4 DA3	ANTI ICE/PROBES/3/AOA	122 VU Z15
5 DA3	ANTI ICE/PROBES/3/STATIC	122 VU Z14
5 DA1	ANTI ICE/PROBES/1/STATIC	122 VU Z13
1 DA1	ANTI ICE/PROBES/1/TAT	122 VU Z12

Note: C/B could be tripped due to shorted probe

PITOT HEATING CHECK

3. On the panel 25 VU, select the PROBE/WINDOW/HEAT/AUTO/ON pb ON (ON legend illuminated).
4. Outside the aircraft check all three pitots are heated by placing a hand close to them:

CAUTION	Do not physically touch hot probe by hand.

- If all three are heated the aircraft may be dispatched as is.
  - On the panel 25 VU, release the PROBE/WINDOW HEAT pb (on legend extinguished)
  - Go to step 12 (See step 12).
- If one pitot is unheated and the ECAM warning is ANTI ICE CAPT PROBES - NO DISPATCH
- If one pitot is unheated and the ECAM warning is ANTI ICE F/O PROBES go to step 5 (See step 5).
- If one pitot is unheated and the ECAM warning is ANTI ICE STBY PROBES go to step 9 (See step 9).

F/O PROBES HEAT INOPERATIVE

5. On the panel 25 VU, release the PROBE/WINDOW HEAT pb (ON legend extinguished)
6. Select ADIRS 1, 2, 3, to the NAV position.
7. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU MENU key	MCDU MENU page appears
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select ICE and RAIN line key (LSK 3R).	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC line key (LSK 3L).	PHC 1 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 3 line key (LSK 5L).	PHC 3 page appears.

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ACTIONS	RESULTS
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

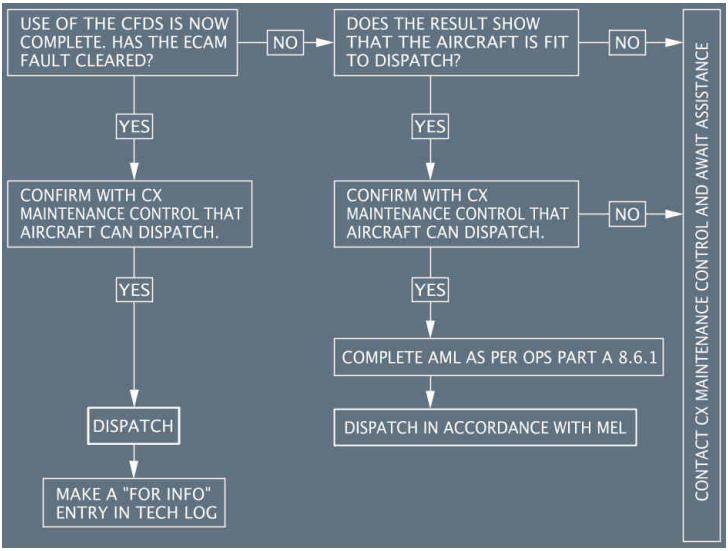
8. Go to step 12 (See step 12).

STBY PROBES HEAT INOPERATIVE

9. On the panel 25 VU, release the PROBE/WINDOW HEAT pb (ON legend extinguished)
10. Select ADIRS 1, 2, 3, to the NAV position.
11. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select ICE and RAIN line key (LSK 3R).	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 1 line key (LSK 3L).	PHC 1 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 2 line key (LSK 4L).	PHC 2 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

12. *Refer to MEL/MI-30-31 Probe Heat Computer (PHC)* and check the applicable Operational Procedures and limitations have been complied with then exit the procedure using the flow chart below.



11. PITOT HEATER - TEST OF TWO OPERATIVE PROBE HEAT SYSTEMS

Applicable to: ALL

In the event of an ECAM warning ANTI ICE CAPT (F/O) (STBY) PITOT the following procedure is used to check the two Probe Heat Computers associated with the two operative pitots.

1. Energize the aircraft.
2. Check the following circuit breakers are closed:

FIN	DESIGNATION	LOCATION
4 DA1	ANTI ICE/PROBES/AOA/1	49 VU D04
2 DA1	ANTI ICE/PROBES/PHC/1	49 VU D03
3 DA1	ANTI ICE/PROBES/PITOT/1	49 VU D02
2 DA3	ANTI ICE/PROBES/PHC/3	122 VU Y16
1 DA2	ANTI ICE/PROBES/2/TAT	122 VU Y15
3 DA2	ANTI ICE/PROBES/2/PITOT	122 VU Y14
4 DA2	ANTI ICE/PROBES/2/AOA	122 VU Y13
2 DA2	ANTI ICE/PROBES/2/PHC	122 VU Y12
5 DA2	ANTI ICE/PROBES/2/STATIC	122 VU Y11
3 DA3	ANTI ICE/PROBES/3/PITOT	122 VU Z16
4 DA3	ANTI ICE/PROBES/3/AOA	122 VU Z15
5 DA3	ANTI ICE/PROBES/3/STATIC	122 VU Z14
5 DA1	ANTI ICE/PROBES/1/STATIC	122 VU Z13
1 DA1	ANTI ICE/PROBES/1/TAT	122 VU Z12

Note: C/B could be tripped due to shorted probe.

3. On the panel 25 VU, ensure the PROBE/WINDOW HEAT pb is released (ON legend extinguished)
4. Selected ADIRS 1, 2, 3 to the NAV position.

- If the ECAM warning is ANTI ICE CAPT PITOT go to step 5.
- If the ECAM warning is ANTI ICE F/O PITOT go to step 7.
- If the ECAM warning is ANTI ICE STBY PITOT go to step 9.

CAPTAIN'S PITOT HEAT INOPERATIVE

5. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select ICE and RAIN line key (LSK 3R).	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 2 line key (LSK 4L).	PHC 2 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 3 line key (LSK 5L).	PHC 3 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

6. Go to step 10.

F/O PITOT HEAT INOPERATIVE

7. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select ICE and RAIN line key (LSK 3R).	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 1 line key (LSK 3L).	PHC 1 page appears.

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ACTIONS	RESULTS
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 3 line key (LSK 5L).	PHC 3 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

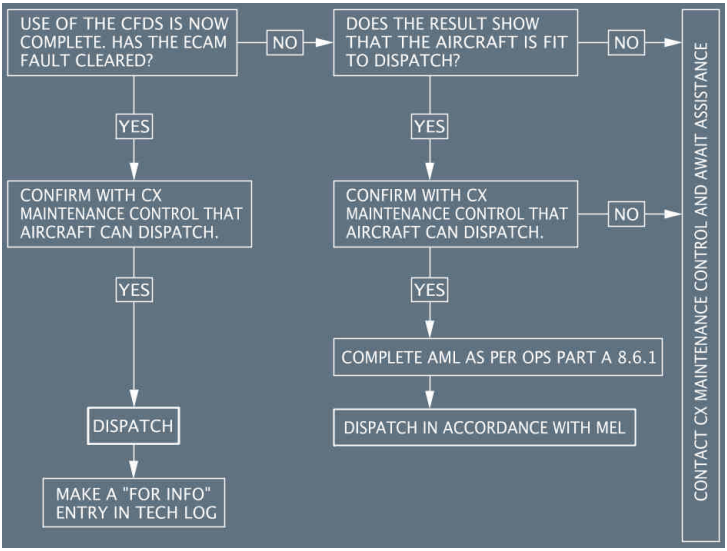
8. Go to step 10.

STBY PITOT HEAT INOPERATIVE

9. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select ICE and RAIN line key (LSK 3R).	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 1 line key (LSK 3L).	PHC 1 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 2 line key (LSK 4L).	PHC 2 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

10. Refer to MEL/MI-30-31-02 Pitot Heater and check the applicable Operational Procedures and limitations have been complied with then exit the procedure using the flow chart below.



12. STATIC PORT HEATER - TEST OF TWO OPERATIVE PROBE HEAT SYSTEMS

Applicable to: ALL

In the event of an ECAM warning ANTI ICE CAPT L (R) STAT, ANTI ICE F/O L (R) STAT, ANTI ICE STBY L (R) STAT the following is used to check the two Probe Heat Computers associated with the operative static port heaters.

1. Energize the aircraft.
2. Check the following circuit breakers are closed :

FIN	DESIGNATION	LOCATION
4 DA1	ANTI ICE/PROBES/AOA/1	49 VU D04
2 DA1	ANTI ICE/PROBES/PHC/1	49 VU D03
3 DA1	ANTI ICE/PROBES/PITOT/1	49 VU D02
3 DA3	ANTI ICE/PROBES/PHC/3	122 VU Y16
1 DA2	ANTI ICE/PROBES/2/TAT	122 VU Y15
3 DA2	ANTI ICE/PROBES/2/PITOT	122 VU Y14
4 DA2	ANTI ICE/PROBES/2/AOA	122 VU Y13
2 DA2	ANTI ICE/PROBES/2/PHC	122 VU Y12
5 DA2	ANTI ICE/PROBES/2/STATIC	122 VU Y11
3 DA3	ANTI ICE/PROBES/3/PITOT	122 VU Z16
4 DA3	ANTI ICE/PROBES/3/AOA	122 VU Z15
5 DA3	ANTI ICE/PROBES/3/STATIC	122 VU Z14

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FIN	DESIGNATION	LOCATION
5 DA1	ANTI ICE/PROBES/1/STATIC	122 VU Z13
1 DA1	ANTI ICE/PROBES/1/TAT	122 VU Z12

3. If the ECAM warning is ANTI ICE STBY L STAT or it is ANTI ICE STBY R STAT (in other words only one of the two standby static port heaters is inoperative) then there is no need to check the Probe Heat Computers and the aircraft may be dispatched as is, go to step 11. Otherwise continue below.
4. On the panel 25 VU, ensure the PROBE/WINDOW HEAT pb is released (ON legend extinguished).
5. Select ADIRS 1, 2, 3 to the NAV position.

- If the ECAM warning is ANTI ICE CAPT L STAT and/or it is ANTI ICE CAPT R STAT (in other words one or both Captain's static port heaters inoperative) then go to step 6.
- If the ECAM warning is ANTI ICE F/O L STAT and/or it is ANTI ICE F/O R STAT (in other words one or both F/O's static port heaters inoperative) then go to step 8.
- If the ECAM warning is ANTI ICE STBY L R STAT (in other words both STBY static port heaters inoperative) then go to step 10.

CAPTAIN'S STATIC PORT HEAT INOPERATIVE

6. Do the following procedure :

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select ICE and RAIN line key (LSK 3R).	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 2 line key (LSK 4L).	PHC 2 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 3 line key (LSK 5L).	PHC 3 page appears.
Select TEST line key (LSK 2L)	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

7. Go to step 11.

F/O'S STATIC PORT HEAT INOPERATIVE

8. Do the following procedure :

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select ICE and RAIN line key (LSK 3R).	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 1 line key (LSK 3L).	PHC 1 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 3 line key (LSK 5L).	PHC 3 page appears.
Select TEST line key (LSK 2L)	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

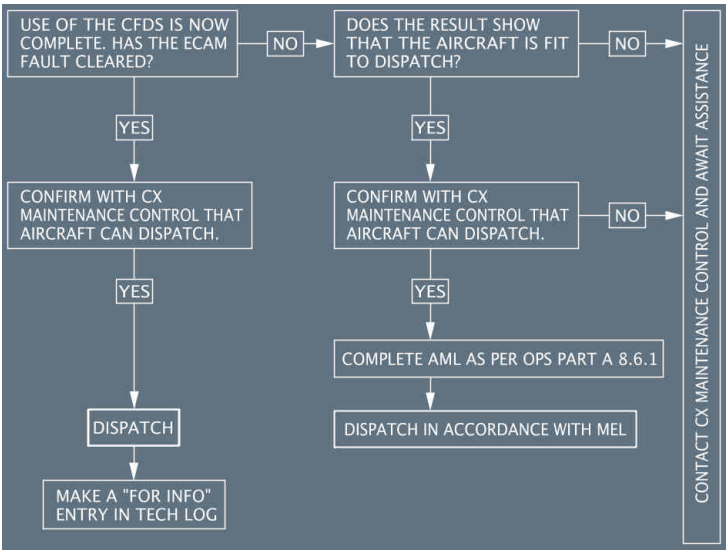
9. Go to step 11.

STBY STATIC PORT HEAT INOPERATIVE

10. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select ICE and RAIN line key (LSK 3R).	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 1 line key (LSK 3L).	PHC 1 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 2 line key (LSK 4L).	PHC 2 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

11. Refer to MEL/MI-30-31-03 Static Ports Heater and check the applicable Operational Procedures and limitations have been complied with then exit the procedure using the flow chart below.



13. AOA PROBE HEATER - TEST OF TWO OPERATIVE PROBE HEAT SYSTEMS

Applicable to: ALL

In the event of an ECAM warning ANTI ICE CAPT (F/O) (STBY) AOA the following procedure is used to check the two Probe Heat Computers associated with the two operative AOAs.

1. Energize the aircraft
2. Check the following circuit breakers are closed:

FIN	DESIGNATION	LOCATION
4 DA1	ANTI ICE/PROBES/AOA/1	49 VU D04
2 DA1	ANTI ICE/PROBES/PHC/1	49 VU D03
3 DA1	ANTI ICE/PROBES/PITOT/1	49 VU D02
3 DA3	ANTI ICE/PROBES/PHC/3	122 VU Y16
1 DA2	ANTI ICE/PROBES/2/TAT	122 VU Y15
3 DA2	ANTI ICE/PROBES/2/PITOT	122 VU Y14
4 DA2	ANTI ICE/PROBES/2/AOA	122 VU Y13
2 DA2	ANTI ICE/PROBES/2/PHC	122 VU Y12
5 DA2	ANTI ICE/PROBES/2/STATIC	122 VU Y11

Continued on the following page

Continued from the previous page

FIN	DESIGNATION	LOCATION
3 DA3	ANTI ICE/PROBES/3/PITOT	122 VU Z16
4 DA3	ANTI ICE/PROBES/3/AOA	122 VU Z15
5 DA3	ANTI ICE/PROBES/3/STATIC	122 VU Z14
5 DA1	ANTI ICE/PROBES/1/STATIC	122 VU Z13
1 DA1	ANTI ICE/PROBES/1/TAT	122 VU Z12

Note: C/B could be tripped due to shorted probe.

3. On the panel 25 VU, ensure the PROBE/WINDOW HEAT pb is released (ON legend extinguished).
4. Select the ADIRS 1, 2, 3 to the NAV position.

- If the ECAM warning is ANTI ICE CAPT AOA go to step 5.
- If the ECAM warning is ANTI ICE F/O AOA go to step 7.
- If the ECAM warning is ANTI ICE STBY AOA go to step 9.

CAPTAIN'S AOA HEAT INOPERATIVE

5. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select ICE and RAIN line key (LSK 3R).	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 2 line key (LSK 4L).	PHC 2 page appears.
Select TEST line key (LSK 2L).	"TEST WAIT" message appears first. After a few seconds "TEST OK" message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 3 line key (LSK 5L).	PHC 3 page appears.
Select TEST line key (LSK 2L).	"TEST WAIT" message appears first. After a few seconds "TEST OK" message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

6. Go to step 10.

F/O'S AOA HEAT INOPERATIVE

7. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select ICE and RAIN line key (LSK 3R).	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 1 line key (LSK 3L).	PHC 1 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 3 line key (LSK 5L).	PHC 3 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

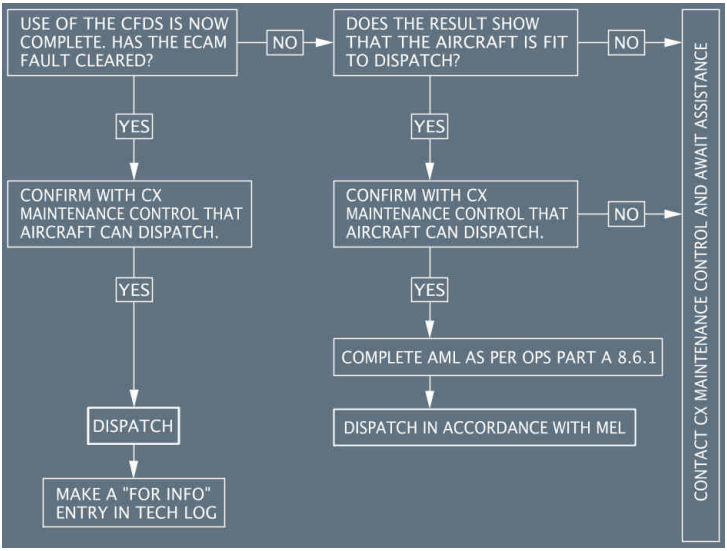
8. Go to step 10.

STBY AOA HEAT INOPERATIVE

9. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select ICE and RAIN line key (LSK 3R).	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 1 line key (LSK 3L).	PHC 1 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) twice.	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select PHC 2 line key (LSK 4L).	PHC 2 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

10. Refer to MEL/MI-30-31-04 Angle of Attack (AOA) Probes Heating and check the applicable limitations have been complied with then exit the procedure using the flow chart below.



14. WINDOW HEAT COMPUTER - TEST OF THE OPERATIVE WINDOW HEAT SYSTEMS

Applicable to: ALL

In the event of a Window Heat Computer failure (ECAM warnings ANTI ICE L WINDOW and ANTI ICE L WINDSHIELD both displayed together or ECAM warnings ANTI ICE R WINDOW and ANTI ICE R WINDSHIELD both displayed together) the following procedure is used to check the remaining operative Window Heat Computer.

1. Energize the aircraft
2. Check the following circuit breakers are closed:

FIN	DESIGNATION	LOCATION
4 DG2	ANTI ICE/WINDOWS/R	122 VU W14
5 DG2	ANTI ICE/WHC/2	122 VU W13
4 DG1	ANTI ICE/WINDOW/L	122 VU X14
5 DG1	ANTI ICE/WHC/1	122 VU X13
1 DG1	ANTI ICE/L/WSHLD	123 VU AF10
1 DG2	ANTI ICE/R/WSHLD	123 VU AF03

3. On the panel 25 VU, ensure the PROBE/WINDOW HEAT pb is released (ON legend extinguished).

- If the ECAM warning is ANTI ICE L WINDOW and ANTI ICE L WINDSHIELD go to step 4 (See step 4).
- If the ECAM warning is ANTI ICE R WINDOW and ANTI ICE R WINDSHIELD go to step 6 (See step 6).

LEFT HAND SIDE WINDOW AND WINDSHIELD HEAT INOPERATIVE

4. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select ICE and RAIN line key (LSK 3R).	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select WHC 2 line key (LSK 2L).	WHC 2 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

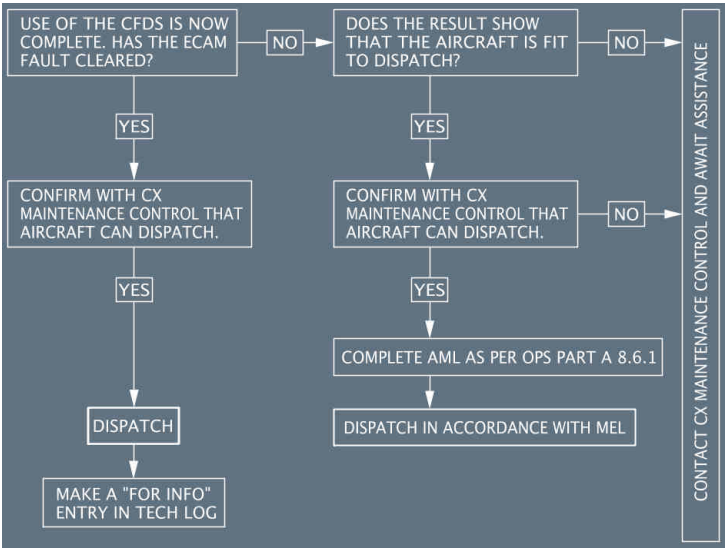
5. Go to step 7 (See step 7).

RIGHT HAND SIDE WINDOW AND WINDSHIELD HEAT INOPERATIVE

6. Do the following procedure:

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select ICE and RAIN line key (LSK 3R).	SYSTEM REPORT/TEST ICE and RAIN page appears.
Select WHC 1 line key (LSK 1L).	WHC 1 page appears.
Select TEST line key (LSK 2L).	″TEST WAIT″ message appears first. After a few seconds ″TEST OK″ message must appear otherwise - NO DISPATCH.
Select RETURN line key (LSK 6L) until CFDS main menu appears.	CFDS main menu page appears.
Press MCDU MENU key.	MCDU MENU page appears.

7. *Refer to MEL/MI-30-42 Window Heat Computer* and check the limitations in paragraph a) are complied with then exit the procedure using the flow chart below.



15. TEST OF THE GEAR NOT DOWN ECAM WARNING

Applicable to: ALL

If the red down arrow light on the landing gear selector panel is inoperative, the following procedure is used to check the L/G GEAR NOT DOWN ECAM warning.

CAUTION	As a safety precaution, make sure that the ground safety locks are on the landing gear.

1. Energize the aircraft electrical circuits.
2. On the ECAM select the WHEEL SD page.
3. Select ON the YELLOW ELEC PUMP pb-sw

Note: PTU may be selected OFF to avoid pressurization of the green hydraulic system.

CAUTION	Check area around the flaps.

4. Select FLAP 3 or FULL.
5. Open the following C/B:

FIN	DESIGNATION	LOCATION
2 GA	HYDRAULIC/LGCIU/SYS 2	121 VU Q35
1DA1	ANTI ICE/PROBES/1/TAT	122 VU Z12

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FIN	DESIGNATION	LOCATION
1DA2	ANTI ICE/PROBES/2/TAT	122 VU Y15
3DA1	ANTI ICE/PROBES/PITOT/1	49 VU D02
3DA2	ANTI ICE/PROBES/2/PITOT	122 VU Y14
3DA3	ANTI ICE/PROBES/3/PITOT	122 VU Z16
4DA1	ANTI ICE/PROBES/AOA/1	49 VU D04
4D2A	ANTI ICE/PROBES/2/AOA	122 VU Y13
4DA3	ANTI ICE/PROBES/3/AOA	122 VU Z15
5DA1	ANTI ICE/PROBES/1/STATIC	122 VU Z13
5DA2	ANTI ICE/PROBES/2/STATIC	122 VU Y11
5DA3	ANTI ICE/PROBES/3/STATIC	122 VU Z14

6. Make sure that ENG 1 MASTER sw and ENG 2 MASTER sw are in the OFF position.
7. On the panel 50 VU, select ON the ENG 1 FADEC GND PWR pb-sw and ENG 2 FADEC GND PWR pb-sw.
8. On the center pedestal, put the thrust levers in the IDLE position.
9. Do the following test.

ACTIONS	RESULTS
On the LH or RH MCDU press MCDU MENU key.	MCDU MENU page appears.
Select CFDS line key (LSK 4L).	CFDS main menu page appears.
Select SYSTEM REPORT/TEST line key (LSK 5L).	SYSTEM REPORT/TEST page appears.
Select L/G line key (LSK 5R).	SYSTEM REPORT/TEST L/G page appears.
Select LGCIU 1 line key (LSK 1L)	LGCIU 1 menu page appears.
Select NEXT PAGE P/B	LGCIU 1 Page 2 menu appears
Select LANDING GEAR SIMULATION line key (LSK 1L)	LANDING GEAR SIMULATION page appears.
Select NOSE + LH + RH line key (LSK 5L)	NOSE + LH + RH page menu appears.
Select UPLOCKED line key (LSK 4L)	the UPLOCKED '<' goes off.
	On the ECAM lower DU : the WHEEL SD page shows the wheels in the UP position and L/G CTL in amber *Note:* *The amber crosses will stay on screen because the N° 2 LGCIU circuit breaker is open.* On 402 VU: the UNLK (red) indicator lights show.
	On the ECAM upper DU : the L/G GEAR NOT DOWN display comes into view and after 30 s, L/G GEAR NOT DOWNLOCKED appears.
	On the panels 130 VU and 131 VU : the MASTER WARN lights flash you can hear the warning chime.
On the ECAM CP: Depress the EMER CANC pb	The warning chime stops.
	On the panels 130 VU and 131 VU : the MASTER WARN lights go off.
	On 402VU: the UNLK (red) indicator lights stay on.

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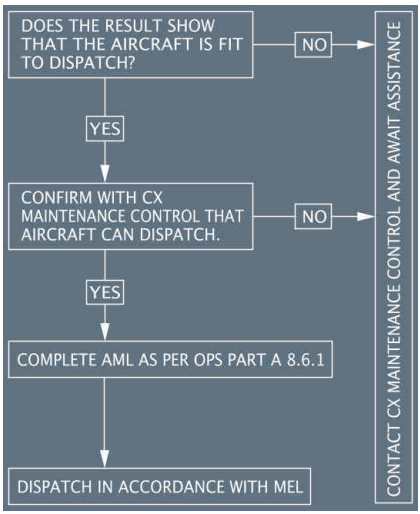
ACTIONS	RESULTS
On the MCDU: Select DOWNLOCKED line key (LSK 3L)	On the ECAM upper DU : the L/G GEAR NOT DOWN and L/G GEAR NOT DOWNLOCKED display goes out of view. The UNLK (red) indicator lights go out and the LKD (green) indicator lights come on.
	On the ECAM lower DU: the WHEEL SD page shows the wheels in the DOWN position. *Note:* *The amber crosses will stay on screen because the N°2 LGCIU circuit breaker is open.*
Select RETURN line key (LSK 6L) until the CFDS menu page shows	CFDS main menu page appears.
Press the MCDU MENU line key	MCDU MENU appears.

10. Close C/B 2GA, 1DA1, 1DA2, 3DA1, 3DA2, 3DA3, 4DA1, 4DA2, 4DA3, 5DA1, 5DA2 and 5DA3
11. Set the flap lever to position 0, the slats and flaps move to position 0.
12. On the panel 40 VU, release the YELLOW ELEC PUMP pb-sw (ON legend extinguish).
13. On the panel 50 VU, release the ENG FADEC GND PWR pb-sw (ON legend extinguishes).
14. There are no applicable MEL Operational Procedures or limitations. Exit the procedure using the flow chart below.



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ATSU INITIALIZATION

Applicable to: ALL

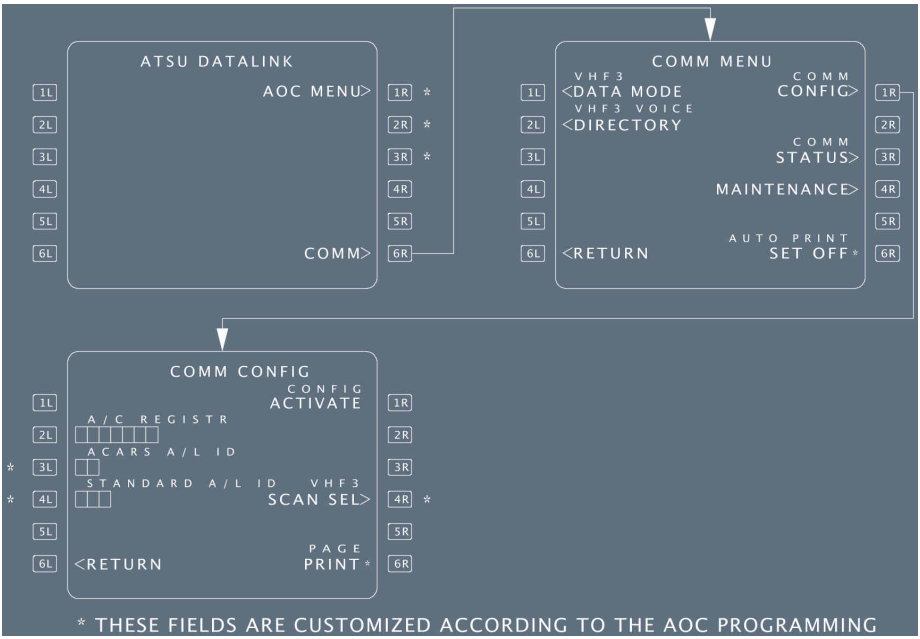
ATSU is automatically initialized, provided a list of Service Providers has been scanned, and provided the following three parameters have been received and validated by the ATSU:

- Aircraft Registration Number (ARN)
- ACARS Airline Identity code (ACARS A/L ID).
- Standard Airline Identity code (STANDARD A/L ID)

If one of the above four conditions is not fulfilled, then ATSU is not available :

- The ECAM displays ATSU FAULT,
  and
- The MCDU scratchpad displays a message to request flight crew action.

A manual entry of the missing parameter followed by its activation, reinitializes the ATSU, and clears the ECAM and MCDU message.



■ **If ARN is not valid:**

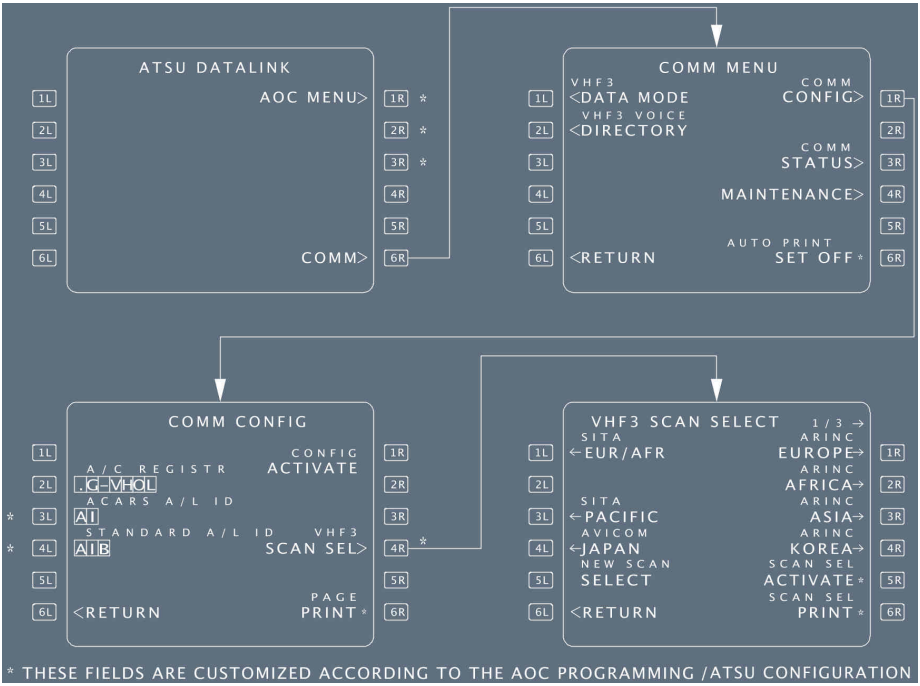
The MCDU scratchpad displays the “ENTER A/C REGISTER”message. After clearing the scratchpad, the crew writes the ARN on the scratchpad. Pressing the 2L key on the COMM

CONFIG SD page enters the ARN in the 2L field. The flight crew has to press the 1R key to activate it.

- **If the A/L ID is not valid:**
  The MCDU scratchpad displays the “ENTER A/L IDENT”message. After clearing the scratchpad, enter the two-letter A/L ID code on the scratchpad. Press the 3L key to enter the A/L ID code in the 3L field. Repeat the same operation for the three-letter A/L ID code, by using the 4L key instead of the 3L key. The flight crew has to press the 1R key to activate it.

- **If the VHF3 SCAN SELECT menu can be accessed, and if no VHF Service Providers have been selected:**
  The MCDU scratchpad displays the “ENTER VHF3 SCAN SELECT” message.
  On the VHF3 SCAN SELECT SD page, select a Service Providers' list, in the airline priority order, and activate the VHF SCAN SELECT function.

  Example : To select Service Providers SITA 725 and ARINC:
  1. Press the 5L key: The star next to SELECT indication disappears, then reappears.
  2. Press the 1L key to select SITA 725: The SELECT indication goes off, and the priority number of selection # 1 appears.
  3. Press the 1R key to select ARINC: The SELECT indication goes off, and the priority number of selection # 2 appears.
  4. Press the 5R key to activate the VHF SCAN SELECT function: The star next to the SCAN SELECT ACTIVATE indication disappears, then reappears.



Note: *Modification of the SCAN SELECT setting may result in the loss of air-ground VHF datalink communication and also in the increase of Datalink Service Providers charges. Therefore, the SCAN SELECT setting should not be modified by the flight crew, unless they have been instructed to do so.*

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ACARS PROCEDURES

Applicable to: ALL

1

GENERAL

All Dragonair aircraft are equipped with functional and operational ACARS systems.
An ACARS interactive training presentation is available on Dragonet. (Refer to Flight Crew Team-Training-Best Practice).

ACARS ACROYNMS

ACARS	:	Aircraft Communicating, Addressing and Reporting System
AGM	:	Air Ground Message
AIDS	:	Aircraft Integrated Data System
AOC	:	Airline Operational Control
ARINC	:	Aeronautical Radio Inc
ARN	:	Aircraft Registration Number
ATSU	:	Air Traffic Services Unit
DATIS	:	Digital ATIS
DSP	:	Datalink Service Provider
MU	:	Management Unit. A computer utilised to generate and route digital data to/from various aircraft avionics systems and a ground network
OOOI	:	OUT (Off Blocks), OFF (Takeoff), ON (Landing) and IN (On Blocks)
PDC	:	Pre-Departure Airways Clearance
SITA	:	System International Telecommunication Association

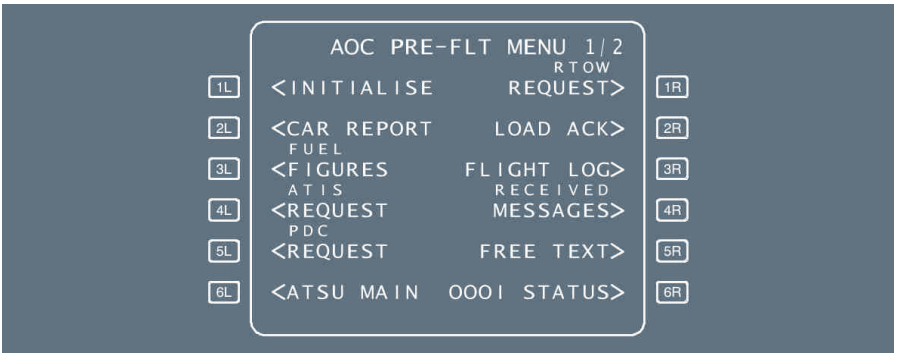
DRAGONAIR AOC MENU PAGES

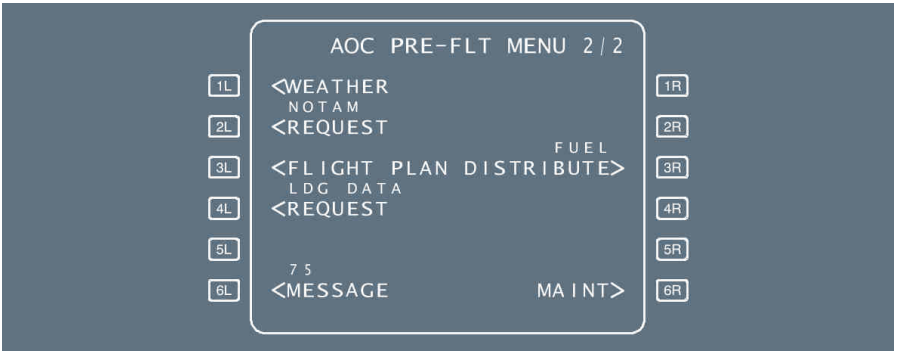
Applicable to: ALL

2

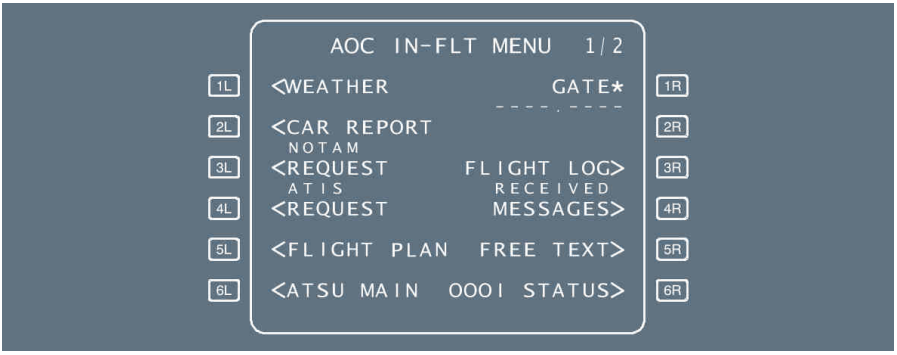
Below are illustrations of AOC menu screens as seen in the aircraft MCDU.

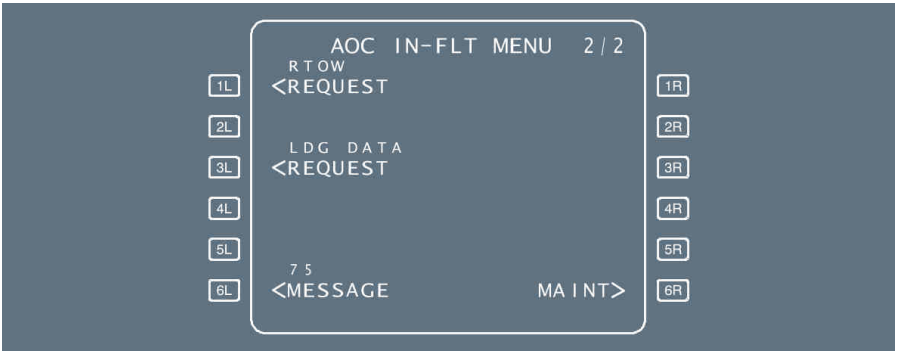
ACARS PRE-FLT MENU SCREEN



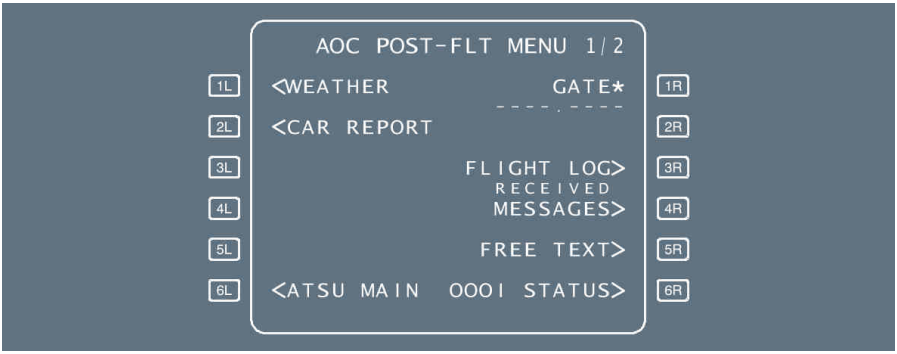


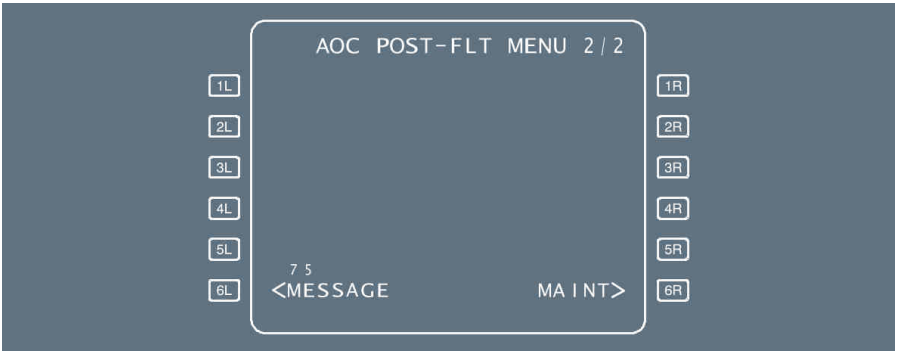
ACARS IN-FLT MENU SCREEN





ACARS POST-FLT MENU SCREEN





AOC APPLICATIONS SUMMARY

Applicable to: ALL

3

INITIALISE

Allows the synchronisation of airframe registration (tail number), flight number, and flight crew. Enables flight details to be uplinked from various company applications.

CAR REPORT

Commander's Administrative Report. During flight used to insert data such as, takeoff & landing ERN, autoland, and ETOPS. This information is then printed at the end of the flight.

FUEL FIGURES

Summary of fuel figures, used as the basis for loadsheet compilation. Part A chapter 8 refers.

ATIS REQUEST

Digital ATIS for departure and arrival at airports equipped with D-ATIS.

PDC REQUEST

Sends a request to the specified ATC unit to receive a pre-departure clearance.

RTOW REQUEST

Sends a request for ACARS RTOW takeoff performance data.

LDG DATA REQUEST

Sends a request for ACARS LANDING landing performance data.

LOAD ACK

Load acknowledgement. Part A chapter 8 refers.

FLIGHT LOG

Shows real time, off blocks, airborne, landing & on blocks times. During flight OUT, OFF and elapsed times are displayed.

RECEIVED MESSAGES

Used to view messages received by the aircraft. Some are automatically printed. Others can be read and printed if desired.

FREE TEXT

Used to send air-ground messages stations that are programmed to receive messages from the aircraft.

OOOI STATUS

Out, Off, On, In times. Shows details when specific events occurred, such as doors closed.

WEATHER

Provides flight crew access to actual and forecast weather information to over 4000 stations worldwide.

NOTAM REQUEST

Not implemented.

FLIGHT PLAN

Allows for three types of CFP to be requested.

75 MESSAGE

Hijack alert. When sent this downlink message will alert IOC that a Hijack situation is occurring. Part A chapter 10 refers.

MAINT

Not for crew use.

GATE*

Not implemented.

FUEL DISTRIBUTE

Allows individual tank quantities to be sent to CLC for loadsheet preparation in the event of a non-standard fuel distribution. In this case the normal FUEL FIGURES page should not be used. Part A chapter 8 refers.

ACARS SYSTEMS AND AIRCRAFT EQUIPMENT

Applicable to: ALL

4

ACARS messages are transmitted from the aircraft by VHF radio (or SATCOM ◁✻) to ground stations provided by Datalink Service Providers such as ARINC and SITA. Messages are then routed to Dragonair via a Telex Network.
Two-way communication between aircraft and airline is available within the entire Dragonair network. Messages are stored electronically for a period of 12 months.

5

ACARS SYSTEMS

ATSU : The ATSU is an integrated communications system which includes the Airline Operational Control (AOC) as well as the facility for communication with Air Traffic Control (DCDU ◁). *Refer to FCOM DSC-46 Information Systems*.

6

EQUIPMENT

ACARS aircraft equipment includes, ECAM, MCDU, RMP, and Printer. Overall control of the equipment is provided by the Air Traffic Service Unit (ATSU).

ECAM : Provides operational status of the ACARS system and message alerts. Refer to PRO-ABN.

MCDU : The primary interface with ACARS is the MCDU display unit. It is used to select and navigate the ACARS/AOC menu screens.

RMP : RMP3 (where fitted) is primarily intended for ACARS use. ACARS should be in the active window. If ACARS is in the standby window, complete voice communication and press transfer switch.

AIRCRAFT PRINTER : ACARS uses the aircraft printer, located on the central pedestal, to print hard copy uplink messages, weather information, and reports.

OPERATING INSTRUCTIONS

Applicable to: ALL

7

Initialisation and use of ACARS is an operational requirement. *Refer to FCOM PRO-NOR-SOP*.

8

DSP FREQUENCIES

The Data Service Provider (DSP) frequencies are listed below and must not be modified by crew. If any other DSP is observed then a Maintenance Log Entry should be made for Engineering to reactivate the VHF3 SCAN MASK.

ARINCASIA	131.450
AVICOM JAPAN	131.450
ARINC KOREA	131.725
ARINC INDIA	131.825
SITA EUR/AFR	131.725

9

It is acceptable to manually tune DSPs from the table above, e.g. due to loss of auto-tuning, provided that DSP selection is returned to "AUTO" when the selected DSP is no longer required.
To carry out a full Downlink/Uplink test of the system (normally only required when system operation suspect), type “TEST” on the first line of a FREE TEXT page and press SEND. A successful response proves the integrity of the ACARS system.

10

OOOI TIMES

If Block and Flight times are required, they are available on the FLIGHT LOG prompt in the ACARS menu screen.

11

TRANSIT PROCEDURES

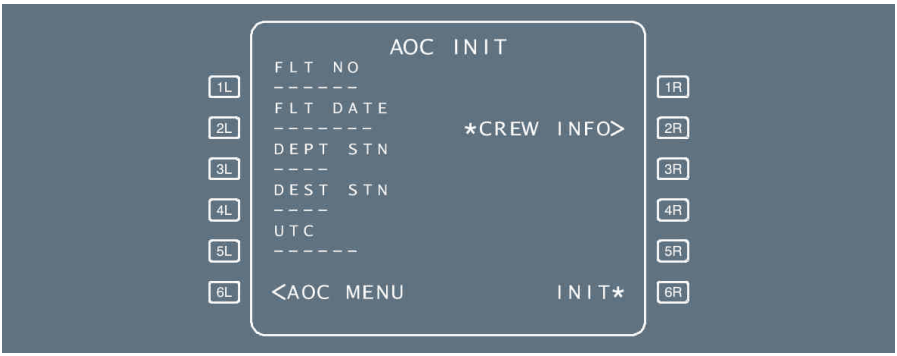
During transits, allow at least 10 min after the "On Block" time of the previous sector before entering the next sector details into the FMGC Init page. This is to avoid corruption of the previous Sector Summary, which automatically downlinks at ATA +10 min. The INITIALISE prompt will appear after the downlink is complete.

COMMANDER’S ADMINISTRATIVE REPORT

Applicable to: ALL

12

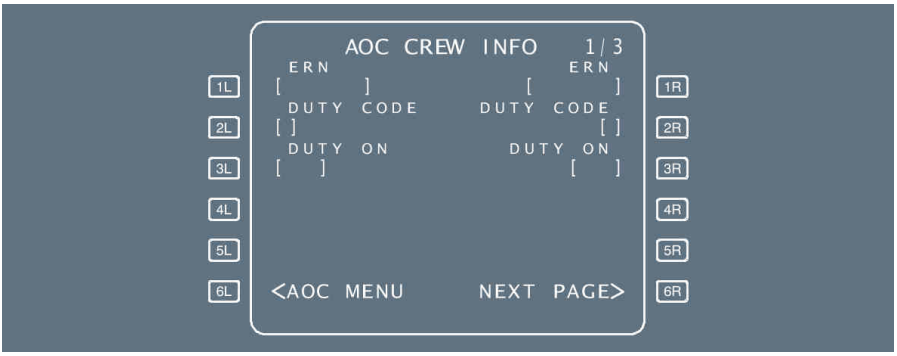
AOC INIT PAGE



Press "INIT" (6R) to trigger the flight data and crew data uplink. When uplink is completed, an asterisk (*) will appear next to "CREW INFO" (2R). Data on the left column of the screen is retrieved automatically from the FM.

13

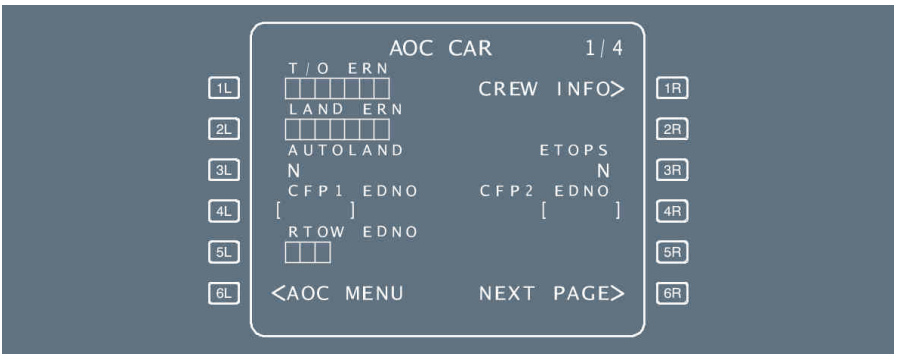
AOC CREW INFO PAGE



1. Data on this page is retrieved from the Crew Control System, or entered by crew.
2. Should extended ground duties occur after the “IN” event, then include details on the CAR Comment Page.

14

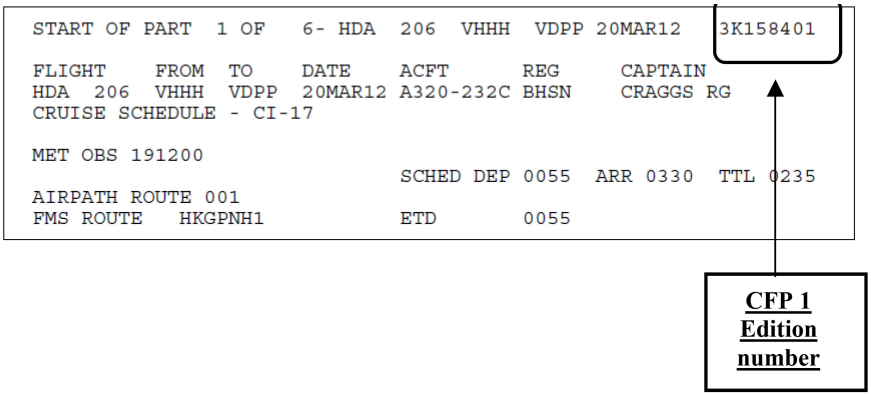
AOC CAR 1/4 PAGE



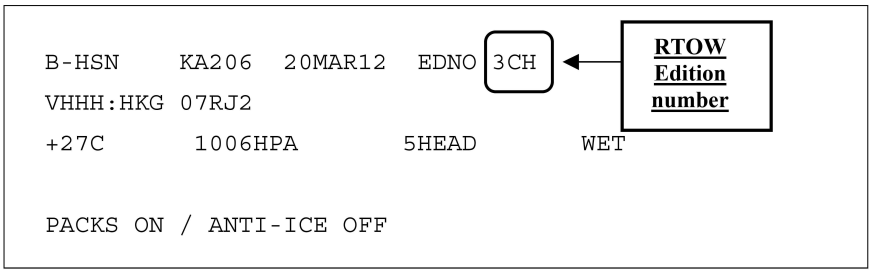
1. Key in the crew ERN for T/O and LDG.
2. Change to “Y” for “AUTOLAND” and “ETOPS”if necessary.

3. "CFP1 EDNO"(4L) should be uplinked automatically. If it differs from the EDNO of the printed CFP, crew shall verify which is the most up-to-date edition, and edit the field accordingly.
4. If CFP is requested due to inflight diversion etc. and **used**, enter that CFP edition number into "CFP2 EDNO" (4R).
5. Enter "RTOW EDNO"(5L) with the edition number from the ACARS RTOW (see sample below) or SMS RTOW or WEB RTOW output. Enter "---" if paper RTOW chart is used.

CFP1 EDNO SAMPLE

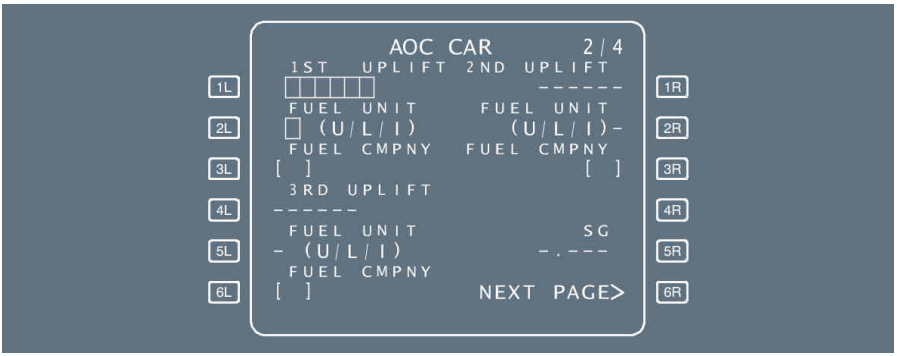


ACARS RTOW EDNO SAMPLE



15

AOC CAR 2/4 PAGE

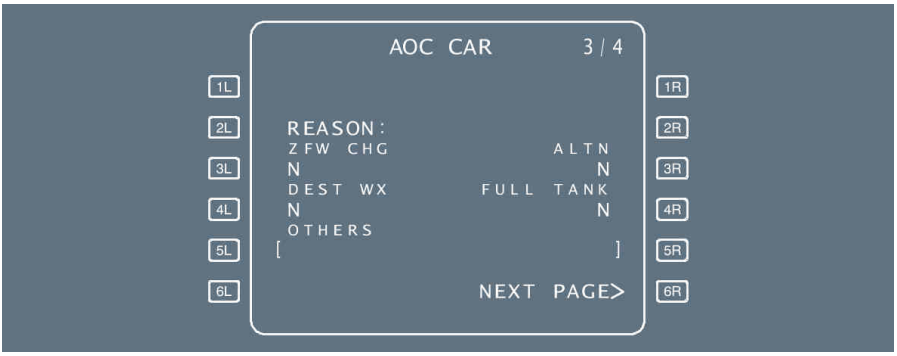


1. Enter fuel units:
   "U" - US Gallons
   "L" - Litres
   "I" - Imperial gallons.
2. If there is no fuel uplift enter "0" – Zero, in Field 1L and "L" in 2L.
3. Fuel Supplier Codes are on the reverse of the clipboard.

Note: *If only one code is listed for a port, use that code regardless of what is printed on the fuel receipt.*

16

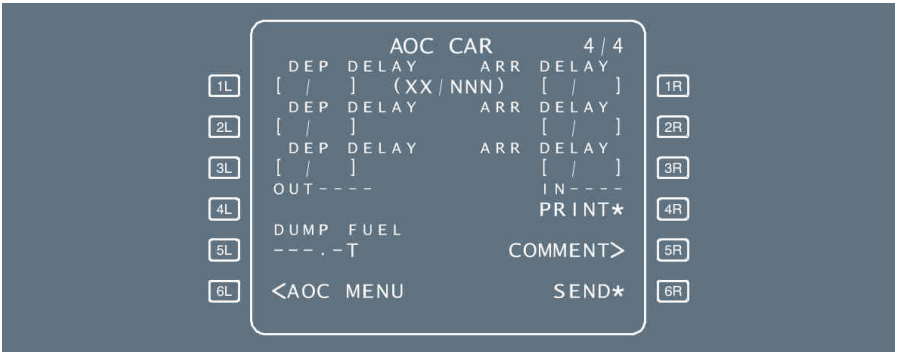
AOC CAR 3/4 PAGE



1. Type “Y” to identify the reasons for carriage of additional fuel.
2. Type “Y” at LSK4R if fuel is tankage limited.

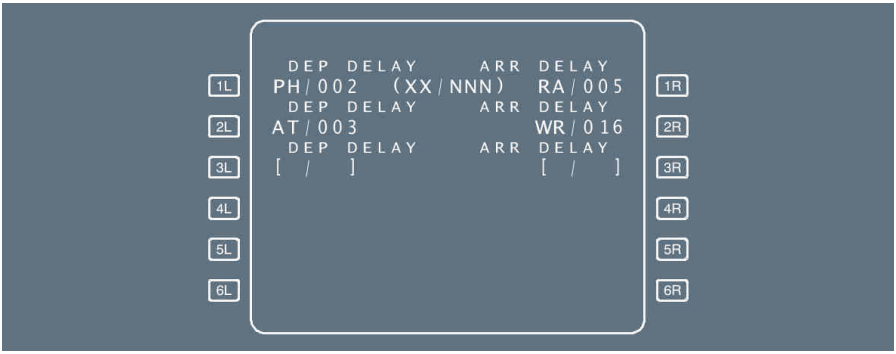
17

AOC CAR 4/4 PAGE



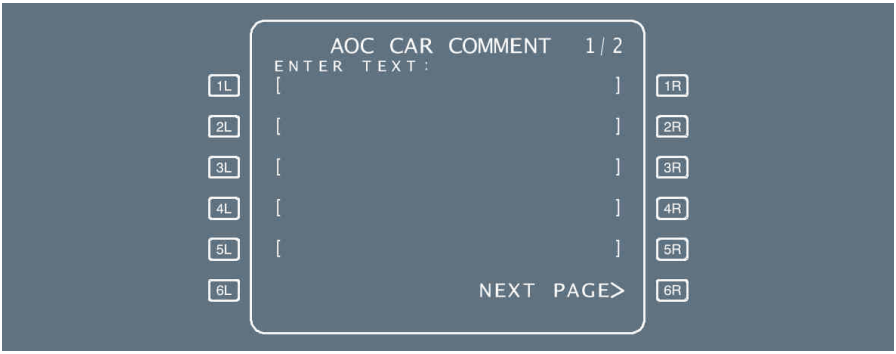
Enter quantity of fuel dumped, if appropriate, at LSK 5L.
If a comment is required, press LSK 5R to access the AOC CAR COMMENT page.
Print and sign a paper copy of the CAR for all flights and put it in the flight document envelope.
Delay Codes are listed on the reverse of the clipboard and should be entered as a two-figure code followed by a three-figure time in minutes. The left hand column allows up to three delay summaries to be entered based on the STD shown on the CFP, whilst the right hand column is based on the STA shown on the CFP.

e.g. A two minute passenger boarding delay followed by a three minute departure ATC delay, followed by a sixteen minute delay holding at destination due to weather (i.e., a total of 21 min late on arrival), would be shown as follows:



18

AOC CAR COMMENT 1/2 PAGE



Fill in this page for short CAR comment then select LSK 6R to access the MESSAGE DIRECTOR page. Type "Y" in the appropriate addressee prompt of page 2 then press LSK 6R to send. Use the paper Commander's Report Form for long messages.

It is important to print the CAR before sending any comments. If the SEND prompt is pressed before printing, comments will not be shown on the printed copy.

POST FLIGHT ACTIONS

Applicable to: ALL

19

- **If no AOC CAR COMMENT is included:**

  No Crew action is required– all data is automatically downlinked 10 min after the "IN" event.

● **If an AOC CAR COMMENT is included:**

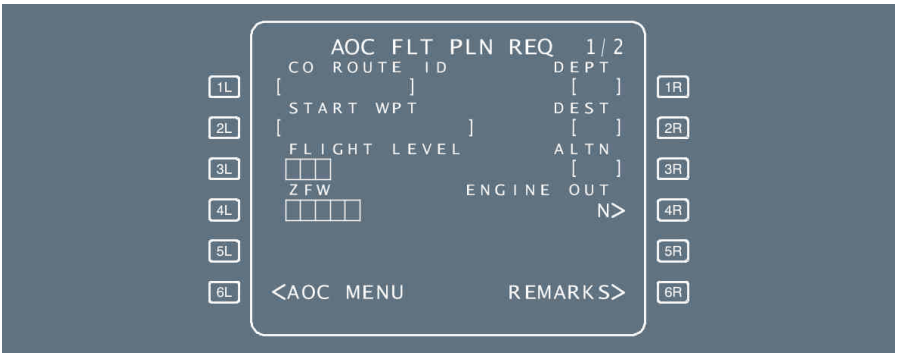
Crew action is required – The "AOC CAR COMMENT" must be completed prior to the “IN” event plus 10 min, press the “PRINT” button **before** the "SEND" button to print a hard copy and send the information to the ground system.

AOC FLIGHT PLAN REQUEST

Applicable to: ALL

20

AOC FLIGHT PLAN REQUEST



The FLIGHT PLAN prompt on the ACARS MENU allows three types of CFP to be uplinked to the aircraft, as follows:

T1 : CFP front page only
Used for ZFW change, aircraft change, alternate change, etc.

T2 : Combined navigation and fuel log
As per the normal CFP, but with a simplified format. Useful for re-routings.

T3 : Full CFP
As per the normal CFP format. Can be used following a diversion, etc.

Be aware that the time taken to prepare each CFP depends on the format, with T1 taking the least time, whilst T3 can take up to half an hour. The time required is also affected by the number of CFP requests received, as well as Despatch workload.

The format for the request is self-explanatory, although the following should be noted:

- All fields need to be completed.
- ZFW is in tonnes.
- For a full Departure-Destination CFP, enter the departure airport under START WPT.

Enter "T1", "T2" or "T3" as appropriate into the first line of page 2. No other text should be entered on this line, although additional information can be entered in the remaining fields.

COMMUNICATION

Applicable to: ALL

21

AIR GROUND MESSAGES

All messages sent from the aircraft are automatically addressed to a specific recipient list defined by the airline. This list includes IOC and the Engineering Department and cannot be modified by the crew. However, priority prefixes may be inserted by the crew when appropriate. *Part A chapter 8 refers*.

DOWNLINK MESSAGES

Aircraft to ground messages (downlink) can comprise maintenance, monitoring, operational, performance and cabin data. Messages can be grouped into two basic categories, reports and requests.

Reports can be either automatic or pilot initiated. Reports generated by a peripheral systems (CMS, ACMS, FMS) can be automatically downlinked. These will provide constant aircraft position and engine maintenance status.

Requests are generally “pilot initiated”. For example they are used to provide weather information to flight crew.

UPLINK MESSAGES

Ground to aircraft messages (uplink) either contains crew information or automatically embedded requests for transmission of specific downlink reports into the system.

STANDARD COMMUNICATION

An uplink message is sent to aircraft arriving in HKG and other selected ports. It is intended to give gate, aircraft next service and baggage carousel information. It should normally be received no later than 30 min before arrival. However, the message can only be delivered if the ACARS Data Service Provider “knows” where the aircraft is so that the message can be routed accordingly.

```
ATSU ..B-HTG HDA627 240409 05:13:52
COCKPIT PRINTER MESSAGE - LABEL C1
.DDLIRXA 240513
AGM
AN B-HTG/MA 134A
-  KA627/24-APR-2009
FLIGHT INFO
BAY N145   BAGGAGE CAROUSEL 6
NEXT SERVICE KA896 PVG ETD 08:00U
```

MEDLINK

Applicable to: ALL

22

Refer to Volume 7.1.19

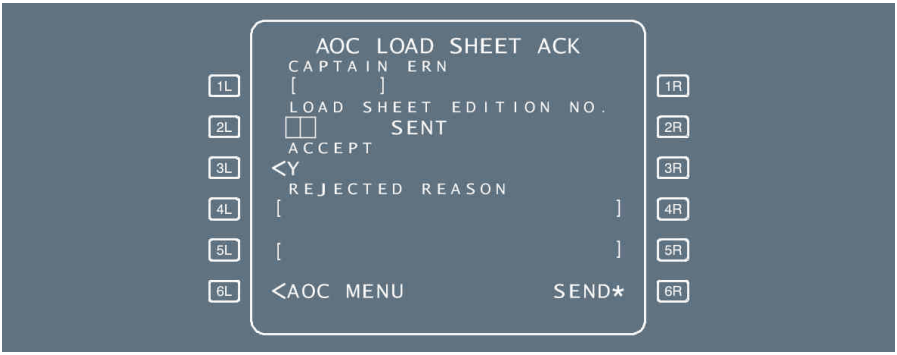
LOADSHEETS

Applicable to: ALL

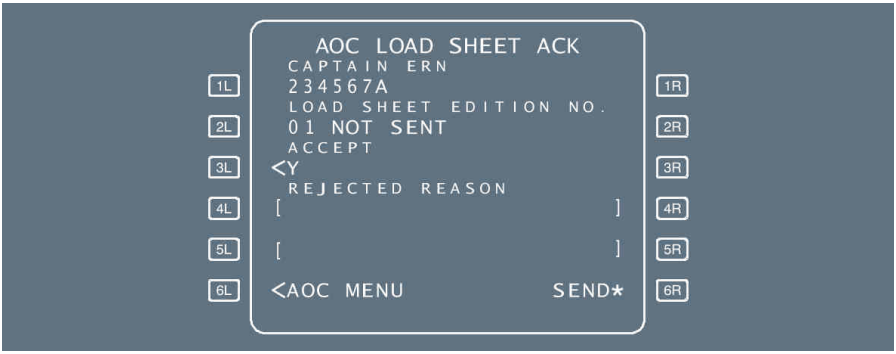
23

LOADSHEET ACKNOWLEDGEMENT REPORT (LAR)

Before ACARS crew information has been uplinked:



After ACARS crew information has been uplinked:



Captain's ERN appears. This can only be changed by amending the Captain's ERN on the AOC CREW INFO page.
Loadsheet Edition Number defaults to 1. The word "NOT" appears in row 2 until LSK6R has been pressed.

ATC INTERFACE

Applicable to: ALL

24

PRE DEPARTURE CLEARANCE

A 2-way Pre Departure Clearance (PDC) via data link is available at certain ports, as annotated on the Port Page.

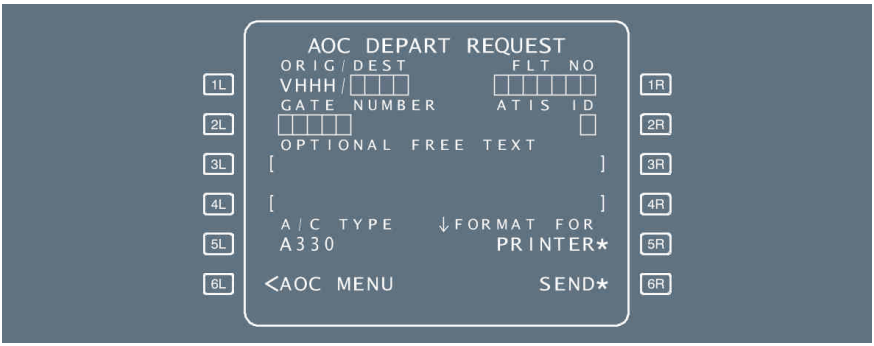
PROCEDURE

Approximately 20 min before 'ready to start' send the request for Clearance by using the PDC REQUEST function on the ACARS menu. Complete the required data fields and SEND.

Three messages will be received during the process:
1. ATC will respond with 'Request Being Processed Standby' shortly followed by;
2. The Departure Clearance. Once crew have confirmed that the clearance is as expected, go to RECEIVED MESSAGES, open the PDC message and select ACCEPT.
3. ATC will acknowledge the acceptance of the clearance by sending a further message 'Clearance Confirmed'.

Any subsequent amendment to ATC Clearance will be issued by voice.
If Clearance message is not received within 5 min of sending the request or if there is any technical problem with the data link exchanges, contact the appropriate Clearance Delivery Frequency.

Read-back requirements vary from airport to airport and any specific requirements will be detailed on the PDC, or the Port Page. Otherwise, report 'ready' on the frequency given in the Departure Clearance message.



DIGITAL ATIS

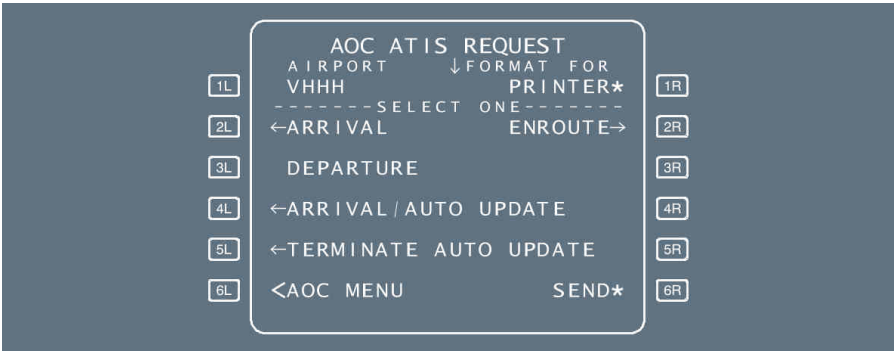
Some airports generate an electronic digital ATIS, or D-ATIS, for reception by ACARS equipped aircraft. This is in addition to the standard VHF ATIS.

D-ATIS can be received by sending an ACARS request. The ATIS REQUEST prompt can be accessed in the ACARS PRE-FLT and IN-FLT menu pages.

If a D-ATIS is received, there is no requirement to transcribe the data onto the CFP provided the printout is filed in the Flight Documents Envelope.

D-ATIS has an "Auto Update" function which, if selected by the crew, will automatically uplink to the aircraft any update of the ATIS, provided the specific airport has activated the function. Crew should ensure "Auto Update" is cancelled before leaving the aircraft.

D-ATIS has an "Enroute" function which, if selected by the crew, will uplink to the aircraft VOLMET information, provided the specific airport has activated the function.



SYSTEM TROUBLE SHOOTING

Applicable to: ALL

25

ACARS STANDBY

"FM Datalink Unavail" will appear on the MCDU and "ACARS STBY" appears in the ECAM when reception is lost or the system is malfunctioning.
The Dragonair ACARS system normally uses VHF. VHF provides good-quality, reliable reception but requires line-of-sight. This in turn requires use of an extensive network of ground stations. There are two possible reasons that this message can appear.

1. The aircraft simply flies out of VHF range, in which case nothing further can be done until reception is regained.
2. When transitioning from one area of coverage to another area. In this case reception should shortly be recovered and the message disappears. If the message does not disappear it can be an indication of more serious problems. If ACARS does not work after a short period of time the aircraft position, altitude, and description of problem should passed along via CAR to the Technical Manager Airbus (TMA).

Within the KA network this problem occasionally occurs around the Fuzhou area. The aircraft is flying within one area of coverage (ARINC ASIA 131.450) but in close proximity to Taiwan, which uses a different network (ARINC KOREA 131.750). The ACARS system attempts to lock-on to the Taiwan network, however the signal is poor and reception is lost. In this situation reception can be regained by manually tuning the ARINC ASIA network.
Experience has shown that some system anomalies (e.g. 'ACARS STBY' displayed) may be corrected similarly by manually tuning the Datalink Service Provider (DSP) frequency and then reselecting AUTOMATIC. However, whilst manual tuning is permitted, do not change the list of DSPs in the Scan Mask.

AIRCRAFT PRINTER MALFUNCTIONS

Pilots are permitted to replace printer paper or clear jammed paper. Instructions are found on the underside of the printer cover flap. Spare rolls of paper are stored on the cockpit bulkhead. Printer malfunctions should be recorded in the AML.

ACARS ADMINISTRATION

Applicable to: ALL

26

ACARS ADMINISTRATION

ACARS is a companywide communications system, monitored as follows:

Technical Administrator	:	The Technical Manager Airbus (TMA) is the Flight Operations ACARS Administrator. All technical aspects of ACARS fall in this jurisdiction.
Operational Administrator	:	The Manager Line Operations (MLO) is responsible for operational aspects of ACARS.
IOC	:	The Manager IOC (MIOC) is responsible for ACARS AGM messages and recording ACARS flight Data.

FAULT REPORTING

All ACARS/ATSU defects or unserviceabilities should be reported in the Aircraft Maintenance Log. Additionally any comments or observations can be relayed via CAR and addressed to the appropriate office.

Intentionally left blank

THRUST CONTROL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

GENERAL

The flight crew uses console-mounted levers to control engine thrust. Each lever sends electrical signals to the FADEC of the engine it controls. The FADEC responds to the thrust lever position or an autothrust command by setting the engine thrust.

The thrust lever quadrant is the equivalent of a thrust rating panel. For each lever it has five detents. Moving the thrust lever to the forward stop of the quadrant always gives maximum takeoff or go-around thrust, as appropriate, and signals the AP/FD to go to takeoff or go-around, as appropriate. The FMA (Flight Mode Annunciator) in the left window of each PFD displays the status of the thrust system to the pilot.

The engine instrument display gives a read-out of the engine thrust mode (CL, MCT, etc.) and the appropriate engine limit. It displays the actual limit set, thrust lever position, FADEC command, and maximum engine rating limit continually.

MANUAL THRUST CONTROL

With A/THR disconnected, thrust control between full reverse (on the ground only) and maximum takeoff or go-around thrust is entirely conventional.

TLA (Thrust Lever Angle) determines the thrust demanded.

The rating limit selected by the pilot and the actual engine limit appear on the engine instrument display.

With the thrust lever short of the CL position on the quadrant, the engine instrument display shows CL continually. If one or both thrust levers are above CL, it shows MCT/FLEX. If one or both thrust levers are beyond the MCT detent, it shows TOGA. With the thrust levers positioned in a detent, the detent setting controls the engines to that limiting parameter.

AUTOTHRUST

When active A/THR controls either speed, thrust or retard as appropriate. The engine limit corresponds to the thrust lever position. If the thrust lever is below the CL detent then the TLA determines the engine power limit.

With the thrust lever above the CL detent, autothrust reverts to arm (A/THR blue on FMA) except if alpha-floor is active. CLB (or LVR CLB) flashes on the FMA.

If the thrust levers are not aligned, an asymmetric message (ASYM or LVR ASYM) appears on the FMA. If so, each engine is limited to its appropriate TLA.

This allows the use of autothrust to continue if one engine has to have its maximum RPM limited for some operational reasons such as excessive vibration.

AUTOTHRUST DISCONNECTION

Autothrust disconnection occurs when:
- The A/THR fails, or
- The FCU's A/THR pb is pressed, or
- The thrust lever(s)' instinctive disconnect button is pressed, or
- Both thrust levers are set to IDLE.
- When the radio altitude is below 100 ft and:
  - Both thrust levers above CL detent or
  - One thrust lever above MCT detent.

1. Disconnection, due to a failure or to the use of the FCU A/THR pb.
   If the thrust levers are in the CL detent (both engines operating), or one thrust lever in the MCT (one engine operative), the thrust is locked at its actual value. The FMA displays "THR LK". A single chime sounds, and an amber ECAM caution appears, as long as thrust is locked. (For more details: *Refer to Autothrust section*).
   Movement of the thrust lever(s) unlocks the thrust, and the engine then responds to TLA at the normal rate.
2. Disconnection, due to the use of instinctive disconnect button.
   When a pilot presses the instinctive disconnect button, the engines immediately develop thrust corresponding to the position of their thrust levers, whatever that might be.

INSTINCTIVE DISCONNECTION PROCEDURE

To avoid any confusion for those pilots flying the A318/A319/A320/A321 with different modifications (with, and without, energy management), Airbus recommends that pilots use one procedure for disconnecting with the instinctive disconnect button.
- Set the thrust levers to the current thrust setting by adjusting the levers until the N1 (or EPR) TLA white (blue with EIS2 screens) circle is adjacent to the N1 (or EPR) needle.
- Use the instinctive button to disconnect the A/THR.
- Check that "A/THR"memo is displayed on the ECAM, and that the autothrust mode on the first column of the FMA disappears.
- Set the thrust manually.

USE OF AUTOTHRUST IN APPROACH

The pilot should use autothrust for approaches. On final approach, it usually gives more accurate speed control, although in turbulent conditions the actual airspeed may vary from the target speed, by as much as five knots. Although the changeover between auto and manual thrust is easy to make with a little practice, the pilot should, when using autothrust for the final approach, keep it engaged until he retards the thrust levers to idle for touchdown. If the pilot is

going to make the landing using manual thrust, he should disconnect the A/THR by the time he has reached 1 000 ft on the final approach.
If he makes a shallow flare, with A/THR engaged, it will increase thrust to maintain the approach speed until he pulls the thrust levers back to idle. Therefore he should avoid making a shallow flare, or should retard the thrust levers as soon as it is no longer necessary to carry thrust, and if necessary before he receives the “retard” reminder.
Although use of the autothrust is recommended for the entire approach, this does not absolve the pilot from his responsibility to monitor its performance, and to disconnect it if it fails to maintain speed at the selected value. Such monitoring should include checking on whether or not the managed speed, calculated by the FMGC, is reasonable.
For more information concerning aircraft handling during final approach, refer to the FCOM Bulletin ”Aircraft handling in final approach”.

ENGINE FAILURE

The pilot can continue to use autothrust after an engine failure, but some pilots feel that directional control is more difficult, when autothrust changes the thrust instead of the pilot making the thrust changes manually. The choice between using, or not using, autothrust after engine failure is a personal one. As far as speed control is concerned, autothrust is usually more accurate than a pilot.

THRUST CONTROL

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

GENERAL

The flight crew uses console-mounted levers to control engine thrust. Each lever sends electrical signals to the FADEC of the engine it controls. The FADEC responds to the thrust lever position or an autothrust command by setting the engine thrust.
The thrust lever quadrant is the equivalent of a thrust rating panel. For each lever it has five detents. Moving the thrust lever to the forward stop of the quadrant always gives maximum takeoff or go-around thrust, as appropriate, and signals the AP/FD to go to takeoff or go-around, as appropriate. The FMA (Flight Mode Annunciator) in the left window of each PFD displays the status of the thrust system to the pilot.
The engine instrument display gives a read-out of the engine thrust mode (CL, MCT, etc.) and the appropriate engine limit. It displays the actual limit set, thrust lever position, FADEC command, and maximum engine rating limit continually.

MANUAL THRUST CONTROL

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The rating limit selected by the pilot and the actual engine limit appear on the engine instrument display.
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AUTOTHRUST

When active A/THR controls either speed, thrust or retard as appropriate. The engine limit corresponds to the thrust lever position. If the thrust lever is below the CL detent then the TLA determines the engine power limit.
With the thrust lever above the CL detent, autothrust reverts to arm (A/THR blue on FMA) except if alpha-floor is active. CLB (or LVR CLB) flashes on the FMA.
If the thrust levers are not aligned, an asymmetric message (ASYM or LVR ASYM) appears on the FMA. If so, each engine is limited to its appropriate TLA.
This allows the use of autothrust to continue if one engine has to have its maximum RPM limited for some operational reasons such as excessive vibration.

AUTOTHRUST DISCONNECTION

Autothrust disconnection occurs when :
- The A/THR fails, or
- The FCU's A/THR pb is pressed, or
- The thrust lever(s)' instinctive disconnect button is pressed, or
- Both thrust levers are set to IDLE.

1. Disconnection, due to a failure or to the use of the FCU A/THR pb. If the thrust levers are in the CL detent (both engines operative), or one thrust lever in the MCT detent (one engine operative), the thrust is locked at its actual value. The FMA displays a "THR LK" pulsing memo. A single chime sounds, and an amber ECAM caution appears, as long as thrust is locked. (For more details: *Refer to Autothrust section*). Movement of the thrust lever(s) unlocks the thrust, and the engine(s) then respond(s) to TLA position.
2. Disconnection,due to the use of instinctive disconnect button.
   When a pilot presses the instinctive disconnect button, the engines immediately develop thrust corresponding to the position of their thrust levers, whatever that might be.

INSTINCTIVE DISCONNECTION PROCEDURE

To avoid any confusion for those pilots flying the A318/A319/A320/A321 with different modifications (with, and without, energy management), Airbus recommends that pilots use one procedure for disconnecting with the instinctive disconnect button.

- Set the thrust levers to the current thrust setting by adjusting the levers until the N1 (or EPR) TLA white (blue with EIS2 screens) circle is adjacent to the N1 (or EPR) needle.
- Use the instinctive button to disconnect the A/THR.
- Check that “A/THR”memo is displayed on the ECAM, and that the autothrust mode on the first column of the FMA disappears.
- Set the thrust manually.

USE OF AUTOTHRUST IN APPROACH

The pilot should use autothrust for approaches. On final approach, it usually gives more accurate speed control, although in turbulent conditions the actual airspeed may vary from the target speed, by as much as five knots. Although the changeover between auto and manual thrust is easy to make with a little practice, the pilot should, when using autothrust for the final approach, keep it engaged until he retards the thrust levers to idle for touchdown. If the pilot is going to make the landing using manual thrust, he should disconnect the A/THR by the time he has reached 1 000 ft on the final approach.

If he makes a shallow flare, with A/THR engaged, it will increase thrust to maintain the approach speed until he pulls the thrust levers back to idle. Therefore he should avoid making a shallow flare, or should retard the thrust levers as soon as it is no longer necessary to carry thrust, and if necessary before he receives the “retard” reminder.

Although use of the autothrust is recommended for the entire approach, this does not absolve the pilot from his responsibility to monitor its performance, and to disconnect it if it fails to maintain speed at the selected value. Such monitoring should include checking on whether or not the managed speed, calculated by the FMGC, is reasonable.

For more information concerning aircraft handling during final approach, refer to the FCOM Bulletin ”Aircraft handling in final approach”.

ENGINE FAILURE

The pilot can continue to use autothrust after an engine failure, but some pilots feel that directional control is more difficult, when autothrust changes the thrust instead of the pilot making the thrust changes manually. The choice between using, or not using, autothrust after engine failure is a personal one. As far as speed control is concerned, autothrust is usually more accurate than a pilot.

MANUAL ENGINE START

Applicable to: ALL

Pilots normally use automatic starting to start an engine.

However, manual starting is recommended in the following cases :

- **After aborting a start, because of :**
  - Engine stall, or Engine EGT overlimit, or LO START AIR PRESS, or No N1 rotation, or Hung start.
- **When expecting a start abort, because of :**
  - Degraded bleed performance, due to hot conditions, or at a high-altitude airfields.
  - An engine with a reduced EGT margin, in hot conditions, or at a high-altitude airfields.
  - Marginal performance of the external pneumatic power group.
  - Tailwind greater than 10 kt
    Starting in tailwind may fail due to N1 counterrotation, hot gas black flow. Fuel should be set to ON at N2 max motoring speed, provided N1 has stopped, and turn clockwise. (confirmation by the ground crew).

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

MANUAL ENGINE START PROCEDURE

CAUTION	FADEC passively monitors the start parameters. Crew shall take appropriate action in case of abnormal start.

Note: Manual starts shall be accomplished by the Captain.

THR LEVERS.....IDLE

CAUTION	The engine will start, regardless of the thrust lever position, and will rapidly accelerate to generate the thrust demanded by the TLA, causing a hazardous situation, if the thrust levers are not at idle.

ENG MODE selector.....NORM THEN IGN

The lower ECAM displays the engine page.

ENG MAN START pb .....ON

- *Do not set the MAN START pb to ON, before all amber crosses except on N1 and N2, have disappeared on engine parameters (upper ECAM display).*
- *On the ECAM lower display, check that the START VALVE is inline*
- *On the ECAM displays, check that the OIL PRESS increases, and N2 increases.*

- **If N2 does not reach 15 % , check that the pack valves have correctly closed.**

  During engine start, if the APU bleed is used and pack valves are closed, shed APU electrical loads to increase bleed air pressure, as follows:

  GALLEY.....OFF

  - **If needed, shed also :**
    BLUE ELEC PUMP (ground only).....OFF
    FUEL X FEED.....ON
    FUEL PUMPS except R TK PUMP 2.....OFF
    BLOWER.....OVRD
    CAB FANS.....OFF

  - **If additional shedding is required,** engine pump may be switched OFF (it should be ON for second engine start for PTU auto test).

- **When N2 reaches the maximum motoring speed (minimum 15 %) and 30 s after selection of the MAN START pushbutton :**

  Maximum motoring speed is reached when a significant decrease in N2 acceleration is observed. Do not attempt start unless N2 is at least 15 %

  MASTER switch.....ON

  The F/O starts the timing for monitoring the light-up delay.

  ECAM displays.....CHECK

  Check :
  - *Indication of igniters A and B*
  - *Fuel flow increase (with current EEC std, FF indication spiking occurs at fuel on)*
  - *EGT increase 20 s (maximum) after fuel is on.*
  - *N1 increases before 34 % N2*

  If the electrical power supply is interrupted during the start sequence (indicated by loss of ECAM CRTs), abort the start by setting the MASTER switch to OFF. Then perform a 30 s dry crank.

- **When N2 reaches 43 %**

  ECAM displays.....CHECK

  Check :
  - *Igniter indication off (at 43 % N2)*
  - *START VALVE crossline (N2 slightly above 43 %)*
  - *Main and secondary engine idle parameters normal.*

  Gray background on N2 indication disappears.

  MAN START.....OFF
  ENG MODE selector.....NORM

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

MANUAL ENGINE START PROCEDURE

CAUTION	FADEC passively monitors the start parameters. Crew shall take appropriate action in case of abnormal start.

Note: Manual starts shall be accomplished by the Captain.

THR LEVERS.....IDLE

CAUTION	The engine will start, regardless of the thrust lever position, and will rapidly accelerate to generate the thrust demanded by the TLA, causing a hazardous situation, if the thrust levers are not at idle.

ENG MODE selector.....NORM THEN IGN

The lower ECAM displays the engine page.

ENG MAN START pb .....ON

- *Do not set the MAN START pb to ON, before all amber crosses except on N1 and N2, have disappeared on engine parameters (upper ECAM display).*
- *On the ECAM lower display, check that the START VALVE is inline*
- *On the ECAM displays, check that the OIL PRESS increases, and N2 increases.*

● **If N2 does not reach 15 % , check that the pack valves have correctly closed.**

During engine start, if the APU bleed is used and pack valves are closed, shed APU electrical loads to increase bleed air pressure, as follows:

GALY & CAB.....OFF

● **If needed, shed also :**
BLUE ELEC PUMP (ground only).....OFF
FUEL X FEED.....ON
FUEL PUMPS except R TK PUMP 2.....OFF
BLOWER.....OVRD
CAB FANS.....OFF

● **If additional shedding is required,** engine pump may be switched OFF (it should be ON for second engine start for PTU auto test).

● **When N2 reaches the maximum motoring speed (minimum 15 %) and 30 s after selection of the MAN START pushbutton :**

Maximum motoring speed is reached when a significant decrease in N2 acceleration is observed. Do not attempt start unless N2 is at least 15 %

MASTER switch.....ON

The F/O starts the timing for monitoring the light-up delay.

ECAM displays.....CHECK

Check :
- *Indication of igniters A and B*
- *Fuel flow increase (with current EEC std, FF indication spiking occurs at fuel on)*
- *EGT increase 20 s (maximum) after fuel is on.*
- *N1 increases before 34 % N2*

If the electrical power supply is interrupted during the start sequence (indicated by loss of ECAM CRTs), abort the start by setting the MASTER switch to OFF. Then perform a 30 s dry crank.

● **When N2 reaches 43 %**

ECAM displays.....CHECK

Check :
- *Igniter indication off (at 43 % N2)*
- *START VALVE crossline (N2 slightly above 43 %)*
- *Main and secondary engine idle parameters normal.*

Gray background on N2 indication disappears.

MAN START.....OFF
ENG MODE selector.....NORM

ENGINE START WITH EXTERNAL PNEUMATIC POWER

Applicable to: ALL

● **Before connecting external pneumatic power :**

PACKS 1 and 2.....OFF

(To prevent pack contamination).

● **Before start :**

APU BLEED.....OFF
ENG BLEED (both engines).....OFF
X BLEED.....OPEN

● **Cleared to start :**

Start Engine 2 first.

Note: As necessary, Engine 1 can also be started by using the external pneumatic power. If Engine 1 is started first, check the brake ACCU pressure prior to engine start.

Use the normal engine start procedure.

The minimum recommended starter air supply pressure is 25 PSI, when the start valve is open. Two external pneumatic power units may be used in parallel, if the pressure/flow relation is expected to be marginal.

- **After Engine 2 is started :**
  - **If external pneumatic power is used to start Engine 1 :**

    Start Engine 1

    Request the removal of external pneumatic power unit.
    X BLEED.....AUTO
    ENG BLEED (Both engines).....ON
    PACKS 1 and 2.....ON

  - **If the crossbleed engine start procedure is used for Engine 1 :**

    Request the removal of external pneumatic power unit
    PACKS 1 and 2.....ON
    ENG 2 BLEED.....ON
    CROSSBLEED ENGINE START PROC for Engine 1.....APPLY

CROSSBLEED ENGINE START

Applicable to: ALL

1

CAUTION	The use of engine bleed supply and external pneumatic power supply simultaneously is prohibited.

CAUTION	Do not commence a crossbleed start until pushback is complete and the park brake is set.

- **Before start :**

  APU BLEED.....OFF

  The BLEED valve of the running engine reopens and the cross bleed valve closes.

  ENG BLEED (running engine).....check ON
  ENG BLEED (receiving engine).....OFF

  The bleed valve of engine to be started is closed to eliminate reverse flow leakage.

  X BLEED.....OPEN

- **Cleared to start :**

  Confirm area is clear of obstacles.

  Ensure increased power jet wake does not constitute any hazard to people or installation behind the aircraft.

Adjust thrust of supplying engine to obtain 30 PSI at start air valve before start initiation and at least 25 PSI during start.
Do not exceed 75 % N2 to limit jet wake.
Apply the normal engine start procedure.

- **After start :**

THRUST LEVER (supplying engine)..... IDLE
X BLEED..... AUTO
ENG BLEED (receiving engine)..... ON
PACKS.....Check ON

START VALVE MANUAL OPERATION

Applicable to: ALL

2

Advise ground crew to prepare for manual start valve operation.

CAUTION	In the case that both engines needs to be manually started, and in order to avoid that the maintenance mechanic is in between two running engines, the manual start valve sequence should be such that first the left hand engine is started, and then the right hand engine. The access to the start valve is located on the right hand side in flight direction of the pylon.

AUDIO CONTROL PANEL.....CAB

- **When ground crew member is ready, order "START 1 or 2"**

ENG MODE selector ..... IGN
ENG MASTER sw ..... ON
START VALVE..... ORDER "OPEN AND KEEP OPEN"

If not maintained in OPEN position by the ground crew member, the start valve closes.

- **When N2 at 43 %**

START VALVE..... ORDER "CLOSE"

Continue with normal procedure.

DETECTION OF HANDLING BLEED VALVE MALFUNCTION

Applicable to: ALL

- Should any evidence supporting the probability of malfunction of one or more handling bleed valve(s) be observed by the flight crew, a log book entry should be performed and a maintenance determination (and corrective action, as required) be conducted upon return to the main base or at the next out station capable of conducting such a maintenance determination/action.
  Handling bleed valve(s) malfunction may be evidenced on ground or in flight by:
  - Starting difficulties:
    - Hung start,
    - Sub-idle stall/roll back,
    - Start EGT exceedance.
  - Takeoff EGT being unexpectedly high (considering typical engine-to-engine variation and typical engine EGT margin),
  - Fuel flow shift in the order +3 % in typical cruise conditions and/or +6 % in typical climb/alternate/diversion conditions (cross-wing comparison).
  - Climb/Cruise EGT shift in the order of +20 °C to +50 °C, depending on flight phase (cross-wing comparison).

    Note: *EGT increase due to engine deterioration is associated with N2 decrease. EGT increase due to handling bleed malfunction is associated with N2 increase.*

  - Engine stall (surge) upon engine transient (acceleration or deceleration), in this particular case a maintenance action is due prior to the next flight.
- In case of starting difficulties (hung start or start stall) being experienced during ground or air start, proceed with a second or third start attempt in manual start.
  Proceeding with successive start attempts has proven to be effective in achieving a successful ground or air start.
- In case of detected Fuel Flow shift, and should one or more flight leg(s) be flown under this condition, consider adding extra fuel accordingly.

ON GROUND - NON ENG SHUTDOWN AFTER SETTING ENG MASTER SW TO OFF

Applicable to: ALL

The normal procedure to shut down an engine is to set the ENG MASTER sw to OFF. In the case where the engine does not shut down as expected, use the following procedure:

ECAM FUEL PAGE..... PRESS
LP FUEL VALVE POSITION (affected)..... CHECK

■ **If LP fuel valve is closed – cross line in amber**

No crew action. The engine will shut down after a time delay.

■ **If LP fuel valve is not closed**

ENG FIRE pb sw(affected)..... PRESS

Using the engine fire pushbutton will force the LP fuel valve to close. The engine will shut down after a time delay.

TIME DELAY

The affected engine will shut down when all the fuel between the LP fuel valve and the engine nozzles is burned by the engine. The shutdown of the engine can take up to 2 min and 30 s , depending on airport altitude and fuel recirculation system operation.
Keep ground staff informed.

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GENERAL

Applicable to: ALL

Except in some operational conditions, such as uphill slopes, slippery taxiways, or high gross weight, it may be advisable to taxi on one engine. The flight crew must exercise caution when taxiing on one engine to avoid generating excessive jet blast.

DEPARTURE

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

One engine taxi for departure should only be considered in exceptional circumstances, such as extended ATC delays, to prevent fuel on board reducing below the minimum sector requirement.

BRAKE ACCU PRESS.....CHECK

If necessary, use the Y ELEC PUMP to pressurize the brake accumulator.

ENGINE 1..... START

After a shutdown period of more than two hours, to avoid thermal shock, the flight crew should operate the engine at or near idle for at least five minutes before advancing the thrust lever to high power. Taxi time may be included in the warm-up period.
Use Engine 1 for taxiing because it pressurizes the green hydraulic system (nosewheel steering + normal braking), without using the PTU.

X BLEED.....OPEN

This supplies both packs from Engine 1.

Apply the normal “AFTER START” procedures, but:

- Keep the APU running to avoid additional electrical transients and to allow the galley operation. APU BLEED should be switched off to avoid ingestion of engine exhaust gases in the air conditioning system.
- After both engines have been started, perform the ECAM STATUS check, and then select and set the engine anti-icing and/or wing anti-icing as required.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

One engine taxi for departure should only be considered in exceptional circumstances, such as extended ATC delays, to prevent fuel on board reducing below the minimum sector requirement.

BRAKE ACCU PRESS.....CHECK

If necessary, use the Y ELEC PUMP to pressurize the brake accumulator.

ENGINE 1..... START

After a shutdown period of more than two hours, to avoid thermal shock, the flight crew should operate the engine at or near idle for at least five minutes before advancing the thrust lever to high power. Taxi time may be included in the warm-up period.
Use Engine 1 for taxiing because it pressurizes the green hydraulic system (normal braking).

X BLEED.....OPEN

This supplies both packs from Engine 1.

Apply the normal "AFTER START" procedures, but:
- Keep the APU running to avoid additional electrical transients and to allow the galley operation. APU BLEED should be switched off to avoid ingestion of engine exhaust gases in the air conditioning system.
- After both engines have been started, perform the ECAM STATUS check, and then select and set the engine anti-icing and/or wing anti-icing as required.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

Y ELEC PUMP..... ON

This pressurizes the yellow hydraulic system.

Apply the normal "TAXI" procedures, but:
- Perform the Flight Controls checks after both engines have been started.
- Do not arm the Auto Brake system before the Flight Controls checks have been completed.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

Y ELEC PUMP..... ON

This pressurizes the yellow hydraulic system (nosewheel steering) without using the PTU.

Apply the normal "TAXI" procedures, but:
- Perform the Flight Controls checks after both engines have been started.
- Do not arm the Auto Brake system before the Flight Controls checks have been completed.

Applicable to: ALL

Y ELEC PUMP..... OFF

Correct operation of the PTU will be checked during Engine 2 start.

APU BLEED..... ON

Applicable to: ALL

● **No less than 5 min before takeoff if the engine has been shutdown for more than 2 h, and no less than 3 min before takeoff in any case:**

The last engine must be started:
- No less than 5 min before takeoff if the engine has been shutdown for 2 h or more, to avoid engine thermal shock
- No less than 3 min before takeoff in any case:
  - To avoid engine thermal shock
  - To ensure that takeoff is not initiated before the center tank pumps test is finished, since takeoff on center tank is prohibited.

ENGINE 2.....START

Note: During engine start, a slight jerk forward may occur, if brakes are applied while the aircraft is moving.

APU ..... AS RQRD
X BLEED..... AUTO

Continue with the "AFTER START" procedures:

After both engines have been started, perform the ECAM STATUS check, and then select and set the engine anti-icing and/or wing anti-icing as required.

Proceed with the "AFTER START" checklist.
FLIGHT CONTROLS..... CHECK
AUTO BRK .....MAX

ARRIVAL

Applicable to: ALL

The flight crew may use the following procedure to taxi in:

APU..... START

Start the APU before shutting down the engine, in order to avoid additional electrical transient.

● **No less than 3 min after high thrust operations, and when taxiing in a straight line:**
ENG 2..... SHUT DOWN

Note: During engine shutdown, a slight jerk forward may occur, if brakes are applied while the aircraft is moving.

Y ELEC PUMP.....ON

This avoids running the PTU.

Y ELEC PUMP..... OFF
ENG 1.....SHUT DOWN

GENERAL

Applicable to: ALL

Whenever possible, avoid areas with known or forecasted severe turbulence. If turbulence is unavoidable, aim to keep the speed in the region of the target speed given in this section, so as to provide the best protection against the effect of gust on the structural limits, whilst maintaining an adequate margin above VLS.
Sufficient buffet margin exists at optimum altitude. In order to further increase the margin to buffet onset, consider descending to a lower altitude.
Severe turbulence is defined as turbulence that causes large, abrupt changes in altitude and/or attitude. It usually causes large variations in airspeed. Occupants are forced violently against their seat belts and loose objects will move around the aircraft.
If severe turbulence occurs during a flight, the flight crew must make a logbook entry in order to initiate maintenance action.

Note: *Recommendations for severe turbulence are also applicable to extreme turbulence.*

SIGNS

Applicable to: ALL

Before entering an area of known turbulence, the flight crew and the cabin crew must secure all loose equipment and switch the cabin SIGNS to ON.
Refer to Part A 8.3.1.8 and 8.3.13.2 for policy regarding in-fight turbulence and the use of seat belts.

AUTOPILOT/AUTOTHRUST

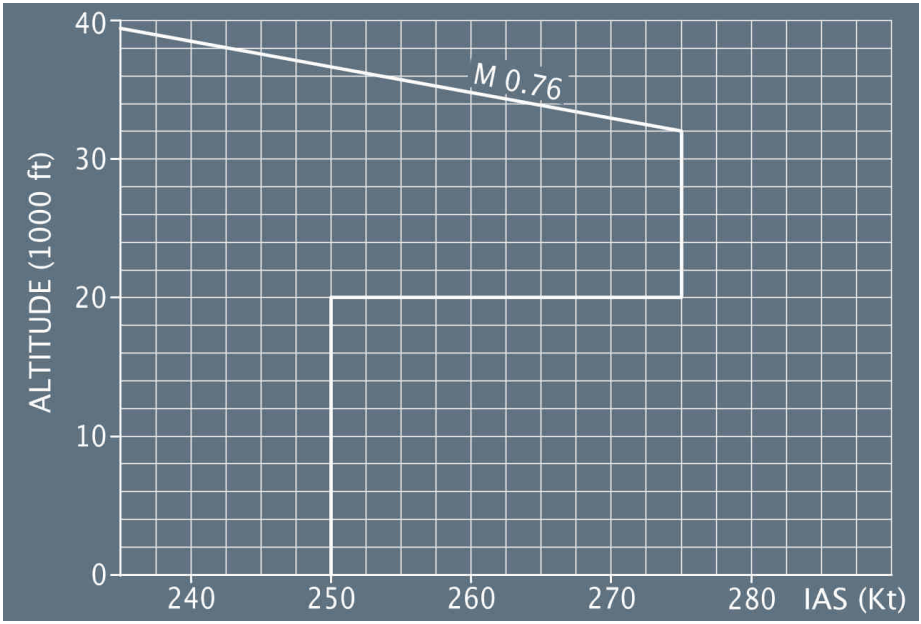
Applicable to: ALL

Keep the autopilot ON.
When thrust changes become excessive : Disconnect Autothrust.
For approach : Use A/THR for managed speed.

THRUST AND AIRSPEED

Applicable to: ALL 320

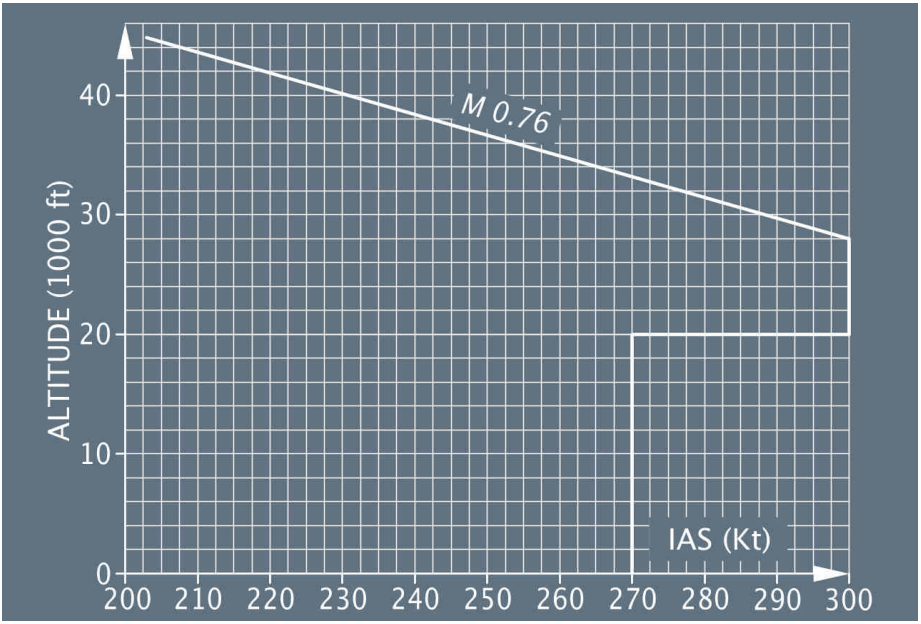
1 Set the thrust to give the recommended speed (*Refer to PRO-SUP-91-10 Thrust Setting (N1) for Recommended Speed*). This thrust setting attempts to obtain, in stabilized conditions, the speed for turbulence penetration given in the graph below.
Only change thrust in case of an extreme variation in airspeed, and do not chase your Mach or airspeed.
A transient increase is preferable to a loss of speed, that decreases buffet margins and is difficult to recover.



THRUST AND AIRSPEED

Applicable to: ALL 321

2 Set the thrust to give the recommended speed (*Refer to PRO-SUP-91-10 Thrust Setting (N1) for Recommended Speed*). This thrust setting attempts to obtain, in stabilized conditions, the speed for turbulence penetration given in the graph below.
Only change thrust in case of an extreme variation in airspeed, and do not chase your Mach or airspeed.
A transient increase is preferable to a loss of speed, that decreases buffet margins and is difficult to recover.



THRUST SETTING (N1) FOR RECOMMENDED SPEED

Applicable to: ALL 320

SPEED AND THRUST SETTING FOR RECOMMENDED TURBULENCE SPEED										
FL	SPD or Mach	GROSS WEIGHT (1000 kg)								
		44	48	52	56	60	64	68	72	76
		N1 %								
390	0.76	75.7	76.6	77.7	79.0	-	-	-	-	-
370	0.76	74.7	75.5	76.3	77.2	78.4	79.7	-	-	-
350	0.76	74.3	74.8	75.6	76.3	77.1	78.1	79.3	80.5	-
330	0.76	74.5	74.8	75.3	76.0	76.6	77.4	78.2	79.2	80.2
310	275	74.1	74.3	74.7	75.2	75.8	76.4	77.1	77.9	78.8
290	275	72.9	73.2	73.5	73.9	74.5	75.1	75.8	76.5	77.3
270	275	71.7	71.9	72.3	72.7	73.3	73.9	74.5	75.2	76.0
250	275	70.4	70.7	71.0	71.4	71.9	72.6	73.2	73.9	74.7
200	275	66.8	67.1	67.4	67.9	68.4	69.0	69.8	70.4	71.1
150	250	59.9	60.4	61.0	61.7	62.5	63.5	64.5	65.5	66.5

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SPEED AND THRUST SETTING FOR RECOMMENDED TURBULENCE SPEED										
FL	SPD or Mach	GROSS WEIGHT (1000 kg)								
		44	48	52	56	60	64	68	72	76
		N1 %								
100	250	56.3	56.7	57.2	57.8	58.5	59.3	60.3	61.4	62.5
50	250	52.7	53.4	53.8	54.4	54.9	55.7	56.5	57.4	58.4

THRUST SETTING (N1) FOR RECOMMENDED SPEED

Applicable to: ALL 321

SEVERE TURBULENCE SPEED AND THRUST SETTING FOR RECOMMENDED TURBULENCE SPEED												
FL	SPD or Mach	GROSS WEIGHT (1000 kg)										
		54	58	62	66	70	74	78	82	86	90	94
		N1 %										
390	0.76	79.4	80.6	–	–	–	–	–	–	–	–	–
370	0.76	77.9	78.9	80.0	81.2	–	–	–	–	–	–	–
350	0.76	77.2	77.9	78.8	79.7	80.7	–	–	–	–	–	–
330	0.76	76.9	77.6	78.2	79.0	79.8	80.7	81.6	–	–	–	–
310	0.76	76.7	77.3	77.9	78.5	79.2	79.9	80.6	81.5	82.4	–	–
290	0.76	76.7	77.2	77.7	78.2	78.8	79.4	80.0	80.6	81.4	82.1	83.0
270	300	76.2	76.6	77.0	77.5	78.0	78.5	79.7	79.6	80.3	80.9	81.6
250	300	75.0	75.4	75.8	76.2	76.7	77.1	77.7	78.2	78.9	79.5	80.2
200	300	72.2	72.5	72.9	73.3	73.7	74.2	74.7	75.2	75.8	76.4	77.0
150	270	65.5	65.9	66.5	67.0	67.7	68.4	69.2	70.3	71.0	71.8	72.6
100	270	62.5	62.9	63.5	64.0	64.6	65.3	66.0	66.8	67.6	68.4	69.2
50	270	59.1	59.5	60.0	60.5	61.1	61.8	62.6	63.4	64.2	65.0	65.7

ALTITUDE

Applicable to: ALL

If the crew flies the aircraft manually :

- Expect large variations in altitude, but do not chase altitude.
- Maintain attitude and allow altitude to vary.

LANDING

Applicable to: ALL

Configuration FULL, or 3, can be used.

However, Configuration 3 provides more energy and less drag.

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PRECAUTIONS FOR SUSPECTED WINDSHEAR

Applicable to: ALL

BEFORE TAKEOFF

Delay takeoff until conditions improve.

Evaluate takeoff conditions :
- Using observations and experience.
- Checking weather conditions.

Select the most favorable runway (considering location of the likely windshear).
Use the weather radar or the predictive windshear system ◁ before commencing takeoff to ensure that the flight path clears any potential problem areas.
Select TOGA thrust.
Monitor closely airspeed and airspeed trend during the takeoff run for early signs of windshear.

DURING APPROACH

Delay landing or divert to another airport until conditions are more favorable.

Evaluate condition for a safe landing by :
- Using observations and experience.
- Checking weather conditions.

Use the weather radar.
Select the most favorable runway, considering also which has the most appropriate approach aid.
Consider FLAPS 3.
Use managed speed in the approach phase.
Check both FDs engaged in ILS, FPA or V/S.
Engage the autopilot, for a more accurate approach and earlier recognition of deviation from the beam, when ILS is available.

Note: - *When it is using the GS mini-function, associated with managed speed, the system will carry extra speed in strong wind conditions.*
- *In case of strong or gusty crosswind greater than 20 kt, Refer to QRH/FPE-IFL VAPP Determination.*

RECOVERY TECHNIQUE AT TAKEOFF

Applicable to: ALL

BEFORE V1

The takeoff should only be rejected if unacceptable airspeed variations occur below the indicated V1, and the pilot decides that there is sufficient runway remaining to stop the aircraft.

AFTER V1

Set thrust levers to TOGA
Rotate normally.
Follow SRS orders.

DURING INITIAL CLIMB

Set or maintain TOGA.
If the autopilot is engaged, use it ; but, be aware that automatic disengagement may occur, if $\alpha > \alpha$ prot.
Follow SRS orders (including use of full backstick, if demanded).

Note: If FD bars are unavailable, use an initial pitch attitude up to 17.5 ° with full backstick, if necessary. If needed, to minimize the loss of height, increase this pitch attitude.

Do not change configuration (gear, flaps), until out of shear.
Closely monitor the flight path and speed.
Recover smoothly to a normal climb, when out of shear.

RECOVERY TECHNIQUE AT LANDING

Applicable to: ALL

Set thrust levers to TOGA.
If the autopilot is engaged, use it ; but, be aware that automatic disengagement may occur, if $\alpha > \alpha$ prot.
Follow SRS orders.

Note: If FD bars are unavailable, use an initial pitch attitude up to 17.5 ° with full backstick, if necessary. If needed, to minimize the loss of height, increase this pitch attitude.

Do not change configuration.
Closely monitor the flight path and speed.
Recover smoothly to a normal climb, when out of shear.

GENERAL

Applicable to: ALL

1 For flight operations in icing conditions, *Refer to PRO-SUP-30 Operations in Icing Conditions*.
For ground operations on contaminated runways, *Refer to PER-TOF-CTA-20*.
The preparation and ground operation of the aircraft, after it has been sitting idle in very low temperatures, may present particular problems. In such cases, the flight crew should use the following procedures, which complement the normal operating procedures.
Ice accumulates on the aircraft when the air temperature approaches, or falls below, freezing (0 °C) and there is precipitation or condensation. Ice may also build up when the aircraft is exposed to any form of moisture, after the surfaces have been cold-soaked during previous cruise flight at high altitudes, after the aircraft has been refueled with cold fuel, or after it has been exposed to low overnight air temperatures.

EXTERIOR INSPECTION

Applicable to: ALL

PRELIMINARY COCKPIT PREPARATION (normal procedures)..... COMPLETED

APU is started and air conditioning is on.

ICE/SNOW..... REMOVE FROM WINDSHIELD/UPPER COCKPIT FUSELAGE

CAUTION	With ice or snow accumulated on the windshield/upper cockpit fuselage, and if the PROBE/WINDOW HEAT pb is turned on, melted snow running down from the cockpit windows could re-freeze on the fuselage area below, when the temperature is very low. This could create ice build up on the forward fuselage that could possibly disturb the airflow around the static/pitot probes.

PROBE/WINDOW HEAT.....ON

Note: Ensure that the probe covers are removed in order to prevent the probe covers from melting.

SURFACES.....CHECKED FREE OF FROST, ICE AND SNOW

All surfaces of the aircraft (critical surfaces : leading edges and upper surfaces of wings, vertical and horizontal stabilizers, all control surfaces, slats and flaps) must be clear of snow, frost and ice for takeoff.
Thin hoarfrost is acceptable on the upper surface of the fuselage.

Note: Thin hoarfrost is typically a white crystalline deposit which usually develops uniformly on exposed surfaces on cold and cloudless nights ; it is so thin that a person can distinguish surface features (lines or markings) beneath it.

On the underside of the wing tank area, a maximum layer of 3 mm (1/8 in) of frost will not penalize takeoff performance.

FOLLOWING EQUIPMENT.....CHECKED FREE OF FROST, ICE AND SNOW

- *Landing gear assemblies (lever locks) and tires, landing gear doors.*
- *Engine inlets, inlet lips, fans (check for rotation), spinners, fan exhaust ducts, reverser assemblies.*
- *Drains, bleeds, probes (pitots, static ports, TAT sensors, angle of attack sensors).*
- *Fuel tank ventilation.*
- *Radome.*
- *Verify that the commercial water supplies are not frozen and have been refilled (these should have been emptied prior to the cold soak).*

● **After first engine start**

PROBE/WINDOW HEAT.....AUTO

Heating will continue to operate but under automatic control.

DEICING/ANTI-ICING PROCEDURE ON GROUND

Applicable to: ALL

GENERAL

In all situations, it is the Captain's responsibility to decide if the ground crew must deice/anti-ice the aircraft, and/or if additional deicing/anti-icing treatment is required.

Before starting the deicing/anti-icing procedure, the flight crew must establish communication with the ground crew that will be applying the procedure.

CAUTION	- Make sure that the low or high-pressure ground connectors do not supply any external air to the aircraft. - If it is necessary for the ground crew to repeatedly anti-ice the aircraft, they must deice the surfaces with a hot fluid mixture before applying a new layer of anti-icing fluid.

Make sure that the ground crew uses the correct de-icing/anti-icing fluids, in accordance with Part A 8.2.3.

The aircraft can be deiced or anti-iced when the APU and engines are either stopped or running. However, do not start the engines when the ground crew is spraying fluid on the aircraft.

CAUTION	- The ground crew should take care when spraying deicing fluid, and make sure that the engine and APU do not ingest any fluid. - Do not move flaps, slats, ailerons, spoilers, or elevators, if they are not free of ice. - Always ensure that both the left and right sides of the aircraft receive the same, complete, and symmetrical deicing/anti-icing treatment.

Note: *In the case of frost formation on one or several areas of the wing surface, the captain can request a local de-icing application only on the affected areas. The captain shall take care that both wings must receive the same symmetrical treatment even if frost formation does not affect symmetrically both wings.*

BEFORE SPRAYING FLUID

CAB PRESS MODE SEL.....CHECK AUTO
ENG BLEED 1 + 2.....OFF
APU BLEED.....OFF
DITCHING pb .....ON

Outflow valve, pack valves, and avionic ventilation inlet and extract valves close.
This prevents de-icing fluid from entering the aircraft. Avionic ventilation is in a closed circuit with both fans running. In view of the low OAT, there is no time limit for this configuration.
However, in order not to affect passengers comfort, it is recommended to avoid packs inoperative for longer than 20 min.

Note: *If the "VENT AVNCS SYS FAULT" warning appears, reset the AEVC circuit breaker at the end of the aircraft de-icing procedure.*
AIR COND/AVNCS VENT/CTL D06 on 49VU.
AIR COND/AVNCS/VENT/MONG Y17 on 122 VU.

THRUST LEVERS.....CHECK IDLE
"AIRCRAFT PREPARED FOR SPRAYING"..... INFORM GROUND CREW

UPON COMPLETION OF THE SPRAYING OPERATION

DITCHING pushbutton.....OFF
OUTFLOW VALVE.....CHECK OPEN

On the ECAM PRESS page, confirm that the outflow valve indication reaches the open green position to avoid any unexpected aircraft pressurization.

ENG BLEED 1 + 2.....ON
PITOTS and STATICS (ground crew).....CHECK

CAUTION	When the OAT is low (below -5 °C) during snow/freezing rain precipitations and with crosswind conditions, melted snow or raindrops may drip from the cockpit windshields and freeze on the fuselage below. Ice may then build up and possibly disturb the airflow around the static/pitot probes, and result in unreliable air data measurements during takeoff. Therefore during taxi out before takeoff beware of this possible build up of ice. The area around static/pitot probes must be free of ice/snow before starting takeoff.

GROUND EQUIPMENT..... REMOVE
DE-ICING/ANTI-ICING REPORT..... RECEIVED

The information from ground personnel, who performed the de-icing and post-application check, must include (ANTI-ICING CODE) :

- *Type of fluid used*
- *The mix ratio of fluid to water (for example 75/25)*
- *When the holdover time began.*
- *Result of post application check; aircraft critical parts are clean.*

● **A few minutes after completion of spraying operation :**

APU BLEED..... ON

Note: If the fuselage has been sprayed, there is a risk of de-icing fluid ingestion by the APU air intake, resulting in specific odors, or smoke warnings. Therefore:

- *Keep the APU running with the APU BLEED OFF for about 5 min after spraying completion before setting the APU BLEED to ON,*
- *Consider APU BLEED OFF for takeoff.*

NORMAL PROCEDURE..... RESUME

Apply appropriate normal procedures. Pay special attention to the flight control check. In freezing precipitation, perform the appropriate checks to evaluate aircraft icing. Base the decision on whether to takeoff, or to re-protect the aircraft, on the amount of ice that has built up on the critical surfaces since the last de-icing, as revealed by a personal inspection from the inside and outside of the aircraft. Make this inspection before the holdover time expires, or just before takeoff.

SECURING THE AIRCRAFT FOR COLD SOAK

Applicable to: ALL

● **After switching off all bleeds, and before switching off AC power :**

DITCHING pushbutton..... ON

This closes the outflow valve, the pack valves, and the avionic ventilation inlet and extract valves.

PARKING BRAKE.....OFF

Check chocks in place, and release the parking brake to prevent brakes from freezing.

- **After switching off the batteries :**

DITCHING pushbutton.....OFF
PROTECTIVE COVERS.....INSTALL

Install protective covers and plugs to protect the aircraft and engines from snow and ice.

WATER SYSTEM DRAINING

Applicable to: ALL

Drain the water system, if the OAT requires it, as shown below :

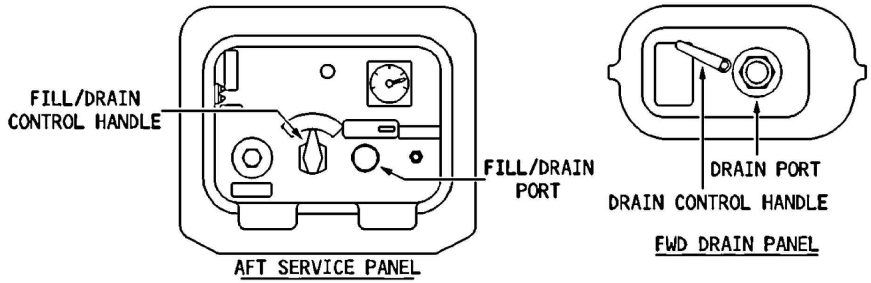
Configuration			Exposure time	Water tank drain
Air Conditioning	**Cabin temperature**	**Outside Air Temperature**		
ON	Above 10 °C (50 °F)	Between 0 °C and -15 °C (32 °F and 5 °F)	None	Not required
		Below -15 °C (5 °F)	1 h 15 min	Required
OFF		Between 0 °C and -7 °C (32 °F and 19.4 °F)	1 h 30 min	
		Between -7 °C and -15 °C (19.4 °F and 5 °F)	0 h 30 min	
		Below -15 °C (5 °F)	Any	

FOR DRAINING WATER PROCEDURE

Applicable to: ALL

INTRODUCTION

This procedure uses electrical power.



ACCESS PLATFORM(S).....PUT IN POSITION

SHUTOFF VALVE IN GALLEYS/TOILETS..... CHECK OPEN
FWD/AFT ACCESS PANEL DOORS.....OPEN
DRAIN PORT CAPS..... REMOVE

Remove drain port caps on forward drain and aft service panels.

DRAIN HOSES.....CONNECT

Connect drain hoses to :

- *the drain port on the forward drain panel.*
- *the full/drain port on the aft service panel.*

ON THE FORWARD DRAIN PANEL

DRAIN CONTROL HANDLE.....TURN LEFT

Turn the control handle to drain.

ON THE AFT SERVICE PANEL

FILL/DRAIN CONTROL HANDLE.....TURN TO “DRAIN” AND PULL

Turn the handle to the “DRAIN” position and pull it out to its mechanical stop to drain.
The indicator light comes on.

WHEN THE WATER SYSTEM IS DRAINED

In freezing conditions, the drain valves must stay open to prevent damage to the system. Do not put on the caps and leave the access door open.

DRAIN HOSES.....DISCONNECT
PANELS..... CLEAN AND DRY
ACCESS PLATFORM(S)..... REMOVE

GENERAL

Applicable to: ALL

The following procedures are recommended for operators who fly routes that could take their aircraft through the material emerging from active volcanoes.
Because volcanic ash is composed of very abrasive particles it can do serious damage to aircraft parts and impair the operation of aircraft systems significantly.
Operators should avoid airports with volcanic ash deposits if possible. If operations at such airports are unavoidable, operators should heed the following recommendations.
When operation on airport contaminated by sand or dust is expected, based on their experience and the amount of contaminant, operators can consider applying most of the on-ground recommendations in order to help preventing contamination of aircraft systems.

GROUND OPERATIONS ON AIRPORTS COVERED WITH ASH, SAND OR DUST

Applicable to: ALL

PREPARATION OF THE COCKPIT

APU .....DO NOT USE

Use the APU only to start the engines, and then only if ground power is not available, particularly in case of volcanic ash.
Request ground supply for air conditioning and for electricity.

WINDSHIELD WIPERS..... DO NOT USE

Do not use windshield wipers to remove ash, or for anything else.

BRAKE PERFORMANCE.....CONSIDER PENALTY

A layer of volcanic ash on the runway may degrade braking efficiency. Treat takeoff performance as if it is similar to that on a wet runway (dry ash) or on slush (wet ash).

EXTERIOR INSPECTION

SURFACES AND EQUIPMENT.....CHECK FREE OF DEPOSITS

Ground maintenance should remove ash, sand or dust that has settled on exposed lubricated surfaces and could penetrate seals or enter the engine gas path, air conditioning system, air data probes, access doors and panels and other orifices on the aircraft.

ENGINE/APU INLETS..... CHECK FREE OF DEPOSITS

Inspect the inlets and order them cleaned of deposit. Have the area within 25 ft of the engine inlet cleaned of volcanic ash (as much as practical).

ENGINE START

Use external pneumatic supply for starting the engines, if it is available. (*Refer to PRO-SUP-70 Engine Start with External Pneumatic Power*).

ENGINE..... CRANK

Before starting the engines, ventilate them by dry cranking at maximum motoring speed for two minutes. This will blow out any contaminant ash that may have entered the booster area.

TAXI

After releasing the brakes:

THRUST LEVERS..... ADVANCE SMOOTHLY THEN MOVE TO IDLE WHEN ROLLING

Advance the levers smoothly to the minimum required for breakaway.
Avoid making sharp or high-speed turns.

ENG 1, ENG 2 BLEED.....OFF

Keep bleed valves closed for taxiing, particularly in volcanic ash.

In case of crosswind when performing a 180 ° turn on the runway, initiate this turn with the nose down wind in order to prevent ash, sand or dust ingestion.

TAKEOFF

Allow ash, sand and dust (if present) to settle on runway before starting the takeoff roll.
Use the rolling takeoff technique if possible.
Adjust progressively engine power as for normal takeoff procedures.
To prevent contamination of air conditioning system, consider a takeoff with packs OFF.

LANDING

REVERSERS..... USE AS LIGHTLY AS FEASIBLE

If it appears that maximum reverse thrust will be needed, apply reverse thrust when the main landing gear touches down. Limit the use of reverse thrust as much as possible, because reverse flow may throw up ash, sand, dust and impair visibility.

Note: The abrasive effect of volcanic ash on windshields and landing lights may reduce the pilot's visibility for approach and landing significantly. Consider diverting to an airfield where it is possible to use AUTOLAND.

BRAKE PERFORMANCE.....CONSIDER PENALTY

A layer of volcanic ash on the runway may degrade braking efficiency. Treat landing performance as if it is similar to that on a wet runway (dry ash) or on slush (wet ash).

SECURING THE AIRCRAFT

If the aircraft is to be parked at an airport contaminated with volcanic ash, sand or dust, install engine inlet covers and other protective covers and plugs.
In addition:

- **After switching off all bleeds and before switching off AC power:**
  DITCHING pb ..... ON
  This closes the outflow valve, pack valves and avionic ventilation extract valve.

- **After switching off the batteries :**
  DITCHING pb .....OFF
  PROTECTIVE COVERS.....INSTALL
  Install protective covers/plugs, to protect the aircraft/engines from volcanic ash.

FLIGHT OPERATIONS WITH VOLCANIC ASH

Applicable to: ALL

Avoid flight into areas of known volcanic activity.
If a volcanic eruption is reported while the aircraft is in flight, reroute the flight to remain well clear of the affected area (volcanic dust may spread over several hundred miles). If possible, stay on the upwind side of the volcano (at least 20 nm upwind of it if it is erupting).

In hours of darkness or in meteorological conditions that obscure volcanic dust, one or several of the following phenomena indicate that the aircraft may be flying into ash cloud:

- smoke or dust in the cockpit,
- acrid odor similar to that of electrical smoke,
- at night, the appearance of St. Elmo's fire and static discharges around the windshield,
- bright white or orange glow appearing in the engine inlets,
- sharp, distinct beams from the landing lights,
- multiple engine malfunctions, such as rising EGT, decreasing power, stall, or flame out.

For the in-flight procedure, *Refer to VOLCANIC ASH ENCOUNTER procedure* and *Refer to QRH/ABN-80 VOLCANIC ASH ENCOUNTER*.

REPORTING

- Whenever operating in areas affected by volcanic activity, flight crews should be aware of volcanic reporting procedures and be familiar with the use of the ICAO Special Air Report of Volcanic Activity (Model VAR).
- If the aircraft encounters a volcanic ash cloud, the flight crew should report the location, altitude, and direction of drift for the ash cloud to ATC, flight conditions and crew duties permitting.

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SPRAY PATTERN

Applicable to: ALL

There is a little chance of the engines ingesting fluid, which in any case should not jeopardize safety. The risk of ingestion is independent of the depth of the contaminant.

TAXIING

Applicable to: ALL

FOLLOWING TAXIING PROCEDURES.....CONSIDER

- *Avoid high thrust settings.*
- *When taxiing on slippery surfaces, stay well behind preceding aircraft.*
- *Taxi at low speed. Note that antiskid does not operate at low taxi speeds.*
- *On slippery taxiways during turns with large nose wheel steering angles, noise and vibration may result from the wheels slipping sideways. Keep speed as low as possible to make a smooth turn with minimum radius. Differential power may be needed.*

● **If taxiing in icing conditions with precipitation on runways and taxiways contaminated with slush or snow :**

Before takeoff keep flaps/slats retracted until reaching the holding point on the takeoff runway to avoid contaminating the mechanism. Hold the BEFORE TO checklist at FLAP SETTING and finish it after extending flaps/slats.

When taxiing in after landing, do not retract the flaps/slats to avoid damage of the structure. After engine shutdown make a visual inspection to determine that the flap/slat mechanism is free of contamination.

When the mechanism is clean, use the following procedure to retract the flaps/slats before the aircraft electric network is de-energized :

- *Set the YELLOW ELEC PUMP to ON*
- *Check that the BLUE ELEC PUMP is in the AUTO position*
- *Set the BLUE PUMP OVRD to ON*
- *Retract the FLAPS and monitor retraction on ECAM page.*
- *Select off the YELLOW ELEC PUMP and BLUE PUMP OVRD and resume with normal procedure.*

Note: - *On contaminated runways and taxiways, the radio altitude indications may fluctuate and auto call outs or GPWS warnings may be activated. Disregard them.*
- *During taxi on snowy runways, the radio altimeters may not compute any data and the ECAM warnings 'DUAL ENG FAILURE', 'ANTI ICE CAPT TAT FAULT', 'ANTI ICE F/O TAT FAULT', 'L/G SHOCK ABSORBER FAULT' may be triggered. Disregard these warnings.*

TAKEOFF

Applicable to: ALL

FOLLOWING TAKEOFF PROCEDURES..... CONSIDER

- *For contaminated runways, select MAX TO.*
- *Do not abort takeoff for minor deficiencies even at low speeds.*
  If you have to abort takeoff, maintain directional control with the rudder and small inputs to the nose wheel. If necessary, use differential braking to regain the center line when stopping distance permits.
- *Do not lift the nose wheel before VR in an attempt to avoid splashing slush on the aircraft, because this produces additional aerodynamic drag.*
- *Rotate, lift off and retract gear and high lift devices in the normal manner.*

LANDING

Applicable to: ALL

FOLLOWING LANDING PROCEDURES.....CONSIDER

- *Avoid landing on contaminated runways if the antiskid is not functioning. The use of autobrake LOW or MED is recommended provided that the contamination is evenly distributed.*
- *Approach at the normal speed.*
- *Make a positive touchdown after a brief flare.*
- *As soon as the aircraft has touched down, lower the nose wheel onto the runway and select maximum reverse thrust.*
  Do not hold the nose wheel off the ground.
- *If necessary, the maximum reverse thrust can be used until the aircraft is fully stopped.*
- *If the runway length is limiting, apply the brakes before lowering the nose gear onto the runway, but be prepared to apply back stick to counter the nose down pitch produced by the brakes application. (The strength of this pitching moment will depend on the brake torque attainable on the slippery runway).*
- *Maintain directional control with the rudder as long as possible, use nose wheel steering with care.*
- *When the aircraft is at taxi speed, follow the recommendations for taxiing.*

Note: *If there is snow, visibility may be reduced by snow blowing forward at low speeds if reversers are not cancelled.*

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LOW VISIBILITY OPERATIONS

Applicable to: ALL

INTRODUCTION

Refer to Part A 8.4.1 for company policy.
The Captain occupying the LHS shall be PF.
The requirements of this section are provided as a supplement to the Normal Procedures.

TAXING

Speeds in excess of 10 kt should be avoided. The PM should use the airport chart and closely monitor the position of the aircraft. Expected headings during the taxi should be confirmed by cross-checking with the PFD/ND heading.
Complete the before takeoff procedures either before taxiing or upon reaching the holding point.

LINE UP AND TAKEOFF

Select the LS pb or ROSE LS on the EFIS CTL in order to monitor the localizer on the PFD/ND and confirm that the aircraft is lined up with the centerline of the correct runway.
During the takeoff roll, the centreline lights will appear to stream, making it easier to assess the aircraft's position relative to the centreline. The yaw bar will also provide centerline guidance (up to 30 ft RA). During the rotation, the Captain should positively transfer to instruments as soon as the visual cues disappear.

1 DESCENT

STRATEGY

Check the ECAM STATUS page for any degraded approach capability. Check any system fault against the table in QRH OPS.04 that lists the equipment required for the various landing capabilities.
Irrespective of the actual weather conditions, the approach shall be planned using the best approach capability, normally CAT 3 DUAL, and all available automated systems subject to aircraft status. The following minimum autoflight requirements shall be observed:

	Autoland	Auto-rollout	A/THR	Auto-callout
CAT 3B	Required	Required	Required	Required
CAT 3A	Required	Preferred	Required	Required
CAT 2	Preferred (1)	Preferred	Preferred	Preferred

Note: *(1) If manual landing is required, autopilot shall be disengaged by 80 ft RA.*

MINIMA

Port Page and Part A 8.4.1 refers.

DH	RADIO / DH on PERF APPR page
With DH	Set DH from Port Page
NO DH	Set "NO" (1)

Note: (1) This will generate an autocall of "100", and there will be no "Minimum" call.

BRIEFING

The normal arrival briefing should be supplemented with:

- Confirm LVP in force (clearance to fly a Cat 2/3 approach satisfies this requirement).
- A review of the LVO and autoland requirements on the Port Page.
- For autoland, confirmation that the wind is within the autoland limits.
- The category of approach to be flown.
- Reversion capability.
- A review of task sharing, standard calls and the actions in the event of a missed approach.

ALERT HEIGHT

The alert height is 200 ft RA. FCTM NO-150 refers.

AUTOMATIC APPROACH AND LAND EVENT SEQUENCE

RAD ALT / ft	EVENT
700	ILS frequency and course frozen in receiver.
≤400	Land mode engages. 'LAND' annunciated on the FMA. This mode can only be disengaged by selecting Go-around.
200	Alert Height. CAT 3 DUAL and CAT 3 SINGLE annunciations are frozen. A failure below this height causing a downgrade of the aircraft's capability would not cause any annunciation change on the FMA.
≤50	Flare mode engages. 'FLARE' annunciated on FMA.
≤40	A/THR Retard mode engages commanding idle thrust. Alignment with centreline (not annunciated).
10	Autocall "Retard."
0	Rollout mode engages. 'ROLLOUT' annunciated on FMA.

FINAL APPROACH AND LANDING

GENERAL

During the approach, the PM shall remain head down throughout until taxi speed is achieved.
Landing lights should not be used during low visibility approaches.

REVERSION

If LAND green is not annunciated by 350 ft RA, a go-around is mandatory unless there are sufficient visual references.
For any system fault that does not incur a landing capability downgrade on ECAM STATUS or FMA, the fault shall be checked against the table in QRH OPS.04 that lists the equipment required for the various landing capabilities.
If a reversion to a degraded approach capability occurs and the RVR is within limits for the approach to be continued with the new capability:

- Above 1 000 ft AAL, complete ECAM actions, amend the DH in the PERF APPR page and continue the approach.
- Below 1 000 ft AAL, a go-around is recommended.

If a reversion to a degraded approach capability occurs and the RVR is below the minima for the new approach capability:

- Above 1 000 ft AAL, the approach may be continued to 1 000 ft in anticipation of an improvement in RVR. Complete ECAM actions, amend the DH in the PERF APPR page and continue the approach.
- Below 1 000 ft AAL, a go-around is mandatory.

The autocall at 1 000 ft RA may be utilized, when appropriate, to meet the above requirements.

BELOW THE ALERT HEIGHT

As a general rule, in Cat 3 DUAL fail operational mode, a single failure that does not illuminate the AUTOLAND warning light does not require a go-around. Unless there are sufficient visual references, a go-around is mandatory:

- If the AUTOLAND warning light illuminates.
- If during an autoland, FLARE is not annunciated by 30 ft RA. In this case, the PM shall call "No flare."

AFTER LANDING

If visual reference is lost after touchdown, a go-around should not be attempted. When clearing the runway, the PM should make reference to the airport chart for taxiing in.
Complete the After Landing Procedures once clear of the runway and before commencing taxi in.

PILOT INCAPACITATION

In the event of pilot incapacitation the approach may be continued as long as the PFD annunciates Cat 2 or better. The pilot incapacitation checklist need not be actioned until after completion of the landing roll.

2 AUTOLAND OPERATIONS ON RUNWAYS NOT APPROVED FOR LVO, OR WHEN LVP ARE NOT IN FORCE

Weather conditions must meet Cat 1 ILS RVR requirements or better. Confirm AUTOLAND is approved on the Port Page. Insert the Cat 1 ILS minima as the MDA in the MCDU PERF APPR page. LVO procedures apply.

3 TASK SHARING FOR LVO

	RAD ALT	PF	PM (1)
	350	• Announce "Land green" when displayed on FMA. • Check ILS course on PFD. • Commence outside scanning.	
WITH DH	DH + 100	• Announce "Check."	• Monitor auto callout "Hundred Above."
	DH	• Announce "Continue" or "Go-around, Flaps" as appropriate and execute.	• Monitor auto callout "Minimum."
NO DH	100	• If no failure detected, announce "Continue."	• Monitor auto callout "One Hundred."

Continued on the following page

Continued from the previous page

	RAD ALT	PF	PM (1)
	30		• Monitor auto callout. • Announce "Flare" when displayed on FMA. • Monitor thrust reduction and flare by reference to instruments.
	10	• Retard thrust levers to idle. • Monitor lateral guidance by external reference. • Select and control reverse thrust. • Disengage the APs at the end of the rollout.	• Monitor engine parameters. • Announce "Rollout" when displayed on FMA. • Check and call "Spoilers, Reverse green, Decel." • Announce "Seventy knots."

Note: (1) For Cat 2 approaches, PM must make the calls if the autocallout function is inoperative.

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HOT WEATHER GROUND CONDITIONS

Applicable to: ALL

The Bleed duct overheat detection sensing units are prone to deterioration in a high humidity, high temperature environment.
This leads to a gradual lowering of the overheat detector trigger temperature.
On ground, high temperature conditions may cause overheating to be spuriously detected around the bleed ducts in the wings, resulting in AIR L(R) WING LEAK warnings.
CX Engineering monitor individual aircraft displaying the above noted trend. In some cases, they will raise a NTC in the Aircraft Maintenance Logbook requesting the crew to perform the following procedure in order to minimize or avoid spurious warnings.

- **These recommendations apply when the OAT is >30 C and the expected transit time is greater than 1 hour.**

  1. Do not retract flaps after landing to less than Flap 1 position.

     Note: This will leave the leading edge slats partially extended and the flaps in the 1+F position.

  2. Ensure that the required flap setting for the subsequent takeoff is entered into the MCDU PERF T/O page.
  3. After engine start, set the flap lever to the required takeoff flap setting.

Note: It is permissible to leave the flap at position 1 even when the crew are not in transit with the aircraft. During the transit period, for safety reasons, obtain ground clearance before moving the flap lever.

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TYPHOON CONDITIONS

Applicable to: ALL

Typhoon conditions are associated with very gusty winds and it is the gusts that must be catered for. Large airspeed changes can occur in these conditions. An initial approach speed of VLS +20 kt to 30 kt is acceptable.

On the final stages of the approach consideration should be given to the fact that VAPP takes into account a wind correction as well as minimum ground speed. Speeds significantly in excess of the VAPP at the threshold of a limited length runway may compromise landing distance required. In this case a go-around should be initiated.

It is recommended that approaches in very gusty conditions be flown in MANUAL THRUST (to dampen harsh thrust reactions) and MANAGED SPEED (to benefit from the in built protections of the FMGS).

MAXIMUM WIND FOR LANDING

Applicable to: ALL

Landings should not be made at airports where frequent gusts of 55 kt or greater are being experienced. This reduces the potential damage to aircraft by wind-blown ground equipment.

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LIMITATIONS

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LIM-PLP PRELIMINARY PAGES

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LIST OF EFFECTIVE TEMPORARY DOCUMENTARY UNITS

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LIM-11 Weight and Center of Gravity Limits

LIM-12 Environmental Envelope and Airport Operations

LIM-13 Speed Limitations

LIM-21 Air Conditioning / Pressurization / Ventilation

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LIM-32 Landing Gear

LIM-34 Navigation

LIM-35 Oxygen

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LIM-70 Power Plant

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M(1)	Localization	DU Title	DU identification	DU date
	LIM-22-20	**Automatic Landing in Johannesburg**	00013685.0001001	30 MAR 12
	Criteria: IAE, K2113, SA **Applicable to: ALL** *Impacted DU: NONE*			

(1) Evolution code : N=New, R=Revised, E=Effectivity

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LIMITATIONS

GENERAL LIMITATIONS

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LIM-10-PLP PRELIMINARY PAGES

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FLIGHT MANEUVERING LOAD ACCELERATION LIMITS.... D

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GENERAL

Applicable to: ALL

This section includes the limitations required by the regulations and contained in the Flight Manual. All references to airspeed, Mach and altitude relate to indicated airspeed, indicated Mach, and pressure altitude, unless otherwise noted.

KIND OF OPERATIONS

Applicable to: ALL 320

This airplane is certified in the public transport category (passengers and freight) for day and night operations, in the following conditions when the appropriate equipment and instruments required by the airworthiness and operating regulations are approved, installed, and in an operable condition :

- VFR and IFR
- Extended overwater flight
- Flight in icing conditions
- Maximum number of passenger seats : 180.

KIND OF OPERATIONS

Applicable to: ALL 321

This airplane is certified in the public transport category (passengers and freight) for day and night operations, in the following conditions when the appropriate equipment and instruments required by the airworthiness and operating regulations are approved, installed, and in an operable condition :

- VFR and IFR
- Extended overwater flight
- Flight in icing conditions
- Maximum number of passenger seats : 220.

MINIMUM FLIGHT CREW

Applicable to: ALL

The minimum flight crew consists of 2 pilots.

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Applicable to: ALL

Clean configuration..... –1 g to +2.5 g
Slats and flaps extended.....0 g to +2 g
Slats extended and flaps retracted.....0 g to +2 g

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LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITS

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Center of Gravity Limits.....A
Weight Limitations.....B

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LIM-11 Center of Gravity Limits	A	1	Improvement of illustration quality.
LIM-11 Center of Gravity Limits	A	2	Improvement of illustration quality.
LIM-11 Center of Gravity Limits	A	3	Improvement of illustration quality.

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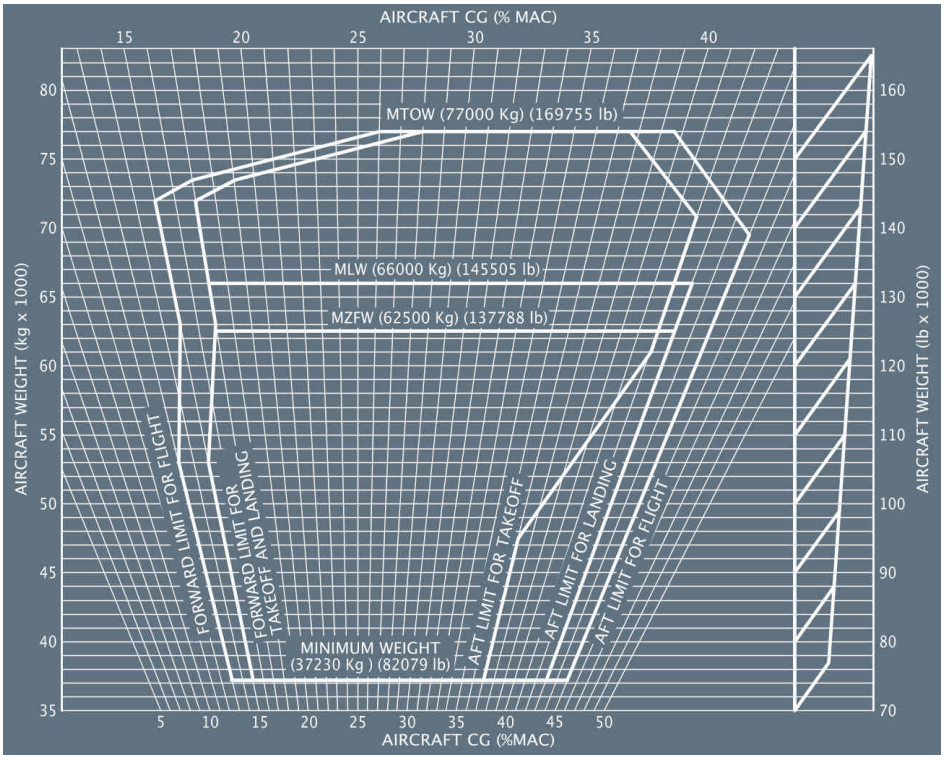
CENTER OF GRAVITY LIMITS

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

1

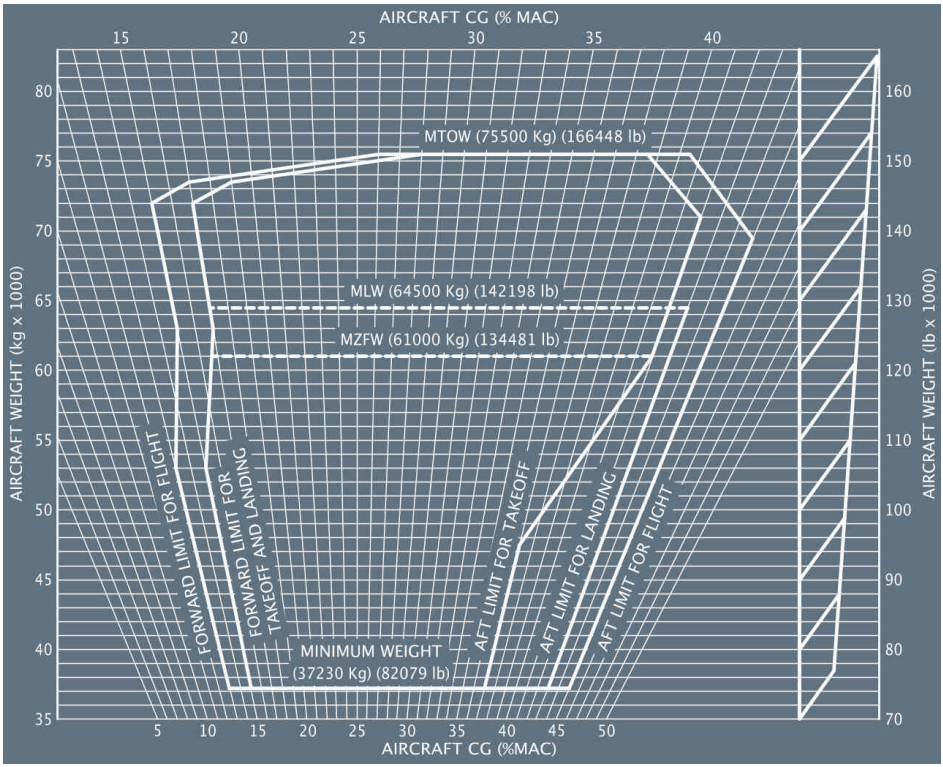


- CG limits are given in percentage of the reference chord length aft of the leading edge.
- The reference chord length is 4.193 m (13.76 ft). It is 16.31 m (53.51 ft) aft of the aircraft nose.
- The CG must always be within these limits, regardless of fuel load.

CENTER OF GRAVITY LIMITS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

2

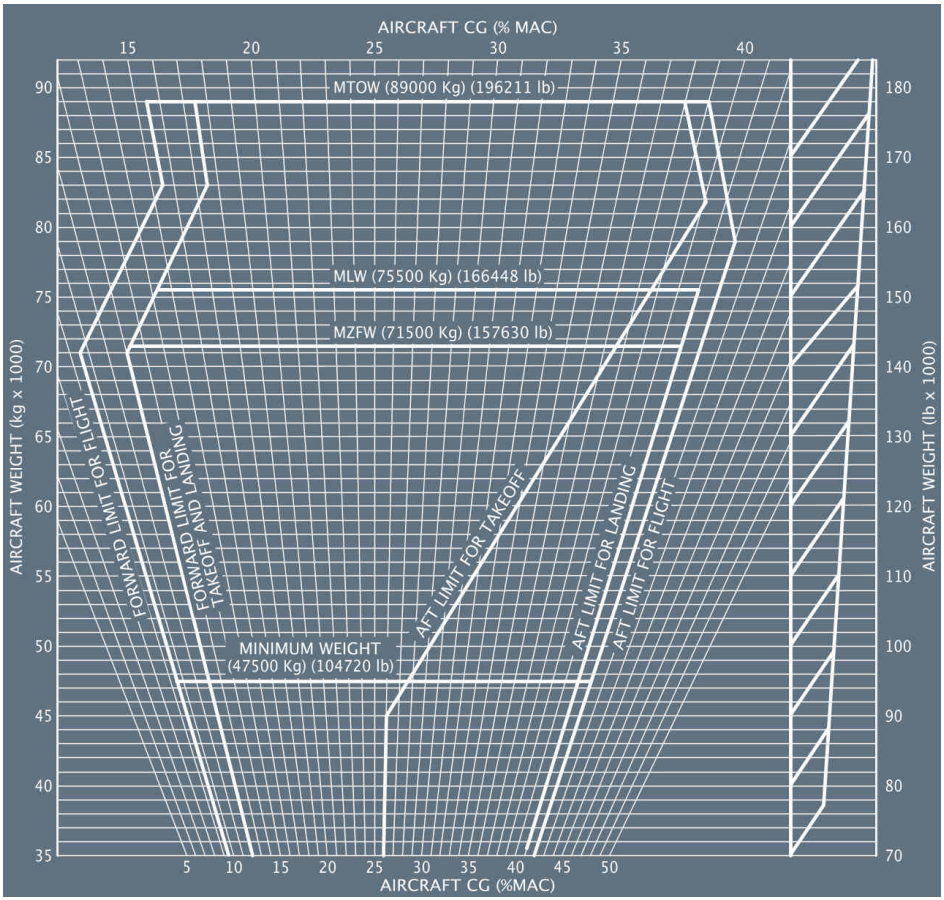


- CG limits are given in percentage of the reference chord length aft of the leading edge.
- The reference chord length is 4.193 m (13.76 ft). It is 16.31 m (53.51 ft) aft of the aircraft nose.
- The CG must always be within these limits, regardless of fuel load.

CENTER OF GRAVITY LIMITS

Applicable to: ALL 321

3



- CG limits are given in percentage of the reference chord length aft of the leading edge.
- The reference chord length is 4.193 m (13.76 ft). It is 20.58 m (67.53 ft) aft of the aircraft nose.
- The CG must always be within these limits, regardless of fuel load.

WEIGHT LIMITATIONS

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

Maximum taxi weight.....77 400 kg (170 637 lb)
Maximum takeoff weight (brake release).....77 000 kg (169 755 lb)
Maximum landing weight.....66 000 kg (145 505 lb)
Maximum zero fuel weight.....62 500 kg (137 788 lb)
Minimum weight.....37 230 kg (82 079 lb)
In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

WEIGHT LIMITATIONS

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

Maximum taxi weight.....75 900 kg (167 330 lb)
Maximum takeoff weight (brake release).....75 500 kg (166 448 lb)
Maximum landing weight.....64 500 kg (142 198 lb)
Maximum zero fuel weight.....61 000 kg (134 481 lb)
Minimum weight.....37 230 kg (82 079 lb)
In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

WEIGHT LIMITATIONS

Applicable to: ALL 321

Maximum taxi weight.....89 400 kg (197 093 lb)
Maximum takeoff weight (brake release).....89 000 kg (196 211 lb)
Maximum landing weight.....75 500 kg (166 449 lb)
Maximum zero fuel weight.....71 500 kg (157 630 lb)
Minimum weight.....47 500 kg (104 720 lb)
In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

LIMITATIONS

ENVIRONMENTAL ENVELOPE AND AIRPORT OPERATIONS

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Airport Operations and Wind Limitations....B

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Localization Title	Toc Index	ID	Reason
LIM-12 Environmental Envelope	A	1	DU revised to improve illustrations.
LIM-12 Environmental Envelope	A	2	DU revised to improve illustrations.
LIM-12 Environmental Envelope	A	3	DU revised to improve illustrations.
LIM-12 Environmental Envelope	A	4	DU revised to improve illustrations.
LIM-12 Airport Operations	B	5	Content revised to delete the reference to the FCOM PRO-SUP-91-Crosswind as these information are now provided in this FCOM LIM section.
LIM-12 MAXIMUM CROSSWIND ON CONTAMINATED RUNWAYS	B	6	Documentation update: Addition of "MAXIMUM CROSSWIND ON CONTAMINATED RUNWAYS" documentary unit
LIM-12 Takeoff Limitations on Contaminated Runways	B	7	Documentation update: Addition of "Takeoff Limitations on Contaminated Runways" documentary unit

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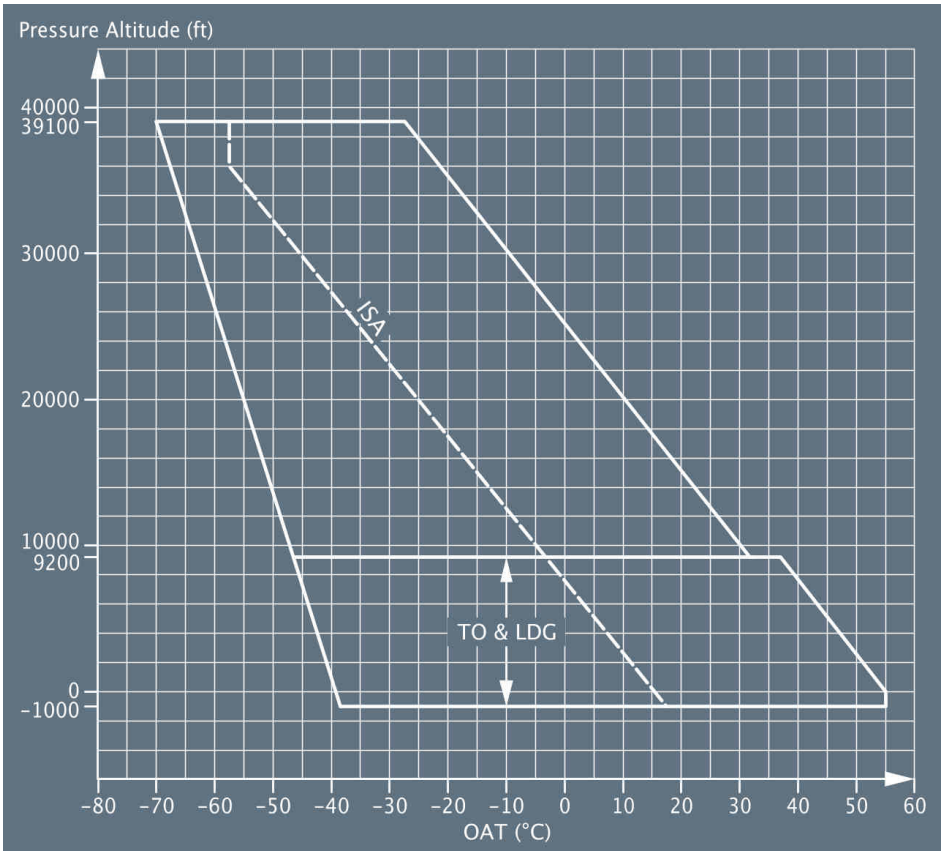
ENVIRONMENTAL ENVELOPE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

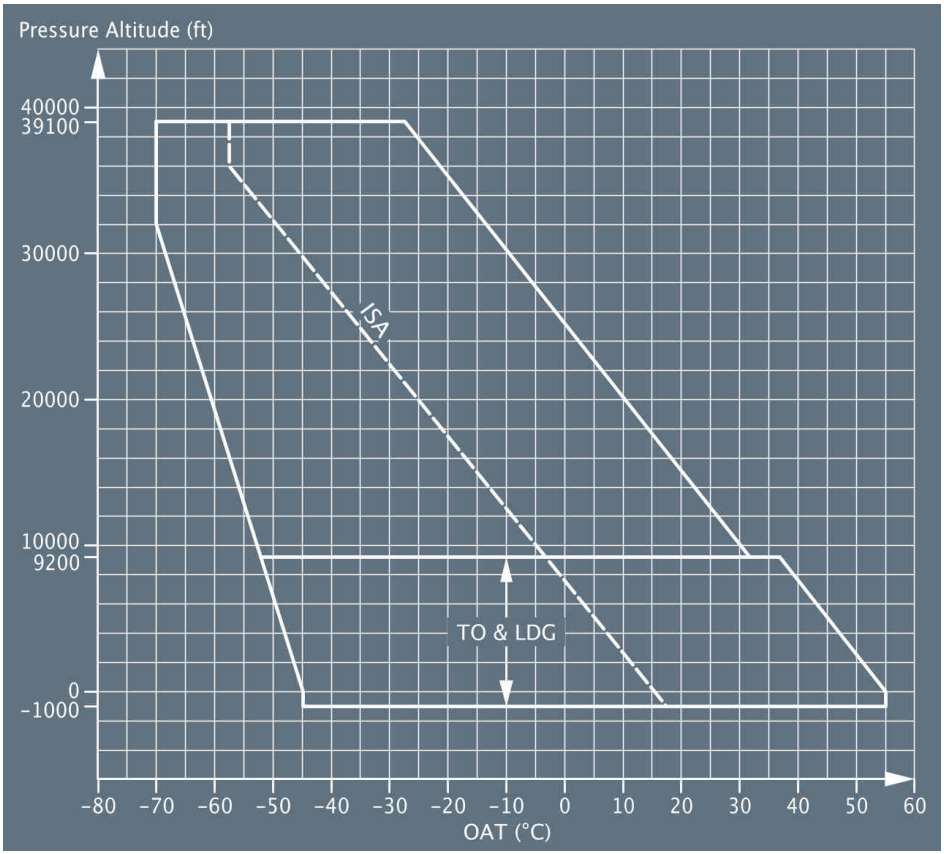
1



ENVIRONMENTAL ENVELOPE

Applicable to: B-HTD, B-HTE, B-HTF

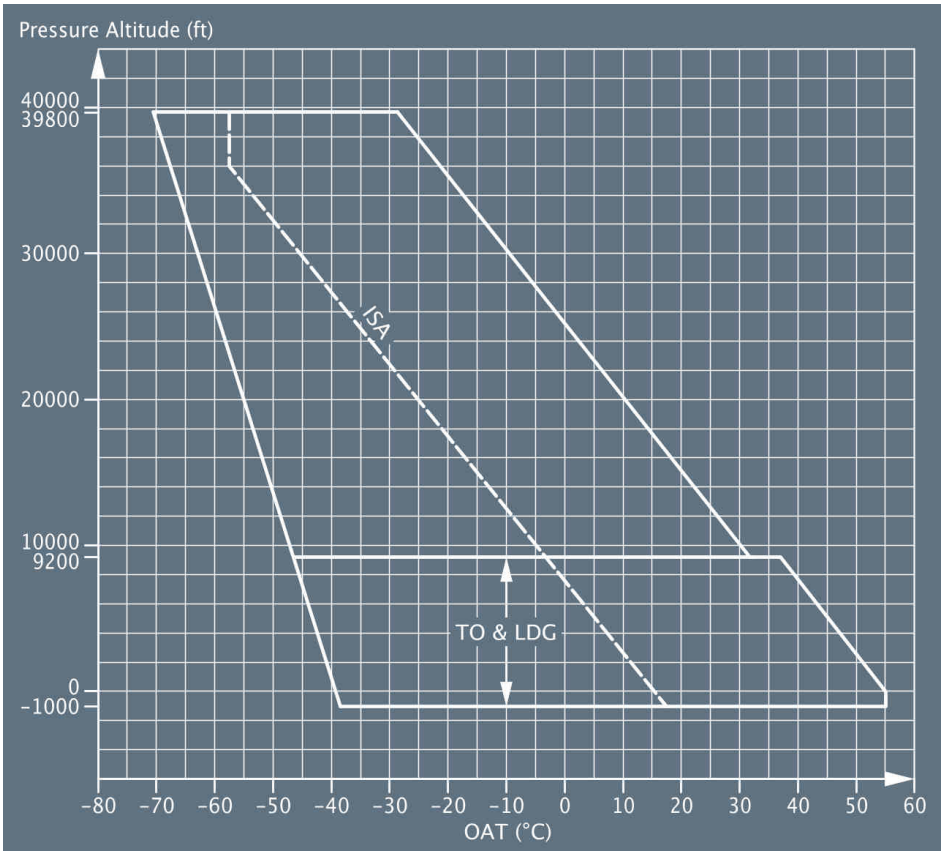
2



ENVIRONMENTAL ENVELOPE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

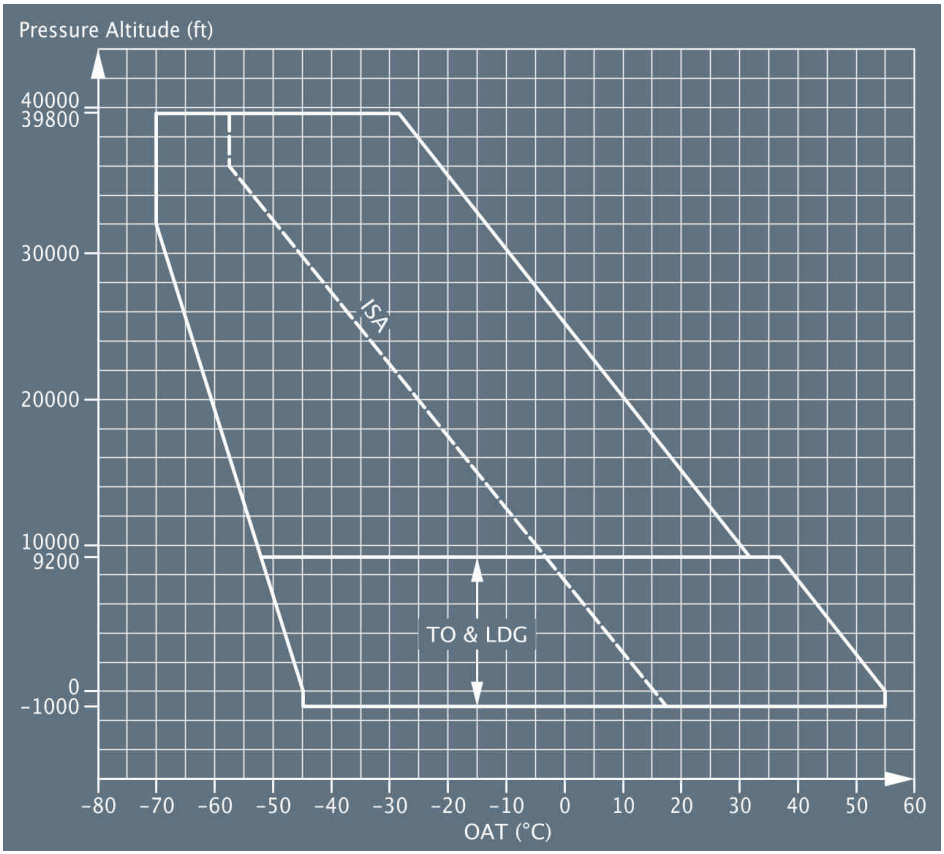
3



ENVIRONMENTAL ENVELOPE

Applicable to: B-HTG, B-HTH, B-HTI

4



AIRPORT OPERATIONS AND WIND LIMITATIONS

Applicable to: ALL

5 Runway slope (mean)..... ±2 %
Runway altitude..... 9 200 ft
Nominal runway width..... 45 m

Wind for takeoff and landing:

Maximum demonstrated crosswind.....38 kt (gust included)

Note: *The maximum demonstrated crosswind value is not an Airplane Flight Manual (AFM) limitation : It is the maximum crosswind condition experienced during the aircraft certification campaign. Airbus recommends that operators should not intentionally operate in crosswinds that exceed this value.*

Maximum tailwind for takeoff..... 15 kt
Maximum tailwind for landing ..... 15 kt

Note:
- *The maximum tailwind for automatic landing and rollout remains 10 kt.*
- *FLAPS FULL selection is recommended for landing with 15 kt tailwind.*

Wind for passenger/cargo door operation:

Maximum wind for passenger door operation:..... 65 kt
Maximum wind for cargo door operation: 40 kt (or 50 kt, if the aircraft nose is oriented into the wind, or the cargo door is on the leeward side).
The cargo door must be closed, before the wind speed exceeds 65 kt.

6

Maximum Crosswind on Contaminated Runways

Runway Condition	Max Crosswind for takeoff (Gust included)	Max Crosswind for landing (Gust included)
Damp Wet	38kt	38kt
3 mm (1/8") or less of • Slush • Dry Snow • Wet Snow Frost Compacted Snow (OAT at or below -15°C)	29kt	29kt
Slippery when wet Compacted Snow (OAT at or above -15°C) More than 3 mm (1/8") depth of: • Dry Snow - max 130 mm (5") • Wet Snow - max 30 mm (1 1/8")	25kt	25kt
More than 3 mm (1/8") depth of: • Water - max 12.7 mm (1/2") • Slush - max 12.7 mm (1/2")	20kt	20kt
Ice (cold & dry)	15kt	15kt

Note: *The maximum crosswind values given in the above table are recommended values based on computations.*

7

TAKEOFF LIMITATIONS ON CONTAMINATED RUNWAYS

Takeoff is not recommended on the following runway conditions:

- Wet ice
- Water on top of Compacted Snow
- Dry Snow or Wet Snow over Ice

LIMITATIONS

SPEED LIMITATIONS

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LIM-13-PLP PRELIMINARY PAGES

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MAXIMUM OPERATING SPEED VMO/MMO....A
Maximum Design Manoeuvering Speed VA....B
MAXIMUM DESIGN MANOEUVERING SPEED VA....C
Buffet Onset....D
Minimum Control Speeds....E
Maximum Flaps/Slats Speeds....F
GEAR DOWN SPEEDS....G
MAXIMUM TIRE SPEED....H
WINDSHIELD WIPERS IN USE....I
COCKPIT WINDOW OPEN....J
TAXI SPEED....K
STALLING SPEEDS....L
Stalling Speeds (Basic Forward C.G.)....M
Stalling Speeds (Alternate Forward C.G.)....N

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Localization Title	Toc Index	ID	Reason
LIM-13 Buffet Onset	D	1	Improvement of illustration quality.
LIM-13 Buffet Onset	D	2	Improvement of illustration quality.

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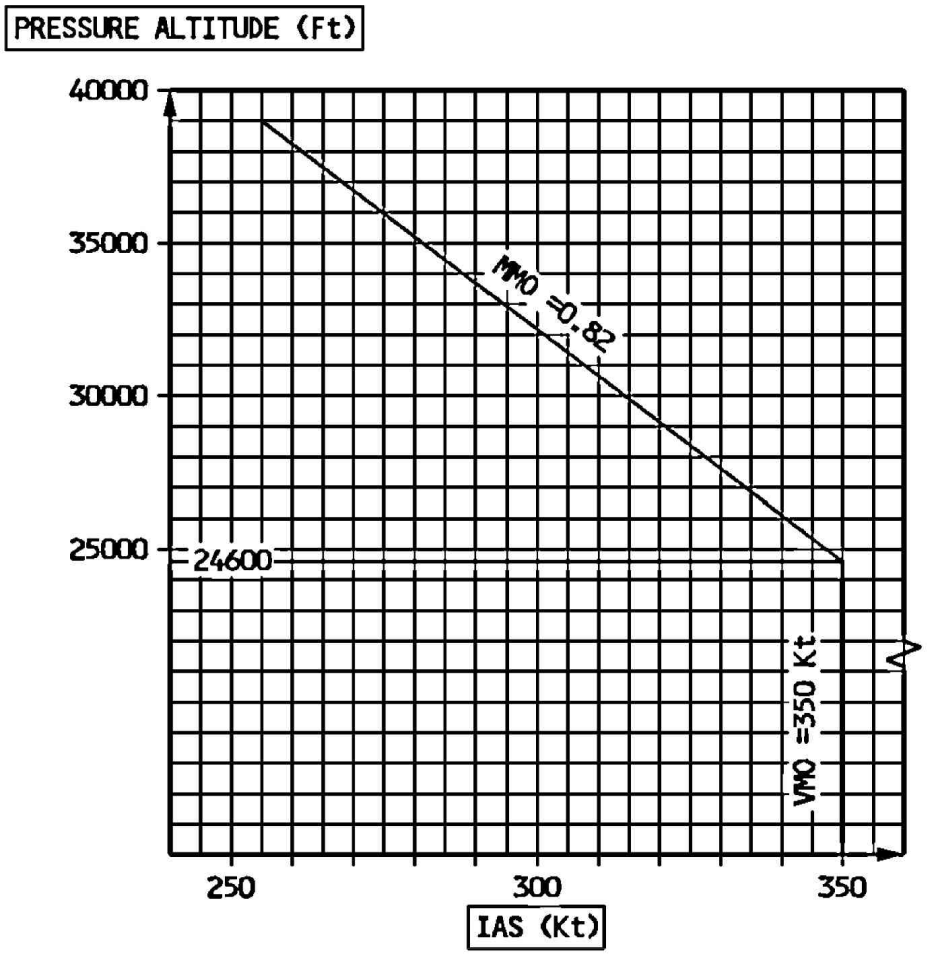
MAXIMUM OPERATING SPEED VMO/MMO

Applicable to: ALL

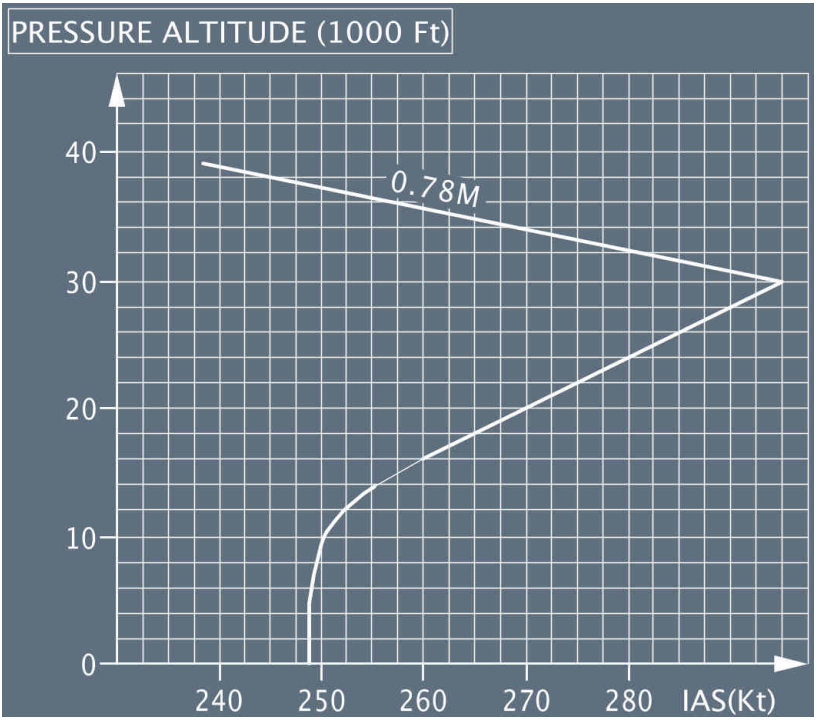


The maximum operating limit speed VMO/MMO may not be deliberately exceeded in any regime of flight.

MAXIMUM DESIGN MANOEUVERING SPEED VA

Applicable to: ALL 320

(Applies in alternate or direct flight control laws only).



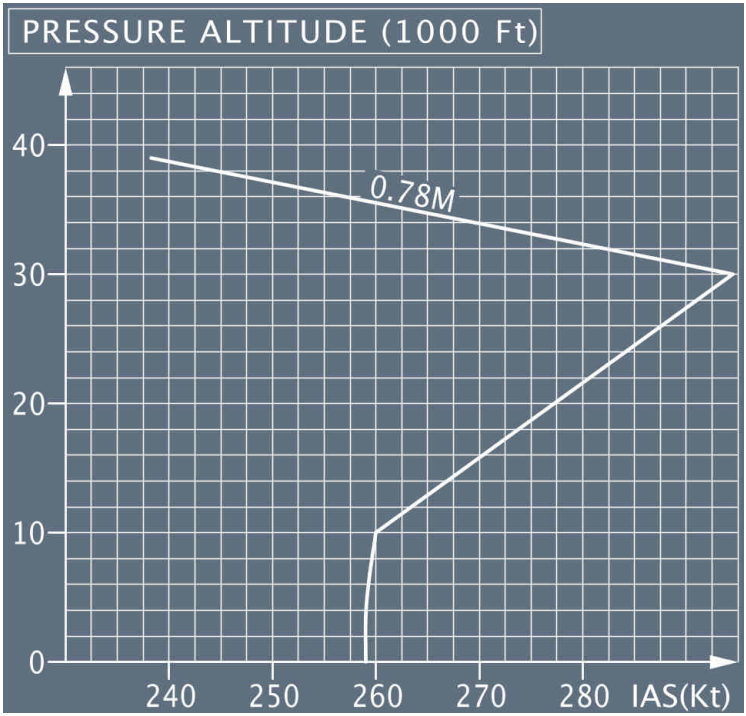
If alternate or direct law is active, full ailerons and rudder application should be confined to speeds below VA.
If alternate or direct law is active manoeuvres involving angle of attack near stall should be confined to speeds below VA.

CAUTION	Rapid and large alternating control inputs, especially in combination with large changes in pitch, roll, or yaw (e.g. large sideslip angles) may result in structural failures at any speed, even below VA.

MAXIMUM DESIGN MANOEUVERING SPEED VA

Applicable to: ALL 321

(Applies in alternate or direct flight control laws only).



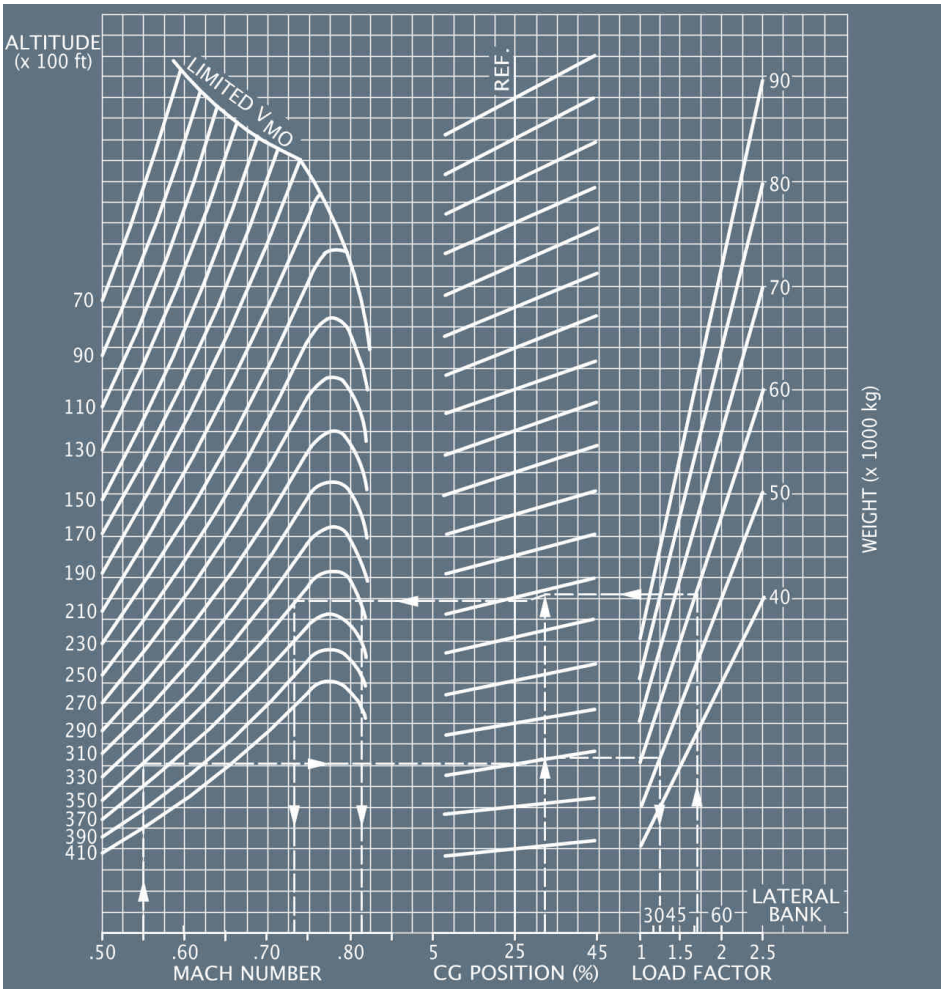
If alternate or direct law is active, full ailerons and rudder application should be confined to speeds below VA.
If alternate or direct law is active manoeuvres involving angle of attack near stall should be confined to speeds below VA.

CAUTION	Rapid and large alternating control inputs, especially in combination with large changes in pitch, roll, or yaw (e.g. large sideslip angles) may result in structural failures at any speed, even below VA.

BUFFET ONSET

Applicable to: ALL 320

1



Examples:

1. Determine Maximum Bank Angle limited by buffet:
   DATA : M = 0.55, FL = 350, CG = 31 %, WEIGHT = 50 000 kg

RESULT: load factor = 1.25 g or 35 ° bank

2. Determine low and high speed limited by buffet:

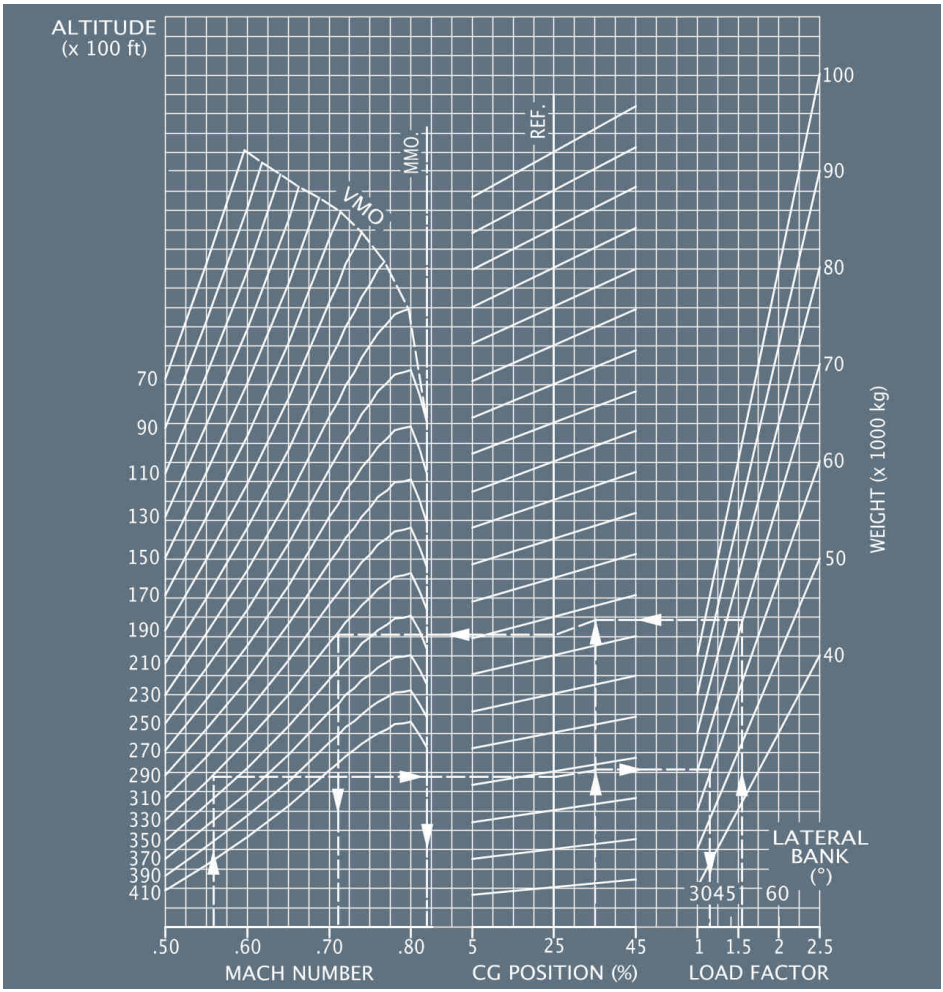
DATA : 52 ° bank or 1.7 g, WEIGHT = 60 000 kg, CG = 31 %, FL = 350

RESULT: M = 0.73 (low speed buffet) and M = 0.81 (high speed buffet).

BUFFET ONSET

Applicable to: ALL 321

2



Examples:

1. Determine Maximum Bank Angle limited by buffet:
   DATA : M = 0.56, FL = 330, CG = 35 %, WEIGHT = 60 000 kg

RESULT: load factor = 1.2 g or 30 ° bank

2. Determine low and high speed limited by buffet:

DATA : 48 ° bank or 1.55 g, WEIGHT = 70 000 kg, CG = 35 %, FL = 330

RESULT: M = 0.71 (low speed buffet) and M = 0.82 (high speed buffet).

MINIMUM CONTROL SPEEDS

Applicable to: ALL 320

Altitude (ft)	VMCA (KT CAS)	VMCG (KT IAS)		
		CONF 1 + F	CONF 2	CONF 3
-2 000	113.5	112	110	109.5
0	111.5	110.5	108.5	108
2 000	110.5	109.5	107.5	107
4 000	108	107	105	104.5
6 000	105	104	102	102
8 000	102.5	102	100	99.5
9 200	101	100.5	98.5	98
10 000	99.5	99.5	97.5	97
12 000	96.5	96.5	94.5	94
14 100	93.5	93.5	91.5	91.5

MINIMUM CONTROL SPEEDS

Applicable to: ALL 321

Altitude (ft)	VMCA (KT CAS)	VMCG (KT IAS)		
		CONF 1 + F	CONF 2	CONF 3
-2 000	114	110	110	108.5
0	114	110	110	108.5
2 000	111	107	107	105.5
4 000	107	103.5	103.5	102
6 000	103	99.5	99.5	98
8 000	99.5	96	96	94.5
9 200	97.5	93.5	93.5	92.5
10 000	95.5	92.5	92.5	91
12 000	92	92.6	92.6	91.5
14 100	88.5	85	85	84.5

MAXIMUM FLAPS/SLATS SPEEDS

Applicable to: ALL 320

LEVER POSITION	SLATS	FLAPS	Ind. on ECAM	MAX SPD	FLIGHT PHASE
1	18	0	1	230	HOLDING
1	18	10	1 + F	215	TAKEOFF
2	22	15	2	200	TAKEOFF/APPROACH
3	22	20	3	185	TAKEOFF/APPROACH/LANDING
FULL	27	40	FULL	177	LANDING

MAXIMUM FLAPS/SLATS SPEEDS

Applicable to: ALL 321

LEVER POSITION	SLATS	FLAPS	Ind. on ECAM	MAX SPD	FLIGHT PHASE
1	18	0	1	230	HOLDING
1	18	10	1 + F	215	TAKEOFF
2	22	14	2	215	TAKEOFF/APPROACH
3	22	21	3	195	TAKEOFF/APPROACH/LANDING
FULL	27	25	FULL	190	LANDING

GEAR DOWN SPEEDS

Applicable to: ALL

Maximum speed with landing gear extended (VLE).....280 kt /M .67
Maximum speed at which the landing gear may be extended (VLO extension) ..... 250 kt
Maximum speed at which the landing gear may be retracted (VLO retraction) ..... 220 kt
Maximum altitude at which the landing gear may be extended..... 25 000 ft

MAXIMUM TIRE SPEED

Applicable to: ALL

Ground speed..... 195 kt

WINDSHIELD WIPERS IN USE

Applicable to: ALL

Maximum speed..... 230 kt

COCKPIT WINDOW OPEN

Applicable to: ALL

Maximum speed..... 200 kt

TAXI SPEED

Applicable to: ALL

When the taxi weight is higher than 76 000 kg (167 550 lb), do not exceed a taxi speed of 20 kt during a turn.

STALLING SPEEDS

Applicable to: ALL 320

The following graphs serve to determine the VS according to the configuration.

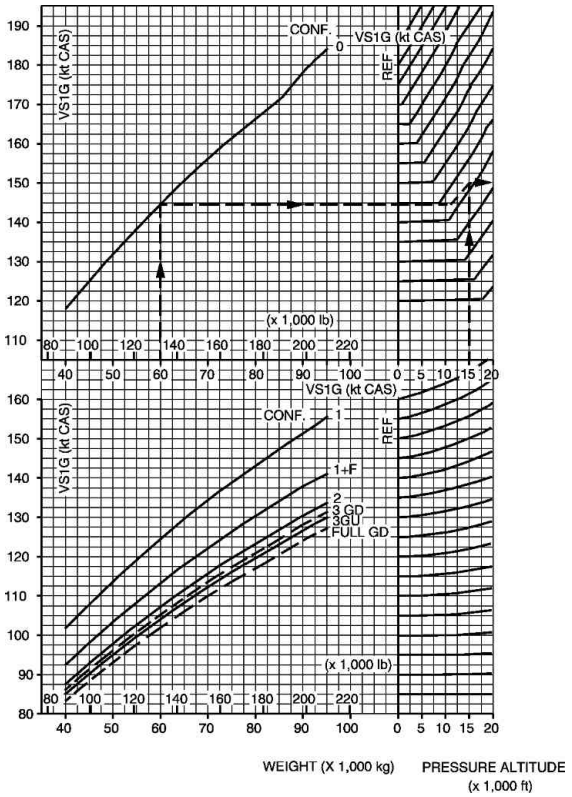
These graphs have been established for

- Basic forward CG
  - 23 % CG location in clean configuration
  - 25 % CG location in takeoff, approach and landing configuration
- Alternate forward CG
  - forward CG limit. *Refer to LIM-11 Center of Gravity Limits*.

In most cases the CG location remains within the CG envelope below. Consequently the basic forward CG must be retained for any performance determination.
In some rare cases, if more forward CG is anticipated during any part of the flight, the alternate forward CG must be retained for any performance determination.

STALLING SPEEDS

Applicable to: ALL 321



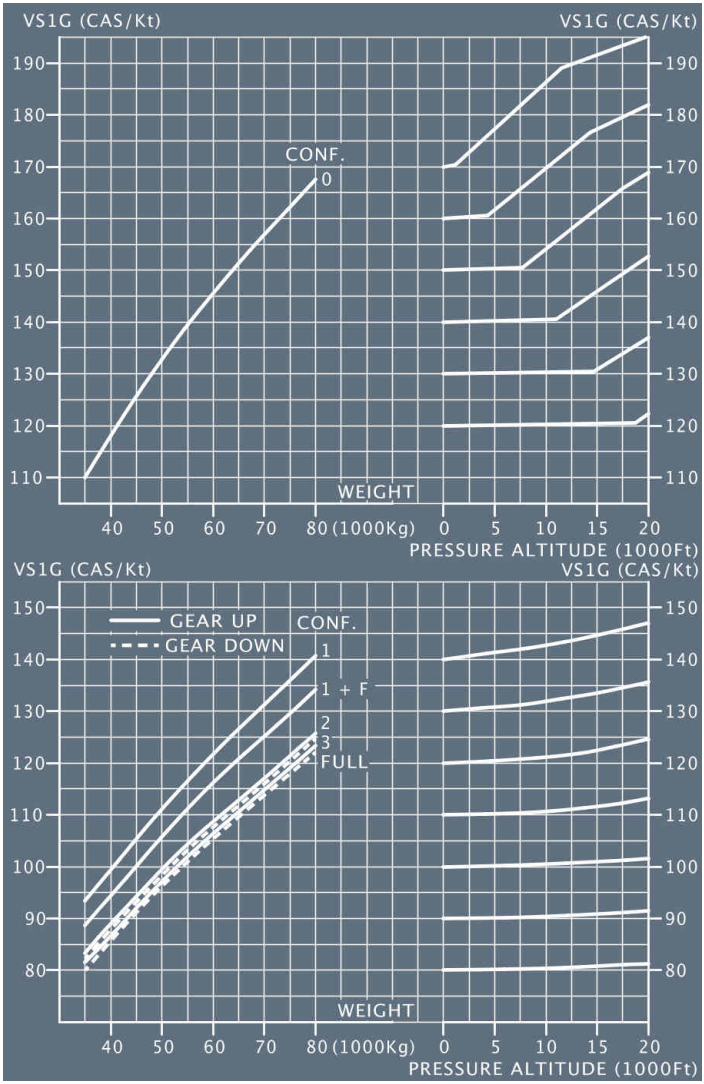
EXAMPLE :

DATA : 60 000 kg (132 276 lb), pressure altitude 15 000 ft, clean configuration.

RESULT : VS1G CAS = 150 kt

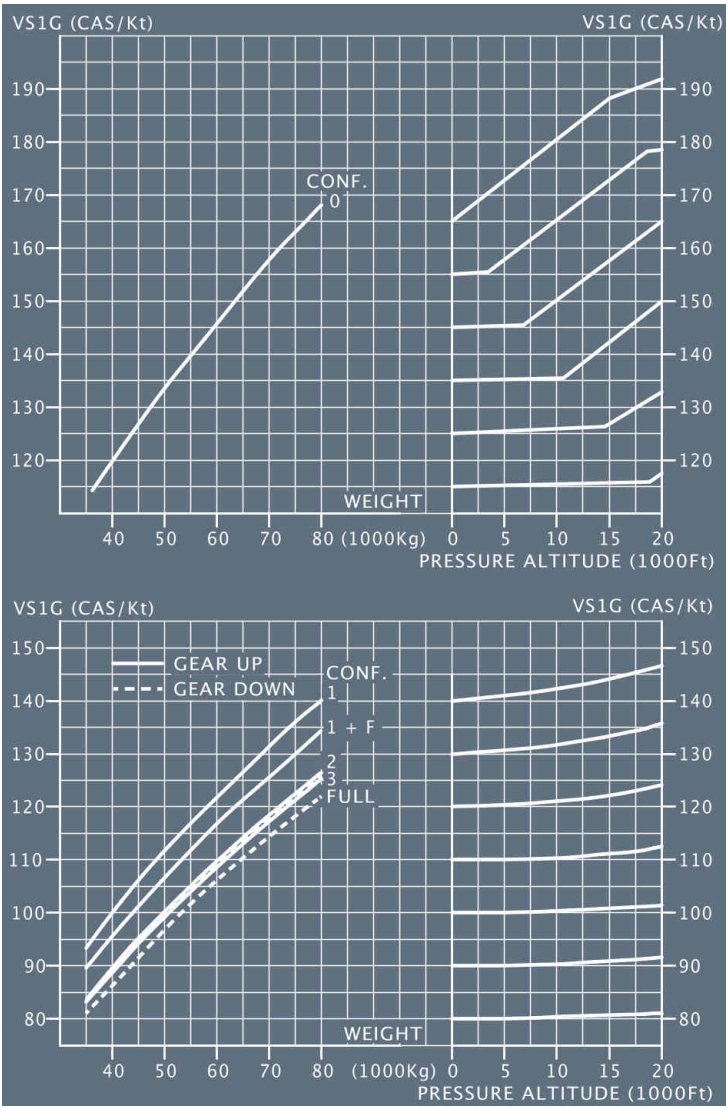
STALLING SPEEDS (BASIC FORWARD C.G.)

Applicable to: ALL 320



STALLING SPEEDS (ALTERNATE FORWARD C.G.)

Applicable to: ALL 320


VS1G (CAS/Kt)
VS1G (CAS/Kt)
190
180
170
160
150
140
130
120
CONF.
0
WEIGHT
40 50 60 70 80 (1000Kg)
0 5 10 15 20
PRESSURE ALTITUDE (1000Ft)
VS1G (CAS/Kt)
VS1G (CAS/Kt)
150
140
130
120
110
100
90
80
GEAR UP
GEAR DOWN
CONF.
1
1 + F
2
3
FULL
WEIGHT
40 50 60 70 80 (1000Kg)
0 5 10 15 20
PRESSURE ALTITUDE (1000Ft)

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LIMITATIONS

AIR CONDITIONING / PRESSURIZATION / VENTILATION

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AIR CONDITIONING WITH LP GROUND UNIT ..... B
AIR CONDITIONING WITH HP GROUND UNIT C

LIM-21-21_20 Pressurization

Cabin Pressure ..... A

LIM-21-21_30 Ventilation

AVIONICS VENTILATION ..... A

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Localization Title	Toc Index	ID	Reason
LIM-21-21_20 Cabin Pressure	A	1	Improvement of illustration quality.
LIM-21-21_20 Cabin Pressure	A	2	Improvement of illustration quality.

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RAM AIR INLET

Applicable to: ALL

Only open if differential pressure is lower than 1 PSI.

AIR CONDITIONING WITH LP GROUND UNIT

Applicable to: ALL

- Do not use conditioned air simultaneously from packs and LP ground unit (to avoid chattering of the non return valves).
- Airflow supplied by the ground cart shall not exceed 1.2 kg/s (2.60 lb/s).

AIR CONDITIONING WITH HP GROUND UNIT

Applicable to: ALL

Do not use HP ground unit when APU supplies bleed air to avoid bleed system damage.

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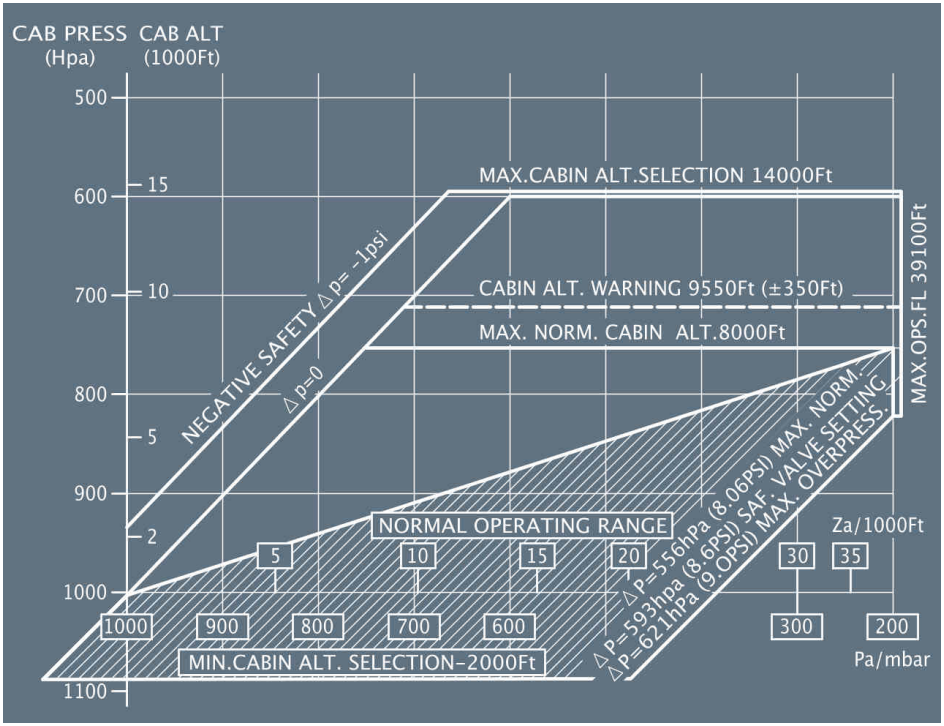
CABIN PRESSURE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

1 Maximum positive differential pressure..... 8.6 PSI
Maximum negative differential pressure..... -1 PSI

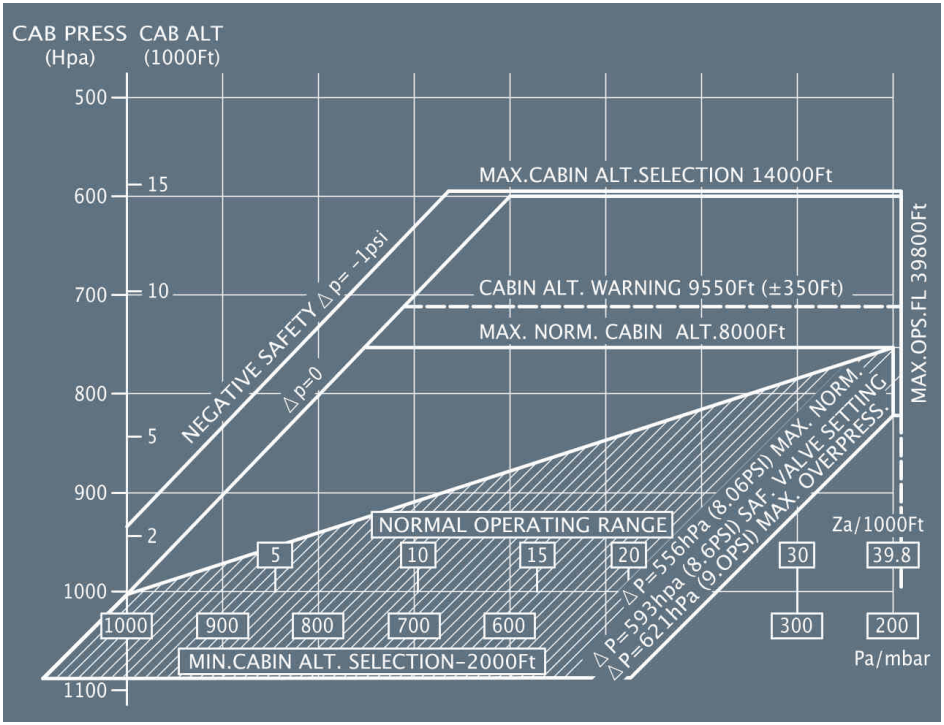


Note: *Max Δp and safety valve setting tolerance = ± 7 hPa (0.1 PSI)*

CABIN PRESSURE

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

2 Maximum positive differential pressure..... 8.6 PSI
Maximum negative differential pressure..... -1 PSI



Note: *Max Δp and safety valve setting tolerance = ± 7 hPa (0.1 PSI)*

AVIONICS VENTILATION

Applicable to: ALL

During ground operations, limit the aircraft electric power supply with avionics ventilation system in normal configuration as follows :

OAT = 49 °C	no limitation
OAT = 55 °C	time limit 2 h
OAT = 60 °C	time limit 1 h
OAT = 64 °C	time limit 1/2 h

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LIMITATIONS

AUTO FLIGHT

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LIM-22-20 Automatic Approach, Landing and Roll Out

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CATEGORY III FAIL OPERATION (DUAL)..... D
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MAXIMUM WIND CONDITIONS FOR CAT III AUTOMATIC APPROACH OR AUTOMATIC LANDING AND AUTOMATIC ROLL OUT..... G
Automatic Landing..... H
ILS Automatic Landing in CAT I or Better Weather Conditions..... I
Automatic Landing in Johannesburg..... J

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AUTO PILOT FUNCTION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ

Minimum height for use of autopilot on takeoff with SRS mode..... 100 ft AGL

(An internal FMGS logic prevents the autopilot from engaging during the 5 s after liftoff).

Minimum height for use of the autopilot in:

- Straight-in non precision approach..... applicable MDA (MDH)
- Straight-in LNAV/VNAV approach..... applicable DA
- Circling approach..... applicable MDA - 100 ft (or MDH - 100 ft)
- ILS approach when CAT2 or CAT3 is not displayed on the FMA ..... 160 ft AGL
- Go-around (AP or FD engagement) ..... 100 ft AGL
- All other phases..... 500 ft AGL

Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 500 ft, whichever is the highest.

AUTO PILOT FUNCTION

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

Minimum height for use of autopilot on takeoff with SRS mode..... 100 ft AGL

(An internal FMGS logic prevents the autopilot from engaging during the 5 s after liftoff).

Minimum height for use of the autopilot in:

- Straight-in non precision approach..... applicable MDA (MDH)
- Straight-in LNAV/VNAV approach..... applicable DA
- Circling approach..... applicable MDA - 100 ft (or MDH - 100 ft)
- ILS approach when CAT2 or CAT3 is not displayed on the FMA..... 160 ft AGL
- PAR approach (Precision Approach Radar) ..... 250 ft AGL

  Use of the AP and/or FD is authorized in PAR approach, with HDG V/S or TRK FPA.
- Go-around (AP or FD engagement) ..... 100 ft AGL
- All other phases..... 500 ft AGL

Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 500 ft, whichever is the highest.

AUTO PILOT FUNCTION

Applicable to: B-HTD, B-HTE, B-HTF

Minimum height for use of autopilot on takeoff with SRS mode..... 100 ft AGL

(An internal FMGS logic prevents the autopilot from engaging during the 5 s after liftoff).

Minimum height for use of the autopilot in:
- Straight-in non precision approach..... applicable MDA (MDH)
- Straight-in LNAV/VNAV approach..... applicable DA
- Circling approach..... applicable MDA - 100 ft (or MDH - 100 ft)
- ILS approach when CAT2 or CAT3 is not displayed on the FMA..... 160 ft AGL
- Go-around (AP or FD engagement) ..... 100 ft AGL
- All other phases..... 900 ft AGL

Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 900 ft, whichever is the highest.

AUTO PILOT FUNCTION

Applicable to: B-HTG, B-HTH, B-HTI

Minimum height for use of autopilot on takeoff with SRS mode..... 100 ft AGL

(An internal FMGS logic prevents the autopilot from engaging during the 5 s after liftoff).

Minimum height for use of the autopilot in:
- Straight-in non precision approach..... applicable MDA (MDH)
- Straight-in LNAV/VNAV approach..... applicable DA
- Circling approach..... applicable MDA - 100 ft (or MDH - 100 ft)
- ILS approach when CAT2 or CAT3 is not displayed on the FMA..... 160 ft AGL
- PAR approach (Precision Approach Radar) ..... 250 ft AGL

  Use of the AP and/or FD is authorized in PAR approach, with HDG V/S or TRK FPA.
- Go-around (AP or FD engagement) ..... 100 ft AGL
- All other phases..... 900 ft AGL

Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 900 ft, whichever is the highest.

AUTO PILOT FUNCTION

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

Minimum height for use of autopilot on takeoff with SRS mode..... 100 ft AGL

(An internal FMGS logic prevents the autopilot from engaging during the 5 s after liftoff).

Minimum height for use of the autopilot in:
- Straight-in non precision approach..... applicable minimum
- Circling approach..... applicable circling minimums - 100 ft
- ILS approach when CAT2 or CAT3 is not displayed on the FMA ..... 160 ft AGL

- PAR approach (Precision Approach Radar) ..... 250 ft AGL
  Use of the AP and/or FD is authorized in PAR approach, with HDG V/S or TRK FPA.
- Go-around (AP or FD engagement) ..... 100 ft AGL
- All other phases..... 500 ft AGL

Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 500 ft, whichever is the highest.

AUTOTHRUST FUNCTION

Applicable to: ALL

Use of the autothrust is approved with, or without, AP/FD in selected or managed mode.

FLIGHT MANAGEMENT FUNCTION

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

FMGS lateral and vertical navigation has been certified for after takeoff, en route, and terminal area operations, for instrument approach procedures (except ILS, LOC, LOC-BC, LDA, SDF and MLS), and for missed approach procedures.
RNP accuracy with GPS PRIMARY, or radio updating, has been demonstrated to be:

	With AP ON in NAV	With AP OFF and FD ON in NAV	With AP OFF and FD OFF
En route	2 nm	2 nm	2 nm
In terminal area	0.5 nm	0.52 nm	0.52 nm
In approach	0.3 nm	0.3 nm with GPS 0.37 nm without GPS	Not authorized

Without GPS PRIMARY (or GPS deselected or inoperative), the accuracy has been demonstrated, provided the appropriate RNP value is checked or entered on the MCDU, and HIGH accuracy is displayed.
Without GPS PRIMARY (or GPS deselected or inoperative), navigation accuracy is a function of ground radio NAVAID infrastructure, or elapsed time since the last radio update.
The FMGS is also certified for navigation within BRNAV, PRNAV, RNP-4 and RNP-10 airspace. RNP 10 oceanic/remote area operations are approved with GPS PRIMARY, or without GPS PRIMARY (or GPS deselected or inoperative), provided time limitations in IRS only navigation (acceptable to operational authorities), are established.
FMGS approval is based on the assumption that the navigation database has been validated for intended use.
Obstacle clearance and adherence to airspace constraints remains the flight crew's responsibility.
Fuel, time predictions/performance information is provided for advisory purposes only.

NAV mode may be used after takeoff, provided FMGS runway updating has been checked.

FLIGHT MANAGEMENT FUNCTION

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

FMGS lateral and vertical navigation has been certified for after takeoff, en route, and terminal area operations, for instrument approach procedures (except ILS, LOC, LOC-BC, LDA, SDF and MLS), and for missed approach procedures.
RNP accuracy with GPS PRIMARY, or radio updating, has been demonstrated to be:

	With AP ON in NAV	With AP OFF and FD ON in NAV	With AP OFF and FD OFF
En route	1 nm	1 nm	1.1 nm
In terminal area	0.5 nm	0.51 nm	0.51 nm
In approach	0.3 nm	0.3 nm	Not authorized

Without GPS PRIMARY (or GPS deselected or inoperative), the accuracy has been demonstrated, provided the appropriate RNP value is checked or entered on the MCDU, and HIGH accuracy is displayed.
Without GPS PRIMARY (or GPS deselected or inoperative), navigation accuracy is a function of ground radio NAVAID infrastructure, or elapsed time since the last radio update.
The FMGS is also certified for navigation within BRNAV, PRNAV, RNP-4 and RNP-10 airspace. RNP 10 oceanic/remote area operations are approved with GPS PRIMARY, or without GPS PRIMARY (or GPS deselected or inoperative), provided time limitations in IRS only navigation (acceptable to operational authorities), are established.
FMGS approval is based on the assumption that the navigation database has been validated for intended use.
Obstacle clearance and adherence to airspace constraints remains the flight crew's responsibility.
Fuel, time predictions/performance information is provided for advisory purposes only.
NAV mode may be used after takeoff, provided FMGS runway updating has been checked.

TAKEOFF IN GPS PRIMARY

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

For certain airports, where the difference between the local coordinate system and WGS 84 (geodesic standard used by GPS, FMS) is not negligible, an incorrect NAV guidance may occur after takeoff.
GPS must be deselected for takeoff from these airports, until a safe altitude is reached.

TAKEOFF IN GPS PRIMARY

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

For certain airports, where the difference between the local coordinate system and WGS 84 (geodesic standard used by GPS, FMS) is not negligible, a map shift may occur after takeoff. GPS must be deselected for takeoff from these airports, until a safe altitude is reached.

USE OF NAV AND FINAL APP MODES FOR NON-PRECISION APPROACH

Applicable to: ALL

NAV, or NAV and FINAL APP mode may be used for VOR, VOR/DME, NDB, NDB/DME or RNAV (including GPS) approach, but not for ILS, LOC, LOC-BC, LDA, SDF, or MLS final approach.
For instrument procedures not coded in the WGS 84 coordinate system, the GPS must be deselected, unless the shift between the local coordinate system and the WGS 84 is found acceptable for the intended operation.

Note: *1. The assesment of this shift can be done:*
- *In flight, monitoring the NAVAID raw data in non RNAV procedures,*
- *On ground performing a GPS survey of the procedure waypoints.*

2. RNAV (GPS) and RNP RNAV approach procedures require WGS 84 coordinates and GPS.

FINAL APP mode guidance capability with GPS PRIMARY has been demonstrated down to MDH/DH (barometric) 250 ft.

VOR, VOR/DME, NDB or NDB/DME approach procedures may be performed, in NAV, or NAV and FINAL APP mode, provided AP or FD is used, and:
- GPS PRIMARY is available. In this case, the reference NAVAID may be unserviceable, or the airborne radio equipment may be inoperative, or not installed, provided operational approval is obtained.
- Without GPS PRIMARY:
  - The reference NAVAID and the corresponding airborne equipment is serviceable, tuned, and monitored during the approach, or
  - The radio NAVAID coverage supports the RNP value, specified for the approach procedure, and an operational approval is obtained.

For GPS approach, GPS PRIMARY must be available.
RNAV approach without GPS PRIMARY may be performed only if the radio NAVAID coverage supports the RNP value and HIGH accuracy is displayed on the MCDU with the specified RNP, and operational approval is obtained.

NAV mode may be used in the terminal area, provided:
- GPS PRIMARY is available, or
- HIGH accuracy is displayed, and the appropriate RNP is checked or entered on the MCDU, or
- NAVAID raw data is monitored.

NON-PRECISION APPROACHES WITH ENGINE-OUT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

If one engine is inoperative, it is not permitted to use the autopilot to perform NPAs in the following modes: FINAL APP, NAV V/S, NAV/FPA.
Only FD use is permitted.

NON-PRECISION APPROACHES WITH ENGINE-OUT

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

No longer applicable

CATEGORY II

Applicable to: ALL 320

Minimum decision height..... 100 ft AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
If the flight crew performs an automatic approach without autoland, the autopilot must be disengaged no later than at 80 ft AGL.

CATEGORY II

Applicable to: ALL 321

Minimum decision height..... 100 ft AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
If the flight crew performs an automatic approach without autoland, the autopilot must be disengaged no later than at 80 ft AGL.

MAXIMUM WIND CONDITIONS FOR CAT II AUTOMATIC APPROACH WITHOUT AUTOLAND

Head wind	:	40 kt
Tail wind	:	10 kt
Cross wind	:	25 kt

CATEGORY III FAIL PASSIVE (SINGLE)

Applicable to: ALL

Minimum decision height..... 50 ft
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
A/THR must be used in selected or managed speed.

CATEGORY III FAIL OPERATIONAL (DUAL)

Applicable to: ALL 320

A/THR must be used in selected or managed speed.
Alert height..... 100 ft

- CAT III with DH :
  Minimum decision height..... 25 ft
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
- CAT III without DH :
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
  Minimum Runway Visual Range..... 75 m

CATEGORY III FAIL OPERATION (DUAL)

Applicable to: ALL 321

A/THR must be used in selected or managed speed.
Alert height..... 100 ft

- CAT III with DH :
  Minimum decision height..... 22 ft
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
- CAT III without DH :
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
  Minimum Runway Visual Range..... 75 m

ENGINE OUT

Applicable to: ALL 320

CAT II and CAT III fail passive autoland are only approved in configuration FULL, and if engine-out procedures are completed before reaching 1 000 ft in approach.

ENGINE OUT

Applicable to: ALL 321

CAT II and CAT III fail passive autoland are only approved in configuration 3 and FULL, and if engine-out procedures are completed before reaching 1 000 ft in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLL OUT

Applicable to: ALL 320

Headwind : 30 kt
Tailwind : 10 kt
Crosswind : 20 kt

Note: *Wind limitation is based on the surface wind reported by ATC. If the wind displayed on ND exceeds the above-noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT I automatic approach without autoland can be performed.*

MAXIMUM WIND CONDITIONS FOR CAT III AUTOMATIC APPROACH OR AUTOMATIC LANDING AND AUTOMATIC ROLL OUT

Applicable to: ALL 321

Headwind : 30 kt

Tailwind : 10 kt

Crosswind : 20 kt

Note: *Wind limitation is based on the surface wind reported by ATC. If the wind displayed on the ND exceeds the above-noted autoland limitations, but the tower reports surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind that exceeds the limitations, only CAT II automatic approach without autoland can be performed provided wind conditions are within the limitations quoted on Refer to LIM-22-20 Category II. Otherwise, only CAT I automatic approach without autoland can be performed.*

AUTOMATIC LANDING

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.

Automatic landing is demonstrated:
- With CAT II and CAT III ILS beam.
- With slope angle within (-2.5 °, -3.15 °) range.
- At or below the maximum landing weight.
- For airport elevation at or below 6 500 ft.
- At approach speed (VAPP) = VLS + wind correction.
  Minimum wind correction 5 kt, maximum wind correction 15 kt.

Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.

AUTOMATIC LANDING

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.

Automatic landing is demonstrated :
- With CAT II and CAT III ILS beam.
- With slope angle within (–2.5 °, –3.15 °) range.
- For airport elevation at or below 2 500 ft.
- At or below the maximum landing weight.
- At approach speed (VAPP) = VLS + wind correction.
  Minimum wind correction 5 kt ; maximum windcorrection15 kt.

Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.

AUTOMATIC LANDING

Applicable to: B-HTD, B-HTE, B-HTF

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.

Automatic landing is demonstrated:
- With CAT II and CAT III ILS beam
- With slope angle within (-2.5 °, -3.15 °) range
- For airport elevation at or below 2 500 ft
- At or below the maximum landing weight
- At approach speed (VAPP) = VLS + wind correction
  Minimum wind correction 5 kt ; maximum wind correction 15 kt.

Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.
During automatic rollout with one engine inoperative or one thrust reverser inoperative, the use of the thrust reverser is limited to IDLE reverse with a maximum crosswind component of 15 kt

AUTOMATIC LANDING

Applicable to: B-HTG, B-HTH, B-HTI

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.

Automatic landing is demonstrated:
- With CAT II and CAT III ILS beam
- With slope angle within (-2.5 °, -3.15 °) range
- For airport elevation at or below 5 750 ft
- At or below the maximum landing weight
- At approach speed (VAPP) = VLS + wind correction
  Minimum wind correction 5 kt, maximum wind correction 15 kt.

Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.

During automatic rollout with one engine inoperative or one thrust reverser inoperative, the flight crew can use the remaining thrust reverser, provided that:

- Only IDLE reverse thrust is used
- The crosswind does not exceed 15 kt.

ILS AUTOMATIC LANDING IN CAT I OR BETTER WEATHER CONDITIONS

Applicable to: ALL

The automatic landing system's performance has been demonstrated on runways equipped with CAT II or CAT III ILS approaches. However, automatic landing in CAT I or better weather conditions is possible on CAT I ground installations or when ILS sensitive areas are not protected, if the following precautions are taken:

- The airline has checked that the ILS beam quality and the effect of terrain profile before the runway have no adverse effect on AP/FD guidance. In particular, the effect of terrain discontinuities within 300 m before runway threshold must be evaluated.
- The crew is aware that LOC or GS beam fluctuations, independent of the aircraft systems, may occur and the PF is prepared to immediately disconnect the AP and take appropriate action, should unsatisfactory guidance occur.
- At least CAT2 capability is displayed on the FMA, and CAT II/III procedures are used.
- Visual references are obtained at an altitude appropriate to the performed CAT I approach, otherwise go–around is initiated.

AUTOMATIC LANDING IN JOHANNESBURG

Applicable to: ALL
Impacted DU: NONE

Do not perform an automatic landing on the Johannesburg 03R/21L runway.
The flight crew can perform a CAT II automatic approach, but the flight crew must disconnect the AP no later than at 80 ft AGL.

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LIMITATIONS

ELECTRICAL

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Electrical.....A
ELECTRICAL.....B

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ELECTRICAL

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HTD, B-HTE, B-HTF, B-HTG

MAX continuous load per generator.....100 % (90 KVA)
MAX continuous load per TR (continuous)..... 200 A

ELECTRICAL

Applicable to: B-HTH, B-HTI

MAX continuous load per generator.....100 % (90 KVA)
MAX continuous load per TR (continuous)..... 200 A

IN-SEAT POWER SUPPLY SYSTEM (ISPSS)

The In-Seat Power Supply System (ISPSS) for Portable Electronic Devices (PED carried by the passengers) must be switched off during takeoff and landing. The airworthiness approval of the ISPSS for PED does not constitute an operational approval to connect a PED to the system.

ELECTRICAL

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

MAX continuous load per generator.....100 % (90 KVA)
MAX continuous load per TR (continuous)..... 200 A

ELECTRICAL

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

MAX continuous load per generator.....100 % (90 KVA)
MAX continuous load per TR (continuous)..... 200 A

IN-SEAT POWER SUPPLY SYSTEM (ISPSS)

The In-Seat Power Supply System (ISPSS) for Portable Electronic Devices (PED carried by the passengers) must be switched off during takeoff and landing. The airworthiness approval of the ISPSS for PED does not constitute an operational approval to connect a PED to the system.

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LIMITATIONS

FLIGHT CONTROLS

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Flight Control.....A

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FLIGHT CONTROL

Applicable to: ALL

Flaps and slats:

Max operating altitude with slats and/or flaps extended is 20 000 ft.

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LIMITATIONS

FUEL

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Fuel Temperature..... C
MINIMUM FUEL QUANTITY FOR TAKEOFF : 1 500 Kg/3 307 lb..... D
When Using JP 4 and JET B..... E
Fuel Management..... F
Fuel Mixability..... G

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FUEL AND ADDITIVE SPECIFICATIONS

Applicable to: ALL

- See engine manufacturer specification
- Fuel system has been certified for JET A1, JP 8, JET A, JP 5, RT, TS-1, JET B, JP 4 and N°3 JET.

MAXIMUM ALLOWED WING FUEL IMBALANCE

Applicable to: ALL 320

INNER TANKS (OUTER TANKS BALANCED)

Tank Fuel Quantity (Heavier tank)	Maximum allowed imbalance
Full	1 500 kg (3 306 lb)
4 300 kg (9 479 lb)	1 600 kg (3 527 lb)
2 250 kg (4 960 lb)	2 250 kg (4 960 lb)

The variation is linear between these values (No limitation below 2 250 kg /4 960 lb)

OUTER TANKS

Maximum allowed imbalance	690 kg (1 521 lb)(1)

(1) *Maximum outer wing tank imbalance (one full/one empty) is allowed provided:*

- *Fuel content of one side (outer + inner) is equal to the fuel content of the other side (outer + inner), or*
- *On the side of the lighter outer tank, the inner tank fuel quantity is higher than the opposite inner tank quantity, up to a maximum of 3 000 kg/6 614 lb higher.*

Note: In exceptional conditions (i.e., fuel system failures) the above-mentioned maximum fuel imbalance values may be exceeded without significantly affecting the aircraft handling qualities. The aircraft remains fully controllable in all phases of the flight.

MAXIMUM ALLOWED WING FUEL IMBALANCE

Applicable to: ALL 321

Wing tanks	
Heavy tank content	**Maximum allowed imbalance**
FULL	1 320 kg/2 910 lb
4 000 kg/8 818 lb	1 450 kg/3 196 lb
2 350 kg/5 180 lb (empty on the other side)	2 350 kg/5 180 lb)

Apply linear interpolation between these values (No limitation below 2 350 kg /5 180 lb).

Note: *In exceptional conditions (i.e., fuel system failures) the above-mentioned maximum fuel imbalance values may be exceeded without significantly affecting the aircraft handling qualities. The aircraft remains fully controllable in all phases of the flight.*

FUEL TEMPERATURE

Applicable to: ALL 320

	JET A1/JP 8/N°3 JET	JET A	JP 5	RT	TS-1	JET B	JP 4
MINI	-43 °C	-36 °C (1)	-42 °C	-45 °C	-45 °C	-46 °C	-54 °C
MAXI	54 °C					49 °C	

(1) *For JET A only, if TAT reaches -34 °C, monitor on FUEL SD page that fuel temperature remains higher than -36 °C.*

FUEL TEMPERATURE

Applicable to: ALL 321

	JET A1/JP 8/N°3 JET	JET A	JP 5	RT	TS-1	JET B	JP 4
MINI	-43 °C	-36 °C (1)	-42 °C	-45 °C	-45 °C	-46 °C	-54 °C
MAXI	54 °C						

(1) *For JET A only, if TAT reaches -34 °C, monitor on FUEL SD page that fuel temperature remains higher than -36 °C.*

MINIMUM FUEL QUANTITY FOR TAKEOFF : 1 500 KG/3 307 LB

Applicable to: ALL

WING TK LO LVL warning must not be displayed on ECAM for takeoff.

WHEN USING JP 4 AND JET B

Applicable to: ALL 320

Fuel in center tank is to be regarded as unusable if the wing fuel temperature exceeds the following values before engine start and if the given flight level is exceeded before the center tank fuel has been used:

- +30 °C not above FL 350
- +40 °C not above FL 300
- +49 °C not above FL 250

Reason At high altitude with high fuel temperature, the pressure delivered by the center tank pumps becomes lower than the pressure delivered by the wing tank pumps.

FUEL MANAGEMENT

Applicable to: ALL 320

- Tanks must be emptied in the following order:
  - center tank then wing tanks
- Takeoff on center tank is prohibited

FUEL MIXABILITY

Applicable to: ALL

The various types of fuel can be mixed in all proportions.
The freezing point of a fuel mixture varies, based on non-linear laws. If required, determine the fuel freezing point of the fuel mixture.

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LIMITATIONS

HYDRAULIC

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HYDRAULIC.....A

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HYDRAULIC

Applicable to: ALL

Normal operating pressure 3 000 PSI ±200

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LIMITATIONS

LANDING GEAR

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AUTOBRAKE..... B
TAXI WITH DEFLATED TIRES..... C
Nosewheel Steering (NWS)..... D

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BRAKES

Applicable to: ALL

Maximum brake temperature for takeoff (brake fans ⋘ off)..... 300 °C

The braking system is not designed to hold the aircraft in a stationary position when a high thrust level is applied on at least one engine. During ground procedures that require a thrust increase with braking, the flight crew must ensure that the aircraft remains stationary.

AUTOBRAKE

Applicable to: ALL

Use of the autobrake does not relieve the pilot of his responsibility to safely stop within the available runway length, by taking over brake control with brake pedals, if necessary.

The flight crew can disengage the automatic braking system by:
- Pressing the pushbutton of the armed mode, or
- Applying sufficient pressure to the brake pedals.

TAXI WITH DEFLATED TIRES

Applicable to: ALL

If tire damage is suspected after landing or after a rejected takeoff, an inspection of the tires is required before taxi. If the tire is deflated but not damaged, the aircraft can be taxied at low speed with the following limitations :

1. If one tire is deflated on one or more gears (ie. a maximum of three tires), the speed should be limited to 7 kt when turning.
2. If two tires are deflated on the same main gear (the other main gear tires not being deflated), speed should be limited to 3 kt and the nose wheel steering angle limited to 30 °.

NOSEWHEEL STEERING (NWS)

Applicable to: ALL

The nosewheel steering angle is limited to 75 ° when using the handwheels.
For towing and pushback, the nosewheel steering angle is limited to 95 °.
Towbarless towing and pushback on the nose landing gear is approved for the "accepted towbarless towing vehicles" that are listed in the Airbus SIL 09-002, but the nosewheel steering angle must be limited to 85 °.

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LIMITATIONS

NAVIGATION

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INERTIAL REFERENCE SYSTEM

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

IRS ground alignment has been demonstrated to be satisfactory up to 73 ° latitude.

In NAV mode, the IRS will not provide a valid magnetic heading:
- For latitude greater than 73 ° North,
- For latitude greater than 60 ° South.

Flight outside the above-noted limits is prohibited.

INERTIAL REFERENCE SYSTEM

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

IRS ground alignment has been demonstrated to be satisfactory up to 82 ° latitude.

In NAV mode, the IRS will not provide a valid magnetic heading:
- For latitude greater than 82 ° North,
- For latitude greater than 73 ° North, between 90 ° and 120 ° West (magnetic polar region),
- For latitude greater than 60 ° South.

Flight outside the above-noted limits is prohibited.

ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS)

Applicable to: ALL

- Aircraft navigation is not to be predicated on the use of the terrain display.
  The terrain display is only intended as a situational awareness tool, and may not provide the accuracy on which to solely base terrain avoidance maneuvers.
- The EGPWS enhanced function should be inhibited (TERR pushbutton to OFF, on the GPWS panel) when the aircraft position is less than 15 nm from the airfield :
  - For operations to/from runways not incorporated in the EGPWS database.
  - For specific approach procedures, which have previously been identified as potentially producing false terrain alerts.

ISIS

Applicable to: B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

When both PFDs are lost, the ISIS bugs function must not be used.

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LIMITATIONS

OXYGEN

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Cockpit Fixed Oxygen System..... A

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COCKPIT FIXED OXYGEN SYSTEM

Applicable to: ALL

MINIMUM FLIGHT CREW OXYGEN PRESSURE

REF TEMPERATURE (1)		Deg.C	-10	0	10	20	30	40	50
		Deg.F	14	32	50	68	86	104	122
MIN (2) BOTTLE PRESSURE (PSI)	2 CREWMEMBERS		468	486	504	522	540	558	576
	2 CREWMEMBERS	+1 OBS	606	629	652	675	698	721	744
	2 CREWMEMBERS	+2 OBS	759	788	817	846	875	904	933

(1) *REF TEMPERATURE :*

- *On ground : REF TEMPERATURE = (OAT + COCKPIT TEMP) / 2*
- *In flight : REF TEMPERATURE (deg. C) = CAB TEMP (deg. C) -10 °C*
  or
  REF TEMPERATURE (deg. F) = CAB TEMP(deg.F)-18 °F

(2) *MINIMUM BOTTLE PRESSURE TO TAKE INTO ACCOUNT :*

- *Preflight checks*
- *The use of oxygen, when only one flight crewmember is in the cockpit*
- *Unusable quantity (to ensure that the regulator functions with minimum pressure)*
- *Normal system leakage*
- *and*

  Protection after loss of cabin pressure, with mask regulator on NORMAL (diluted oxygen):
  - *During an emergency descent : For all cockpit members for 13 min*
  - *During cruise at FL 100 : For 2 flight crewmembers for 107 min.*

  or

  Protection in case of smoke, with 100 % oxygen : For all cockpit members for 15 min at a cabin altitude of 8 000 ft.

Note: The above times are based on the use of a sealed mask, but may be shorter if the flight crewmember has a beard.

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LIMITATIONS

APU

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SUMMARY OF HIGHLIGHTS

LIM-49-10 General

General....A

LIM-49-20 Envelope

Envelope.... A
Generator Load....B
Electrical Power/Air Bleed Extraction....C

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Localization Title	Toc Index	ID	Reason
LIM-49-20 Envelope	A	1	Improvement of illustration quality.
LIM-49-20 Envelope	A	2	Improvement of illustration quality.
LIM-49-20 Generator Load	B	3	Documentation update: Addition of "Generator Load" documentary unit

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GENERAL

Applicable to: ALL

OIL QUANTITY

The APU may be started and operated even if the LOW OIL LEVEL ECAM advisory is displayed. Maintenance action is required within next 10 h of APU operation.

Applicable to: ALL

APU STARTER

After 3 starter motor duty cycles, wait 60 min before attempting 3 more cycles.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

ROTOR SPEED

Maximum N (ECAM display)..... 107 %

Note: The APU automatically shuts down at 107 % N speed, that appears on the ECAM. This corresponds to an actual N speed of 105 %.

Applicable to: B-HSQ, B-HSR

ROTOR SPEED

Maximum N (ECAM display)..... 107 %

Note: The APU automatically shuts down at 107 % N speed, that appears on the ECAM. This corresponds to an actual N speed of 106 %.

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

EGT

Maximum EGT for start:
Below 25 000 ft..... 900 °C
Above 25 000 ft..... 982 °C

Maximum EGT, with APU running:
- 682 °C, with 5 s confirmation time for shutdown, or
- From 700 °C to 742 °C for immediate shutdown, depending on the ambient temperature.

Applicable to: B-HSQ, B-HSR

EGT

Maximum EGT..... 675 °C
Maximum for start (below 35 000 ft)..... 1 090 °C
Maximum for start (above 35 000 ft)..... 1 120 °C

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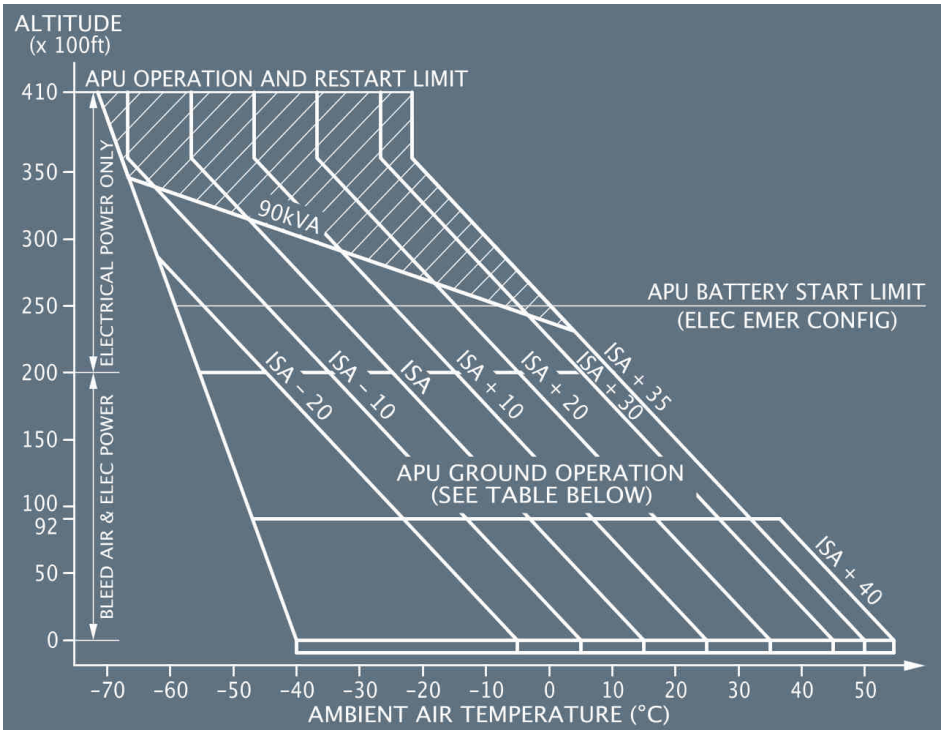
ENVELOPE

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

1

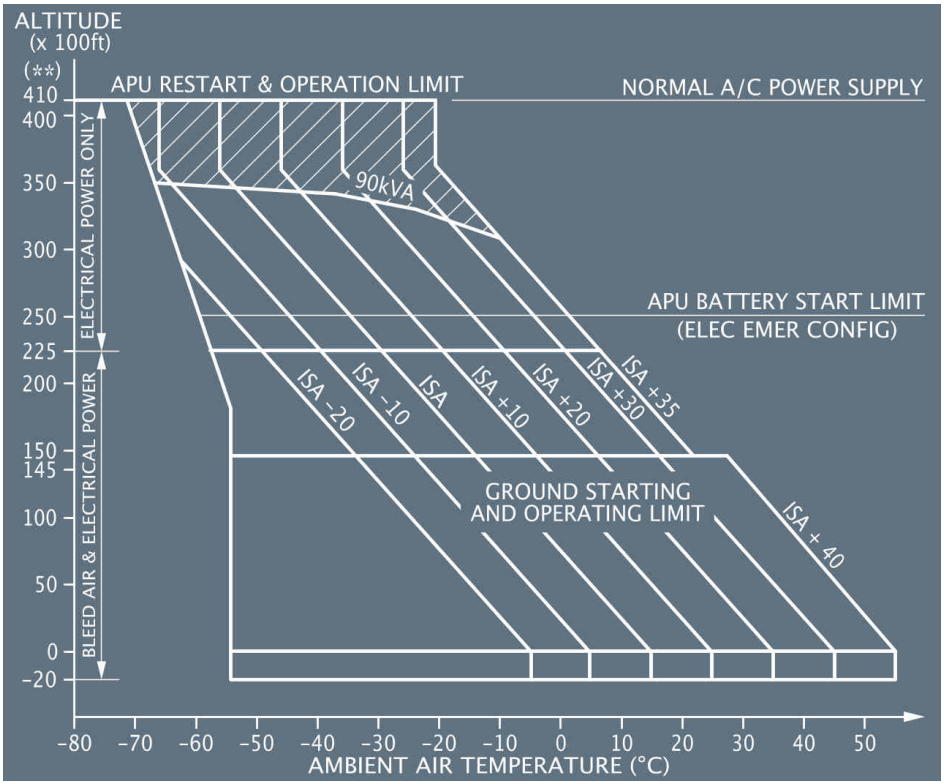


Note: *In the APU start envelope, the APU start is guaranteed within 3 consecutive start attempts.*

ENVELOPE

Applicable to: B-HSQ, B-HSR, B-HTF

2



Note: *In the APU start envelope, the APU start is guaranteed within 3 consecutive start attempts.*

GENERATOR LOAD

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTD, B-HTE, B-HTG, B-HTH, B-HTI

GENERATOR LOAD IN FLIGHT			
TEMP ▸ / MAX ALT (FT) ▾	ISA	ISA + 20	ISA + 35
25 000	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)
30 000	100 % (90 KVA)	92 % (83 KVA)	84 % (76 KVA)
35 000	86 % (78 KVA)	71 % (64 KVA)	67 % (60 KVA)
39 000	70 % (63 KVA)	56 % (51 KVA)	53 % (48 KVA)

GENERATOR LOAD ON THE GROUND				
TEMP ▸ / ALT (FT) ▾		ISA	ISA + 20	ISA + 40
0	ENG START	100 % (90 KVA)	100 % (90 KVA)	71 % (64 KVA)
	PACKS			39 % (35 KVA) (1)
9 200	ENG START			57 % (51 KVA)
	PACKS			60 % (54 KVA)

(1) generator load with maximum air conditioning demand.

GENERATOR LOAD

Applicable to: B-HTF

3

GENERATOR LOAD IN FLIGHT					
Altitude (ft)	ISA	ISA + 10	ISA + 20	ISA + 30	ISA + 35
25 000	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)
30 000	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	98 % (88 KVA)
35 000	93 % (84 KVA)	91 % (82 KVA)	88 % (79 KVA)	84 % (76 KVA)	79 % (71 KVA)
39 000	71 % (64 KVA)	69 % (62 KVA)	68 % (61 KVA)	63 % (57 KVA)	61 % (55 KVA)
41 000 (1)	57 % (51 KVA)	55 % (50 KVA)	55 % (50 KVA)	54 % (49 KVA)	53 % (48 KVA)

(1) Only for aircraft certified up to that flight level.

GENERATOR LOAD ON THE GROUND							
Altitude (ft)	MODE	ISA	ISA + 10	ISA + 20	ISA + 30	ISA + 35	ISA + 40
14 500	ENG START	100 % (90 KVA)	100 % (90 KVA)	98 % (88 KVA)	85 % (77 KVA)(1)	79 % (71 KVA)(1)	68 % (61 KVA) (1)
	PACKS	100 % (90 KVA)	100 % (90 KVA)	91 % (82 KVA)	78 % (70 KVA)	70 % (63 KVA)	58 % (52 KVA)

Continued on the following page

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GENERATOR LOAD ON THE GROUND							
Altitude (ft)	**MODE**	**ISA**	**ISA + 10**	**ISA + 20**	**ISA + 30**	**ISA + 35**	**ISA + 40**
9 200	ENG START	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	91 % (82 KVA)	83 % (75 KVA)	72 % (65 KVA)
	PACKS	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	87 % (78 KVA)	78 % (70 KVA)	67 % (60 KVA)
8 000	ENG START	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	92 % (83 KVA)	84 % (76 KVA)	74 % (67 KVA)
	PACKS	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	89 % (80 KVA)	79 % (71 KVA)	70 % (63 KVA)
0	ENG START	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	90 % (81 KVA)	81 % (73 KVA)
	PACKS	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	91 % (82 KVA)	83 % (75 KVA)	75 % (68 KVA)

(1) Generator load with maximum bleed performance.

GENERATOR LOAD

Applicable to: B-HSK, B-HSL, B-HSM, B-HSN

GENERATOR LOAD IN FLIGHT			
TEMP ▸ / MAX ALT (FT) ▾	**ISA**	**ISA + 20**	**ISA + 35**
25 000	100 % (90 KVA)	100 % (90 KVA)	92 % (83 KVA)
30 000	91 % (82 KVA)	84 % (76 KVA)	78 % (70 KVA)
35 000	71 % (64 KVA)	69 % (62 KVA)	63 % (57 KVA)
39 000	55 % (50 KVA)	54 % (49 KVA)	52 % (47 KVA)

GENERATOR LOAD ON THE GROUND					
MAX ALT (FT)	**TEMP**	**ISA**	**ISA + 20**	**ISA + 35**	**ISA + 40**
0	ENG START	100 % (90 KVA)	99 % (89 KVA)	88 % (79 KVA)	81 % (73 KVA)
	PACKS		83 % (75 KVA)	70 % (63 KVA)	63 % (57 KVA)
8 000	ENG START	78 % (70 KVA)	62 % (56 KVA)	51 % (46 KVA)	48 % (43 KVA)
	PACKS	76 % (68 KVA)	64 % (58 KVA)	51 % (46 KVA)	50 % (45 KVA)
9 200	ENG START	76 % (68 KVA)	61 % (55 KVA)	49 % (44 KVA)	46 % (41 KVA)
	PACKS	72 % (65 KVA)	62 % (56 KVA)	49 % (44 KVA)	48 % (43 KVA)

ELECTRICAL POWER/AIR BLEED EXTRACTION

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HST, B-HSU

- Electric power extraction:

  At or below 25 000 ft:
  ISA + 35 °C and below..... 90 KVA

- Air bleed and generator load in flight:

MAXIMUM ALTITUDE FOR BLEED AIR AND GENERATOR LOAD IN FLIGHT			
TEMP ▸ MAX ALT (FT) ▾	**ISA**	**ISA + 20**	**ISA + 35**
ENG START UP TO 15 000 ft IF SPEED BELOW 150 kt	58 % (53 KVA)	51 % (46 KVA)	45 % (41 KVA)
ENG START UP TO20 000 ft IF SPEED ABOVE 150 kt			
ONE PACK UP TO 20 000 ft	71 % (64 KVA)	64 % (58 KVA)	61 % (55 KVA)
TWO PACKS UP TO 15 000 ft	88 % (80 KVA)	76 % (69 KVA)	64 % (58 KVA)

- Air bleed extraction for wing anti-icing is not permitted.

ELECTRICAL POWER/AIR BLEED EXTRACTION

Applicable to: B-HSQ, B-HSR

- Electric power extraction:

  At or below 25 000 ft:
  ISA + 35 °C and below..... 90 KVA

- Air bleed and generator load in flight:

MAXIMUM ALTITUDE FOR BLEED AIR AND GENERATOR LOAD IN FLIGHT			
TEMP ▸ MAX ALT (FT) ▾	**ISA**	**ISA + 20**	**ISA + 35**
ENG START UP TO 15 000 ft IF SPEED BELOW 150 kt	92 % (83 KVA)	64 % (58 KVA)	45 % (41 KVA)
ENG START UP TO 20 000 ft IF SPEED ABOVE 180 kt			
ONE PACK UP TO 22 500 ft	78 % (70 KVA)	67 % (60 KVA)	63 % (57 KVA)
TWO PACKS UP TO 15 000 ft	100 % (90 KVA)	79 % (71 KVA)	64 % (58 KVA)

- Air bleed extraction for wing anti-icing is not permitted.

LIMITATIONS

POWER PLANT

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THRUST SETTING/EGT LIMITS

Applicable to: ALL 321

OPERATING CONDITION	TIME LIMIT	EGT LIMIT	NOTE
TAKEOFF and GO-AROUND	5 min	650 °C	
	10 min		Only in case of engine failure
MCT	Unlimited	610 °C	
STARTING		635 °C	

THRUST SETTING/EGT LIMITS

Applicable to: ALL 320

OPERATING CONDITION	TIME LIMIT	EGT LIMIT	NOTE
TAKEOFF and GO-AROUND	5 min	635 °C	
	10 min		Only in case of engine failure
MCT	Unlimited	610 °C	
STARTING		635 °C	

OIL

Applicable to: ALL

OIL TEMPERATURE

Minimum prior to exceeding idle..... -10 °C
Minimum prior to takeoff..... 50 °C
Max continuous temperature..... 155 °C
Max transient temperature (15 min)..... 165 °C
Minimum starting temperature..... -40 °C
Minimum oil quantity..... (*Refer to PRO-NOR-SOP-04-Before Walk Around-ECAM.*)

MINIMUM OIL PRESSURE

Minimum oil pressure..... 60 PSI

RPM

Applicable to: ALL

N1 max..... 100 %

Note: *The N1 limit depends upon ambient conditions and engine airbleed configuration. These may limit N1 to a value lower than the one noted above (For additional information, refer to Performance/Thrust Ratings).*

N2 max..... 100 %

STARTER

Applicable to: ALL

- 3 consecutive cycles : 2 cycles of 2 min each, followed by a 3rd cycle of 1 min .
- Pause between start attempts : 15 s.
- Cooling period, following 3 start attempts or 4 min of continuous cranking : 30 min .
- No running engagement of the starter, when N2 is above 10 % on ground, and 18 % in flight.

REVERSE THRUST

Applicable to: ALL 321

- It is not permitted to select reverse thrust in flight
- It is not permitted to back up the aircraft with reverse thrust
- Maximum reverse should not be used below 70 kt. (Idle reverse is permitted down to aircraft stop).

REVERSE THRUST

Applicable to: ALL 320

- It is not permitted to select reverse thrust in flight.
- It is not permitted to back up the aircraft with reverse thrust.
- Maximum reverse should not be used below 70 kt (or when the airspeed indication starts to fluctuate). Idle reverse is permitted down to aircraft stop.

REDUCED THRUST TAKEOFF

Applicable to: ALL 320

- Takeoff at reduced thrust is only permitted, if the airplane meets all applicable performance requirements at the planned takeoff weight, with the operating engines at the thrust available for the assumed temperature.
- Thrust reduction must not exceed 25 % of the full rated takeoff thrust. To meet this requirement, the flexible temperature must not be higher than ISA + 55 °C(T MAX FLEX).
- The assumed temperature must not be lower than the flat rating temperature, or the current OAT.
- Takeoff at reduced thrust is not permitted on contaminated runways.
- Takeoff at reduced thrust is permitted with any inoperative item affecting the performance, only if the associated performance shortfall has been applied to meet all performance requirements at the takeoff weight, with the operating engines at the thrust available for the flex temperature.

REDUCED THRUST TAKEOFF

Applicable to: ALL 321

- Takeoff at reduced thrust is only permitted, if the airplane meets all applicable performance requirements at the planned takeoff weight, with the operating engines at the thrust available for the assumed temperature.
- Thrust reduction must not exceed 25 % of the full rated takeoff thrust. To meet this requirement, the flexible temperature must not be higher than ISA + 42 °C(T MAX FLEX).
- The assumed temperature must not be lower than the flat rating temperature, or the current OAT.
- Takeoff at reduced thrust is not permitted on contaminated runways.
- Takeoff at reduced thrust is permitted with any inoperative item affecting the performance, only if the associated performance shortfall has been applied to meet all performance requirements at the takeoff weight, with the operating engines at the thrust available for the flex temperature.

CROSS WIND OPERATION ON GROUND

Applicable to: ALL

This engine is capable of starting in crosswinds up to 35 kt .

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OEB-30 No SRS Engagement During Go Around Below MDA

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OEB-40 AIR ENG 1(2) BLEED ABNORMAL PR or AIR ENG 1(2) BLEED FAULT

OEB-41 Erroneous Alternate Fuel Predictions Upon Modification of a Company Route in the Alternate Flight Plan

OEB-43 F/CTL SPOILER FAULT

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OPERATIONS
ENGINEERING BULLETINS

GENERAL DESCRIPTION

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GENERAL DESCRIPTION

Applicable to: ALL

An Operations Engineering Bulletin (OEB) is issued to rapidly inform operators of any deviations from initial design objectives that have a significant operational impact. An OEB provides the operators with technical information and temporary operational procedures that address these deviations.

TYPE OF OEB

OEBs can either be red or white, depending on their level of priority.

- RED OEBs are issued to indicate that non-compliance with the recommended procedures may have a significant impact on the safe operation of the aircraft.
- WHITE OEBs are issued to indicate that non-compliance with the recommended procedures may have a significant impact on aircraft operation.

Airbus strongly recommends that all Operators rapidly apply the OEB corrective actions as soon as they become available, particularly for red OEBs.

OEB CONTENT AND MANAGEMENT

An OEB:
- Is temporary and usually focuses on one operational subject only,
- Is included in the OEB section of both the FCOM and QRH. The procedural part of each white or red OEB (OEB PROC) is provided in the OEB section of the QRH, so that the flight crew can easily access the procedures,
- Remains applicable until the appropriate corrective actions are completed.

Note: After installation of the OEB corrective modification/Service Bulletins (SB): if an Operator reinstalls any spare equipment for which there was an associated OEB, it is Operator's responsibility to ensure that this OEB be applied again for the applicable aircraft.

OEB IN THE FCOM

The content of each OEB includes:
- The reason for issue,
- Technical explanations of the deviation from the initial design objectives,

- The operational impact if the flight crew does not apply the OEB procedure,

  The conditions for applying the OEB procedures :
  - ECAM warning/caution affected by the OEB,
  - Cockpit effects,
  - Flight phases,
  - Specific event.

- The OEB operational procedure(s) to be applied,
- The corrective actions that cancel the OEB (if available)
- The OEB REMINDER codes, (if applicable).

OEB IN THE QRH

Each FCOM OEB has an associated “OEB PROC”in the OEB section of the QRH, that includes:
- The title of the OEB PROC,
- The “ECAM ENTRY" field:
  This section identifies whether or not one of the possible conditions for applying the OEB PROC is an ECAM warning/caution.
  The flight crew must disregard the ECAM procedure and/or STATUS of the ECAM alerts listed in the "ECAM ENTRY" field and must apply the QRH’s OEB procedure instead.
- The OEB operational procedure(s) that the flight crew must apply.

LIST OF EFFECTIVE OEB

The List of Effective operation Engineering Bulletins(LEOEB) enables to review all the OEBs that are applicable to the fleet. Each time an Operations Engineering Bulletin (OEB) is issued or revised, the List of Effective Operations Engineering Bulletins (LEOEB) is updated.

M (1)	Identification	T (2)	E (3)	REV. Date	Title
	OEB38 issue 1	R	N	18 MAR 11	Erroneous Radio Altimeter Height Indication
	Criteria: SA Applicable to: ALL				

(1) Evolution code: N=New, R=Revised, E=Effectivity
(2) Type of OEB: R=Red, W=White
(3) Affects ECAM: Y=Yes, N=No

The LEOEB consists of:

The "M" field that may provide the following Evolution Code
- The "N" letter indicates a new OEB
- The "R" letter indicates a revised OEB
- The "E" letter indicates an aircraft validity change on the OEB

The "Identification" field which identifies the OEB with its identification number

Note: *The FCOM OEB and associated QRH OEB PROC have the same OEB number in order to be consistent. However, the issue number of the QRH OEB PROC and the FCOM OEB may be different, because a revision of an FCOM OEB does not necessarily result in a revision of the corresponding QRH OEB PROC, that only provides the procedure part.*

The "T" field indicates the Type of OEB:
- The "W" letter indicates a white OEB
- The "R" letter indicates a red OEB

Note: *OEBs are listed by type of OEB (RED OEBs first, then WHITE OEBs), and in numerical order for each type of OEB. This enables the flight crew to easily review the OEBs before flight*

The "E" field indicates whether or not the OEB affects ECAM procedure(s). This enable the flight crew to easily review the OEBs before flight particularly for Operators that use the OEB REMINDER function:
- The "Y" letter indicates that the OEB affects ECAM procedure(s)
- The "N" letter indicates that at least one of the procedures provided in the OEB does not affect ECAM procedure(s)

CAUTION	When Airbus provides the Operator with the LEOEB, the information "AFFECTS ECAM : Y" ("E" field) does not necessarily mean that: - The OEB only affects ECAM alerts: The flight crew must also check in the OEB whether or not they have to memorize some additional operational recommendations that are not related to ECAM alerts. - For Operators using the OEB REMINDER function, the Operator's maintenance personnel has activated the OEB REMINDER codes for this OEB onboard the aircraft. It is the Operator's responsibility to define a suitable process for providing the flight crew with confirmation that the OEB REMINDER codes are activated for the ECAM alerts affected by OEBs.

The "Rev Date" field indicates the date at which the OEB content was issued/ changed
The "Title" field provides the OEB title.

REVIEW OF THE OEB

In accordance with the Standard Operating Procedures, and before each flight, the flight crew must review all OEBs that are applicable to their aircraft. If the OEB conditions are applicable, the flight crew must apply the operational procedure(s) that is in the QRH OEB section.

DISTRIBUTION

OEB are distributed to all affected Operators. The Operators shall provide flight crews with the content of the OEB without delay.

OEB REMINDER FUNCTION

The OEB reminder function provides operational help to the flight crew by enabling them to clearly identify on the ECAM all procedures and STATUS messages superseded by an OEB procedure. When a situation causes an ECAM warning/caution to trigger, a message informs the flight crew in real time that there is an OEB for the displayed ECAM warning/caution and/or STATUS, and as a result, that the ECAM procedure and/or STATUS is not applicable. In this case, a specific ECAM message informs the flight crew to refer to the QRH. For more information *Refer to DSC-31-27 General*.

OEB REMINDER CODE

The maintenance personnel must enter specific OEB REMINDER code(s) in the FWC OEB database in order to update the ECAM.
These OEB REMINDER codes are provided in the FCOM OEB chapter only, and are sent to the Operator's Flignt Operations department along with the associated QRH OEB PROC. This is to ensure that the OEB database is not updated before the OEB procedure is available in the QRH and FCOM onboard documentation.

Good coordination between the Airline's/Operator's Flight Operations department and the Airline's/Operator's Engineering department must be established, in order to:

- Ensure that the QRH OEB section is updated onboard the aircraft before the activation of the OEB REMINDER function for a specific OEB.
- Rapidly send information about the OEB REMINDER codes to the Engineering department for a rapid update of the ECAM.
- Provide the flight crew with confirmation that the OEB REMINDER codes are activated onboard the aircraft for the ECAM alerts affected by OEBs.

CAUTION	As soon as the maintenance personnel has embodied the corrective action that cancels the OEB PROC on a specific aircraft, the Operator must ensure that: 1. Maintenance personnel has deactivated the OEB REMINDER function for the specific OEB, before informing their Flight Operations department of the installation of the OEB correction action. 2. The QRH OEB section onboard the aircraft is updated to remove the specific OEB from the applicable aircraft.

CROSS REFERENCE BETWEEN THE FORMER AND NEW OEB IDENTIFICATIONS

Applicable to: ALL

Following the entry into service of the new digital FCOM/QRH, the OEB/OEBPROC identifications were changed.

Note: The former OEB identification is also provided within each OEB.

The following table provides the cross reference between the former and the new OEB/OEBPROC identifications:

Aircraft	Manual	Former OEB Identification	Issue	New OEB Identification	OEB Type	OEB Title
A318/319/320/321	FCOM	78	6	OEB 2	R	Braking Misbehaviour
A318/319/320/321	QRH	78	1			
A318/319/320/321	FCOM	101	2	OEB 3	W	Nose Landing Gear
A318/319/320/321	QRH	101	1			
A318/319/320/321	FCOM	124	4	OEB 4	W	VOR Bearing Fluctuations (Bendix VOR)
A318/319/320/321	QRH	124	1			
A318/319/320/321	FCOM	137	1	OEB 5	W	Loss of Braking
A318/319/320/321	QRH	137	1			
A318/319/320/321	FCOM	138	2	OEB 6	W	Partial Deployment of Passenger Oxygen Masks
A318/319/320/321	QRH	138	1			
A318/319/320/321	FCOM	140	2	OEB 7	W	False ECAM Amber Cautions
A318/319/320/321	QRH	140	1			
A318/319/320/321	FCOM	141	3	OEB 8	W	Insufficient Bank Angle
A318/319/320/321	QRH	141	1			
A318/319/320/321	FCOM	142	1	OEB 9	W	Dual FWC Failure following Status Page Display
A318/319/320/321	QRH	142	1			
A318/319/320/321	FCOM	144	3	OEB 10	W	No Transition to Go-Around Phase
A318/319/320/321	QRH	144	1			
A318/319/320/321	FCOM	152	3	OEB 11	W	"ENG 1(2) OIL FILTER CLOG" ECAM Caution During Flight
A318/319/320/321	QRH	152	1			
A318/319/320/321	FCOM	154	5	OEB 12	W	Undue High Speed Target at GA with One Eng Inop
A318/319/320/321	QRH	154	2			
A318/319/320/321	FCOM	159	3	OEB 13	W	IDG Connector Arcing (IAE)
A318/319/320/321	QRH	159	1			
A318/319/320/321	FCOM	162	2	OEB 14	W	Incorrect Grid-MORA Value Display on ND
A318/319/320/321	QRH	162	1			
A318/319/320/321	FCOM	167	2	OEB 15	W	LGCIU 1 Fault
A318/319/320/321	QRH	167	1			
A318/319/320/321	FCOM	168	2	OEB 16	R	FUEL L(R) TK PUMP 1+2 LO PR
A318/319/320/321	QRH	168	1			

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Aircraft	Manual	Former OEB Identification	Issue	New OEB Identification	OEB Type	OEB Title
A318/319/320/321	FCOM	169	2	OEB 17	W	Dual FM Reset upon Radial Fix Info Entry
A318/319/320/321	QRH	169	1			
A318/319/320/321	FCOM	171	2	OEB 18	W	Excessive FMS Holding Pattern Size
A318/319/320/321	QRH	171	1			
A318/319/320/321	FCOM	172	2	OEB 19	W	Erroneous Guidance to VAPP Target During Climb
A318/319/320/321	QRH	172	1			
A318/319/320/321	FCOM	175	5	OEB 20	R	WHEEL N/W STRG FAULT and L/G SHOCK ABSORBER FAULT ECAM Cautions
A318/319/320/321	QRH	175	1			
A318/319/320/321	FCOM	176	5	OEB 21	R	WHEEL N/W STEER FAULT and L/G SHOCK ABSORBER FAULT ECAM Cautions
A318/319/320/321	QRH	176	1			
A318/319/320/321	FCOM	177	3	OEB 22	W	High Engine Vibration Procedure in Case of Temporary Loss of N1 Vibration Indication
A318/319/320/321	QRH	177	1			
A318/319/320/321	FCOM	178	2	OEB 23	R	Operation of Center Tank Pumps
A318/319/320/321	QRH	178	1			
A318/319/320/321	FCOM	180	2	OEB 24	R	Operation of Fuel Pumps
A318/319/320/321	QRH	180	1			
A318/319/320/321	FCOM	181	1	OEB 25	W	Incorrect Sequencing of Altitude-Terminated (xA) Legs
A318/319/320/321	QRH	181	1			
A318/319/320/321	FCOM	182	2	OEB 26	W	Avionics Smoke
A318/319/320/321	QRH	182	1			
A318/319/320/321	FCOM	183	1	OEB 27	W	Dual Engine Failure
A318/319/320/321	QRH	183	1			
A318/319/320/321	FCOM	184	2	OEB 28	W	No Localizer or Glide Slope Capture in Approach
A318/319/320/321	QRH	184	1			
A318/319/320/321	FCOM	185	2	OEB 29	W	Use of Dome Light for Entire Flight to Ensure the Readability of Standby Instruments
A318/319/320/321	QRH	185	1			
A318/319/320/321	FCOM	188	2	OEB 30	W	No SRS Engagement During Go Around Below MDA
A318/319/320/321	QRH	188	1			
A318/319/320/321	FCOM	189	1	OEB 31	W	Erroneous Vertical Profile During RNAV, LOC and LOC B/C Approaches
A318/319/320/321	QRH	189	1			
A318/319/320/321	FCOM	190	2	OEB 32	W	Smoke/Fumes in Cockpit/Cabin Due to Oil Leak at Engine Start
A318/319/320/321	QRH	190	1			
A318/319/320/321	FCOM	194	2	OEB 33	W	BSCU L4.9 Reset in Flight
A318/319/320/321	QRH	194	1			

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Aircraft	Manual	Former OEB Identification	Issue	New OEB Identification	OEB Type	OEB Title
A318/319/320/321	FCOM	195	3	OEB 34	W	FUEL L(R) XFR VALVE FAULT or FUEL L(R) WING TK OVERFLOW
A318/319/320/321	QRH	195	2			
A318/319/320/321	FCOM	197	1	OEB 35	R	Bleed Selection to Prevent Engine Stall on Both Engines
A318/319/320/321	QRH	197	1			
A318/319/320/321	FCOM	199	2	OEB 36	W	No SRS Engagement During Go Around in the Case of EPR Mode Fault
A318/319/320/321	QRH	199	1			
A318/319/320/321	FCOM	200	1	OEB 37	W	Erroneous Lateral Guidance in NAV Mode During Takeoff and Go Around
A318/319/320/321	QRH	200	1			
A318/319/320/321	FCOM	201	2	OEB 38	R	Erroneous Radio Altimeter Height Indication
A318/319/320/321	QRH	201	2			
A318/319/320/321	FCOM	202	1	OEB 39	W	Loss of MLS LOC and G/S Deviations
A318/319/320/321	QRH	202	1			
A318/319/320/321	FCOM	203	1	OEB 40	W	AIR ENG 1(2) BLEED ABNORMAL PR or AIR ENG 1(2) BLEED FAULT
A318/319/320/321	QRH	203	1			
A318/319/320/321	FCOM	204	1	OEB 41	W	Erroneous Alternate Fuel Predictions Upon Modification of a Company Route in the Alternate Flight Plan
A318/319/320/321	QRH	204	1			
A318/319/320/321	FCOM	205	1	OEB 42	W	Incorrect Vertical Profile During Non Precision Approaches
A318/319/320/321	QRH	205	1			
A318/319/320/321	FCOM	208	1	OEB 43	W	F/CTL SPOILER FAULT
A318/319/320/321	QRH	208	1			
A318/319/320/321	FCOM	209	1	OEB 44	W	L/G GEAR NOT DOWNLOCKED
A318/319/320/321	QRH	209	1			

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OPERATIONS
ENGINEERING BULLETINS

"ENG 1(2) OIL FILTER CLOG" ECAM CAUTION DURING FLIGHT

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OPERATIONS ENGINEERING BULLETINS

"ENG 1(2) OIL FILTER CLOG" ECAM CAUTION DURING FLIGHT

OEB11 Issue 1.0
Associated with QRH OEB Proc N°: OEB11/1.0
"ENG 1(2) OIL FILTER CLOG" ECAM CAUTION DURING FLIGHT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

Approved by: Head of Flight Operations Support and Services

- This OEB covers a significant operational issue. Non-compliance with this OEB should have a significant impact on the operations of the aircraft. The Operators shall distribute its content to all flight crews without delay. An extract of this OEB is provided for insertion in the QRH.
- It is recommended that all Operators accelerate the incorporation of all corrective Service Bulletins as soon as they become available.

Reason for issue: This OEB replaces the A320 OEB 152.
Engine bearing N°3 failure cases, leading to in-flight shutdowns and, in some cases, accompanied by oil door/smoke in the cabin/cockpit, have been reported on V2500-A5 engines. In a recent case, where a N°3 bearing failure is highly suspected, significant smoke entered the cabin and cockpit, leading the crew to deploy the oxygen masks and divert. In most of these events, an ENG 1(2) OIL FILTER CLOG ECAM caution was displayed prior to the in-flight shutdown.

Applicable to: All A320 family aircraft fitted V2500-A5 engines.

Cancelled by: MOD 35795 (SB A320 72-1029).

Note: The interchangeability code, given in the Illustrated Part Catalog (IPC), indicates the conditions for interchangeability of equipment. After installation of corrective modification(s)/SB(s), if an Operator reinstalls any equipment affected by this OEB, it is the Operator's responsibility to ensure that the recommendations given in this OEB are applied again for the applicable aircraft.

Operations Engineering Bulletins are issued by Airbus as the need arises to quickly transmit technical and procedural information. They are distributed to all FCOM holders and to others who need advice of changes to operational information.
Information in this bulletin is recommended by Airbus but may not be approved by Airworthiness Authorities. If the procedures contained in this OEB differ from the procedures in the AFM, the AFM remains the reference.

M	Localization	T	DU Title	DU identification	DU date
	OEB-11		**"ENG 1(2) OIL FILTER CLOG" ECAM Caution During Flight**	00013200.0001001	30 MAR 12
	Criteria: V2500-A5 **Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN**				

"ENG 1(2) OIL FILTER CLOG" ECAM CAUTION DURING FLIGHT

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

EXPLANATION

These events are the consequence of a quality issue concerning the HPC stubshaft coating on a specific batch of engines. Only V2500-A5 engines in the serial number range V10600 to V11365 with bearing Part Number 2A1165 are affected.

In service reports have shown that the ENG 1(2) OIL FILTER CLOG ECAM caution is frequently a symptom of engine bearing damage, that could potentially lead to smoke entering the cabin via the pack of the affected side.

In some cases, this ECAM caution could be accompanied by a variation in oil pressure, an increase in engine vibrations, and/or engine stall/surge.

A N°3 bearing failure can potentially result in damage to the carbon seal at the exit of the bearing chamber, thus causing some oil to migrate to the HP compressor and, subsequently, to contaminate the aircraft's air conditioning system. This could lead to oil odor/smoke in the cabin and the cockpit.

PROCEDURE

The ECAM does not request any pilot action, in the event of an ENG 1(2) OIL FILTER CLOG ECAM caution.

However, to minimize the risk of contaminating the air conditioning system by oil fumes: while continuing normal engine operation, systematically apply the following procedure, in any case where the ENG 1(2) OIL FILTER CLOG ECAM caution occurs in flight:

ENG BLEED (affected side).....OFF

Prevents possible bleed contamination by engine oil.

PACK (affected side).....OFF

Switching OFF one pack enables the remaining pack to operate at 120 %, without any risk of misbehavior on the remaining bleed. Keep the pack on (affected side), in case of an MEL dispatch with the other pack inoperative.

The pack that has been switched off remains available, with the crossbleed valve open. Therefore, switch it on, in case of a subsequent independent malfunction affecting the operating pack.

X BLEED..... OPEN

Opening the crossbleed valve enables the wing anti-ice to be used, when needed.

CLOSELY MONITOR ENGINE PARAMETERS for surge / stall, oil pressure variations, abnormal engine vibrations and, when necessary, apply the associated procedure.

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"ENG 1(2) OIL FILTER CLOG" ECAM CAUTION DURING FLIGHT (Cont'd)

- **If, after the oil filter clog indication, the engine experiences or has already experienced a surge/stall (audible surge detected/undetected by the ECAM) possibly accompanied by a yaw effect on the aircraft:**
  ENG (affected) THRUST LEVER..... IDLE
  Reducing the thrust of the affected engine minimizes further damage to the engine's rotary machinery, but will not necessarily prevent more oil from entering the gas path. Maintain engine at idle, and consider engine shutdown, when high vibration occurs, or oil quantity/oil pressure drops low.

Note: ENG 1(2) OIL FILTER CLOG ECAM caution occurring on ground during engine start are frequently due to low oil viscosity and may be self-recoverable: No maintenance action is required, if the message appears before the engine has reached a stabilized idle condition (Refer to FCOM "ENG 1(2) OIL FILTER CLOG" procedure). Maintenance action is required, if it does not disappear when the engine is stabilized at idle.

OEB REMINDER

For aircraft that have the OEB Reminder Function activated, the ENG 1 OIL FILTER CLOG ECAM caution procedure and status may be flagged.
If the ENG 1 OIL FILTER CLOG ECAM caution procedure is flagged, the ECAM will display the "REFER TO QRH PROC"line or "REFER TO QRH/OEB PROC"line (depending on Flight Warning Computer (FWC) standard) instead of the procedure itself.
To flag the procedure and the status that corresponds to the ENG 1 OIL FILTER CLOG ECAM caution, the following code must be entered in the FWC OEB database:

CODE	WARN	STS
ENG 1 OIL FILTER CLOG 77/00/056/109	Y	N
ENG 2 OIL FILTER CLOG 77/00/057/110	Y	N

CORRECTIVE ACTION

The embodiment of the Airbus SB A320 72-1029 cancels the need for this OEB.
For the aircraft that are affected by the above mentioned batch of engines, the IAE SB No. V2500 ENG-72-0459 must be embodied first before reporting to Airbus the embodiment of Airbus SB A320 72-1029.
For the aircraft that are not affected by the above-mentioned batch of engines, Operators must also send the SB A320 72-1029 reporting sheet to Airbus.

OPERATIONS
ENGINEERING BULLETINS

DUAL FM RESET UPON RADIAL FIX INFO ENTRY

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OEB17 Issue 1.0
Associated with QRH OEB Proc N°: OEB17/1.0
DUAL FM RESET UPON RADIAL FIX INFO ENTRY

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

Approved by: Head of Flight Operations Support and Services

- This OEB covers a significant operational issue. Non-compliance with this OEB should have a significant impact on the operations of the aircraft. The Operators shall distribute its content to all flight crews without delay. An extract of this OEB is provided for insertion in the QRH.
- It is recommended that all Operators accelerate the incorporation of all corrective Service Bulletins as soon as they become available.

Reason for issue: This OEB replace the A320 OEB 169
Several Operators reported that both FMS reset immediately after the flight crew inserted a FIX INFO radial that intercepted the F-PLN just prior to the last point of the approach (Missed Approach Point (MAP), or runway threshold).
Therefore, this OEB is issued to provide the operational recommendations that should be applied, in order to help prevent this situation.

Applicable to: All A318/A319/A320/A321 aircraft with FMS2 Pegasus :

- P1C8 MOD 31896, or
- P1C9 MOD 32222, or
- P1C11 MOD 34573, or
- P1I8 MOD 31897.

Cancelled by: FMGC with PEGASUS H2 - Release 1A

- H2C12 MOD 38778, or
- H2I11 MOD 38779.

Note: The interchangeability code, given in the Illustrated Part Catalog (IPC), indicates the conditions for interchangeability of equipment. After installation of corrective modification(s)/SB(s), if an Operator reinstalls any equipment affected by this OEB, it is the Operator's responsibility to ensure that the recommendations given in this OEB are applied again for the applicable aircraft.

OPERATIONS ENGINEERING BULLETINS

DUAL FM RESET UPON RADIAL FIX INFO ENTRY

Operations Engineering Bulletins are issued by Airbus as the need arises to quickly transmit technical and procedural information. They are distributed to all FCOM holders and to others who need advice of changes to operational information.
Information in this bulletin is recommended by Airbus but may not be approved by Airworthiness Authorities. If the procedures contained in this OEB differ from the procedures in the AFM, the AFM remains the reference.

M	Localization	T	DU Title	DU identification	DU date
	OEB-17		**Dual FM Reset upon Radial Fix Info Entry**	00013513.0001001	30 MAR 12
	Criteria: 22-1090, P7520 **Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI**				
	OEB-17		**Dual FM Reset upon Radial Fix Info Entry**	00013515.0001001	30 MAR 12
	Criteria: 22-1090, P7520 **Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI**				

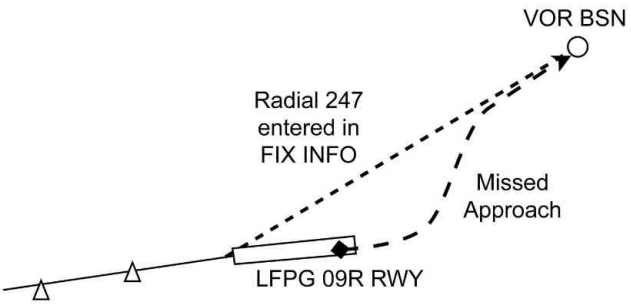
DUAL FM RESET UPON RADIAL FIX INFO ENTRY

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HTG, B-HTH, B-HTI

EXPLANATION

The diagram below illustrates one of the reported events that occurred during the aircraft's approach into Paris CDG airport RWY 09R, after inserting the BSN VOR 247 ° radial in the MCDU FIX INFO page.

Paris CDG diagram



Paris CDG diagram

In some reset cases, the FM lost the GW/CG information. When the GW/CG were re-inserted, the FM reset again. However, F-PLN data were not lost, and the AP/FD/ATHR remain engaged.
In other reset cases, the FM lost the F-PLN and all other manually-entered data.
Airbus has reproduced the reported scenarios in the simulator. Investigations indicate that the FMS cannot perform the associated prediction computations, when FIX INFO radials intersect the F-PLN just before the last point of the approach. These specific conditions systematically cause the FM reset.
The reset may occur during any flight phase, as soon as the corresponding FIX INFO radial is inserted, and the associated predictions are computed.

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DUAL FM RESET UPON RADIAL FIX INFO ENTRY (Cont'd)

Due to the fact that several FM resets may occur consecutively, it may take some time for the FMS to automatically recover.

PROCEDURE

PREVENTIVE PROCEDURE

Do not use the FIX INFO function with any radials that could intercept the F-PLN just before the last point of the approach (less than 0.1 nm).

Note: The last point of the approach corresponds to the runway threshold for an ILS approach, or to the Missed Approach Point (MAP) for a Non-Precision Approach (NPA).

RECOVERY PROCEDURE

If disengaged, consider reengagement of the AP/FD and ATHR.
While the FMS is recovering, consider using RMP backup tuning for navigation.

- **If the F-PLN is not lost:**

  Normal FMS operation can be recovered by clearing the radial FIX INFO, and then by re-entering the GW/CG.

- **If the F-PLN is lost:**

  When the FMS has automatically recovered, perform the associated procedures (*Refer to QRH/ABN-22 LOSS OF FMS DATA IN DESCENT/APPROACH (Severe Reset)*).

CORRECTIVE ACTION

This OEB is cancelled by PEGASUS H2-R1A FMS standard.

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OPERATIONS
ENGINEERING BULLETINS

NO LOCALIZER OR GLIDE SLOPE CAPTURE IN APPROACH

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OEB28 Issue 1.0
Associated with QRH OEB Proc N°: OEB28/1.0
NO LOCALIZER OR GLIDE SLOPE CAPTURE IN APPROACH

Applicable to: B-HTD

Approved by: Head of Flight Operations Support and Services

- This OEB covers a significant operational issue. Non-compliance with this OEB should have a significant impact on the operations of the aircraft. The Operators shall distribute its content to all flight crews without delay. An extract of this OEB is provided for insertion in the QRH.
- It is recommended that all Operators accelerate the incorporation of all corrective Service Bulletins as soon as they become available.

Reason for issue: This OEB replaces the A320 OEB 184.
Several Operators experienced the following event: LOC* (G/S*) capture mode did not engage when intercepting the localizer (glide slope) during an ILS approach.
This OEB provides an explanation of the above-mentioned event, as well as the operational recommendations that the flight crew should apply, in order to intercept the ILS using LOC and G/S modes.

Applicable to: Aircraft with Rockwell Collins Multi-Mode Receiver (MMR), P/N 822-1152-121 (MOD 26999 or MOD 30631)

Cancelled by: MMR P/N 822-1152-122 (MOD 37356)

Note: The interchangeability code, given in the Illustrated Part Catalog (IPC), indicates the conditions for interchangeability of equipment. After installation of corrective modification(s)/SB(s), if an Operator reinstalls any equipment affected by this OEB, it is the Operator's responsibility to ensure that the recommendations given in this OEB are applied again for the applicable aircraft.

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Information in this bulletin is recommended by Airbus but may not be approved by Airworthiness Authorities. If the procedures contained in this OEB differ from the procedures in the AFM, the AFM remains the reference.

M	Localization	T	DU Title	DU identification	DU date
E	OEB-28		**No Localizer or Glide Slope Capture in Approach**	00013496.0001001	30 MAR 12
E	Criteria: 34-1162 **Applicable to: B-HTD**				
	OEB-28		**No Localizer or Glide Slope Capture in Approach**	00013497.0001001	30 MAR 12
E	Criteria: 34-1162 **Applicable to: B-HTD**				

NO LOCALIZER OR GLIDE SLOPE CAPTURE IN APPROACH

Applicable to: B-HTD

EXPLANATION

Investigations have indicated that the LOC* capture mode did not engage due to an automatic, internal reset of one Multi-Mode Receiver (MMR). This automatic reset causes the LOC and/or G/S deviation data computed by this MMR to continuously change from Normal Operation to No Computed Data, approximately every second. This can only be stopped, on ground, if the maintenance crew cuts the MMR power for more than 10 s.

The Master FMGC must receive a valid LOC signal from its onside MMR for a minimum of 3 s to enable LOC* mode engagement. When the MMR associated to the Master FMGC periodically resets, the associated LOC signal is valid for less than one second, which explains why the LOC* mode does not engage.

In such cases, when the AP and/or FD is engaged and the LOC and G/S modes are armed, the aircraft may unexpectedly fly through the ILS beam without capturing it. The ILS identification and deviation symbols displayed on the PFD (and on the ND in ROSE-LS mode) may intermittently disappear. However, when displayed, these ILS deviation symbols are reliable.

The possibility of both MMRs being simultaneously affected is very remote. Therefore, it is highly probable that the second MMR is operative and will continue to provide constant and valid data to the Slave FMGC.

If the flight crew changes the AP in command, the Slave FMGC becomes Master, and will use the associated, valid data from its onside MMR. This will enable the localizer and/or the glide slope capture modes to engage.

Note: *1. If both APs are engaged, FMGC1 is Master. To change the Master FMGC from FMGC1 to FMGC2, the flight crew must disengage AP1 pb by pressing the AP1 pb on the FCU.*

2. If the autopilot is disengaged, and both FDs are engaged, FMGC1 is Master by default. It is possible to change the Master FMGC from FMGC1 to FMGC2, by engaging AP2, or disengaging FD1.

PROCEDURE

In accordance with the FCOM Standard Operating Procedures (*Refer to PRO-NOR-SOP-18 Precision Approach Pattern*), the flight crew should closely monitor the localizer and glide slope capture, for every ILS approach.

- **If LOC* mode does not engage when expected, the flight crew should:**

  Perform the ILS interception using the LOC raw data deviations. The FD and AP can be used in selected modes (HDG-V/S modes, or preferably TRK-FPA modes) for this purpose.

Continued on the following page

NO LOCALIZER OR GLIDE SLOPE CAPTURE IN APPROACH (Cont'd)

Consider changing the Master FMGC:

- **If the AP is engaged:**

  Change the AP in command

  (If AP1+2 are engaged, change to AP2, by pressing the AP1 pb on the FCU to disengage AP1)

- **If the AP is disengaged, and the FDs are engaged:**

  Turn off FD1

Then, attempt to reengage the LOC and G/S modes, by pressing the APPR pb.

LOC* (G/S*) mode should engage as expected, and the ILS can then be flown in LOC and G/S modes. However, the flight crew should disregard the approach capability on the FMA, and perform only a CAT I approach with a manual landing.

Note: *If it is still not possible to intercept the ILS after changing the Master FMGC, the flight crew must perform an ILS approach using raw data. The AP/FD can be used in selected modes (HDG/VS, or preferably TRK/FPA). The flight crew should disarm the APPR (LOC) mode(s) by setting the APPR (LOC) pb to OFF on the FCU, and then perform a CAT I approach with a manual landing.*

CORRECTIVE ACTION

This OEB is cancelled by the installation of the MMR P/N 822-1152-122.

OPERATIONS
ENGINEERING BULLETINS

NO SRS ENGAGEMENT DURING GO AROUND BELOW MDA

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OEB30 Issue 1.0
Associated with QRH OEB Proc N°: OEB30/1.0
NO SRS ENGAGEMENT DURING GO AROUND BELOW MDA

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

Approved by: Head of Flight Operations Support and Services

- This OEB covers a significant operational issue. Non-compliance with this OEB should have a significant impact on the operations of the aircraft. The Operators shall distribute its content to all flight crews without delay. An extract of this OEB is provided for insertion in the QRH.
- It is recommended that all Operators accelerate the incorporation of all corrective Service Bulletins as soon as they become available.

Reason for issue:

This OEB replaces the A320 OEB 188.
One Operator reported a case where the flight crew initiated a Go Around slightly below the Minimum Descent Altitude (MDA), and the aircraft did not pitch up as expected. The flight crew performed a non precision approach (a VORDME approach) using the FINAL APP managed guidance mode with the AP1 (Autopilot) engaged during the final approach.
This OEB is issued to provide flight crews with an operational procedure to avoid such aircraft behavior.
The operational procedure provided in this OEB applies to all Non Precision Approaches, for both conventional approaches and RNAV approaches, flown in FINAL APP managed guidance mode.

Applicable to: All A318/A319/A320/A321 aircraft

Cancelled by: Flight Guidance (FG) "I11" standard part of FMGC S4I11 (MOD 37252), P1I11 (MOD 37311) or FG "C12" standard part of FMGC S4C12 (MOD 37935), P1C12 (MOD 37934).

Note: The interchangeability code, given in the Illustrated Part Catalog (IPC), indicates the conditions for interchangeability of equipment. After installation of corrective modification(s)/SB(s), if an Operator reinstalls any equipment affected by this OEB, it is the Operator's responsibility to ensure that the recommendations given in this OEB are applied again for the applicable aircraft.

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Information in this bulletin is recommended by Airbus but may not be approved by Airworthiness Authorities. If the procedures contained in this OEB differ from the procedures in the AFM, the AFM remains the reference.

M	Localization	T	DU Title	DU identification	DU date
	OEB-30		**No SRS Engagement During Go Around Below MDA**	00013524.0002001	30 MAR 12
	Criteria: SA **Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF**				
	OEB-30		**No SRS Engagement During Go Around Below MDA**	00013525.0002001	30 MAR 12
	Criteria: SA **Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF**				

NO SRS ENGAGEMENT DURING GO AROUND BELOW MDA

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HTD, B-HTE, B-HTF

EXPLANATION

Note: The following behavior does not occur when the flight crew uses lateral managed guidance only (NAV-FPA or NAV-V/S).

The following occurs when the flight crew uses the FINAL APP managed guidance mode, and engages either AP1 or FD1 (AP OFF, FMGC1 is the master):
During a non-precision approach, when the aircraft is reaching MDA (MDH) minus 50 ft, or the Missed Approach Point (MAP), the FMGC automatically commands an AP/FD disconnection, in order to automatically disengage the FINAL APP managed guidance mode. After the AP/FD disconnection, the FD engages again, either in heading-vertical speed (HDG-V/S), or track-Flight Path Angle (TRK-FPA) mode, with the current aircraft targets.
If the flight crew initiates a go-around below MDA (MDH) during a short period of time (approximately 600 ms) after the AP/FD disconnection, no FMGC takes over to engage the go-around guidance modes, as expected. This is due to the fact that both FMGCs are not entirely synchronized when the AP/FD automatically disconnects.
As a result, the GA TRK lateral guidance mode and the SRS vertical guidance mode do not engage during the go-around. In addition, the FD remains in a basic guidance mode (i.e. HDG-V/S or TRK-FPA), and provides the flight crew with pitch down orders that are not appropriate.
Investigation has demonstrated that if the flight crew disengages the FINAL APP managed guidance mode during the final stage of the approach, the SRS and the GA TRK guidance modes engage as expected, when the flight crew initiates a go-around slightly below MDA(MDH).

PROCEDURE

During a non precision approach, when using the FINAL APP managed guidance mode:

- **At DA(DH) or MDA(MDH), or earlier in approach if visual conditions are obtained:**
  DISENGAGE the FINAL APP mode by pressing the APPR pushbutton on the FCU.

When the flight crew presses the APPR pb in order to disengage the FINAL APP managed guidance mode, a basic vertical guidance mode, either V/S or FPA, engages.

This ensures that the SRS and GA TRK guidance modes correctly engage, if the flight crew initiates a go-around slightly below MDA (MDH).

Continued on the following page

NO SRS ENGAGEMENT DURING GO AROUND BELOW MDA (Cont'd)

CORRECTIVE ACTION

This OEB is cancelled by the installation of the Flight Guidance (FG) "I11" standard part of FMGC S4I11 (MOD 37252), P1I11 (MOD 37311) or FG "C12" standard part of FMGC S4C12 (MOD 37935), P1C12 (MOD 37934).

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OPERATIONS
ENGINEERING BULLETINS

ERRONEOUS VERTICAL PROFILE DURING RNAV, LOC AND LOC B/C APPROACHES

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OEB31 Issue 1.0
Associated with QRH OEB Proc N°: OEB31/1.0
ERRONEOUS VERTICAL PROFILE DURING RNAV, LOC AND LOC B/C APPROACHES

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

Approved by: Head of Flight Operations Support and Services

- This OEB covers a significant operational issue. Non-compliance with this OEB should have a significant impact on the operations of the aircraft. The Operators shall distribute its content to all flight crews without delay. An extract of this OEB is provided for insertion in the QRH.
- It is recommended that all Operators accelerate the incorporation of all corrective Service Bulletins as soon as they become available.

Reason for issue:

This OEB replaces the A320 OEB 189.

This OEB is issued to provide Operators with the operational recommendations to apply in cases where the flight crew performs an RNAV or a LOC or LOC Back Course (B/C) approach with the MAP located before the runway (RWY) threshold.

This is because in such cases, the FMGC does not compute the vertical flight path correctly. As a result, it may cause the aircraft, when flown in managed vertical guidance, during an RNAV approach, to fly a vertical flight path lower than the published one on the approach procedure chart.

This anomaly also applies to the vertical deviation indication symbol, VDEV.

These recommendations were originally published in *Refer to FCOM Standard Operating Procedure - Non Precision Approach section*. Due to the fact that more and more RNAV procedures are being published in the Instrument Approach Procedures (IAP), Airbus found it necessary to publish this OEB in order to highlight these recommendations.

Applicable to:

All A320 family aircraft fitted with the Honeywell FMS.

Cancelled by:

Honeywell FMS2 "Release 1A" Standard (MOD 38778 on CFM aircraft, or MOD 38779 on IAE/PW aircraft), or a future standard for legacy FMS (Mod TBD).

Note: The interchangeability code, given in the Illustrated Part Catalog (IPC), indicates the conditions for interchangeability of equipment. After installation of corrective modification(s)/SB(s), if an Operator reinstalls any equipment affected by this OEB, it is the Operator's responsibility to ensure that the recommendations given in this OEB are applied again for the applicable aircraft.

OPERATIONS ENGINEERING BULLETINS
ERRONEOUS VERTICAL PROFILE DURING RNAV, LOC AND LOC B/C APPROACHES

Operations Engineering Bulletins are issued by Airbus as the need arises to quickly transmit technical and procedural information. They are distributed to all FCOM holders and to others who need advice of changes to operational information.
Information in this bulletin is recommended by Airbus but may not be approved by Airworthiness Authorities. If the procedures contained in this OEB differ from the procedures in the AFM, the AFM remains the reference.

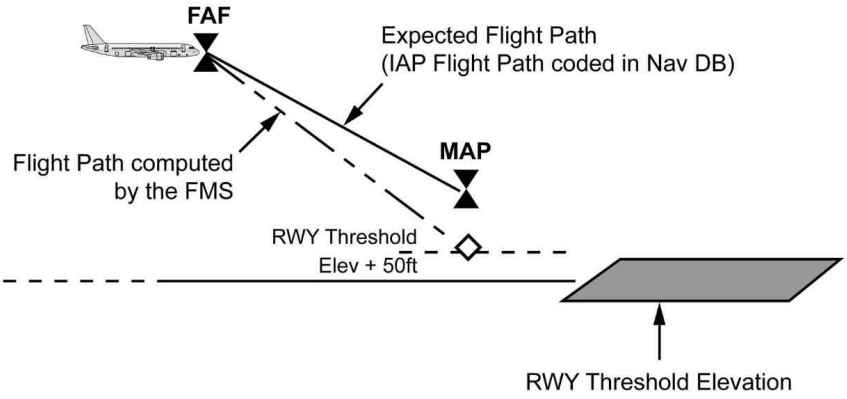
M	Localization	T	DU Title	DU identification	DU date
	OEB-31		**Erroneous Vertical Profile During RNAV, LOC and LOC B/C Approaches**	00013528.0003001	30 MAR 12
	Criteria: SA **Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP**				
	OEB-31		**Erroneous Vertical Profile During RNAV, LOC and LOC B/C Approaches**	00013529.0003001	30 MAR 12
	Criteria: SA **Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP**				

ERRONEOUS VERTICAL PROFILE DURING RNAV, LOC AND LOC B/C APPROACHES

Applicable to: ALL 321, B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP

EXPLANATION

When the FMGC identifies an IAP that is labelled as RNAV in the navigation database, and that is labelled as RNV on the MCDU, it builds the final approach vertical flight path assuming that there is an altitude constraint at the MAP equal to the runway threshold elevation plus 50 ft.
As a result, when the MAP is located before the runway (RWY) threshold, the FMGC computes an erroneous vertical flight path for the final approach, an erroneous crossing altitude at the MAP, and displays an erroneous vertical deviation indication (VDEV symbol) on the PFD, when flying the approach. This VDEV anomaly also applies to the LOC and LOC B/C approaches with the MAP located before the runway (RWY) threshold.



MAP: Missed Approach Point
FAF: Final Approach Fix

Therefore, for RNAV approaches, when the MAP is located before the runway threshold, the flight crew cannot use flight guidance in FINAL APP mode, and they must disregard the VDEV symbol.
The flight crew must fly the LOC and LOC B/C approaches in selected vertical guidance mode (FPA or V/S mode), and they must disregard the vertical deviation symbol (VDEV).
Note that approaches labelled as "GPS"on the MCDU are not affected and can be flown in FINAL APP mode regardless of the MAP position.

Continued on the following page

ERRONEOUS VERTICAL PROFILE DURING RNAV, LOC AND LOC B/C APPROACHES (Cont'd)

PROCEDURE

FOR RNAV APPROACHES

For any approach labelled as RNV on MCDU:

VERIFY on the approach chart and on the MCDU that the MAP is at the runway threshold
On the MCDU F-PLN page, if the last waypoint of the active F-PLN, displayed in green, is identified as a runway (e.g. LFB032L), it means that the runway threshold is the MAP.

- **If the MAP is located at the runway (RWY) threshold:**

  Use of the vertical managed guidance mode (FINAL APP) is possible

- **If the MAP is not located at the runway (RWY) threshold:**

  DO NOT USE vertical managed guidance (FINAL APP)
  USE NAV mode for lateral guidance
  USE SELECTED vertical guidance mode only (FPA is recommended)
  DISREGARD the VDEV symbol, and crosscheck the final descent using altitude versus distance to the MAP.

Note: *Approaches labelled as "GPS"on the MCDU can be flown in FINAL APP mode, regardless of the MAP position.*

FOR LOC, OR LOC BACK COURSE (B/C) APPROACHES

CHECK the position of the MAP on the approach chart

- **If the MAP is located at the runway (RWY) threshold:**

  VDEV symbol can be used to assist the flight crew in flying the vertical flight path in selected mode.

- **If the MAP is located before the runway (RWY) threshold:**

  DISREGARD the VDEV symbol, and crosscheck the final descent using the altitude versus the distance to the MAP.

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OPERATIONS ENGINEERING BULLETINS

NO SRS ENGAGEMENT DURING GO AROUND IN THE CASE OF EPR MODE FAULT

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OPERATIONS ENGINEERING BULLETINS
NO SRS ENGAGEMENT DURING GO AROUND IN THE CASE OF EPR MODE FAULT

OEB36 Issue 1.0
Associated with QRH OEB Proc N°: OEB36/1.0
NO SRS ENGAGEMENT DURING GO AROUND IN THE CASE OF EPR MODE FAULT

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

Approved by: Head of Flight Operations Support and Services

- This OEB covers a significant operational issue. Non-compliance with this OEB should have a significant impact on the operations of the aircraft. The Operators shall distribute its content to all flight crews without delay. An extract of this OEB is provided for insertion in the QRH.
- It is recommended that all Operators accelerate the incorporation of all corrective Service Bulletins as soon as they become available.

Reason for issue: This OEB replaces the A320 OEB 199.
One operator reported a case where, at takeoff, the Speed Reference System (SRS) mode did not engage, as expected while setting takeoff thrust. The aircraft was dispatched in N1 rated control mode (EPR control mode inoperative).
Investigation has shown that similar misbehavior also applies in the case of go-around with EPR control mode inoperative.
This OEB is issued to provide flight crews with an operational procedure in the case of a go-around with EPR control mode inoperative (EPR control mode failure in flight).

Applicable to: All A320 family aircraft fitted with IAE engines and Flight Guidance (FG) "I9" (Thales/GE, MOD 34076) "I10" (Honeywell, MOD 35526) standard and subsequent.

Cancelled by: Flight Guidance (FG) "I11 A" (Thales/GE, MOD 151693, Airbus SB A320-22-1345, or Honeywell, MOD 151692, Airbus SB: TBD) and "I12" standard (MOD/Airbus SB: TBD)

Note: The interchangeability code, given in the Illustrated Part Catalog (IPC), indicates the conditions for interchangeability of equipment. After installation of corrective modification(s)/SB(s), if an Operator reinstalls any equipment affected by this OEB, it is the Operator's responsibility to ensure that the recommendations given in this OEB are applied again for the applicable aircraft.

OPERATIONS ENGINEERING BULLETINS
NO SRS ENGAGEMENT DURING GO AROUND IN THE CASE OF EPR MODE FAULT

Operations Engineering Bulletins are issued by Airbus as the need arises to quickly transmit technical and procedural information. They are distributed to all FCOM holders and to others who need advice of changes to operational information.
Information in this bulletin is recommended by Airbus but may not be approved by Airworthiness Authorities. If the procedures contained in this OEB differ from the procedures in the AFM, the AFM remains the reference.

M	Localization	T	DU Title	DU identification	DU date
E	OEB-36		**No SRS Engagement During Go Around in the Case of EPR Mode Fault**	00013566.0003001	30 MAR 12
E	Criteria: 22-1203, IAE, P9126 **Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI**				
	OEB-36		**No SRS Engagement During Go Around in the Case of EPR Mode Fault**	00013568.0003001	30 MAR 12
E	Criteria: 22-1203, IAE, P9126 **Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI**				

NO SRS ENGAGEMENT DURING GO AROUND IN THE CASE OF EPR MODE FAULT

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU, B-HTG, B-HTH, B-HTI

EXPLANATION

The following occurs in case of go-around when engines are in N1 control mode (EPR control mode inoperative).
If the flight crew initiates a go-around, go-around modes do not engage and the FMS does not engage the GO AROUND phase, as expected. The Flight Director (FD) does not engage in go-around mode but either remains in current mode or reverts in basic guidance mode (i.e. V/S-HDG or FPA-TRK).
Consequently FD crossbars provide the flight crew with inappropriate pitch down orders.
If the FD is OFF (or the Flight Path Vector is used) the FD crossbars will not automatically engage (even with the automatic FD crossbars engagement during go-around).
If initially engaged, Auto Pilot(s) (APs) disengages.
As a consequence the flight crew will have to perform a manual go-around and simultaneously to disengage the FD (if previously engaged). Afterwards APs and FDs can be reengaged.
The landing capability is limited to CAT 1.

PROCEDURE

In the case of go-around with EPR control mode inoperative, perform a manual go-around with no FD:

Maximum landing capability is CAT 1.

Note: To perform a manual go-around with no FD, the PF simultaneously announces her/his intention, disengages the AP, applies TOGA and initiates the rotation.

GO-AROUND..... ANNOUNCE
AP (if engaged)..... OFF
BOTH FDs (if engaged)..... OFF

Action performed by the PNF on PF request.

THRUST LEVERS.....TOGA
ROTATION.....15 °OF PITCH

Rotate to 12.5 ° in case of engine failure.

FLAPS.....RETRACT ONE STEP
POSITIVE CLIMB.....ANNOUNCE
LDG GEAR UP.....ORDER
LDG GEAR.....SELECT UP
Adjust pitch to maintain VAPP

Continued on the following page

NO SRS ENGAGEMENT DURING GO AROUND IN THE CASE OF EPR MODE FAULT (Cont'd)

- **When appropriate:**
  Set both FDs to ON (basic guidance modes engage)
  Engage OP CLB and select appropriate speed and lateral mode
  AP use as required
- **When reaching thrust reduction altitude:**
  Set both thrust levers to CL detent
- **When reaching acceleration altitude:**
  Resume normal acceleration and climb procedures.

Note: CLB or LVR CLB will not flash on the FMA as the A/THR is not available. The FMS does not engage the GO AROUND phase.

OEB REMINDER

For aircraft that have the OEB reminder function activated, the ENG 1(2) EPR MODE FAULT ECAM caution procedure and status may be flagged.
If the ENG 1(2) EPR MODE FAULT ECAM caution procedure is flagged, the ECAM will display the FOR STS REFER TO QRH line or FOR STS REFER TO OEB line (depending on Flight Warning Computer (FWC) standard) instead of the status itself.
To flag the procedure and the status that corresponds to the ENG 1(2) EPR MODE FAULT ECAM caution, the following code must be entered in the FWC OEB database:

CODE	WARN	STS
ENG 1 EPR MODE FAULT 77/11/186/126	N	Y
ENG 2 EPR MODE FAULT 77/11/187/127	N	Y

CORRECTIVE ACTION

The embodiment of the following FG standard cancels the need for this OEB.

- Flight Guidance (FG) "I11A"
  - Thales/GE, MOD 151693, Airbus SB A320 22-1345, or
  - Honeywell, MOD 151692, Airbus SB: TBD
- "I12" standard (Mod/Airbus SB: TBD)

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OPERATIONS
ENGINEERING BULLETINS

ERRONEOUS RADIO ALTIMETER HEIGHT INDICATION

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OEB38 Issue 1.0
Associated with QRH OEB Proc N°: OEB38/1.0
ERRONEOUS RADIO ALTIMETER HEIGHT INDICATION

Applicable to: ALL

Approved by: Head of Flight Operations Support and Services

- This OEB covers a significant operational issue. Non-compliance with this OEB should have a significant impact on the safe operations of the aircraft. The Operators shall distribute its content to all flight crews without delay. An extract of this OEB is provided for insertion in the QRH.
- It is strongly recommended that all Operators accelerate the incorporation of all corrective Service Bulletins as soon as they are available.

Reason for issue: This OEB replaces the A320 OEB 201
In follow-up to questions received from several Operators, the objective of this OEB is to remind Operators of the possible operational consequences of an erroneous Radio Altimeter (RA) height indication:

In addition this OEB is issued to:
- Highlight that during ILS (or MLS, GLS) approach with AP engaged, in the event of an unexpected early THR IDLE and FLARE modes engagement, the flight crew must immediately react to prevent the angle-of-attack from increasing.
- Provide explanation of erroneous RA height indication effects on Auto Flight System (AFS) and flight control law.

Applicable to: All A318/A319/A320/A321 operators
Cancelled by: TBD

Note: The interchangeability code, given in the Illustrated Part Catalog (IPC), indicates the conditions for interchangeability of equipment. After installation of corrective modification(s)/SB(s), if an Operator reinstalls any equipment affected by this OEB, it is the Operator's responsibility to ensure that the recommendations given in this OEB are applied again for the applicable aircraft.

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Operations Engineering Bulletins are issued by Airbus as the need arises to quickly transmit technical and procedural information. They are distributed to all FCOM holders and to others who need advice of changes to operational information.
Information in this bulletin is recommended by Airbus but may not be approved by Airworthiness Authorities. If the procedures contained in this OEB differ from the procedures in the AFM, the AFM remains the reference.

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M	Localization	T	DU Title	DU identification	DU date
	OEB-38		**Erroneous Radio Altimeter Height Indication**	00013580.0001001	30 MAR 12
	Criteria: SA **Applicable to: ALL**				
	OEB-38		**Erroneous Radio Altimeter Height Indication**	00013582.0001001	30 MAR 12
	Criteria: SA **Applicable to: ALL**				

ERRONEOUS RADIO ALTIMETER HEIGHT INDICATION

Applicable to: ALL

EXPLANATION

If an RA transmits erroneous height indication, this may have any of the following effects on aircraft systems depending on the flight phase. However, these effects may not necessarily occur in every case of an erroneous RA height indication.

On the Primary Flight Display (PFD):
- The RA height indication (possibly negative) is frozen and appears in either amber or green depending on the height
- Discrepancy between both PFDs (RA indications, FD orders, and if both AP engaged, PFD FMAs)

On the System Display (SD):
- A pulsing Cabin Differential Pressure Advisory appears on CAB PRESS page (No consequence on cabin pressure)

Warnings / Callouts:
- Untimely Terrain Awareness and Warning System (TAWS) alerts
- Untimely or absence of “RETARD”callout
- Untimely L/G GEAR NOT DOWN ECAM warning
- Absence or interruption of RA automatic callout (height announcement)
- Activation of AUTOLAND light warning light in ILS (or MLS, GLS) approach (Refer to FCOM DSC 22_30 - Auto Flight - Flight Guidance) with AP engaged in LAND or FLARE mode when:
  - One RA height goes below 200 ft and
  - The difference between both RA height indications is greater than 15 ft.

  Note: There is no ECAM message or audio warning in association to the AUTOLAND warning light. The AUTOLAND warning can be triggered even if AUTOLAND is not planned.

Auto Flight System mode changes (indicated on FMA):
- NAV mode engagement not possible after take off
- During an ILS (or MLS, GLS) approach, and depending on the engaged Flight Guidance (FG) modes, the consequences may be:

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ERRONEOUS RADIO ALTIMETER HEIGHT INDICATION (Cont'd)

- Untimely/early engagement of the LAND / FLARE / THR IDLE modes if the RA height used by the FG is erroneous and lower than the real height.

  Note: *During ILS (or MLS, GLS) approach with AP and A/THR engaged, THR IDLE (RETARD) mode untimely engagement will be associated with an initial pitch attitude increase due to FLARE mode engagement.*

- In AUTOLAND, the LAND / FLARE / THR IDLE modes will not engage, if the RA height used by the FG is erroneous and higher than the real height.
- In case of Go-Around and if the RA is still frozen at a very low height indication:

  ■ SRS and GA TRK modes engage
  ■ NAV, HDG or TRK lateral modes cannot be selected
  ■ LVR CLB will not be displayed on the FMA at THR RED ALT
  ■ ALT* and ALT will not engage at FCU altitude.

  Disconnecting AP and resetting both FDs enable to recover basic mode (HDG and V/S).

During an ILS (or MLS, GLS) approach with AP engaged, if an erroneous and very low RA height indication occurs, THR IDLE and FLARE modes may engage early with the following consequences:

- In CONF FULL, the High Angle of Attack protection is not available. As a consequence the autopilot will not automatically disconnect at α prot +1 °. If the flight crew does not immediately react, the angle-of-attack will increase and may reach the stall value.
- In configurations other than CONF FULL, the High Angle of Attack autopilot disconnection is available. The autopilot will automatically disconnect at α prot +1 °.
- Loss of ALPHA FLOOR.
- The LOW ENERGY AUDIO WARNING – “SPEED SPEED SPEED”- remains available. In case of activation of LOW ENERGY AUDIO WARNING, the flight crew must react as per procedure (QRH ABN 22.2).
- In CONF FULL, the auto-trim function is inhibited.
- In manual flight or after AP disconnection, significant longitudinal sidestick input may be required.

PROCEDURE

During all phases of flight, the flight crew must monitor and crosscheck all primary flight parameters and FMA indications.

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ERRONEOUS RADIO ALTIMETER HEIGHT INDICATION (Cont'd)

During ILS (or MLS, GLS) approach with AP engaged, in the event of an unexpected early THR IDLE and FLARE modes engagement, the flight crew must immediately react as follows:

- **Immediately** perform an automatic Go-Around (Thrust Levers set to TOGA),
  OR
- **Immediately** disconnect the AP,
  - Then continue the landing using raw data or visual references (FDs set to OFF),
    OR
  - Perform a manual Go-Around (Thrust Levers set to TOGA). Significant longitudinal sidestick input may be required.

Note: *1. If the flight crew does not immediately react, the angle-of-attack will increase and may reach the stall value.*

2. In case of Go-Around and if the RA is still frozen at a very low height indication:

- *SRS and GA TRK modes engage*
- *NAV, HDG or TRK lateral modes cannot be selected*
- *LVR CLB will not be displayed on the FMA at THR RED ALT*
- *ALT* and ALT will not engage at FCU altitude*

Disconnecting AP and resetting both FDs enable to recover basic modes (HDG and V/S).

3. In CONF FULL, the auto-trim function is inhibited. Retracting one step enable to recover the auto-trim function.

For all the others events that may occur during approach, there is no change in the procedures or in the recommended flight crew reactions.
Flight crews must report, in the technical logbook, any of the above-listed consequences of erroneous RA height.

CORRECTIVE ACTION

Airbus is currently investigating to find the permanent fixes that will cancel the need for this OEB.

******* END OF RED OEB38 ISSUE 1.0 *******

OPERATIONS
ENGINEERING BULLETINS

AIR ENG 1(2) BLEED ABNORMAL PR OR
AIR ENG 1(2) BLEED FAULT

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OEB40 Issue 1.0
Associated with QRH OEB Proc N°: OEB40/1.0
AIR ENG 1(2) BLEED ABNORMAL PR OR AIR ENG 1(2) BLEED FAULT

Applicable to: ALL

Approved by: Head of Flight Operations Support and Services

- This OEB covers a significant operational issue. Non-compliance with this OEB should have a significant impact on the operations of the aircraft. The Operators shall distribute its content to all flight crews without delay. An extract of this OEB is provided for insertion in the QRH.
- It is recommended that all Operators accelerate the incorporation of all corrective Service Bulletins as soon as they become available.

Reason for issue: This OEB replaces the A320 OEB 203.
Subsequent to several dual bleed loss cases reported by Operators, Airbus decided to develop different technical solutions to improve the robustness of the bleed system. These technical solutions, although significantly reducing the number of dual bleed loss occurrences, cannot fully avoid such occurrences.
Therefore, this OEB is published in order to provide all SA Operators with operational procedures aiming at further reducing the number of dual bleed loss occurrences, whatever the bleed system solution installed.

Applicable to: All A320 family aircraft.

Cancelled by: FWC Standard H2-F6 (MOD 151269)

Note: The interchangeability code, given in the Illustrated Part Catalog (IPC), indicates the conditions for interchangeability of equipment. After installation of corrective modification(s)/SB(s), if an Operator reinstalls any equipment affected by this OEB, it is the Operator's responsibility to ensure that the recommendations given in this OEB are applied again for the applicable aircraft.

Operations Engineering Bulletins are issued by Airbus as the need arises to quickly transmit technical and procedural information. They are distributed to all FCOM holders and to others who need advice of changes to operational information.
Information in this bulletin is recommended by Airbus but may not be approved by Airworthiness Authorities. If the procedures contained in this OEB differ from the procedures in the AFM, the AFM remains the reference.

M	Localization	T	DU Title	DU identification	DU date
	OEB-40		**AIR ENG 1(2) BLEED ABNORMAL PR or AIR ENG 1(2) BLEED FAULT**	00013607.0001001	30 MAR 12
	Criteria: SA **Applicable to: ALL**				
	OEB-40		**AIR ENG 1(2) BLEED ABNORMAL PR or AIR ENG 1(2) BLEED FAULT**	00013608.0001001	30 MAR 12
	Criteria: SA **Applicable to: ALL**				

AIR ENG 1(2) BLEED ABNORMAL PR OR AIR ENG 1(2) BLEED FAULT

Applicable to: ALL

EXPLANATION

In case of AIR ENG 1(2) BLEED ABNORMAL PR or AIR ENG 1(2) BLEED FAULT ECAM cautions, the current associated ECAM procedures, ask to open the crossbleed valve in order to supply both Packs (or one Pack and the Wing Anti-Ice system) with the remaining engine bleed. This leads to an increase in air demand on the remaining engine bleed. On ageing bleed equipment or due to undetected failure, the remaining bleed may not succeed in sustaining this increase in air demand. In that case, it can result in an overheat of the remaining engine bleed and subsequent loss of the entire engine bleed system, leading to possible emergency descents. The purpose of this OEB is, therefore, to prevent from the loss of the remaining engine bleed by reducing the bleed air demand, when the first engine bleed has been already lost.

PROCEDURE

Apply the corresponding procedures if one of the following ECAM caution is triggered:

- AIR ENG 1(2) BLEED ABNORMAL PR
- AIR ENG 1(2) BLEED FAULT

AIR ENG 1(2) BLEED ABNORMAL PR

■ **If Wing Anti-Ice is OFF**

PACK FLOW.....LO (A319/A320)
ECON FLOW.....ON (A321)
AFT CARGO HOT AIR (if installed).....OFF
X BLEED.....OPEN
BLEED page.....SELECT and MONITOR

● **If the precooler outlet temperature of the remaining bleed exceeds 240 °C within 2 min after X BLEED valve opening:**

PACK (on the first affected bleed side).....OFF

Note: If Wing Anti-Ice is required (icing conditions) while operating with one PACK, consider switching OFF the remaining pack, if aircraft's altitude permits.

■ **If Wing Anti-Ice is ON**

● **If both PACKS are ON**

PACK (affected bleed side).....OFF

X BLEED.....OPEN
BLEED Page.....SELECT and MONITOR

Continued on the following page

AIR ENG 1(2) BLEED ABNORMAL PR OR AIR ENG 1(2) BLEED FAULT (Cont'd)

● **If the precooler outlet temperature of the remaining bleed exceeds 240 °C within 2 min after X BLEED valve opening:**

BLEED AIR DEMAND.....REDUCE

Consider reducing the bleed air demand, by, depending on the flight conditions:

- *Switching OFF the remaining pack (if aircraft's altitude permits), or*
- *Switching OFF the Wing Anti-Ice system (if no longer icing conditions).*

AIR ENG 1(2) BLEED FAULT

ENG BLEED affected.....OFF

■ **If Wing Anti-Ice is OFF**

PACK FLOW.....LO (A319/A320)
ECON FLOW.....ON (A321)
AFT CARGO HOT AIR (if installed).....OFF
X BLEED.....OPEN
BLEED Page.....SELECT and MONITOR

● **If the precooler outlet temperature of the remaining bleed exceeds 240 °C within 2 min after X BLEED valve opening:**

PACK (on the first affected bleed side).....OFF

Note: If Wing Anti-Ice is required (icing conditions) while operating with one PACK, consider switching OFF the remaining pack, if aircraft's altitude permits.

■ **If Wing Anti-Ice is ON**

● **If both PACKS are ON**

PACK (affected bleed side).....OFF

X BLEED.....OPEN
BLEED Page.....SELECT and MONITOR

● **If the precooler outlet temperature of the remaining bleed exceeds 240 °C within 2 min after X BLEED valve opening:**

BLEED AIR DEMAND.....REDUCE

Consider reducing the bleed air demand, by, depending on the flight conditions:

- *Switching OFF the remaining pack (if aircraft's altitude permits), or*
- *Switching OFF the Wing Anti-Ice system (if no longer icing conditions).*

Continued on the following page

AIR ENG 1(2) BLEED ABNORMAL PR OR AIR ENG 1(2) BLEED FAULT (Cont'd)

OEB REMINDER

For aircraft that have the OEB reminder function activated, the AIR ENG 1(2) BLEED ABNORMAL PR and AIR ENG 1(2) BLEED FAULT ECAM cautions procedure and status may be flagged.

If the AIR ENG 1(2) BLEED ABNORMAL PR and AIR ENG 1(2) BLEED FAULT ECAM cautions procedure are flagged, the ECAM will display the REFER TO QRH PROC line or REFER TO QRH/OEB PROC line (depending on Flight Warning Computer (FWC) standard) instead of the procedure itself.

To flag the procedure and the status that corresponds to the AIR ENG 1(2) BLEED ABNORMAL PR and AIR ENG 1(2) BLEED FAULT ECAM cautions, the following code must be entered in the FWC OEB database:

CODE	WARN	STS
AIR ENG 1 BLEED ABNORMAL PR 36/11/150/081	Y	N
AIR ENG 2 BLEED ABNORMAL PR 36/11/160/083	Y	N
AIR ENG 1 BLEED FAULT 36/21/010/075	Y	N
AIR ENG 2 BLEED FAULT 36/21/020/077	Y	N

CORRECTIVE ACTION

The embodiment of FWC Standard H2-F6 (MOD 151269) cancels the need for this OEB.

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OPERATIONS ENGINEERING BULLETINS

ERRONEOUS ALTERNATE FUEL PREDICTIONS UPON MODIFICATION OF A COMPANY ROUTE IN THE ALTERNATE FLIGHT PLAN

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OEB-41-PLP PRELIMINARY PAGES

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Erroneous Alternate Fuel Predictions Upon Modification of a Company Route in the Alternate Flight Plan..... A
Erroneous Alternate Fuel Predictions Upon Modification of a Company Route in the Alternate Flight Plan..... B

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OEB41 Issue 1.0
Associated with QRH OEB Proc N°: OEB41/1.0
ERRONEOUS ALTERNATE FUEL PREDICTIONS UPON MODIFICATION OF A COMPANY ROUTE IN THE ALTERNATE FLIGHT PLAN

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

Approved by: Head of Flight Operations Support and Services

- This OEB covers a significant operational issue. Non-compliance with this OEB should have a significant impact on the operations of the aircraft. The Operators shall distribute its content to all flight crews without delay. An extract of this OEB is provided for insertion in the QRH.
- It is recommended that all Operators accelerate the incorporation of all corrective Service Bulletins as soon as they become available.

Reason for issue: This OEB replaces the A320 OEB 204.
This OEB is issued to inform the operators of the following: Erroneous alternate (ALTN) fuel predictions are experienced when the flight crew modifies a company route (CO RTE) previously inserted in the alternate Flight Plan (F-PLN).
This OEB provides an explanation and operational recommendations in case of erroneous ALTN fuel predictions.

Applicable to: Aircraft with Honeywell FMGC Release 1A "H2" (MOD 38778, Airbus SB A320 22-1269 and MOD 38779, Airbus SB A320 22-1270)

Cancelled by: Future Honeywell Standard MOD/Airbus SB to be determined later.

Note: The interchangeability code, given in the Illustrated Part Catalog (IPC), indicates the conditions for interchangeability of equipment. After installation of corrective modification(s)/SB(s), if an Operator reinstalls any equipment affected by this OEB, it is the Operator's responsibility to ensure that the recommendations given in this OEB are applied again for the applicable aircraft.

Operations Engineering Bulletins are issued by Airbus as the need arises to quickly transmit technical and procedural information. They are distributed to all FCOM holders and to others who need advice of changes to operational information.
Information in this bulletin is recommended by Airbus but may not be approved by Airworthiness Authorities. If the procedures contained in this OEB differ from the procedures in the AFM, the AFM remains the reference.

M	Localization	T	DU Title	DU identification	DU date
E	OEB-41		**Erroneous Alternate Fuel Predictions Upon Modification of a Company Route in the Alternate Flight Plan**	00013609.0001001	18 MAR 11
E	Criteria: P10763 **Applicable to: B-HSQ, B-HSR, B-HST, B-HSU**				
	OEB-41		**Erroneous Alternate Fuel Predictions Upon Modification of a Company Route in the Alternate Flight Plan**	00013610.0001001	18 MAR 11
E	Criteria: P10763 **Applicable to: B-HSQ, B-HSR, B-HST, B-HSU**				

ERRONEOUS ALTERNATE FUEL PREDICTIONS UPON MODIFICATION OF A COMPANY ROUTE IN THE ALTERNATE FLIGHT PLAN

Applicable to: B-HSQ, B-HSR, B-HST, B-HSU

EXPLANATION

When the flight crew modifies the CO RTE in the ALTN F-PLN, the FMS no longer computes the ALTN fuel predictions (refer to the below illustration).
This CO RTE could be extracted from the Navigation database or stored by the flight crew.
The modification of the CO RTE by the flight crew could be for example an entry of a departure or an arrival procedure.



The consequences of the CO RTE modification are:

- The fuel predictions are set to zero for the ALTN (solid circles) on FUEL PRED page (also on INIT FUEL PRED if done on ground)
  This condition is sufficient to apply the operational recommendations provided in the "PROCEDURE" paragraph.
- The Estimated Fuel On Board (EFOB) and the predicted UTC (solid circles) at ALTN destination becomes equal to the EFOB and the UTC at the Primary Destination
- If the ALTN fuel and the MIN DEST FOB values on FUEL PRED page are both at their default value (i.e. have not been modified by the crew), the MIN DEST FOB (solid circle) becomes erroneous (equal to FINAL instead of FINAL+ ALTN). Therefore, the MCDU scratchpad message "DEST EFOB BELOW MIN", is no longer triggered on the expected threshold
- If the flight crew had entered a value for the ALTN fuel, the entry is correctly used (but no more modifiable unless a new ALTN is entered)
- If the flight crew had manually entered the MIN DEST FOB value on FUEL PRED page (but not the ALTN fuel value), then the message "CHECK MIN DEST FOB"is no longer triggered at the correct threshold

Continued on the following page

ERRONEOUS ALTERNATE FUEL PREDICTIONS UPON MODIFICATION OF A COMPANY ROUTE IN THE ALTERNATE FLIGHT PLAN (Cont'd)

However, the new ALTN F-PLN is correctly displayed on the F-PLN page, the Navigation Display (ND) and the INIT page correctly shows the ALTN identifier.

Note: *The EFOB of the primary destination remains correctly computed (dashed circle).*

The reason for the anomaly is that when the ALTN CO RTE is modified, the FMS erroneously assumes there is no alternate F-PLN anymore for the fuel predictions. An additional modification of the ALTN F-PLN enables to recover correct ALTN fuel predictions.

PROCEDURE

This procedure only applies when a CO RTE is used for ALTN F-PLN. In the case of ALTN fuel predictions erroneously set to zero further to a modification of this ALTN F-PLN:

ENTER manually a waypoint in the en-route F-PLN (neither in the departure, nor in the arrival), to start a new computation of ALTN fuel predictions
Maintain or delete the entered waypoint at convenience
Check the ALTN fuel predictions are correct

CORRECTIVE ACTION

A future Honeywell FMS standard, will cancel this OEB (MOD and Airbus SB to be determined later).

OPERATIONS
ENGINEERING BULLETINS

F/CTL SPOILER FAULT

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OEB-43-PLP PRELIMINARY PAGES

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F/CTL SPOILER FAULT.....A
F/CTL SPOILER FAULT.....B

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OEB43 Issue 3.0
Associated with QRH OEB Proc N°: OEB43/4.0
F/CTL SPOILER FAULT

Applicable to: ALL

- This OEB covers a significant operational issue. Non-compliance with this OEB should have a significant impact on the operations of the aircraft. The Operators shall distribute its content to all flight crews without delay. An extract of this OEB is provided for insertion in the QRH.
- It is recommended that all Operators accelerate the incorporation of all corrective Service Bulletins as soon as they become available.

Reason for issue: This OEB replaces the A320 OEB 208.

- Several cases of spoiler runaway occurring in flight have been reported. During these events, the failed spoiler remained in the full deflected position for the remaining of the flight. The purpose of this OEB is to inform operators about the operational impact of such a failure and to provide the associated operational procedure.
- Following flight test, this OEB is revised to modify the procedure part of this OEB and to give the corrective action that cancel the need for this OEB.
- This OEB is revised to take into account the publication of In-Flight Landing Distances (QRH FPE-IFL).

Applicable to: All A318/A319/A320/A321 Aircrafts.
Cancelled by: H2F7 FWC Standard

Note: The interchangeability code, given in the Illustrated Part Catalog (IPC), indicates the conditions for interchangeability of equipment. After installation of corrective modification(s)/SB(s), if an Operator reinstalls any equipment affected by this OEB, it is the Operator's responsibility to ensure that the recommendations given in this OEB are applied again for the applicable aircraft.

Operations Engineering Bulletins are issued by Airbus as the need arises to quickly transmit technical and procedural information. They are distributed to all FCOM holders and to others who need advice of changes to operational information.
Information in this bulletin is recommended by Airbus but may not be approved by Airworthiness Authorities. If the procedures contained in this OEB differ from the procedures in the AFM, the AFM remains the reference.

M	Localization	T	DU Title	DU identification	DU date
R	OEB-43		**F/CTL SPOILER FAULT**	00013694.0001001	30 MAY 12
	Criteria: SA **Applicable to: ALL**				
	OEB-43		**F/CTL SPOILER FAULT**	00013696.0001001	30 MAY 12
	Criteria: SA **Applicable to: ALL**				

F/CTL SPOILER FAULT

Applicable to: ALL

EXPLANATION

Investigations have shown that the root cause of these events is the deterioration of an O-ring seal in the spoiler's servo-valve. This deterioration allows high hydraulic pressure to go in the extension piston chamber leading to an uncontrolled spoiler deflection in full position.
In most of cases, the autopilot has not enough authority to counteract the roll induced by spoiler runaway. Therefore, the autopilot disconnects and the flight crew takes over to recover wing level in normal law.
When this issue occurs, the F/CTL SPLR FAULT ECAM caution triggers and the F/CTL S/D page shows an amber deflected arrow on the failed spoiler. This information does not, however, enable the flight crew to determine whether the faulty spoiler is partially or fully deflected.
AIRBUS recommendations assume that if the F/CTL SPLR FAULT ECAM caution triggers, along with at least one amber deflected spoiler arrow displayed on the F/CTL S/D page, the spoiler is supposed to be fully deflected.

PROCEDURE

- **If F/CTL SPLR FAULT is triggered**

  F/CTL S/D page..... CHECK

  The flight crew should check the spoiler position on the F/CTL System Display page.

  - **If all amber spoilers are indicated retracted:**

    Loss of one or more spoilers in the retracted position. In such a case, the flight crew must apply the following operational procedure that reflects the F/CTL SPLR FAULT ECAM caution.

Continued on the following page

F/CTL SPOILER FAULT (Cont'd)

F/CTL SPLR FAULT

Note: If heavy vibrations are felt, CONF3 may be used for landing in order to reduce the buffeting.

– SPD BRK (if spoilers 3 + 4 affected).....DO NOT USE

Do not use speedbrakes, since using only surfaces N°2 is not efficient and would activate the SPD BRK DISAGREE caution.

	STATUS
● if spoilers 3+4 affected	INOP SYS
– SPD BRK .....DO NOT USE LDG DIST PROC.....APPLY	SPLR(affected) SPD BRK (if spoilers 2+3+4 affected)

■ **If at least one spoiler is indicated deflected in amber, apply the following procedure:**

F/CTL SPLR FAULT

AP..... OFF

Depending on the failed spoiler position, the AP may not have enough authority to counteract the roll induced by spoiler runaway.

SPEED..... GDOT+10

Whenever possible, target green dot speed +10 kt to minimize fuel consumption. However, if buffet is encountered at GDOT speed +10 kt, increase speed to fly out of buffet condition.

CRUISE ALTITUDE.....AS REQUIRED

Current Flight Level (FL) may not be maintained due to increased drag. Maintain a cruise FL as high as possible.

FUEL CONSUMPTION INCREASED
FMS FUEL PRED..... DISREGARD
FUEL CONSUMPTION.....DETERMINE
DIVERSION..... CONSIDER

APPR PROC

Continued on the following page

F/CTL SPOILER FAULT (Cont'd)

In clean configuration, if VLS is above VFE_{NEXT}, the flight crew should deselect A/THR, decelerate to VFE_{NEXT}, and select CONF 1 when below VFE_{NEXT}. When established at CONF 1, the flight crew can reengage the A/THR and use managed speed again.

FOR LDG.....USE FLAP 3
GPWS LDG FLAP 3..... ON
LANDING PERFORMANCE ASSESSMENT..... PERFORM

For Landing Performance assessment refer to QRH FPE-IFL

OEB REMINDER

For aircraft that have the OEB Reminder Function activated, the F/CTL SPLR FAULT ECAM caution procedure and status may be flagged.
If the F/CTL SPLR FAULT ECAM caution procedure is flagged, the ECAM will display the "REFER TO QRH PROC"line or "REFER TO QRH/OEB PROC"line (depending on Flight Warning Computer (FWC) standard) instead of the procedure itself.
To flag the procedure and the status that corresponds to the F/CTL SPLR FAULT ECAM caution, the following code must be entered in the FWC OEB database:

Code	WARN	STS
F/CTL SPLR FAULT 27/00/300/068	Y	Y

CORRECTIVE ACTION

H2F7 FWC standard will cancel the need for this OEB and should be available end 2012 at the earliest.

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OPERATIONS
ENGINEERING BULLETINS

L/G GEAR NOT DOWNLOCKED

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OEB-44-PLP PRELIMINARY PAGES

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L/G GEAR NOT DOWNLOCKED.....A
[redacted] L/G GEAR NOT DOWNLOCKED [redacted].....B

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OEB44 Issue 2.0
Associated with QRH OEB Proc N°: OEB44/4.0
L/G GEAR NOT DOWNLOCKED

Applicable to: ALL

- This OEB covers a significant operational issue. Non-compliance with this OEB should have a significant impact on the operations of the aircraft. The Operators shall distribute its content to all flight crews without delay. An extract of this OEB is provided for insertion in the QRH.
- It is recommended that all Operators accelerate the incorporation of all corrective Service Bulletins as soon as they become available.

Reason for issue:
Issue 2:
This OEB is reissued to improve the display of the L/G GEAR NOT DOWNLOCKED procedure.
Issue 1:
This OEB replaces the A320 OEB 209.
This OEB is issued to provide operational recommendations in the case of L/G GEAR NOT DOWNLOCKED ECAM warning.

Applicable to: All A320 family aircraft

Cancelled by: H2F7 FWC STD

Note: The interchangeability code, given in the Illustrated Part Catalog (IPC), indicates the conditions for interchangeability of equipment. After installation of corrective modification(s)/SB(s), if an Operator reinstalls any equipment affected by this OEB, it is the Operator's responsibility to ensure that the recommendations given in this OEB are applied again for the applicable aircraft.

Operations Engineering Bulletins are issued by Airbus as the need arises to quickly transmit technical and procedural information. They are distributed to all FCOM holders and to others who need advice of changes to operational information.
Information in this bulletin is recommended by Airbus but may not be approved by Airworthiness Authorities. If the procedures contained in this OEB differ from the procedures in the AFM, the AFM remains the reference.

M	Localization	T	DU Title	DU identification	DU date
R	OEB-44		**L/G GEAR NOT DOWNLOCKED**	00013697.0001001	30 MAY 12
	Criteria: SA **Applicable to: ALL**				
	OEB-44		**L/G GEAR NOT DOWNLOCKED**	00013698.0001001	30 MAY 12
	Criteria: SA **Applicable to: ALL**				

L/G GEAR NOT DOWNLOCKED

Applicable to: ALL

EXPLANATION

The current L/G GEAR NOT DOWNLOCKED ECAM warning procedure requires the recycling of the landing gear before initiating L/G gravity extension.
Recent study has shown that waiting for 2 min after the recycling of the landing gear may allow gears to extend under normal powered extension. Waiting for 2 min before extending the landing gear by gravity will allow hydraulic pressure to continue to act on doors and gears.
In the case the landing gear is not locked down within 30 s after the lever is selected down, this waiting time may allow the normal landing gear extension to work successfully.
Therefore this OEB is issued to recommend that after the recycling of the landing gear, the flight crew waits for 2 min before extending the landing gear by gravity.

PROCEDURE

Apply the following procedure if the ECAM triggers the L/G GEAR NOT DOWNLOCKED warning:

L/G GEAR NOT DOWNLOCKED

This warning appears, if the landing gear sequence is not completed after 30 seconds.

L/G lever.....RECYCLE

- **IF GEAR NOT DOWNLOCKED AFTER 2 MINUTES:**

L/G GRAVITY EXTENSION PROC.....APPLY

STATUS

The status displayed on the ECAM is correct.

OEB REMINDER

For aircraft that have the OEB Reminder Function activated, the L/G GEAR NOT DOWNLOCKED ECAM warning procedure and status may be flagged.
If the L/G GEAR NOT DOWNLOCKED ECAM warning procedure is flagged, the ECAM will display the "REFER TO QRH PROCline or "REFER TO QRH/OEB PROC"line (depending on Flight Warning Computer (FWC) standard) instead of the procedure itself.
To flag the procedure and the status that corresponds to the L/G GEAR NOT DOWNLOCKED ECAM warning, the following code must be entered in the FWC OEB database:

CODE	WARN	STS
L/G GEAR NOT DOWNLOCKED	Y	N

Continued on the following page

L/G GEAR NOT DOWNLOCKED (Cont'd)

CODE	WARN	STS
32/00/140/046		

CORRECTIVE ACTION

H2F7 FWC standard will introduce this recommendation in the L/G GEAR NOT DOWNLOCKED ECAM warning. Therefore, H2F7 FWC standard will cancel the need for this OEB.

FLIGHT CREW BULLETINS

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FCB-FCB8 Electronic Interference from Portable Equipment carried on by Passengers

FCB-FCB9 Thrust Acceleration in A/THR Modes

FCB-FCB11 Radio Altimeter Anomalies during Adverse Weather Conditions

FCB-FCB12 FMGS Navigation Database

FCB-FCB13 Specific Features of the FMGS Full Standard

FCB-FCB15 VMO/MMO Determination

FCB-FCB16 Operation of Fleets with/without CPIP

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FLIGHT CREW BULLETINS

INTRODUCTION

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FCB-10-PLP PRELIMINARY PAGES

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Introduction.....A

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INTRODUCTION

Applicable to: ALL

FCOM Bulletins were created to provide complementary technical/operational explanations related to the information included in the Flight Crew Operating Manuals (FCOMs).

The objective of FCOM Bulletins differs from that of Operations Engineering Bulletins (OEBs). OEBs are issued to rapidly address specific problems that have an operational impact. They are created, as needed, in order to quickly transmit technical and procedural information, and are normally issued in response to a detected irregularity or an abnormal aircraft/system behavior.

FCOM Bulletins are periodically issued to address one or several subjects and include supplementary explanations concerning procedures, system descriptions, performance, and regulations.

They are updated as the need arises and are filed in FCOM/FCB Flight Crew Bulletins.

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FLIGHT CREW BULLETINS

OPERATION IN WINDSHEAR/DOWNBURST CONDITIONS

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FCB-FCB2-PLP PRELIMINARY PAGES

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Operation in Windshear/Downburst Conditions.....A

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OPERATION IN WINDSHEAR/DOWNBURST CONDITIONS

Applicable to: ALL

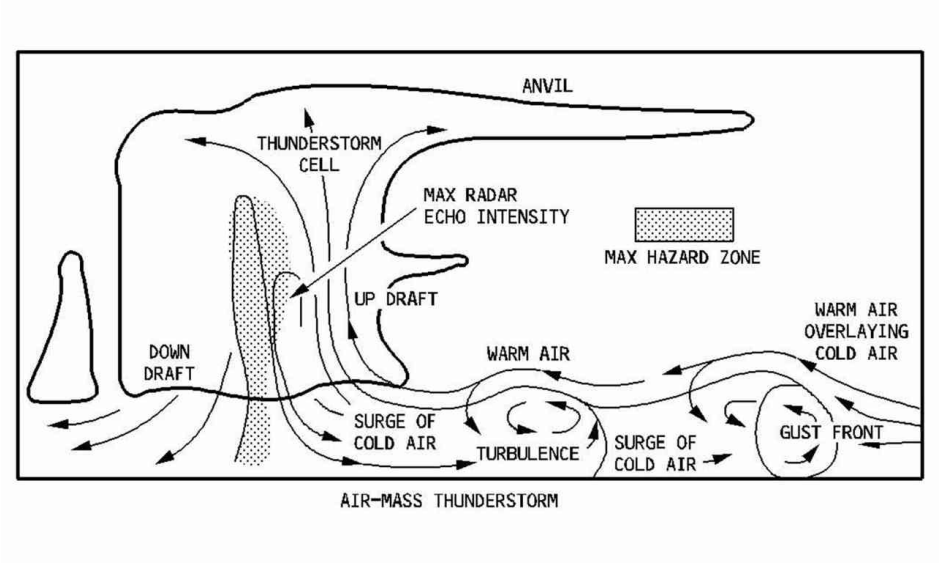
GENERALITY

Windshear-related problems are generally connected to "a change in wind direction and/or speed over a very short distance in the atmosphere". The most prominent meteorological conditions conducive to this are:

- Convective storm shear (air mass and frontal thunderstorms, downburst, wet and dry microburst)
- Non-convective (cold and warm) frontal systems
- Windshear associated with strong winds near the ground.

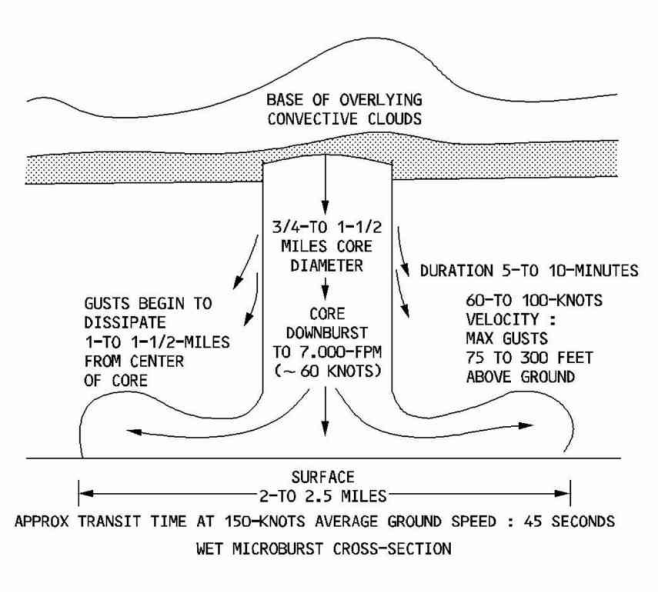
WINDSHEAR ASSOCIATED WITH CONVECTIVE CLOUDS AND STORM CELLS

- The air-mass thunderstorm develops from localized earth surface heating with air rising and cooling to form cumulus clouds. As these keep growing, heavy rain and hail precipitation begins to develop in the higher areas thereby cutting off the updraft energy source and eventually dissipating the thunderstorm cell. A surge of cold air emerging from the heavy rain and associated downdraft can produce:
  - A downburst, i.e. strong downdrafts inducing an outburst of damaging winds on or near the ground
  - A gust front with blowing dust on the earth surface
  - A shear boundary with turbulent flow due to interaction with the warm, undisturbed environmental air.



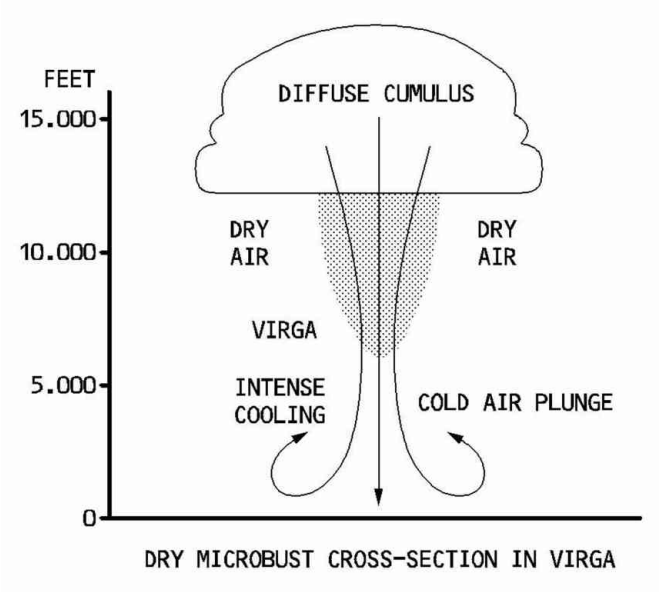
AIR-MASS THUNDERSTORM

- Frontal thunderstorms are usually more tilted in the vertical, allowing precipitation to fall away from the updraft and airflow intensity within the storm accelerating much more than for the simple air-mass thunderstorm, sometimes resulting in a tornado.
- Microbursts consist of intense, non rotating, highly localized downward airflows with velocities up to 7 000 fpm that may emanate below a convective cloud base. Some of these microbursts will expose penetrating aircraft to major safety hazards whatever technique is used in anticipation/reaction.



Microbursts can take 2-5 min to develop maximum intensity and may then be sustained for an equal period of time. They tend to develop in groups which may be merged, delaying dissipation to 30 min. Present knowledge contends that approximately one in a hundred heavy rain thunderstorms produce microbursts. It was determined that microbursts can also occur in relatively dry conditions. Once it gains sufficient downward momentum, a downflow with evaporative cooling accelerates to the earth's surface to induce a "dry microburs" with very light or non-existant precipitation, called virga. "Wet microburst" are expected to occur in the wet regions of the world. Dry microbursts are commonly seen in the dry areas and most likely below cumulus cloud when dew point is 30 °C or more below ambient temperature.
Changes in meteorological conditions associated with both macro and microbursts tend to be very complicated.

CONDITIONS	MACROBURSTS	MICROBURSTS
Air temperature	ISA + 15 °C decreasing	ISA + 15 °C increasing or decreasing
Dew point spread	Increase (20-40 °C)	Increase (20-40 °C)
Surface pressure	Rise or fall (up to 2/3 mb)	Rise or fall (up to 2/3 mb)



DRY MICROBUST CROSS-SECTION IN VIRGA

WINDSHEAR ASSOCIATED WITH NON-CONVECTIVE FRONTAL SYSTEMS

Substantial differences in winds can be encountered by approaching and departing aircraft close to low pressure centers and their associated cold, warm and occluded fronts.
Penetrating a cold front on either side leads to a headwind increase, potentially bringing a performance increasing shear. Pilots are advised to beware of thunderstorms in the vicinity that may contribute to amplify windshear conditions.
Penetrating a warm front on either side exposes to a headwind decrease, potentially resulting in a performance decreasing shear generally not exceeding performance limits of the aircraft. Windshear at a warm front is more severe than at a cold front with large head/tail and vertical wind changes in the lowest 1 000 ft above ground level.

The magnitude of the windshear may become significant when:
- The temperature difference across the front is at least 6 °C
- The temperature gradient of the front shows a minimum of 6 °C over 50 nm
- The speed of frontal movement is greater than 30 kt.

WINDSHEAR ASSOCIATED WITH STRONG WINDS NEAR THE GROUND

Very similar to a surface boundary layer with increasing winds and approximately constant wind direction.

Low altitude jet streams may be found in a variety of situations such as strong low altitude jet winds, nocturnal jet winds, terrain-induced low altitude windshear, mountain-wave and downslope flows, strong surface winds combined with small hills or large buildings, lake and seabreeze windshear due to temperature gradients between sun-heated terrain and water-cooled air. In particular, strong temperature change across an inversion may trigger very variable wind conditions.

DETECTION OF CONDITIONS

OPTIONAL SYSTEMS INTEGRATED ON THE AIRCRAFT

Predictive Windshear

Predictive Windshear is incorporated into the weather radar system to enable the detection of a microburst windshear event within 5 nm forward of the aircraft. It is based on dynamic Doppler effects.
When a windshear is detected, the system generates the appropriate annunciation to the crew to alert them of a potential danger.

There are different alert levels depending on:
- The severity of the windshear event detected
- The distance and angular position between the aircraft and the windshear
- The altitude and speed of the aircraft
- The flight phase.

The Predictive Windshear system provides advanced warning for the crew to escape a windshear event using normal handling technique or to initiate a recovery maneuver earlier.

Reactive Windshear

Reactive Windshear advises the crew when windshear conditions have been entered. The system generates an audio and visual warning to the crew. The FAC measures the difference between the impredicate energy state and the minimum energy state for flight security.

At a defined threshold, a message is displayed on the PFD and an aural warning alert is provided to the crew:
- At takeoff, from 5 s after lift off up to 1 300 ft RA
- At landing, from 1 300 ft RA down to 50 ft RA.

BRIEFING AND PREPARATION

a. ANALYSE weather information during preflight:
   - Weather messages provided by the airline
   - Aviation surface observations
   - NOTAMS
   - SIGMETS, particularly convective sigmets

- Terminal forecasts
- Area forecasts, possibly mentioning the Low Level Wind Shear Alert System (LLWSAS) installed on the periphery of certain airports (USA only).

b. LISTEN to pilot reports (PIREPS) on wind shear. PIREPS should include:
- Location of shear encountered
- Altitude of shear encountered
- Airspeed change experienced (knots gained or lost)
- Type of aircraft undergoing the shear.

Note: Pilots should always report any windshear encountered to Air Traffic Control.

c. LOOK OUT for weather clues on the way to the airport and/or from the cockpit (parked, taxi or airborne) such as:
- Extreme variations in wind velocity/direction in a very short time span
- Isolated rainshowers with or without lightning showing divergences from the raincore and clear curling horizontal vortex rolls, within 5 miles of the airport
- Heavy precipitation along intended flight path
- Lightning, thunderstorms or evidence of any tornadic feature in airport vicinity
- Evidence of a gust front such as blowing dust on the airport surface, suggesting the possible passage of a thunderstorm within 15 min
- Evidence of convective activity particularly with anvil clouds in dry areas, supercells, low echos, mushroom, sinkhole and/or giant ant-eater clouds, cumulo nimbus mamatus and altocumulus.

Note: The existence of other types of shear can occur due to local obstruction, topographical and meteorological conditions. It is important for crews to realize that windshear conditions should be considered cumulative: simultaneous conditions can increase the severity of effects.

d. EXAMINE the approach or take-off area with the airplane weather radar to determine whether returns are in the vicinity of the airport or intended flight path:
   - Flight operations below 10 000 ft such as take-off and landings require 2 to 3 ° upward tilt for target detections up to 40 nm; if there is significant weather activity, the tilt angle should be adjusted to provide a solid ground return outside of the desired range to ensure that no overscanning will occur.

     Note: Since radar echoes are due to precipitation reflection, dry environment situations and conditions to dry microbursts may not be detectable by weather radar.

e. MONITOR the aircraft instruments whenever windshear is suspected:
   - Any rapid change in the relationship between airspeed and groundspeed represents a windshear; groundspeed must be compared with airspeed, on the ND's. (GS/TAS)
   - Airspeed tendency (Vc trend):
     • Acceleration in headwind/updraft
     • Deceleration in tailwind/downdraft.
   - Direction and intensity of wind (computed by the IRS and displayed on ND's) allows a comparison at the initial approach altitude (1 500 ft to 2 000 ft AGL), with the reported runway surface wind to check any shear situation between the airplane and the runway
   - Speed margin from α-prot speed (shown by a red and amber strip along the speed scale of the PFD's)
   - Rate of descent (on stabilized ILS approach):
     • High rate suggesting a strong tailwind
     • Low rate suggesting a strong headwind.
   - Rate of climb:
     • High rate suggesting a strong headwind
     • Low rate suggesting a strong tailwind.
   - Pitch attitude:

Increasing	With headwind shear
	With downdraft shear.
Decreasing	With tailwind shear
	With updraft shear.

   - Power needed:

     To hold the glideslope:
     • Less power necessary suggesting a strong tail wind
     • More power necessary suggesting a strong headwind.

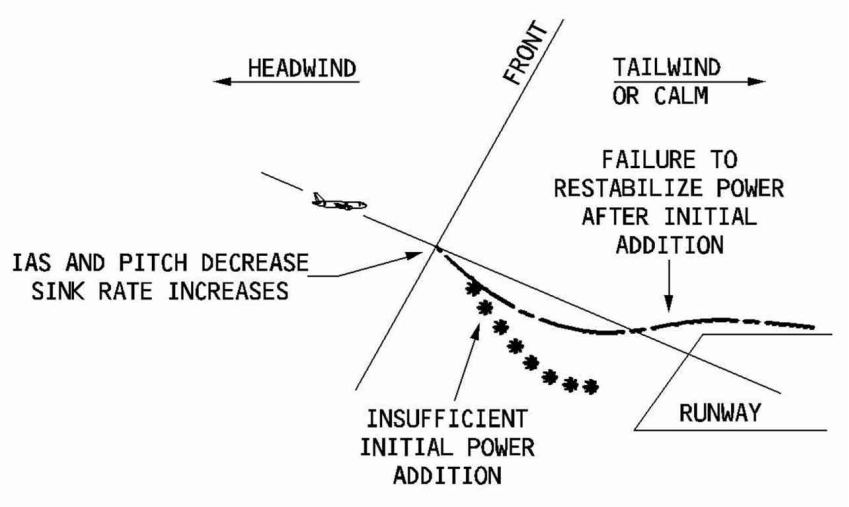
     To hold a climb angle:
     - Less power necessary suggesting a strong headwind,
     - More power necessary suggesting a strong tailwind.

INFLUENCE OF WINDSHEAR ON AIRCRAFT PERFORMANCE

DECREASED PERFORMANCE

Headwind to tailwind
Headwind to calm
Calm to tailwind
Headwind to decreased headwind.

Approach with a Tailwind Shear



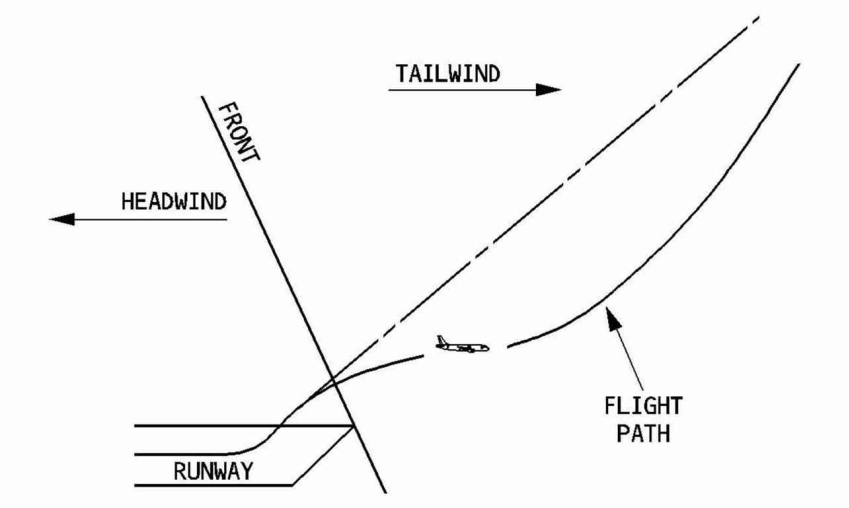
- Airspeed decreases, lift decreases
- A/C nose begins to pitch down
- A/C begins to drop below the glide slope

In this case the A/C is both slow and low in a "power deficient" state.

Consequences

- If the pilot pulls the nose up to recapture the glide slope without selecting sufficient power:
  The A/C will loose altitude very rapidly and may even reach the ground before the power deficiency is corrected, resulting in a hard landing, or
- If sufficient power is set to regain the glideslope before reaching the ground:
  The "double negative" problem may arise if the pilot does not quickly retard the throttles after glide recapture, i.e. throttles set too high for a stabilized approach in a no-wind condition leading to a long and fast landing.

Take Off with a Tailwind Shear



- Airspeed decreases, lift decreases
- A/C nose begins to pitch down
- A/C drops below its nominal flight path.

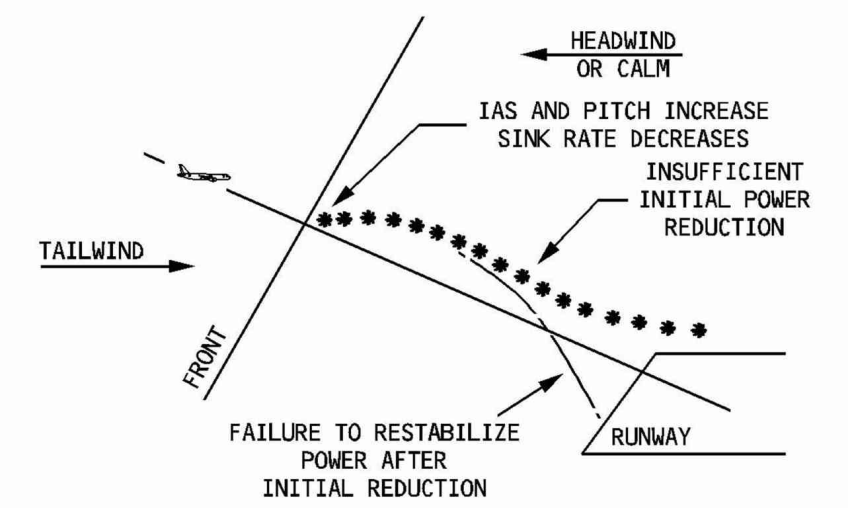
Consequences

- Because of aircraft inertia, attitude and ground speed will be initially maintained upon encountering windshear but airspeed will decrease, causing a reduction in lift which will result in a downward acceleration and a nose down pitching moment.
- If there is no pilot action, the aircraft will descend below its nominal flight path. Because of aircraft stability, original angle of attack and airspeed will eventually be recovered, but on a reduced flight path.

INCREASED PERFORMANCE

Tailwind to headwind
Calm to headwind
Tailwind to calm
Headwind to increased headwind

Approach with a Headwind Shear



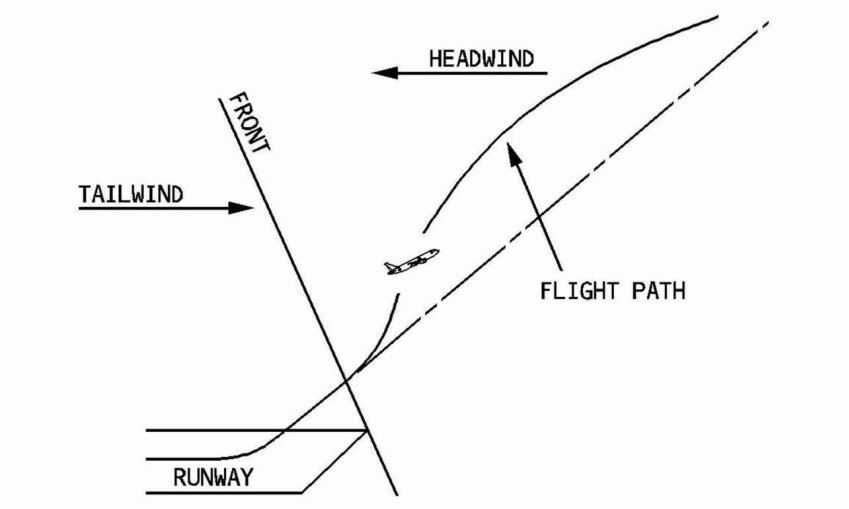
The reverse of the previous case prevails:
- Airspeed increases, lift increases
- A/C nose begins to pitch up
- A/C balloons above the glide slope.

In this case the A/C is both fast and high in a "power excessive" state.

Consequences

- The pilot does not initially reduce power, the aircraft will gain altitude and airspeed resulting in a long, fast landing with the possibility of an overrun, or
- If the pilot reduces thrust to regain the glideslope and initial airspeed: the "double negative" problem can arise if the thrust is not recovered which leads to a high sink rate and possible short, hard landing.

Take Off with a Headwind Shear



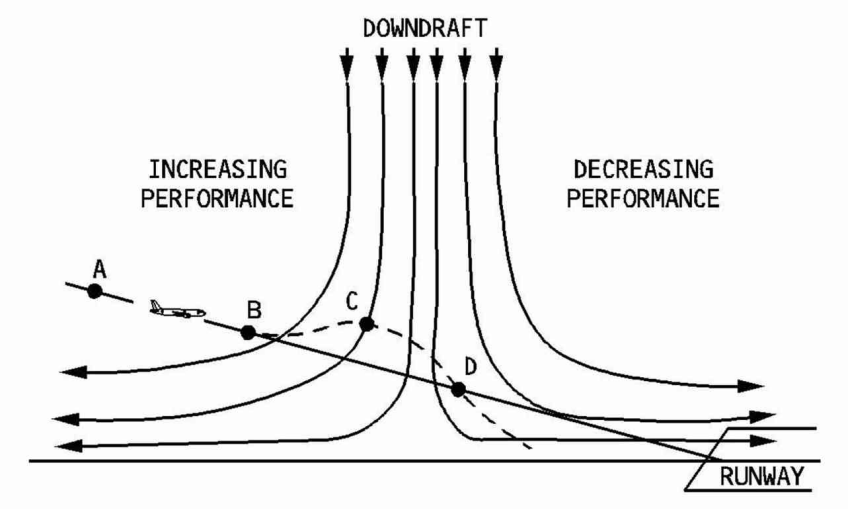
The reverse of the previous case prevails:
- Airspeed increases, lift increases
- A/C nose begins to pitch up
- A/C rises above its nominal flight path.

Note: - *A headwind shear usually leads to increased aircraft performance.*
- *The resulting increase in lift may however lead to an excessive angle of attack which could eventually trigger the α-prot function once out of the shear.*

INCREASED PERFORMANCE FOLLOWED BY DECREASED PERFORMANCE

Downdraft + tailwind shear

Approach through Microburst

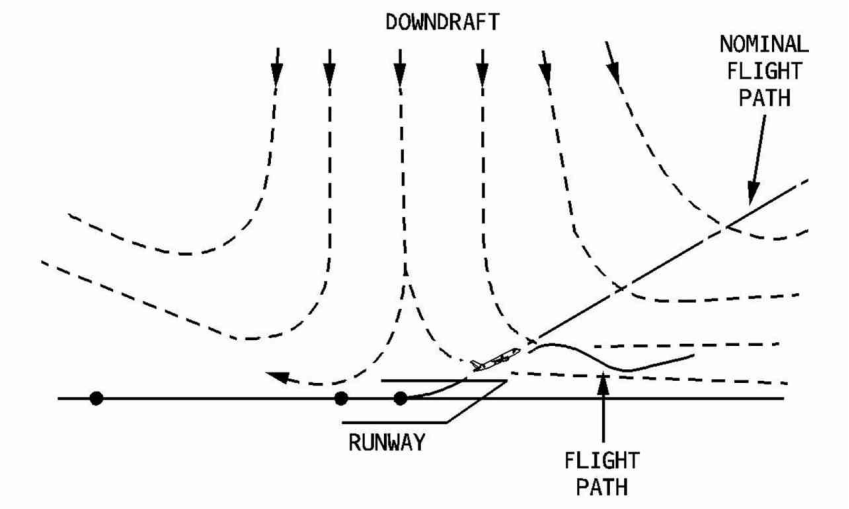


- At point A the aircraft is on speed and on glide slope.
- At point B it encounters an increasing headwind. Its airspeed and pitch increase and it balloons above the glide slope.
- At point C the "moment of truth" occurs:
  If the pilot does not fully appreciate the situation, he may attempt to regain the glide slope by reducing power and pushing the nose down.
  But between C and D the headwind ceases, a strong downdraft is entered and the tailwind begins to increase. The skin rate occurs rapidly and ground impact may become difficult to avoid.

Consequences

- A go-around initiated at point C or sooner would probably be successful since the A/C is fast and high at this point.
- Gradual groundspeed decay shortly after point B coupled with rapidly increasing airspeed could have allowed detection of signs of impending downdraft.

Take Off through Microburst



- Airspeed decreases
- A/C nose begins to pitch down
- A/C drops below its nominal flight path.

Consequences

- Initially the pilot may not fully appreciate the situation since he is taking off in increased performance shear conditions. Progression into the downburst core causes a violent and rapid loss of lift, followed by a high sink rate with very little loss of airspeed. Exiting the downburst core below the nominal flight path (after 20 to 40 s) is then followed by a low-level decreased performance tailwind shear
- In this microburst example, the angle of attack is instantly decreased causing an immediate loss of lift.

CLIMB GRADIENT AND ACCELERATION CAPABILITY

This section presents an example of A/C ability to maintain an horizontal flight at a given airspeed, in case of tailwind shear or downdraft conditions by adjusting the thrust.
In practice, windshear conditions will very often be a combination of horizontal and vertical shear components.

This will make it necessary to establish a tradeoff between climb gradient and acceleration requirements.
a. Acceleration capability

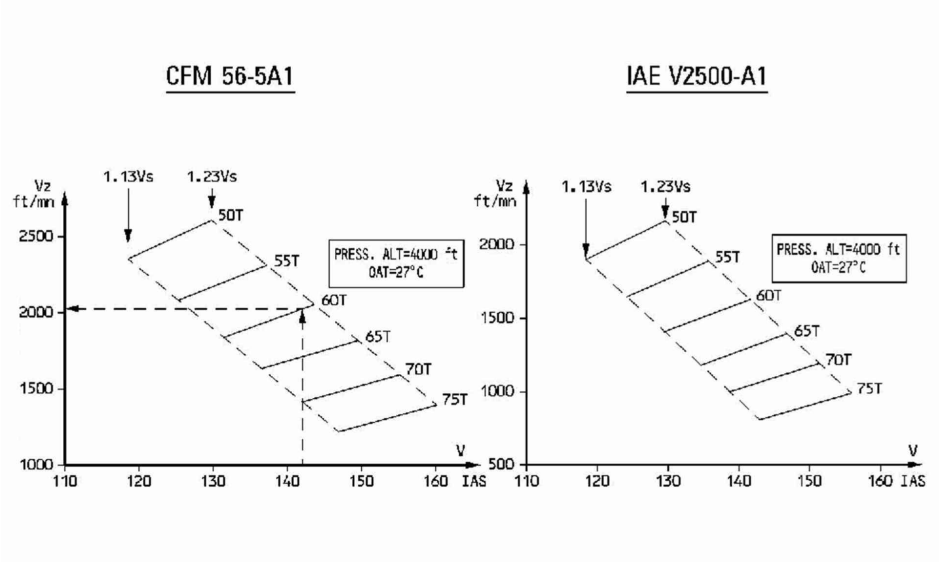
In case of tailwind shear, the aircraft oppose a level flight acceleration capability. For example, an A320 powered with CFM56-5A1 engines (A/C weight = 60 000 kg (132 300 lb), FLAPS 3, pressure altitude = 0 ft, OAT at ISA) is able to maintain an horizontal flight in a 4 kt/s decreased performance shear, keeping a constant airspeed and increasing ground speed of 4 kt/s.

If the horizontal shear exceeds the flight level acceleration, the airspeed will decrease and will descend unless pitch attitude is increased.

b. Climb gradient maintainability

In downburst conditions, level flight will be maintained with the climb gradient maintainability. In the following example (CFM 56-5A1, A/C weight = 60 000 kg (132 300 lb) pressure altitude 4 000 ft, OAT = 27 °C, V = 142 kt), the aircraft has the capability to maintain level flight in a 2 040 ft/min downdraft without any airspeed change. If the downdraft exceeds this climb gradient capability, the A/C will descend unless pitch attitude is increased to adapt angle of attack.

For information, a typical example:



FLIGHT CREW BULLETINS

IAE V2500 N1 MODE

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FLIGHT CREW BULLETINS

IAE V2500 N1 MODE

PRELIMINARY PAGES - SUMMARY OF HIGHLIGHTS

Localization Title	Toc Index	ID	Reason
FCB-FCB3 IAE V2500 N1 Mode	A	1	Improvement of illustration quality.
FCB-FCB3 IAE V2500 N1 Mode	A	2	Improvement of illustration quality.

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IAE V2500 N1 MODE

Applicable to: ALL

The FADEC NORMAL mode is EPR mode which requires various inputs including:
- Thrust Lever Angle (TLA) altitude
- Mach number
- Ambient temperature
- Engine inlet total air temperature (T2), and
- The service bleed.

If any of these inputs are not available, the FADEC automatically reverts to a reversionary which may be:
- N1 RATED mode
- N1 UNRATED mode (named DEGRADED mode on ECAM).

1 **N1 RATED MODE**

DESCRIPTION

The N1 RATED MODE is a FADEC reversionary mode which occurs:
- Either AUTOMATICALLY if P2 (engine inlet total pressure) and/or P5 (LP turbine exit total pressure) engine parameters are not available, or
- MANUALLY if the pilot presses the N1 MODE pb.

The FADEC, in this mode, processes the N1 power management as a function of TLA, T2 and altitude, for the following ratings:
- MAX TO or GO AROUND
- MAX CONTINUOUS
- MAX CLIMB.

Additionally the FADEC provides the following data to the crew via ECAM E/W display:
- N1 rating limit corresponding to the selected Thrust Limit mode (CLB, MCT, TO)
- Selected THRUST LIMIT mode as a function of TLA
- N1 TLA corresponding to the thrust lever position
- Actual N1.

OPERATIONAL CONSEQUENCES

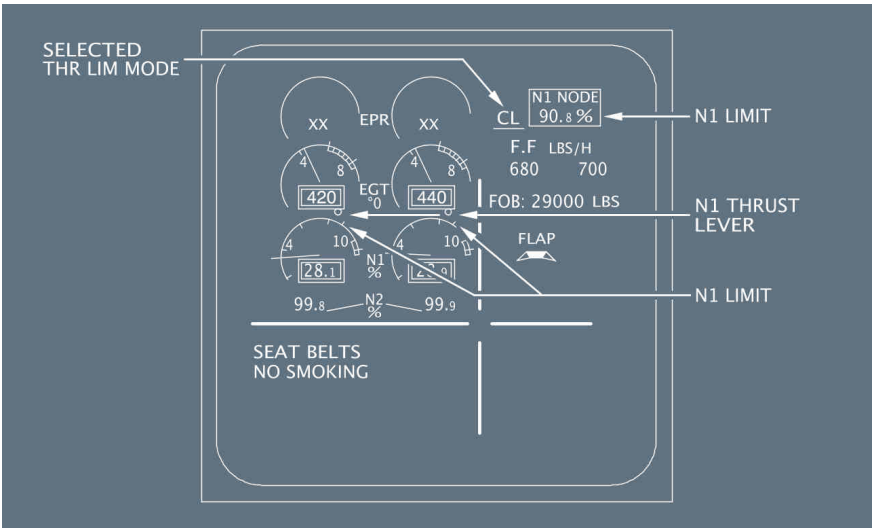
1. Reversion from EPR →N1 RATED mode on the GROUND:
   - This is a GO ITEM (please *Refer to MEL/MI-73-20 EPR Control Mode*)
   - Autothrust control is lost and thus alpha-floor protection is not available

- Performance penalties must be applied (please *Refer to MEL/MO-73-20 EPR Control Mode*):
  - For takeoff MAX weights and associated speeds
  - For single engine cruise, drift down net ceiling.
- Flexible takeoff is not permitted.

2. Reversion from EPR →N1 RATED mode during T/O Phase:
   The thrust remains EQUIVALENT to the thrust initially obtained with EPR mode, up to 2 500 ft above runway level.
3. Reversion from EPR →N1 RATED mode in FLIGHT:
   A cockpit caution and audio message are triggered with the associated ECAM procedure "EPR MODE FAULT".
   In addition, the A/THR will disengage and the alpha floor will be lost. If the thrust levers were in the CLB detent (MCT for single engine operation), the THRUST LOCK function will be activated. It will be deactivated as soon as a thrust lever is moved from the CLB (MCT) detent.

Note: *No particular precautions are required when pressing the N1 MODE pb.*

The ECAM E/W display correct data on the N1 indicator, when N1 RATED MODE is active for both engine.



2 N1 UNRATED MODE

DESCRIPTION

The N1 UNRATED MODE reversion occurs in the event of the loss of the engine inlet total air temperature (T2) or the ambient temperature (ambient pressure engine sensor).
The N1 is defined as a function of TLA only and is limited by the FADEC to either the lower of maximum N1 or N1 redline (if T2 is available) or N1 redline (if T2 is not available).
The only data provided to the crew by the FADEC is:
N1 ACTUAL

There is a difference between N1 provided in EPR MODE or N1 in RATED MODE and UNRATED MODE, for a given TLA. As a consequence, switching from EPR to N1 UNRATED may result in a N1 change:

- In case the reversion occurs when A/THR is engaged and thrust levers are out of a detent or subsquently moved out of a detent
- When pressing the N1 MODE pb.

OPERATIONAL CONSEQUENCES

1. If reversion to N1 UNRATED MODE occurs on the GROUND:
   This is a NO GO ITEM.
2. If reversion occurs in FLIGHT:
   A cockpit caution and audio message are triggered with an ECAM procedure. Please *Refer to PRO-ABN-70 ENG 1(2) EPR MODE FAULT*, to have the detail of the corresponding ECAM procedure.

   Additionally the A/THR will disengage and alpha-floor protection will be lost:
   - If thrust levers were in CLB detent (or MCT notch with one engine INOP), the THRUST LOCK function will be activated. Moving thrust levers or depressing the N1 MODE pushbutton will cause the THRUST LOCK system to be deactivated and N1 will follow TLA position.
   - If thrust levers were not in CLB/MCT notches, the N1 change would occur immediately.

   In the case both FADECs revert to N1 UNRATED MODE, in order to ensure a proper power management and satisfy N1 LIMIT values, N1 tables are provided in FCOM:
   - "Thrust ratings", N1 MCT, *Refer to PER-THR-N1 N1 MODE THRUST CONTROL*
   - N1 MAX CLB, *Refer to PER-THR-N1 MAXIMUM CLIMB N1*
   - N1 MAX CRZ, *Refer to PER-THR-N1 MAXIMUM CRUISE N1*
   - N1 GO AROUND, *Refer to PER-THR-N1 MAXIMUM GO AROUND N1*.

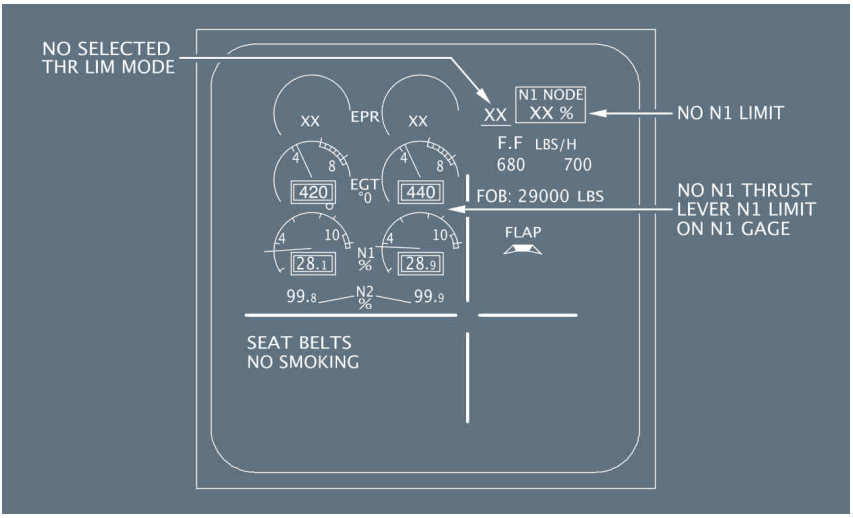
   Furthermore SINGLE ENG DRIFT ON NET CEILING penalties will be also published there.
3. It would be more likely to have a MIXED CASE where a failure is experienced on one engine, while the other is working normaly. If this occurs, the CAUTION/AUDIO/ECAM messages will be identical except for one additional message (NOT EXCEED N1 LIMIT): Indeed both N1

MODE pb will have to be pressed so as to help the crew to properly adjust the ACTUAL N1 on the engine where the FADEC is in N1 UNRATED MODE, by using the data provided by the other FADEC (N1 ACTUAL, N1 LIMIT). As a consequence, the crew will have to adjust the thrust lever, on the failed side, to a position (which depends on flight conditions) so as to align its N1 ACTUAL to the other N1 ACTUAL provided on ECAM. In this case there will be a thrust lever misalignment.

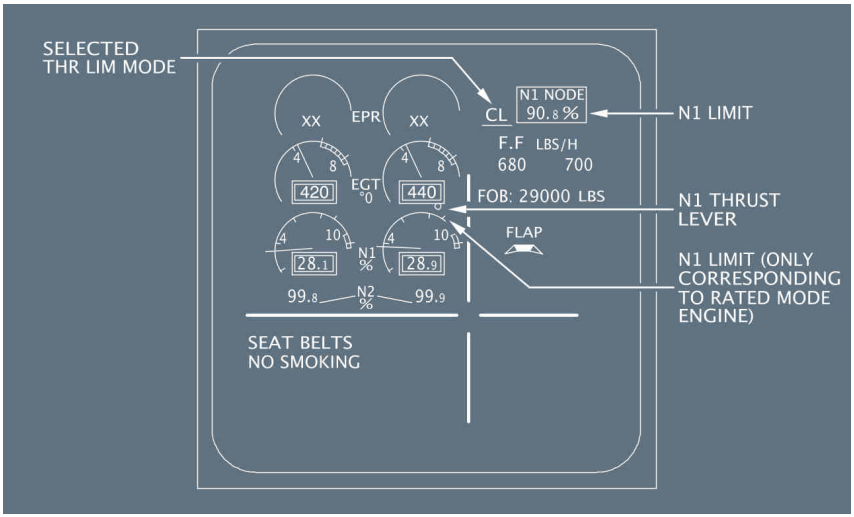
Single engine cruise drift down net ceiling penalties should also be used, in case that a subsequent engine failure occurs.

4. The ECAM E/W display indicates the following data on the N1 gage, depending upon 2 FADECs in N1 UNRATED mode, or 1 FADEC in N1 RATED and the other in N1 DERATED mode

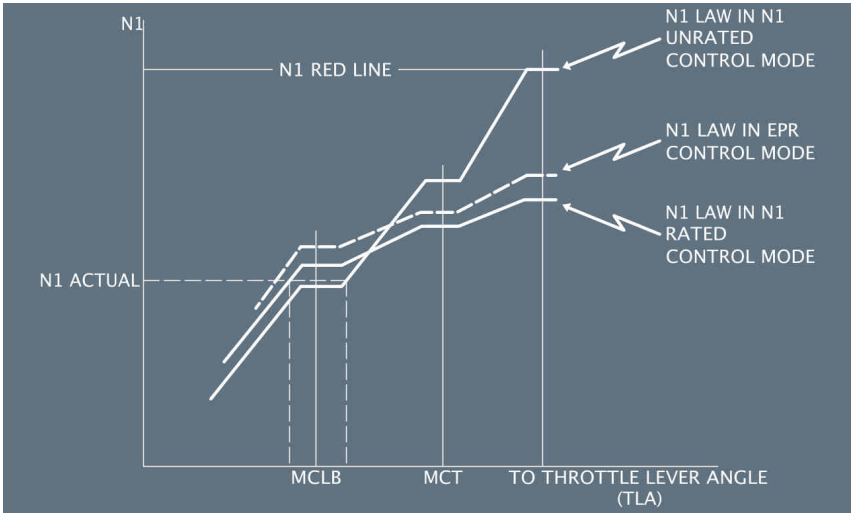
2 FADEC N1 DEGRADED MODE



MIXED CASE: ENG 1 Degraded, ENG 2 Rated mode



N1 COMMAND VERSUS THRUST LEVER POSITION RELATIONSHIP



This figure indicates that, in the MIXED case, the thrust lever position on both engines will be quite different in order to achieve the same N1 actual:

- For example in order to achieve an N1 actual lower than MAX CLB.
  - The thrust lever position on the side where FADEC is in UNRATED mode may be FORWARD of MAX CLB notch, while
  - The thrust lever position on the side where FADEC is in RATED mode is systematically AFT of MAX CLB notch.

FLIGHT CREW BULLETINS

AVOIDING TAILSTRIKES

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FCB-FCB5-PLP PRELIMINARY PAGES

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Avoiding Tailstrikes..... A

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AVOIDING TAILSTRIKES

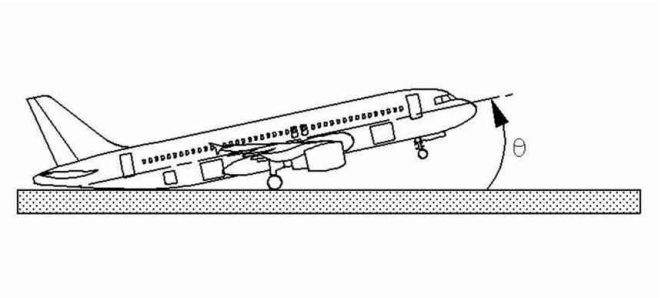
Applicable to: ALL

Inadvertent tailstrikes may occasionally occur, and may result in expensive structural damage.
Several tailstrikes have been reported throughout service life.
They are very often associated with such adverse conditions as crosswind, turbulence, windshear, etc.

A/C GEOMETRY LIMITS

Two limits need to be considered:

- The geometry limit corresponding to the main gear oleo fully extended (θ1)
- The geometry limit corresponding to the main gear oleo fully compressed (θ2).
  Example:



	PITCH ATTITUDE θ			
MAIN GEAR OLEO POSITION	**A318**	**A319**	**A320**	**A321**
FULLY EXTENDED	17.3 °	15.5 °	13.5 °	11.2 °
FULLY COMPRESSED	15.7 °	13.9 °	11.7 °	9.7 °

Note: On the A321, the installation of a TFTS antenna decreases these values.

CLEARANCE AT TOUCHDOWN

The following table provides the ground clearance in degrees for the A318, the A319, the A320, and the A321 at landing (all numbers are mean values).

AIRCRAFT	GEOMETRY LIMIT AT TOUCHDOWN	PITCH ATTITUDE AT VAPP (VREF + 5)(1)	PITCH ATTITUDE AT TOUCHDOWN (VAPP - 8)(2)	CLEARANCE(3)
A318	17.3 °	3.2 °	7.8 °	9.5 °
A319	15.5 °	3.4 °	7.7 °	7.8 °

Continued on the following page

Continued from the previous page

AIRCRAFT	GEOMETRY LIMIT AT TOUCHDOWN	PITCH ATTITUDE AT VAPP (VREF + 5)(1)	PITCH ATTITUDE AT TOUCHDOWN (VAPP - 8)(2)	CLEARANCE(3)
A320	13.5 °	3.3 °	7.6 °	5.9 °
A321	11.2 °	2.4 °	6.6 °	4.6 °

(1) Flight path in approach = -3 °

(2) Mean value of pitch attitude at touchdown, assuming a deceleration of 8 kt during flare (VAPP -8), and a flight path of -1 ° at touchdown (approximately 3 ft/s).

(3) Clearance = Geometry limit-Pitch attitude at touchdown.

When the approach speed is decreased by 5 kt, clearance decreases by approximately 1.3 ° (attitude at touchdown increases by 1.3 °).

TAILSTRIKE FACTOR AT TAKEOFF

Early rotation, over-rotation, excessive pitch rate, or a combination of these three factors are the main causes of tailstrikes at takeoff.

EARLY ROTATION

Early rotation occurs, when:
- A too low VR is computed
- The rotation is initiated prior to VR.

Erroneous VR computation may occur, when the takeoff speeds are not crosschecked, or an incorrect loadsheet data is used. At hot-and-high elevation airfields, the error can be critical.

Rotation initiated prior to VR due to:
- Flaps improperly set for the calculated VR
- Bird or obstacle avoidance leading to early rotation
- Early rotation due to windshear, encountered during the takeoff roll. In such an event, the FAA recommends rotation, 2 000 ft before the end of the runway.

OVER-ROTATION OR EXCESSIVE PITCH RATE

These two causes are generally associated with a second factor in tailstrike incidents (one engine-out, aircraft out of trim, additive inputs from both pilots, early rotation, etc.).
Certification requires demonstration of a safe takeoff at VR -10 kt (2 engines) and VR -5 kt (1 engine).
The pitch and the pitch rate, obtained during these tests, are for information purposes only, and are not certified limits.

AIRCRAFT	WEIGHT (kg)	CG	CONFIG.	ROTATION SPEED	θ°PER SEC	θ°AT LIFT-OFF
A318 CFM	60 145	15.6 %	CONF 2	VR -10 kt 2 engines	5.9 °/s	10.6 °
	61 725	15.4 %	CONF 3	VR -5 kt 1 engine-out	5.3 °/s	9.8 °
A319 CFM	62 550	21.4 %	CONF 2	VR -10 kt 2 engines	5.8 °/s	12.5 °
	63 440	21.3 %	CONF 2	VR -5 kt 1 engine-out	5.9 °/s	12.8 °
A320	67 200	17.8 %	CONF 2	VR -10 kt 2 engines	5.8 °/s	9.5 °
	65 300	116.5 %	CONF 2	VR -5 kt 1 engine-out	5.4 °/s	9.0 °
A321 IAE	75 950	14.9 %	CONF 2	VR -10 kt 2 engines	6.3 °/s	8.5 °
	73 720	15.0 %	CONF 2	VR -5 kt 1 engine-out	5.4 °/s	9.0 °

Note: VR represents the speed at aircraft rotation, in order to obtain V2 at 35 ft, in the event of an engine failure.

Normal rotation of 3 °/s prevents a tailstrike, unless the rotation is initiated at a speed which is far too low. This rotation is obtained in 5 to 6 s for an average 15 ° to 18 ° takeoff attitude.

TAILSTRIKE AT LANDING

Industry statistics show that tailstrikes are more likely to occur at landing, than at takeoff (2 to 1). Although most of them are due to deviations from normal landing techniques, some are associated with such external conditions as turbulence and wind gradient.

DEVIATION FROM NORMAL LANDING TECHNIQUES

Deviations from normal landing techniques are the most common causes of tailstrikes, the main reasons for this being:

a. Allowing speed to decrease well below VAPP before flare.
   Flying at a too low speed means high a AOA and high pitch attitude, thus reducing ground clearance. When reaching the flare height, the pilot will have to significantly increase the pitch to reduce the sink rate. This may lead the pitch to go beyond the critical angle.
b. Prolonged hold-off for a smooth touchdown
   As the pitch attitude increases, the pilot needs to focus further ahead to assess the aircraft's position in relation to the ground. The attitude and distance relationship can lead to a pitch attitude increase beyond the critical angle.
c. Too high flare

A high flare can result in a combination of decreased airspeed and long float. Since both lead to increased pitch attitude, the result is reduced tail clearance.

d. Too high a sink rate, just prior reaching the flare height.
In case of a too high sink rate close to the ground, the pilot may attempt to avoid a firm touchdown by commanding a high pitch rate.
This action will significantly increase the pitch attitude and, as the resulting lift increase may be insufficient to significantly reduce the sink rate, a firm touchdown may occur. In addition, the high pitch rate may be difficult to control after touchdown, particularly in case of bounce.

e. Bouncing at touchdown
In case of bouncing at touchdown, the pilot may be tempted to increase the pitch attitude so as to ensure a smooth second touchdown. If the bounce results from a firm touchdown associated with a high pitch rate, it is important to control the pitch so that it does not further increase beyond the critical angle.

APPROACH AND LANDING TECHNIQUES

A stabilized approach is essential for achieving successful landings. It is imperative that the flare height be reached at the appropriate airspeed and flight path angle. A/THR and FPV are effective aids to the pilot.
The VAPP should be determined with the wind corrections, given in FCOM/QRH, using FMGS functions.
As a reminder, when close to the ground, the wind intensity tends to decrease and the wind direction to turn (direction in degrees decreasing in northern latitudes).
Both effects may reduce the headwind component close to the ground, and the wind correction to Vapp is there to compensate this effect.
When close to the ground, high sink rates should be avoided, even in an attempt to maintain a close tracking of the glideslope. Priority should be given to attitude and sink rate. If a normal touchdown distance is not possible, a go-around should be performed.
If the aircraft has reached the flare height at VAPP with a stabilized flight path angle, the normal SOP landing technique will lead to repetitive touchdown attitude and airspeed.
Assuming an 8 kt speed decrease during flare, and a -1 ° flight path angle at touchdown, the pitch attitude will increase by approximately 4.5 °.
During flare, the pilot should not concentrate on the airspeed, but only on the attitude with external cues.

Note: *Airspeed indication during flare is influenced by the static error due to the ground effect.*

The PNF should monitor the pitch attitude on the PFD and call "PITCH", whenever the following pitch value is reached:

- For the A318/A319/A320 : 10.0 °
- For the A321 : 7.5 °

After touchdown, the pilot must "fly" the nosewheel smoothly, but without delay, on to the runway, remaining prepared to counteract any residual pitch up effect of the ground spoilers.

Note: *The main part of the spoilers' pitch up effect is compensated by the flight control laws.*

BOUNCING AT TOUCHDOWN

In case of a light bounce, maintain the pitch attitude and complete the landing, while keeping thrust at idle.
Do not allow the pitch attitude to increase, particularly following a firm touchdown with a high pitch rate.
In case of a high bounce, maintain the pitch attitude and initiate a go-around.
Do not try to avoid a second touchdown during the go-around. Should it happen, it would be soft enough to prevent damage to the aircraft, if pitch attitude is maintained.
Only when safely established in the go-around, retract flaps one step and the landing gear.
A landing should not be attempted immediately after a high bounce, as thrust may be required to soften the second touchdown, and the remaining runway length may be insufficient to stop the aircraft.

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FLIGHT CREW BULLETINS

FQI ACCURACY

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FQI ACCURACY

Applicable to: ALL

INTRODUCTION

The FQI system installed on Airbus aircraft use probes to measure the quantity of fuel in the different fuel tanks.
Each FQI probe consists of two fixed concentric tubes which form the plates of a capacitor.
The dielectric of this capacitor is provided by air and fuel which have different dielectric constants.
Therefore the capacitance of a vertically installed probe varies with the fuel level and gives an indication of fuel quantity in the tank.

FQI ACCURACY ON AIRBUS INDUSTRIES PRODUCTS

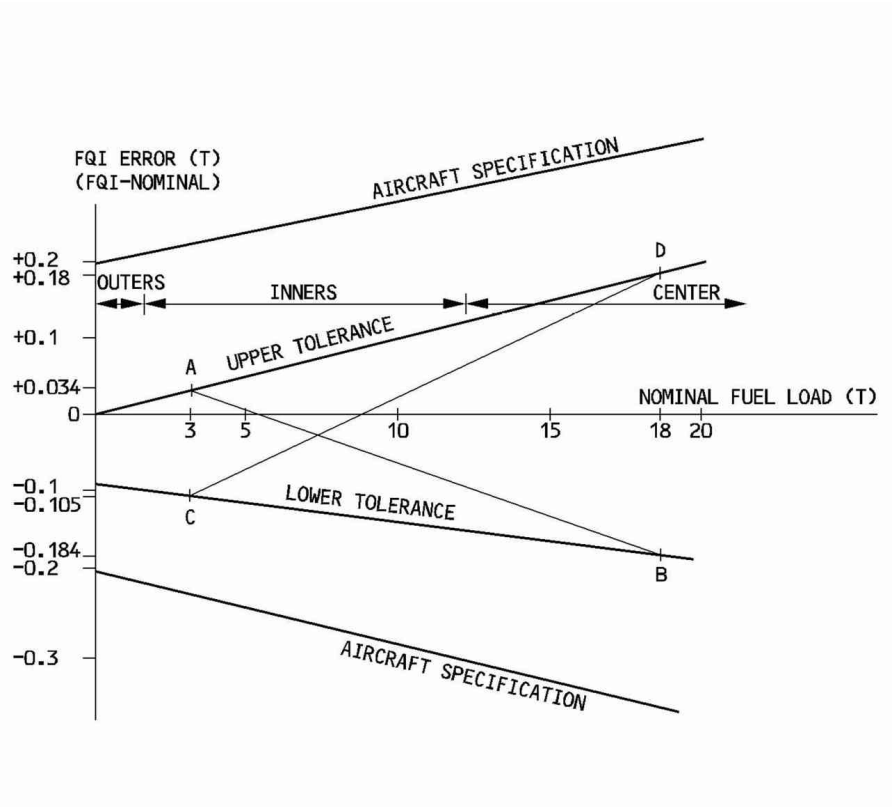
The accuracy of any measuring device such as the FQI system, is dependant on various parameters.
There are bias and random errors that can affect FQI system accuracy. Errors can involve tank manufacturing tolerances, FQI computer inaccuracies, error in density determination, probe-mounting tolerances, water that causes FQI over-reads, wing deflection, aircraft reference improperly taken into account.

The following figure gives, the Airbus Industrie standard specifications for FQI system accuracies on the A319/A320/A321:

- **Accuracy: ±** 1 % **of max tank capacity ±** 1 % **of actual fuel quantity**.
- Supplier:
  - A319/A320: Smiths and Intertechnique managed by **Smiths**
  - A321: BFE Goodrich and Sextant managed by **BFE Goodrich**.
- New probes compared to A310/A300-600
- Density sensors measuring all in-tank fuel as opposed to up-lifted fuel only for A310/A300-600
- Attitude correction from IRS in addition to fuel surface probe cutting.

Each aircraft is checked on ground prior to delivery to be within the tolerances shown on the following graphs (See Figure 1).
FAR/JAR 25.1337 requires that "each fuel quantity indicator is calibrated to read "zero" during level flight when the quantity of fuel remaining in the tank is equal to the unusable fuel supply..."
Tolerances are reduced when there is low level in the tanks in order to achieve an under-reading of the FQI as required by the regulations.

Figure 1



UNDERSTANDING FQI DISCREPANCIES

ON GROUND

Refueling personnel sometimes report discrepancies at the end of refueling, between the uplifted quantity based on FQI (total after refuel-total before refuel) and the uplifted quantity from the bowser (litres x measured density).

These discrepancies may be due to the following tolerance considerations.

Max discrepancy (Δ) = **Fuel load [per bowser] - Fuel added [FQI end - FQI start]**

= **±FQI error (end) ± FQI error (start) ± Bowser Qty and Density error + APU fuel burn** (during refueling)

Example (A320-200):
- Actual FOB before refueling = 3 t (6 600 lb)
- Actual FOB after refueling = 18 t (39 600 lb).

Bowser Quantity and Density Error

- Volume tolerance is generally lower than ± 0.5 %
- Density error due to both temperature accuracy and density reading: Δd = ± 0.002. Or ± 0.25 % on tolerance at any fuel loading.
  Total bowser quantity and density error = ± 15 000 x 0.75 % ~±115 kg (253 lb)

APU Fuel Used

- When comparing bowser data versus FQI data as indicated above, the reported discrepancy includes the fuel used by the APU between FQI readings before and after refueling.
- Depending on external conditions and generator load, the APU fuel consumption on ground is between 100 (220) and 150 kg/h (330 lb/h). For a refueling time of 30 min, APU burn would be at least 50 kg (110 lb).

FQI Errors

The three following cases should be considered:

1. Significant FQI system changes have been performed (FQI computer, probes change etc...) on the aircraft since delivery or its last FQI ground calibration.
   The FQI accuracy to be taken into consideration should be the one given by the aircraft specification i.e. ± 1 % of maximum tank capacity ± 1 % of actual fuel quantity.
   Assuming a maximum fuel capacity of 19 t (418 000 lb):
   FQI at start = 3 t ±220 kg (6 600 lb ±484 lb)
   FQI at end = 18 t ±370 kg (39 600 lb ±814 lb)
   Δ1 = ± 220 kg ±370 kg ±115 kg ±50 kg (Δ1 = ± 484 lb ±814 lb ±253 lb ±110 lb)
   Δ1 max ~ ± 755 kg **(**1 661 lb**)**
2. No FQI system modification has been performed since the last FQI calibration. All FQI readings are within the ground tolerances (See Figure 1).
   Maximum positive Δ is obtained when FQI presents the maximum over-reading at start and the maximum under-reading after refuel, i.e. when the particular aircraft calibration curve runs from A to B.
   Maximum positive Δ = 15.000 - [(18.000 - 185) - (3.000 + 35)] + 115 + 50 = + 385 kg
   Conversely, maximum negative Δ is obtained when particular aircraft calibration curve runs from C to D.
   Maximum negative Δ = 15.000 - [(18.000 + 180) - (3.000 - 105)] - 115 + 50 = - 350 kg
   Δ2 max ~ ± 385 kg (847 lb)
3. Particular aircraft FQI calibration curve is available.

In this case, although the reported discrepancy can be of the same magnitude as Δ2 maximum given above, after correction of FQI reading according to the calibration curve, the remaining difference should be due to bowser error and APU burn only.
Δ3 max ~ ± 165 kg (363 lb)

Conclusion

- When comparing bowser uplift versus FQI readings on ground, the maximum difference is: **Δ1 max = [FQI over-read (start)] - [FQI under-read(end)] + bowser error + APU burn**
- Difference can be significant when FQI over/underreadings before and after refueling are very different.
- An aircraft presenting a Δ ~ 0 does not confirm its FQI system is more accurate than another aircraft with a difference. It suggests (bowser error and APU burn not taken into account) that over/underreadings before and after refueling are very close but not necessarily equal to 0.

IN FLIGHT

As a routine, crews should check the fuel on board (FOB) plus fuel used (FU) against the block fuel during flight. This would detect fuel leaks and provide a more reliable basis of calculation in case of either FQI or FU failure during flight.
Discrepancies have been observed during routine checks.

These discrepancies are made up from the three following inherent errors:
- BLOCK FUEL (error constant throughout flight)
- FU (error increasing during flight)
- FOB (error decreasing during flight).

Example: A320 with 18 t
- BLOCK FUEL: 18 t →error = ± 370 kg (814 lb)
- FOB: 3 t →error = ± 220 kg (484 lb)
- FU: 15 t →error = ± 225 kg (495 lb)

In an extreme case:
Block Fuel = FOB + FU ± 815 kg (1 793 lb) **+ APU FU if any**
and this with no system fault.
Consequently, it is important to know the FQI tolerances to understand discrepancies.

Note: 1. *FU indication accuracy, which is an integration of the FF, is estimated to be better than ± 1.5 %. The error of the fuel flow (FF) meter is dependent upon fuel flow rate and temperature conditions. For normal cruise conditions, this error is around ± 1 %.*

2. *FQI errors for both Block Fuel and FOB are as per the specification because ground calibration curve is not applicable in flight. Block Fuel error, ground tolerances may be used if applicable (refer to 3.1). In this case, Block Fuel error is ± 185 kg (407 lb) instead of ± 370 kg (814 lb).*
   If the particular ground calibration curve is known, there should not be any substantial error on Block Fuel.
   Possible discrepancy due to FOB and FU errors remains significant:
   Block Fuel = FOB + FU ±** 450 kg (990 lb) **+ APU FU if any

3. *APU fuel used in flight, which is not recorded, is between 40 (88) and 100 kg/h (220 lb/h).*

4. *With the Flight Management and Guidance System (FMGS), FOB is also available on the appropriate page of the FMGS. FOB is computed by the FMGS using both FQI and FF data.*
   In the event of a FQI failure, the FMGS will continue to display FOB by means of the last available FOB and by FF integration.

USE OF MANUAL MAGNETIC INDICATORS

It often happens that when a discrepancy has been detected either on ground or in flight as explained above, some airline procedures request to make a check of the FOB after refueling or after landing by means of the Manual Magnetic Indicators (MMI).
It has to be highlighted that MMI readings involve several measurements and interpolations (on rods, on clinometers, on charts) in addition to the MMI indication accuracy itself.
This is why the accuracy of a MMI reading is approximately ± 5 % and thus worse than FQI system accuracy.
Therefore, MMI readings should not be used to check FQI system. They should only be used when the FQI system is inoperative.

REDUCING FQI DISCREPANCIES

FQI system accuracy continue to improve. Operational accuracy goals have been established by ARINC in cooperation with airframe and equipment manufacturers and in agreement with airline requirements.

The discrepancies described are inherent in the FQI system:

- Both on-ground and in-flight reported discrepancies are generaly due to FQI errors on Block Fuel.
  The Block Fuel maximum error should be reduced. This will depend on a responsible judgement based on knowledge of a particular aircraft FQI calibration curve; i.e. assuming no FQI modification following aircraft delivery, this curve will be reasonably constant (on ground) and thus, for a given FQI reading, real Block Fuel can be deduced.
  This calibration may be done by any operator while it is not applicable to the correction of in-flight reading.
  A FQI calibration procedure is a maintenance function and will be introduced in the AMM in the future.
- FU (fuel used) is the primary parameter to determine fuel consumption (max error = ± 1.5 %). Nevertheless, on certain high-fuel-capacity aircraft, the FOB error (decreasing during flight) may become lower than FU error (increasing during flight) by end of flight.
  Example: A320 with 19 t (41 800 lb) maximum capacity.

  • BLOCK FUEL = 18 t (39 600 lb)
  • FOB = 3 t ±1/100 (3 t + 19 t) = 3 t ±220 kg
    (FOB = 6 600 lb ±1/100 (6 600 lb + 41 800 lb) = 6 600 lb ±484 lb)
  • FU = 15 t x (± 1.5 %) = 15 t ±225 kg
    (FU = 3 300 lb x (± 1.5 %) = 3 300 ±495 lb)

In this example, when FOB is less than 3 t (6 600 lb), FOB error may be assumed to be lower than FU error. Furthermore:

- If Block Fuel is confirmed as per a particular calibration curve:
  • When FOB >3 t (6 600 lb):
    Use FU parameter to determine both FOB and FU
  • When FOB <3 t (6 600 lb):
    Use FOB parameter to determine both FOB and FU

OPERATIONAL CONSIDERATIONS

Some economic aspects relating to FQI accuracy are approached here and should be considered when operating an aircraft.

TECHNICAL DELAYS

Incorrect application of MMI check, may cause a possible delay.
Knowing the FQI calibration curve helps to understand and reduce discrepancies.

EXTRA FUEL LOADED

- Crews uplift more fuel than required for a particular flight, as a contingency factor, when they are unsure of the FQI accuracy.
- An under-reading FQI leads also to carrying extra fuel.
- 1 extra tonne will increase fuel consumption up to 1.2 %, depending on airframe and flight conditions.

PAYLOAD PENALTY

Extra fuel loaded due to uncertainty of FQI may lead to decreasing the payload.

Payload = TOW + TAXI fuel - OEW - Fuel loaded

TOW = Take-Off Weight

OEW = Operating Empty Weight

We have seen, that adding 130 kg (286 lb) of fuel can allow the payload to be increased by 870 kg (1 914 lb) on a 4 h flight.

- When the payload is **limited by MTOW** as TOW cannot be increased, **any extra fuel will decrease** and replace payload by the **same amount**.
  Also, **any defueling will significantly decrease the payload.**
- When the payload is limited by the max fuel capacity:
  - If the FQI under-reads, the payload could be increased
  - If the FQI over-reads, the payload should be decreased.

For example, an inaccuracy of ± 130 kg (286 lb) on fuel can affect the payload by ± 870 kg(1 914 lb).
Again, knowing your FQI calibration curve allows to adjust the payload.

Note: Although not approved by DGAC/JAA as it is a non compliance item, using the 2 % thermal expansion volume as extra-fuel could be authorized by national airworthiness authorities to increase max fuel capacity.
In this case the FQI reading is limited somewhere above high level until fuel quantity falls below this value.

CONCLUSION

Airbus Industrie has always improved FQI systems, because it is essential for crews to have a reliable and accurate fuel quantity indication system.
Taking into account the difficulty of measuring the weight of a liquid stored in complex-shaped tanks always moving, FQI system installed on Airbus aircraft has a good accuracy, well within specifications and international standards.
It is important on certain flights with certain aircraft fitted with a FQI system presenting large over-/underreadings, to know the particular FQI ground calibration curve.

Crews should know this curve and FQI tolerances in order to:
- Understand and reduce FQI discrepancies
- Avoid delays
- Save fuel
- Adjust the payload.

FQI calibration should be done when deemed necessary by each operator as this will be profitable for both operational and economic aspects.

FLIGHT CREW BULLETINS

ELECTRONIC INTERFERENCE FROM PORTABLE EQUIPMENT CARRIED ON BY PASSENGERS

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ELECTRONIC INTERFERENCE FROM PORTABLE EQUIPMENT CARRIED ON BY PASSENGERS

Applicable to: ALL

- Airlines often wonder whether they should allow passengers to operate electronic devices in the cabin without any limit.

  Federal Aviation Regulation (FAR) section 91.19 allows passengers to operate:
  - Portable voice recorders
  - Hearing aids
  - Heart pacemakers
  - Electric shavers
  - Any other portable electronic device that the operator of the aircraft has determined will not cause interference with the navigation or communication system of the aircraft on which it is to be used.

  It is obvious that the myriad portable devices that now exists or that may be available in the future cannot be tested.
- As far as aircraft specific electrical flight controls and engine control computers on Airbus aircraft are concerned, there is no chance of their operation being affected by passenger-operated electronic devices, due to the high level of protection applied to these systems.
- Nevertheless, this question arises for navigation and communication receivers and is applicable to any aircraft.
  A study has been conducted by an RTCA (Radio Technical Commission for Aeronautics) special commitee.
- The conclusion is that the probability of a passenger-operated device interfering with the ILS localizer during a typical flight is about one in a million.
  Airbus Industrie recommendations is that no portable device should be used during take-off and landing.
- Concerning radio phones Airbus Industrie recommends to prohibit the use of those devices.

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FLIGHT CREW BULLETINS

THRUST ACCELERATION IN A/THR MODES

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THRUST ACCELERATION IN A/THR MODES

Applicable to: ALL

These are specific thrust acceleration logics when A/THR is engaged in thrust or speed mode. The crew should be aware of each.
The purpose of the logic is to obtain adapted thrust variation to the whole flight envelope, depending on the current mode engaged, "G" load limitation, and vertical modes switching if any.
This is based on different logics which can be summarized as following.

1. LOGIC IN THRUST MODE "CLB"(ASSOCIATED WITH OP CLB/EXP CLB/CLB)

1.1 WHEN AP IS ENGAGED

During thrust increased, the maximum acceleration rate is 20 %/sec until the N1 reaches N1 target minus 5 %. At that point, the acceleration logic is speed mode. This acceleration limit is defined to achieve a smooth and rapid transition without noticeable speed excursion.
However normal acceleration rate is between 1.5 %/sec and 20 %/sec.
When target N1 minus 5 % is reached, N1 rate becomes 1.5 %/sec until target N1 (MAX CLB Thrust) is obtained.

Note: When decelerating (more than 10 kt between current speed and speed target), the N1 rate is maintained at 1.5 %/sec.

1.2 WHEN AP IS OFF

It has been revealed, that during manual flying with AP off, the rate limit up to 20 %/sec was not as optimum as with AP engaged. The reason for this is that during transition the system was using A/THR speed mode logic to obtain N1 rate limit of 20 %/sec MAX; if the pilot did not fly the FD bars, established CLB thrust was not always obtained.
Consequently, the current system maintains the fixed value of 1.5 %/sec which represents the best value when following the FD bars.
Flight tests proved this logic (it means to provide maximum rate of 20 %/sec only if autopilot is engaged) to be the optimum compromise through the flight envelope.

WARNING	If FD bar commands are not smoothly followed or not followed at all, a speed excursion may occur, due to the fact that the change of attitude is not adapted to the thrust acceleration rate. If required, additional manual thrust may be briefly added by the pilot during the transition.

2. LOGIC IN THRUST MODE "IDLE" (ASSOCIATED WITH OP DES/EXP DES/DES)

The N1 rate limit is 2 %/sec (IS8) and 1 %/sec (full standard). Both rates were selected to preclude speed excursion and improve passenger comfort (smooth attitude variation during transition).

3. LOGIC IN SPEED MODE

The N1 rate limit is 20 %/sec MAX, however it can be lower depending upon the difference between the current speed and the target speed.
There is no difference in A/THR speed mode linked to AP ON or OFF. The speed hold is the same with AP ON or OFF.
When pilot is flying manually, a temporary speed loss can occur if an increased load factor is required. This authority is not possible with AP due to system.

FLIGHT CREW BULLETINS

RADIO ALTIMETER ANOMALIES DURING ADVERSE WEATHER CONDITIONS

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RADIO ALTIMETER ANOMALIES DURING ADVERSE WEATHER CONDITIONS

Applicable to: ALL

INTRODUCTION

All radio altimeters are very sensitive to adverse weather conditions.
Reflections from hail clouds or heavy precipitation located between the ground and the aircraft, may cause the radio altimeter to indicate a false height value momentarily.
These erroneous indications are also transmitted to other systems which may induce spurious warnings or unexpected AP/FD guidance.

EXAMPLE	Under heavy rain condition at 2 600 ft, at least one of the radio altimeter delivered a height indication of 480 ft during 13 s. The warning "L/G gear not down" was displayed. No other anomaly was reported until landing.

EXPLANATION

ORIGIN

A radio altimeter measures the shortest distance between the aircraft and the closest obstacles below it.
During adverse weather conditions, returns can be generated due to reflection on hail clouds or heavy rain. The energy which is reflected depends directly upon the hail or rain density.
If the energy received by the radio altimeter is powerful enough, it will be validated and a height lower than the distance to the ground will be measured and sent to system users.
If the return is too weak, the measurement will be validated but the increased noise level may hide the return from the ground and thus no height indication would be provided.

CHARACTERISTICS

This phenomenon is rare. Typical weather conditions which trigger these effects are not frequent and generally isolated.
It is less likely with increased height.
Due to the physical nature of the hail and rain and the radio altimeter characteristics, the radio altimeter indication will only be influenced if the distance between the A/C and the clouds is equal or greater than 300 ft for rain and 80 ft for hail.
Both radio altimeters are likely to be affected simultaneously.

OPERATIONAL CONSIDERATIONS

If both radio altimeters are affected simultaneously the crew may experience:

- If the value is greater than 150 ft:
  - Spurious auto call out
  - Spurious ECAM or GPWS warnings.
- If the value ranges between 150 ft and 80 ft:
  - During automatic approach:
    - Degradation of the guidance, glide slope is no longer flown, excessive deviation may occur
    - Variation of the longitudinal pitch and/or vertical speed leading to GPWS warning.
  - During manual approach:
    - No adverse effect could be reproduced during simulation but GPWS or auto call out warning might be spuriously triggered.

CONCLUSION AND OPERATIONAL RECOMMENDATIONS

Very few cases of spurious radio altimeter indications have been reported to Airbus. Radio altimeter sensitivity issues have been tuned to the limits of improvement. There is no practical solution to cure the phenomenon without reducing system performance to an unsatisfactory level. Crews need to be aware that erroneous radio altimeter behavior is rare, but can occur during severe weather conditions. During approach and landing, crews need to consider this phenomenon.

The weather radar may be used to detect heavy rain or hail.

The interpretation of the color codes is as follows:

Black rainfall rate	less than	0.7 mm/hr
Green rainfall rate	between	0.7 and 4 mm/hr
Yellow rainfall rate	between	4 and 12 mm/hr
Red rainfall rate	greater than	12 mm/hr

As an example stormy tropical shower rate can be as high as 500 mm/hr and uppest limit for hail may reach 4700 mm/hr.

FLIGHT CREW BULLETINS

FMGS NAVIGATION DATABASE

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FMGS NAVIGATION DATA BASE

Applicable to: ALL

REASON FOR ISSUE AND SCOPE

The aim of this FCOM Bulletin is to highlight the importance of the Navigation Data Base accuracy and therefore the importance of its update and its correctness.
As any NAV data base discrepancy or false coding may induce navigation errors and lateral or vertical misguidances, this FCOM Bulletin provides flight crews with operational recommendations.

INCORRECT NAV DATA BASE CASES

NAVIGATION DATA BASE DISCREPANCIES

Numerous in service events have been reported during the last few years, which are caused by 3 different types of Navigation Data Base discrepancies:
- NAV data base not updated on time
- Incorrect coding or impossibility of coding of published procedures
- Coding errors.

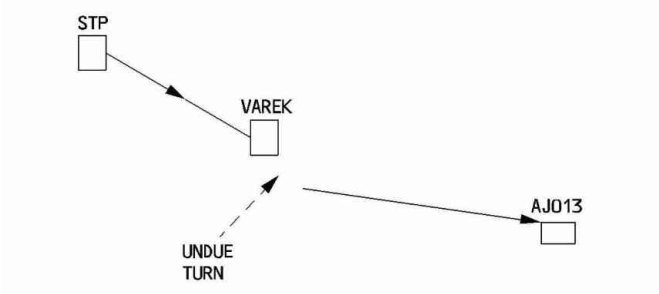
NAV Data Base Not Updated on Time

When a NAV Data Base is not updated on time, this may lead to incorrect position or misguidance:
- 1st example
  STAR MEN2 (LFBO) was modified but not incorporated in the NAV D.B. As a result the STAR displayed on the ND was not the published one.
- 2nd example
  TRANS between STAR VAREK and NDB03 was not coded at Ajaccio (LFKJ). Misguidance was the consequence.

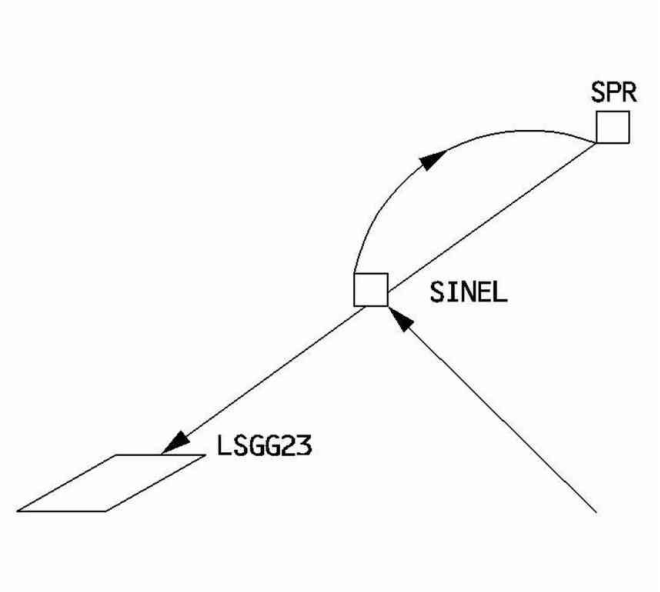
NAV Data Base Incorrect Coding

Incorrect coding in the NAV D.B. induces misguidance in SID or STAR:

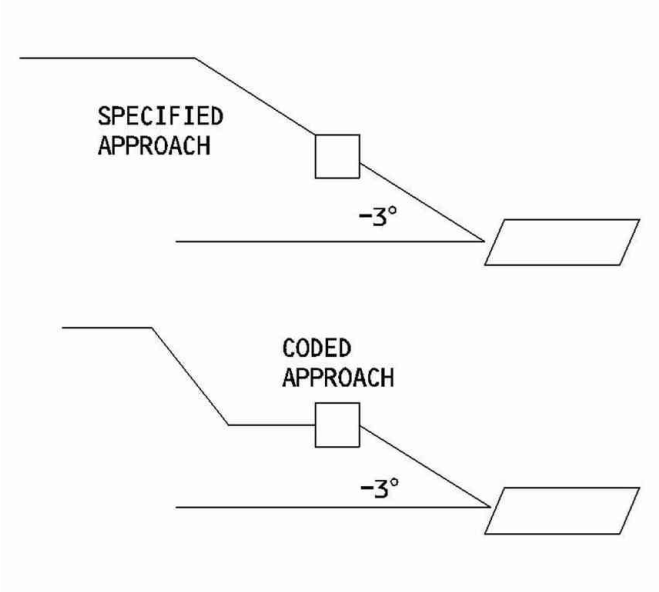
- 1st example
  STAR VAREK at Ajaccio (LFKJ).
  The leg STP-VAREK was coded as a TF (track to fix) and the following leg was coded as a CF (course to fix). Due to the imprecision of the magnetic variation in the area, both legs were not lined up and the A/C had to turn, after VAREK WPT, to capture the next leg.



- 2nd example
  STAR PERIK 1 and GORON 1 AT Genova (LSGG).
  These STARs end at WPT SINEL located in the middle of the APPR 23.
  This creates a F-PLN discontinuity and the procedure is not flyable. The NAV D.B. error is linked to both coding and procedure concept.



- 3rd example
  On several non precision approaches, the final descent angle is coded for the last leg only instead of the last 2 legs. Again this creates a level off segment which does not exist.



Coding Errors

Coding errors generally have very similar effects on the FMGS system and may induce position errors as well as misguidance:

- 1st example
  Erroneous position of runway threshold at LFMT RWY 32R inducing a lateral offset during non precision approach
- 2nd example
  ILS/DME coded as an ILS only preventing autotuning of the DME in approach (IWW and IGG at EGKK).

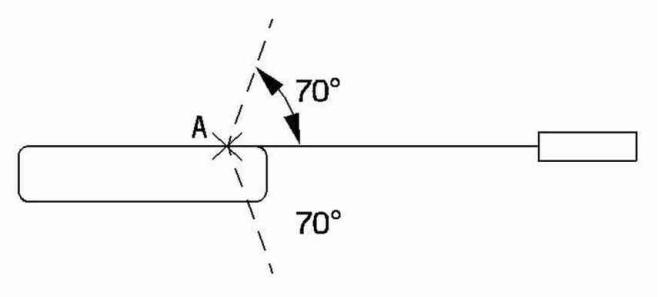
PROBLEMS LINKED TO ARINC 424 SPECIFICATION

If an item is not specified in the ARINC 424, it will not be part of the NAV D.B.
For example:
No specific field reserved for THR RED/ACC ALT. As a result, it is not possible to link such information to a company route (e.g noise abatement). Defaulted value is provided instead.

Systematic Coding of HF Leg in Procedures

When a Final Approach procedure displays a Holding Pattern, this pattern is systematically coded in the APPR VIA or STAR as an HF leg; this means that this holding is always taken

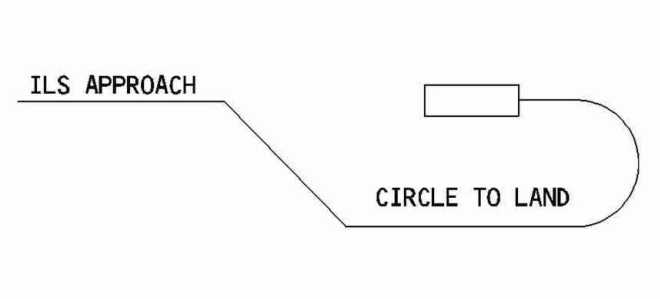
into account in the F-PLN, assuming one turn; in certain cases, this is realistic but in most circumstances, it is not.



If the HF leg is of no use, it corrupts all predictions and performance computations.
Furthermore if a holding pattern is ATC required, by then the crew has all means to insert it into the F-PLN, and be then provided with realistic estimates.
As a consequence, realistic coding of procedure turns should be requested.

Circle to Land

At many airports approaches are defined only in one direction; while the landing runway may be in the other direction.
If the weather is poor, a defined instrument approach is carried out down to circle to land MDA, and then a circle to land trajectory is flown.
Circle to Land feature is not part of current ARINC specification; this forces the crews to improvise in order to get a realistic trajectory on the ND, and to get proper predictions on CDU



RECOMMENDATIONS

In order to control and correct NAVIGATION Data Base all pilots are encouraged to report to their flight operations any misbehaviour which may have been induced by an incorrect data base.

This can be done during normal operations:

- During preflight by checking the consistency of the MCDU F-PLN versus ATC F-PLN. Refer to current FCOM
- In flight by performing the navigation accuracy assessment on a regular basis as described in the FCOM procedures and techniques.

CONCLUSION

Tomorrow, the increasing number of RNAV approaches will require faultless NAV Data Base procedures since it will not always be possible to monitor the guidance by using raw data.
On a short term basis, the NAV Data Base improvement is a matter of step by step error detection which mainly requires pilot attention during preflight and in flight.
On a longer term basis, the NAV Data Base improvement requires decisions and actions of concerned agencies/authorities and NAV Data Base manufacturers.
It has to be reminded that the aircraft constructor has no control over the data base used by each operator.

FLIGHT CREW BULLETINS

SPECIFIC FEATURES OF THE FMGS
FULL STANDARD

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Specific Features of the FMGS Full Standard..... A

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SPECIFIC FEATURES OF THE FMGS FULL STANDARD

Applicable to: ALL

Note: This FCOM bulletin is only valid for aircraft equipped with FMGS full standard.

The FMGS full standard was introduced in 1992. During the first months of service, questions have been raised on particularities of the system.

1. ALTITUDE PREDICTIONS NOT ACCURATE ON GROUND

Predicted altitudes indicated on the F-PLN A page are not accurate until take off; an error of a few hundred feet may be noticed on predicted altitudes at all waypoints until lift off.

EXPLANATION

The predictions are computed using simplified model for the take off run. This causes a minor error on the altitude predictions. Predictions are continuously updated during the take off roll and once airborne, they are accurate.

2. SPURIOUS "FMS 1/FMS 2 SPD TGT DIFF" MSG

When changing of CRZ FL using the FCU altitude knob, the message "FMS 1/FMS 2 SPD TGT DIFF" may come up.

EXPLANATION

The new FCU altitude is sent by the master FMGC to the slave, therefore predictions are not computed at the same time on both FMGCs; a speed target difference may occur during a very short period, triggering the message.

PROCEDURE

Disregard the message.

3. "IRS ONLY NAVIGATION" MSG TRIGGERED AT DESCENT PHASE SWITCHING

When the A/C is in IRS ONLY NAV mode, the message "IRS ONLY NAVIGATION" is triggered when the A/C starts the descent.

EXPLANATION

The system logic is triggered when the FMGS navigation mode has been in inertial only for more than 10 min in cruise or when the A/C is transitionning to descent phase without radio updating.
If the FMGS is in IRS only navigation mode at descent phase switching, the message is immediately triggered, reminding the crew that the A/C is operating without radio position.

PROCEDURE

Perform a NAV ACCY CHECK.

4. VERTICAL DEVIATION DIFFERENT ON BOTH SIDES

In descent or approach the vertical deviation (VDEV) indicated on the PFD and PROG page may differ on side 1 and 2.

EXPLANATION

The vertical deviation (VDEV) is computed independently on side 1 and 2; if FM 1/2 position ground speed or other data used for VDEV computation differ slightly from side 1 and 2, a small difference of VDEV will be observed during descent and/or approach.

5. INCREASE OF VERTICAL SPEED IN DES MODE

The vertical speed may increase noticeably for a short period of time during descent with DES mode engaged. The V/S regains the normal value when intercepting the path.

EXPLANATION

When the A/C is above path and an increase of speed target is required manually or automatically, the V/S will increase temporarily until the vertical profile is intercepted.

6. VLS COMPUTATION

6.1 The VLS computed by the FMGS uses the same algorithm and performance table as the FAC. Nevertheless some differences may be observed due to the fact that the FAC computes the VLS from flight parameters and the precision of the computation provides an accuracy of ±3 kt (PFD VLS).

6.2 In CONF 3, the performance table used to compute the VLS assumes the gear up although the table provided in the QRH and FCOM assume gear down. A VLS difference of 2 kt can be observed between performance table and FAC/FMGS in CONF 3.

7. A/C POSITION INVALID

When a fast realignment is performed, the message A/C POSITION INVALID is triggered.
The message disappears when the realignment is completed.

EXPLANATION

During an IRS alignment, the ADIRS send no data to the FMGS and the FMGS cannot process any position.
The POS MONITOR page is empty and the MSG "A/C POSITION INVALID" is automatically triggered. Once the IRS are realigned, the ADIRS provide data to the FM and a mix IRS position is recomputed; the message disappears.

FLIGHT CREW BULLETINS

VMO/MMO DETERMINATION

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VMO/MMO Determination.....A

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VMO/MMO DETERMINATION

Applicable to: ALL

GENERAL

VMO (the design cruising speed) is the maximum operating speed that the crew may fly within the normal flight envelope. It is not authorized to fly intentionally above this limit.
VD is the design dive speed. VMO and VD must comply with load requirements (gust loads, maneuvering loads). For example, the aircraft must be able to sustain a load factor of 2.5 up to VD. The range between VMO/VD considers normal reaction time to the crew to use standard recovery techniques for returning the aircraft to normal attitude at a speed of VMO/MMO.
The A319/A320/A321 are protected by the High Speed Protection law which automatically makes the recovery if VMO is exceeded (between VMO and VMO +6) as shown in the following table.

HIGH SPEED/MACH TABLE

MD = 0.89	VD = 381 kt	VD = VMO +31 kt
MMO +0.04	VMO +20 kt	Structural inspection required. (Refer to relevant AMM section)
MMO +0.01	VMO +6 kt	Upper limit for entry into HSP
MMO +0.006	VMO +4 kt	Overspeed warning
MMO = 0.82	VMO = 350 kt	Max operating SPEED/MACH and lower limit for entry into HSP
MMO -0.006	VMO -3 kt	Max upper speed range in DES mode.
MMO -0.02	VMO -10 kt	Managed speed target limit (ECON mode)

Depending upon the speed trend, the autopilot will disconnect at or below VMO +6 kt/MMO +0.01 and an automatic pitching up will allow VMO to be regained.
Per design, in DES mode or OP DES mode, autopilot authority is limited to 0.1 g compared to 0.15 g in EXPEDITE. This limitation was required by the launching customers for passenger's comfort.
Due to the load factor limitation, some flight paths or environment conditions depending on their magnitude, may not be counteracted by the autopilot leading to VMO/MMO overshoot.
A short exceedance of few knots above VMO has no consequences on the aircraft.

Nevertheless, an intentional exceedance is not authorized:
- By regulation
- Because above VMO/MMO the HSP (high speed protection) may be activated automatically. Any pilot input to recover the target speed may be added to the HSP order, leading to a load factor incompatible with passenger's comfort.

For this reason, it is recommended to be smooth on the stick when manually recovering from a VMO/MMO exceedance. In order to prevent this exceedance during descent, a procedure has been described in *Refer to PRO-NOR-SRP-01-60 Descent Initiation*.

FLIGHT CREW BULLETINS

OPERATION OF FLEETS WITH/WITHOUT CPIP

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Operation of Fleets with/without CPIP..... A

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OPERATION OF FLEETS WITH/WITHOUT CPIP

Applicable to: ALL

INTRODUCTION

In order to continuously improve the man/machine interface, Airbus developed continuous product improvement programmes (CPIP), the modifications of which are available for retrofit and are commonly introduced on all new A320/A321 and on A319.
This FCOM bulletin details the differences which crews should be aware of.

DEFINITION

BASIC AIRCRAFT

The A320 equipped with full standard FMGS without CPIP (continuous production improvement programme) nor ENERGY MANAGEMENT.

ADVANCED STANDARD

The A319/A320/A321 with CPIP 1 + 2 + 3, LOW ENERGY warning and ENERGY MANAGEMENT. This standard is basic on the A319/A321 and A320 in current production and can be retrofitted to all A320.

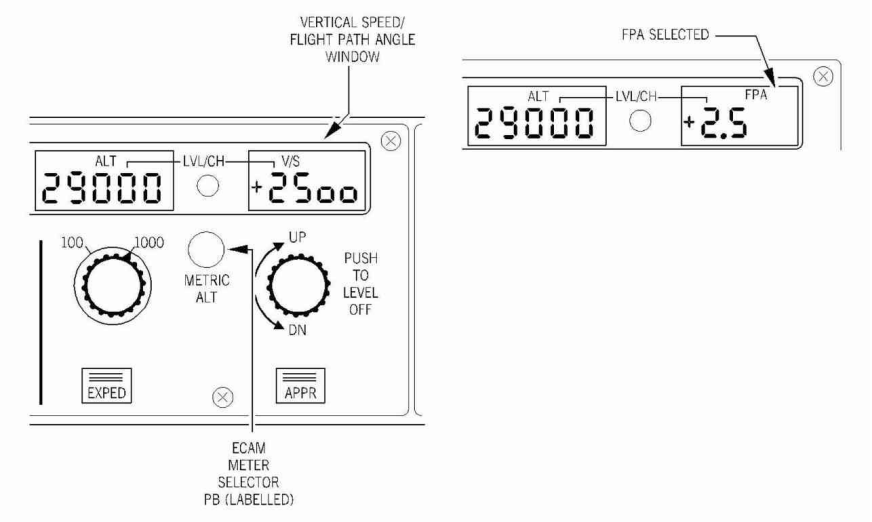
MODIFICATION DESCRIPTION

CPIP 1 (FCU MODIFICATION)

- Altitude selection change inhibited during push/pull action. This modification prevents any change of altitude during mode engagement.
- HDG and V/S preselection time increased from 10 to 45 s.
- V/S/FPA click differentiation for rapid selection:
  1 click = 1 ° FPA
  2 clicks = 100 ft/min V/S

CPIP 2 (FCU MODIFICATION)

- V/S/FPA "push to level off" function.
  When pushing the V/S/FPA selector knob, V/S/FPA target is set to zero.
- 4 digits for V/S target.
  The V/S and FPA target are displayed in the window as followed:
  V/S = 4 digits
  FPA = 2 digits
- HDG/TRK target is synchronized when switching from HDG to TRK or vice versa.
- SPD/MACH, HDG/TRK, METRIC ALT switching pushbuttons are labelled.

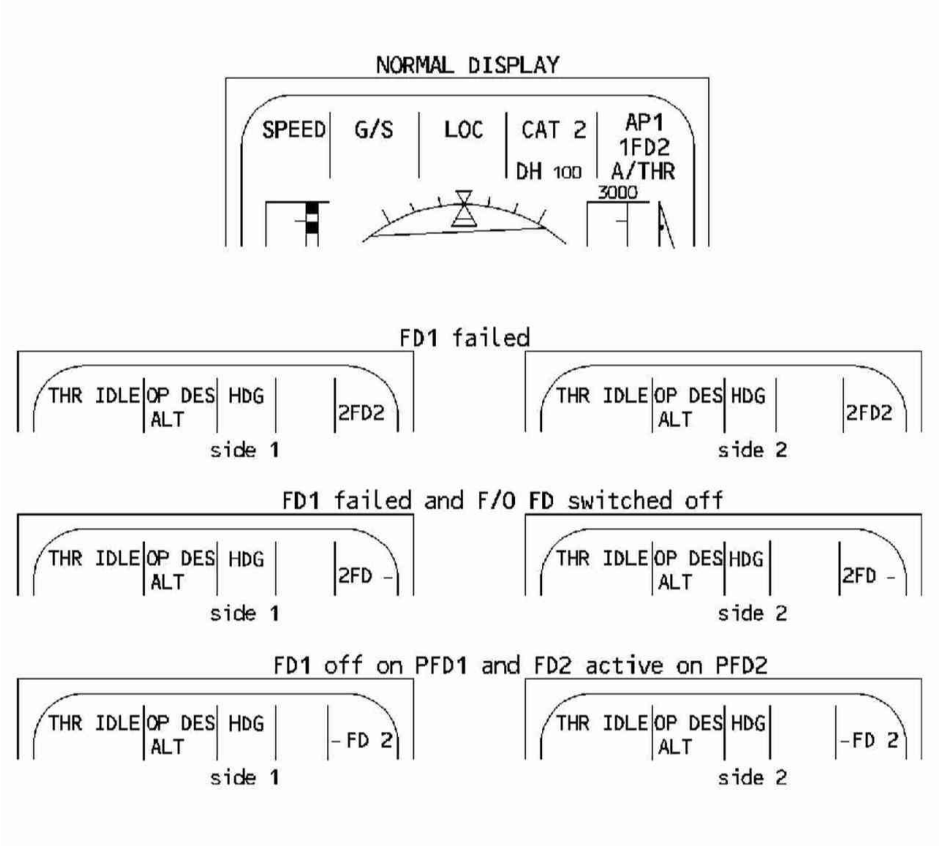


LOW ENERGY WARNING (FAC AND FWC MODIFICATION)

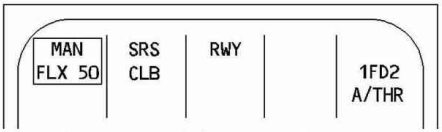
The low energy warning consists of an aural warning "speed speed speed" triggered every 5 s. This warning is available when CONF ≥2 and 100 ft <RA <2 000 ft; it indicates that the energy level is not sufficient to recover to a positive flight path angle with only pitch command. The thrust must be increased. This warning is generated before the alpha floor is triggered.

CPIP 3: FMA IMPROVEMENTS (DMC AND FWC MODIFICATION)

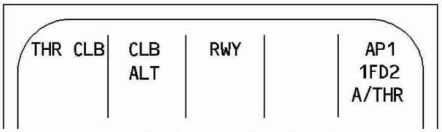
- Engagement status of both FDs are displayed on both PFDs:



- A/THR annunciations are changed as follows:
  - White colour and MAN label when the thrust levers are set manually in the corresponding detent. e.g. MAN TOGA, MAN FLEX, MAN MCT.
    MAN THR when the thrust levers are set above the applicable detent. The A/THR is armed (A/THR blue on FMA).
  - LVR white (or amber) label whenever the thrust levers are not in the correct detent: (e.g. LVR CLB, LVR MCT, LVR ASYM)
  - THR green label when the Thrust mode is active:
    THR CLB, THR MCT, THR IDLE.

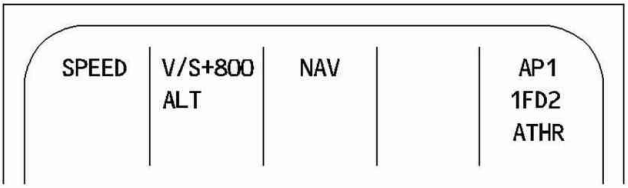


Typical FMA with RWY mode engaged



Typical FMA in climb

- All AP/FD modes are displayed as abbreviations (no dashes): (e.g. NAV, ALT CRZ, ALT CSTR).
- V/S or FPA target are displayed in the FMA: e.g. V/S: + 800
- Message and MSG colours are changed as follows:
  "MORE DRAG" white message instead of "AIRBRAKES"
  "CHECK APP SEL" white message instead of "CHECK APP GUIDANCE"
  "SET MANAGED SPD"white message instead of "SET AUTO SPEED"
  "SET GREEN DOT SPD"white message instead of "SET VFTO"



ENERGY MANAGEMENT IMPROVEMENT

(FAC, FWC, DMC, FADEC modification)

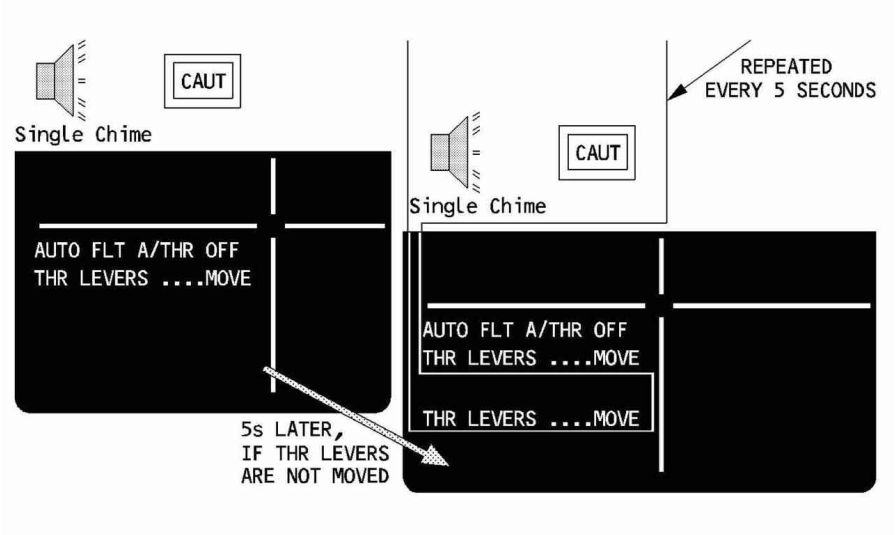
The ENERGY MANAGEMENT package is related to A/THR logic modification and additional ECAM announcements. The package eases the normal procedure of A/THR disconnection and improves the crew information on the current thrust setting.

A/THR Disconnection Using the Instinctive Disconnect Pushbutton

When the instinctive disconnect pushbutton is depressed:

- Thrust is immediately set to the thrust corresponding to the thrust lever position. (Thrust lock no longer effective)
- A gong sounds and the master CAUTION light illuminates for 3 s
- AUTO FLT A/THR OFF is displayed on the ECAM for 9 s maximum.

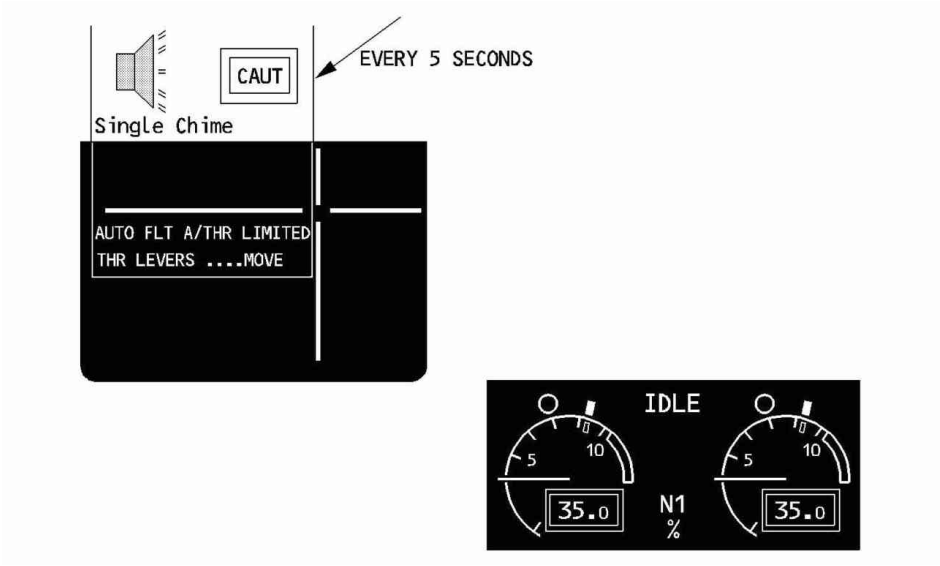
A/THR disconnection due to a failure or an action on the A/THR FCU P/B when illuminated green:



- THRUST LOCK is active until the thrust levers are moved out of corresponding detent (or alpha floor activates)
- Annunciation is enhanced as follows:
  - Repetitive gong and master CAUTION light
  - THR LK amber displayed on both PFDs
  - AUTO FLT A/THR OFF displayed on ECAM
  - Blue "THR LEVERS.....MOVE" displayed on ECAM
  - With a 5 s delay, flashing "ENG THRUST LOCKED".

Thrust levers set below CL detent:

- Repetitive gong and master CAUTION light
- "AUTO FLT A/THR LIMITED" and "THR LEVER...MOVE" displayed on ECAM
- LVR CLB displayed on FMA



IDLE announcement on ECAM

When thrust is set automatically or manually at IDLE thrust, IDLE legend flashes green for 10 s then steady on ECAM EWD (adjacent to N1/EPR scale).

OPERATIONAL CONSIDERATIONS

FCU MODIFICATION (CPIP 1 AND CPIP 2)

The introduction of FCU modifications does not significantly modify the published procedures:

- V/S push to level off function
  V/S = 0.0 selection may still apply; the "push to level off" function is a easier action. In both cases, the crew must crosscheck with FMA.
- Different digits for V/S and FPA
  The procedure which consists of crosschecking (and announcing) V/S or FPA value obtained on PFD remains mandatory.
- Synchronisation of HDG/TRK target
  This allows the switching from HDG to TRK or vice versa with bank angle.
  Airbus still recommends the switching with wings level.

LOW ENERGY WARNING

This feature provides an advanced warning to the crew before alpha floor is triggered.
Standard procedures are unchanged and flight envelope remains the same.
Alpha floor and alpha protection are identical.

CPIP 3

The announciations of the FMA are self explanatory.

The procedure remains the same:

- Any mode change is to be checked and announced.
- When a new target is selected and activated through the FCU, the resulting guidance has to be checked on the PFD.

ENERGY MANAGEMENT

The main feature of the ENERGY management is the suppression of the thrust lock when the A/THR instinctive disconnect pushbutton is used.
The A/THR disconnection technique remains unchanged (*Refer to PRO-SUP-70 Thrust Control*), and may be summarized as follows:

When A/THR is to be disconnected:

- Move the thrust levers out of the applicable detent, to the current or desired thrust level
- Depress the instinctive disconnected pb.

The new ECAM features facilitate the crew action but do not modify the procedures.

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FLIGHT CREW BULLETINS

CHARACTERISTIC AND PROTECTION SPEEDS

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Characteristic and Protection Speeds..... A

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CHARACTERISTIC AND PROTECTION SPEEDS

Applicable to: ALL

INTRODUCTION

The different speeds displayed to the crew on the main cockpit interfaces: PFD, MCDU, ND are computed by the FACs, the FMGCs and the ADIRS.

PFD	MCDU PERF PAGE
FAC COMPUTATION Computed on current aircraft status and configuration.	FMGC COMPUTATION Computed for take off, go around and landing.
VLS F S "O" Green Dot Vαprot Vαmax Vsw (stall warning speed)	VLS of the selected landing configuration. F S "O" Green Dot

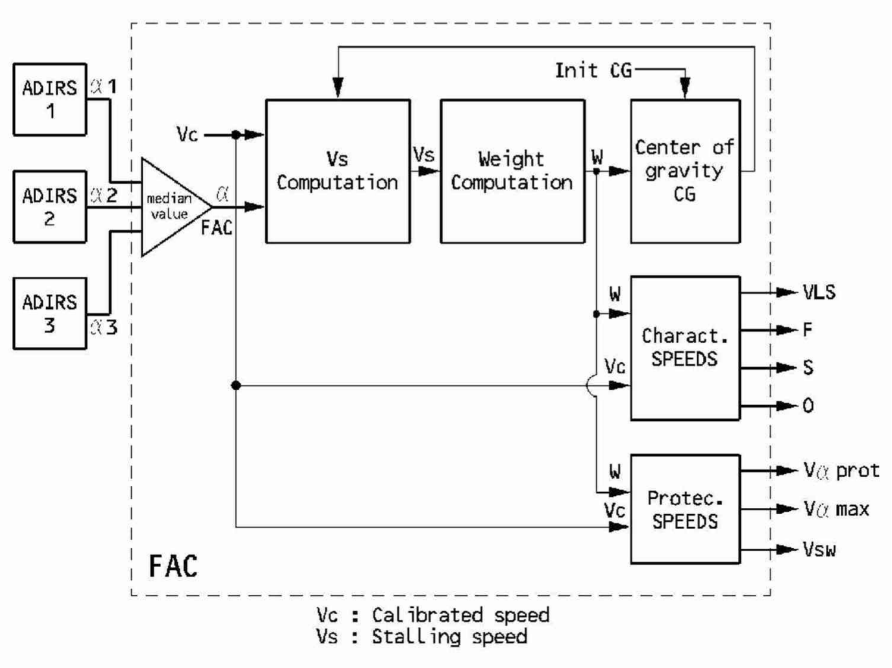
Each FAC computes its own speeds which are displayed on the relevant PFD:
FAC 1 on side 1
FAC 2 on side 2.

Each FMGC computes its own speeds displayed on the relevant MCDU:
FMGC 1 on side 1
FMGC 2 on side 2.

The algorithms used to compute the characteristic speeds are the same in both FAC and FMGC but as the inputs are different, the resulting values may differ.

CHARACTERISTICS SPEEDS COMPUTED BY THE FAC

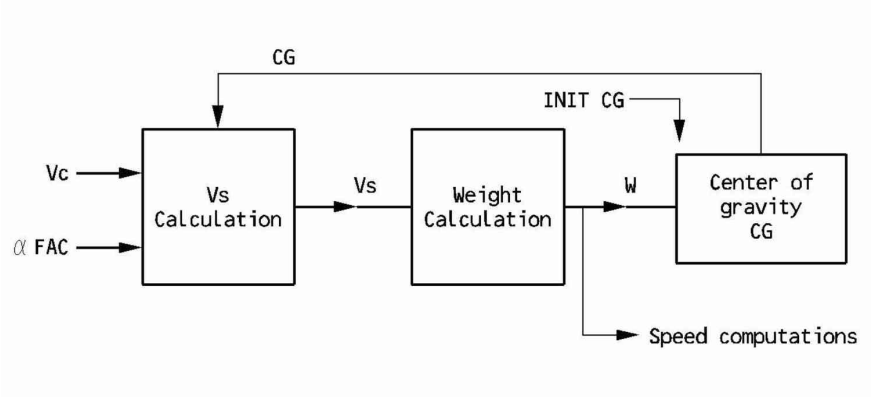
The FAC computes its characteristic speeds with 2 main inputs from ADIRS (Angle of Attack (α) and calibrated airspeed (Vc)). It also uses THS position, SFCC data and FADEC data.
From these inputs, the FAC computes a stall speed Vs which is used to determine the aircraft weight.
The following sketch gives the basic architecture for FAC speed computation.



AOA DETERMINATION

The angle of attack value used to compute the characteristic speeds is the mean value of the 3 AOAs (Vote).
Accuracy of the AOAs is a paramount factor in the weight calculation.
0.3 ° of error in the AOA results in a 3 t error in weight.

WEIGHT COMPUTATION



The weight is computed provided the following conditions are met:
- Aircraft altitude below 14 600 ft and speed (Vc) below 240 kt
- Bank angle less than 5 °
- Speedbrakes retracted
- No dynamic maneuver (vertical load factor lower than 1.07 g)
- No change of aircraft configuration and not in CONF full.

When one of these conditions is not met, the last calculated weight value is considered and updated for the fuel consumption based on actual engine N1.

CHARACTERISTIC SPEEDS COMPUTATION

A320

VLS is computed from Weight and Vc and corrected for the current CG.

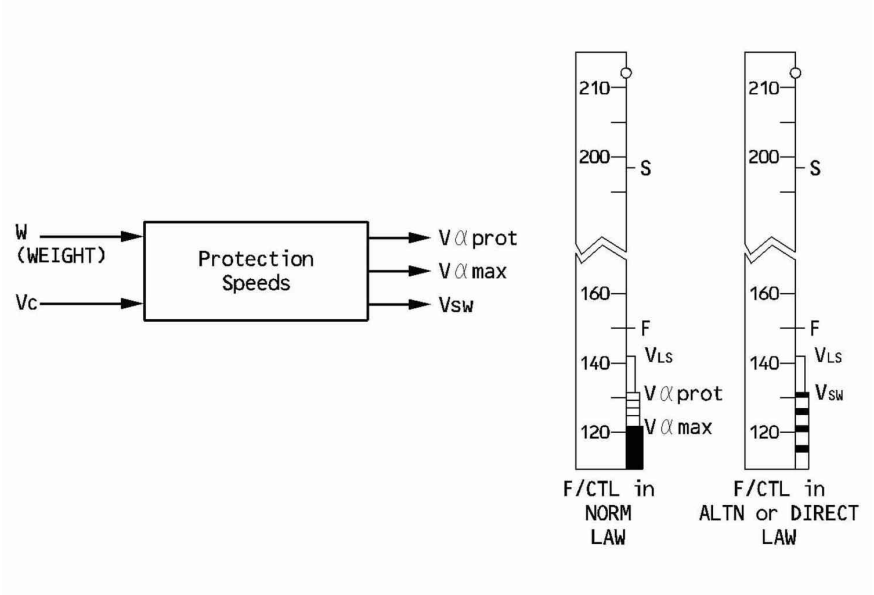
- If the current CG is forward of 15 %, 15 % CG is used to compute the speeds
- If the current CG is between 15 % and 25 %, the speeds are computed using an interpolation between 15 % and 25 % CG
- If the current CG is aft of 25 %, 25 % CG is used for speed computation.
  F, S, and Green dot are independent of CG.

A319-321

VLS, F, S and Green Dot are computed for a forward CG. No CG correction is applied for A319/A320 VLS as it has a negligible effect.

PROTECTION SPEEDS CALCULATED BY THE FAC

Vαprot and Vαmax are displayed in normal law.
The FAC does not trigger alpha prot and alpha MAX protection.
(The alpha prot and alpha max protection are activated by the ELAC).
Vsw, the stall warning speed is computed by the FAC in ALTN or DIRECT law. At Vsw speed, an audio warning (crickets - STALL synthetic voice) is triggered.



TOLERANCE OF FAC COMPUTED SPEEDS

Due to the data accuracy used to compute the characteristic speeds, and specifically the AOA accuracy, the precision of the computation is specified to be within 2.5 %.

During acceptance flight, the tolerances are as following:

Clean aircraft

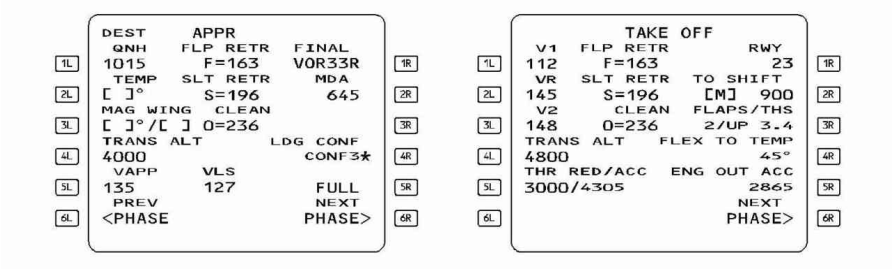
Green Dot	±5 kt
VLS	±4 kt
Vαprot	±5 kt
Vαmax	±5 kt

Conf full

VLS	±3 kt
Vαprot	±5 kt
Vαmax	±5 kt

CHARACTERISTICS SPEEDS COMPUTED BY THE FMGC

Characteristic speeds computed by the FMGC are based on a predicted GW, CG (and selected configuration for landing) at a given time at landing for example.
GW and CG values are computed from entered ZFW and ZFWCG corrected for the predicted FOB and CG variation.
When the Approach phase is activated, the characteristic speeds are recomputed using the actual weight and CG.
The performance model used to compute the characteristic speeds, is accurate enough to provide speed errors of less than ± 2 kt from the certified speeds.



THE MOST FREQUENT QUESTIONS ON SPEED COMPUTATION

- **Why are the characteristic speeds computed by the FAC subject to inaccuracy greater than FMGC computation?**
  Answer:
  The precision of the AOA measurement is usually the cause of speed differences.
  An error of 0.3 ° in AOA measurement causes a weight inaccuracy close to 3 t.
- **Is the FMGC computation more accurate than the FAC computation?**
  Answer:
  Algorithms are the same but the initial data are different.
  The FAC computes current dynamic speeds.
  The FMGS computes characteristic speeds for given phases (and configuration for landing).
  Usually, the FMGC characteristic speeds for landing are more accurate due to the tolerance of FAC inputs, if the ZFW was correct initially.

  Note: To determine the GW at landing, the FMGC uses the ZFW entered by the crew and adds the fuel on board.
  A significant difference between PFD and MCDU characteristic speeds may also indicate an error in the ZFW as entered by the crew

- **Why are there two characteristic speed calculations?**
  Answer:
  The computation done by the FAC is independent of any manually entered data and provides permanent speed values displayed on the PFD.
  During approach, the comparison of characteristic speeds allows the crew to detect any speed discrepancy which may affect approach and final phases.
- **When a difference exists between computed speeds from FAC and FMGC, what are the best speeds to be relied on ?**
  Answer:
  Whenever differences are observed, Airbus recommends to rely on QRH values.
  Refer to QRH/FPE-SPD Speeds.

FLIGHT CREW BULLETINS

GROUND SPEED MINI FUNCTION

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Ground Speed Mini Function.....A

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GROUND SPEED MINI FUNCTION

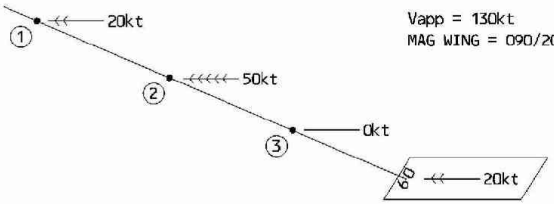
Applicable to: ALL

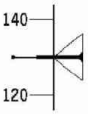
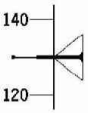
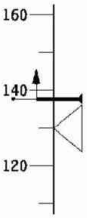
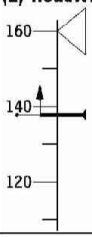
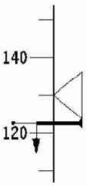
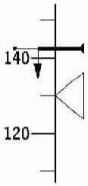
GENERAL

When an approach is flown in managed speed mode, the crew will notice that the target speed (magenta) displayed on the PFD, is variable during the approach.
This approach target speed, also called IAS target, is computed in the FMGS using the "ground speed mini function".
The purpose of the Ground speed mini function is to take advantage of the aircraft inertia, when the wind conditions vary during the approach. The aircraft flies a target speed during the approach and the energy of the aircraft is maintained above a minimum level ensuring standard aerodynamic margins over stall.
If the A/THR is active in SPEED mode, it will automatically follow the IAS target, ensuring efficient thrust management during the approach.

PRINCIPLE

The minimum energy level is based upon the ground speed the aircraft should have at touchdown, when landing at VAPP with the expected wind. It is called "GROUND SPD MINI".
During the approach, the FMGS continuously computes the IAS target to keep the ground speed at or above the "Ground Speed Mini", based upon the actual winds.
This IAS target is limited to VAPP
The IAS target is displayed on the PFD speed scale in magenta, when approach phase and managed speed are active. It is independent of the AP/FD and/or the A/THR engagements.
The following examples provide a comparison between the ground speed mini function versus the conventional selected speed hold function, in terms of speed target, and thrust management during an approach where winds are varying.



Conventional selected speed hold function	GS mini function
(1) Headwind 20 kt  N1 = 55% Speed Target 130 kt	**(1) Headwind 20 kt**  N1 = 55% IAS target 130 kt
(2) Headwind increases to 50 kt  * Current speed increases * Speed Trend is going up. * Thrust will be reduced to IDLE in order to match the speed target which remains unchanged.	**(2) Headwind increases to 50 kt**  * IAS target and current speed increases. * Speed trend is going up. * Thrust will be increased
(3) Headwind decreases to 0 kt  * Current Speed drops down * Speed Trend goes down. * Thrust is initially low and can be close to IDLE. ===> A/C energy is low. Thrust has to be significantly increased.	**(3) Headwind decreases to 0 kt**  * Current speed drops down from a higher speed. * Target speed drops down to VAPP * Speed trend goes down. * Thrust is initially high. ===> A/C energy is high. Thrust has to be smoothly reduced.

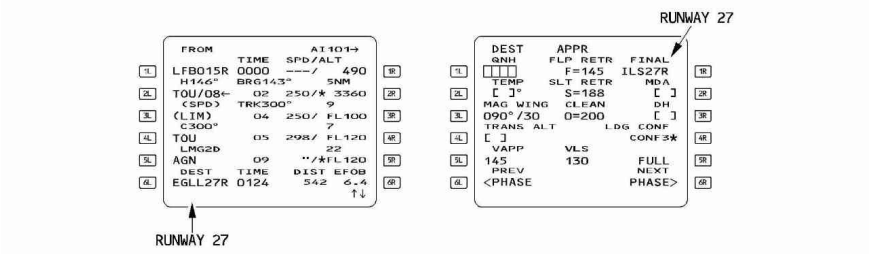
Ground speed mini function provides all the information necessary to manage the thrust smoothly and efficiently during the approach, in the event of gusts or horizontal windshears.

BASIC COMPUTATION

Wind is a key factor in the ground speed mini function.

TOWER WIND

It is the MAG WIND entered in the PERF approach page. It is the average wind as provided by the ATIS or the tower. Gusts are not inserted; they are taken into account during ground speed mini computation.



TOWER HEADWIND COMPONENT

Component of the MAG WIND relative to the FMS runway axis.
The FMS Runway axis is the landing runway axis entered in the F-PLN and indicated on the PERF APPR page.

CURRENT WIND COMPONENT

Component of the actual wind measured by ADIRS, relative to the aircraft axis.
The three following formulae explain how the approach speed target (IAS target) is computed using the ground speed mini function. Note that this computation is different for the A320 and the A319, A321 or A320 with the modification which reduces VAPP (mod 25225).

VAPP Computation

	VAPP COMPUTATION
A320	VAPP = VLS + 5 kt + 1/3 OF THE TOWER HEADWIND COMPONENT
A320 with Mod 25225 A319/A321	VAPP = VLS + MAX (5, 1/3 OF THE TOWER HEADWIND COMPONENT)

Wind correction limit: mini 0 kt, maxi 15 kt
VAPP may be changed manually by the crew if desired.
The 5 kt increment to VLS is an Airworthiness requirement when autoland is used. (CAT 2 - CAT 3)
Tower headwind component is counted positively.
In case of a tower tailwind, the wind correction is zero and VAPP = VLS + 5.

Ground Speed Mini Computation

The ground speed mini value is not displayed to the crew, but it is of interest to understand its principle.
GS mini = VAPP - TWR HEADWIND COMPONENT

- The TWR HEADWIND COMPONENT is counted positively
- The TWR HEADWIND COMPONENT is counted positively
- If the TWR HEADWIND COMPONENT is below 10 kt or if there is a TWR TAILWIND COMPONENT, GS mini = VAPP -10

Approach Speed Target Computation (IAS Target)

Approach speed target, also called IAS target is computed as the higher of:
- VAPP
- GS mini plus current wind component

IAS target = MAX (VAPP, GS mini + CURRENT WIND COMPONENT)
CURRENT HEADWIND COMPONENT is counted positively. CURRENT TAILWIND COMPONENT is counted negatively.
No max value limitation exists.

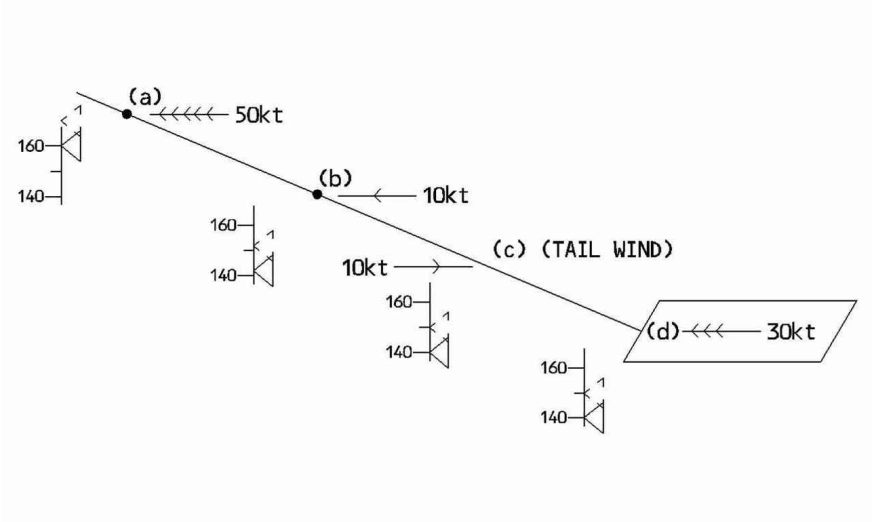
EXAMPLES

NORMAL APPROACH

- Approach on Runway 09 - FMS Runway 09
- TWR wind on PERF APPR page: 090/30
- VLS = 130 kt

COMPUTATION	A320 (basic configuration)	A320 (with Mod 25225) A319 - A321
VAPP	$VAPP = 130 + 5 + \frac{1}{3}\text{of } 30 = 145\,kt$	$VAPP = 130 + MAX(5, \frac{1}{3}\text{of } 30) = 140\ kt$
GS Mini	GS Mini = 145 - 30 = 115 kt	GS Mini = 140 - 30 = 110 kt

Current wind in Approach	IAS target (◁) A320 (basic configuration)	IAS target (◁) A320 (with Mod 25225) A319, A321
(a) 090/50	MAX (VAPP, 115 + 50) = 165 kt	MAX (VAPP, 110 + 50) = 160 kt
(b) 090/10	MAX (VAPP, 115 + 10) = 145 kt	MAX (VAPP, 110 + 10) = 140 kt
(c) 270/10	MAX (VAPP, 115 - 10) = 145 kt	MAX (VAPP, 110 - 10) = 140 kt
(d) 090/30	MAX (VAPP, 115 + 30) = 145 kt	MAX (VAPP, 110 + 30) = 140 kt



CIRCLING APPROACH

The crew will insert (primary F-PLN) the instrument approach to be flown to MDA. The secondary flight plan should contain final approach for the landing runway with the associated wind information.
During the circling maneuver, the crew must activate the secondary in order to provide valid ground speed mini information.

Example:

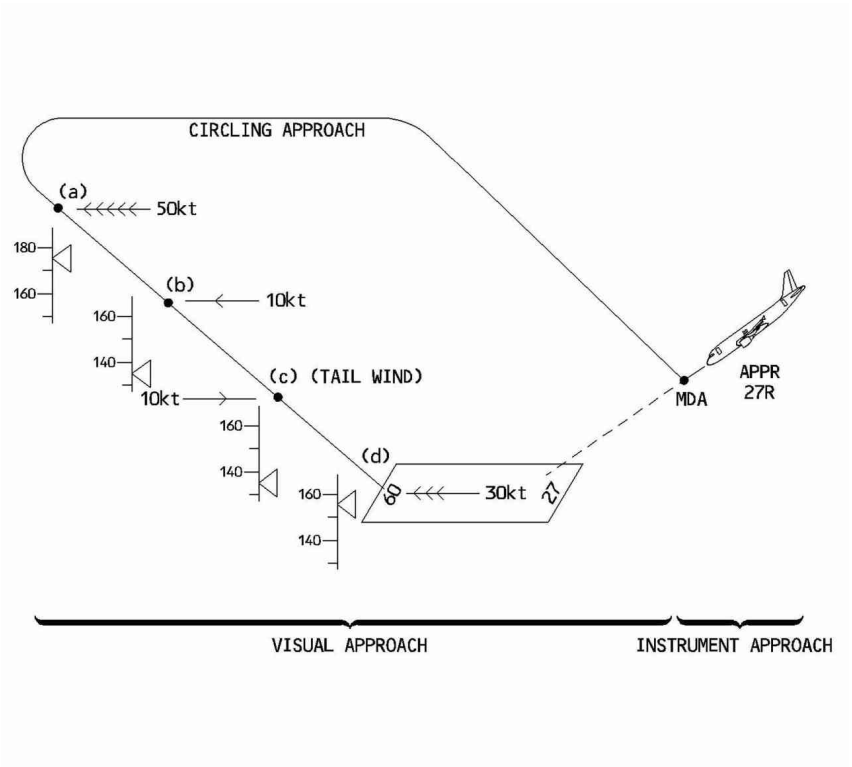
Instrument Approach on RWY 27
Circling Approach to RWY 09

Winds
a. 090/50 kt
b. 090/10 kt
c. 270/10 kt
d. 090/30 kt (TWR wind on PERF APPR)

VLS = 130 kt

The 3 formulae give the following results:

1. VAPP = 130 + 5 + Zero* = 135 kt for A320 basic configuration
   130 + MAX (5 kt, Zero*) = 135 kt for A320 with Mod 25225, A319, A321
   * wind is considered as tail wind because RWY 27 is selected in the F-PLN.
2. GS Mini = 135 - 10 = 125 kt (10 kt default wind value)
3. IAS target = MAX (135, 125 + current headwind component).



The IAS target is function of the runway which is selected in the active flight plan.
Let us consider that the aircraft is actually on Final Approach onto Runway 09, the approach target speed in final will vary as follows in case Runway 27 or Runway 09 are inserted in the FMS F-PLN:

	A320 (basic configuration)	**A320 (Mod 25225) A319, A321**
Runway 27 selected in the F-PLN	Runway 09 selected in the F-PLN	Runway 09 selected in the F-PLN
VAPP = 135 kt	VAPP = 145 kt	VAPP = 140 kt
GS MINI = 125 kt	GS MINI = 115 kt	GS MINI = 110 kt

SELECTED RUNWAY IN F-PLN	VAPP VALUE (PERF APPR PAGE)	GS MINI	ENCOUNTERED WINDS	IAS TARGET IN FINAL FOR RUNWAY 09
(1) RUNWAY 09 A320	145 kt	115 kt	(a) 090/50 (b) 090/10 (c) 270/10 (d) 090/30	165 kt 145 kt 145 kt 145 kt
(1) RUNWAY 27 A320 (Mod 25225) A319, A321	140 kt	110 kt	(a) 090/50 (b) 090/10 (c) 270/10 (d) 090/30	160 kt 140 kt 140 kt 140 kt
(2) RUNWAY 27	135 kt	125 kt	(a) 090/50 (b) 090/10 (c) 270/10 (d) 090/30	175 kt 135 kt 135 kt 155 kt

CONCLUSION

If the landing runway inserted in the FMGS F-PLN is different from the actual landing runway, MANAGED APPROACH SPD shall not be used since the resulting targets may be significantly too high. (This rule applies wherever the FMS landing runway axis is different by 30 ° the actual landing runway axis).
In this case, select the approach speed directly on the FCU.

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FLIGHT CREW BULLETINS

PUBLICATION OF SOME ATTENDANT INFORMATION BULLETINS

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PUBLICATION OF SOME ATTENDANT INFORMATION BULLETINS

Applicable to: ALL

EMERGENCY LIGHTING SYSTEM

REASON FOR ISSUE

Some cases of exit signs not illuminating during takeoff, landing and on ground have been reported.
In normal operation with the "EMER EXIT LT sw"4WL (25VU) in "ARM" position and the "NO SMOKING sw"190RH (25VU) in auto position the exit signs extinguish only when the "NO SMOKING" signs extinguish at landing gear retraction and illuminate again at landing gear extention.
Investigation revealed that the emergency power supply unit could remain frozen after power transfer.

PROCEDURE

During taxi and before landing check exit signs for proper illumination.

If one or more exit signs are not illuminated, perform a reset of the emergency power supply by:

1. From attendant panel:
   - Press the "EMERGENCY pb"120RH once on flight attendant panel
   - Wait approximately 4 s
   - Press the "EMERGENCY pb"120RH again to recover normal configuration.

   or
2. From the cockpit:
   - Select the "EMER EXIT LT sw"on panel 25VU to "ON" position
   - Select the "EMER EXIT LT sw"to "ARM" position.

If normal operation is not recovered, maintenance action is due before the next flight unless the dispatch is authorized by the MEL.

DELIBERATE INHIBITION OF AMBIENT LAVATORY SMOKE DETECTORS

(A/C with MOD 22561)

EXPLANATION

When the smoke detector grill is removed and foreing objects like tissue paper or plastic bags are packed around the detector (see graphic below), the result will have a serious impact on the detection system. The detector may not be able to "sample" the air.

PROCEDURE

The cabin crew is recommended to inspect the lavatory smoke detectors for tampering before every flight. If foreign bodies or sign of tampering are found, line maintenance should be informed.

VACUUM TOILET RINSE VALVE LEAKAGE

(A/C with MOD 26145)

EXPLANATION

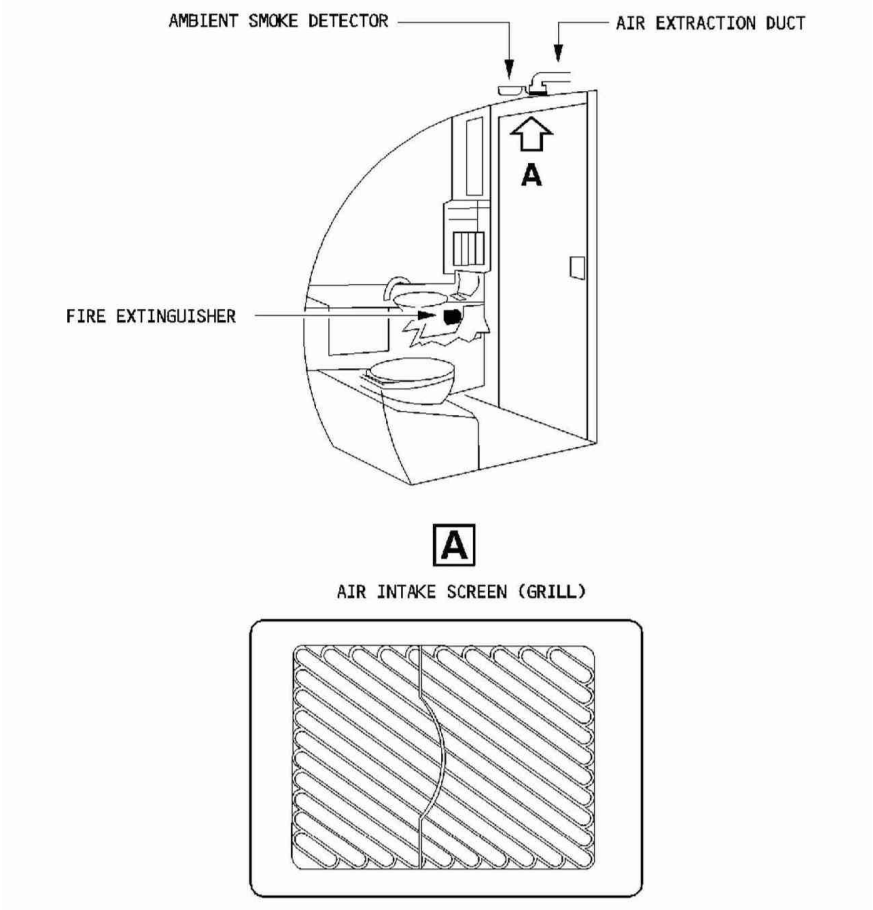
An increase in vacuum toilet rinse value leakage has been experienced. Leakage at the vacuum toilet rinse valve in the forward lavatory may lead to water flooding in the cockpit with possible water spillage in the avionic bay.

ACTION

Airbus Industrie has initiated a modification consisting of the introduction of an improved rinse valve.

PROCEDURE

Pending the introduction of the improved rinse valve, it is recommended that the cabin crew perform a toilet flush in each lavatory before the first flight of the day. This should minimize the effect of possible overnight deposit inside the valve by draining the content.
The cabin crew should advise the maintenance if abnormal water accumulation is found.



This grill is a cover for the ambient smoke detector and the air extraction duct. The view shown is how the grill would appear when looked at from below.
This grill can be removed. Foreign objects (tissues, plastic bags) have been found packed around the ambient smoke detector.

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FLIGHT CREW BULLETINS

EGPWS DATABASE

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EGPWS DATABASE

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FCB-FCB22 EGPWS Database	A	1	Update of the technical wording

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EGPWS DATABASE

Applicable to: ALL

1 PURPOSE

Airbus has received some reports of EGPWS warnings that were unduly triggered due to airport data missing from the database.
It is the Airlines responsibility to identify the airport(s) where the terrain data is missing from the database. During operation around such airports, the enhanced function must be switched off (TERR pb OFF on overhead panel) when the aircraft position is less than 15 nm from the runway.
The purpose of this bulletin is to provide the operators and the flight crews with additional information regarding the EGPWS database and the EGPWS system reaction when the airport/terrain data is not included in the database.
The FCOM-LIM-34 (*Refer to LIM-34 Enhanced Ground Proximity Warning System (EGPWS)*) provides limitations of the system.

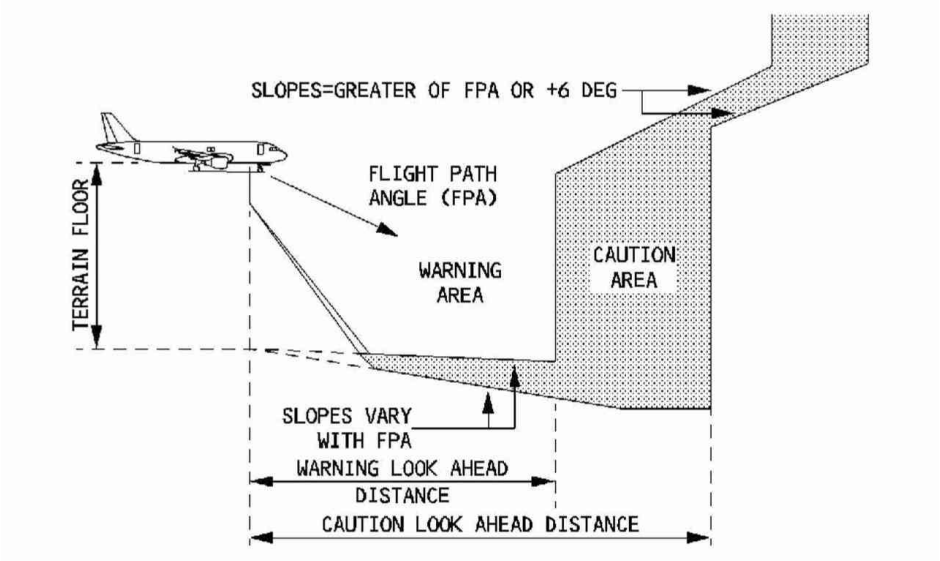
1. THE ENHANCED GPWS FUNCTIONS

The purpose of the Enhanced Ground Proximity Warning System (EGPWS) is to alert the crew of potential hazardous conditions with regards to Controlled Flight into Terrain (CFIT).

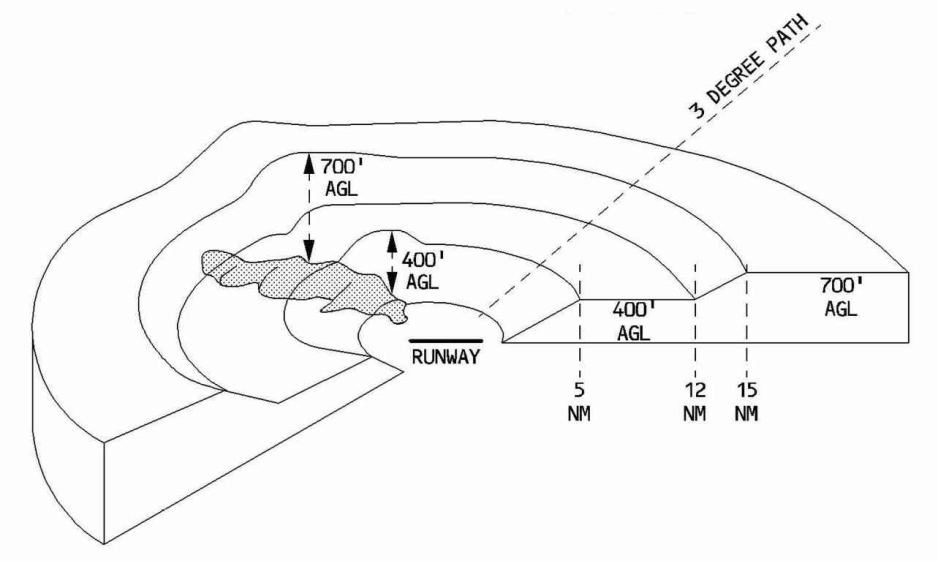
Two enhanced functions have been added to the basic modes of the GPWS. These functions are the following:

- Terrain Awareness and Display (TAD)
- Terrain Clearance Floor (TCF)

• The Terrain Awareness and Display (TAD) function compares the aircraft FMS position with the local terrain in the database. It also computes two envelope boundaries ahead of the aircraft. When terrain data conflicts with one of these envelopes, specific aural and visual alerts are triggered.
This function also provides terrain data display on the Navigation Display (ND)



• The Terrain Clearance Floor (TCF) function computes a terrain clearance envelope around the airport runway. It is based on current aircraft location, nearest runway center point position included in the database and radio height. When the aircraft enters this envelope, an alert "TOO LOW TERRAIN" is produced even if the aircraft is in landing configuration. This alert protects against an attempt to land where there is no airfield. This can be the case for example when descending by mistake on a wrong vertical path during a non-precision approach. This function operates during any flight phase.



2. THE EGPWS DATABASE

The terrain database divides the Earth surface into grid cells. These cells are recorded upon the WGS-84 geographic coordinate system for longitude and latitude data. Each cell records the highest terrain altitude in the respective terrain area.

The resolution of the grid varies upon the geographic location, ranging from:
- 0.25 nm x 0.25 nm
- 0.5 nm x 0.5 nm
- 1 nm x 1 nm
- 2 nm x 2 nm
- 5 nm x 5 nm.

The highest resolution (0.25 nm x 0.25 nm) is used around the airports. This is to avoid producing alerts during normal procedures (the terrain database has to reflect as closely as possible the actual terrain). The lowest resolution (5 nm x 5 nm) is used outside airports where such a coarse terrain database cannot interfere with normal en-route trajectories. The database also contains the position of the airport runway center point. This concerns all hard surface runways (whatever the surface type is) longer than or equal to 3 500 ft.
Additionally, the database gives the possibility of incorporating data regarding man-made obstacles in the vicinity of the major airports.

3. EGPWS REACTION WHEN AIRPORT DATA IS MISSING FROM THE DATABASE.

When an airport/terrain data is not yet covered by the database, the TCF envelope cannot be defined. The system uses the lowest map resolution (5 nm x 5 nm) as no airport is detected. Therefore, early and unexpected TAD cautions and warnings are triggered. The red EGPWS legend of the GPWS/G/S pb comes on, the aural warnings "TERRAIN AHEAD" and "TERRAIN AHEAD, PULL-UP" sound and the terrain image pops up on the Navigation Display. When within 15 nm, it is recommended to switch off the enhanced functions (EGPWS TERR pb switched to OFF on overhead panel) for operations from/to runways not incorporated in the database (*Refer to LIM-34 Enhanced Ground Proximity Warning System (EGPWS)*).

4. THE EGPWS DATABASE UPDATE

The database update is under the responsibility of the vendor.

The vendor may use one or more sources of data for a particular airport:

1. Data from in-country government and/or regulatory agencies
2. Data from airlines that have surveyed an airport while establishing layout, approach/departure procedures, etc.
3. Data from commercial vendors who also produce data sets for FMS and other navigational systems
4. Data from commercial and military surveying agencies that make such information publicly available
5. Airport layout and physical properties from high-resolution maps and/or digitized data sources
6. Airport layout and physical properties from imagery.

Some difficulties may be encountered in some areas to compile and validate airport data.
For an official indication of the latest EGPWS database, as well as a list of covered airports, please review the manufacturer document, EGPWS Terrain Database Airport Coverage list.
More information can be found on the Honeywell website:
WWW51.honeywell.com/aero/

5. CONCLUSION

The enhanced functions of the EGPWS are not reliable when operating around airports which are not included in the database. In this case, these functions must be switched off (TERR pb off on the overhead panel).
It is the airlines responsibility to identify with the database manufacturer the airports where terrain data is missing.
Airbus strongly recommends to the airline to report to the database manufacturer and to their local airworthiness authorities any EGPWS warning occurrence due to airport data missing from the database. It is also recommended that airlines request that their national authorities publish the

necessary data in order that the database manufacturer can extend the database coverage to all operated airports.

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USE OF MANAGED GUIDANCE IN APPROACH AND NAV DATABASE VALIDATION

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FCB-FCB23 Use of Managed Guidance in Approach and NAV Database Validation	A	1	DU revised to inform that Additional vertical requirements for RNAV approaches has no impact on Aircraft equipped with FMS Honeywell R1A.

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USE OF MANAGED GUIDANCE IN APPROACH AND NAV DATABASE VALIDATION

Applicable to: ALL

1. BACKGROUND

The purpose of this FCOM Bulletin is to highlight SOP recommendations on the use of managed guidance in approach.
The current body of published Instrument Approach Procedures (IAP) includes "old style" procedures, based on conventional radio NAVAIDs which cannot always be coded in the navigation database, in a suitable manner for satisfactory FMGS guidance in approach.

Note: *RNAV procedures are usually designed and coded for optimum FMGS guidance in FINAL APP mode.*

For conventional NPA using FMS managed lateral and vertical guidance, if the navigation database has been obtained from approved suppliers compliant with the requirements of ED76/DO200A, the validation of the approach coded in the database can be deferred to the flight crew, checking the FM F-PLN (on MCDU and ND) against the published approach chart.

Note: *Conventional radio NAVAIDs must be available and monitored during the approach, and must be considered as the primary means of navigation.*

For RNAV approaches using FMS managed lateral guidance only, based on the provisions of AMC 20 XZ (draft), if the navigation database has been obtained from approved suppliers compliant with the requirements of ED76/DO0200A, the validation of the approach lateral flight path coded in the navigation database can be deferred to the flight crew, checking the FM F-PLN (on MCDU and ND) against the published approach chart.

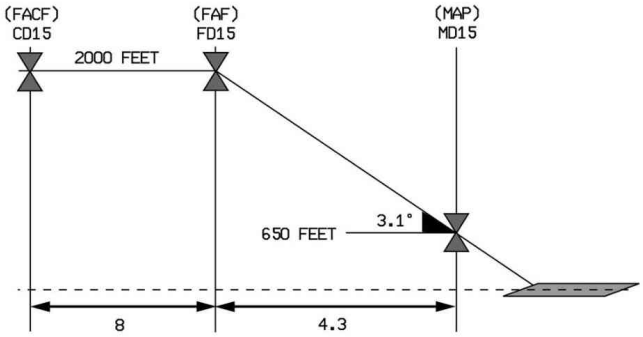
Note: *When flying an RNAV approach using NAV mode associated with selected vertical guidance (FPA, V/S), the distance to the runway or the MAP versus altitude is the primary means of vertical navitation, the vertical deviation on the PFD may be unreliable.*

For RNAV approaches using FMS managed lateral and vertical guidance, the vertical flight path coded in the navigation database must be validated by the operator.
Validation of the navigation database should ensure that the IAP is of an eligible type, and is correctly coded so that the aircraft in FINAL APP mode will fly a constant flight path angle from the FAF to the runway with the required obstacle margins.
Different methods or processes can be used to validate the IAP that is coded in the navigation database.
One method is to fly each approach in a simulator (or equivalent device), or with the aircraft when weather conditions are good. An IAP that is regularly and correctly flown in FINAL APP mode can be considered as validated.
Another method is to use a dedicated software to read the navigation database diskette. The listing or display of the coded IAP is then assessed by comparing it with the approach chart. The

airline should keep an up-to-date record of the IAPs that are approved for the use of FINAL APP mode.

2. IAP AND CODING REQUIREMENTS

A number of FMGC coding guidance requirements have been identified, and must be considered, when performing navigation database validation for the use of managed guidance in approach. As an example, the following drawings show the coding of an VOR DME IAP (with the MAP before the runway), and the associated MCDU display. Refer to drawings below.



FACF = Final Approach Course Fix
FAF = Final Approach Fix
MAP = Missed Approach Point

= Waypoints with associated altitude constraints

	UTC	SPD / ALT
-----	----	---- ----
C144°		
CD15L	----	---- * 2000
C144°	TRK144°	8
FD15L	----	---- * 2000
C144°		4 -3.1°
MD15L	----	---- 650

The final approach consists of a sequence of at least two waypoints. However, it more often consists of 3, or 4, waypoints.
In the above example, the 3 waypoints are the FACF, the FAF, and the MAP. Sometimes, the MAP is located at, or after, the runway threshold. We will see that it is important for the crew to

identify the MAP position. Sometimes, a Step Down Fix (SDF) is added on the approach final descent, between the FAF and the MAP.
The SDF is not necessarily identical to the waypoints published on the approach chart. The identification of the waypoints shown on the MCDU often differs from the identification shown on the approach chart.

THE LATERAL F-PLN CODING REQUIREMENTS

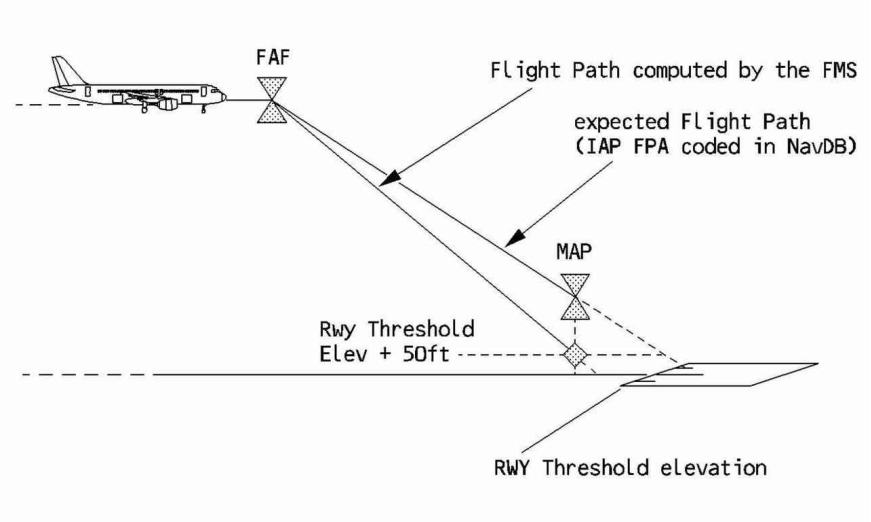
The FACF and the FAF must be aligned with the approach course.
If the FACF and the FAF are collocated, the course change at the FAF should be small. A sharp turn would prevent the aircraft from overflying the FAF, and the final descent would start before the FAF, without the aircraft being established on the final approach course.
For aircraft equipped with Honeywell FMS, approach procedures, including a PI-CF Leg (PROC T displayed between 2 approach waypoints on the MCDU F-PLN page), are not permitted with AP or FD managed guidance.
These approaches must be flown in selected guidance, using published approach chart and NAVAID raw data.

THE VERTICAL F-PLN CODING REQUIREMENTS

An altitude constraint must be coded at each approach waypoint.
Any waypoint of the approach should not be common to a STAR or a VIA waypoint with different altitude constraints. Combining altitude constraint may lead to erroneous vertical flight path guidance.
An AT or ABOVE constraint can be used for an SDF.
When the **MAP is located at, or before, the runway threshold, an FPA** (≠ 0 °) **must be coded at the MAP. or at the runway threshold (RW). This FPA will appear on the MCDU, between the MAP and the FAF, or any previous SDF in the final approach.**
When the **MAP is located after the runway threshold, an FPA =** 0 ° **must be coded at the MAP.**
For these "old style IAP", with the MAP after the runway threshold, and depending on the position of the approach axis relative to the runway, FMGC guidance may start the final approach descent slightly before the FAF. In most cases, the crossing altitude difference at the FAF is not significant (less than 50 ft). But, sometimes, this difference may be higher. Therefore, as it is not acceptable for the use of FINAL APP mode, we recommend validating the IAP with a MAP after the runway threshold, either in a simulator (or equivalent device), or with the aircraft in good weather conditions.
An FPA (≠ 0 °) must be coded for each SDF that is on the final approach descent. The MAP of an RNAV IAP must be located at the runway threshold.
Additional vertical requirements for RNAV approaches (applicable to FMS Honeywell and not applicable to FMS Honeywell R1A)
The MAP of RNAV approaches must be located at the runway threshold.

Whenever the FMGC identifies an IAP labelled RNAV, it constructs the vertical flight profile assuming that there is an altitude constraint at the MAP equals to the runway threshold plus 50 ft. If the MAP is located significantly before the runway threshold, the FMGC computes an incorrect vertical flight path, and will display a wrong vertical deviation indication (VDEV) on the PFD.
Consequently, the MAP crossing altitude on the F-PLN page will be incorrect compared to the published value.
As a result, an RNAV IAP with a MAP located before the runway threshold must not be validated to be flown with the full FMS managed mode FINAL APP.

Note: *The approaches labelled "GPS"are not affected and can be flown in FINAL APP mode.*



3. FLIGHT CREW PROCEDURES

The SOP (Refer to PRO-NOR-SOP-19) for Non Precision and RNAV approaches are applicable.
The following recommendations are provided to highlight specific vertical navigation aspects, when FINAL APP mode is used.
As applicable, the crew should first check that the Airline has approved the approach for FINAL APP mode use.

3.1 APPROACH F-PLN VERIFICATION

Before starting the approach, the crew must check the FMS F-PLN (on the MCDU, and on the ND in PLAN mode with the CSTR displayed), starting from the beginning of the STAR down to

the runway and the missed approach procedure, and verify the profile against the published IAP chart.

For the final approach procedure, the crew should check the:

- Approach course
- Waypoints and associated altitude constraints
- IAP must not include a Procedure Turn (PROC T indicated on the MCDU)
- Distance from the FAF to RW, or FAF to MAP
- Approach angle (shown on the MCDU line above the related waypoints):
  - **If MAP. after the runway threshold: FPA =** 0 ° **at MAP**
  - **If MAP before or at runway threshold: FPA ≠** 0 ° **at MAP**
  - **For each Step Down Fix, an FPA ≠** 0 ° **must be defined**
- **IAP does not include a PI-CF leg (PROC displayed on the MCDU)**
- **MAP of an RNAV IAP must be located at the runway threshold.**

  Note: The MAP of a GPS IAP can be located before the runway threshold.

- Altitude at the MAP, or at the runway threshold:
  If the crossing altitude at MAP is not shown on the approach chart, crosscheck consistency with the distance to the runway and the approach angle.

3.2 LIMITATIONS TO APPROACH F-PLN MODIFICATIONS

When performing an IAP, using NAV and FINAL APP modes, the active F-PLN, extracted from the navigation database, can be modified, provided the following limitations are observed:

1. F-PLN modifications:
   - No lateral modification of the F-PLN from FACF (inclusive) to RW or to MAP.
     A modification is permitted before FACF, provided the resulting change in the flight path course is not so large that it prevents the aircraft from being laterally-stabilized on the final approach course before reaching the FAF.
   - No altitude constraint modification from FACF to MAP. Even in case of a very low OAT, no altitude correction can be entered in this way. This may require that a minimum OAT be defined, so that the vertical flight path will clear obstacles with the required margin. This minimum OAT should be given to the crew, when appropriate. In the future, for RNAV approaches, the minimum OAT will be published on the approach chart itself.

- When the FAF is the TO waypoint, the FROM waypoint must not be cleared in an attempt to perform a DIR TO/INTERCEPT.
- To benefit from managed speed, and have a correct location of the DECEL point, it is recommended to enter VAPP as a SPD CSTR at FAF.

2. DIR TO...
   - DIR TO FACF is permitted, provided the resulting change in flight path course at FACF is not so large that it prevents the aircraft from being laterally-stabilized on the final approach course before reaching the FAF.
   - DIR TO FAF is permitted, provided the resulting change in flight path course at FAF is small.
   - For aircraft with FMS 2: DIR TO/INTERCEPT TO FAF is permitted, provided the RADIAL IN corresponding to the final approach course (approach course + 180 °) is selected, and that the interception angle is not so large that it prevents the aircraft from being laterally-stabilized on the final approach course at the FAF.
3. Lateral F-PLN interception in HDG/TRK:
   - F-PLN must be intercepted before the FACF, and the interception angle should not be so large that it prevents the aircraft from being laterally-stabilized on the final approach course before reaching the FAF, or
   - Before FAF, at the latest, provided the interception angle is small.

CAUTION	- Before arming NAV, check that the correct "TO"waypoint is displayed on the ND. - The intercept path in HDG/TRK must not cause premature sequencing of the FAF. The FAF should be sequenced in NAV mode, when established on the final approach course.

4. Vertical F-PLN interception:
   - The crew should manage the descent, so that the vertical F-PLN is intercepted before the FAF, at the latest.

3.3 APPROACH MONITORING

Except for RNAV IAP, approach NAVAIDs should be tuned and the associated raw data should be displayed and actively-monitored. This active monitoring should include vertical navigation, using altimeter readings versus DME distances or the equivalent.
For RNAV IAP, vertical navigation can be monitored by using the distance to the RW, or to the MAP displayed on the ND, and the altimeter reading.
After passing the FAF, when stabilized on the final descent, the crew should check that the X-TRK and VDEV are correct, and that the FPV is consistent with the approach angle.

When APPR is selected on the FCU, the crew must verify the:
- Correct FMA display (APP NAV green, FINAL blue)
- Correct TO waypoint on the ND

- Blue descent arrow at FAF and the correct F-PLN
- Correct Vertical Flight Path deviation indication

When passing the FAF, the crew must verify:
- Correct altitude indication
- Correct FMA display (FINAL APP green)
- Correct TO waypoint on the ND
- Correct blue track on the ND, armed for Missed Approach
- That the aircraft starts the descent and follows the correct lateral and vertical flight path.

If HIGH ACCUR is lost during the approach, but active radio NAVAID monitoring confirms correct navigation, the approach can be continued in FINAL APP mode. Otherwise, the crew should revert to TRK/FPA mode to fly the aircraft with NAVAIDs raw data.

The IAP must be discontinued, when one of the following warnings occurs:
- GPS PRIMARY LOST, if GPS accuracy is required
- NAV ACCUR DOWNGRAD, during an RNAV approach
- FM/GPS POS DISAGREE, if GPS is installed and is not deselected, and if no NAVAID raw data is available to revert to selected modes
- FM 1/FM 2 POS DIFF, unless NAVAID raw data is available to revert to selected modes.

3.4 CREW REPORTING

The crew must report any lateral or vertical NAV guidance anomaly to their Flight Operations. The report must be fully-documented to enable further investigation and corrective actions:

It should, therefore, include the following information:
- Approach designation and airport
- Aircraft type, MSN, GW, wind/temperature
- Navigation database cycle
- Pilot selections, FMA, ND, MCDU displays
- Description of anomaly, flight path
- DFDR/QAR reading.

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FLIGHT CREW BULLETINS

AIRCRAFT HANDLING IN FINAL APPROACH

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Aircraft Handling in Final Approach..... A

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AIRCRAFT HANDLING IN FINAL APPROACH

Applicable to: ALL

REASON FOR ISSUE

During the approach, with the A/THR active, Airbus recommended to set the thrust levers above the CL detent (but below the MCT detent), in exceptional circumstances, if the speed significantly dropped below VAPP. However this procedure is not trained and proved to have more drawbacks than advantages. Therefore, Airbus no longer recommends to use this procedure. The procedure is deleted from the operational documentation.
If the A/THR performance is not satisfactory, the flight crew should take over, and control the thrust manually.

GENERAL

The purpose of this FCOM Bulletin is to highlight certain aspects of aircraft handling during final approach, and to illustrate that the feedback received from in-service experience merits further attention.
Although approach in turbulence is part of this discussion, windshear in approach is not addressed here. For more details on the subjects of "Windshear in Approach" and "Operations in Windshear or Downburst Conditions", *Refer to PRO-SUP-91-20*.

APPROACH STABILIZATION CRITERIA

The prerequisite for a successful final approach and landing is to stabilize the aircraft on the final approach trajectory in pitch, thrust, airspeed, and bank angle.

This signifies that the:
- Aircraft is established on the:
  - Final approach trajectory, and only minor heading corrections are necessary (except for indirect or curve approaches) to correct the effect of external conditions, acting on the roll axis
  - Final approach vertical flight path, and only minor pitch corrections are necessary to correct the effect of external conditions;
- The target speed is maintained on the desired descent path, with the appropriate thrust (not stabilized at idle).

Airbus policy requires that stabilized conditions be reached at 1 000 ft Height Above Threshold in IMC, and 500 ft feet in VMC, and that they be kept down to the flare height.
In turbulent conditions, there may be heading, pitch, and thrust corrections of such a magnitude that it could be difficult to determine when to consider the approach stabilization criteria as being lost. Thrust corrections, in particular with the A/THR ON, could lead engines to temporarily reduce thrust to idle, which may not be desirable close to the ground, if the aircraft level of energy is low.
The PNF callout for excessive deviation is certainly an indication for the PF to decide/determine if the approach becomes destabilized. However, the answer to this question is generally a matter of

pilot judgement. The pilot must assess whether or not it is possible to return to nominal conditions early enough: That is, at the latest before flare initiation. If the pilot judges that it will not be possible to start the flare at the correct height with the correct attitude, sink rate, and thrust, or if the pilot starts to feel "out of the loop", then it is time to perform a go-around.

PNF CALLOUT

In approach, the PNF is expected to monitor the PFD and to make a callout, when some parameters are exceeded.

The Airbus FCOM Standard Operating Procedures (*Refer to PRO-SUP-91-20* and *Refer to PRO-NOR-SOP-18* and *Refer to PRO-NOR-SOP-19*) state that a callout should be made, if:
- Speed becomes lower than the speed target -5 kt, or greater than the speed target +10 kt
- Pitch attitude becomes lower than 2.5 ° nose down, or greater than 10 ° nose up
- Bank angle becomes greater than 7 °
- Descent rate becomes greater than 1 000 ft/min
- Excessive LOC or GLIDE deviation occurs (*Refer to PRO-NOR-SOP-18* only).

The suitable PF response would be to immediately take appropriate actions to control the exceeded parameter and evaluate whether stabilized conditions will be recovered early enough. Otherwise, a go-around must be initiated. The PF should acknowledge the PNF callout so that crew coordination remains effective.

AIRCRAFT HANDLING ON THE LONGITUDINAL AXIS

The pilot's objective, with respect to the longitudinal axis, is to control the airspeed and the vertical flight path. For thrust and speed control, it is recommended to use FMGS managed speed, in order to benefit from the minimum GS function.
The A/THR is, in particular, best suited to tracking a moving target speed, when flying in managed speed mode. Statistically, the A/THR provides the best protection against airspeed excursions and its use is, therefore, recommended even in turbulent conditions, unless thrust variations become excessive.
A/THR response to airspeed variations is the result of a design compromise between performance and comfort, and it is optimized when the AP is engaged. Therefore, in turbulent conditions and when flying manually, the pilot may sometimes find it to be too slow or lagging.
If conditions are such that a large speed decrease with engines at idle is anticipated, then the PF may take over thrust manually to recover the speed target and continue the approach in manual thrust.
It is not recommended to use the speedbrakes in the final approach. In final approach, the drag with the Landing Gear down is normally sufficient to cope with all kinds of situations, including a tailwind landing.
The pilot's objective, with respect to vertical navigation, is to maintain a constant flight path angle down to the runway threshold, using the vertical deviation indication of an ILS, the FMGS

VDEV indication, the indication of an external lighting system, or visual cues. However, when approaching flare height, the pilot's primary objective will progressively shift from vertical flight path control to safe pitch attitude and vertical speed, to start the flare in good conditions. The PF will primarily control the attitude and the vertical speed to perform a safe flare.

If the vertical speed is too high, prior to starting the flare, the vertical deceleration that can be achieved during flare may be insufficient to avoid a hard landing. The aircraft may touch down with an excessive residual vertical speed and pitch rate, which may lead to bouncing and exposure to tailstrike.

The pilot should also consider that the flare height might vary slightly from one aircraft type to another, depending on aircraft inertia. In the event of turbulence and wind gradient, pitch monitoring is of primary importance when close to the ground. The pilot should react promptly to any uncommanded pitch down tendency, to avoid ducking under, with a risk of premature touchdown.

If vertical speed and pitch attitude become the primary objectives, the touchdown point might occur slightly further ahead on the runway, thereby reducing the available stopping distance. In the large majority of landings, and based on the pilot's judgement, this effect should be acceptable. However, in case of doubt, it is always best to perform a go-around.

AIRCRAFT HANDLING ON THE LATERAL AXIS

Generally speaking, lateral handling of fly-by-wire aircraft is conventional. But, in very gusty conditions, it is necessary to recall the principle of the flight control law in roll. With the sidestick, the pilot can order a roll rate up to a maximum of 15 °/s. However, the aerodynamic capacity of the roll surfaces, when fully deflected, is much higher: That is, up to about 40 °/s. This means that, if the aircraft is flying through turbulence that produces a roll rate of 25 °/s to the right, the aircraft still has the capacity to roll to the left at a rate of 15 °/s, with full sidestick command. This is more than what is necessary in the worst conditions.

The sidestick's ergonomical design is such that the stop at full deflection is easily reached. This may give the pilot the impression that the aircraft is limited in roll authority, because there is a time delay before the pilot feels the result of his/her action. On conventional aircraft, due to the control wheel inertia, the pilot needs considerably more time to reach the flight control stop.

The flight control system of Airbus fly-by-wire aircraft partially counteracts roll movements induced by the effect of gust, even with the sidestick in the neutral position. The PF must ensure that the overall corrective orders maintain the desired aircraft lateral axis. He/she will minimize lateral inputs and will resist applying sidestick order from one stop to the other.

Every sidestick input is a roll rate demand, superimposed on the roll corrections already initiated by the fly-by-wire system. The pilot should only apply "longer-term" corrections as needed.

Before flare height, heading corrections should only be made with roll. As small bank angles are possible and acceptable close to the ground, only small heading changes can be envisaged. Otherwise, a go-around should be initiated.

Use of rudder, combined with roll inputs, should be avoided, since this may significantly increase the pilot's lateral handling tasks. Rudder use should be limited to the "de-crab" maneuver in case of crosswind, while maintaining the wings level, with the sidestick in the roll axis. (Refer to the FCOM's SOP, for Crosswind Landing Techniques).

SUMMARY

In summary, the following are the main points addressed by this Bulletin:

- Strictly observe the approach stabilization criteria to decide whether to land, or to perform a go-around
- Promptly react to any pitch down at low height, to avoid ducking under
- Reach the flare height with the correct pitch attitude and sink rate
- In turbulent conditions, it is recommended to use the A/THR, unless the PF is not satisfied by the A/THR response
- Refrain from excessive sidestick roll activity. Order "longer-term" roll corrections
- Restrict rudder use to "de-crabbing" in crosswind.

FLIGHT CREW BULLETINS

USE OF RUDDER ON TRANSPORT CATEGORY AIRPLANES

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SUMMARY OF HIGHLIGHTS

Use of Rudder on Transport Category Airplanes.....A

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Localization Title	Toc Index	ID	Reason
FCB-FCB25 Use of Rudder on Transport Category Airplanes	A	1	Improvement of illustration quality.

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USE OF RUDDER ON TRANSPORT CATEGORY AIRPLANES

Applicable to: ALL

REASON FOR ISSUE

On February 8th, 2002, the National Transportation Safety Board (NTSB), in cooperation with the French "Bureau Enquetes Accidents (BEA)", issued recommendations that aircraft manufacturers re-emphasize the structural certification requirements for the rudder and vertical stabilizer, showing how some maneuvers can result in exceeding design limits and even lead to structural failure.
The purpose of this FCOM Bulletin is to re-emphasize proper operational use of the rudder, highlighting certification requirements and rudder control design characteristics.

1 YAW CONTROL

GENERAL

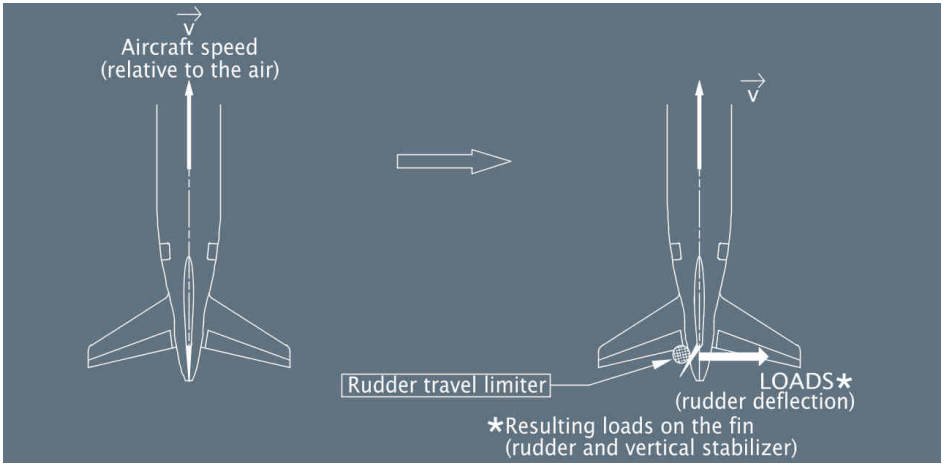
In flight, yaw control is provided by the rudder, and directional stability is provided by the vertical stabilizer.

The rudder and vertical stabilizer are sized to meet the two following objectives:
- Provide sufficient lateral control of the aircraft during crosswind takeoffs and landings, within the published crosswind limits (*Refer to LIM-12 Airport Operations*)
- Provide positive aircraft control under conditions of engine failure and maximum asymmetric thrust, at any speed above VMCG (minimum control speed on ground).

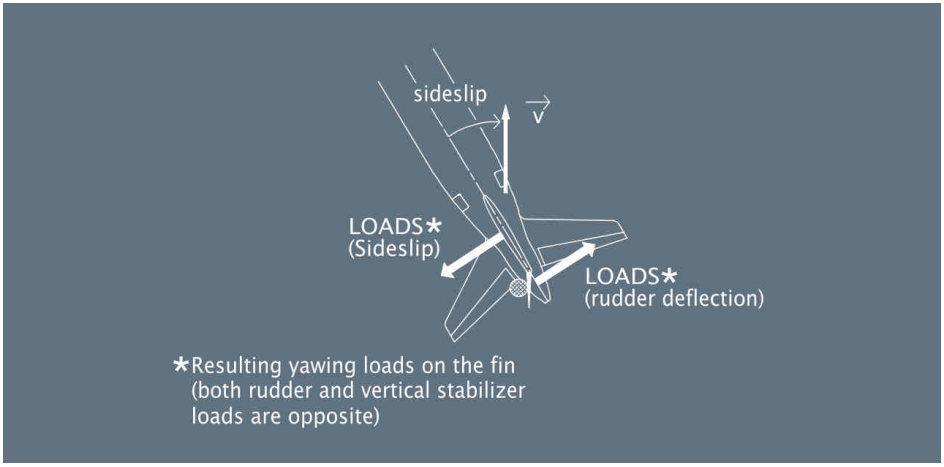
The vertical stabilizer and the rudder must be capable of generating sufficient yawing moments to maintain directional control of the aircraft.
The rudder deflection, necessary to achieve these yawing moments, and the resulting sideslip angles can place significant aerodynamic loads on the rudder and on the vertical stabilizer.
Both vertical stabilizer and rudder are designed to sustain loads as prescribed in the JAR/FAR 25 certification requirements which define several lateral loading conditions (maneuver, gust loads and asymmetrical loads due to engine failure) leading to a required level of structural strength.

CERTIFICATION REQUIREMENTS

For certification in accordance with JAR/FAR 25.351, loads on the stabilizer and the rudder are defined, considering yawing maneuvers as shown below, for a range of speeds from VMC (minimum control speed) to VD/MD (maximum design speed), from sea level up to maximum altitude, and over the full range of aircraft weights and Center of Gravity limits:
1. With the aircraft in unaccelerated and stabilized straight flight, the rudder pedal is suddenly displaced to the maximum available deflection at the current aircraft speed.



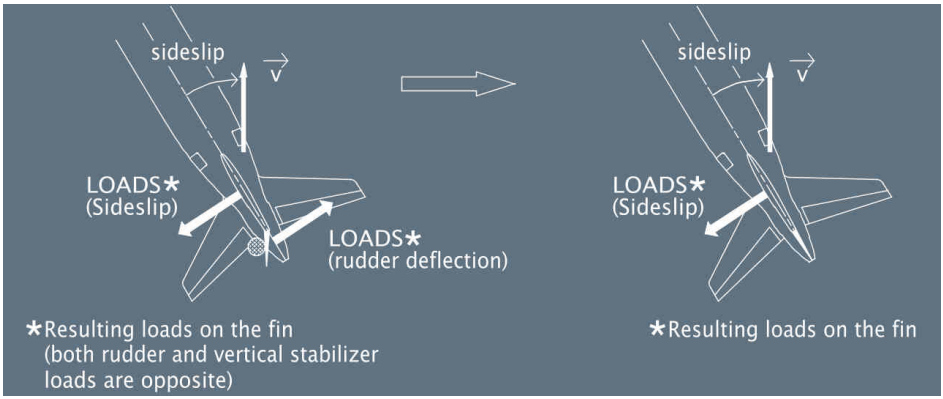
2. With the rudder deflected as shown above, the aircraft yaws to the resulting overswing sideslip angle, and then stabilizes at a somewhat smaller steady-state slideslip angle.



3. With the airplane yawed to the steady-state (static) sideslip angle corresponding to the above rudder deflection, the certification regulations assume that the rudder pedal is released to neutral.

   Note: *Because the aircraft has natural yaw stability, returning the rudder to neutral will also result in returning the sideslip angle to neutral.*

Certification yawing maneuver design



JAR/FAR 25 requires the above yawing maneuver to be analyzed over the full range of specified conditions. The most severe loads imposed on the vertical stabilizer and rudder are identified.

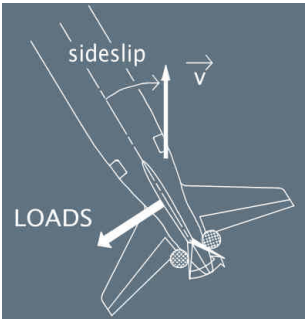
The same analysis is performed for lateral gusts, rolling maneuvers and asymmetrical engine failure conditions. The most severe of all these cases and associated loads provides the design basis for the vertical stabilizer and rudder.

The above loads define the limit loads according to JAR/FAR 25 requirements. These loads correspond to the maximum loads that may be expected in service.

According to JAR/FAR 25 requirements, the ultimate loads are defined as the limit loads multiplied by a prescribed safety factor of 1.5 unless otherwise specified.

The aircraft structure must be able to sustain limit loads without detrimental permanent deformation and ultimate loads without failure for at least 3 s.

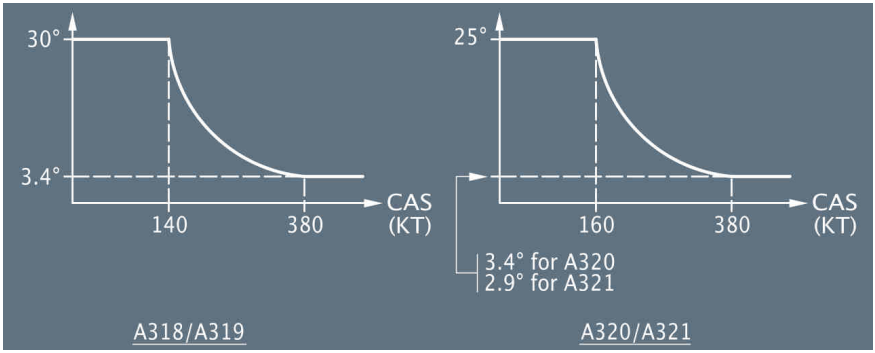
Higher loads could lead to structural failure.

CAUTION	Sudden commanded full, or nearly full, opposite rudder movement against a sideslip can generate loads that exceed the limit loads and possibly the ultimate loads and can result in structural failure. This is true even at speeds below the maximum design maneuvering speed, VA.  Certification regulations do not consider the loads imposed on the structure when there is a sudden full, or nearly full, rudder movement that is opposite to the sideslip.

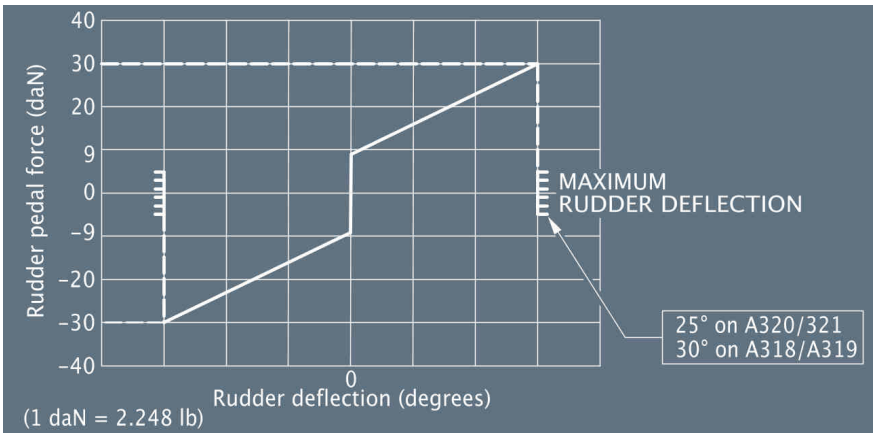
RUDDER CONTROL

The rudder surface is controlled by 3 actuators, commanded by a cable run from rudder pedals, to which the flight control input (yaw damping and turn coordination functions coming from the ELACs and the FACs) are added.
The rudder travel limiter, controlled by the FACs, is designed to progressively reduce the available total rudder travel depending on aircraft speed.
This provides sufficient yaw control within the entire flight envelope, including engine failure and maximum asymmetric thrust, limiting the lateral loads on the stabilizer and rudder so that they remain within the certification limits.

Rudder travel is limited as a function of the aircraft speed, as shown below:
- At low speeds, the rudder deflection required to maneuver the aircraft in yaw is large, and so are the resulting pedal displacement and forces
- At high speeds, the rudder authority is limited but the gearing between the pedals and the rudder does not change. Therefore, less force will be required to achieve maximum available rudder deflection.



As speed increases, the rudder deflection required by any yaw maneuver (eg, engine failure and maximum asymmetric thrust) decreases, and consequently, so do rudder pedal displacement and associated forces.
Rudder pedal displacement is almost linearly proportional to rudder deflection.



Thus, to explain the two preceding graphs:
The rudder pedal displacement and the resulting pedal forces required to achieve a given rudder deflection are independent from aircraft speed

- To start moving the rudder pedals from the neutral position, a minimum force of ± 9 daN must be applied ("breakout force")
- At low speeds, i.e. up to approximately 150 kt, maximum available rudder deflection (25 ° for the A320/A321 and 30 ° for the A318/A319) is obtained by moving the rudder pedals to their maximum travel which represents a 30 daN force applied on the pedals
- At higher speeds, for example at 350 kt, the maximum available rudder deflection is reduced to approximately 4 °. It is consequently obtained with less rudder pedal displacement which represents approximately a 13 daN force applied on the pedals (approximately 40 % of the maximum force to reach full pedal travel).

OPERATIONAL RECOMMENDATIONS

In order to avoid exceeding structural loads on the rudder and vertical stabilizer, the following recommendations must be observed.

1. The Rudder is Designed to Control the Aircraft, in the Following Circumstances

1.1 In Normal Operations, for Lateral Control:

- During the takeoff roll, when on ground, especially in crosswind conditions
- During landing flare with crosswind, for decrab purposes
- During the landing roll, when on ground.

In these circumstances, large and even rapid rudder inputs may be necessary to maintain control of the aircraft.
Rudder corrections should always be applied as necessary to obtain the appropriate aircraft response.
On Airbus aircraft, the rudder control system includes a turn coordination function to achieve acceptable turn coordination.

1.2 To Counteract Thrust Asymmetry

Full rudder authority can be used to compensate for the yawing moment of asymmetric thrust.

Note: *At high speed (i.e. slats retracted), thrust asymmetry (eg. due to an engine failure) has relatively small effect on yaw control of the aircraft.*
The amount of rudder required to counter an engine failure and center the sideslip is small.

1.3 In Some Other Abnormal Situations

The rudder may also be used in such abnormal situations as:

- Loss of both yaw damper systems. The rudder may be used as deemed necessary, for turn coordination to prevent excessive sideslip
- Rudder trim runaway. The rudder may be used to return the rudder to neutral
- Landing with abnormal landing gear position. The rudder can be used for directional control on ground.

In all of the above mentioned normal or abnormal circumstances, proper rudder maneuvers will not affect the aircraft's structural integrity.

Note: *In the event of a rudder travel limit system failure, refer to the relevant RUDDER TRAVEL LIMIT FAULT procedure.*

2. The Rudder Should Not be Used

- To induce roll, or
- To counter roll, induced by any type of turbulence.

Whatever the airborne flight condition may be, aggressive, full or nearly full, opposite rudder pedal inputs must not be applied. Such inputs can lead to loads higher than the limit, and can result in structural damage or failure.
The rudder travel limiter system is not designed to prevent structural damage or failure in the event of such rudder system inputs.

Note: *Rudder pedal reversals must never be incorporated into airline policy, including so-called" aircraft defensive maneuvers" to disable or incapacitate hijackers.*

As far as dutch roll is concerned, yaw damper action and natural aircraft damping are sufficient to adequately dampen dutch roll oscillations. The rudder should not be used to complement the yaw damper.

Note: *Even if both yaw damper systems are lost, the rudder should not be used to dampen the dutch roll. Refer to the YAW DAMPER FAULT procedure.*

3. Special Cases

Recovery techniques from upset situations
Proper use of the rudder, particularly during maneuvers intended to address upset recovery, are emphasized in the Airbus Training Program, supported by the industry-produced 1998 "UPSET RECOVERY TRAINING AID".

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FLIGHT CREW BULLETINS

YAW DISTURBANCES DURING THE TAKEOFF ROLL

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Yaw Disturbances during the Takeoff Roll.....A

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YAW DISTURBANCES DURING THE TAKEOFF ROLL

Applicable to: ALL

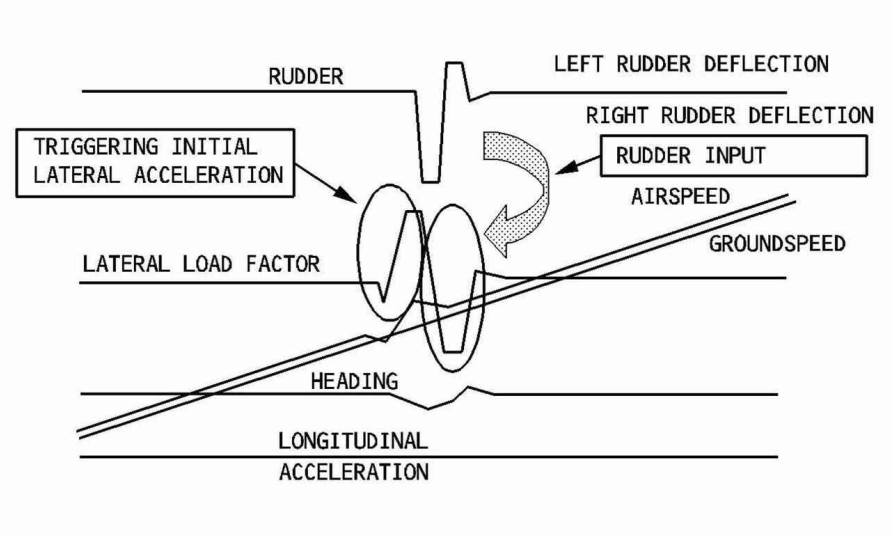
Various operators have reported occurrences of "unusual" yaw movement during the takeoff roll. The large majority of these events took place in extremely hot weather conditions.
Flight crews have used such terms as "lateral jerk", lateral g-load, or "yaw control perturbation", to describe these occurrences.
Airbus has conducted extensive investigations, in order to fully understand the origin and cause of these events, and to take into account any contributing conditions, whether it be technical or external.

DESCRIPTION OF THE OBSERVED EVENTS

The most significant of these events, included the following characteristics:

- An initial sharp lateral disturbance, associated with short, but substantial, lateral acceleration and heading variation
- In most cases, the pilot took immediate action, with a sharp pedal deflection in the opposite direction, in order to correct the heading and the lateral deviation
- This induced a lateral acceleration peak, of approximately the same magnitude, in the opposite direction.

The general characteristics of these events produce the typical DFDR traces, illustrated below:



ANALYSIS OF THE EVENTS

Simulation tools were specifically developed, in an attempt to reproduce the condition and assess the effects of such failure modes as:

- Sharp rudder deflection (mechanical)
- Sudden differential braking
- Sudden nosewheel movement
- Sudden thrust asymmetry

None of these failure modes could reproduce and explain the typical traces that were observed on the DFDR. This led to the assumption that only external causes were at the root of these events. This assumption was confirmed, after Airbus experienced a similar event on a test aircraft, equipped with a more sophisticated flight test recording equipment (greater sampling rate than the DFDR).

The data recorded onboard the aircraft during this event was used to estimate the profile of a wind variation, which could have generated the recorded lateral disturbance. This was done by two methods, which both led to the same result. It was found that wind profiles, having a magnitude of less than 15 kt, perfectly matched the simulation of the recorded flight parameters.

All of these tests confirmed that the lateral perturbations were not caused by an aircraft system malfunction, but were always due to external lateral gusts.

ORIGIN OF LATERAL GUSTS

Different situations may create isolated lateral gusts. For example, the jet blast of another aircraft close to the active runway, or the wind between two buildings accelerated by "venturi" effect, may create such lateral gust effects. However, the most probable cause is the presence of thermals or thermal vortices that often develop in hot and dry countries. Sometimes, as these thermal streams get stronger, they create small whirlwinds referred to as "dust devils".

AIRCRAFT RESPONSE AND HANDLING

All aircraft can be affected by lateral disturbances and their response, in terms of lateral g, yaw acceleration, and heading variation will depend on the aircraft's aerodynamic characteristics, plus the yaw inertia combined with the dynamics of ground reactions.

Generally speaking, it is easy to maintain the aircraft on the runway centerline via normal use of the rudder. The issue, in these events, is that the disturbance can be quite isolated, and sufficiently strong, to catch the pilot by surprise.

During a takeoff in a gusty crosswind, the pilot may have to cope with the effect of lateral wind variations. In such cases, the pilot will readily control the aircraft on the runway centerline, throughout the takeoff roll, because the aircraft behaves as the pilot expects, and the pilot is prepared to act.

In the reported events, the condition arose suddenly, during the takeoff roll, with very little, or no obvious turbulence. In such circumstances the pilot is less prepared for a such sudden lateral

disturbance; And analysis of these events has revealed that pilots had a tendency to overreact, by increasing rudder input, and consequently increasing the magnitude of the lateral disturbance.

CONCLUSION

The objective of this FCOM Bulletin is to inform flight crews that they may encounter such lateral disturbances, particularly in areas and in weather conditions where strong thermals have a tendency to develop.
Pilots should, therefore, be prepared to react to these isolated disturbances by using the rudder normally, and avoiding excessive rudder input.

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FLIGHT CREW BULLETINS

AUTOMATIC LANDING PERFORMANCE

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Automatic Landing Performance..... A

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AUTOMATIC LANDING PERFORMANCE

Applicable to: ALL

REASON FOR ISSUE

Abnormal automatic landing behaviors are periodically reported on some airports/runways with specific terrain profile before runway threshold, or specific runway profile.

AUTOMATIC LANDING FLARE MODE

All Airbus aircraft use similar FLARE modes for automatic landing. The FLARE mode is initiated at a given radio altitude (RA), which can be either advanced or delayed in function of the Rate Of Descent (ROD) - measured as a rate of change of RA with time.
Once the FLARE mode is engaged, the flare is commenced by an open-loop elevator input (pre-command), which is adapted to the aircraft GW, CG and GS. The flare is then continued with a closed-loop signal to satisfy ROD and RA targets function of the horizontal distance (or time).
The pitch demand given by the flare pre-command is modified by pitch demands in order to reduce the differences between the actual and the desired RA and ROD. The intent is to reduce both the ROD and the RA as a function of distance or time so that the aircraft touches down with a reasonable ROD in a reasonable distance (or time - typically 7 to 9 s).
This is effectively what a pilot does during manual flare. As the ground approaches, pitch-up input is introduced to reduce the ROD; the importance of the input varies according to the pilot's perception of the rate at which the ground is approaching.

AUTOMATIC LANDING CERTIFICATION REQUIREMENTS

The automatic landing certification regulations are complex and impose many requirements on the system. Among performance requirements are limits on touch down vertical speed and touch down distance from runway threshold.

These limits are expressed in term of probability to exceed ultimate values; for touch down vertical speed and distance these limits are:

- The probability to exceed a touch down vertical speed of 10 ft/s must be less than one per million (10^{-6}),
- The probability to touch down at a distance less than 60 m from the runway threshold or more than 900 m must be less than one per million (10^{-6}).

There are similar requirements for the touch down lateral distance from the runway centerline, for the bank angle at touch down and lateral deviation during rollout.
To demonstrate statistically compliance with these requirements, the aircraft manufacturers use a combination of flight tests and simulation tools and must cover the full range of GW, CG and winds in a range of pressure altitude up to the maximum certified altitude for automatic landing (Refer to the AFM).

The automatic landing system performance has been demonstrated during certification with CAT II/III ILS beams with a G/S from 2.5 ° to 3.15 °.
There is no certification requirement to prove that the automatic landing system will perform as expected at all conceivable airports.

Certification flight tests are performed on a limited number of airports equipped with a CAT II or CAT III ILS. However, the simulation tests must include specific unusual terrain profile before runway threshold and specific runway slope:
- Runway slope of ±0.8 % .
- 20 ft step before runway threshold
- Rising terrain slope of 12.5 ° followed by 60 m horizontal surface just before runway threshold.

Airbus aircraft meet all these certification requirements.
In addition, Airbus has assessed in simulation the effect of terrain/runway profiles of specific airports known to be somehow problematic ("special terrain/runway profile").
The appendix 8 of FAA AC 120-280 related to irregular terrain assessment as part of the CAT III operational evaluation gives the following background: "FAA type design approval of flight guidance systems provides for generic performance evaluation of autoland capability through simulation with reference terrain conditions, and flight testing at a few particular locations. This is to verify suitability of the design analysis. When an aircraft is type certificated for use of a flight guidance system, it is not the intent, nor is it practical that each model of aircraft be tested at each conceivable locations that it could potentially be used in operations ... While type design certification addresses generic system performance, specific operational review and approval of particular aircraft type/site autoland performance is necessary when minima are predicated on the use of autoland. This is especially important at airports with irregular pre-threshold terrain (e.g., cliffs, valleys, sea walls) in the area of final approach within approximately 1 500 ft of runway threshold."

AUTOMATIC LANDING DISTANCE

The automatic landing distance calculation uses a realistic airborne distance obtained from flight tests demonstrations - statistically determined as the mean touch down distance from runway threshold plus 3 times the standard variation of this distance -, which is then added to a ground distance calculated with maximum braking starting at the mean touchdown speed plus 3 times the standard variation of this speed. The combined airborne and ground distances are then multiplied by 1.15 to give the automatic landing distance. Refer to QRH Autoland.
The required landing distance cannot be less than the manual landing distance multiplied by 1.67 (or 1.67 x 1.15 on wet runway) or the automatic landing distance, whichever is the highest.
The airborne mean distance and its statistical variation is determined using data collected for the certification process. A special runway profile (for example hill top double slope) may lead to increase airborne distances.

EFFECT OF TERRAIN/RUNWAY PROFILE

A higher ROD in the last part of the approach (due to terrain profile before runway threshold) will cause the flare mode to engage earlier than usual.
A rising slope before the runway can cause the flare to engage higher, and the aircraft may temporarily float above the runway surface before the pitch is reduced to resume a gentle descent down to the runway leading to a long flare. If, in addition, the runway has a negative slope, the descent will be further prolonged. However, the system will always try to re-establish the aircraft on the flare profile.
In general, runways sloping up are prone to produce firm landings whereas runways sloping down will tend to produce long flares.
Double runway slope with hill top located in the touch down zone may significantly affect the statistical distribution of the touch down point, increasing sometimes the airborne distance.
A flare is a dynamic maneuver, and flares are never exactly the same. To satisfy certification requirements, the RA signal is filtered to avoid irregular variations, and the aircraft reaction in pitch is limited in order to prevent over-reactions in the event of erroneous signal variations. The consequence of these requirements is a more sluggish response to variations in RA signal, which restricts the ability to cope with large variations in terrain/runway profile.

OPERATIONAL DEMONSTRATION

For the purpose of CAT II/III operational demonstration, the airline has to perform a number of automatic landings in good weather conditions on different runways, usually at their home base and main destinations.

To determine if an airport/runway is eligible for CAT II/III operations, the Appendix 1 of JAR OPS 1.440 (h) requires that:

1. "Each aeroplane type/on-board equipment/runway combination must be verified by the completion of at least one approach and landing in Category II or better weather conditions, prior to commencing Category III operations.
2. For runways with irregular pre-threshold terrain or other foreseeable or known deficiencies, each aeroplane type/on-board equipment/runway combination must be verified by operations in Category I or better weather conditions, prior to commencing Category II or III operations".

The appendix 8 of FAA AC 120-280 says: "At typical airports runways that are not considered to be "special terrain", the review and approval process usually consists of verifying the operator's report or performance for a small number of "line landings" using the flight guidance system in weather conditions better than those requiring use of CAT II or lower minima".
Before deciding that an airport/runway is suitable for automatic landing, the operator must seek information on the local characteristics of the runway and verify that the airport is not listed as "special terrain" for CAT II/III operations (e.g., those listed for example in the CAT II/III Status on the FAA web site).

For airports/runways that exhibit special characteristics (pre-threshold terrain, runway profile or a combination of both), a specific operational evaluation is generally necessary. This initial evaluation should consist in 4 to 6 automatic landings in typical wind conditions and representative LW to be performed by a CAT III qualified and experienced pilot (Airline technical pilot, senior training pilot, ...).
DFDR data need to be analyzed to verify that the automatic landing system performed adequately. Airbus may support the operator for this data analysis. This initial evaluation should be then complemented by the monitoring of typically 25 automatic landings in line operation.
This evaluation program should be done with the agreement of the operational authorities using for example the guidelines from FAA AC 120-280 Appendix 8.

AUTOMATIC LANDING IN CAT I OR BETTER WEATHER CONDITIONS

Automatic landings need sometimes to be performed in CAT I or better weather conditions for flight crew training purpose or for operational evaluation/demonstration.

Although the automatic landing system performance has been demonstrated during certification with CAT II/III ILS beams, automatic landing is possible on a CAT I ILS, or on a CAT II/III ILS when the ILS protection is not activated (Low Visibility Procedure not enforced), provided:

- The operator has checked that the ILS beam quality and the effect of the terrain profile before the runway have no adverse effect on autopilot guidance. For that, the operator should seek information on terrain discontinuities before runway threshold and runway slope. Information from other operators with the same aircraft type and airport authorities can also be used.
- The flight crew is aware that LOC or G/S beam fluctuations independent of the aircraft system may occur, and the PF is prepared to immediately disconnect the AP and to take the appropriate action, should unsatisfactory guidance occur.

AUTOMATIC ROLLOUT ON CAT II RUNWAYS

For CAT II operations there is no requirement on LOC beam quality for the rollout segment. Automatic rollout in CAT II operations on a runway that is not CAT III qualified remains under the crew responsibility.

- As LOC beam fluctuations independent of the aircraft system may occur, the PF should be prepared to take over directional control if the AP disconnects during rollout, or to immediately disconnect the AP if unsatisfactory rollout guidance occurs.

AUTOMATIC LANDING ABOVE MLW

For some Airbus models, the FCOM OVERWEIGHT LANDING procedure may indicate that automatic landing is certified up to the MLW but that flight tests have been performed successfully up to a higher LW. The FCOM states that in case of emergency, and under crew responsibility, an automatic landing may be performed up to this higher LW, provided the runway is approved for automatic landing.

This means that Airbus has performed a number of automatic landings up to this higher LW for average conditions in term of CG, wind, and runway characteristics. The full range of conditions required by the certification requirements have not been assessed for LW higher than the MLW. However, the tests performed are sufficient to indicate that the possibility of an automatic landing is an option that the flight crew can consider in its decision making resulting from an emergency in particular operational situation.

AUTOMATIC LANDING WITH OUT-OF-DATE ADIRS MAG VAR TABLE

Some Airbus SA and LR aircraft continue to fly a number of years with ADIRS part numbers fitted with out-of-date magnetic variation tables. If the ADIRS magnetic variation differs by more than 2 ° or 3 ° (depending of aircraft type) compared to the airport current magnetic variation, the lateral performance of the automatic landing and rollout is significantly affected, which prevents from using the automatic landing system on these airports. Airbus publishes in the FCOM for each year, the list of airports where automatic landing is no more authorized with these ADIRS part numbers.

AIRPORTS/RUNWAYS WITH "SPECIAL TERRAIN/RUNWAY PROFILE"

The consequences of irregular terrain or runway profile on the automatic landing system performance can be quite variable.
For example, the automatic landing RW 03 R in Johannesburg (JNB) had to be suspended for the Airbus SA until certification of a new standard of FMCG (refer to FCOM Limitation).
Another example is RW 32 in Leeds (LBA) also with Airbus SA where the consequence of the runway profile is only a possibility of long flare. In this case an increase of the automatic landing distance of 300 m is sufficient to address the runway specificity.

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PERFORMANCE

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PER-PLP PRELIMINARY PAGES

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PER-OPD Operating Data

PER-THR Thrust Ratings

PER-TOF Takeoff

PER-FPL Flight Planning

PER-CLB Climb

PER-CRZ Cruise

PER-HLD Holding

PER-DES Descent

PER-GOA Go Around

PER-LDG Landing

PER-OEI One Engine Inoperative

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PERFORMANCE

LOADING

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PER-LOD-PLP PRELIMINARY PAGES

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PER-LOD-WBA WEIGHT AND BALANCE

PER-LOD-WBA-LTS LOAD AND TRIM SHEET

GENERAL....A

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Localization Title	Toc Index	ID	Reason
PER-LOD-GEN WEIGHT AND CENTRE OF GRAVITY SCHEDULE	B	1	Documentation update: Addition of "WEIGHT AND CENTRE OF GRAVITY SCHEDULE" documentary unit
PER-LOD-FUL REFUELING WITH ONE ENGINE RUNNING	F	1	Improvement of the technical wording.
PER-LOD-FUL REFUELING WITH ONE ENGINE RUNNING	F	2	Improvement of the technical wording.
PER-LOD-FUL USE OF MANUAL MAGNETIC INDICATORS (MMI) - TO DETERMINE FUEL QUANTITY IN THE WING TANK	H	3	Solution revised to add missing title.
PER-LOD-FUL USE OF MANUAL MAGNETIC INDICATORS (MMI) - TO DETERMINE FUEL QUANTITY IN THE WING TANK	H	4	Solution revised to add missing title.
PER-LOD-FUL USE OF MANUAL MAGNETIC INDICATORS (MMI) - TO DETERMINE FUEL QUANTITY IN THE CENTER TANK	H	5	Solution revised to add missing title.
PER-LOD-WBA-LTS GENERAL	A	1	**Update of the technical wording**

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DEFINITIONS

Applicable to: ALL

MANUFACTURER'S EMPTY WEIGHT (MEW)

The weight of the structure, power plant, furnishings, systems and other items of equipment that are considered as integral part of the aircraft. It is essentially a "dry" weight, including only those fluids contained in closed systems (e.g. hydraulic fluid).

OPERATIONAL EMPTY WEIGHT (OEW)

The manufacturer's weight empty plus the operator's items i.e. the flight and cabin crew and their baggage, unusable fuel, engine oil, emergency equipment, toilet chemicals and fluids, galley structure, catering equipment, seats, documents etc.

DRY OPERATING WEIGHT (DOW)

The total weight of an aircraft ready for a specific type of operation excluding all usable fuel and traffic load.
Operational Empty Weight plus items specific to the type of flight i.e. catering, newspapers, pantry equipment etc.

TAKEOFF FUEL

The weight of the fuel onboard at takeoff.

OPERATING WEIGHT

The weight obtained by addition of the operational empty weight and the takeoff fuel.

TOTAL TRAFFIC LOAD

The weight of the payload including cargo loads, passengers and passengers bags.

ZERO FUEL WEIGHT (ZFW)

The weight obtained by addition of the total traffic load and the dry operating weight.

TAKEOFF WEIGHT (TOW)

The weight at takeoff. It is equal to the addition of the zero fuel weight and takeoff fuel.

TRIP FUEL

The weight of the fuel necessary to cover the normal leg without reserves.

LANDING WEIGHT

The weight at landing. It is equal to takeoff weight minus trip fuel.

WEIGHT AND CENTRE OF GRAVITY SCHEDULE

Applicable to: ALL

1

The Weight and Centre of Gravity Schedule is produced by the Engineering Department for each individual aircraft and contains the aircraft weight summary for the different configurations together with the CG expressed in %MAC and as an index. It lists the empty weight and index, the basic weight and index, loading information and the standard operating items for the standard and training configurations.

GENERAL

Applicable to: ALL 320

The aircraft has two lower deck cargo compartments :
- Forward cargo compartment, compartment 1.
- Aft cargo compartment, subdivided into compartments 3, 4 and 5.

The main access doors to forward and aft compartments are hydraulically operated.
A bulk cargo door ◁ gives additional access to the aft cargo compartment. It is manually operated.

GENERAL

Applicable to: ALL 321

The aircraft has two lower deck cargo compartments :
- Forward cargo compartment, compartment 1 and 2.
- Aft cargo compartment, subdivided into compartments 3, 4 and 5.

The main access doors to forward and aft compartments are hydraulically operated.
A bulk cargo door ◁ gives additional access to the aft cargo compartment. It is manually operated.

DESCRIPTION

Applicable to: ALL 320

Each compartment is divided into sections, and is designed to be category D (for A320 and A319) or category C (A321, A319 ◁ and A320 ◁) as defined by FAR.
A placard in each compartment indicates the maximum authorized gross weight.
The compartments have separate lighting.

DESCRIPTION

Applicable to: ALL 321

Each compartment is divided into sections, and is designed to be category C as defined by FAR.
A placard in each compartment indicates the maximum authorized gross weight.
The compartments have separate lighting.

RESTRAINT SYSTEM

Applicable to: ALL

Divider nets subdivide the compartments to allow them to be partially loaded and to retain the bulk.
Door nets which protect the doors from shifting cargo, must be used whenever the compartment contain cargo.

CARGO LOADING SYSTEM (IF INSTALLED)

Applicable to: ALL

A semi-automatic cargo loading system, which may be installed in forward and aft compartments, loads pallets and containers.

CARGO CAPACITY

Applicable to: ALL 320

FULL BULK

The maximum load capacity for each cargo compartment is as follows :

- **Forward**
  Compartment 1 : 3 402 kg (7 500 lb)
- **Aft**
  Compartment 3 : 2 426 kg (5 349 lb)
  Compartment 4 : 2 110 kg (4 652 lb)
  Compartment 5 : 1 497 kg (3 300 lb)

CARGO CAPACITY

Applicable to: B-HTG, B-HTH, B-HTI

FULL BULK

The maximum load capacity for each cargo compartment is as follows :

- **Forward**
  Compartment 1 : 2 202 kg (4 854 lb)
  Compartment 2 : 3 468 kg (7 645 lb)
- **Aft**
  The following table indicates the maximum allowable cargo load (fuel excluded) for each aft cargo compartment, and the maximum allowable combined load (cargo + ACT fuel) for all aft cargo compartments. Both sets of limitations must be respected.

	Maximum Gross Weight		
	ACT not installed	**One ACT installed**	**Two ACTs installed**
Compartment 3 (cargo)	3 587 kg (7 908 lb)	2 298 kg (5 067 lb)	1 121 kg (2 472 lb)
Compartment 4 (cargo)	2 083 kg (4 592 lb)	2 083 kg (4 592 lb)	2 083 kg (4 592 lb)
Compartment 5 (cargo)	1 497 kg (3 300 lb)	1 497 kg (3 300 lb)	1 497 kg (3 300 lb)
Compartments 3+4+5 (cargo + ACT fuel)	Not applicable	7 298 kg (16 089 lb)	6 924 kg (15 264 lb)

ACT : Additional Center Tank

ACT fuel : Fuel weight in the ACTs

CARGO CAPACITY

Applicable to: B-HTD, B-HTE, B-HTF

FULL BULK

The maximum load capacity for each cargo compartment is as follows :

- **Forward**
  Compartment 1 : 2 202 kg (4 854 lb)
  Compartment 2 : 3 468 kg (7 645 lb)
- **Aft**
  The following table indicates the maximum allowable cargo load (fuel excluded) for each aft cargo compartment, and the maximum allowable combined load (cargo + ACT fuel) for all aft cargo compartments. Both sets of limitations must be respected.

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Compartments 3+4+5 (cargo + ACT fuel)	Not applicable	7 298 kg (16 089 lb)

ACT : Additional Center Tank
ACT fuel : Fuel weight in the ACTs

CARGO DOOR OPERATION

Applicable to: ALL

NORMAL OPERATION

OPENING

- **On door**
  ACCESS DOOR OPERATING HANDLE..... RELEASE
  Push handle flap inward.
  DOOR..... UNLOCK
  Move door operating handle downward (105 °) from LOCKED to UNLOCK position.
- **On door service panel**
  SERVICE PANEL ACCESS DOOR.....OPEN

LEVER OF MANUAL SELECTOR VALVE.....HOLD ON OPEN

The yellow hydraulic system is pressurized (YELLOW ELEC PUMP energized). Operation of the flight controls and PTU is inhibited.

- **When the door is fully open (green light on the service panel is on) :**
  LEVER OF MANUAL SELECTOR VALVE.....RELEASE

  When released, the lever returns to the neutral position and shuts down the electric pump.

CLOSING

- **On door service panel**
  LEVER OF MANUAL SELECTOR VALVE.....HOLD ON CLOSE

  At first the lever locks in an intermediate position, maintaining a pre-set pressurization to prevent the door from dropping open. The operator can then move the lever to CLOSE and the door closes. When it is fully closed, the lever returns to the neutral position and shuts down the electric pump.
  Ensure that green indicator light goes off.

- **On door**
  DOOR..... LOCK

  Immediately push the door operating handle upwards to the locked position. When the door is locked, the cargo doors view ports appear green, the CARGO door indication on ECAM extinguishes, and the handle flap mechanism locks the operating handle.

- **On door service panel**
  ACCESS DOOR.....CLOSE

AUXILIARY OPERATION

In case of an electrical failure or if the electric pump fails, the operator can open or close the doors by working the hand pump.

HAND PUMP OPENING

- **On door**
  DOOR..... UNLOCK

  Unlock the operating handle as if for normal operation.

- **On door service panel**
  SERVICE PANEL ACCESS DOOR.....OPEN
  LEVER OF MANUAL SELECTOR VALVE.....HOLD ON OPEN

- **On ground service panel**
  HAND PUMP.....OPERATE
  The door opens.

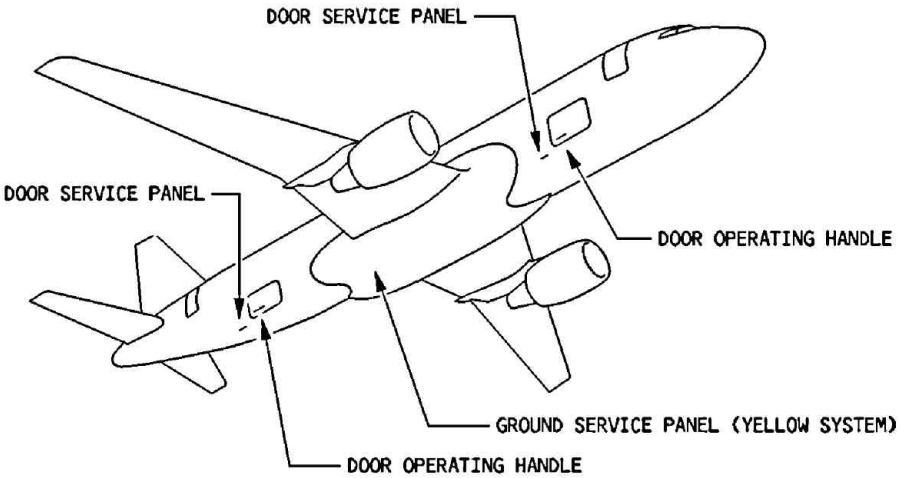
- **When the door is fully open (green light on the service panel is on) :**
  - **On door service panel**
    LEVER OF MANUAL SELECTOR VALVE..... RELEASE

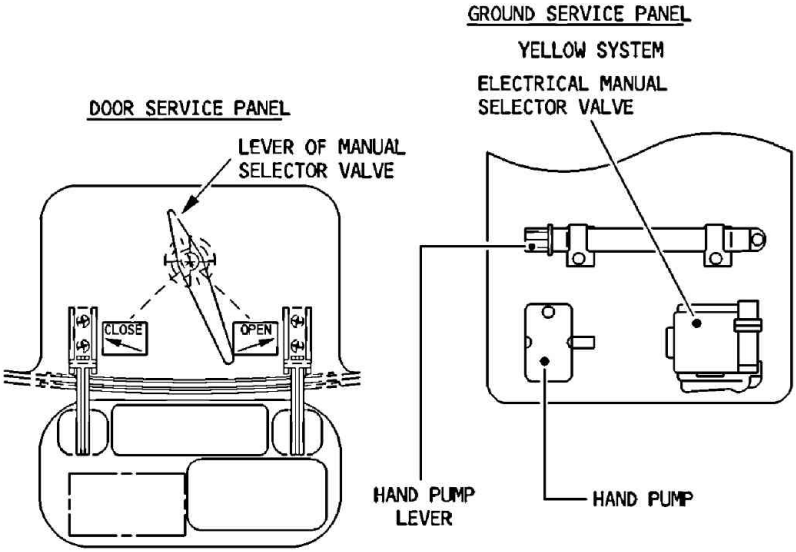
HAND PUMP CLOSING

- **On door service panel**
  LEVER OF MANUAL SELECTOR VALVE.....HOLD ON CLOSE
- **On ground service panel**
  HAND PUMP.....OPERATE
  The door closes.
- **On door service panel**
  LEVER OF MANUAL SELECTOR VALVE.....RELEASE
  Release when door is fully closed.
- **On door**
  DOOR..... LOCK
  Lock the operating handle as for normal operation.
- **On door service panel and ground service panel**
  ACCESS DOORS.....CLOSE

LOCATION OF SERVICE PANELS

Applicable to: ALL


DOOR SERVICE PANEL
DOOR SERVICE PANEL
DOOR OPERATING HANDLE
GROUND SERVICE PANEL (YELLOW SYSTEM)
DOOR OPERATING HANDLE


GROUND SERVICE PANEL
YELLOW SYSTEM
ELECTRICAL MANUAL
SELECTOR VALVE
DOOR SERVICE PANEL
LEVER OF MANUAL
SELECTOR VALVE
CLOSE
OPEN
HAND PUMP
LEVER
HAND PUMP

GENERAL INFORMATION

Applicable to: ALL 320

USABLE FUEL VOLUME

	WING TANKS		CENTER TANK	TOTAL
	OUTER CELL	INNER CELL		
LITERS	1 760	13 849	8 250	23 859
US GALLONS	464	3 659	2 180	6 303

Applicable to: B-HTD, B-HTE, B-HTF

USABLE FUEL VOLUME

	WING TANKS	CENTER TANK	ACT	TOTAL WITHOUT ACT	TOTAL WITH ACT
LITERS	15 500	8 200	2 900	23 700	26 600
US GALLONS	4 094	2 166	766	6 260	7 026

Applicable to: B-HTG, B-HTH, B-HTI

USABLE FUEL VOLUME

	WING TANKS	CENTER TANK	ACT	TOTAL WITHOUT ACT	TOTAL WITH ACT
LITERS	15 500	8 200	2 900	23 700	26 600
US GALLONS	4 094	2 166	766	6 260	7 026

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

USABLE FUEL VOLUME PER TANK

	WING TANKS		CENTER TANK	ACT 1	ACT 2	ACT 3
	OUTER CELL	INNER CELL				
LITERS	1 760	13 849	8 250	3 121	3 121	2 186
US GALLONS	464	3 659	2 180	824	824	577

	ACT 4	ACT 5	ACT 6
LITERS	2 186	3 046	3 121
US GALLONS	577	805	824

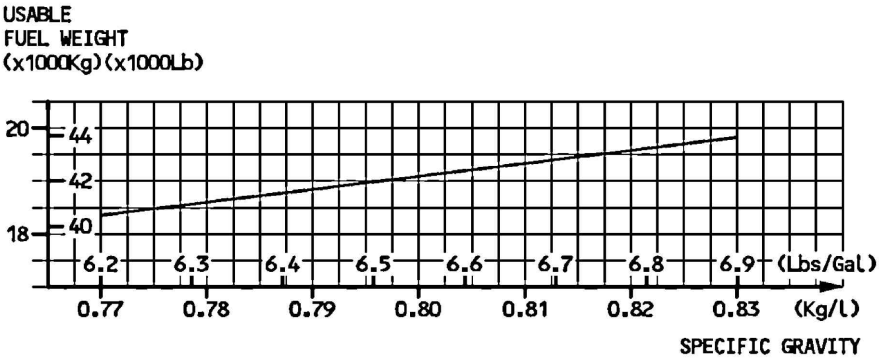
Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

TOTAL USABLE FUEL VOLUME

	TOTAL without ACTs	TOTAL with 1 ACT	TOTAL with 2 ACTs	TOTAL with 3 ACTs	TOTAL with 4 ACTs	TOTAL with 5 ACTs	TOTAL with 6 ACTs
LITERS	23 859	26 980	30 101	32 287	34 473	37 519	40 640
US GALLONS	6 303	7 126	7 951	8 528	9 105	9 910	10 734

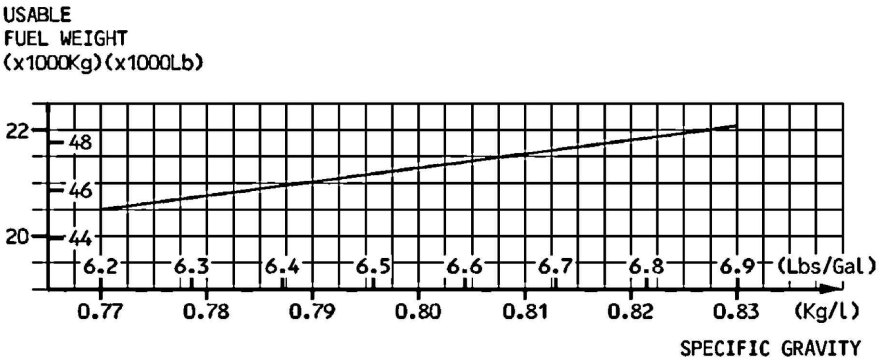
Applicable to: ALL 320

USABLE FUEL WEIGHT

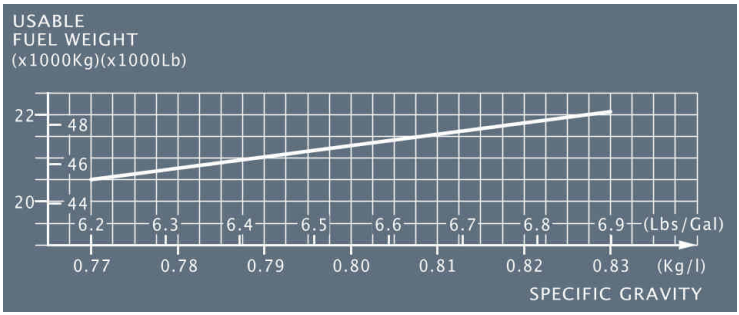


Applicable to: B-HTD, B-HTE, B-HTF

USABLE FUEL WEIGHT



Applicable to: B-HTG, B-HTH, B-HTI



Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

REFUELING

- During automatic refueling, fuel goes into the center tank and outer cell of wing tanks simultaneously. When the outer cell the wing tank is full, fuel overflows into the inner cell. During manual refueling, fill the wing tanks first, then the center tank.
- With the tanks filled to the maximum capacity, there is enough space in each tank to allow for a 2 % thermal expansion of the fuel without its spilling through the vent system.
- Electrical transients (caused by switching among the APU, the external and the engine electrical supply) during automatic refueling may stop the process. If the automatic refueling process is stopped, it is necessary to re-enter the Preselected Fuel Quantity.

Applicable to: B-HTD, B-HTE, B-HTF

REFUELING

- During automatic refueling, fuel goes into the center tank and the wing tanks simultaneously. When the center tank is full, fuel overflows into the ACT ◁ .
  During manual refueling, fill the wing tanks first, then the center tank, then the ACT ◁ .
- With the tanks filled to the maximum capacity, there is enough space in each tank to allow for a 2 % thermal expansion of the fuel without its spilling through the vent system.
- Electrical transients (caused by switching among the APU, the external and the engine electrical supply) during automatic refueling may stop the process. If the automatic refueling process is stopped, it is necessary to re-enter the Preselected Fuel Quantity.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

REFUELING

- During automatic refueling, fuel goes into the center tank and the wing tanks simultaneously. When the center tank is full, fuel overflows into the ACTs ⋖ .
  During manual refueling, fill the wing tanks first, then the center tank, then the ACTs ⋖ .
- With the tanks filled to the maximum capacity, there is enough space in each tank to allow for a 2 % thermal expansion of the fuel without its spilling through the vent system.
- Electrical transients (caused by switching among the APU, the external and the engine electrical supply) during automatic refueling may stop the process. If the automatic refueling process is stopped, it is necessary to re-enter the Preselected Fuel Quantity.

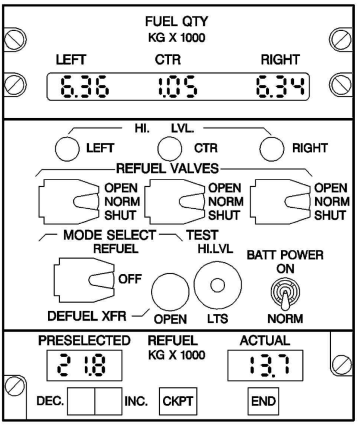
Applicable to: B-HTG, B-HTH, B-HTI

REFUELING

- During automatic refueling, fuel goes into the center tank and the wing tanks simultaneously. When the center tank is full, fuel overflows into the ACT.
  During manual refueling, fill the wing tanks first, then the center tank, then the ACT.
- With the tanks filled to the maximum capacity, there is enough space in each tank to allow for a 2 % thermal expansion of the fuel without its spilling through the vent system.
- Electrical transients (caused by switching among the APU, the external and the engine electrical supply) during automatic refueling may stop the process. If the automatic refueling process is stopped, it is necessary to re-enter the Preselected Fuel Quantity.

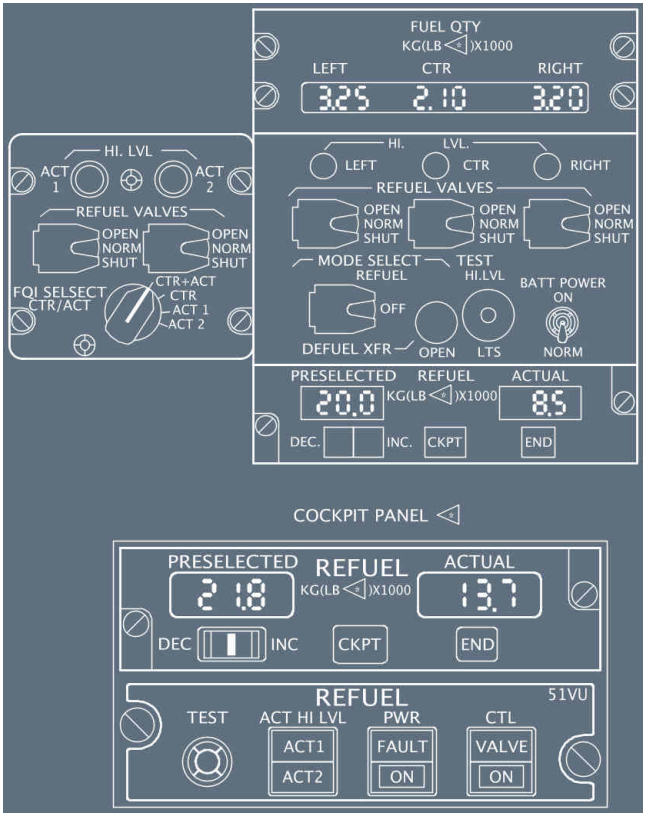
Applicable to: ALL 320

REFUELING CONTROL PANEL



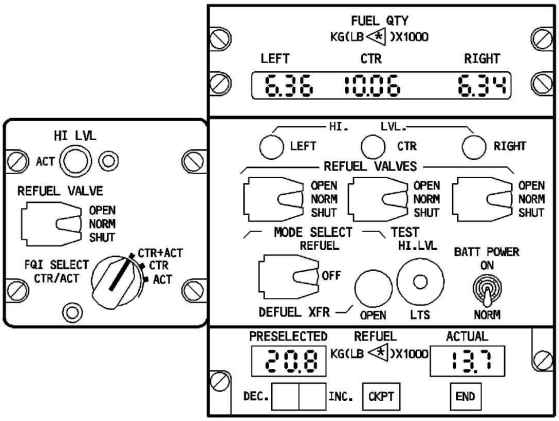
Applicable to: B-HTG, B-HTH, B-HTI

REFUELING CONTROL PANEL

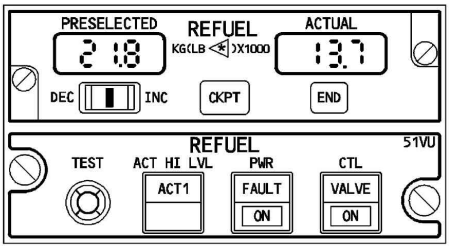


Applicable to: B-HTD, B-HTE, B-HTF

REFUELING CONTROL PANEL



COCKPIT PANEL



REFUELING

Applicable to: ALL

PREPARATION

ACCESS PLATFORM.....IN POSITION

SAFETY PRECAUTIONS.....APPLY

During refueling operations, ensure that:
- *No HF transmission is performed*
- *The aircraft is properly bonded to the tanker*
- *The tanker and the aircraft are properly grounded. If suitable ground is not available, the aircraft can be bonded to the tanker only. Always connect the ground cable to the parking ground point (or to the tanker) before connecting it to the aircraft. In the cockpit, check that the PARK BRK is ON and that the ACCU PRESS has sufficient pressure. Do not refuel, if a fire or engine overheat warning is displayed. During refueling, do not operate the external lighting.*

.

Note: For APU start/shutdown during refueling, Refer to PER-LOD-FUL APU START/SHUTDOWN DURING REFUELING/DEFUELING.

MAX REFUELING PRESSURE.....50 PSI (3.5 bar)

● **On refueling control panel:**

TEST..... LTS

Lights on the panel come on. FUEL QTY and the PRESELECTED and ACTUAL displays show 8's.

TEST.....HI.LVL

HI LVL lights change state if the high level sensors and their circuits are serviceable.

AUTOMATIC REFUELING

REFUEL VALVES.....CHECK NORM and GUARDED
PRESELECTOR.....SET
MODE SELECT..... REFUEL
START REFUELING

When the refueling is finished the END light comes on.

ACTUAL QUANTITY..... CHECK

The actual quantity must be within 100 kg (220 lb) of the preselected quantity.

MODE SELECT.....OFF and GUARDED

MANUAL REFUELING

REFUEL VALVES..... SHUT
MODE SELECT..... REFUEL
REFUEL VALVES (tanks to be filled)..... OPEN
START REFUELING

FUEL QTY.....MONITOR

- **When the contents of the tanks reach the required level :**

  Corresponding REFUEL VALVES.....SHUT
  MODE SELECT.....OFF and GUARDED
  REFUEL VALVES.....NORM and GUARDED

GROUND FUEL TRANSFER

Applicable to: ALL 320

- **<u>On cockpit overhead FUEL panel</u>**

  PUMPS (of the tanks not to be defueled).....OFF
  MODE SEL.....MAN
  PUMPS (of the tank to be defueled).....ON

- **if left wing and/or center tanks is (are) to be defueled :**

  X FEED.....ON

  OPEN light comes on.

- **<u>On refueling control panel :</u>**

  REFUEL VALVES (of tanks not to be filled).....SHUT
  REFUEL VALVES (of tanks to be filled).....OPEN
  MODE SELECT.....DEFUEL/XFR

  OPEN light comes on.

  FUEL QTY.....MONITOR

- **When the tank contents reach the required level :**

  Corresponding REFUEL VALVES.....SHUT
  MODE SELECT.....OFF and GUARDED

  OPEN light goes out.

  REFUEL VALVES.....NORM and GUARDED

  Set cockpit FUEL panel to normal configuration.

GROUND FUEL TRANSFER

Applicable to: ALL 321

- **<u>From one wing tank to the other wing tank or to the center tank :</u>**

  - **<u>On cockpit overhead FUEL panel</u>**

    PUMPS (of the wing tank not to be defueled).....OFF
    PUMPS (of the wing tank to be defueled).....ON

X FEED.....ON

OPEN light comes on.

- **On refueling control panel :**

REFUEL VALVES (of tanks not to be filled)..... SHUT
REFUEL VALVES (of tanks to be filled)..... OPEN
MODE SELECT.....DEFUEL/XFR

OPEN light comes on.

FUEL QTY..... MONITOR

- **When the tank contents reach the required level :**

Corresponding REFUEL VALVES.....SHUT
MODE SELECT..... OFF and GUARDED

OPEN light goes out.

REFUEL VALVES.....NORM and GUARDED

Set cockpit FUEL panel to normal configuration.

- **From center tank to the L (R) wing tank :**

L(R) TK PUMPS..... ON
CTR TK L(R) XFR..... ON

When the wing tank is full or if the center tank is empty the transfer valve will automatically close.

- **From ACT to center tank :**
  - **On cockpit refuelling control panel (if fitted) :**

REFUEL PWR pushbutton switch.....ON

or

REFUEL/DEFUEL Control panel access door..... OPEN

  - **On cockpit overhead FUEL panel**

ACT.....FWD
FUEL QTY..... MONITOR

  - **When the tank contents reach the required level :**

ACT..... AUTO
REFUEL PWR Pushbutton switch.....OFF

or

REFUEL/DEFUEL control panel access door.....CLOSE

DEFUELING

Applicable to: ALL 320

Note: Defueling by suction is not possible

ACCESS PLATFORM.....IN POSITION
SAFETY PRECAUTIONS.....APPLY

During defueling operations, ensure that:
- *No HF transmission is performed*
- *The aircraft is properly bonded to the tanker*
- *The tanker and the aircraft are properly grounded. If suitable ground is not available, the aircraft can be bonded to the tanker only. Always connect the ground cable to the parking ground point (or to the tanker) before connecting it to the aircraft. In the cockpit, check that the PARK BRK is ON and that the ACCU PRESS has sufficient pressure. Do not defuel, if a fire or engine overheat warning is displayed. During defueling, do not operate the external lighting.*

Note: For APU start/shutdown during defueling, Refer to PER-LOD-FUL APU START/SHUTDOWN DURING REFUELING/DEFUELING.

MAX DEFUELING PRESSURE.....11 PSI (0.75 bar)

- **On cockpit overhead FUEL panel:**
  PUMPS.....OFF
- **On refueling control panel:**
  REFUEL VALVES.....NORM
  MODE SELECT (OPEN light comes on).....DEFUEL/XFR
- **On cockpit overhead FUEL panel :**
  MODE SEL.....MAN
  PUMPS (of the tank(s) to be defueled).....ON
  X FEED (OPEN light comes on).....ON
  FUEL QTY.....MONITOR
- **When tank contents reach required level**
  Corresponding PUMPS.....OFF
- **On refueling control panel:**
  MODE SELECT (OPEN light goes out).....OFF and GUARDED
  REFUEL VALVES.....NORM and GUARDED

  Set cockpit FUEL panel to normal configuration.

DEFUELING

Applicable to: ALL 321

Note: Defueling by suction is not possible. Fuel can be removed from wing tank only. To defuel center tank, first transfer fuel to the wing tanks.

ACCESS PLATFORM.....IN POSITION
SAFETY PRECAUTIONS.....APPLY

During defueling operations, ensure that:
- *No HF transmission is performed*
- *The aircraft is properly bonded to the tanker*
- *The tanker and the aircraft are properly grounded. If suitable ground is not available, the aircraft can be bonded to the tanker only. Always connect the ground cable to the parking ground point (or to the tanker) before connecting it to the aircraft. In the cockpit, check that the PARK BRK is ON and that the ACCU PRESS has sufficient pressure. Do not defuel, if a fire or engine overheat warning is displayed. During defueling, do not operate the external lighting.*

Note: For APU start/shutdown during defueling, Refer to PER-LOD-FUL APU START/SHUTDOWN DURING REFUELING/DEFUELING.

MAX DEFUELING PRESSURE.....11 PSI (0.75 bar)

- **On cockpit overhead FUEL panel:**
  PUMPS.....OFF
- **On refueling control panel:**
  REFUEL VALVES.....NORM
  MODE SELECT (OPEN light comes on).....DEFUEL/XFR
- **On cockpit overhead FUEL panel :**
  PUMPS (of the tank(s) to be defueled).....ON
  X FEED (OPEN light comes on).....ON
  FUEL QTY.....MONITOR
- **When tank contents reach required level**
  Corresponding PUMPS.....OFF
- **On refueling control panel:**
  MODE SELECT (OPEN light goes out).....OFF and GUARDED
  REFUEL VALVES.....NORM and GUARDED

  Set cockpit FUEL panel to normal configuration.

OVERWING GRAVITY REFUELING

Applicable to: ALL 320

Overwing gravity refueling is done at the refuel point in the top of each wing. Fuel is delivered directly into the outer cell from which the inner cell is filled by opening the intercell transfer valves. Fill center tank by transfer from the right wing tank (open the X FEED valve in case of transfer from the left wing tank).

SAFETY PRECAUTIONS.....APPLY

Disembark all passengers.

During refueling operations, ensure that:
- *No HF transmission is performed*
- *The aircraft is properly bonded to the tanker*
- *The tanker and the aircraft are properly grounded. If suitable ground is not available, the aircraft can be bonded to the tanker only. Always connect the ground cable to the parking ground point (or to the tanker) before connecting it to the aircraft. Refer to Aircraft Maintenance Manual (AMM) 12–11–28 PB 301 for detailed safety procedures.*

Note: *For APU start/shutdown during refueling, Refer to PER-LOD-FUL APU START/SHUTDOWN DURING REFUELING/DEFUELING.*

TRANSFER VALVES (on ECAM FUEL page)..... CHECK POSITION

● **If transfer valves closed:**

MODE SELECT (on the refuel control panel)..... Check OFF

FUEL/XFR VALVE 1/WING/L C/B (A10 on 49VU) and FUEL/XFR VALVE 2/WING/L C/B (M22 on 121VU)..... PULL for a minimum of 5 s then PUSH

The refuel control panel door must be closed when the C/B's are being pulled.

FUEL/XFR VALVE 1/WING/R C/B (A11 on 49VU) and FUEL/XFR VALVE 2/WING/R C/B (M23 on 121VU)..... PULL for a minimum of 5 s then PUSH

Intercell transfer valves will stay open until the next refuel selection.

FUEL/XFR VALVE 1/WING/L and R C/B's (A10 and A11 on 49VU), and FUEL/XFR VALVE 2/WING/L and R C/B's (M22 and M23 on 121 VU).....PULL

The refuel control panel door must be closed when the C/B's are being pulled. Then it could be opened for subsequent procedures.

RH WING REFUELING PROCEDURE

* OVERWING REFUEL CAP.....REMOVE

* REFUELING..... START

● **If the center tank is to be refueled:**

GROUND FUEL TRANSFER PROCEDURE..... APPLY

● **When the wing tank reaches the required level:**

* REFUELING.....STOP
* OVERWING REFUEL CAP..... INSTALL

LH WING REFUELING PROCEDURE

Perform the steps for RH wing refueling procedure marked * then:

FUEL/XFR VALVE 1/WING/L and R C/B's (A10 and A11 on 49VU) and FUEL/XFR VALVE 2/WING/L and R C/B's (M22 and M23 on 121VU)..... PUSH
MODE SELECT..... REFUEL then OFF

Check on FUEL page that the intercell transfer valves close.

Note: *The overwing refuel point is not at the highest point of the wing and therefore the wing tanks cannot be filled to full.*

OVERWING GRAVITY REFUELING

Applicable to: ALL 321

Overwing gravity refueling is done at the refuel point in the top of each wing. Fill center tank by transfer from the right wing tank (open the X FEED valve in case of transfer from the left wing tank) and ACT by transfer from the center tank.

SAFETY PRECAUTIONS.....APPLY

Disembark all passengers.

During refueling operations, ensure that:
- *No HF transmission is performed*
- *The aircraft is properly bonded to the tanker*
- *The tanker and the aircraft are properly grounded. If suitable ground is not available, the aircraft can be bonded to the tanker only. Always connect the ground cable to the parking ground point (or to the tanker) before connecting it to the aircraft. Refer to Aircraft Maintenance Manual (AMM) 12–11–28 PB 301 for detailed safety procedures.*

Note: *For APU start/shutdown during refueling, Refer to PER-LOD-FUL APU START/SHUTDOWN DURING REFUELING/DEFUELING.*

RH WING REFUELING PROCEDURE

* OVERWING REFUEL CAP.....REMOVE
* REFUELING..... START

● **If the center tank and/or the ACTs are to be refueled:**

GROUND FUEL TRANSFER PROCEDURE..... APPLY

- **When the wing tank reaches the required level:**
  - * REFUELING.....STOP
  - * OVERWING REFUEL CAP..... INSTALL

LH WING REFUELING PROCEDURE

Perform the steps for RH wing refueling procedure marked * then:

MODE SELECT..... REFUEL then OFF

Note: *The overwing refuel point is not at the highest point of the wing and therefore the wing tanks cannot be filled to full.*

REFUELING WITH ONE ENGINE RUNNING

Applicable to: ALL 320

1

- Refuel with one engine running only at airports where no external ground pneumatic power is available and only when APU is unserviceable.
- Only the RH fuel couplings can be used.
- Overwing gravity filling is not permitted.
- Disembark all passengers.
- Obtain airport authorization.
  The Airport Fire Department should standby at the aircraft during the entire refueling procedure.
- Point the aircraft into the wind at a location where the slope is negligible.
  Set the parking brake and check its pressure.
  Run engine n° 1 at ground idle with its generator connected.
- Do not start engine n° 2, do not shut down engine n° 1 or do not attempt to start the APU before all fueling operations have been completed.
- Position the fuel truck under the extremity of the right wing. Its pressure should not exceed 30 PSI.
- Follow manual refueling procedure.

OPERATION MONITORING

DURING THE ENTIRE REFUELING PROCEDURE :

- Monitor the fuel truck shut off valve.
- Be sure that the fueling company is keeping permanent control of the emergency fuel shut off device.
- Have a flight crew member in the cockpit monitoring all systems and the running engine.

- Have a qualified ground crew member at the fueling station to operate the refuel valve switches.
- Monitor the refueling closely and be prepared to close the refuel valves in order not to exceed the following fuel quantities :

DENSITY (kg/l)	0.77	0.78	0.79	0.8	0.81	0.82	0.83
L(R) WING (kg)	5 710	5 780	5 860	5 930	6 005	6 080	6 160
CENTER (kg)	6 030	6 110	6 190	6 270	6 350	6 430	6 500

AFTER SECOND ENGINE START :

- **Reset the 3DMCs in order to reinitialize the fuel used values :**

  DMC 1 SPLY C/B (E11 on 49VU)..... PULL
  DMC 2 SPLY C/B (Q8 on 121 VU).....PULL
  DMC 3 SPLY C/B (Q9 on 121 VU).....PULL
  DMC 3 SPLY STBY (E10 on 49 VU).....PULL

  - **After 5 s :**

    All C/B's.....PUSH

    Note: *The T.O MEMO does not appear automatically since one engine is kept running.*

REFUELING WITH ONE ENGINE RUNNING

Applicable to: ALL 321

2

- Refuel with one engine running only at airports where no external ground pneumatic power is available and only when APU is unserviceable.
- Only the RH fuel couplings can be used.
- Overwing gravity filling is not permitted.
- Disembark all passengers.
- Obtain airport authorization.
  The Airport Fire Department should standby at the aircraft during the entire refueling procedure.
- Point the aircraft into the wind at a location where the slope is negligible.
  Set the parking brake and check its pressure.
  Run engine n° 1 at ground idle with its generator connected.
- Do not start engine n° 2, do not shut down engine n° 1 or do not attempt to start the APU before all fueling operations have been completed.
- Position the fuel truck under the extremity of the right wing. Its pressure should not exceed 30 PSI.
- Follow manual refueling procedure.

OPERATION MONITORING

DURING THE ENTIRE REFUELING PROCEDURE :

- Monitor the fuel truck shut off valve.
- Be sure that the fueling company is keeping permanent control of the emergency fuel shut off device.
- Have a flight crew member in the cockpit monitoring all systems and the running engine.
- Have a qualified ground crew member at the fueling station to operate the refuel valve switches.
- Monitor the refueling closely and be prepared to close the refuel valves in order not to exceed the following fuel quantities :

DENSITY (kg/l)	0.77	0.78	0.79	0.8	0.81	0.82	0.83
L(R) WING (kg)	5 660	5 730	5 810	5 880	5 950	6 030	6 100
CENTER (kg)	5 990	6 070	6 150	6 220	6 300	6 380	6 460

AFTER SECOND ENGINE START :

- **Reset the 3DMCs in order to reinitialize the fuel used values :**

  DMC 1 SPLY C/B (E11 on 49VU)..... PULL
  DMC 2 SPLY C/B (Q8 on 121 VU).....PULL
  DMC 3 SPLY C/B (Q9 on 121 VU).....PULL
  DMC 3 SPLY STBY (E10 on 49 VU).....PULL

  - **After 5 s :**

    All C/B's.....PUSH

    Note: *The T.O MEMO does not appear automatically since one engine is kept running.*

APU START/SHUTDOWN DURING REFUELING/DEFUELING

Applicable to: ALL

APU starts or shutdowns are permitted during refuel/defuel procedures. If it is necessary to operate the APU, the limits that follow apply :

a. An APU start is not permitted during a refuel/defuel procedure if the APU has failed to start or an automatic shutdown has occured
b. A normal APU shutdown must be completed if a fuel spill has occured during the refuel defuel procedure.

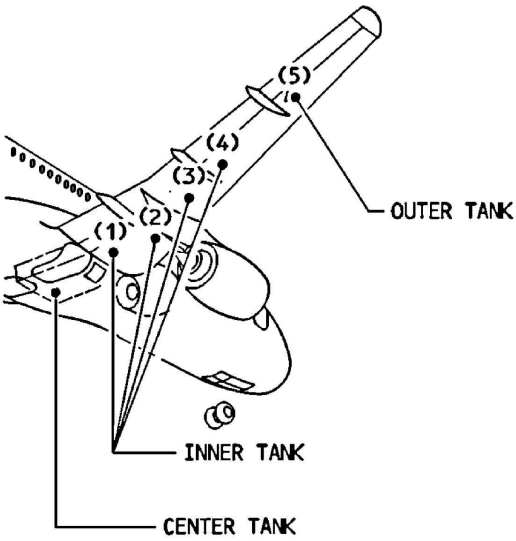
USE OF MANUAL MAGNETIC INDICATORS (MMI)

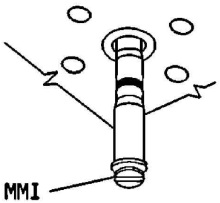
Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

GENERAL

Indicators are disposed as follows:

- five in each wing tank, four in inner tank and one in outer tank
- one in the center tank





TO DETERMINE AIRCRAFT ATTITUDE

Set ADIRS 1, 2, 3 to the NAV position.
On the LH or RH MCDU, press MCDU MENU pushbutton.
Select CFDSline key (LSK 4L).
Select SYSTEM REPORT/TEST line key (LSK 5L).
Select the line key adjacent to the FUEL indication.
On the MCDU control panel, push the NEXT PAGE key to display the FUEL Main Menu second page.
Select the line key adjacent to the INPUT PARAMETERS VALUES indication.
Use the Table given on the next page to determine the equivalent number and letter from PITCH and ROLL data.
Select RETURN line key (LSK 6L) until CFDS main menu appears.
Press MCDU MENU pushbutton.

PITCH	REF	ROLL	REF
Minus 1.5	1	**Minus 1.5**	A
Minus 1.0	2	**Minus 1.0**	B
Minus 0.5	3	**Minus 0.5**	C
0.0	4	**0.0**	D
Plus 0.5	5	**Plus 0.5**	E
Plus 1.0	6	**Plus 1.0**	F
Plus 1.5	7	**Plus 1.5**	G

Note: *1. This procedure can only be used if:*

- *The PITCH and ROLL data is taken from the ADIRS (identified by an "A" after the PITCH and ROLL title).*
- *The PITCH data displayed for the LEFT, CTR, and RIGHT is no more or less than 0.1 of each other.*
- *The ROLL data displayed for the LEFT, CTR, and RIGHT is no more or less than 0.1 of each other.*

2. The FQIS input parameters are not automatically updated. Use the NEXT PAGE control on the MCDU to cycle the pages to update the screen.

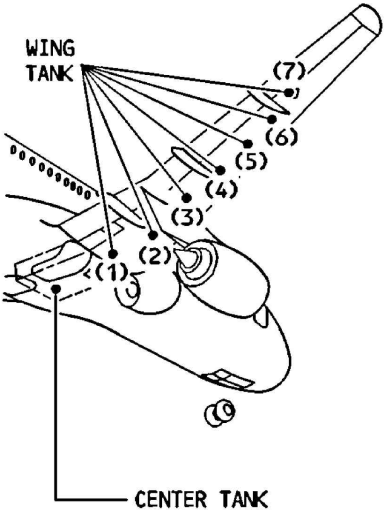
ACCESS PLATFORM.....IN POSITION

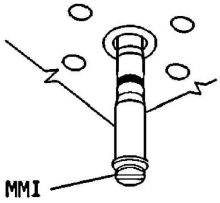
Applicable to: ALL 321

GENERAL

Indicators are disposed as follows :

- seven in each wing tank,
- one in the center tank





TO DETERMINE AIRCRAFT ATTITUDE

Set ADIRS 1, 2, 3 to the NAV position.
On the LH or RH MCDU, press MCDU MENU pushbutton.
Select CFDSline key (LSK 4L).
Select SYSTEM REPORT/TEST line key (LSK 5L).
Select the line key adjacent to the FUEL indication.
On the MCDU control panel, push the NEXT PAGE key to display the FUEL Main Menu second page.
Select the line key adjacent to the INPUT PARAMETERS VALUES indication.
Use the Table given on the next page to determine the equivalent number and letter from PITCH and ROLL data.
Select RETURN line key (LSK 6L) until CFDS main menu appears.
Press MCDU MENU pushbutton.

PITCH	REF	ROLL	REF
Minus 1.5	1	**Minus 1.5**	A
Minus 1.0	2	**Minus 1.0**	B
Minus 0.5	3	**Minus 0.5**	C
0.0	4	**0.0**	D
Plus 0.5	5	**Plus 0.5**	E

Continued on the following page

Continued from the previous page

PITCH	REF	ROLL	REF
Plus 1.0	6	**Plus 1.0**	F
Plus 1.5	7	**Plus 1.5**	G

Note: *1. This procedure can only be used if :*
- *The PITCH and ROLL data is taken from the ADIRS (Make sure that the FQIS Status page does not show "NO DATA FROM ADIRU 1" and "NO DATA FROM ADIRU 2").*
- *The PITCH data displayed for the LEFT, CTR, and RIGHT is no more or less than 0.1 of each other.*
- *The ROLL data displayed for the LEFT, CTR, and RIGHT is no more or less than 0.1 of each other.*

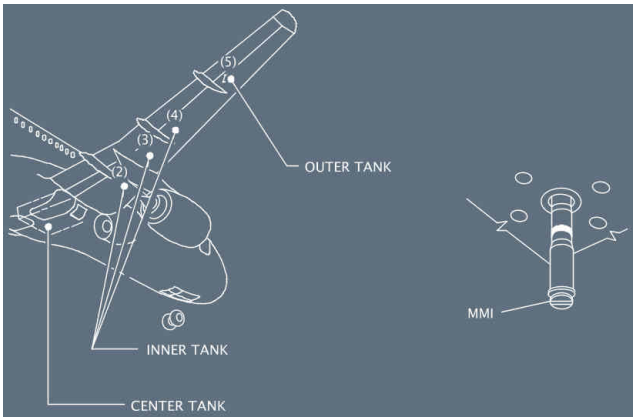
2. The FQIS input parameters are not automatically updated every 5.50 s

ACCESS PLATFORM.....IN POSITION

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

GENERAL

Indicators are installed as follows:
- Four in each wing tank: Three in the inner tank and one in the outer tank
- One in the center tank



TO DETERMINE AIRCRAFT ATTITUDE

Set ADIRS 1, 2, 3 to the NAV position.
On the LH or RH MCDU, press MCDU MENU pushbutton.
Select CFDS line key (LSK 4L).
Select SYSTEM REPORT/TEST line key (LSK 5L).
Select the line key adjacent to the FUEL indication.
On the MCDU control panel, push the NEXT PAGE key to display the FUEL Main Menu second page.
Select the line key adjacent to the INPUT PARAMETERS VALUES indication.
Use the Table given on the next page to determine the equivalent number and letter from PITCH and ROLL data.
Select RETURN line key (LSK 6L) until CFDS main menu appears.
Press MCDU MENU pushbutton.

PITCH	REF	ROLL	REF
Minus 1.5	1	**Minus 1.5**	A
Minus 1.0	2	**Minus 1.0**	B
Minus 0.5	3	**Minus 0.5**	C
0.0	4	**0.0**	D
Plus 0.5	5	**Plus 0.5**	E
Plus 1.0	6	**Plus 1.0**	F
Plus 1.5	7	**Plus 1.5**	G

Note: *1. This procedure can only be used if:*

- *The PITCH and ROLL data is taken from the ADIRS (identified by an "A" after the PITCH and ROLL title).*
- *The PITCH data displayed for the LEFT, CTR, and RIGHT is no more or less than 0.1 of each other.*
- *The ROLL data displayed for the LEFT, CTR, and RIGHT is no more or less than 0.1 of each other.*

2. The FQIS input parameters are not automatically updated. Use the NEXT PAGE control on the MCDU to cycle the pages to update the screen.

ACCESS PLATFORM.....IN POSITION

Applicable to: ALL 320

TO DETERMINE FUEL QUANTITY IN THE OUTER TANK

MMI number 5.....UNLOCK and WITHDRAW

The crewmember must withdraw the MMI slowly until he feels the magnetic attraction between the rod and float magnets.

Do not use force when withdrawing the MMI as this will disengage the float magnet from the rod magnet and bring the rod down onto the mechanical stop.

ROD GRADUATION (which aligns with bottom wing surface).....READ

MMI..... IN PLACE and LOCKED

Use the table for the applicable aircraft wing side, aircraft attitude (grid square letter and number), and the MMI stick number 5, to find the volume of fuel in the outer tank (See below).

Multiply the result by the specific gravity to find the fuel weight.

Applicable to: ALL 321

3 ## TO DETERMINE FUEL QUANTITY IN THE WING TANK

MMI (from number 7 to number 1).....UNLOCK and WITHDRAW

The crewmember must slowly withdraw the MMI, until magnetic attraction is felt between the rod and float magnets.

Do not use force when withdrawing the MMI, as this will disengage the float magnet from the rod magnet, and bring the rod down on to the mechanical stop.

ROD GRADUATION (which aligns with bottom wing surface).....READ

MMIs shall be withdrawn from number 7 to number 1 until one MMI measures fuel.

MMI..... IN PLACE and LOCKED

Enter the table for the applicable aircraft wing side, aircraft attitude (grid square letter and number), and the applicable MMI stick number, to find the volume of fuel in the wing tank (See below).

Multiply the result by the specific gravity to find the fuel weight.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

4 ## TO DETERMINE FUEL QUANTITY IN THE WING TANK

MMI (from number 4 to number 2).....UNLOCK and WITHDRAW

The crewmember must slowly withdraw the MMI, until magnetic attraction is felt between the rod and float magnets.

Do not use force when withdrawing the MMI, as this will disengage the float magnet from the rod magnet, and bring the rod down on to the mechanical stop.

ROD GRADUATION (which aligns with bottom wing surface).....READ

MMIs shall be withdrawn from number 4 to number 2 until one MMI measures fuel.

MMI..... IN PLACE and LOCKED

Enter the table for the applicable aircraft wing side, aircraft attitude (grid square letter and number), and the applicable MMI stick number, to find the volume of fuel in the wing tank (See below).

Multiply the result by the specific gravity to find the fuel weight.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

TO DETERMINE FUEL QUANTITY IN THE INNER TANK

MMI (from number 4 to number 1).....UNLOCK and WITHDRAW

The crewmember must withdraw the MMI slowly until he feels the magnetic attraction between the rod and float magnets.

Do not use force when withdrawing the MMI as this will disengage the float magnet from the rod magnet and bring the rod down onto the mechanical stop.

ROD GRADUATION (which aligns with bottom wing surface).....READ

MMI..... IN PLACE and LOCKED

MMIs shall be withdrawn from number 4 to number 1 until one MMI measures fuel.

Use the table for the applicable aircraft wing side, aircraft attitude (grid square letter and number), and the applicable MMI stick number to find the volume of fuel in the inner tank (Refer to FCOM - PER.LOD.FUL FUEL. C.USE OF MANUAL MAGNETIC INDICATORS (MMI) - WING TANKS).

Multiply the result by the specific gravity to find the fuel weight.

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

TO DETERMINE FUEL QUANTITY IN THE INNER TANK

MMI (from number 4 to number 2).....UNLOCK and WITHDRAW

The crewmember must withdraw the MMI slowly until he feels the magnetic attraction between the rod and float magnets.

Do not use force when withdrawing the MMI as this will disengage the float magnet from the rod magnet and bring the rod down onto the mechanical stop.

ROD GRADUATION (which aligns with bottom wing surface).....READ

MMI..... IN PLACE and LOCKED

MMIs shall be withdrawn from number 4 to number 2 until one MMI measures fuel.

Use the table for the applicable aircraft wing side, aircraft attitude (grid square letter and number), and the applicable MMI stick number to find the volume of fuel in the inner tank (Refer to FCOM - PER.LOD.FUL FUEL. C.USE OF MANUAL MAGNETIC INDICATORS (MMI) - WING TANKS).

Multiply the result by the specific gravity to find the fuel weight.

Applicable to: ALL

5 **TO DETERMINE FUEL QUANTITY IN THE CENTER TANK**

CENTER TANK MMI..... UNLOCK and WITHDRAW

The crewmember must withdraw the MMI slowly until he feels the magnetic attraction between the rod and float magnets.
Do not use force when withdrawing the MMI as this will disengage the float magnet from the rod magnet and bring the rod down onto the mechanical stop.

ROD GRADUATION (which aligns with bottom wing surface)..... READ
MMI..... IN PLACE and LOCKED

Use the table for the center tank, and for the applicable aircraft attitude (grid square letter and number) to find the volume of fuel in the center tank (See below).
Multiply the result by the specific gravity to find the fuel weight.

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI, B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN

WING TANKS (LITERS)

MMI N°	MMI READING	LITERS ATTITUDE MONITOR READING A* LEFT WING 1	2	3	4	G 5	RIGHT WING 6	7	MMI READING	LITERS ATTITUDE MONITOR READING A RIGHT WING 1	2	3	4	G 5	LEFT WING 6	7**
	2	50	50	50	50	50	50	50	2	50	50	50	50	50	50	50
	4	100	100	100	100	100	100	100	4	50	50	50	50	50	50	50
	6	100	100	100	100	100	100	100	6	100	100	100	100	100	100	100
	8	150	150	150	150	150	150	150	8	150	150	150	150	150	150	150
	10	200	200	200	200	200	200	200	10	200	200	200	200	200	200	150
	12	250	250	250	250	250	250	250	12	250	250	250	250	250	250	200
	14	300	300	300	300	300	300	300	14	300	300	300	300	300	300	250
	16	350	350	350	350	350	350	350	16	350	350	350	350	350	350	300
	18	450	450	450	450	450	400	400	18	400	400	400	400	400	400	350
	20	500	500	500	500	500	500	500	20	450	450	450	450	450	450	400
	22	550	550	550	550	550	550	550	22	500	500	500	500	500	500	450
	24	650	650	650	650	650	650	600	24	550	550	550	550	550	550	550
	26	750	750	750	750	750	700	700	26	650	650	650	650	650	650	600
	28	800	800	800	800	800	800	800	28	700	700	700	700	700	700	700
	30	900	900	900	900	900	900	900	30	800	800	800	800	800	800	750
	32	1050	1050	1050	1050	1050	1000	1000	32	900	900	900	900	850	850	850
1	34	1150	1150	1150	1150	1150	1150	1100	34	950	950	950	950	950	950	950
	36	1250	1250	1250	1250	1250	1250	1250	36	1050	1050	1050	1050	1050	1050	1050
	38	1350	1350	1350	1350	1350	1350	1350	38	1150	1150	1150	1150	1150	1150	1150
	40	1500	1500	1500	1500	1500	1500	1500	40	1250	1250	1250	1250	1250	1250	1250
	42	1600	1600	1600	1600	1600	1600	1600	42	1350	1350	1350	1350	1350	1350	1350
	44	1750	1750	1750	1750	1750	1750	1750	44	1450	1450	1450	1450	1450	1450	1450
	46	1900	1900	1900	1900	1900	1900	1900	46	1550	1550	1550	1550	1550	1550	1550
	48	2000	2000	2000	2000	2000	2000	2050	48	1700	1700	1700	1700	1700	1700	1700
	50	2200	2200	2200	2200	2200	2200	2200	50	1800	1800	1800	1800	1800	1800	1800
	52	2350	2350	2350	2350	2350	2350	2400	52	1950	1950	1950	1950	1950	1950	1950
	54	2500	2500	2500	2500	2500	2550	2550	54	2000	2000	2050	2050	2050	2050	2050
	56	2650	2650	2700	2700	2700	2650	2700	56	2200	2200	2200	2200	2200	2200	2200
	58	2800	2800	2800	2800	2850	2850	2850	58	2300	2300	2300	2300	2300	2350	2350
	60	2950	2950	2950	3000	3000	3050	3050	60	2450	2500	2500	2500	2500	2500	2500
	62	3100	3100	3150	3150	3150	3200	3250	62	2600	2600	2650	2650	2650	2650	2650
	63	3150	3150	3200	3200	3250	3300	3350	63	2650	2650	2700	2700	2700	2700	2700
	MAX	3450	3450	3450	3500	3500	3600	3600	MAX	2950	2950	2950	2950	2950	3000	3000

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

MMI N°	MMI READING	LITERS ATTITUDE READING A	LEFT WING 1	2	3	4	G 5	RIGHT WING 6	7	MMI READING	LITERS ATTITUDE READING A	RIGHT WING 1	2	3	4	G 5	LEFT WING 6	7
2	2	2300	2250	2200	2200	2200	2200	2200		2	2850	2850	2850	2850	2850	2850	2800	
	4	2500	2450	2400	2400	2350	2350	2350		4	3050	3050	3050	3050	3050	3000	3000	
	6	2650	2600	2600	2600	2550	2500	2500		6	3200	3200	3200	3200	3200	3200	3150	
	8	2750	2750	2750	2700	2700	2650	2650		8	3300	3300	3300	3300	3300	3300	3250	
	10	2900	2900	2900	2900	2850	2850	2850		10	3500	3500	3500	3500	3450	3450	3400	
	12	3100	3100	3100	3100	3100	3050	3000		12	3650	3650	3600	3600	3600	3600	3600	
	14	3250	3250	3250	3250	3250	3250	3200		14	3800	3800	3750	3750	3750	3750	3750	
	16	3450	3450	3450	3450	3450	3400	3400		16	3950	3900	3900	3900	3900	3900	3900	
	18	3700	3650	3650	3650	3650	3600	3600		18	4050	4050	4050	4050	4050	4050	4050	
	20	3900	3900	3900	3900	3850	3850	3850		20	4200	4200	4200	4200	4200	4200	4200	
	22	4100	4100	4050	4050	4050	4050	4050		22	4250	4250	4250	4300	4300	4300	4300	
	24	4300	4300	4300	4300	4300	4300	4300		24	4400	4400	4400	4400	4450	4450	4450	
	26	4500	4500	4500	4500	4500	4500	4550		26	4500	4500	4550	4550	4550	4600	4600	
	28	4700	4700	4750	4750	4750	4750	4750		28	4600	4650	4650	4700	4700	4750	4800	
	30	4950	4950	4950	4950	5000	5000	5000		30	4750	4750	4800	4800	4850	4850	4900	
	32	5100	5100	5150	5150	5150	5200	5200		32	4850	4850	4900	4900	4950	5000	5000	
	MAX									MAX								
3	2	4400	4350	4300	4250	4200	4150	4050		2	5050	5050	5100	5100	5100	5100	5100	
	4	4700	4700	4650	4600	4500	4400	4300		4	5150	5150	5200	5200	5200	5200	5200	
	6	4950	4950	4900	4850	4800	4700	4550		6	5250	5250	5300	5300	5300	5300	5300	
	8	5150	5100	5100	5050	5000	4950	4800		8	5350	5350	5400	5400	5400	5400	5400	
	10	5250	5250	5250	5250	5200	5150	5050		10	5450	5450	5500	5500	5500	5500	5500	
	12	5400	5400	5400	5400	5350	5300	5250		12	5500	5500	5550	5600	5600	5600	5650	
	14	5600	5600	5550	5550	5500	5500	5450		14	5600	5650	5650	5700	5700	5700	5750	
	16	5750	5750	5700	5700	5700	5650	5600		16	5650	5700	5700	5750	5750	5800	5800	
	18	5900	5900	5850	5850	5850	5850	5800		18	5800	5800	5850	5850	5900	5900	5950	
	20	6000	6000	6000	6000	6000	6000	6000		20	5900	5900	5950	5950	6000	6000	6050	
4	2	5700	5600	5550	5500	5450	5400	5300		2	6000	6050	6100	6100	6100	6100	6100	
	4	5850	5750	5700	5650	5600	5550	5500		4	6100	6100	6150	6150	6150	6200	6200	
	6	6000	5900	5850	5800	5750	5700	5650		6	6200	6200	6200	6250	6250	6250	6300	
	8	6150	6100	6050	6000	5950	5900	5850		8	6250	6300	6300	6350	6350	6350	6400	
	10	6300	6300	6250	6200	6150	6150	6100		10	6350	6400	6400	6400	6450	6450	6450	
	12	6450	6400	6400	6400	6350	6300	6250		12	6450	6450	6450	6500	6500	6550	6550	
	14	6550	6500	6500	6500	6500	6450	6450		14	6500	6550	6550	6550	6600	6600	6650	
	16	6600	6600	6600	6600	6600	6600	6550		16	6600	6600	6600	6650	6650	6700	6750	
	18	6650	6650	6650	6650	6650	6650	6650		18	6650	6700	6700	6750	6750	6750	6800	
	MAX									MAX								
5	2	650	600	550	550	550	500	500		2	700	700	700	700	700	700	700	
	4	700	650	650	600	600	550	550		4	750	750	750	750	750	750	750	
	6	750	700	700	650	650	650	600		6	800	800	800	800	750	750	750	
	8	750	750	750	750	700	700	700		8	800	800	800	800	800	800	800	
	10	800	800	800	750	750	750	750		10	850	850	850	850	850	850	850	
	12	800	800	800	800	800	800	800		12	850	850	850	850	850	850	850	
	14	850	850	850	850	850	850	850		14	850	850	850	850	850	850	850	
	MAX	850	850	850	850	850	850	850		MAX	850	850	850	850	850	850	850	

MMI N°	MMI READING	LITERS ATTITUDE MONITOR READING B* LEFT WING 1	2	3	4	F 5	RIGHT WING 6	7	MMI READING	LITERS ATTITUDE MONITOR READING B RIGHT WING 1	2	3	4	F 5	LEFT WING 6	7**
1	2	50	50	50	50	50	50	50	2	50	50	50	50	50	50	50
	4	50	50	50	50	50	50	50	4	50	50	50	50	50	50	50
	6	100	100	100	100	100	100	100	6	100	100	100	100	100	100	100
	8	150	150	150	150	150	150	150	8	150	150	150	150	150	150	150
	10	200	200	200	200	200	200	200	10	200	200	200	200	200	200	150
	12	250	250	250	250	250	250	250	12	250	250	250	250	250	250	200
	14	300	300	300	300	300	300	300	14	300	300	300	300	300	300	250
	16	350	350	350	350	360	350	350	16	350	350	350	350	350	350	300
	18	400	400	400	400	400	400	400	18	400	400	400	400	400	400	350
	20	450	450	450	450	450	450	450	20	450	450	450	450	450	450	450
	22	550	550	550	550	550	550	550	22	500	500	500	500	500	500	500
	24	600	600	600	600	600	600	600	24	550	550	550	550	550	550	550
	26	700	700	700	700	700	700	700	26	650	650	650	650	650	650	650
	28	800	800	800	800	800	800	800	28	700	700	700	700	700	700	700
	30	900	900	900	900	900	900	850	30	800	800	800	800	800	800	800
	32	1000	1000	1000	1000	1000	1000	950	32	900	900	900	900	900	900	850
	34	1100	1100	1100	1100	1100	1100	1100	34	1000	1000	1000	1000	950	950	950
	36	1200	1200	1200	1200	1200	1200	1200	36	1100	1100	1100	1100	1050	1050	1050
	38	1300	1300	1300	1300	1300	1300	1300	38	1200	1200	1200	1200	1200	1150	1150
	40	1450	1450	1450	1450	1450	1450	1450	40	1300	1300	1300	1300	1300	1300	1300
	42	1550	1550	1550	1550	1550	1550	1550	42	1400	1400	1400	1400	1400	1400	1400
	44	1700	1700	1700	1700	1700	1700	1700	44	1500	1500	1500	1500	1500	1500	1500
	46	1800	1800	1800	1800	1800	1800	1800	46	1600	1600	1600	1600	1600	1600	1600
	48	1950	1950	1950	1950	1950	1950	1950	48	1700	1700	1700	1700	1700	1700	1700
	50	2100	2100	2100	2100	2100	2100	2100	50	1850	1850	1850	1850	1850	1850	1850
	52	2250	2250	2250	2250	2250	2250	2250	52	1950	1950	1950	1950	1950	1950	1950
	54	2400	2400	2400	2400	2400	2400	2450	54	2100	2100	2100	2100	2100	2100	2100
	56	2550	2550	2600	2600	2600	2600	2600	56	2250	2250	2250	2250	2250	2250	2250
	58	2750	2750	2750	2750	2750	2750	2750	58	2400	2400	2400	2400	2400	2400	2400
	60	2850	2850	2850	2850	2900	2900	2950	60	2550	2550	2550	2550	2550	2550	2550
	62	3000	3000	3000	3050	3050	3050	3100	62	2700	2700	2700	2700	2700	2700	2700
	63	3050	3050	3050	3100	3150	3150	3200	63	2750	2750	2750	2750	2750	2750	2750
	MAX	3350	3350	3350	3350	3400	3450	3500	MAX	3000	3000	3000	3000	3000	3000	3000

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

MMI N°	MMI READING	LITERS ATTITUDE MONITOR READING B LEFT WING 1	2	3	4	F RIGHT WING 5	6	7	MMI READING	LITERS ATTITUDE MONITOR READING B RIGHT WING 1	2	3	4	F LEFT WING 5	6	7
2	2	2350	2350	2300	2300	2250	2200	2200	2	2800	2750	2750	2750	2700	2700	2650
	4	2550	2500	2500	2450	2450	2400	2400	4	2950	2950	2900	2900	2900	2900	2850
	6	2750	2700	2700	2650	2650	2600	2600	6	3100	3100	3100	3100	3100	3050	3050
	8	2850	2850	2800	2800	2800	2750	2750	8	3200	3200	3200	3200	3200	3200	3150
	10	3000	3000	3000	3000	3000	2950	2900	10	3400	3400	3350	3350	3350	3350	3300
	12	3150	3150	3200	3150	3150	3150	3100	12	3550	3550	3550	3550	3500	3500	3450
	14	3350	3350	3350	3350	3350	3300	3300	14	3750	3700	3700	3700	3650	3650	3650
	16	3550	3550	3550	3550	3500	3500	3450	16	3900	3850	3850	3850	3850	3800	3800
	18	3750	3750	3750	3750	3700	3700	3650	18	4050	4000	4000	4000	4000	4000	3950
	20	4000	3950	3950	3950	3950	3900	3900	20	4200	4150	4150	4150	4150	4150	4150
	22	4150	4100	4100	4100	4100	4100	4100	22	4250	4250	4250	4250	4250	4250	4250
	24	4300	4300	4300	4300	4300	4300	4300	24	4400	4400	4400	4400	4400	4400	4400
	26	4500	4500	4500	4500	4500	4500	4500	26	4500	4500	4500	4550	4550	4550	4550
	28	4700	4700	4700	4700	4700	4750	4750	28	4650	4650	4650	4650	4700	4700	4750
	30	4850	4900	4900	4900	4950	4950	4950	30	4750	4750	4800	4800	4850	4850	4900
	32	5050	5100	5100	5100	5100	5150	5150	32	4850	4900	4900	4950	4950	5000	5050
	MAX								MAX							
3	2	4550	4500	4500	4450	4400	4350	4300	2	5000	5000	5000	5000	5000	5000	4950
	4	4800	4800	4800	4750	4650	4600	4500	4	5100	5100	5100	5100	5100	5100	5100
	6	5050	5000	5000	5000	4900	4850	4750	6	5200	5200	5200	5250	5200	5200	5200
	8	5150	5150	5150	5150	5100	5000	5000	8	5300	5300	5350	5350	5350	5350	5350
	10	5300	5300	5300	5300	5250	5200	5150	10	5400	5400	5450	5450	5450	5450	5450
	12	5450	5450	5450	5450	5400	5400	5350	12	5500	5500	5550	5550	5550	5550	5550
	14	5600	5600	5600	5550	5550	5550	5500	14	5600	5600	5650	5650	5650	5650	5700
	16	5700	5700	5700	5700	5700	5700	5700	16	5700	5700	5700	5750	5750	5750	5800
	18	5850	5850	5850	5850	5850	5850	5850	18	5800	5800	5800	5850	5850	5850	5900
	20	6000	6000	6050	6050	6050	6000	6000	20	5900	5900	5950	5950	6000	6000	6000
	MAX								MAX							
4	2								2	5950	5950	6100	6000	6050	6050	6050
	4	5850	5750	5700	5650	5600	5600	5600	4	6050	6050	6100	6100	6100	6100	6150
	6	6000	6000	5950	5900	5850	5800	5800	6	6150	6150	6200	6200	6200	6200	6200
	8	6150	6150	6100	6100	6050	6000	6000	8	6250	6250	6250	6300	6300	6300	6300
	10	6300	6300	6250	6250	6250	6200	6150	10	6350	6350	6350	6400	6400	6400	6400
	12	6400	6400	6400	6400	6350	6350	6300	12	6400	6450	6450	6450	6500	6500	6500
	14	6500	6500	6500	6500	6500	6450	6450	14	6500	6500	6550	6550	6600	6600	6600
	16	6600	6600	6600	6600	6550	6550	6550	16	6600	6600	6600	6650	6650	6700	6700
	18	6760	6770	6770	6770	6770	6770	6760	18	6750	6770	6800	6830	6850	6870	6880
	MAX								MAX							
5	2	650	650	600	600	600	550	550	2	750	700	700	700	700	700	700
	4	750	700	700	650	650	600	600	4	750	750	750	750	750	750	750
	6	750	750	750	700	700	650	650	6	800	800	800	800	750	750	750
	8	800	800	750	750	750	750	700	8	800	800	800	800	800	800	800
	10	800	800	800	800	800	750	750	10	850	850	850	850	800	800	800
	12	850	850	800	800	800	800	800	12	850	850	850	850	850	850	850
	14	850	850	850	850	850	850	850	14	850	850	850	850	850	850	850
	MAX	850	850	850	850	850	850	850	MAX	850	850	850	850	850	850	850

MMI N°	MMI READING	LITERS ATTITUDE MONITOR READING C* LEFT WING 1	2	3	4	E 5	RIGHT WING 6	7	MMI READING	LITERS ATTITUDE MONITOR READING C RIGHT WING 1	2	3	4	E 5	LEFT WING 6	7**
1	2	50	50	50	50	50	50	50	2	50	50	50	50	50	50	50
	4	50	50	50	50	50	50	50	4	50	50	50	50	50	50	50
	6	100	100	100	100	100	100	100	6	100	100	100	100	100	100	100
	8	150	150	150	150	150	150	150	8	150	150	150	150	150	150	150
	10	200	200	200	200	200	200	200	10	200	200	200	200	200	200	150
	12	250	250	250	250	250	250	250	12	250	250	250	250	250	250	200
	14	300	300	300	300	300	300	300	14	300	300	300	300	300	300	250
	16	350	350	350	350	350	350	350	16	350	350	350	350	350	350	350
	18	400	400	400	400	400	400	400	18	400	400	400	400	400	400	400
	20	450	450	450	450	450	450	450	20	450	450	450	450	450	450	450
	22	550	550	550	550	500	500	500	22	500	500	500	500	500	500	500
	24	600	600	600	600	600	600	600	24	600	600	600	600	600	550	550
	26	700	700	700	700	650	650	650	26	650	650	650	650	650	650	650
	28	750	750	750	750	750	750	750	28	750	750	750	750	750	700	700
	30	850	850	850	850	850	850	850	30	800	800	800	800	800	800	800
	32	950	950	950	950	950	950	950	32	900	900	900	900	900	900	900
	34	1050	1050	1050	1050	1050	1050	1050	34	1000	1000	1000	1000	1000	1000	1000
	36	1200	1150	1150	1150	1150	1150	1150	36	1100	1100	1100	1100	1100	1100	1100
	38	1300	1300	1300	1250	1250	1250	1250	38	1200	1200	1200	1200	1200	1200	1200
	40	1400	1400	1400	1400	1400	1400	1400	40	1300	1300	1300	1300	1300	1300	1300
	42	1500	1500	1500	1500	1500	1500	1500	42	1400	1400	1400	1400	1400	1400	1400
	44	1600	1600	1600	1600	1600	1600	1600	44	1550	1550	1500	1500	1500	1500	1500
	46	1750	1750	1750	1750	1750	1750	1750	46	1650	1650	1650	1650	1650	1650	1650
	48	1850	1850	1850	1850	1900	1900	1900	48	1800	1750	1750	1750	1750	1750	1800
	50	2000	2000	2000	2000	2000	2000	2050	50	1900	1900	1900	1900	1900	1900	1900
	52	2150	2150	2150	2150	2150	2150	2200	52	2000	2000	2000	2000	2000	2000	2050
	54	2300	2300	2300	2300	2300	2300	2350	54	2150	2150	2150	2150	2150	2150	2200
	56	2450	2500	2500	2500	2500	2500	2500	56	2300	2300	2300	2300	2300	2300	2350
	58	2600	2650	2650	2650	2650	2650	2700	58	2450	2450	2450	2450	2450	2500	2500
	60	2800	2800	2800	2800	2850	2850	2850	60	2600	2600	2600	2600	2600	2650	2650
	62	2900	2950	2950	2950	2950	2950	3000	62	2750	2750	2750	2750	2800	2800	2800
	63	2950	3000	3000	3000	3050	3050	3100	63	2800	2800	2800	2800	2850	2850	2850
	MAX	3250	3250	3300	3350	3350	3350	3400	MAX	3100	3100	3100	3100	3100	3100	3100

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

MMI N°	MMI READING	LITERS ATTITUDE READING C	LEFT WING 1	2	3	4	E 5	RIGHT WING 6	7
2	2	2450	2400	2400	2400	2350	2350	2350
	4	2650	2600	2600	2600	2550	2550	2500
	6	2800	2800	2800	2800	2750	2750	2700
	8	2900	2900	2900	2900	2900	2850	2850
	10	3100	3100	3100	3100	3100	3050	3000
	12	3250	3250	3250	3250	3250	3250	3200
	14	3450	3450	3450	3450	3400	3400	3350
	16	3650	3650	3650	3600	3600	3550	3550
	18	3850	3850	3800	3800	3800	3750	3750
	20	4050	4050	4000	4000	4000	3950	3950
	22	4200	4200	4150	4150	4150	4100	4100
	24	4350	4350	4300	4300	4300	4300	4300
	26	4500	4500	4500	4500	4500	4500	4500
	28	4650	4650	4650	4700	4700	4700	4700
	30	4850	4850	4850	4850	4900	4900	4900
	32	5000	5000	5000	5050	5050	5050	5100
	MAX							
3	2	4650	4650	4650	4600	4600	4500	4500
	4	4900	4900	4900	4900	4800	4750	4650
	6	5100	5100	5100	5050	5050	5000	4900
	8	5200	5200	5200	5200	5200	5150	5100
	10	5300	5350	5350	5350	5300	5300	5250
	12	5450	5450	5450	5450	5450	5450	5400
	14	5600	5600	5600	5600	5600	5600	5550
	16	5700	5700	5700	5700	5700	5700	5700
	18	5800	5850	5850	5850	5850	5850	5850
	20	5950	5950	6000	6000	6000	6000	6000
4	2	5800	5750	5750	5700	5700	5700	5700
	4	5950	5900	5900	5850	5850	5800	5800
	6	6050	6050	6000	6000	6000	5950	5950
	8	6200	6150	6150	6150	6150	6100	6100
	10	6300	6300	6300	6300	6300	6250	6250
	12	6400	6400	6400	6400	6400	6400	6400
	14	6500	6500	6500	6500	6500	6500	6500
	16	6600	6600	6600	6600	6600	6600	6600
	18	6730	6740	6750	6750	6760	6760	6770
	MAX							
5	2	700	700	650	650	600	600	600
	4	750	750	700	700	650	650	650
	6	750	750	750	750	700	700	700
	8	800	800	800	750	750	750	750
	10	800	800	800	800	800	800	800
	12	850	850	850	800	800	800	800
	14	850	850	850	850	850	850	850

MMI READING	LITERS ATTITUDE MONITOR READING C	RIGHT WING 1	2	3	4	E 5	LEFT WING 6	7
2	2700	2650	2650	2600	2600	2550	2550
4	2850	2800	2800	2800	2800	2750	2750
6	3000	3000	3000	3000	3000	2950	2900
8	3100	3100	3100	3100	3100	3100	3050
10	3300	3300	3300	3250	3250	3250	3200
12	3450	3450	3450	3450	3450	3400	3350
14	3650	3650	3600	3600	3600	3550	3550
16	3800	3800	3800	3750	3750	3750	3700
18	4000	3950	3950	3950	3900	3900	3900
20	4150	4100	4100	4100	4100	4100	4100
22	4250	4250	4200	4200	4200	4200	4200
24	4350	4350	4350	4350	4350	4350	4350
26	4500	4500	4500	4500	4500	4500	4550
28	4650	4650	4650	4650	4700	4700	4700
30	4750	4800	4800	4800	4850	4850	4850
32	4900	4900	4950	4950	5000	5000	5050
MAX							
2	4900	4900	4900	4900	4900	4850	4800
4	5050	5100	5100	5100	5100	5050	5000
6	5150	5200	5200	5200	5200	5150	5150
8	5250	5300	5300	5300	5300	5300	5300
10	5350	5400	5400	5400	5400	5400	5400
12	5500	5500	5500	5500	5550	5550	5550
14	5600	5600	5600	5650	5650	5650	5650
16	5700	5700	5750	5750	5750	5750	5800
18	5800	5800	5850	5850	5900	5900	5900
20	5900	5950	5950	6000	6000	6000	6000
2	5900	5900	5900	5900	5950	5950	5950
4	6000	6000	6000	6050	6050	6050	6050
6	6100	6100	6150	6150	6150	6150	6150
8	6200	6250	6250	6250	6250	6250	6250
10	6300	6350	6350	6350	6350	6350	6350
12	6400	6400	6450	6450	6450	6450	6450
14	6500	6500	6500	6550	6550	6550	6550
16	6550	6600	6600	6600	6600	6600	6600
18	6750	6750	6770	6790	6800	6810	6820
MAX							
2	750	700	700	700	700	650	650
4	750	750	750	750	700	700	700
6	800	800	750	750	750	750	750
8	800	800	800	800	800	800	800
10	850	850	850	800	800	800	800
12	850	850	850	850	850	850	850
14	900	900	850	850	850	850	850

MMI N°	MMI READING	LITERS ATTITUDE MONITOR READING D* BOTH WINGS 1	2	3	4	5	6	7
1	2	50	50	50	50	50	50	50
	4	100	100	100	100	100	100	100
	6	100	100	100	100	100	100	100
	8	150	150	150	150	150	150	150
	10	200	200	200	200	200	200	200
	12	250	250	250	250	250	250	250
	14	300	300	300	300	300	300	300
	16	350	350	350	350	360	350	350
	18	400	400	400	400	400	400	400
	20	450	450	450	450	450	450	450
	22	500	500	500	500	500	500	500
	24	600	600	600	600	600	600	600
	26	650	650	650	650	650	650	650
	28	750	750	750	750	750	750	750
	30	850	850	850	850	850	850	850
	32	950	950	950	950	950	950	950
	34	1050	1050	1050	1050	1050	1000	1000
	36	1150	1150	1150	1150	1150	1100	1100
	38	1250	1250	1250	1250	1250	1250	1250
	40	1350	1350	1350	1350	1350	1350	1350
	42	1450	1450	1450	1450	1450	1450	1450
	44	1550	1550	1550	1550	1550	1550	1550
	46	1700	1700	1700	1700	1700	1700	1700
	48	1800	1800	1800	1800	1800	1800	1800
	50	1950	1950	1950	1950	1950	1950	1950
	52	2100	2100	2100	2100	2100	2100	2100
	54	2250	2250	2250	2250	2250	2250	2250
	56	2400	2400	2400	2400	2400	2400	2400
	58	2550	2550	2550	2550	2550	2600	2600
	60	2700	2700	2700	2700	2700	2750	2750
	62	2850	2850	2850	2850	2850	2900	2900
	63	2900	2900	2900	2900	2900	2950	2950
	MAX	3050	3050	3100	3100	3100	3150	3150
2	2	2550	2550	2500	2500	2450	2450	2450
	4	2750	2700	2700	2700	2650	2650	2600
	6	2900	2900	2850	2850	2850	2800	2800
	8	3000	3000	2950	2950	2950	2950	2900
	10	3200	3150	3150	3150	3150	3100	3050
	12	3350	3350	3350	3350	3300	3300	3250
	14	3550	3550	3550	3500	3500	3450	3450
	16	3750	3750	3700	3700	3650	3650	3600

MMI READING	LITERS ATTITUDE MONITOR READING D BOTH WINGS 1	2	3	4	5	6	7**	MMI N°
18	3950	3900	3900	3850	3850	3850	3800	2
20	4100	4100	4050	4050	4050	4000	4000	
22	4200	4200	4150	4150	4150	4150	4150	
24	4350	4350	4350	4300	4300	4300	4300	
26	4500	4500	4500	4500	4500	4500	4500	
28	4650	4650	4650	4650	4650	4700	4700	
30	4800	4800	4800	4850	4850	4850	4900	
32	4950	4950	5000	5000	5000	5050	5100	
MAX								
2	4800	4800	4800	4800	4750	4750	4600	3
4	5000	5000	5000	5000	4950	4900	4850	
6	5100	5150	5150	5100	5100	5100	5050	
8	5250	5250	5250	5250	5250	5200	5200	
10	5350	5350	5350	5400	5400	5350	5350	
12	5450	5500	5500	5500	5500	5500	5500	
14	5600	5600	5600	5600	5600	5600	5600	
16	5700	5700	5700	5750	5750	5750	5750	
18	5800	5800	5850	5850	5850	5900	5900	
20	5900	5900	5950	5950	5950	6000	6000	
MAX								
2	5900	5850	5800	5800	5800	5800	5800	4
4	6000	5950	5950	5950	5950	5950	5950	
6	6100	6100	6050	6050	6050	6050	6050	
8	6200	6200	6200	6200	6200	6200	6200	
10	6300	6300	6300	6300	6300	6300	6300	
12	6400	6400	6400	6400	6400	6400	6400	
14	6500	6500	6500	6500	6500	6500	6500	
16	6600	6600	6600	6600	6600	6600	6600	
18	6750	6750	6770	6800	6800	6810	6820	
MAX								
2	700	700	700	650	650	650	600	5
4	750	750	750	700	700	700	650	
6	800	800	750	750	750	750	700	
8	800	800	800	800	800	750	750	
10	850	800	800	800	800	800	800	
12	850	850	850	850	850	850	850	
14	850	850	850	850	850	850	850	
MAX	850	850	850	850	850	850	850	

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

Applicable to: ALL 321

WING TANKS (LITERS)

MMI N°	MMI READING	LITERS ATTITUDE MONITOR READING A LEFT WING 1	2	3	4	G 5	RIGHT WING 6	7	MMI READING	LITERS ATTITUDE MONITOR READING A RIGHT WING 1	2	3	4	G 5	LEFT WING 6	7
1	0	50	50	50	50	50	50	50	0	50	50	50	50	50	50	50
	2	50	50	50	50	50	50	50	2	100	100	100	50	50	50	50
	4	100	100	100	100	100	100	100	4	100	100	100	100	100	100	100
	6	150	150	150	150	150	150	150	6	150	150	150	150	150	150	150
	8	150	150	150	150	150	150	150	8	150	150	150	150	150	150	150
	10	200	200	200	200	200	200	200	10	200	200	200	200	200	200	200
	12	250	250	250	250	250	250	250	12	250	250	250	250	250	250	250
	14	300	300	300	300	300	300	300	14	300	300	300	300	300	300	300
	16	400	350	350	350	350	350	350	16	350	350	350	350	350	350	350
	18	450	450	450	450	450	450	450	18	400	400	400	400	400	400	400
	20	500	500	500	500	500	500	500	20	450	450	450	450	450	450	450
	22	600	600	600	600	550	550	550	22	550	550	550	500	500	500	500
	24	650	650	650	650	650	650	650	24	600	600	600	600	600	600	600
	26	750	750	750	750	750	750	750	26	650	650	650	650	650	650	650
	28	850	850	850	850	850	850	850	28	750	750	750	750	750	750	700
	30	950	950	950	950	950	950	950	30	850	800	800	800	800	800	800
	32	1050	1050	1050	1050	1050	1050	1050	32	900	900	900	900	900	900	900
	34	1150	1150	1150	1150	1150	1150	1150	34	1000	1000	1000	1000	1000	1000	1000
	36	1300	1250	1250	1250	1300	1300	1300	36	1100	1100	1100	1100	1100	1100	1050
	38	1400	1400	1400	1400	1400	1400	1400	38	1200	1200	1200	1200	1200	1150	1150
	40	1500	1500	1550	1550	1550	1550	1550	40	1300	1300	1300	1300	1300	1300	1300
	42	1650	1650	1650	1650	1650	1700	1700	42	1400	1400	1400	1400	1400	1400	1400
	44	1800	1800	1800	1800	1800	1800	1850	44	1500	1500	1500	1500	1500	1500	1500
	46	1950	1950	1950	1950	1950	2000	2000	46	1600	1600	1600	1600	1600	1600	1600
	48	2100	2100	2100	2100	2100	2150	2150	48	1750	1750	1750	1750	1750	1750	1750
	50	2250	2250	2250	2250	2300	2300	2300	50	1850	1850	1850	1850	1850	1850	1850
	52	2400	2400	2400	2450	2450	2450	2500	52	2000	2000	2000	2000	2000	2000	2000
	54	2550	2550	2600	2600	2650	2650	2700	54	2100	2100	2100	2100	2150	2150	2150
	56	2700	2750	2750	2800	2800	2850	2850	56	2250	2250	2250	2250	2250	2250	2300
	58	2900	2900	2950	2950	3000	3050	3050	58	2400	2400	2400	2400	2400	2400	2400
	60	3050	3100	3150	3150	3200	3250	3250	60	2550	2550	2550	2550	2550	2550	2550
	62	3250	3300	3300	3350	3400	3450	3500	62	2650	2700	2700	2700	2700	2700	2700
	64	3450	3500	3500	3550	3600	3650	3700	64	2800	2800	2850	2850	2850	2850	2900
2	0	2150	2100	2100	2050	2050	2050	2000	0	2800	2750	2750	2750	2700	2700	2650
	2	2300	2250	2250	2250	2200	2200	2150	2	2950	2900	2900	2850	2850	2850	2800
	4	2450	2450	2400	2400	2350	2350	2350	4	3100	3050	3050	3050	3000	3000	2950
	6	2600	2600	2550	2550	2550	2500	2500	6	3250	3200	3200	3200	3150	3150	3150
	8	2800	2750	2750	2750	2700	2700	2700	8	3400	3400	3350	3350	3300	3300	3300
	10	2950	2950	2900	2900	2900	2900	2850	10	3550	3550	3500	3500	3500	3450	3450
	12	3150	3100	3100	3100	3100	3050	3050	12	3700	3700	3700	3650	3650	3650	3600
	14	3300	3300	3300	3300	3300	3250	3250	14	3850	3850	3850	3850	3800	3800	3800
	16	3500	3500	3500	3500	3500	3500	3500	16	4000	4000	4000	4000	4000	3950	3950
	18	3700	3700	3700	3700	3700	3700	3700	18	4150	4150	4150	4150	4150	4150	4100
	20	3900	3900	3900	3900	3900	3900	3900	20	4300	4300	4300	4300	4300	4300	4300
	22	4150	4150	4150	4150	4150	4150	4150	22	4400	4450	4450	4450	4450	4450	4450
	24	4350	4350	4350	4350	4350	4400	4400	24	4550	4550	4550	4550	4600	4600	4600
	26	4550	4550	4550	4600	4600	4600	4650	26	4650	4650	4700	4700	4700	4750	4750
	28	4750	4800	4800	4800	4850	4850	4900	28	4750	4800	4800	4800	4850	4850	4850
	30	4950	5000	5000	5050	5100	5100	5150	30	4850	4900	4900	4950	4950	5000	5000
	32	5150	5200	5250	5250	5300	5350	5400	32	4950	5000	5000	5050	5050	5100	5150
	34	5350	5400	5450	5500	5550	5600	5650	34	5050	5100	5150	5150	5200	5200	5250

MMI N°	MMI READING	LITERS ATTITUDE READING A LEFT WING 1	2	3	4	G 5	RIGHT WING 6	7	MMI READING	LITERS ATTITUDE READING A RIGHT WING 1	2	3	4	G 5	LEFT WING 6	7
3	0	4300	4200	4150	4100	4000	3950	3850	0	5050	5050	5050	5050	5000	5000	5000
	2	4500	4450	4350	4300	4250	4150	4100	2	5150	5150	5150	5150	5150	5100	5100
	4	4700	4650	4600	4550	4450	4400	4350	4	5250	5250	5250	5250	5250	5250	5250
	6	4900	4850	4800	4750	4700	4650	4600	6	5350	5350	5350	5350	5350	5350	5350
	8	5100	5050	5050	5000	4950	4900	4850	8	5450	5450	5450	5450	5450	5450	5450
	10	5300	5250	5250	5200	5150	5150	5100	10	5550	5550	5550	5550	5550	5550	5550
	12	5450	5450	5450	5400	5400	5350	5350	12	5650	5650	5650	5650	5650	5650	5650
	14	5650	5650	5650	5650	5600	5600	5600	14	5700	5750	5750	5750	5750	5750	5800
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	4	5950	5950	5900	5850	5800	5750	5700	4	6250	6250	6250	6250	6250	6250	6250
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	8	6250	6200	6200	6200	6200	6150	6150	8	6400	6400	6450	6450	6450	6450	6450
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	14	7250	7250	7250	7200	7200	7150	7100	14	7250	7250	7250	7250	7250	7250	7200
	16	7350	7350	7350	7350	7300	7300	7300	16	7300	7300	7300	7300	7300	7300	7300
	18	7450	7450	7450	7450	7450	7450	7400	18	7400	7400	7350	7350	7350	7350	7350
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6	0	7150	7100	7050	6950	6900	6800	6650	0	7400	7400	7400	7350	7350	7350	7300
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	4	7350	7300	7300	7250	7150	7100	7000	4	7550	7500	7500	7500	7500	7450	7450
	6	7450	7400	7400	7350	7300	7250	7200	6	7600	7550	7550	7550	7550	7550	7500
	8	7550	7500	7500	7450	7450	7400	7350	8	7600	7600	7600	7600	7600	7600	7550
	10	7650	7600	7600	7550	7550	7500	7450	10	7650	7650	7650	7650	7650	7650	7650
	12	7700	7700	7700	7650	7650	7650	7600	12	7700	7700	7700	7700	7700	7700	7700
	14	7800	7800	7750	7750	7750	7750	7700	14	7750	7750	7750	7750	7750	7750	7750
	16	7850	7850	7850	7850	7850	7850	7800	16	7800	7800	7800	7800	7800	7800	7800
7	0	7600	7600	7550	7500	7450	7400	7300	0	7800	7800	7800	7800	7800	7750	7750
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	4	7800	7750	7750	7700	7650	7650	7600	4	7900	7900	7900	7850	7850	7850	7850
	6	7850	7850	7800	7800	7750	7750	7700	6	7950	7900	7900	7900	7900	7900	7900
	8	7900	7900	7900	7850	7850	7850	7800	8	7950	7950	7950	7950	7950	7950	7950
	10	7950	7950	7950	7950	7900	7900	7900	10	8000	8000	8000	8000	8000	8000	8000
	12	8000	8000	8000	8000	8000	7950	7950	12	8000	8000	8000	8000	8000	8000	8000
	14	8050	8050	8050	8000	8000	8000	8000	14	8050	8050	8050	8050	8050	8050	8050

MMIN°	MMI	READING	LITERS ATTITUDE MONITOR READING B LEFT WING 1	2	3	4	F 5	RIGHT WING 6	7	MMI	READING	LITERS ATTITUDE MONITOR READING B RIGHT WING 1	2	3	4	F 5	LEFT WING 6	7
1		0	50	50	50	50	50	50	50		0	50	50	50	50	50	50	50
		2	50	50	50	50	50	50	50		2	100	100	50	50	50	50	50
		4	100	100	100	100	100	100	100		4	100	100	100	100	100	100	100
		6	150	150	150	150	150	150	150		6	150	150	150	150	150	150	150
		8	150	150	150	150	150	150	150		8	150	150	150	150	150	150	150
		10	200	200	200	200	200	200	200		10	200	200	200	200	200	200	200
		12	250	250	250	250	250	250	250		12	250	250	250	250	250	250	250
		14	300	300	300	300	300	300	300		14	300	300	300	300	300	300	300
		16	350	350	350	350	350	350	350		16	350	350	350	350	350	350	350
		18	450	450	450	400	400	400	400		18	400	400	400	400	400	400	400
		20	500	500	500	500	500	500	500		20	500	450	450	450	450	450	450
		22	600	550	550	550	550	550	550		22	550	550	550	550	500	500	500
		24	650	650	650	650	650	650	650		24	600	600	600	600	600	600	600
		26	750	750	750	750	700	700	700		26	700	700	650	650	650	650	650
		28	850	800	800	800	800	800	800		28	750	750	750	750	750	750	700
		30	900	900	900	900	900	900	900		30	850	850	850	850	850	800	800
		32	1000	1000	1000	1000	1000	1000	1000		32	950	900	900	900	900	900	900
		34	1150	1100	1100	1100	1100	1100	1100		34	1000	1000	1000	1000	1000	1000	1000
		36	1250	1250	1250	1250	1250	1250	1250		36	1100	1100	1100	1100	1100	1100	1100
		38	1350	1350	1350	1350	1350	1350	1350		38	1200	1200	1200	1200	1200	1200	1200
		40	1450	1450	1450	1450	1500	1500	1500		40	1300	1300	1300	1300	1300	1300	1300
		42	1600	1600	1600	1600	1600	1600	1600		42	1450	1450	1400	1400	1400	1400	1400
		44	1750	1750	1750	1750	1750	1750	1750		44	1550	1550	1550	1550	1550	1550	1550
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		48	2000	2000	2000	2000	2050	2050	2050		48	1800	1800	1800	1800	1800	1800	1800
		50	2150	2150	2150	2200	2200	2200	2200		50	1900	1900	1900	1900	1900	1900	1900
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		58	2800	2800	2800	2850	2850	2900	2900		58	2450	2450	2450	2450	2500	2500	2500
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		62	3100	3150	3150	3200	3200	3250	3250		62	2750	2750	2750	2750	2800	2800	2800
		64	3300	3350	3350	3400	3400	3450	3450		64	2900	2900	2900	2950	2950	2950	2950
2		0	2250	2200	2200	2200	2150	2150	2100		0	2700	2650	2650	2600	2600	2550	2550
		2	2400	2400	2350	2350	2300	2300	2300		2	2850	2800	2800	2750	2750	2700	2700
		4	2550	2550	2500	2500	2450	2450	2450		4	3000	2950	2950	2900	2900	2900	2850
		6	2700	2700	2700	2650	2650	2600	2600		6	3150	3100	3100	3100	3050	3050	3000
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		10	3050	3050	3000	3000	3000	3000	2950		10	3450	3450	3450	3400	3400	3350	3350
		12	3250	3200	3200	3200	3200	3150	3150		12	3650	3600	3600	3600	3550	3550	3550
		14	3400	3400	3400	3400	3350	3350	3350		14	3800	3800	3750	3750	3750	3700	3700
		16	3600	3600	3600	3550	3550	3550	3550		16	3950	3950	3950	3900	3900	3900	3900
		18	3800	3800	3800	3750	3750	3750	3750		18	4100	4100	4100	4100	4100	4050	4050
		20	4000	4000	4000	4000	4000	3950	4000		20	4250	4250	4250	4250	4250	4250	4250
		22	4200	4200	4200	4200	4200	4200	4200		22	4400	4400	4400	4400	4400	4400	4400
		24	4400	4400	4400	4400	4400	4400	4400		24	4550	4550	4550	4550	4550	4550	4550
		26	4600	4600	4600	4600	4600	4650	4650		26	4650	4650	4700	4700	4700	4750	4750
		28	4800	4800	4800	4850	4850	4850	4900		28	4800	4800	4800	4850	4850	4850	4900
		30	4950	5000	5000	5050	5050	5100	5100		30	4900	4900	4950	4950	5000	5000	5050
		32	5150	5150	5200	5250	5250	5300	5350		32	5000	5000	5050	5100	5100	5150	5150
		34	5300	5300	5350	5400	5450	5500	5550		34	5100	5150	5150	5200	5200	5250	5300

MMI N°	MMI READING	LITERS ATTITUDE READING B LEFT WING 1	2	3	4	F 5	RIGHT WING 6	7	MMI READING	LITERS ATTITUDE READING B RIGHT WING 1	2	3	4	F 5	LEFT WING 6	7
3	0	4550	4450	4400	4350	4250	4200	4150	0	5000	5000	5000	4950	4950	4950	4900
	2	4750	4700	4600	4550	4500	4400	4350	2	5100	5100	5100	5100	5050	5050	5050
	4	4900	4900	4800	4750	4700	4650	4600	4	5200	5200	5200	5200	5200	5200	5150
	6	5100	5050	5000	4950	4900	4850	4800	6	5300	5300	5300	5300	5300	5300	5300
	8	5250	5200	5200	5200	5150	5100	5050	8	5400	5400	5400	5400	5400	5400	5400
	10	5400	5400	5350	5350	5350	5300	5250	10	5500	5500	5500	5550	5550	5550	5550
	12	5500	5550	5550	5550	5550	5500	5500	12	5600	5600	5650	5650	5650	5650	5650
	14	5650	5650	5700	5700	5700	5700	5700	14	5700	5700	5700	5700	5700	5700	5800
	16	5800	5800	5850	5850	5850	5900	5900	16	5800	5800	5850	5850	5850	5900	5900
	18	5900	5950	5950	6000	6000	6050	6100	18	5900	5900	5950	5950	5950	6000	6000
	20	6050	6100	6100	6150	6150	6200	6250	20	6000	6000	6050	6050	6050	6100	6100
	22	6200	6200	6250	6300	6300	6350	6400	22	6100	6100	6100	6150	6150	6200	6200
4	0	5750	5750	5750	5700	5650	5600	5500	0	6050	6050	6050	6050	6000	6000	6000
	2	5900	5900	5850	5850	5850	5800	5750	2	6150	6150	6150	6100	6100	6100	6100
	4	6050	6000	6000	6000	6000	5950	5900	4	6200	6200	6200	6200	6200	6200	6200
	6	6150	6150	6150	6150	6150	6150	6100	6	6300	6300	6300	6300	6300	6300	6300
	8	6300	6300	6300	6300	6300	6300	6300	8	6400	6400	6400	6400	6400	6400	6450
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	12	6500	6550	6550	6550	6550	6600	6600	12	6550	6600	6600	6600	6600	6600	6650
	14	6650	6650	6650	6700	6700	6700	6750	14	6650	6650	6650	6700	6700	6700	6750
	16	6750	6750	6800	6800	6850	6850	6900	16	6750	6750	6750	6750	6800	6800	6800
	18	6850	6900	6900	6950	6950	7000	7050	18	6800	6800	6850	6850	6850	6900	6900
	20	6950	7000	7000	7050	7100	7100	7150	20	6900	6900	6900	6950	6950	7000	7000
5	0	6550	6500	6450	6350	6300	6200	6100	0	6750	6750	6700	6700	6650	6600	6600
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	6	6850	6850	6800	6750	6700	6650	6600	6	7000	7000	6950	6950	6900	6900	6850
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	10	7100	7050	7050	7000	6950	6950	6900	10	7150	7100	7100	7100	7100	7050	7050
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	14	7250	7250	7250	7250	7200	7200	7150	14	7250	7250	7250	7250	7250	7250	7200
	16	7350	7350	7350	7350	7300	7300	7300	16	7350	7300	7300	7300	7300	7300	7300
	18	7450	7450	7450	7450	7450	7400	7400	18	7400	7400	7400	7400	7400	7350	7350
	20	7500	7500	7550	7550	7550	7550	7550	20	7450	7450	7450	7450	7450	7450	7450
6	0	7250	7200	7150	7100	7050	7000	6900	0	7400	7400	7350	7350	7300	7300	7250
	2	7300	7300	7250	7200	7150	7100	7050	2	7450	7450	7450	7400	7400	7350	7350
	4	7400	7400	7350	7300	7300	7250	7200	4	7500	7500	7500	7450	7450	7450	7400
	6	7500	7450	7450	7400	7400	7350	7300	6	7550	7550	7550	7550	7500	7500	7500
	8	7550	7550	7550	7500	7500	7450	7450	8	7600	7600	7600	7600	7600	7550	7550
	10	7650	7650	7600	7600	7600	7550	7550	10	7650	7650	7650	7650	7650	7650	7600
	12	7700	7700	7700	7700	7700	7650	7650	12	7700	7700	7700	7700	7700	7700	7700
	14	7800	7800	7750	7750	7750	7750	7750	14	7750	7750	7750	7750	7750	7750	7750
	16	7850	7850	7850	7850	7850	7850	7800	16	7800	7800	7800	7800	7800	7800	7800
7	0	7700	7650	7650	7600	7550	7550	7500	0	7800	7800	7800	7750	7750	7750	7750
	2	7750	7750	7700	7700	7650	7650	7600	2	7850	7850	7800	7800	7800	7800	7800
	4	7800	7800	7800	7750	7750	7750	7700	4	7900	7900	7850	7850	7850	7850	7850
	6	7850	7850	7850	7850	7800	7800	7800	6	7900	7900	7900	7900	7900	7900	7900
	8	7950	7900	7900	7900	7900	7900	7850	8	7950	7950	7950	7950	7950	7950	7950
	10	7950	7950	7950	7950	7950	7950	7950	10	8000	8000	8000	8000	8000	8000	8000
	12	8000	8000	8000	8000	8000	8000	8000	12	8000	8000	8000	8000	8000	8000	8000
	14	8050	8050	8050	8050	8050	8000	8000	14	8050	8050	8050	8050	8050	8050	8050

MMI N°	MMI READING	LITERS ATTITUDE MONITOR READING C	LEFT WING 1	2	3	4	E 5	RIGHT WING 6	7	MMI READING	LITERS ATTITUDE MONITOR READING C	RIGHT WING 1	2	3	4	E 5	LEFT WING 6	7
	0	50	50	50	50	50	50	50		0	50	50	50	50	50	50	50	
	2	50	50	50	50	50	50	50		2	100	50	50	50	50	50	50	
	4	100	100	100	100	100	100	100		4	100	100	100	100	100	100	100	
	6	150	150	150	150	150	150	150		6	150	150	150	150	150	150	150	
	8	150	150	150	150	150	150	150		8	150	150	150	150	150	150	150	
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	12	250	250	250	250	250	250	250		12	250	250	250	250	250	250	250	
	14	300	300	300	300	300	300	300		14	300	300	300	300	300	300	300	
	16	350	350	350	350	350	350	350		16	350	350	350	350	350	350	350	
	18	450	400	400	400	400	400	400		18	400	400	400	400	400	400	400	
	20	500	500	500	500	500	500	500		20	500	500	450	450	450	450	450	
	22	550	550	550	550	550	550	550		22	550	550	550	550	500	500	500	
	24	650	650	650	650	650	600	600		24	600	600	600	600	600	600	600	
	26	700	700	700	700	700	700	700		26	700	700	700	700	700	650	650	
	28	800	800	800	800	800	800	800		28	800	750	750	750	750	750	750	
	30	900	900	900	900	900	900	900		30	850	850	850	850	850	850	850	
1	32	1000	1000	1000	1000	1000	1000	1000		32	950	950	950	950	950	950	950	
	34	1100	1100	1100	1100	1100	1100	1100		34	1050	1050	1050	1050	1050	1050	1050	
	36	1200	1200	1200	1200	1200	1200	1200		36	1150	1150	1150	1150	1150	1150	1150	
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	40	1450	1450	1450	1450	1450	1450	1450		40	1350	1350	1350	1350	1350	1350	1350	
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	44	1700	1700	1700	1700	1700	1700	1700		44	1600	1600	1600	1600	1600	1600	1600	
	46	1800	1800	1800	1800	1800	1850	1850		46	1700	1700	1700	1700	1700	1700	1700	
	48	1950	1950	1950	1950	1950	1950	2000		48	1850	1850	1850	1850	1850	1850	1850	
	50	2100	2100	2100	2100	2100	2100	2150		50	1950	1950	1950	1950	2000	2000	2000	
	52	2250	2250	2250	2250	2250	2250	2300		52	2100	2100	2100	2100	2100	2100	2150	
	54	2400	2400	2400	2400	2400	2450	2450		54	2250	2250	2250	2250	2250	2250	2300	
	56	2550	2550	2550	2550	2600	2600	2600		56	2400	2400	2400	2400	2400	2400	2450	
	58	2700	2700	2700	2750	2750	2750	2800		58	2500	2550	2550	2550	2550	2550	2600	
	60	2850	2850	2900	2900	2900	2950	2950		60	2650	2700	2700	2700	2700	2750	2750	
	62	3000	3050	3050	3050	3100	3100	3150		62	2850	2850	2850	2850	2900	2900	2900	
	64	3200	3200	3250	3250	3300	3300	3350		64	3000	3000	3000	3050	3050	3050	3100	
	0	2350	2350	2300	2300	2250	2250	2250		0	2550	2550	2550	2500	2500	2450	2450	
	2	2500	2500	2450	2450	2400	2400	2400		2	2700	2700	2700	2650	2650	2600	2600	
	4	2650	2650	2600	2600	2600	2550	2550		4	2900	2850	2850	2800	2800	2750	2750	
	6	2800	2800	2800	2750	2750	2750	2700		6	3050	3000	3000	2950	2950	2950	2900	
	8	3000	2950	2950	2950	2900	2900	2900		8	3200	3200	3150	3150	3100	3100	3100	
	10	3150	3150	3100	3100	3100	3100	3050		10	3350	3350	3350	3300	3300	3300	3250	
	12	3350	3300	3300	3300	3250	3250	3250		12	3550	3500	3500	3500	3450	3450	3450	
	14	3500	3500	3500	3450	3450	3450	3450		14	3700	3700	3650	3650	3650	3650	3600	
2	16	3700	3700	3650	3650	3650	3650	3650		16	3900	3850	3850	3850	3800	3800	3800	
	18	3900	3900	3850	3850	3850	3850	3850		18	4050	4050	4000	4000	4000	4000	4000	
	20	4100	4050	4050	4050	4050	4050	4050		20	4200	4200	4200	4200	4200	4150	4150	
	22	4250	4250	4250	4250	4250	4250	4250		22	4350	4350	4350	4350	4350	4350	4350	
	24	4450	4450	4450	4450	4450	4450	4450		24	4500	4500	4550	4550	4550	4550	4550	
	26	4650	4650	4650	4650	4650	4650	4650		26	4650	4650	4700	4700	4700	4700	4700	
	28	4800	4800	4850	4850	4850	4850	4900		28	4800	4800	4800	4850	4850	4850	4900	
	30	4950	5000	5000	5000	5050	5050	5100		30	4900	4950	4950	5000	5000	5050	5050	
	32	5100	5150	5150	5200	5250	5250	5300		32	5050	5050	5100	5100	5150	5150	5200	
	34	5250	5250	5300	5350	5400	5450	5500		34	5150	5150	5200	5250	5300	5300	5350	

MMI N°	MMI READING	LITERS ATTITUDE READING C LEFT WING 1	2	3	4	E 5	RIGHT WING 6	7
3	0	4700	4650	4600	4550	4500	4400	4350
	2	4850	4800	4750	4750	4650	4600	4550
	4	5000	5000	4950	4900	4850	4800	4750
	6	5150	5150	5100	5100	5050	5000	4950
	8	5300	5300	5250	5250	5250	5200	5150
	10	5400	5400	5400	5400	5400	5400	5350
	12	5550	5550	5550	5550	5550	5550	5550
	14	5650	5700	5700	5700	5700	5750	5750
	16	5800	5800	5850	5850	5850	5900	5900
	18	5900	5950	5950	6000	6000	6050	6050
	20	6050	6050	6100	6150	6150	6150	6200
	22	6150	6200	6200	6250	6250	6300	6350
4	0	5850	5850	5800	5800	5750	5750	5700
	2	5950	5950	5950	5950	5900	5900	5850
	4	6100	6100	6050	6050	6050	6050	6000
	6	6200	6200	6200	6200	6200	6200	6200
	8	6300	6300	6300	6300	6300	6300	6300
	10	6400	6450	6450	6450	6450	6450	6450
	12	6550	6550	6550	6550	6600	6600	6600
	14	6650	6650	6650	6700	6700	6700	6750
	16	6750	6750	6800	6800	6800	6850	6850
	18	6850	6850	6900	6900	6950	6950	7000
	20	6950	6950	7000	7000	7050	7100	7100
5	0	6600	6550	6500	6450	6400	6350	6250
	2	6700	6700	6650	6600	6550	6450	6400
	4	6800	6800	6750	6700	6650	6600	6550
	6	6900	6900	6850	6800	6800	6750	6700
	8	7000	7000	6950	6950	6900	6850	6800
	10	7100	7100	7050	7050	7000	7000	6950
	12	7200	7150	7150	7150	7100	7100	7050
	14	7250	7250	7250	7250	7200	7200	7200
	16	7350	7350	7350	7350	7300	7300	7300
	18	7450	7400	7400	7400	7400	7400	7400
	20	7500	7500	7500	7500	7500	7500	7500
6	0	7300	7250	7200	7200	7150	7100	7000
	2	7350	7350	7300	7300	7250	7200	7150
	4	7450	7400	7400	7350	7350	7300	7250
	6	7500	7500	7500	7450	7450	7400	7350
	8	7600	7550	7550	7550	7500	7500	7450
	10	7650	7650	7650	7600	7600	7600	7550
	12	7700	7700	7700	7700	7700	7650	7650
	14	7800	7750	7750	7750	7750	7750	7750
	16	7850	7850	7850	7850	7850	7850	7800
7	0	7700	7700	7700	7650	7650	7600	7550
	2	7800	7750	7750	7750	7700	7700	7650
	4	7850	7800	7800	7800	7800	7750	7750
	6	7900	7900	7850	7850	7850	7850	7800
	8	7950	7950	7900	7900	7900	7900	7900
	10	8000	7950	7950	7950	7950	7950	7950
	12	8000	8000	8000	8000	8000	8000	8000
	14	8050	8050	8050	8050	8050	8050	8000

MMI	MMI READING	LITERS ATTITUDE READING C RIGHT WING 1	2	3	4	E 5	LEFT WING 6	7
3	0	4900	4900	4900	4850	4800	4800	4750
	2	5050	5050	5000	5000	4950	4950	4900
	4	5150	5150	5150	5150	5100	5100	5050
	6	5250	5250	5250	5250	5250	5250	5200
	8	5400	5400	5400	5400	5400	5400	5350
	10	5500	5500	5500	5500	5500	5500	5500
	12	5600	5600	5600	5600	5650	5650	5650
	14	5700	5700	5700	5750	5750	5750	5750
	16	5800	5800	5850	5850	5850	5900	5900
	18	5900	5900	5950	5950	6000	6000	6000
	20	6000	6000	6050	6050	6100	6100	6150
	22	6100	6100	6150	6150	6200	6250	6250
4	0	6000	6000	5950	5950	5950	5950	5900
	2	6100	6100	6100	6050	6050	6050	6050
	4	6200	6200	6200	6200	6150	6150	6150
	6	6300	6300	6300	6300	6300	6300	6300
	8	6350	6400	6400	6400	6400	6400	6400
	10	6450	6450	6500	6500	6500	6500	6500
	12	6550	6550	6600	6600	6600	6600	6600
	14	6650	6650	6650	6700	6700	6700	6750
	16	6750	6750	6750	6800	6800	6800	6850
	18	6800	6850	6850	6850	6900	6900	6950
	20	6900	6900	6950	6950	7000	7000	7050
5	0	6750	6700	6650	6650	6600	6550	6500
	2	6800	6800	6750	6700	6700	6650	6600
	4	6900	6850	6850	6800	6800	6750	6700
	6	6950	6950	6950	6900	6900	6850	6800
	8	7050	7050	7000	7000	6950	6950	6900
	10	7100	7100	7100	7100	7050	7050	7000
	12	7200	7200	7200	7150	7150	7150	7100
	14	7250	7250	7250	7250	7250	7200	7200
	16	7350	7350	7300	7300	7300	7300	7300
	18	7400	7400	7400	7400	7400	7400	7400
	20	7450	7450	7450	7450	7450	7450	7450
6	0	7350	7350	7300	7300	7250	7250	7200
	2	7450	7400	7400	7350	7350	7300	7300
	4	7500	7500	7450	7450	7450	7400	7400
	6	7550	7550	7550	7500	7500	7500	7450
	8	7600	7600	7600	7600	7550	7550	7550
	10	7650	7650	7650	7650	7650	7600	7600
	12	7700	7700	7700	7700	7700	7700	7700
	14	7750	7750	7750	7750	7750	7750	7750
	16	7800	7800	7800	7800	7800	7800	7800
7	0	7750	7750	7750	7750	7700	7700	7700
	2	7800	7800	7800	7800	7800	7750	7750
	4	7850	7850	7850	7850	7850	7850	7800
	6	7900	7900	7900	7900	7900	7900	7850
	8	7950	7950	7950	7950	7950	7950	7900
	10	8000	8000	8000	8000	8000	7950	7950
	12	8000	8000	8000	8000	8000	8000	8000
	14	8050	8050	8050	8050	8050	8050	8050

MMI N°	MMI READING	LITERS ATTITUDE MONITOR READING D BOTH WINGS 1	2	3	4	5	6	7
1	0	50	50	50	50	50	50	50
	2	50	50	50	50	50	50	50
	4	100	100	100	100	100	100	100
	6	150	150	150	150	150	150	150
	8	150	150	150	150	150	150	150
	10	200	200	200	200	200	200	200
	12	250	250	250	250	250	250	250
	14	300	300	300	300	300	300	300
	16	350	350	350	350	350	350	350
	18	400	400	400	400	400	400	400
	20	500	500	500	450	450	450	450
	22	550	550	550	550	550	550	550
	24	650	600	600	600	600	600	600
	26	700	700	700	700	700	700	700
	28	800	800	800	800	750	750	750
	30	900	850	850	850	850	850	850
	32	950	950	950	950	950	950	950
	34	1050	1050	1050	1050	1050	1050	1050
	36	1150	1150	1150	1150	1150	1150	1150
	38	1300	1250	1250	1250	1250	1250	1250
	40	1400	1400	1400	1400	1400	1400	1400
	42	1500	1500	1500	1500	1500	1500	1500
	44	1650	1650	1650	1650	1650	1650	1650
	46	1750	1750	1750	1750	1750	1750	1750
	48	1900	1900	1900	1900	1900	1900	1900
	50	2000	2000	2050	2050	2050	2050	2050
	52	2150	2150	2150	2150	2200	2200	2200
	54	2300	2300	2300	2300	2350	2350	2350
	56	2450	2450	2450	2450	2500	2500	2500
	58	2600	2600	2600	2650	2650	2650	2700
	60	2750	2750	2800	2800	2800	2800	2850
	62	2900	2900	2950	2950	3000	3000	3000
	64	3050	3100	3100	3150	3150	3150	3200
2	0	2450	2450	2400	2400	2350	2350	2350
	2	2600	2600	2550	2550	2500	2500	2500
	4	2750	2750	2750	2700	2700	2650	2650
	6	2950	2900	2900	2850	2850	2850	2800
	8	3100	3050	3050	3050	3000	3000	3000
	10	3250	3250	3200	3200	3200	3200	3150
	12	3450	3400	3400	3400	3350	3350	3350
	14	3600	3600	3600	3550	3550	3550	3550
	16	3800	3800	3750	3750	3750	3750	3700
	18	3950	3950	3950	3950	3950	3900	3900
	20	4150	4150	4150	4150	4100	4100	4100
	22	4350	4350	4300	4300	4300	4300	4300
	24	4500	4500	4500	4500	4500	4500	4500
	26	4650	4650	4650	4700	4700	4700	4700
	28	4800	4800	4850	4850	4850	4850	4900
	30	4950	4950	5000	5000	5050	5050	5050
	32	5050	5100	5100	5150	5200	5200	5250
	34	5200	5200	5250	5300	5350	5350	5400

MMI N°	MMI READING	LITERS ATTITUDE MONITOR READING D BOTH WINGS 1	2	3	4	5	6	7
3	0	4850	4800	4800	4750	4700	4650	4550
	2	4950	4950	3950	4900	4850	4800	4750
	4	5100	5100	5100	5050	5050	5000	4950
	6	5200	5200	5200	5200	5200	5150	5150
	8	5350	5350	5350	5350	5350	5350	5300
	10	5450	5450	5450	5450	5450	5450	5450
	12	5600	5600	5600	5600	5600	5600	5600
	14	5700	5700	5700	5700	5750	5750	5750
	16	5800	5800	5850	5850	5850	5900	5900
	18	5900	5950	5950	5950	6000	6000	6050
	20	6000	6050	6050	6100	6100	6150	6150
	22	6100	6150	6150	6200	6250	6250	6300
4	0	5950	5900	5900	5900	5900	5850	5850
	2	6050	6050	6000	6000	6000	6000	6000
	4	6150	6150	6150	6150	6150	6100	6100
	6	6250	6250	6250	6250	6250	6250	6250
	8	6350	6350	6350	6350	6350	6350	6350
	10	6450	6450	6450	6450	6500	6500	6500
	12	6550	6550	6550	6600	6600	6600	6600
	14	6650	6650	6650	6700	6700	6700	6750
	16	6750	6750	6750	6800	6800	6850	6850
	18	6850	6850	6850	6900	6900	6950	6950
	20	6850	6850	6850	6900	6900	6950	6950
5	0	6700	6650	6600	6550	6500	6450	6400
	2	6750	6750	6700	6650	6600	6600	6500
	4	6850	6850	6800	6750	6750	6700	6650
	6	6950	6950	6900	6850	6850	6800	6750
	8	7050	7000	7000	6950	6950	6900	6900
	10	7100	7100	7100	7050	7050	7000	7000
	12	7200	7200	7150	7150	7150	7100	7100
	14	7250	7250	7250	7250	7250	7200	7200
	16	7350	7350	7350	7350	7300	7300	7300
	18	7400	7400	7400	7400	7400	7400	7400
	20	7500	7500	7500	7500	7500	7500	7500
6	0	7350	7300	7300	7250	7200	7200	7150
	2	7400	7400	7350	7350	7300	7300	7250
	4	7450	7450	7450	7400	7400	7350	7350
	6	7550	7500	7500	7500	7450	7450	7450
	8	7600	7600	7600	7550	7550	7550	7500
	10	7650	7650	7650	7650	7600	7600	7600
	12	7700	7700	7700	7700	7700	7700	7650
	14	7750	7750	7750	7750	7750	7750	7750
	16	7800	7800	7800	7800	7800	7800	7800
7	0	7750	7750	7700	7700	7700	7650	7650
	2	7800	7800	7800	7750	7750	7750	7700
	4	7850	7850	7850	7850	7800	7800	7800
	6	7900	7900	7900	7900	7850	7850	7850
	8	7950	7950	7950	7950	7950	7900	7900
	10	8000	8000	8000	7950	7950	7950	7950
	12	8000	8000	8000	8000	8000	8000	8000
	14	8050	8050	8050	8050	8050	8050	8050

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

WING TANKS (LITERS)

MMI N°	MMI READING	LITERS ATTITUDE READING A* LEFT WING 1	2	3	4	G 5	RIGHT WING 6	7	MMI READING	LITERS ATTITUDE READING A RIGHT WING 1	2	3	4	G 5	LEFT WING 6	7**
2	2	2300	2250	2200	2200	2200	2200	2200	2	2850	2850	2850	2850	2850	2850	2800
	4	2500	2450	2400	2400	2350	2350	2350	4	3050	3050	3050	3050	3050	3000	3000
	6	2650	2600	2600	2600	2550	2500	2500	6	3200	3200	3200	3200	3200	3200	3150
	8	2750	2750	2750	2700	2700	2650	2650	8	3300	3300	3300	3300	3300	3300	3250
	10	2900	2900	2900	2900	2850	2850	2850	10	3500	3500	3500	3500	3450	3450	3400
	12	3100	3100	3100	3100	3100	3050	3000	12	3650	3650	3600	3600	3600	3600	3600
	14	3250	3250	3250	3250	3250	3250	3200	14	3800	3800	3750	3750	3750	3750	3750
	16	3450	3450	3450	3450	3450	3400	3400	16	3950	3900	3900	3900	3900	3900	3900
	18	3700	3650	3650	3650	3650	3600	3600	18	4050	4050	4050	4050	4050	4050	4050
	20	3900	3900	3900	3900	3850	3850	3850	20	4200	4200	4200	4200	4200	4200	4200
	22	4100	4100	4050	4050	4050	4050	4050	22	4250	4250	4250	4300	4300	4300	4300
	24	4300	4300	4300	4300	4300	4300	4300	24	4400	4400	4400	4400	4450	4450	4450
	26	4500	4500	4500	4500	4500	4500	4550	26	4500	4500	4550	4550	4550	4600	4600
	28	4700	4700	4750	4750	4750	4750	4750	28	4600	4650	4650	4700	4700	4750	4800
	30	4950	4950	4950	4950	5000	5000	5000	30	4750	4750	4800	4800	4850	4850	4900
	32	5100	5100	5150	5150	5150	5200	5200	32	4850	4850	4900	4900	4950	5000	5000
	MAX								MAX							
3																
	2	4400	4350	4300	4250	4200	4150	4050	2	5050	5050	5100	5100	5100	5100	5100
	4	4700	4700	4650	4600	4500	4400	4300	4	5150	5150	5200	5200	5200	5200	5200
	6	4950	4950	4900	4850	4800	4700	4550	6	5250	5250	5300	5300	5300	5300	5300
	8	5150	5100	5100	5050	5000	4950	4800	8	5350	5350	5400	5400	5400	5400	5400
	10	5250	5250	5250	5250	5200	5150	5050	10	5450	5450	5500	5500	5500	5500	5500
	12	5400	5400	5400	5400	5350	5300	5250	12	5500	5500	5550	5600	5600	5600	5650
	14	5600	5600	5550	5550	5500	5500	5450	14	5600	5650	5650	5700	5700	5700	5750
	16	5750	5750	5700	5700	5700	5650	5600	16	5650	5700	5700	5750	5750	5800	5800
	18	5900	5900	5850	5850	5850	5850	5800	18	5800	5800	5850	5850	5900	5900	5950
	20	6000	6000	6000	6000	6000	6000	6000	20	5900	5900	5950	5950	6000	6000	6050

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

MMI N°	MMI READING	LITERS ATTITUDE READING A LEFT WING 1	2	3	4	G 5	RIGHT WING 6	7	MMI READING	LITERS ATTITUDE READING A RIGHT WING 1	2	3	4	G 5	LEFT WING 6	7
4	2	5700	5600	5550	5500	5450	5400	5300	2	6000	6050	6100	6100	6100	6100	6100
	4	5850	5750	5700	5650	5600	5550	5500	4	6100	6100	6150	6150	6150	6200	6200
	6	6000	5900	5850	5800	5750	5700	5650	6	6200	6200	6200	6250	6250	6250	6300
	8	6150	6100	6050	6000	5950	5900	5850	8	6250	6300	6300	6350	6350	6350	6400
	10	6300	6300	6250	6200	6150	6150	6100	10	6350	6400	6400	6400	6450	6450	6450
	12	6450	6400	6400	6400	6350	6300	6250	12	6450	6450	6450	6500	6500	6550	6550
	14	6550	6500	6500	6500	6500	6450	6450	14	6500	6550	6550	6550	6600	6600	6650
	16	6600	6600	6600	6600	6600	6600	6550	16	6600	6600	6600	6650	6650	6700	6750
	18	6650	6650	6650	6650	6650	6650	6650	18	6650	6700	6700	6750	6750	6750	6800
	MAX								MAX							
5	2	650	600	550	550	550	500	500	2	700	700	700	700	700	700	700
	4	700	650	650	600	600	550	550	4	750	750	750	750	750	750	750
	6	750	700	700	650	650	650	600	6	800	800	800	800	750	750	750
	8	750	750	750	750	700	700	700	8	800	800	800	800	800	800	800
	10	800	800	800	750	750	750	750	10	850	850	850	850	850	850	850
	12	800	800	800	800	800	800	800	12	850	850	850	850	850	850	850
	14	850	850	850	850	850	850	850	14	850	850	850	850	850	850	850
	MAX	850	850	850	850	850	850	850	MAX	850	850	850	850	850	850	850

MMI N°	MMI READING	LITERS ATTITUDE READING B* LEFT WING 1	2	3	4	F 5	RIGHT WING 6	7	MMI READING	LITERS ATTITUDE READING B RIGHT WING 1	2	3	4	F 5	LEFT WING 6	7**
2	2	2350	2350	2300	2300	2250	2200	2200	2	2800	2750	2750	2750	2700	2700	2650
	4	2550	2500	2500	2450	2450	2400	2400	4	2950	2950	2900	2900	2900	2900	2850
	6	2750	2700	2700	2650	2650	2600	2600	6	3100	3100	3100	3100	3100	3050	3050
	8	2850	2850	2800	2800	2800	2750	2750	8	3200	3200	3200	3200	3200	3200	3150
	10	3000	3000	3000	3000	3000	2950	2900	10	3400	3400	3350	3350	3350	3350	3300
	12	3150	3150	3200	3150	3150	3150	3100	12	3550	3550	3550	3550	3500	3500	3450
	14	3350	3350	3350	3350	3350	3300	3300	14	3750	3700	3700	3700	3650	3650	3650
	16	3550	3550	3550	3550	3500	3500	3450	16	3900	3850	3850	3850	3850	3800	3800
	18	3750	3750	3750	3750	3700	3700	3650	18	4050	4000	4000	4000	4000	4000	3950
	20	4000	3950	3950	3950	3950	3900	3900	20	4200	4150	4150	4150	4150	4150	4150
	22	4150	4100	4100	4100	4100	4100	4100	22	4250	4250	4250	4250	4250	4250	4250
	24	4300	4300	4300	4300	4300	4300	4300	24	4400	4400	4400	4400	4400	4400	4400
	26	4500	4500	4500	4500	4500	4500	4500	26	4500	4500	4500	4550	4550	4550	4550
	28	4700	4700	4700	4700	4700	4750	4750	28	4650	4650	4650	4650	4700	4700	4750
	30	4850	4900	4900	4900	4950	4950	4950	30	4750	4750	4800	4800	4850	4850	4900
	32	5050	5100	5100	5100	5100	5150	5150	32	4850	4900	4900	4950	4950	5000	5050
	MAX								MAX							
3	2	4550	4500	4500	4450	4400	4350	4300	2	5000	5000	5000	5000	5000	5000	4950
	4	4800	4800	4800	4750	4650	4600	4500	4	5100	5100	5100	5100	5100	5100	5100
	6	5050	5000	5000	5000	4900	4850	4750	6	5200	5200	5200	5250	5200	5200	5200
	8	5150	5150	5150	5150	5100	5000	5000	8	5300	5300	5350	5350	5350	5350	5350
	10	5300	5300	5300	5300	5250	5200	5150	10	5400	5400	5450	5450	5450	5450	5450
	12	5450	5450	5450	5450	5400	5400	5350	12	5500	5500	5550	5550	5550	5550	5550
	14	5600	5600	5600	5550	5550	5550	5500	14	5600	5600	5650	5650	5650	5650	5700
	16	5700	5700	5700	5700	5700	5700	5700	16	5700	5700	5700	5750	5750	5750	5800
	18	5850	5850	5850	5850	5850	5850	5850	18	5800	5800	5800	5850	5850	5850	5900
	20	6000	6000	6050	6050	6050	6000	6000	20	5900	5900	5950	5950	6000	6000	6000
	MAX								MAX							

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

MMI N°	MMI READING	LITERS ATTITUDE READING B LEFT WING 1	2	3	4	F RIGHT WING 5	6	7
4	2							
	4	5850	5750	5700	5650	5600	5600	5600
	6	6000	6000	5950	5900	5850	5800	5800
	8	6150	6150	6100	6100	6050	6000	6000
	10	6300	6300	6250	6250	6250	6200	6150
	12	6400	6400	6400	6400	6350	6350	6300
	14	6500	6500	6500	6500	6500	6450	6450
	16	6600	6600	6600	6600	6550	6550	6550
	18	6760	6770	6770	6770	6770	6770	6760
	MAX							
5								
	2	650	650	600	600	600	550	550
	4	750	700	700	650	650	600	600
	6	750	750	750	700	700	650	650
	8	800	800	750	750	750	750	700
	10	800	800	800	800	800	750	750
	12	850	850	800	800	800	800	800
	14	850	850	850	850	850	850	850
	MAX	850	850	850	850	850	850	850

MMI N°	MMI READING	LITERS ATTITUDE READING B RIGHT WING 1	2	3	4	F LEFT WING 5	6	7
4	2	5950	5950	6100	6000	6050	6050	6050
	4	6050	6050	6100	6100	6100	6100	6150
	6	6150	6150	6200	6200	6200	6200	6200
	8	6250	6250	6250	6300	6300	6300	6300
	10	6350	6350	6350	6400	6400	6400	6400
	12	6400	6450	6450	6450	6500	6500	6500
	14	6500	6500	6550	6550	6600	6600	6600
	16	6600	6600	6600	6650	6650	6700	6700
	18	6750	6770	6800	6830	6850	6870	6880
	MAX							
5								
	2	750	700	700	700	700	700	700
	4	750	750	750	750	750	750	750
	6	800	800	800	800	750	750	750
	8	800	800	800	800	800	800	800
	10	850	850	850	850	800	800	800
	12	850	850	850	850	850	850	850
	14	850	850	850	850	850	850	850
	MAX	850	850	850	850	850	850	850

MMI N°	MMI READING	LITERS ATTITUDE READING C* LEFT WING 1	2	3	4	E RIGHT WING 5	6	7
2	2	2450	2400	2400	2400	2350	2350	2350
	4	2650	2600	2600	2600	2550	2550	2500
	6	2800	2800	2800	2800	2750	2750	2700
	8	2900	2900	2900	2900	2900	2850	2850
	10	3100	3100	3100	3100	3100	3050	3000
	12	3250	3250	3250	3250	3250	3250	3200
	14	3450	3450	3450	3450	3400	3400	3350
	16	3650	3650	3650	3600	3600	3550	3550
	18	3850	3850	3800	3800	3800	3750	3750
	20	4050	4050	4000	4000	4000	3950	3950
	22	4200	4200	4150	4150	4150	4100	4100
	24	4350	4350	4300	4300	4300	4300	4300
	26	4500	4500	4500	4500	4500	4500	4500
	28	4650	4650	4650	4700	4700	4700	4700
	30	4850	4850	4850	4850	4900	4900	4900
	32	5000	5000	5000	5050	5050	5050	5100
	MAX							
3								
	2	4650	4650	4650	4600	4600	4500	4500
	4	4900	4900	4900	4900	4800	4750	4650
	6	5100	5100	5100	5050	5050	5000	4900
	8	5200	5200	5200	5200	5200	5150	5100
	10	5300	5350	5350	5350	5300	5300	5250
	12	5450	5450	5450	5450	5450	5450	5400
	14	5600	5600	5600	5600	5600	5600	5550
	16	5700	5700	5700	5700	5700	5700	5700
	18	5800	5850	5850	5850	5850	5850	5850
	20	5950	5950	6000	6000	6000	6000	6000

MMI N°	MMI READING	LITERS ATTITUDE READING C RIGHT WING 1	2	3	4	E LEFT WING 5	6	7**
2	2	2700	2650	2650	2600	2600	2550	2550
	4	2850	2800	2800	2800	2800	2750	2750
	6	3000	3000	3000	3000	3000	2950	2900
	8	3100	3100	3100	3100	3100	3100	3050
	10	3300	3300	3300	3250	3250	3250	3200
	12	3450	3450	3450	3450	3450	3400	3350
	14	3650	3650	3600	3600	3600	3550	3550
	16	3800	3800	3800	3750	3750	3750	3700
	18	4000	3950	3950	3950	3900	3900	3900
	20	4150	4100	4100	4100	4100	4100	4100
	22	4250	4250	4200	4200	4200	4200	4200
	24	4350	4350	4350	4350	4350	4350	4350
	26	4500	4500	4500	4500	4500	4500	4550
	28	4650	4650	4650	4650	4700	4700	4700
	30	4750	4800	4800	4800	4850	4850	4850
	32	4900	4900	4950	4950	5000	5000	5050
	MAX							
3								
	2	4900	4900	4900	4900	4900	4850	4800
	4	5050	5100	5100	5100	5100	5050	5000
	6	5150	5200	5200	5200	5200	5150	5150
	8	5250	5300	5300	5300	5300	5300	5300
	10	5350	5400	5400	5400	5400	5400	5400
	12	5500	5500	5500	5500	5550	5550	5550
	14	5600	5600	5600	5650	5650	5650	5650
	16	5700	5700	5750	5750	5750	5750	5800
	18	5800	5800	5850	5850	5900	5900	5900
	20	5900	5950	5950	6000	6000	6000	6000

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

MMI N°	MMI READING	LITERS ATTITUDE READING C LEFT WING 1	2	3	4	E 5	RIGHT WING 6	7	MMI READING	LITERS ATTITUDE READING C RIGHT WING 1	2	3	4	E 5	LEFT WING 6	7
4	2	5800	5750	5750	5700	5700	5700	5700	2	5900	5900	5900	5900	5950	5950	5950
	4	5950	5900	5900	5850	5850	5800	5800	4	6000	6000	6000	6050	6050	6050	6050
	6	6050	6050	6000	6000	6000	5950	5950	6	6100	6100	6150	6150	6150	6150	6150
	8	6200	6150	6150	6150	6150	6100	6100	8	6200	6250	6250	6250	6250	6250	6250
	10	6300	6300	6300	6300	6300	6250	6250	10	6300	6350	6350	6350	6350	6350	6350
	12	6400	6400	6400	6400	6400	6400	6400	12	6400	6400	6450	6450	6450	6450	6450
	14	6500	6500	6500	6500	6500	6500	6500	14	6500	6500	6500	6550	6550	6550	6550
	16	6600	6600	6600	6600	6600	6600	6600	16	6550	6600	6600	6600	6600	6600	6600
	18	6730	6740	6750	6750	6760	6760	6770	18	6750	6750	6770	6790	6800	6810	6820
	MAX								MAX							
5	2	700	700	650	650	600	600	600	2	750	700	700	700	700	650	650
	4	750	750	700	700	650	650	650	4	750	750	750	750	700	700	700
	6	750	750	750	750	700	700	700	6	800	800	750	750	750	750	750
	8	800	800	800	750	750	750	750	8	800	800	800	800	800	800	800
	10	800	800	800	800	800	800	800	10	850	850	850	800	800	800	800
	12	850	850	850	800	800	800	800	12	850	850	850	850	850	850	850
	14	850	850	850	850	850	850	850	14	900	900	850	850	850	850	850

MMI N°	MMI READING	LITERS ATTITUDE READING D* BOTH WINGS 1	2	3	4	5	6	7	MMI READING	LITERS ATTITUDE READING D BOTH WINGS 1	2	3	4	5	6	7**	MMI N°
2	2	2550	2550	2500	2500	2450	2450	2450	2	5900	5850	5800	5800	5800	5800	5800	4
	4	2750	2700	2700	2700	2650	2650	2600	4	6000	5950	5950	5950	5950	5950	5950	
	6	2900	2900	2850	2850	2850	2800	2800	6	6100	6100	6050	6050	6050	6050	6050	
	8	3000	3000	2950	2950	2950	2950	2900	8	6200	6200	6200	6200	6200	6200	6200	
	10	3200	3150	3150	3150	3150	3100	3050	10	6300	6300	6300	6300	6300	6300	6300	
	12	3350	3350	3350	3350	3300	3300	3250	12	6400	6400	6400	6400	6400	6400	6400	
	14	3550	3550	3550	3500	3500	3450	3450	14	6500	6500	6500	6500	6500	6500	6500	
	16	3750	3750	3700	3700	3650	3650	3600	16	6600	6600	6600	6600	6600	6600	6600	
	18	3950	3900	3900	3850	3850	3850	3800	18	6750	6750	6770	6800	6800	6810	6820	
	20	4100	4100	4050	4050	4050	4000	4000	MAX								
	22	4200	4200	4150	4150	4150	4150	4150									
	24	4350	4350	4350	4300	4300	4300	4300	2	700	700	700	650	650	650	600	5
	26	4500	4500	4500	4500	4500	4500	4500	4	750	750	750	700	700	700	650	
	28	4650	4650	4650	4650	4650	4700	4700	6	800	800	750	750	750	750	700	
	30	4800	4800	4800	4850	4850	4850	4900	8	800	800	800	800	800	750	750	
	32	4950	4950	5000	5000	5000	5050	5100	10	850	800	800	800	800	800	800	
	MAX								12	850	850	850	850	850	850	850	
									14	850	850	850	850	850	850	850	
3	2	4800	4800	4800	4800	4750	4750	4600	MAX	850	850	850	850	850	850	850	
	4	5000	5000	5000	5000	4950	4900	4850									
	6	5100	5150	5150	5100	5100	5100	5050									
	8	5250	5250	5250	5250	5250	5200	5200									
	10	5350	5350	5350	5400	5400	5350	5350									
	12	5450	5500	5500	5500	5500	5500	5500									
	14	5600	5600	5600	5600	5600	5600	5600									
	16	5700	5700	5700	5750	5750	5750	5750									
	18	5800	5800	5850	5850	5850	5900	5900									
	20	5900	5900	5950	5950	5950	6000	6000									
	MAX																

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

Applicable to: B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

WING TANKS (U.S. GAL.)

MMI N°	MMI READING	U.S. GAL. ATTITUDE READING A*	LEFT WING 1	2	3	4	G 5	RIGHT WING 6	7	MMI READING	U.S. GAL. ATTITUDE READING A	RIGHT WING 1	2	3	4	G 5	LEFT WING 6	7**
2	2	610	590	580	580	580	580	580		2	750	750	750	750	750	750	740	
	4	660	650	630	630	620	620	620		4	810	810	810	810	810	790	790	
	6	700	690	690	690	670	660	660		6	850	850	850	850	850	850	830	
	8	730	730	730	710	710	700	700		8	870	870	870	870	870	870	860	
	10	770	770	770	770	750	750	750		10	920	920	920	920	910	910	900	
	12	820	820	820	820	820	810	790		12	960	960	950	950	950	950	950	
	14	860	860	860	860	860	860	850		14	1000	1000	990	990	990	990	990	
	16	910	910	910	910	910	900	900		16	1040	1030	1030	1030	1030	1030	1030	
	18	980	960	960	960	960	950	950		18	1070	1070	1070	1070	1070	1070	1070	
	20	1030	1030	1030	1030	1020	1020	1020		20	1110	1110	1110	1110	1110	1110	1110	
	22	1080	1080	1070	1070	1070	1070	1070		22	1120	1120	1120	1140	1140	1140	1140	
	24	1140	1140	1140	1140	1140	1140	1140		24	1160	1160	1160	1160	1180	1180	1180	
	26	1190	1190	1190	1190	1190	1190	1200		26	1190	1190	1200	1200	1200	1220	1220	
	28	1240	1240	1250	1250	1250	1250	1250		28	1220	1230	1230	1240	1240	1250	1270	
	30	1310	1310	1310	1310	1320	1320	1320		30	1250	1250	1270	1270	1280	1280	1290	
	32	1350	1350	1360	1360	1360	1370	1370		32	1280	1280	1290	1290	1310	1320	1320	
	MAX									MAX								
3	2	1160	1150	1140	1120	1110	1100	1070		2	1330	1330	1350	1350	1350	1350	1350	
	4	1240	1240	1230	1220	1190	1160	1140		4	1360	1360	1360	1370	1370	1370	1370	
	6	1310	1310	1290	1280	1270	1240	1200		6	1390	1390	1400	1400	1400	1400	1400	
	8	1360	1350	1350	1330	1320	1310	1270		8	1410	1410	1430	1430	1430	1430	1430	
	10	1390	1390	1390	1390	1370	1360	1330		10	1440	1440	1450	1450	1450	1450	1450	
	12	1430	1430	1430	1430	1410	1400	1390		12	1450	1470	1470	1480	1480	1480	1490	
	14	1480	1480	1470	1470	1450	1450	1440		14	1480	1490	1490	1510	1510	1510	1520	
	16	1520	1520	1510	1510	1510	1490	1480		16	1490	1510	1510	1520	1520	1530	1530	
	18	1560	1560	1540	1540	1540	1540	1530		18	1530	1530	1540	1540	1560	1560	1570	
	20	1580	1580	1580	1580	1580	1580	1580		20	1560	1560	1570	1570	1580	1580	1600	

(*) GRID SQUARE LETTER

(**) GRID SQUARE NUMBER

MMI N°	READING	U.S. GAL. ATTITUDE READING A LEFT WING 1	2	3	4	G 5	RIGHT WING 6	7	READING	U.S. GAL. ATTITUDE READING A RIGHT WING 1	2	3	4	G 5	LEFT WING 6	7
4	2	1510	1480	1470	1450	1440	1430	1400	2	1580	1600	1610	1610	1610	1610	1610
	4	1540	1520	1510	1490	1480	1470	1450	4	1610	1610	1620	1620	1620	1640	1640
	6	1580	1560	1540	1530	1520	1510	1490	6	1640	1640	1640	1650	1650	1650	1660
	8	1620	1610	1600	1580	1570	1560	1540	8	1650	1650	1660	1680	1680	1680	1690
	10	1660	1660	1650	1640	1620	1620	1610	10	1680	1690	1690	1690	1700	1700	1700
	12	1700	1690	1690	1690	1680	1660	1650	12	1700	1700	1700	1720	1720	1730	1730
	14	1730	1720	1720	1720	1720	1700	1700	14	1720	1730	1730	1730	1740	1740	1760
	16	1740	1740	1740	1740	1740	1740	1730	16	1740	1740	1740	1760	1760	1770	1780
	18	1760	1760	1760	1760	1760	1760	1760	18	1760	1770	1770	1780	1780	1780	1800
	MAX	1800	1800	1800	1800	1800	1800	1800	MAX	1800	1810	1810	1820	1820	1820	1820
5	2	170	160	150	150	150	130	130	2	180	180	180	180	180	180	180
	4	180	170	170	160	160	150	150	4	200	200	200	200	190	190	190
	6	190	180	180	170	170	170	160	6	210	210	210	210	200	200	200
	8	200	200	200	190	180	180	180	8	210	210	210	210	210	210	210
	10	210	210	210	200	200	200	200	10	220	220	220	220	220	220	220
	12	210	210	210	210	210	210	210	12	220	220	220	220	220	220	220
	14	220	220	220	220	220	220	220	14	220	220	220	220	220	220	220
	MAX	220	220	220	220	220	220	220	MAX	220	220	220	220	220	220	220

MMI N°	READING	U.S. GAL. ATTITUDE READING B* LEFT WING 1	2	3	4	F 5	RIGHT WING 6	7	READING	U.S. GAL. ATTITUDE READING B RIGHT WING 1	2	3	4	F 5	LEFT WING 6	7**
2	2	620	620	610	610	590	580	580	2	740	730	730	730	710	710	700
	4	670	660	660	650	650	630	630	4	780	780	770	770	770	770	750
	6	730	710	710	700	700	690	690	6	820	820	820	820	820	810	810
	8	750	750	740	740	740	730	730	8	850	850	850	850	850	850	830
	10	790	790	790	790	790	780	770	10	900	900	880	880	880	880	870
	12	830	830	850	830	830	830	820	12	940	940	940	940	920	920	910
	14	880	880	880	880	880	870	870	14	990	980	980	980	960	960	960
	16	940	940	940	940	920	920	910	16	1030	1020	1020	1020	1020	1000	1000
	18	990	990	990	990	980	980	960	18	1070	1060	1060	1060	1060	1060	1040
	20	1060	1040	1040	1040	1040	1030	1030	20	1110	1100	1100	1100	1100	1100	1100
	22	1100	1080	1080	1080	1080	1080	1080	22	1120	1120	1120	1120	1120	1120	1120
	24	1140	1140	1140	1140	1140	1140	1140	24	1160	1160	1160	1160	1160	1160	1160
	26	1190	1190	1190	1190	1190	1190	1190	26	1190	1190	1190	1200	1200	1200	1200
	28	1240	1240	1240	1240	1240	1250	1250	28	1230	1230	1230	1230	1240	1240	1250
	30	1280	1290	1290	1290	1310	1310	1310	30	1250	1250	1270	1270	1280	1280	1290
	32	1330	1350	1350	1350	1350	1360	1360	32	1280	1290	1290	1310	1310	1320	1330
	MAX								MAX							
3	2	1200	1190	1190	1180	1160	1150	1140	2	1320	1320	1320	1320	1320	1320	1310
	4	1270	1270	1270	1250	1230	1220	1190	4	1350	1350	1350	1350	1350	1350	1350
	6	1330	1320	1320	1320	1290	1280	1250	6	1370	1370	1370	1390	1370	1370	1370
	8	1360	1360	1360	1360	1350	1320	1320	8	1400	1400	1410	1410	1410	1410	1410
	10	1400	1400	1400	1400	1390	1370	1360	10	1430	1430	1440	1440	1440	1440	1440
	12	1440	1440	1440	1440	1430	1430	1410	12	1450	1450	1470	1470	1470	1470	1470
	14	1480	1480	1480	1470	1470	1470	1450	14	1480	1480	1490	1490	1490	1490	1510
	16	1510	1510	1510	1510	1510	1510	1510	16	1510	1510	1510	1520	1520	1520	1530
	18	1540	1540	1540	1540	1540	1540	1540	18	1530	1530	1530	1540	1540	1540	1560
	20	1580	1580	1580	1580	1580	1580	1580	20	1560	1560	1570	1570	1580	1580	1580

(*) GRID SQUARE LETTER

(**) GRID SQUARE NUMBER

MMI N°	MMI READING	U.S. GAL. ATTITUDE READING B LEFT WING 1	2	3	4	F RIGHT WING 5	6	7
4	2							
	4	1540	1520	1510	1490	1480	1480	1480
	6	1580	1580	1570	1560	1540	1530	1530
	8	1620	1620	1610	1610	1600	1580	1580
	10	1660	1660	1650	1650	1650	1640	1620
	12	1690	1690	1690	1690	1680	1680	1660
	14	1720	1720	1720	1720	1720	1700	1700
	16	1740	1740	1740	1740	1730	1730	1730
	18	1790	1790	1790	1790	1790	1790	1790
	MAX	1790	1790	1790	1790	1790	1790	1790
5	2	170	170	160	160	160	150	150
	4	190	180	180	170	170	160	160
	6	200	200	190	180	180	170	170
	8	210	210	200	200	200	190	180
	10	210	210	210	210	210	200	200
	12	220	220	210	210	210	210	210
	14	220	220	220	220	220	220	220

MMI READING	U.S. GAL. ATTITUDE READING B RIGHT WING 1	2	3	4	F LEFT WING 5	6	7	MMI N°
2								
4	1570	1570	1580	1580	1600	1600	1600	
6	1600	1600	1610	1610	1610	1610	1620	
8	1620	1620	1640	1640	1640	1640	1640	
10	1650	1650	1660	1660	1660	1660	1660	
12	1680	1680	1680	1690	1690	1690	1690	
14	1690	1700	1700	1700	1720	1720	1720	4
16	1720	1720	1730	1730	1740	1740	1740	
18	1740	1740	1740	1760	1760	1770	1770	
MAX	1780	1790	1800	1810	1810	1820	1820	
	1800	1810	1810	1820	1820	1820	1820	
2								
4	190	180	180	180	180	180	180	
6	200	200	200	200	190	190	190	
8	210	210	210	210	200	200	200	
10	210	210	210	210	210	210	210	
12	220	220	220	220	220	220	220	
14	220	220	220	220	220	220	220	5

MMI N°	MMI READING	U.S. GAL. ATTITUDE READING C* LEFT WING 1	2	3	4	E RIGHT WING 5	6	7
2	2	650	630	630	630	620	620	620
	4	700	690	690	690	670	670	660
	6	740	740	740	740	730	730	710
	8	770	770	770	770	770	750	750
	10	820	820	820	820	820	810	790
	12	860	860	860	860	860	860	850
	14	910	910	910	910	900	900	880
	16	960	960	960	950	950	940	940
	18	1020	1020	1000	1000	1000	990	990
	20	1070	1070	1060	1060	1060	1040	1040
	22	1110	1110	1110	1110	1110	1080	1080
	24	1150	1150	1140	1140	1140	1140	1140
	26	1190	1190	1190	1190	1190	1190	1190
	28	1230	1230	1230	1240	1240	1240	1240
	30	1280	1280	1280	1280	1290	1290	1290
	32	1320	1320	1320	1330	1330	1330	1350
	MAX							
3	2	1230	1230	1230	1220	1220	1190	1190
	4	1290	1290	1290	1290	1270	1250	1250
	6	1350	1350	1350	1330	1330	1320	1290
	8	1370	1370	1370	1370	1370	1360	1350
	10	1400	1410	1410	1410	1400	1400	1390
	12	1440	1440	1440	1440	1440	1440	1430
	14	1480	1480	1480	1480	1480	1480	1470
	16	1510	1510	1510	1510	1510	1510	1510
	18	1530	1540	1540	1540	1540	1540	1540
	20	1570	1570	1580	1580	1580	1580	1580
	MAX							

MMI READING	U.S. GAL. ATTITUDE READING C RIGHT WING 1	2	3	4	E LEFT WING 5	6	7**	MMI N°
2								
4	710	700	700	690	690	670	670	
6	750	740	740	740	740	730	730	
8	790	790	790	790	790	780	770	
10	820	820	820	820	820	820	810	
12	870	870	870	860	860	860	850	
14	910	910	910	910	910	900	880	
16	960	960	950	950	950	940	940	
18	1000	1000	1000	990	990	990	980	
20	1060	1040	1040	1040	1030	1030	1030	
22	1100	1080	1080	1080	1080	1080	1080	
24	1120	1120	1110	1110	1110	1110	1110	
26	1150	1150	1150	1150	1150	1150	1150	
28	1190	1190	1190	1190	1190	1190	1200	
30	1230	1230	1230	1230	1240	1240	1240	
32	1250	1270	1270	1270	1280	1280	1280	
MAX	1290	1290	1310	1310	1320	1320	1330	
2	1290	1290	1290	1290	1290	1280	1270	
4	1330	1350	1350	1350	1350	1330	1320	
6	1360	1370	1370	1370	1370	1360	1360	
8	1390	1400	1400	1400	1400	1400	1400	
10	1410	1430	1430	1430	1430	1430	1430	
12	1450	1450	1450	1450	1470	1470	1470	
14	1480	1480	1480	1490	1490	1490	1490	
16	1510	1510	1520	1520	1520	1520	1530	
18	1530	1530	1540	1540	1560	1560	1560	
20	1560	1570	1570	1580	1580	1580	1580	
MAX								

(*) GRID SQUARE LETTER

(**) GRID SQUARE NUMBER

MMI N°	MMI READING	U.S. GAL. ATTITUDE READING C LEFT WING 1	2	3	4	E RIGHT WING 5	6	7	MMI READING	U.S. GAL. ATTITUDE READING C RIGHT WING 1	2	3	4	E LEFT WING 5	6	7
4	2	1530	1520	1520	1510	1510	1510	1510	2	1560	1560	1560	1560	1570	1570	1570
	4	1570	1560	1560	1540	1540	1530	1530	4	1580	1580	1580	1600	1600	1600	1600
	6	1600	1600	1580	1580	1580	1570	1570	6	1610	1610	1620	1620	1620	1620	1620
	8	1640	1620	1620	1620	1620	1610	1610	8	1640	1650	1650	1650	1650	1650	1650
	10	1660	1660	1660	1660	1660	1650	1650	10	1660	1680	1680	1680	1680	1680	1680
	12	1690	1690	1690	1690	1690	1690	1690	12	1690	1690	1700	1700	1700	1700	1700
	14	1720	1720	1720	1720	1720	1720	1720	14	1720	1720	1720	1730	1730	1730	1730
	16	1740	1740	1740	1740	1740	1740	1740	16	1730	1740	1740	1740	1740	1740	1760
	18	1780	1780	1780	1780	1790	1790	1790	18	1780	1780	1790	1800	1800	1800	1800
	MAX	1800	1800	1800	1800	1800	1800	1800	MAX	1780	1800	1800	1800	1800	1800	1820
5	2	180	180	170	170	160	160	160	2	190	180	180	180	180	170	170
	4	190	190	180	180	170	170	170	4	200	190	190	190	190	180	180
	6	200	200	190	190	180	180	180	6	210	200	200	200	180	200	200
	8	210	210	210	200	190	190	190	8	210	210	210	210	210	210	210
	10	210	210	210	210	200	200	200	10	220	220	220	220	220	210	210
	12	220	220	220	210	210	210	210	12	230	230	220	220	220	220	220
	14	220	220	220	220	220	220	220	14	240	240	230	230	230	220	220

MMI N°	MMI READING	U.S. GAL. ATTITUDE READING D* BOTH WINGS 1	2	3	4	5	6	7	MMI READING	U.S. GAL. ATTITUDE READING D BOTH WINGS 1	2	3	4	5	6	7**	MMI N°
2	2	670	670	660	660	650	650	650	2	1560	1540	1530	1530	1530	1530	1530	4
	4	730	710	710	710	700	700	690	4	1580	1570	1570	1570	1570	1570	1570	
	6	770	770	750	750	750	740	740	6	1610	1610	1600	1600	1600	1600	1600	
	8	790	790	780	780	780	780	770	8	1640	1640	1640	1640	1640	1640	1640	
	10	850	830	830	830	830	820	810	10	1660	1660	1660	1660	1660	1660	1660	
	12	880	880	880	880	870	870	860	12	1690	1690	1690	1690	1690	1690	1690	
	14	940	940	940	920	920	910	910	14	1720	1720	1720	1720	1720	1720	1720	
	16	990	990	980	980	960	960	950	16	1740	1740	1740	1740	1740	1740	1740	
	18	1040	1030	1030	1020	1020	1020	1000	18	1780	1780	1790	1800	1800	1800	1800	
	20	1080	1080	1070	1070	1070	1060	1060	MAX	1800	1800	1800	1800	1800	1800	1800	
	22	1110	1110	1100	1100	1100	1100	1100									5
	24	1150	1150	1150	1140	1140	1140	1140	2	180	180	180	170	170	170	160	
	26	1190	1190	1190	1190	1190	1190	1190	4	200	200	190	180	180	180	170	
	28	1230	1230	1230	1230	1230	1240	1240	6	210	210	200	200	200	190	190	
	30	1270	1270	1280	1280	1280	1280	1290	8	210	210	210	210	210	200	200	
	32	1310	1310	1320	1320	1320	1330	1350	10	220	210	210	210	210	210	210	
	MAX								12	220	220	220	220	220	220	220	
									14	220	220	220	220	220	220	220	
3	2	1270	1270	1270	1270	1250	1240	1220	MAX	220	220	220	220	220	220	220	
	4	1320	1320	1320	1320	1310	1290	1280									
	6	1350	1360	1360	1350	1350	1350	1330									
	8	1390	1390	1390	1390	1390	1370	1370									
	10	1410	1410	1410	1430	1430	1410	1410									
	12	1440	1450	1450	1450	1450	1450	1450									
	14	1480	1480	1480	1480	1480	1480	1480									
	16	1510	1510	1510	1520	1520	1520	1520									
	18	1530	1530	1540	1540	1540	1560	1560									
	20	1560	1560	1570	1570	1570	1580	1580									
	MAX																

(*) GRID SQUARE LETTER

(**) GRID SQUARE NUMBER

Applicable to: ALL

CENTER TANK (LITERS)

MMI READING	LITERS ATTITUDE MONITOR READING LINES A AND G*						
	1	2	3	4	5	6	7
2	300	300	350	350	350	350	350
4	400	450	450	500	500	500	500
6	600	600	650	650	650	650	650
8	750	750	750	750	750	750	750
10	900	850	850	850	850	850	900
12	1050	1000	1000	1000	1000	1000	1050
14	1250	1250	1200	1200	1200	1200	1200
16	1450	1450	1400	1400	1400	1400	1400
18	1650	1650	1600	1600	1600	1600	1600
20	1900	1850	1850	1850	1850	1800	1800
22	2100	2050	2050	2050	2050	2000	2000
24	2300	2250	2250	2250	2200	2200	2150
26	2450	2450	2450	2450	2450	2400	2350
28	2700	2650	2650	2650	2600	2550	2550
30	2900	2850	2850	2850	2800	2800	2750
32	3050	3050	3050	3050	3000	3000	2950
34	3250	3250	3250	3250	3200	3200	3150
36	3500	3500	3450	3450	3450	3400	3400
38	3700	3700	3700	3700	3650	3650	3600
40	3900	3900	3900	3900	3900	3850	3800
42	4100	4100	4100	4100	4100	4050	4050
44	4350	4350	4350	4300	4300	4250	4250
46	4550	4550	4550	4550	4500	4500	4450
48	4750	4750	4750	4700	4700	4650	4650
50	4950	4950	4950	4950	4900	4900	4850
52	5150	5150	5150	5150	5100	5100	5050
54	5400	5400	5400	5400	5350	5300	5250
56	5600	5600	5600	5600	5550	5500	5450
58	5800	5800	5800	5750	5750	5700	5650
60	6000	6000	6000	5950	5950	5900	5900
62	6200	6200	6200	6150	6150	6100	6100
64	6400	6400	6400	6400	6350	6300	6300
66	6600	6600	6600	6600	6550	6550	6500
68	6800	6800	6750	6750	6750	6700	6700
70	7000	6950	6950	6950	6900	6900	6900
72	7200	7200	7150	7150	7100	7100	7050
74	7400	7400	7350	7350	7300	7300	7300
76	7600	7600	7600	7550	7550	7500	7500
78	7850	7800	7800	7800	7750	7700	7700
MAX	7950	7900	7900	7900	7850	7800	7800

MMI READING	LITERS ATTITUDE MONITOR READING LINES B AND F						
	1	2	3	4	5	6	7**
2	300	300	300	300	300	300	350
4	400	450	450	450	500	500	500
6	600	600	650	650	650	650	600
8	750	750	750	750	750	750	750
10	900	850	850	850	850	850	900
12	1050	1000	1000	1000	1000	1000	1050
14	1250	1200	1200	1200	1200	1200	1200
16	1450	1450	1450	1450	1400	1400	1400
18	1700	1700	1650	1650	1600	1600	1600
20	1900	1900	1900	1850	1850	1850	1800
22	2100	2100	2100	2050	2050	2000	2000
24	2300	2300	2250	2250	2200	2200	2150
26	2500	2500	2450	2450	2400	2350	2350
28	2700	2700	2650	2650	2600	2550	2500
30	2900	2900	2900	2850	2800	2800	2750
32	3100	3100	3100	3050	3050	3000	2950
34	3300	3300	3300	3250	3250	3200	3150
36	3500	3500	3500	3450	3450	3400	3400
38	3700	3700	3700	3700	3650	3650	3600
40	3950	3950	3950	3900	3900	3850	3800
42	4150	4150	4150	4100	4100	4050	4000
44	4350	4350	4350	4300	4300	4250	4200
46	4550	4550	4550	4550	4500	4500	4450
48	4750	4750	4750	4750	4700	4700	4650
50	4950	4950	4950	4950	4900	4900	4850
52	5150	5150	5150	5150	5150	5100	5050
54	5400	5400	5400	5400	5350	5300	5250
56	5600	5600	5600	5600	5550	5500	5450
58	5800	5800	5800	5800	5750	5750	5700
60	6000	6000	6000	6000	5950	5950	5900
62	6200	6200	6200	6200	6150	6150	6100
64	6400	6400	6400	6400	6350	6350	6300
66	6600	6600	6600	6600	6550	6550	6500
68	6800	6800	6800	6800	6750	6750	6700
70	7000	7000	7000	6950	6950	6950	6900
72	7200	7200	7150	7150	7150	7100	7100
74	7400	7400	7350	7350	7350	7300	7300
76	7600	7600	7600	7550	7550	7500	7500
78	7800	7800	7800	7750	7750	7700	7700
MAX	7900	7900	7850	7850	7850	7800	7800

MMI READING	LITERS ATTITUDE MONITOR READING LINES C AND E						
	1	2	3	4	5	6	7
2	250	300	300	300	300	300	300
4	400	450	450	500	500	500	450
6	600	600	650	650	650	600	600
8	750	750	750	750	750	750	750
10	850	850	850	850	850	850	850
12	1050	1000	1000	1000	1000	1000	1000
14	1250	1200	1200	1200	1200	1200	1200
16	1450	1450	1450	1400	1400	1400	1400
18	1650	1650	1650	1650	1600	1600	1600
20	1900	1900	1900	1900	1900	1850	1800
22	2100	2100	2100	2100	2050	2050	2000
24	2300	2300	2250	2250	2250	2200	2200
26	2500	2500	2450	2450	2400	2400	2350
28	2700	2650	2650	2650	2600	2600	2550
30	2900	2900	2850	2850	2800	2800	2750
32	3100	3100	3100	3100	3050	3050	3000
34	3300	3300	3300	3250	3250	3200	3200
36	3500	3500	3500	3500	3450	3450	3400
38	3700	3700	3700	3700	3700	3650	3600
40	3950	3950	3950	3950	3900	3900	3850
42	4150	4150	4150	4150	4100	4100	4050
44	4350	4350	4350	4350	4300	4300	4250
46	4550	4550	4550	4550	4500	4500	4450
48	4750	4750	4750	4750	4750	4700	4650
50	4950	4950	4950	4950	4900	4900	4850
52	5150	5150	5150	5150	5100	5100	5050
54	5400	5400	5400	5400	5350	5300	5250
56	5600	5600	5600	5600	5550	5500	5450
58	5800	5800	5800	5800	5750	5700	5650
60	6000	6000	6000	6000	5950	5950	5900
62	6200	6200	6200	6200	6150	6100	6100
64	6400	6400	6400	6400	6350	6300	6300
66	6600	6600	6600	6600	6550	6550	6500
68	6800	6800	6800	6750	6750	6700	6700
70	7000	7000	7000	6950	6950	6900	6900
72	7200	7200	7150	7150	7150	7150	7100
74	7400	7400	7400	7350	7350	7300	7300
76	7600	7600	7600	7550	7550	7500	7500
78	7800	7800	7800	7750	7750	7700	7700
MAX	7900	7900	7850	7850	7850	7800	7800

MMI READING	LITERS ATTITUDE MONITOR READING LINES D						
	1	2	3	4	5	6	7
2	300	300	300	300	300	300	300
4	450	450	500	500	500	500	500
6	600	600	650	650	650	650	600
8	750	750	750	750	750	750	750
10	900	900	900	900	900	900	900
12	1050	1000	1000	1000	1000	1000	1050
14	1250	1250	1200	1200	1200	1200	1200
16	1500	1450	1450	1450	1400	1400	1400
18	1700	1700	1700	1650	1650	1650	1600
20	1900	1900	1900	1900	1900	1850	1850
22	2100	2100	2100	2100	2050	2050	2000
24	2300	2300	2300	2250	2250	2200	2200
26	2500	2500	2450	2450	2400	2400	2350
28	2700	2700	2700	2650	2600	2600	2550
30	2900	2900	2900	2900	2850	2800	2750
32	3100	3100	3100	3100	3050	3050	3000
34	3300	3300	3300	3300	3250	3250	3200
36	3500	3500	3500	3500	3450	3450	3400
38	3700	3750	3750	3700	3700	3650	3650
40	3950	3950	3950	3950	3900	3900	3850
42	4150	4150	4150	4150	4100	4100	4050
44	4350	4350	4350	4350	4300	4300	4250
46	4550	4550	4550	4550	4500	4500	4450
48	4750	4750	4750	4750	4700	4700	4650
50	4950	4950	4950	4950	4900	4900	4850
52	5200	5200	5200	5150	5100	5100	5050
54	5400	5400	5400	5400	5350	5300	5250
56	5600	5600	5600	5600	5550	5500	5450
58	5800	5800	5800	5800	5750	5700	5650
60	6000	6000	6000	6000	5950	5950	5900
62	6200	6200	6200	6200	6150	6150	6100
64	6400	6400	6400	6400	6350	6350	6300
66	6600	6600	6600	6600	6550	6550	6500
68	6800	6800	6800	6800	6750	6750	6700
70	7000	7000	7000	7000	6950	6950	6900
72	7200	7200	7200	7150	7150	7150	7100
74	7400	7400	7400	7350	7350	7350	7300
76	7600	7600	7600	7550	7550	7550	7500
78	7800	7800	7800	7750	7750	7700	7700
MAX	7900	7900	7900	7900	7850	7850	7800

* GRID SQUARE LETTER

** GRID SQUARE NUMBER

GENERAL

Applicable to: ALL

[1] Refer to Part A 8.1.7.4

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PERFORMANCE

OPERATING DATA

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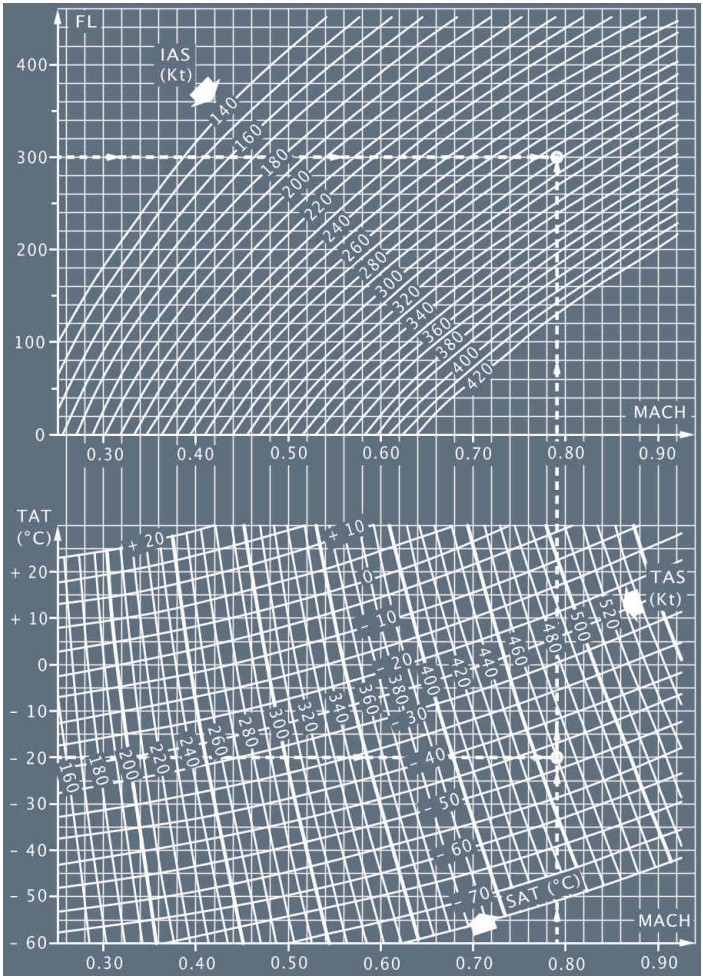
CONVERSIONS - IAS . MACH - TAS . MACH - SAT . TAT

Applicable to: ALL



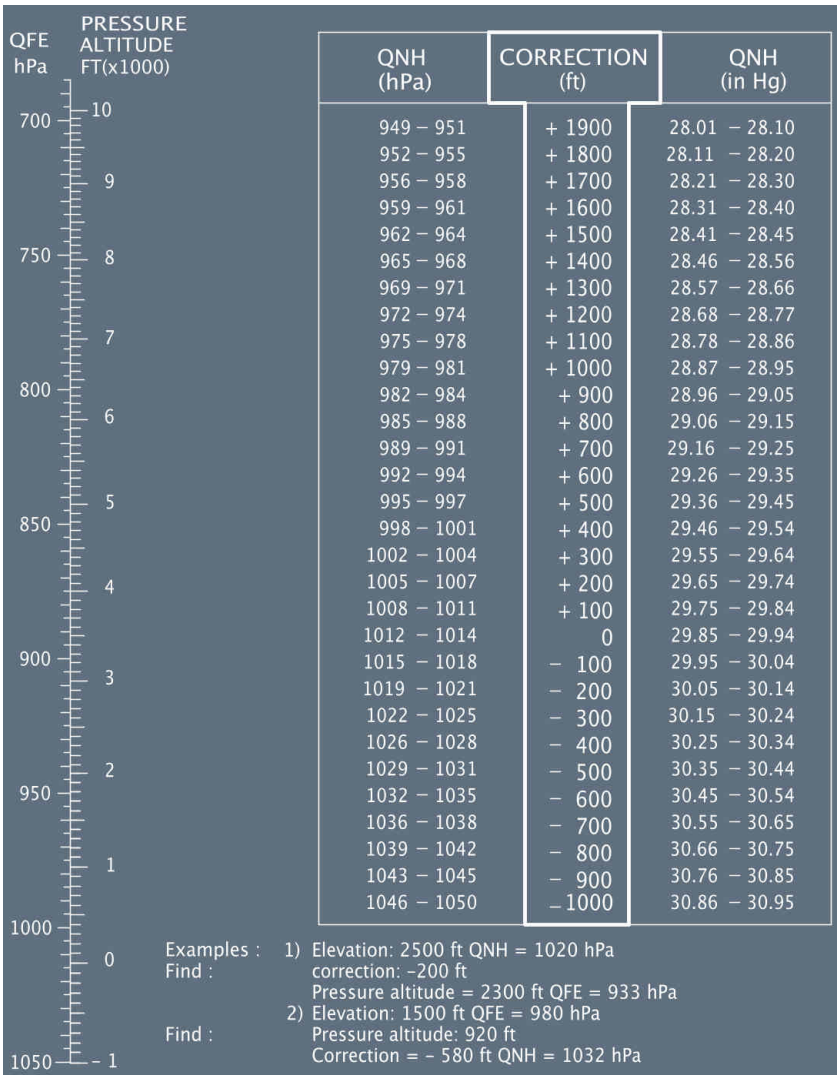
INTERNATIONAL STANDARD ATMOSPHERE (ISA)

Applicable to: ALL

ALTITUDE (Feet)	TEMP. (°C)	PRESSURE			PRESSURE RATIO $\delta = P / Po$	DENSITY $\sigma = \rho / \rho o$	SPEED OF SOUND (a) (kt)	ALTITUDE (meters)
		hPa	P.S.I.	in. Hg.				
40,000	– 56.5	188	2.72	5.54	0.1851	0.2462	573	12.192
39,000	– 56.5	197	2.85	5.81	0.1942	0.2583	573	11.887
38,000	– 56.5	206	2.99	6.10	0.2038	0.2710	573	11.582
37,000	– 56.5	217	3.14	6.40	0.2138	0.2844	573	11.278
36,000	– 56.3	227	3.30	6.71	0.2243	0.2981	573	10.973
35,000	– 54.3	238	3.46	7.04	0.2353	0.3099	576	10.668
34,000	– 52.4	250	3.63	7.38	0.2467	0.3220	579	10.363
33,000	– 50.4	262	3.80	7.74	0.2586	0.3345	581	10.058
32,000	– 48.4	274	3.98	8.11	0.2709	0.3473	584	9.754
31,000	– 46.4	287	4.17	8.49	0.2837	0.3605	586	9.449
30,000	– 44.4	301	4.36	8.89	0.2970	0.3741	589	9.144
29,000	– 42.5	315	4.57	9.30	0.3107	0.3881	591	8.839
28,000	– 40.5	329	4.78	9.73	0.3250	0.4025	594	8.534
27,000	– 38.5	344	4.99	10.17	0.3398	0.4173	597	8.230
26,000	– 36.5	360	5.22	10.63	0.3552	0.4325	599	7.925
25,000	– 34.5	376	5.45	11.10	0.3711	0.4481	602	7.620
24,000	– 32.5	393	5.70	11.60	0.3876	0.4642	604	7.315
23,000	– 30.6	410	5.95	12.11	0.4046	0.4806	607	7.010
22,000	– 28.6	428	6.21	12.64	0.4223	0.4976	609	6.706
21,000	– 26.6	446	6.47	13.18	0.4406	0.5150	611	6.401
20,000	– 24.6	466	6.75	13.75	0.4595	0.5328	614	6.096
19,000	– 22.6	485	7.04	14.34	0.4791	0.5511	616	5.791
18,000	– 20.7	506	7.34	14.94	0.4994	0.5699	619	5.406
17,000	– 18.7	527	7.65	15.57	0.5203	0.5892	621	5.182
16,000	– 16.7	549	7.97	16.22	0.5420	0.6090	624	4.877
15,000	– 14.7	572	8.29	16.89	0.5643	0.6292	626	4.572
14,000	– 12.7	595	8.63	17.58	0.5875	0.6500	628	4.267
13,000	– 10.8	619	8.99	18.29	0.6113	0.6713	631	3.962
12,000	– 8.8	644	9.35	19.03	0.6360	0.6932	633	3.658
11,000	– 6.8	670	9.72	19.79	0.6614	0.7156	636	3.353
10,000	– 4.8	697	10.10	20.58	0.6877	0.7385	638	3.048
9,000	– 2.8	724	10.51	21.39	0.7148	0.7620	640	2.743
8,000	– 0.8	753	10.92	22.22	0.7428	0.7860	643	2.438
7,000	+ 1.1	782	11.34	23.09	0.7716	0.8106	645	2.134
6,000	+ 3.1	812	11.78	23.98	0.8014	0.8359	647	1.829
5,000	+ 5.1	843	12.23	24.90	0.8320	0.8617	650	1.524
4,000	+ 7.1	875	12.69	25.84	0.8637	0.8881	652	1.219
3,000	+ 9.1	908	13.17	26.82	0.8962	0.9151	654	914
2,000	+ 11.0	942	13.67	27.82	0.9298	0.9428	656	610
1,000	+ 13.0	977	14.17	28.86	0.9644	0.9711	659	305
0	+ 15.0	1013	14.70	29.92	1.0000	1.0000	661	0
– 1,000	+ 17.0	1050	15.23	31.02	1.0366	1.0295	664	– 305

CONVERSIONS - QNH - QFE - PRESSURE ALTITUDE

Applicable to: ALL



QNH (hPa)	CORRECTION (ft)	QNH (in Hg)
949 – 951	+ 1900	28.01 – 28.10
952 – 955	+ 1800	28.11 – 28.20
956 – 958	+ 1700	28.21 – 28.30
959 – 961	+ 1600	28.31 – 28.40
962 – 964	+ 1500	28.41 – 28.45
965 – 968	+ 1400	28.46 – 28.56
969 – 971	+ 1300	28.57 – 28.66
972 – 974	+ 1200	28.68 – 28.77
975 – 978	+ 1100	28.78 – 28.86
979 – 981	+ 1000	28.87 – 28.95
982 – 984	+ 900	28.96 – 29.05
985 – 988	+ 800	29.06 – 29.15
989 – 991	+ 700	29.16 – 29.25
992 – 994	+ 600	29.26 – 29.35
995 – 997	+ 500	29.36 – 29.45
998 – 1001	+ 400	29.46 – 29.54
1002 – 1004	+ 300	29.55 – 29.64
1005 – 1007	+ 200	29.65 – 29.74
1008 – 1011	+ 100	29.75 – 29.84
1012 – 1014	0	29.85 – 29.94
1015 – 1018	– 100	29.95 – 30.04
1019 – 1021	– 200	30.05 – 30.14
1022 – 1025	– 300	30.15 – 30.24
1026 – 1028	– 400	30.25 – 30.34
1029 – 1031	– 500	30.35 – 30.44
1032 – 1035	– 600	30.45 – 30.54
1036 – 1038	– 700	30.55 – 30.65
1039 – 1042	– 800	30.66 – 30.75
1043 – 1045	– 900	30.76 – 30.85
1046 – 1050	– 1000	30.86 – 30.95

Examples :
Find :

1) Elevation: 2500 ft QNH = 1020 hPa
correction: -200 ft
Pressure altitude = 2300 ft QFE = 933 hPa

Find :

2) Elevation: 1500 ft QFE = 980 hPa
Pressure altitude: 920 ft
Correction = - 580 ft QNH = 1032 hPa

CONVERSIONS QFE HPA - IN. HG - FT

Applicable to: ALL

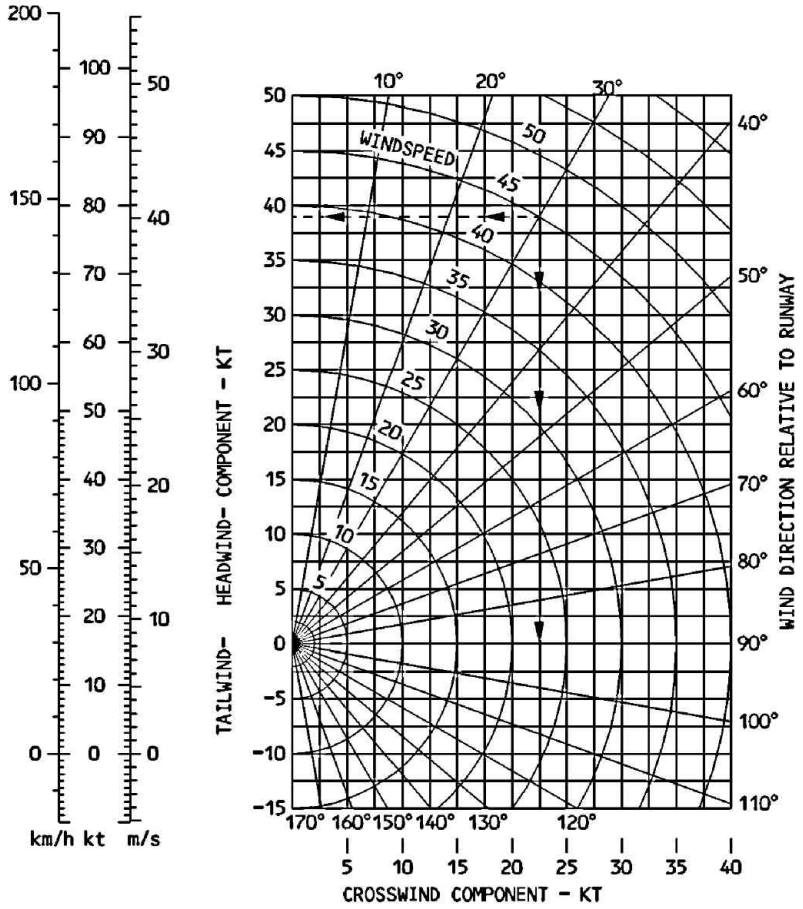
QFE hPa	in. Hg	PRESS. ALT. ft	QFE hPa	in. Hg	PRESS. ALT. ft	QFE hPa	in. Hg	PRESS. ALT. ft
1050	31.01	– 989	960	28.35	1486	870	25.69	4157
1048	30.95	– 936	958	28.29	1543	868	25.63	4219
1046	30.89	– 883	956	28.23	1601	866	25.57	4281
1044	30.83	– 830	954	28.17	1658	864	25.51	4343
1042	30.77	– 776	952	28.11	1715	862	25.45	4405
1040	30.71	– 723	950	28.05	1773	860	25.40	4468
1038	30.65	– 669	948	27.99	1831	858	25.34	4531
1036	30.59	– 615	946	27.94	1889	856	25.28	4593
1034	30.53	– 562	944	27.88	1947	854	25.22	4656
1032	30.47	– 508	942	27.82	2005	852	25.16	4718
1030	30.42	– 454	940	27.76	2062	850	25.10	4781
1028	30.36	– 400	938	27.70	2120	848	25.04	4844
1026	30.30	– 346	936	27.64	2178	846	24.98	4907
1024	30.24	– 292	934	27.58	2236	844	24.92	4970
1022	30.18	– 238	932	27.52	2294	842	24.86	5033
1020	30.12	– 184	930	27.46	2353	840	24.81	5097
1018	30.06	– 129	928	27.40	2412	838	24.75	5161
1016	30.00	– 74	926	27.34	2471	836	24.69	5225
1014	29.94	– 20	924	27.29	2530	834	24.63	5289
1012	29.88	34	922	27.23	2589	832	24.57	5353
1010	29.83	89	920	27.17	2647	830	24.51	5417
1008	29.77	144	918	27.11	2707	828	24.45	5481
1006	29.71	199	916	27.05	2767	826	24.39	5545
1004	29.65	254	914	26.99	2826	824	24.33	5610
1002	29.59	309	912	26.93	2885	822	24.27	5675
1000	29.53	364	910	26.87	2944	820	24.21	5740
998	29.47	419	908	26.81	3004	818	24.16	5805
996	29.41	475	906	26.75	3064	816	24.10	5870
994	29.35	530	904	26.70	3124	814	24.04	5935
992	29.29	586	902	26.64	3183	812	23.98	6000
990	29.23	641	900	26.58	3243	810	23.92	6065
988	29.18	697	898	26.52	3303	808	23.86	6131
986	29.12	753	896	26.46	3363	806	23.80	6197
984	29.06	809	894	26.40	3424	804	23.74	6263
982	29.00	865	892	26.34	3484	802	23.68	6329
980	28.94	921	890	26.28	3545	800	23.62	6394
978	28.88	977	888	26.22	3606	798	23.56	6461
976	28.82	1033	886	26.16	3667	796	23.51	6528
974	28.76	1089	884	26.10	3728	794	23.45	6595
972	28.70	1145	882	26.05	3789	792	23.39	6661
970	28.64	1202	880	25.99	3850	790	23.33	6727
968	28.59	1259	878	25.93	3911	788	23.27	6794
966	28.53	1316	876	25.87	3973	786	23.21	6861
964	28.47	1373	874	25.81	4034	784	23.15	6928
962	28.41	1430	872	25.75	4096	782	23.09	6995

WIND COMPONENTS (FOR TAKEOFF AND LANDING)

Applicable to: ALL

MULTIPLY	BY	TO GET
kt	1.852	km/h
kt	0.5144	m/s
m/s	3.6	km/h
m/s	1.9438	kt
km/h	0.5396	kt
km/h	0.2778	m/s

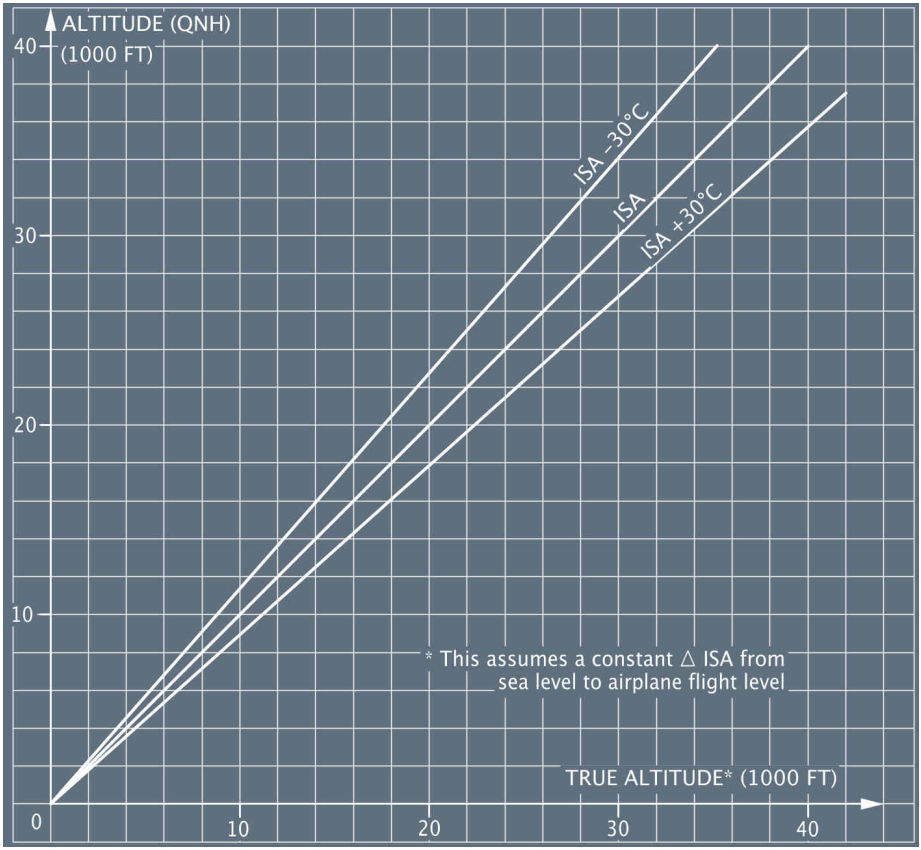
GIVEN	FIND
WIND DIRECTION RELATIVE TO RUNWAY HEADING=30 DEG WIND SPEED=45 KT	CROSS WIND COMPONENT=22.5 KT HEAD WIND COMPONENT=39.0 KT



ALTITUDE TEMPERATURE CORRECTION

Applicable to: ALL

FOR HIGH ALTITUDE USE



FOR LOW ALTITUDE USE

Values to be added by the pilot to minimum promulgated heights/altitude (ft)

Airport Temperature °C	Height above the elevation of the altimeter setting source (feet)								
	200	300	400	500	1 000	2 000	3 000	4 000	5 000
0	20	20	30	30	60	120	170	230	280
-10	20	30	40	50	100	200	290	390	490

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Airport Temperature °C	Height above the elevation of the altimeter setting source (feet)								
	200	**300**	**400**	**500**	**1 000**	**2 000**	**3 000**	**4 000**	**5 000**
-20	30	50	60	70	140	280	420	570	710
-30	40	60	80	100	190	380	570	760	950
-40	50	80	100	120	240	480	720	970	1 210
-50	60	90	120	150	300	590	890	1 190	1 500

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GENERAL

Applicable to: ALL

The ground distance/air distance conversion tables show the air distance for a given ground distance due to the influence of the wind.

The Tables are given for :
- M .78
- Long range speed.

M.78

Applicable to: ALL

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND			WIND COMPONENTS (KT)			HEAD WIND
	+ 150	+ 100	+ 50	0	– 50	– 100	– 150
10	7	8	9	10	11	13	15
20	15	16	18	20	23	26	30
30	22	25	27	30	34	39	45
40	30	33	36	40	45	51	60
50	37	41	45	50	56	64	75
100	75	82	90	100	113	129	150
200	150	164	180	200	225	257	300
300	225	245	270	300	338	386	450
400	300	327	360	400	450	514	600
500	375	409	450	500	563	643	750
1000	750	818	900	1000	1125	1286	1501
1500	1125	1227	1350	1500	1688	1929	2251
2000	1500	1636	1800	2000	2248	2572	3001
2500	1875	2045	2250	2500	2813	3215	3752
3000	2250	2454	2700	3000	3375	3858	4502
3500	2624	2863	3150	3500	3938	4501	5252
4000	2999	3272	3600	4000	4500	5144	6003
4500	3374	3681	4050	4500	5063	5787	6753
5000	3749	4090	4500	5000	5626	6430	7503

FLIP23 A320211 M565A1PIP 3410 03301.000011 0250300 .7800 .00000 0 0300350 0 0 77 64 43 61 18590 FCOM-N0–03–50–002–001

LONG RANGE SPEED UP TO FL270

Applicable to: ALL 320

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND			WIND COMPONENTS (KT)			HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
10	7	8	9	10	12	14	17
20	14	16	18	20	23	27	33
30	21	24	26	30	35	41	50
40	29	32	35	40	46	55	67
50	36	39	44	50	58	68	83
100	71	79	88	100	115	136	167
200	143	158	176	200	231	273	333
300	214	237	265	300	346	409	500
400	286	316	353	400	462	545	667
500	357	395	441	500	577	682	833
1000	714	789	882	1000	1154	1364	1667
1500	1071	1184	1324	1500	1731	2046	2500
2000	1429	1579	1765	2000	2308	2727	3334
2500	1786	1974	2206	2500	2885	3409	4167
3000	2143	2368	2647	3000	3462	4091	5000
3500	2500	2763	3088	3500	4039	4773	5834
4000	2857	3158	3529	4000	4615	5455	6667
4500	3214	3553	3971	4500	5192	6137	7500
5000	3571	3947	4412	5000	5769	6818	8334

LONG RANGE SPEED UP TO FL270

Applicable to: ALL 321

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
10	7	8	9	10	12	14	17
20	14	16	18	20	23	27	33
30	21	24	26	30	35	41	50
40	29	32	35	40	46	54	66
50	36	40	44	50	58	68	83
100	72	79	88	100	115	136	166
200	143	158	177	200	231	272	332
300	215	237	265	300	346	408	498
400	286	316	353	400	461	544	664
500	358	395	441	500	576	680	830
1000	715	790	883	1000	1153	1361	1660
1500	1073	1186	1324	1500	1729	2041	2490
2000	1431	1581	1766	2000	2306	2721	3320
2500	1789	1976	2207	2500	2882	3402	4150
3000	2146	2371	2649	3000	3458	4082	4980
3500	2504	2767	3090	3500	4035	4763	5810
4000	2862	3162	3532	4000	4611	5443	6641
4500	3220	3557	3973	4500	5188	6123	7471
5000	3577	3952	4415	5000	5764	6804	8301

LONG RANGE SPEED ABOVE FL270

Applicable to: ALL 320

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+ 150	+ 100	+ 50	0	– 50	– 100	– 150
10	8	8	9	10	11	13	15
20	15	16	18	20	22	26	30
30	23	25	27	30	34	38	45
40	30	33	36	40	45	51	60
50	38	41	45	50	56	64	75
100	75	82	90	100	112	128	149
200	150	164	180	200	225	256	299
300	226	246	270	300	337	385	448
400	301	328	360	400	449	513	597
500	376	410	450	500	562	641	746
1000	752	820	901	1000	1124	1282	1493
1500	1128	1230	1351	1500	1685	1923	2239
2000	1504	1639	1802	2000	2247	2564	2985
2500	1880	2049	2252	2500	2809	3205	3731
3000	2256	2459	2703	3000	3371	3846	4478
3500	2632	2869	3153	3500	3933	4487	5224
4000	3008	3279	3604	4000	4494	5128	5970
4500	3383	3689	4054	4500	5056	5769	6716
5000	3759	4098	4505	5000	5618	6410	7463

FLIP23 A320211 M565A1PIP 3410 03301.000011 0250300 .7801 .00000 0 0300350 0 0 77 64 43 61 18590 FCOM-N0-03-50-004-001

LONG RANGE SPEED ABOVE FL270

Applicable to: ALL 321

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
10	7	8	9	10	11	13	15
20	15	16	18	20	23	26	30
30	22	25	27	30	34	39	45
40	30	33	36	40	45	52	60
50	37	41	45	50	56	64	75
100	75	82	90	100	113	129	150
200	150	163	180	200	225	258	301
300	225	245	270	300	338	386	451
400	300	327	360	400	450	515	602
500	375	409	450	500	563	644	752
1000	749	817	900	1000	1126	1288	1504
1500	1124	1226	1349	1500	1689	1931	2256
2000	1498	1635	1799	2000	2251	2575	3008
2500	1873	2044	2249	2500	2814	3219	3760
3000	2247	2452	2699	3000	3377	3863	4512
3500	2622	2861	3148	3500	3940	4507	5264
4000	2996	3270	3598	4000	4503	5150	6016
4500	3371	3678	4048	4500	5066	5794	6767
5000	3745	4087	4498	5000	5629	6438	7519

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GENERAL

Applicable to: ALL

The ground distance/air distance conversion tables are used to calculate the air distance for a given ground distance due to the influence of the wind.

Tables are given for :

- LONG RANGE SPEED
- FIXED SPEEDS

LONG RANGE SPEED

Applicable to: ALL 320

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND			WIND COMPONENTS (KT)			HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
10	7	8	9	10	11	13	15
20	15	16	18	20	23	26	31
30	22	24	27	30	34	39	46
40	30	32	36	40	45	52	61
50	37	41	45	50	57	65	77
60	44	49	54	60	68	78	92
70	52	57	63	70	79	91	108
80	59	65	72	80	91	104	123
90	67	73	81	90	102	117	138
100	74	81	90	100	113	130	154
200	148	162	179	200	226	261	307
300	222	243	269	300	340	391	461
400	296	324	358	400	453	521	615
500	371	406	448	500	566	652	768
600	445	487	537	600	679	782	922
700	519	568	627	700	792	913	1076
800	593	649	717	800	905	1043	1230
900	667	730	806	900	1019	1173	1383
1000	741	811	896	1000	1132	1304	1537
1100	815	892	985	1100	1245	1434	1691
1200	889	973	1075	1200	1358	1564	1844
1300	963	1054	1164	1300	1471	1695	1998
1400	1038	1136	1254	1400	1585	1825	2152
1500	1112	1217	1344	1500	1698	1955	2305
1600	1186	1298	1433	1600	1811	2086	2459
1700	1260	1379	1523	1700	1924	2216	2613
1800	1334	1460	1612	1800	2037	2346	2766
1900	1408	1541	1702	1900	2150	2477	2920
2000	1482	1622	1791	2000	2264	2607	3074

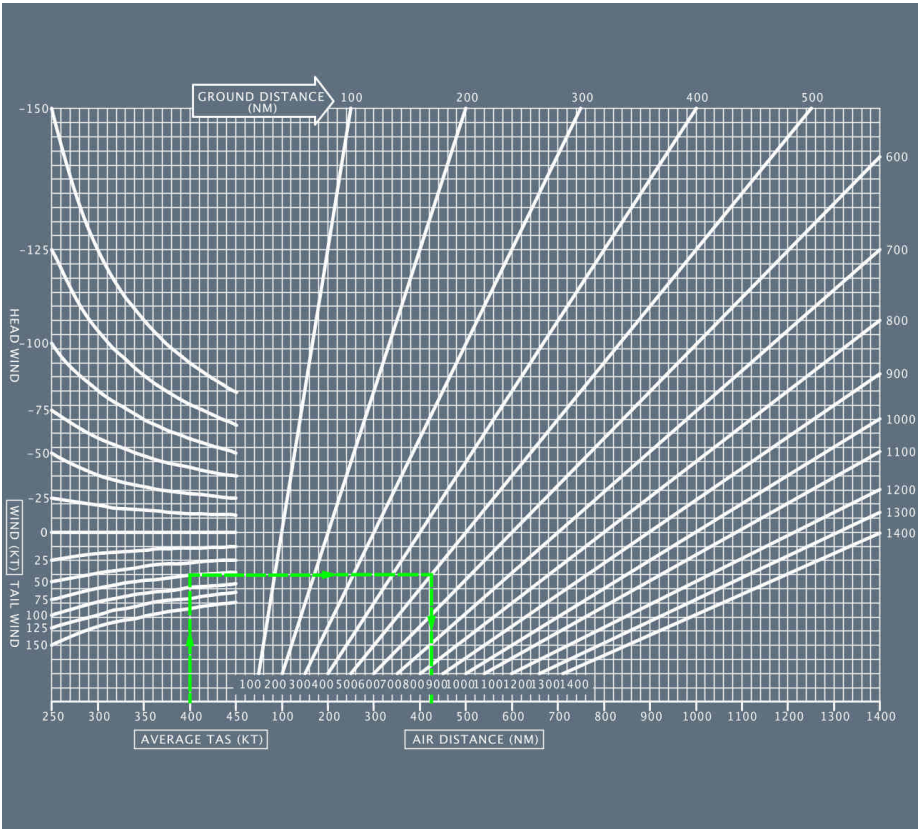
LONG RANGE SPEED

Applicable to: ALL 321

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
10	7	8	9	10	11	13	16
20	15	16	18	20	23	26	31
30	22	24	27	30	34	39	47
40	29	32	36	40	45	53	62
50	37	40	45	50	57	66	78
60	44	48	54	60	68	79	93
70	52	57	63	70	79	92	109
80	59	65	71	80	91	105	124
90	66	73	80	90	102	118	140
100	74	81	89	100	114	131	156
200	147	162	179	200	227	263	311
300	221	242	268	300	341	394	467
400	295	323	357	400	454	525	622
500	368	404	447	500	568	656	778
600	442	485	536	600	681	788	933
700	516	565	626	700	795	919	1089
800	589	646	715	800	908	1050	1244
900	663	727	804	900	1022	1181	1400
1000	737	808	894	1000	1135	1313	1556
1100	811	888	983	1100	1249	1444	1711
1200	884	969	1072	1200	1362	1575	1867
1300	958	1050	1162	1300	1476	1706	2022
1400	1032	1131	1251	1400	1589	1838	2178
1500	1105	1212	1340	1500	1703	1969	2333
1600	1179	1292	1430	1600	1816	2100	2489
1700	1253	1373	1519	1700	1930	2231	2644
1800	1326	1454	1609	1800	2043	2363	2800
1900	1400	1535	1698	1900	2157	2494	2956
2000	1474	1615	1787	2000	2270	2625	3111

FIXED SPEEDS

Applicable to: ALL



PERFORMANCE

THRUST RATINGS

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GENERAL

Applicable to: ALL

The thrust rating charts have been established for:

- Maximum takeoff
- Maximum go around
- Flexible takeoff
- Maximum continuous
- Maximum climb
- Maximum cruise

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DEFINITION

Applicable to: ALL

It is the maximum thrust certified for takeoff and is normally limited to five minutes.
This time is extended to ten minutes for engine out contingency, as authorized by the approved AFM.

MAXIMUM TAKEOFF

Applicable to: ALL 320

V2527–A5	TAKEOFF EPR					NO AIR BLEED				MACH=.000
CORRECTIONS FOR AIR BLEED										
AIR CONDITIONING ON					SUBTRACT .010 FROM EPR					
ENGINE ANTI ICE ON					READ AT ACTUAL OAT + 5(°C)					
ENGINE ANTI ICE AND WING ANTI ICE ON					READ AT ACTUAL OAT + 5(°C) AND SUBTRACT .007 FROM EPR					

OAT (°C)	PRESSURE ALTITUDE (FT)										
	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.	8500.
–60.0	1.378	1.397	1.413	1.430	1.455	1.479	1.504	1.514	1.524	1.534	1.537
–40.0	1.378	1.397	1.413	1.430	1.455	1.479	1.504	1.514	1.524	1.534	1.537
–20.0	1.378	1.397	1.413	1.430	1.455	1.479	1.504	1.514	1.524	1.534	1.537
0.0	1.378	1.397	1.413	1.430	1.455	1.479	1.504	1.514	1.524	1.534	1.537
10.0	1.378	1.397	1.413	1.430	1.455	1.479	1.504	1.514	1.524	1.534	1.537
20.0	1.378	1.397	1.413	1.430	1.455	1.479	1.504	1.514	1.524	1.534	1.537
22.0	1.378	1.397	1.413	1.430	1.455	1.479	1.504	1.514	1.524	1.534	1.537
24.0	1.378	1.397	1.413	1.430	1.455	1.479	1.504	1.514	1.524	1.534	1.533
26.0	1.378	1.397	1.413	1.430	1.455	1.479	1.504	1.514	1.524	1.525	1.523
28.0	1.378	1.397	1.413	1.430	1.455	1.479	1.504	1.514	1.515	1.513	1.512
30.0	1.378	1.397	1.413	1.430	1.455	1.479	1.504	1.505	1.504	1.503	1.501
32.0	1.378	1.397	1.413	1.430	1.455	1.479	1.495	1.494	1.493	1.492	1.491
34.0	1.378	1.397	1.413	1.430	1.455	1.476	1.485	1.484	1.483	1.482	1.480
36.0	1.378	1.397	1.413	1.430	1.455	1.466	1.474	1.474	1.473	1.471	1.469
38.0	1.378	1.397	1.413	1.430	1.448	1.456	1.464	1.464	1.462	1.460	1.459
40.0	1.378	1.397	1.413	1.429	1.438	1.446	1.454	1.453	1.451	*1.450*	*1.448*
42.0	1.378	1.397	1.413	1.419	1.428	1.436	1.444	1.442	*1.441*	*1.440*	*1.438*
44.0	1.378	1.397	1.409	1.409	1.418	1.426	1.433	*1.432*	*1.431*	*1.429*	*1.428*
46.0	1.378	1.397	1.400	1.399	1.408	1.415	*1.423*	*1.422*	*1.421*	*1.419*	*1.418*
48.0	1.378	1.390	1.391	1.390	1.398	*1.405*	*1.413*	*1.412*	*1.411*	*1.409*	*1.408*
50.0	1.378	1.383	1.381	1.380	*1.388*	*1.396*	*1.403*	*1.402*	*1.401*	*1.399*	*1.398*
52.0	1.374	1.373	1.372	*1.371*	*1.379*	*1.386*	*1.393*	*1.392*	*1.391*	*1.389*	*1.388*
54.0	1.364	1.364	*1.363*	*1.362*	*1.369*	*1.377*	*1.383*	*1.382*	*1.381*	*1.379*	
56.0	1.355	*1.355*	*1.354*	*1.352*	*1.360*	*1.367*	*1.374*	*1.372*	*1.371*		
58.0	*1.346*	*1.346*	*1.345*	*1.343*	*1.351*	*1.358*	*1.364*	*1.363*			
60.0	*1.337*	*1.337*	*1.336*	*1.334*	*1.341*	*1.348*	*1.354*				
62.0	*1.329*	*1.329*	*1.327*	*1.325*	*1.332*	*1.339*					
64.0	*1.320*	*1.320*	*1.318*	*1.316*	*1.323*						
66.0	*1.312*	*1.311*	*1.310*	*1.307*							
68.0	*1.303*	*1.303*	*1.301*								
70.0	*1.295*	*1.294*									
72.0											
74.0											
76.0											
78.0	*DATA GIVEN ABOVE ISA + 40 ARE TO BE USED FOR FLEX TAKEOFF ONLY*										

V2527-A5	TAKEOFF EPR				NO AIR BLEED						MACH=.000
CORRECTIONS FOR AIR BLEED											
AIR CONDITIONING ON					SUBTRACT .015 FROM EPR						
ENGINE ANTI-ICE ON					READ AT ACTUAL OAT +5(°C)						
ENGINE ANTI-ICE AND WING ANTI-ICE ON					READ AT ACTUAL OAT +5(°C) AND SUBTRACT .010 FROM EPR						
OAT (°C)	PRESSURE ALTITUDE (FT)										
	5000.	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.
–60.0	1.504	1.514	1.524	1.534	1.540	1.545	1.551	1.556	1.562	1.567	1.570
–40.0	1.504	1.514	1.524	1.534	1.540	1.545	1.551	1.556	1.562	1.567	1.570
–20.0	1.504	1.514	1.524	1.534	1.540	1.545	1.551	1.556	1.562	1.567	1.570
0.0	1.504	1.514	1.524	1.534	1.540	1.545	1.551	1.556	1.562	1.567	1.570
5.0	1.504	1.514	1.524	1.534	1.540	1.545	1.551	1.556	1.562	1.567	1.570
10.0	1.504	1.514	1.524	1.534	1.540	1.545	1.551	1.556	1.562	1.567	1.570
12.0	1.504	1.514	1.524	1.534	1.540	1.545	1.551	1.556	1.562	1.567	1.569
14.0	1.504	1.514	1.524	1.534	1.540	1.545	1.551	1.556	1.562	1.564	1.565
16.0	1.504	1.514	1.524	1.534	1.540	1.545	1.551	1.556	1.557	1.559	1.561
18.0	1.504	1.514	1.524	1.534	1.540	1.545	1.551	1.551	1.552	1.553	1.551
20.0	1.504	1.514	1.524	1.534	1.540	1.545	1.544	1.544	1.544	1.541	1.539
22.0	1.504	1.514	1.524	1.534	1.540	1.538	1.536	1.536	1.533	*1.530*	*1.528*
24.0	1.504	1.514	1.524	1.534	1.531	1.529	1.528	1.525	*1.522*	*1.518*	*1.516*
26.0	1.504	1.514	1.524	1.525	1.521	1.519	1.517	*1.514*	*1.510*	*1.506*	*1.504*
28.0	1.504	1.514	1.515	1.513	1.511	1.508	*1.506*	*1.502*	*1.498*	*1.494*	*1.493*
30.0	1.504	1.505	1.504	1.503	1.500	*1.498*	*1.494*	*1.491*	*1.487*	*1.484*	*1.582*
32.0	1.495	1.494	1.493	1.492	*1.490*	*1.487*	*1.483*	*1.479*	*1.476*	*1.473*	*1.471*
34.0	1.485	1.484	1.483	*1.482*	*1.479*	*1.475*	*1.472*	*1.469*	*1.466*	*1.463*	*1.461*
36.0	1.474	1.474	*1.473*	*1.471*	*1.468*	*1.465*	*1.462*	*1.459*	*1.455*	*1.452*	*1.450*
38.0	1.464	*1.464*	*1.462*	*1.460*	*1.457*	*1.454*	*1.451*	*1.448*	*1.445*	*1.441*	*1.440*
40.0	*1.454*	*1.453*	*1.451*	*1.450*	*1.447*	*1.444*	*1.441*	*1.438*	*1.434*	*1.431*	*1.429*
42.0	*1.444*	*1.442*	*1.441*	*1.440*	*1.437*	*1.434*	*1.431*	*1.427*	*1.424*	*1.420*	
44.0	*1.433*	*1.432*	*1.431*	*1.429*	*1.427*	*1.424*	*1.420*	*1.417*	*1.413*		
46.0	*1.423*	*1.422*	*1.421*	*1.419*	*1.416*	*1.413*	*1.410*	*1.406*			
48.0	*1.413*	*1.412*	*1.411*	*1.409*	*1.406*	*1.403*	*1.400*				
50.0	*1.403*	*1.402*	*1.401*	*1.399*	*1.396*	*1.393*					
52.0	*1.393*	*1.392*	1.391	1.389	1.386						
54.0	*1.383*	*1.382*	*1.381*	*1.379*							
56.0	*1.374*	*1.372*	*1.371*								
58.0	*1.364*	*1.363*	*DATA GIVEN ABOVE ISA+40 ARE TO BE USED FOR FLEX TAKEOFF ONLY*								

MAXIMUM TAKEOFF

Applicable to: ALL 321

V2533-A5	TAKEOFF EPR	NO AIR BLEED	MACH=.000
CORRECTIONS FOR AIR BLEED			
AIR CONDITIONING ON		SUBTRACT .013 FROM EPR	
ENGINE ANTI-ICE ON		READ AT ACTUAL OAT +5.(°C)	
ENGINE ANTI-ICE AND WING ANTI-ICE ON		READ AT ACTUAL OAT +5.(°C) AND SUBTRACT .008 FROM EPR	

OAT (C)	PRESSURE ALTITUDE (FT)										
	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.	9200.
–60.0	1.584	1.618	1.637	1.652	1.655	1.659	1.661	1.661	1.661	1.661	1.661
0.0	1.584	1.618	1.637	1.652	1.655	1.659	1.661	1.661	1.661	1.661	1.661
10.0	1.584	1.618	1.637	1.652	1.655	1.658	1.658	1.658	1.658	1.658	1.658
17.0	1.584	1.618	1.637	1.647	1.647	1.647	1.647	1.647	1.647	1.647	1.647
18.0	1.584	1.618	1.637	1.645	1.645	1.645	1.645	1.645	1.645	1.645	1.645
19.0	1.584	1.618	1.637	1.644	1.644	1.644	1.644	1.644	1.644	1.644	1.644
20.0	1.584	1.618	1.637	1.642	1.642	1.642	1.642	1.642	1.642	1.642	1.642
21.0	1.584	1.618	1.637	1.640	1.640	1.640	1.640	1.640	1.640	1.640	1.640
22.0	1.584	1.618	1.637	1.638	1.638	1.638	1.638	1.638	1.638	1.638	1.638
23.0	1.584	1.618	1.636	1.636	1.636	1.636	1.636	1.636	1.636	1.636	1.636
24.0	1.584	1.618	1.634	1.634	1.634	1.634	1.634	1.634	1.634	1.634	1.634
25.0	1.584	1.618	1.631	1.631	1.631	1.631	1.631	1.631	1.631	1.631	1.631
26.0	1.584	1.618	1.629	1.629	1.629	1.629	1.629	1.629	1.629	1.629	1.629
27.0	1.584	1.618	1.626	1.626	1.626	1.626	1.626	1.626	1.626	1.626	1.626
28.0	1.584	1.618	1.624	1.624	1.624	1.624	1.624	1.624	1.624	1.624	1.624
29.0	1.584	1.618	1.621	1.621	1.621	1.621	1.621	1.621	1.621	1.621	1.621
30.0	1.584	1.618	1.618	1.618	1.618	1.618	1.618	1.618	1.618	1.618	1.618
31.0	1.584	1.612	1.615	1.616	1.616	1.616	1.616	1.616	1.616	1.616	1.616
32.0	1.584	1.604	1.608	1.609	1.612	1.613	1.613	1.613	1.613	1.613	1.613
33.0	1.584	1.596	1.600	1.602	1.606	1.610	1.610	1.610	1.610	1.610	1.610
34.0	1.584	1.588	1.593	1.595	1.600	1.607	1.607	1.607	1.607	1.607	1.607
36.0	1.570	1.573	1.579	1.581	1.587	1.594	1.601	1.601	1.600	1.598	1.595
38.0	1.555	1.559	1.565	1.567	1.574	1.581	1.586	1.587	1.585	1.583	*1.581*
40.0	1.542	1.545	1.551	1.553	1.560	1.566	1.571	1.573	1.571	*1.568*	
42.0	1.529	1.531	1.537	1.538	1.545	1.551	1.557	1.559	*1.556*		
44.0	1.515	1.517	1.522	1.524	1.530	1.536	1.543	*1.544*			
46.0	1.502	1.502	1.507	1.509	1.516	1.522	*1.529*				
48.0	1.487	1.486	1.491	1.495	1.502	*1.507*					
50.0	1.470	1.470	1.478	1.481	*1.486*						
52.0	1.454	1.459	1.466	*1.466*							
54.0	1.441	1.448	*1.453*								
56.0	1.429	*1.436*									
58.0	*1.415*										
60.0											
62.0			DATA GIVEN ABOVE ISA+40 (C) ARE TO BE USED FOR FLEX TAKEOFF ONLY								

V2533-A5	TAKEOFF EPR				NO AIR BLEED						MACH=.000
CORRECTIONS FOR AIR BLEED											
AIR CONDITIONING ON					SUBTRACT .018 FROM EPR						
ENGINE ANTI-ICE ON					READ AT ACTUAL OAT +5. (°C)						
ENGINE ANTI-ICE AND WING ANTI-ICE ON					READ AT ACTUAL OAT +5. (°C) AND SUBTRACT .010 FROM EPR						
OAT (C)	PRESSURE ALTITUDE (FT)										
	5000.	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.
–60.0	1.661	1.661	1.661	1.661	1.661	1.661	1.661	1.661	1.661	1.661	1.661
0.0	1.661	1.661	1.661	1.661	1.661	1.661	1.661	1.661	1.661	1.661	1.661
10.0	1.658	1.658	1.658	1.658	1.658	1.658	1.658	1.658	1.658	1.658	1.658
17.0	1.647	1.647	1.647	1.647	1.647	1.647	1.647	1.647	1.647	1.647	1.647
18.0	1.645	1.645	1.645	1.645	1.645	1.645	1.645	1.645	1.645	1.645	1.645
19.0	1.644	1.644	1.644	1.644	1.644	1.644	1.644	1.644	1.644	1.644	1.644
20.0	1.642	1.642	1.642	1.642	1.642	1.642	1.642	1.642	1.642	1.642	1.642
21.0	1.640	1.640	1.640	1.640	1.640	1.640	1.640	1.640	1.640	1.640	1.640
22.0	1.638	1.638	1.638	1.638	1.638	1.638	1.638	1.638	1.638	1.638	1.638
23.0	1.636	1.636	1.636	1.636	1.636	1.636	1.636	1.636	1.636	1.636	1.636
24.0	1.634	1.634	1.634	1.634	1.634	1.634	1.634	1.634	1.634	1.634	1.634
25.0	1.631	1.631	1.631	1.631	1.631	1.631	1.631	1.631	1.631	1.631	1.631
26.0	1.629	1.629	1.629	1.629	1.629	1.629	1.629	1.629	1.629	1.629	1.629
27.0	1.626	1.626	1.626	1.626	1.626	1.626	1.626	1.626	1.626	1.626	*1.626*
28.0	1.624	1.624	1.624	1.624	1.624	1.624	1.624	1.624	1.624	*1.624*	*1.624*
29.0	1.621	1.621	1.621	1.621	1.621	1.621	1.621	1.621	1.621	*1.621*	
30.0	1.618	1.618	1.618	1.618	1.618	1.618	1.618	1.618	*1.618*		
31.0	1.616	1.616	1.616	1.616	1.616	1.616	1.616	1.616	*1.616*		
32.0	1.613	1.613	1.613	1.613	1.613	1.613	1.613	*1.613*			
33.0	1.610	1.610	1.610	1.610	1.610	1.610	1.610	*1.610*			
34.0	1.607	1.607	1.607	1.607	1.607	1.607	*1.607*				
36.0	1.601	1.601	1.600	1.598	1.595	*1.595*					
38.0	1.586	1.587	1.585	1.583	*1.582*						
40.0	1.571	1.573	1.571	*1.568*							
42.0	1.557	1.559	*1.556*								
44.0	1.543	*1.544*									
46.0	*1.529*										
48.0											
50.0											
52.0			DATA GIVEN ABOVE ISA+40 (C) ARE TO BE USED FOR FLEX TAKEOFF ONLY								

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DEFINITION

Applicable to: ALL

It is the maximum permissible thrust during go-around.

MAXIMUM GO AROUND

Applicable to: ALL 320

V2527-A5	GO-AROUND EPR					AIR COND ON				MACH=.225
CORRECTIONS FOR AIR BLEED										
AIR CONDITIONING OFF						ADD .010 TO EPR				
ENGINE ANTI ICE ON						READ AT TAT +5.(°C)				
ENGINE ANTI ICE AND WING ANTI ICE ON						READ AT TAT +5.(°C) AND SUBTRACT .007 FROM EPR				
TAT	PRESSURE ALTITUDE (FT)									
(°C)	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.	8500.
–60.0	1.391	1.411	1.428	1.446	1.457	1.466	1.475	1.485	1.496	1.507	1.509
–40.0	1.391	1.411	1.428	1.446	1.457	1.466	1.475	1.485	1.496	1.507	1.509
–20.0	1.391	1.411	1.428	1.446	1.457	1.466	1.475	1.485	1.496	1.507	1.509
0.0	1.391	1.411	1.428	1.446	1.457	1.466	1.475	1.485	1.496	1.507	1.509
10.0	1.391	1.411	1.428	1.446	1.457	1.466	1.475	1.485	1.496	1.507	1.509
20.0	1.391	1.411	1.428	1.446	1.457	1.466	1.475	1.485	1.496	1.507	1.509
22.0	1.391	1.411	1.428	1.446	1.457	1.466	1.475	1.485	1.496	1.507	1.509
24.0	1.391	1.411	1.428	1.446	1.457	1.466	1.475	1.485	1.496	1.507	1.509
26.0	1.391	1.411	1.428	1.446	1.457	1.466	1.475	1.485	1.496	1.507	1.509
28.0	1.391	1.411	1.428	1.446	1.457	1.466	1.475	1.485	1.496	1.502	1.500
30.0	1.391	1.411	1.428	1.446	1.457	1.466	1.475	1.485	1.492	1.492	1.491
32.0	1.391	1.411	1.428	1.446	1.457	1.466	1.475	1.482	1.482	1.482	1.480
34.0	1.391	1.411	1.428	1.446	1.457	1.466	1.471	1.472	1.472	1.471	1.470
36.0	1.391	1.411	1.428	1.446	1.457	1.466	1.462	1.463	1.462	1.460	1.459
38.0	1.391	1.411	1.428	1.446	1.457	1.458	1.453	1.452	1.451	1.450	1.448
40.0	1.391	1.411	1.428	1.446	1.455	1.449	1.443	1.442	1.440	1.439	1.438
42.0	1.391	1.411	1.428	1.446	1.444	1.438	1.433	1.431	1.430	1.429	
44.0	1.391	1.411	1.428	1.439	1.433	1.427	1.422	1.421	1.420		
46.0	1.391	1.411	1.428	1.428	1.422	1.416	1.411	1.410			
48.0	1.391	1.411	1.417	1.416	1.411	1.406	1.401				
50.0	1.391	1.407	1.406	1.405	1.400	1.395					
52.0	1.391	1.396	1.396	1.395	1.390						
54.0	1.388	1.386	1.386	1.385							
56.0	1.377	1.377	1.376								
58.0	1.368	1.367									
60.0	1.359										

V2527-A5	GO-AROUND EPR					AIR COND ON					MACH=.225
CORRECTIONS FOR AIR BLEED											
AIR CONDITIONING OFF						ADD .015 TO EPR					
ENGINE ANTI ICE ON						READ AT TAT +5.(°C)					
ENGINE ANTI ICE AND WING ANTI ICE ON						READ AT TAT +5.(°C) AND SUBSTRACT .010 FROM EPR					
TAT (°C)	PRESSURE ALTITUDE (FT)										
	5000.	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.
–60.0	1.475	1.485	1.496	1.507	1.512	1.518	1.523	1.529	1.534	1.539	1.542
–40.0	1.475	1.485	1.496	1.507	1.512	1.518	1.523	1.529	1.534	1.539	1.542
–20.0	1.475	1.485	1.496	1.507	1.512	1.518	1.523	1.529	1.534	1.539	1.542
0.0	1.475	1.485	1.496	1.507	1.512	1.518	1.523	1.529	1.534	1.539	1.542
5.0	1.475	1.485	1.496	1.507	1.512	1.518	1.523	1.529	1.534	1.539	1.542
10.0	1.475	1.485	1.496	1.507	1.512	1.518	1.523	1.529	1.534	1.539	1.542
12.0	1.475	1.485	1.496	1.507	1.512	1.518	1.523	1.529	1.534	1.539	1.542
14.0	1.475	1.485	1.496	1.507	1.512	1.518	1.523	1.529	1.534	1.539	1.542
16.0	1.475	1.485	1.496	1.507	1.512	1.518	1.523	1.529	1.534	1.537	1.538
18.0	1.475	1.485	1.496	1.507	1.512	1.518	1.523	1.529	1.532	1.533	1.534
20.0	1.475	1.485	1.496	1.507	1.512	1.518	1.523	1.526	1.526	1.529	1.528
22.0	1.475	1.485	1.496	1.507	1.512	1.518	1.520	1.520	1.521	1.518	1.516
24.0	1.475	1.485	1.496	1.507	1.512	1.515	1.513	1.513	1.510	1.506	1.504
26.0	1.475	1.485	1.496	1.507	1.509	1.506	1.506	1.502	1.499	1.494	1.492
28.0	1.475	1.485	1.496	1.502	1.499	1.498	1.495	1.491	1.487	1.483	1.480
30.0	1.475	1.485	1.492	1.492	1.490	1.487	1.484	1.480	1.476	1.471	
32.0	1.475	1.482	1.482	1.482	1.479	1.476	1.473	1.469	1.464		
34.0	1.471	1.472	1.472	1.471	1.468	1.465	1.462	1.458			
36.0	1.462	1.463	1.462	1.460	1.457	1.455	1.451				
38.0	1.453	1.452	1.451	1.450	1.447	1.444					
40.0	1.443	1.442	1.440	1.439	1.437						
42.0	1.433	1.431	1.430	1.429							
44.0	1.422	1.421	1.420								
46.0	1.411	1.410									
48.0	1.401										

MAXIMUM GO AROUND

Applicable to: ALL 321

V2533-A5	GO AROUND EPR					AIR COND ON				MACH=.225
CORRECTIONS FOR AIR BLEED										
AIR CONDITIONING OFF	ADD .013 TO EPR									
ENGINE ANTI ICE ON	READ AT ACTUAL TAT +5. (°C)									
ENGINE ANTI ICE AND WING ANTI ICE ON	READ AT ACTUAL TAT +5. (°C) AND SUBTRACT .008 FROM EPR									

TAT (°C)	PRESSURE ALTITUDE (FT)										
	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.	8500.
–60.0	1.575	1.606	1.622	1.634	1.637	1.640	1.643	1.643	1.642	1.641	1.640
0.0	1.575	1.606	1.622	1.634	1.637	1.640	1.643	1.643	1.642	1.641	1.640
10.0	1.575	1.606	1.622	1.634	1.637	1.640	1.643	1.643	1.642	1.641	1.640
18.0	1.575	1.606	1.622	1.634	1.637	1.640	1.643	1.643	1.642	1.641	1.640
19.0	1.575	1.606	1.622	1.634	1.637	1.640	1.643	1.643	1.642	1.640	1.640
20.0	1.575	1.606	1.622	1.634	1.637	1.640	1.643	1.643	1.641	1.640	1.639
21.0	1.575	1.606	1.622	1.634	1.637	1.640	1.643	1.643	1.640	1.640	1.639
22.0	1.575	1.606	1.622	1.634	1.637	1.640	1.643	1.641	1.639	1.640	1.638
23.0	1.575	1.606	1.622	1.634	1.637	1.640	1.643	1.639	1.638	1.638	1.637
24.0	1.575	1.606	1.622	1.634	1.637	1.640	1.640	1.638	1.637	1.637	1.636
25.0	1.575	1.606	1.622	1.634	1.637	1.640	1.637	1.636	1.634	1.636	1.635
26.0	1.575	1.606	1.622	1.634	1.637	1.636	1.635	1.634	1.632	1.635	1.634
27.0	1.575	1.606	1.622	1.634	1.637	1.632	1.632	1.630	1.629	1.634	1.633
28.0	1.575	1.606	1.622	1.634	1.632	1.627	1.629	1.627	1.627	1.632	1.627
29.0	1.575	1.606	1.622	1.634	1.626	1.623	1.624	1.623	1.624	1.627	1.622
30.0	1.575	1.606	1.622	1.628	1.620	1.619	1.619	1.619	1.622	1.621	1.617
31.0	1.575	1.606	1.622	1.620	1.614	1.613	1.614	1.615	1.615	1.615	1.611
32.0	1.575	1.606	1.616	1.613	1.609	1.608	1.609	1.611	1.609	1.609	1.605
33.0	1.575	1.606	1.609	1.606	1.602	1.602	1.605	1.604	1.602	1.602	1.598
34.0	1.575	1.600	1.602	1.598	1.596	1.597	1.600	1.597	1.596	1.595	1.591
35.0	1.575	1.593	1.594	1.591	1.590	1.591	1.592	1.590	1.589	1.588	1.584
36.0	1.575	1.586	1.587	1.584	1.583	1.586	1.584	1.582	1.582	1.580	1.578
38.0	1.569	1.572	1.573	1.570	1.571	1.571	1.569	1.568	1.567	1.566	1.564
40.0	1.553	1.558	1.559	1.556	1.556	1.556	1.555	1.554	1.553	1.552	1.551
42.0	1.540	1.544	1.545	1.542	1.542	1.542	1.541	1.539	1.538	1.537	
44.0	1.527	1.531	1.532	1.528	1.528	1.527	1.526	1.525	1.524		
46.0	1.514	1.517	1.518	1.514	1.514	1.513	1.511	1.510			
48.0	1.501	1.503	1.503	1.500	1.500	1.498	1.496				
50.0	1.489	1.489	1.489	1.486	1.485	1.483					
52.0	1.473	1.474	1.474	1.472	1.471						
54.0	1.457	1.460	1.461	1.459							
56.0	1.442	1.446	1.447								
58.0	1.428	1.433									
60.0	1.414										
62.0											

V2533-A5	GO-AROUND EPR						AIR COND ON			MACH=.225	
CORRECTIONS FOR AIR BLEED											
AIR CONDITIONING OFF					ADD .018 TO EPR						
ENGINE ANTI ICE ON					READ AT ACTUAL TAT +5.(°C)						
ENGINE ANTI ICE AND WING ANTI ICE ON					READ AT ACTUAL TAT +5.(°C) AND SUBTRACT .010 FROM TO EPR						
TAT (°C)	PRESSURE ALTITUDE (FT)										
	5000.	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.
–60.0	1.643	1.643	1.642	1.641	1.640	1.638	1.638	1.638	1.638	1.638	1.639
0.0	1.643	1.643	1.642	1.641	1.640	1.638	1.638	1.638	1.638	1.638	1.639
10.0	1.643	1.643	1.642	1.641	1.640	1.638	1.638	1.638	1.638	1.638	1.639
15.0	1.643	1.643	1.642	1.641	1.640	1.638	1.638	1.638	1.638	1.638	1.639
16.0	1.643	1.643	1.642	1.641	1.640	1.638	1.638	1.637	1.637	1.638	1.639
17.0	1.643	1.643	1.642	1.641	1.639	1.638	1.638	1.637	1.637	1.638	1.639
18.0	1.643	1.643	1.642	1.641	1.639	1.638	1.637	1.637	1.637	1.637	1.639
19.0	1.643	1.643	1.642	1.640	1.639	1.637	1.636	1.636	1.636	1.637	1.639
20.0	1.643	1.643	1.641	1.640	1.639	1.636	1.636	1.636	1.634	1.636	1.639
21.0	1.643	1.643	1.640	1.640	1.638	1.635	1.635	1.633	1.633	1.636	1.639
22.0	1.643	1.641	1.639	1.640	1.637	1.635	1.634	1.631	1.632	1.635	1.639
23.0	1.643	1.639	1.638	1.638	1.636	1.634	1.631	1.629	1.630	1.635	1.639
24.0	1.640	1.638	1.637	1.637	1.635	1.633	1.628	1.627	1.628	1.634	1.639
25.0	1.637	1.636	1.634	1.636	1.634	1.629	1.625	1.624	1.627	1.634	1.638
26.0	1.635	1.634	1.632	1.635	1.633	1.625	1.622	1.621	1.625	1.633	1.637
27.0	1.632	1.630	1.629	1.634	1.628	1.621	1.618	1.618	1.623	1.631	1.637
28.0	1.629	1.627	1.627	1.632	1.623	1.617	1.614	1.615	1.621	1.630	1.636
29.0	1.624	1.623	1.624	1.627	1.618	1.612	1.610	1.613	1.619	1.628	1.635
30.0	1.619	1.619	1.622	1.621	1.613	1.607	1.606	1.610	1.616	1.627	
31.0	1.614	1.615	1.615	1.615	1.607	1.602	1.602	1.606	1.614		
32.0	1.609	1.611	1.609	1.609	1.601	1.597	1.598	1.603	1.612		
34.0	1.600	1.597	1.596	1.595	1.589	1.587	1.590	1.596			
36.0	1.584	1.582	1.582	1.580	1.576	1.576	1.581				
38.0	1.569	1.568	1.567	1.566	1.564	1.566					
40.0	1.555	1.554	1.553	1.552	1.552						
42.0	1.541	1.539	1.538	1.537							
44.0	1.526	1.525	1.524								
46.0	1.511	1.510									
48.0	1.496										
50.0											

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DEFINITION

Applicable to: ALL

It is a reduced takeoff thrust as compared to the maximum permissible. The related EPR is calculated as a function of the flexible temperature entered in the FMGS MCDU. The flexible temperature is a function of the aircraft weight and environmental conditions.
It guarantees that the regular performance requirements are met.

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DEFINITION

Applicable to: ALL

It is the maximum thrust certified for continuous use. This rating should be used, at the pilot's discretion, only when required to ensure safe flight (engine failure).

MAXIMUM CONTINUOUS

Applicable to: ALL 320

V2527/27E	MAXIMUM CONTINUOUS EPR					AIR COND ON*				IAS=230 KT
CORRECTIONS FOR AIR BLEED										
AIR CONDITIONING OFF										.017
ENGINE ANTI-ICE ON										–.017
ENGINE ANTI-ICE AND WING ANTI-ICE ON										–.037
TAT (C)	PRESSURE ALTITUDE (FT)										
	0.	2000.	5000.	8000.	12000.	17000.	20000.	25000.	31000.	35000.	39000.
–50.0	1.285	1.298	1.335	1.442	1.490	1.554	1.588	1.591	1.492	1.505	1.494
–46.0	1.285	1.298	1.335	1.442	1.490	1.554	1.588	1.591	1.492	1.505	1.494
–42.0	1.285	1.298	1.335	1.442	1.490	1.554	1.588	1.591	1.492	1.505	1.494
–38.0	1.285	1.298	1.335	1.442	1.490	1.554	1.588	1.591	1.492	1.505	1.494
–34.0	1.285	1.298	1.335	1.442	1.490	1.554	1.588	1.591	1.492	1.505	1.494
–30.0	1.285	1.298	1.335	1.442	1.490	1.554	1.588	1.591	1.492	1.505	1.494
–26.0	1.285	1.298	1.335	1.442	1.490	1.554	1.588	1.591	1.492	1.505	1.494
–22.0	1.285	1.298	1.335	1.442	1.490	1.554	1.588	1.591	1.492	1.502	1.494
–18.0	1.285	1.298	1.335	1.442	1.490	1.554	1.588	1.591	1.492	1.482	1.477
–14.0	1.285	1.298	1.335	1.442	1.490	1.554	1.588	1.591	1.471	1.462	1.455
–10.0	1.285	1.298	1.335	1.442	1.490	1.554	1.588	1.591	1.448	1.440	1.433
–6.0	1.285	1.298	1.335	1.442	1.490	1.554	1.588	1.575	1.424	1.415	1.408
–2.0	1.285	1.298	1.335	1.442	1.490	1.554	1.588	1.553	1.397	1.393	1.385
2.0	1.285	1.298	1.335	1.442	1.490	1.554	1.569	1.532	1.375	1.370	1.362
6.0	1.285	1.298	1.335	1.442	1.490	1.538	1.548	1.508	1.352	1.348	1.340
10.0	1.285	1.298	1.335	1.442	1.490	1.513	1.526	1.483	1.330	1.325	1.317
14.0	1.285	1.298	1.335	1.442	1.474	1.488	1.503	1.458	1.308		
18.0	1.285	1.298	1.335	1.442	1.449	1.463	1.478	1.432			
22.0	1.285	1.298	1.335	1.418	1.424	1.438	1.453	1.407			
26.0	1.285	1.298	1.327	1.393	1.399	1.413	1.428				
30.0	1.285	1.294	1.316	1.368	1.375	1.388	1.403				
34.0	1.279	1.282	1.305	1.345	1.352	1.362					
38.0	1.265	1.269	1.296	1.325	1.329						
42.0	1.251	1.259	1.285	1.306	1.306						
46.0	1.239	1.249	1.274	1.287							
50.0	1.229	1.239	1.263								
54.0	1.220	1.229	1.252								
58.0	1.211	1.219									
62.0	1.201										
66.0											

(*) One engine inoperative - 1 pack operative on remaining engine.

MAXIMUM CONTINUOUS

Applicable to: ALL 321

V2530/33	MAXIMUM CONTINUOUS EPR			AIR COND ON *					IAS=230KT	
CORRECTIONS FOR AIR BLEED										
AIR CONDITIONING OFF									.020	
ENGINE ANTI ICE ON									–.024	
ENGINE ANTI ICE AND WING ANTI ICE ON									–.046	
TAT (°C)	**PRESSURE ALTITUDE (FT)**									
	0.	**2000.**	**5000.**	**8000.**	**12000.**	**17000.**	**20000.**	**25000.**	**31000.**	**35000.**	**39000.**
–50.0	1.409	1.433	1.470	1.498	1.535	1.575	1.587	1.565	1.611	1.625	1.617
–46.0	1.409	1.433	1.470	1.498	1.535	1.575	1.587	1.565	1.611	1.625	1.617
–42.0	1.409	1.433	1.470	1.498	1.535	1.575	1.587	1.565	1.611	1.625	1.617
–38.0	1.409	1.433	1.470	1.498	1.535	1.575	1.587	1.565	1.611	1.625	1.617
–34.0	1.409	1.433	1.470	1.498	1.535	1.575	1.587	1.565	1.611	1.625	1.617
–30.0	1.409	1.433	1.470	1.498	1.535	1.575	1.587	1.565	1.611	1.625	1.617
–26.0	1.409	1.433	1.470	1.498	1.535	1.575	1.587	1.565	1.611	1.625	1.617
–22.0	1.409	1.433	1.470	1.498	1.535	1.575	1.587	1.565	1.611	1.625	1.617
–18.0	1.409	1.433	1.470	1.498	1.535	1.575	1.587	1.565	1.611	1.607	1.597
–14.0	1.409	1.433	1.470	1.498	1.535	1.575	1.587	1.565	1.590	1.582	1.572
–10.0	1.409	1.433	1.470	1.498	1.535	1.575	1.587	1.565	1.566	1.557	1.547
–6.0	1.409	1.433	1.470	1.498	1.535	1.575	1.587	1.547	1.543	1.534	1.523
–2.0	1.409	1.433	1.470	1.498	1.535	1.575	1.587	1.524	1.518	1.510	1.500
2.0	1.409	1.433	1.470	1.498	1.535	1.575	1.569	1.500	1.494	1.484	1.475
6.0	1.409	1.433	1.470	1.498	1.535	1.557	1.548	1.475	1.468	1.458	1.448
10.0	1.409	1.433	1.470	1.498	1.535	1.532	1.526	1.450	1.441	1.433	1.420
14.0	1.409	1.433	1.470	1.498	1.518	1.506	1.503	1.424	1.415		
18.0	1.409	1.433	1.470	1.498	1.491	1.481	1.480	1.397			
22.0	1.409	1.433	1.470	1.473	1.464	1.456	1.455	1.369			
26.0	1.409	1.433	1.453	1.446	1.438	1.430	1.429				
30.0	1.409	1.425	1.426	1.421	1.411	1.404	1.403				
34.0	1.398	1.399	1.400	1.398	1.387	1.378					
38.0	1.373	1.373	1.383	1.375	1.366						
42.0	1.348	1.353	1.366	1.358	1.345						
46.0	1.327	1.334	1.349	1.343							
50.0	1.306	1.315	1.330								
54.0	1.286	1.296	1.312								
58.0	1.267	1.276									
62.0	1.248										
66.0											

* One engine inoperative – 1 pack operative on remaining engine.

DEFINITION

Applicable to: ALL

It is the maximum thrust approved for normal climb.

MAXIMUM CLIMB

Applicable to: ALL 320

V2527-27E	MAXIMUM CLIMB EPR	AIR COND ON	250/300/.78
CORRECTIONS FOR AIR BLEED			
AIR CONDITIONING OFF			.018
ENGINE ANTI ICE ON			–.018
ENGINE ANTI ICE AND WING ANTI ICE ON			–.030

TAT	PRESSURE ALTITUDE (FT)										
(°C)	0.	2000.	5000.	8000.	12000.	17000.	20000.	25000.	31000.	35000.	39000.
–50.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.395	1.438	1.482	1.491
–46.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.395	1.438	1.482	1.491
–42.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.395	1.438	1.482	1.491
–38.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.395	1.438	1.482	1.491
–34.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.395	1.438	1.482	1.491
–30.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.395	1.438	1.482	1.491
–26.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.395	1.438	1.482	1.491
–22.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.395	1.438	1.482	1.491
–18.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.395	1.438	1.482	1.485
–14.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.395	1.438	1.467	1.462
–10.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.395	1.438	1.443	1.438
–6.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.395	1.428	1.419	1.414
–2.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.395	1.403	1.394	1.389
2.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.389	1.378	1.370	1.366
6.0	1.269	1.289	1.313	1.333	1.326	1.357	1.378	1.365	1.354	1.348	1.344
10.0	1.269	1.289	1.313	1.333	1.326	1.357	1.363	1.341	1.329	1.326	
14.0	1.269	1.289	1.313	1.333	1.326	1.342	1.340	1.317	1.308		
18.0	1.269	1.289	1.313	1.333	1.326	1.320	1.317	1.295	1.287		
22.0	1.269	1.289	1.313	1.323	1.308	1.298	1.296	1.275			
26.0	1.269	1.289	1.308	1.303	1.287	1.277	1.276	1.254			
30.0	1.269	1.289	1.290	1.283	1.267	1.258	1.257				
34.0	1.267	1.272	1.271	1.265	1.248	1.241	1.238				
38.0	1.251	1.255	1.254	1.249	1.231	1.223					
42.0	1.234	1.238	1.238	1.234	1.215						
46.0	1.219	1.223	1.224								
50.0	1.205	1.210	1.210								
54.0	1.192	1.197									
58.0	1.180										
62.0											
66.0											

MAXIMUM CLIMB

Applicable to: ALL 321

V2533–A5	MAXIMUM CLIMB EPR			AIR COND ON						250/300/.78
CORRECTIONS FOR AIR BLEED										
AIR CONDITIONING OFF										.028
ENGINE ANTI ICE ON										–.022
ENGINE ANTI ICE AND WING ANTI ICE ON										–.038

TAT	PRESSURE ALTITUDE (FT)										
(°C)	0.	2000.	5000.	8000.	12000.	17000.	20000.	25000.	31000.	35000.	39000.
–50.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.511	1.557	1.604	1.616
–46.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.511	1.557	1.604	1.616
–42.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.511	1.557	1.604	1.616
–38.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.511	1.557	1.604	1.616
–34.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.511	1.557	1.604	1.616
–30.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.511	1.557	1.604	1.616
–26.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.511	1.557	1.604	1.616
–22.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.511	1.557	1.604	1.616
–18.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.511	1.557	1.604	1.610
–14.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.511	1.557	1.589	1.583
–10.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.511	1.557	1.566	1.557
–6.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.511	1.548	1.542	1.532
–2.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.511	1.524	1.517	1.508
2.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.505	1.500	1.492	1.483
6.0	1.329	1.353	1.388	1.417	1.420	1.464	1.484	1.480	1.475	1.466	1.457
10.0	1.329	1.353	1.388	1.417	1.420	1.464	1.466	1.456	1.448	1.438	
14.0	1.329	1.353	1.388	1.417	1.420	1.445	1.439	1.430	1.421		
18.0	1.329	1.353	1.388	1.417	1.420	1.417	1.413	1.403	1.394		
22.0	1.329	1.353	1.388	1.403	1.396	1.388	1.386	1.375			
26.0	1.329	1.353	1.382	1.377	1.368	1.362	1.359	1.349			
30.0	1.329	1.353	1.357	1.351	1.341	1.336	1.332				
34.0	1.326	1.329	1.333	1.326	1.315	1.310	1.308				
38.0	1.302	1.305	1.308	1.301	1.289	1.285					
42.0	1.278	1.281	1.284	1.277	1.264						
46.0	1.255	1.259	1.260								
50.0	1.235	1.237	1.239								
54.0	1.214	1.217									
58.0	1.196										
62.0											
66.0											

DEFINITION

Applicable to: ALL 320

It is the maximum thrust approved for normal cruise.
There is no thrust lever position corresponding to this thrust rating.
It is not displayed to the pilot, and the EPR limit which is displayed in cruise is the maximum climb EPR.
The FMGS uses the maximum cruise EPR to compute the aircraft maximum speed.
In manual thrust setting, in cruise, the pilot should limit EPR to the maximum cruise EPR that is equal to the displayed maximum climb EPR minus 0.07.

DEFINITION

Applicable to: ALL 321

It is the maximum thrust approved for normal cruise.
There is no thrust lever position corresponding to this thrust rating.
It is not displayed to the pilot, and the EPR limit which is displayed in cruise is the maximum climb EPR.
The FMGS uses the maximum cruise EPR to compute the aircraft maximum speed.
In manual thrust setting, in cruise, the pilot should limit EPR to the maximum cruise EPR that is equal to the displayed maximum climb EPR minus 0.075.

MAXIMUM CRUISE

Applicable to: ALL 320

V2527-27E	MAXIMUM CRUISE EPR					AIR COND ON				250/300/.78
CORRECTIONS FOR AIR BLEED										
AIR CONDITIONING OFF										.018
ENGINE ANTI ICE ON										–.018
ENGINE ANTI ICE AND WING ANTI ICE ON										–.030
TAT	PRESSURE ALTITUDE (FT)										
(°C)	0.	2000.	5000.	8000.	12000.	17000.	20000.	25000.	31000.	35000.	39000.
–50.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.325	1.368	1.412	1.421
–46.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.325	1.368	1.412	1.421
–42.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.325	1.368	1.412	1.421
–38.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.325	1.368	1.412	1.421
–34.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.325	1.368	1.412	1.421
–30.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.325	1.368	1.412	1.421
–26.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.325	1.368	1.412	1.421
–22.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.325	1.368	1.412	1.421
–18.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.325	1.368	1.412	1.415
–14.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.325	1.368	1.397	1.392
–10.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.325	1.368	1.373	1.368
–6.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.325	1.358	1.349	1.344
–2.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.325	1.333	1.324	1.319
2.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.319	1.308	1.300	1.296
6.0	1.199	1.219	1.243	1.263	1.256	1.287	1.308	1.295	1.284	1.278	1.274
10.0	1.199	1.219	1.243	1.263	1.256	1.287	1.293	1.271	1.259	1.256	
14.0	1.199	1.219	1.243	1.263	1.256	1.272	1.270	1.247	1.238		
18.0	1.199	1.219	1.243	1.263	1.256	1.250	1.247	1.225	1.217		
22.0	1.199	1.219	1.243	1.253	1.238	1.228	1.226	1.205			
26.0	1.199	1.219	1.238	1.233	1.217	1.207	1.206	1.184			
30.0	1.199	1.219	1.220	1.213	1.197	1.188	1.187				
34.0	1.197	1.202	1.201	1.195	1.178	1.171	1.168				
38.0	1.181	1.185	1.184	1.179	1.161	1.153					
42.0	1.164	1.168	1.168	1.164	1.145						
46.0	1.149	1.153	1.154								
50.0	1.135	1.140	1.140								
54.0	1.122	1.127									
58.0	1.110										
62.0											
66.0											

MAXIMUM CRUISE

Applicable to: ALL 321

V2533–A5	MAXIMUM CRUISE EPR	AIR COND ON	250/300/.78
CORRECTIONS FOR AIR BLEED			
AIR CONDITIONING OFF			.028
ENGINE ANTI ICE ON			–.022
ENGINE ANTI ICE AND WING ANTI ICE ON			–.038

TAT	PRESSURE ALTITUDE (FT)										
(°C)	0.	2000.	5000.	8000.	12000.	17000.	20000.	25000.	31000.	35000.	39000.
–50.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.436	1.482	1.529	1.541
–46.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.436	1.482	1.529	1.541
–42.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.436	1.482	1.529	1.541
–38.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.436	1.482	1.529	1.541
–34.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.436	1.482	1.529	1.541
–30.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.436	1.482	1.529	1.541
–26.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.436	1.482	1.529	1.541
–22.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.436	1.482	1.529	1.541
–18.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.436	1.482	1.529	1.535
–14.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.436	1.482	1.514	1.508
–10.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.436	1.482	1.491	1.482
–6.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.436	1.473	1.467	1.457
–2.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.436	1.449	1.442	1.433
2.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.430	1.425	1.417	1.408
6.0	1.254	1.278	1.313	1.342	1.345	1.389	1.409	1.405	1.400	1.391	1.382
10.0	1.254	1.278	1.313	1.342	1.345	1.389	1.391	1.381	1.373	1.363	
14.0	1.254	1.278	1.313	1.342	1.345	1.370	1.364	1.355	1.346		
18.0	1.254	1.278	1.313	1.342	1.345	1.342	1.338	1.328	1.319		
22.0	1.254	1.278	1.313	1.328	1.321	1.313	1.311	1.300			
26.0	1.254	1.278	1.307	1.302	1.293	1.287	1.284	1.274			
30.0	1.254	1.278	1.282	1.276	1.266	1.261	1.257				
34.0	1.251	1.254	1.258	1.251	1.240	1.235	1.233				
38.0	1.227	1.230	1.233	1.226	1.214	1.210					
42.0	1.203	1.206	1.209	1.202	1.189						
46.0	1.180	1.184	1.185								
50.0	1.160	1.162	1.164								
54.0	1.139	1.142									
58.0	1.121										
62.0											
66.0											

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N1 MODE THRUST CONTROL

Applicable to: ALL 321

In case of no EPR available, the thrust control automatically reverts to N1 mode (rated or unrated).
Refer to PRO-ABN-70 ENG 1(2) EPR MODE FAULT.
If the N1 rated mode is lost on both engines, refer to the power management tables given on the following pages.
The herebelow table gives the N1 to be set in cruise to maintain M 0.78.

	FLIGHT LEVEL					
WEIGHT (1000 KG)	**290**	**310**	**330**	**350**	**370**	**390**
56	78.1	78.1	78.2	78.4	79.1	80.5
58	78.3	78.4	78.5	78.7	79.5	81.1
60	78.5	78.6	78.8	79.1	79.9	81.6
62	78.7	78.9	79.1	79.4	80.4	82.4
64	78.9	79.1	79.4	79.8	80.9	83.2
66	79.2	79.4	79.7	80.2	81.5	84.1
68	79.4	79.7	80	80.6	82.1	85.2
70	79.7	80	80.4	81.1	82.9	
72	79.9	80.2	80.7	81.6	83.7	
74	80.2	80.6	81.1	82.2	84.6	
76	80.5	80.9	81.5	82.8	85.9	
78	80.7	81.3	82	83.5		
80	81.1	81.6	82.5	84.3		
82	81.3	81.9	83	85.5		N1 (%)

Drift Down ceilings and go around performance are affected as follows:
Drift down ceiling:

Actual Weight (1 000 kg)	**50**	**60**	**70**	**80**	**90**
Ceiling Penalty (ft)	4 000	4 000	4 900	6 000	5 400

Go around weight:

Normal go around Weight (1 000 kg)	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**85**
Weight Penalty (1 000 kg)	5.9	6.5	7.2	7.8	8.5	9.1	9.8	10.4	11.1

N1 MODE THRUST CONTROL

Applicable to: ALL 320

In case of no EPR available, the thrust control automatically reverts to N1 mode (rated or unrated).
Refer to PRO-ABN-70 ENG 1(2) EPR MODE FAULT.
If the N1 rated mode is lost on both engines, refer to the power management tables given on the following pages.
The herebelow table gives the N1 to be set in cruise to maintain M 0.78.

	FLIGHT LEVEL					
WEIGHT (1000 KG)	**290**	**310**	**330**	**350**	**370**	**390**
50	75.4	75.5	75.7	76	76.8	78
52	75.7	75.8	76	76.4	77.2	78.6
54	75.9	76.1	76.4	76.8	77.6	79.1
56	76.2	76.4	76.8	77.2	78.1	79.7
58	76.4	76.7	77.1	77.6	78.6	80.4
60	76.7	77.1	77.5	78	79.2	81.2
62	77.1	77.4	77.9	78.5	79.7	81.9
64	77.3	77.7	78.3	79	80.3	
66	77.7	78.1	78.6	79.5	81	
68	78	78.5	79.1	80	81.7	
70	78.3	78.8	79.5	80.5	82.5	
72	78.6	79.2	80	81.1		
74	79	79.5	80.4	81.7		
76	79.3	80	80.9	82.4		N1 (%)

Drift Down ceilings and go around performance are affected as follows:
Drift down ceiling:

Actual Weight (1 000 kg)	**40**	**50**	**60**	**70**
Ceiling Penalty (ft)	4 000	4 700	5 300	6 000

Go around weight:

Normal go around Weight (1 000 kg)	**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**85**
Weight Penalty (1 000 kg)	5.2	5.9	6.5	7.2	7.8	8.5	9.1	9.8	10.4	11

MAXIMUM TAKEOFF N1

Applicable to: ALL 320

V2527-A5	TAKEOFF N1				NO AIR BLEED MACH=.000				
CORRECTIONS FOR AIR BLEED									
AIR CONDITIONING ON				SUBTRACT .400 FROM N1					
ENGINE ANTI ICE ON				SUBTRACT 1.3 FROM N1 ABOVE CORNER POINT					
ENGINE ANTI ICE AND WING ANTI ICE ON				SUBTRACT .3 FROM N1 BELOW CORNER POINT AND 1.6 ABOVE CORNER POINT					
OAT (°C)	PRESSURE ALTITUDE (FT)								
	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
–60.0	74.6	75.4	76.2	76.9	77.5	78.0	78.4	78.9	79.5
–40.0	78.0	78.9	79.6	80.5	81.0	81.5	82.0	82.6	83.1
–20.0	81.3	82.2	83.0	83.8	84.4	85.0	85.5	86.0	86.6
0.0	84.4	85.4	86.2	87.1	87.7	88.3	88.8	89.4	90.0
10.0	86.0	86.9	87.8	88.7	89.3	89.9	90.4	91.0	91.6
20.0	87.5	88.4	89.3	90.2	90.9	91.4	92.0	92.6	93.2
22.0	87.8	88.7	89.6	90.5	91.2	91.8	92.3	92.9	93.5
24.0	88.1	89.0	89.9	90.8	91.5	92.1	92.6	93.2	93.8
26.0	88.3	89.3	90.2	91.1	91.8	92.4	92.9	93.5	94.1
28.0	88.6	89.6	90.5	91.4	92.1	92.7	93.2	93.8	94.5
30.0	88.9	89.9	90.8	91.7	92.4	93.0	93.5	94.1	*94.4*
32.0	89.2	90.2	91.1	92.1	92.7	93.3	93.8	*94.1*	*94.1*
34.0	89.5	90.5	91.4	92.4	93.0	93.6	*93.8*	*93.8*	*93.8*
36.0	89.8	90.8	91.7	92.7	93.3	*93.8*	*93.6*	*93.6*	*93.5*
38.0	90.1	91.1	92.0	93.0	93.6	*93.6*	*93.3*	*93.3*	*93.2*
40.0	90.4	91.4	92.3	93.2	*93.6*	*93.3*	*93.1*	*93.0*	*93.0*
42.0	90.7	91.7	92.6	93.5	*93.3*	*93.1*	*92.8*	*92.8*	
44.0	91.0	92.0	92.9	*93.3*	*93.0*	*92.8*	*92.6*		
46.0	91.3	92.3	*93.0*	*93.0*	*92.8*	*92.6*			
48.0	91.5	92.6	*92.7*	*92.7*	*92.5*				
50.0	91.8	*92.5*	*92.5*	*92.5*					
52.0	92.1	*92.2*	*92.2*						
54.0	*92.0*	*92.0*							
56.0	*91.8*								
58.0									

BELOW CORNER POINT
ABOVE CORNER POINT

V2527-A5	TAKE-OFF N1	NO AIR BLEED	MACH=.000
CORRECTIONS FOR AIR BLEED			
AIR CONDITIONING ON		SUBTRACT .700 FROM N1	
ENGINE ANTI ICE ON		SUBTRACT 1.7 FROM N1 ABOVE CORNER POINT	
ENGINE ANTI ICE AND WING ANTI ICE ON		SUBTRACT .5 FROM N1 BELOW CORNER POINT AND 2.2 ABOVE CORNER POINT	

OAT (°C)	PRESSURE ALTITUDE (FT)									
	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.
–60.0	78.9	79.5	80.0	80.3	80.6	80.9	81.2	81.5	81.9	82.0
–40.0	82.6	83.1	83.7	84.0	84.3	84.6	84.9	85.3	85.6	85.8
–20.0	86.0	86.6	87.2	87.5	87.8	88.1	88.5	88.8	89.2	89.4
0.0	89.4	90.0	90.6	90.9	91.2	91.6	91.9	92.3	92.7	92.9
5.0	90.2	90.8	91.4	91.7	92.0	92.4	92.7	93.1	93.5	93.7
10.0	91.0	91.6	92.2	92.5	92.9	93.2	93.6	94.0	94.4	94.6
12.0	91.3	91.9	92.5	92.9	93.2	93.5	93.9	94.3	94.7	94.9
14.0	91.6	92.2	92.8	93.2	93.5	93.9	94.2	94.6	95.0	*95.2*
16.0	91.9	92.6	93.2	93.5	93.9	94.2	94.5	95.0	*95.1*	*95.2*
18.0	92.3	92.9	93.5	93.8	94.2	94.5	94.9	*95.0*	*95.2*	*95.3*
20.0	92.6	93.2	93.8	94.2	94.5	94.8	*94.9*	*95.0*	*95.1*	*95.0*
22.0	92.9	93.5	94.1	94.5	94.8	*94.9*	*94.9*	*95.0*	*94.8*	*94.7*
24.0	93.2	93.8	94.4	94.8	*94.8*	*94.8*	*94.8*	*94.6*	*94.5*	*94.4*
26.0	93.5	94.1	94.8	*94.7*	*94.6*	*94.6*	*94.5*	*94.3*	*94.1*	*94.0*
28.0	94.7	94.5	*94.5*	*94.3*	*94.2*	*94.0*				
30.0	94.1	*94.4*	*94.4*	*94.3*	*94.1*	*94.0*	*93.8*			
32.0	*94.1*	*94.1*	*94.1*	*94.0*	*93.8*	*93.7*				
34.0	*93.8*	*93.8*	*93.8*	*93.7*	*93.5*					
36.0	*93.6*	*93.5*	*93.5*	*93.4*						
38.0	*93.3*	*93.2*	*93.2*							
40.0	*93.0*	*93.0*								
42.0	*92.8*									
44.0										
46.0										
48.0										

BELOW CORNER POINT
ABOVE CORNER POINT

MAXIMUM TAKEOFF N1

Applicable to: ALL 321

V2533–A5	TAKEOFF N1				NO AIR BLEED MACH=.000				
CORRECTIONS FOR AIR BLEED									
AIR CONDITIONING ON				SUBTRACT .800 FROM N1					
ENGINE ANTI ICE ON				SUBTRACT 2.0 FROM N1 ABOVE CORNER POINT					
ENGINE ANTI ICE AND WING ANTI ICE ON				SUBTRACT .4 FROM N1 BELOW CORNER POINT AND 2.4 ABOVE CORNER POINT					
OAT (°C)	PRESSURE ALTITUDE (FT)								
	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
–60.0	79.1	80.6	81.2	81.7	82.2	82.7	83.2	83.7	84.2
–56.0	79.9	81.4	81.9	82.5	83.0	83.4	83.9	84.5	85.0
–52.0	80.6	82.1	82.7	83.2	83.7	84.2	84.7	85.3	85.8
–48.0	81.3	82.9	83.4	84.0	84.5	85.0	85.5	86.0	86.6
–44.0	82.0	83.6	84.2	84.7	85.2	85.7	86.2	86.8	87.3
–40.0	82.8	84.3	84.9	85.5	86.0	86.5	87.0	87.5	88.1
–36.0	83.5	85.0	85.6	86.2	86.7	87.2	87.7	88.3	88.9
–32.0	84.2	85.8	86.3	86.9	87.4	87.9	88.4	89.0	89.6
–28.0	84.9	86.5	87.0	87.6	88.1	88.7	89.2	89.8	90.3
–24.0	85.6	87.2	87.8	88.3	88.9	89.4	89.9	90.5	91.1
–20.0	86.2	87.9	88.5	89.0	89.6	90.1	90.6	91.2	91.8
–16.0	86.9	88.6	89.2	89.7	90.3	90.8	91.3	91.9	92.5
–12.0	87.6	89.2	89.8	90.4	91.0	91.5	92.0	92.6	93.2
–8.0	88.3	89.9	90.5	91.1	91.7	92.2	92.7	93.3	94.0
–4.0	88.9	90.6	91.2	91.8	92.4	92.9	93.4	94.1	94.7
0.0	89.6	91.3	91.9	92.5	93.0	93.6	94.1	94.7	95.4
4.0	90.2	91.9	92.6	93.2	93.7	94.3	94.8	95.4	96.1
8.0	90.9	92.6	93.2	93.8	94.4	94.9	95.5	96.1	96.8
12.0	91.5	93.2	93.9	94.5	95.1	95.6	96.2	96.8	97.4
16.0	92.2	93.9	94.5	95.2	95.7	96.3	96.8	97.5	98.1
20.0	92.8	94.5	95.2	95.8	96.4	*97.0*	*97.5*	*98.2*	*98.2*
24.0	93.4	95.2	95.8	*96.5*	*97.0*	*97.6*	*97.6*	*97.4*	*97.2*
28.0	94.1	95.8	*96.5*	*97.1*	*97.1*	*96.9*	*96.8*	*96.5*	*96.3*
32.0	94.7	96.5	*96.5*	*96.4*	*96.2*	*96.0*	*95.8*	*95.6*	*95.4*
36.0	95.3	*95.8*	*95.7*	*95.5*	*95.3*	*95.0*	*94.8*	*94.6*	*94.4*
40.0	*94.7*	*94.9*	*94.7*	*94.6*	*94.3*	*94.1*	*93.8*	*93.7*	*93.5*
44.0	*93.8*	*93.9*	*93.8*	*93.7*	*93.5*	*93.3*	*93.1*		
48.0	*93.3*	*93.3*	*93.2*	*93.1*	*92.9*				
52.0	*92.7*	*92.7*	*92.6*						
56.0	*92.0*								

BELOW CORNER POINT

ABOVE CORNER POINT

V2533-A5	TAKE-OFF N1					NO AIR BLEED			MACH=.000	
CORRECTIONS FOR AIR BLEED										
AIR CONDITIONING ON					SUBTRACT 1.0 FROM N1					
ENGINE ANTI ICE ON					SUBTRACT .1 FROM N1 ABOVE CORNER POINT					
ENGINE ANTI ICE AND WING ANTI ICE ON					SUBTRACT .7 FROM N1 BELOW CORNER POINT AND .8 ABOVE CORNER POINT					
OAT	PRESSURE ALTITUDE (FT)									
(°C)	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.
–60.0	84.3	84.3	84.3	84.3	84.3	84.3	84.3	84.3	84.3	84.3
–50.0	86.3	86.3	86.3	86.3	86.3	86.3	86.3	86.3	86.3	86.3
–40.0	88.2	88.2	88.2	88.2	88.2	88.2	88.2	88.2	88.2	88.2
–30.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
–20.0	91.9	91.9	91.9	91.9	91.9	91.9	91.9	91.9	91.9	91.9
–15.0	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.8	92.8
–10.0	93.7	93.7	93.7	93.7	93.7	93.7	93.7	93.7	93.7	93.7
–5.0	94.6	94.6	94.6	94.6	94.6	94.6	94.6	94.6	94.6	94.6
0.0	95.4	95.4	95.4	95.4	95.4	95.4	95.4	95.4	95.4	95.4
2.0	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8
4.0	96.1	96.1	96.1	96.1	96.1	96.1	96.1	96.1	96.1	96.1
6.0	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5
8.0	96.8	96.8	96.8	96.8	96.8	96.8	96.8	96.8	96.8	96.8
10.0	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2
12.0	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
14.0	97.8	97.8	97.8	97.8	97.8	97.8	97.8	97.8	97.8	97.8
16.0	98.2	98.2	98.2	98.2	98.2	98.2	98.2	98.2	98.2	98.2
18.0	*98.5*	*98.5*	*98.5*	*98.5*	*98.5*	*98.5*	*98.5*	*98.5*	*98.5*	*98.5*
19.0	*98.6*	*98.6*	*98.6*	*98.6*	*98.6*	*98.6*	*98.6*	*98.6*	*98.6*	*98.6*
20.0	*98.7*	*98.7*	*98.7*	*98.7*	*98.7*	*98.7*	*98.7*	*98.7*	*98.7*	*98.7*
21.0	*98.7*	*98.7*	*98.7*	*98.7*	*98.7*	*98.7*	*98.7*	*98.7*	*98.7*	*98.7*
22.0	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*
23.0	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*
24.0	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*	*98.8*
25.0	*98.9*	*98.9*	*98.9*	*98.9*	*98.9*	*98.9*	*98.9*	*98.9*	*98.9*	*98.9*
26.0	*98.9*	*98.9*	*98.9*	*98.9*	*98.9*	*98.9*	*98.9*	*98.9*	*98.9*	*98.9*
28.0	*98.9*	*98.9*	*98.9*	*98.9*	*98.9*	*98.7*	*98.8*	*98.9*		
30.0	*98.8*	*98.8*	*98.8*	*98.8*	*98.6*	*98.6*	*98.8*			
32.0	*98.8*	*98.8*	*98.8*	*98.5*	*98.3*	*98.4*				
34.0	*98.4*	*98.4*	*98.4*	*98.0*	*98.0*					
36.0	*97.8*	*97.8*	*97.7*	*97.6*						
38.0	*97.4*	*97.4*	*97.3*							
40.0	*97.0*	*96.9*								
42.0	*96.5*									
44.0										

BELOW CORNER POINT
ABOVE CORNER POINT

MAXIMUM GO AROUND N1

Applicable to: ALL 320

V2527-A5	GO-AROUND N1	AIR COND ON
CORRECTIONS FOR AIR BLEED		
AIR CONDITIONING OFF		ADD .400 TO N1
NACELLE ANTI ICE ON		SUBTRACT 1.3 FROM N1 ABOVE CORNER POINT
NACELLE ANTI ICE AND WING ANTI ICE ON		SUBTRACT .3 FROM N1 BELOW CORNER POINT AND 1.6 ABOVE CORNER POINT

TAT (°C)	PRESSURE ALTITUDE (FT)								
	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
–60.0	74.3	75.1	75.8	76.6	77.0	77.5	77.9	78.4	78.9
–40.0	77.7	78.5	79.3	80.1	80.6	81.1	81.5	82.0	82.5
–20.0	80.9	81.8	82.6	83.4	84.0	84.5	84.9	85.5	86.0
0.0	84.1	85.0	85.8	86.7	87.2	87.7	88.2	88.8	89.3
10.0	85.6	86.6	87.4	88.3	88.8	89.3	89.8	90.4	91.0
20.0	87.1	88.1	88.9	89.8	90.3	90.9	91.4	92.0	92.5
22.0	87.4	88.4	89.2	90.1	90.7	91.2	91.7	92.3	92.9
24.0	87.7	88.7	89.5	90.4	91.0	91.5	92.0	92.6	93.2
26.0	88.0	89.0	89.8	90.7	91.3	91.8	92.3	92.9	93.5
28.0	88.3	89.3	90.1	91.0	91.6	92.1	92.6	93.2	93.8
30.0	88.6	89.6	90.4	91.3	91.9	92.4	92.9	93.5	*93.7*
32.0	88.9	89.9	90.7	91.6	92.2	92.7	93.2	*93.4*	*93.5*
34.0	89.2	90.1	91.0	91.9	92.5	93.0	*93.2*	*93.2*	*93.2*
36.0	89.4	90.4	91.3	92.2	92.8	*93.3*	*93.0*	*93.0*	*92.9*
38.0	89.7	90.7	91.6	92.5	93.1	*93.0*	*92.8*	*92.7*	*92.6*
40.0	90.0	91.0	91.9	92.8	*93.1*	*92.8*	*92.5*	*92.5*	*92.4*
42.0	90.3	91.3	92.2	93.1	*92.8*	*92.6*	*92.3*	*92.2*	*92.2*
44.0	90.6	91.6	92.5	*92.9*	*92.6*	*92.3*	*92.1*	*92.0*	*91.9*
46.0	90.9	91.9	*92.6*	*92.6*	*92.3*	*92.1*	*91.8*	*91.7*	
48.0	91.2	92.2	*92.3*	*92.3*	*92.0*	*91.8*	*91.5*		
50.0	91.4	*92.1*	*92.1*	*92.0*	*91.8*	*91.5*			
52.0	91.7	*91.8*	*91.8*	*91.8*	*91.5*				
54.0	*91.7*	*91.6*	*91.6*	*91.6*					
56.0	*91.4*	*91.4*	*91.4*						
58.0	*91.2*	*91.2*							

BELOW CORNER POINT
ABOVE CORNER POINT

V2527-A5	GO-AROUND N1	AIR COND ON
CORRECTIONS FOR AIR BLEED		
AIR CONDITIONING OFF		ADD .700 TO N1
ENGINE ANTI ICE ON		READ AT TAT +5. (°C)
ENGINE ANTI ICE AND WING ANTI ICE ON		READ AT TAT +5. (°C) AND SUBTRACT 0.500 FROM N1

TAT (°C)	PRESSURE ALTITUDE (FT)									
	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.
–60.0	78.4	78.9	79.4	79.7	80.0	80.2	80.4	80.7	80.9	81.1
–40.0	82.0	82.5	83.1	83.3	83.6	83.9	84.1	84.4	84.6	84.8
–20.0	85.5	86.0	86.5	86.8	87.1	87.4	87.7	87.9	88.2	88.3
0.0	88.8	89.3	89.9	90.2	90.5	90.8	91.1	91.3	91.6	91.8
5.0	89.6	90.1	90.7	91.0	91.3	91.6	91.9	92.2	92.5	92.6
10.0	90.4	91.0	91.5	91.8	92.2	92.4	92.7	93.0	93.3	93.4
12.0	90.7	91.3	91.9	92.2	92.5	92.8	93.0	93.3	93.6	93.8
14.0	91.0	91.6	92.2	92.5	92.8	93.1	93.4	93.7	93.9	*94.0*
16.0	91.3	91.9	92.5	92.8	93.1	93.4	93.7	94.0	*94.1*	*94.1*
18.0	91.6	92.2	92.8	93.1	93.4	93.7	94.0	*94.1*	*94.2*	*94.2*
20.0	92.0	92.5	93.1	93.5	93.8	94.1	*94.1*	*94.1*	*94.2*	*94.0*
22.0	92.3	92.9	93.5	93.8	94.1	*94.1*	*94.0*	*94.1*	*93.8*	*93.7*
24.0	92.6	93.2	93.8	94.1	*94.1*	*94.0*	*93.9*	*93.7*	*93.5*	*93.4*
26.0	92.9	93.5	94.1	*94.0*	*93.9*	*93.8*	*93.6*	*93.4*	*93.2*	*93.0*
28.0	93.2	93.8	*94.0*	*93.8*	*93.7*	*93.5*	*93.3*	*93.1*	*92.8*	*92.7*
30.0	93.5	*93.7*	*93.7*	*93.6*	*93.4*	*93.2*	*93.0*	*92.7*	*92.5*	
32.0	*93.4*	*93.5*	*93.4*	*93.3*	*93.1*	*92.9*	*92.6*	*92.4*		
34.0	*93.2*	*93.2*	*93.1*	*92.9*	*92.8*	*92.6*	*92.3*			
36.0	*93.0*	*92.9*	*92.8*	*92.6*	*92.5*	*92.3*				
38.0	*92.7*	*92.6*	*92.5*	*92.4*	*92.3*					
40.0	*92.5*	*92.4*	*92.3*	*92.2*						
42.0	*92.2*	*92.2*	*92.1*							
44.0	*92.0*	*91.9*								
46.0	*91.7*									
48.0										

BELOW CORNER POINT
ABOVE CORNER POINT

Note: This table is valid for all aircraft speeds.

MAXIMUM GO AROUND N1

Applicable to: ALL 321

V2533-A5	GO AROUND N1			AIR COND ON					
CORRECTIONS FOR AIR BLEED									
AIR CONDITIONING OFF				ADD .8 TO N1					
ENGINE ANTI ICE ON				SUBTRACT 2.0 FROM N1 ABOVE CORNER POINT					
ENGINE ANTI ICE AND WING ANTI ICE ON				SUBTRACT .4 FROM N1 BELOW CORNER POINT AND 2.4 ABOVE CORNER POINT					
TAT (°C)	PRESSURE ALTITUDE (FT)								
	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
–60.0	80.3	81.8	82.6	83.2	83.3	83.4	83.5	83.5	83.4
–40.0	84.0	85.5	86.4	87.0	87.1	87.2	87.3	87.3	87.3
–20.0	87.5	89.1	90.0	90.7	90.8	90.9	91.0	91.0	90.9
–10.0	89.3	90.9	91.8	92.5	92.6	92.7	92.8	92.8	92.7
–5.0	90.1	91.7	92.7	93.3	93.4	93.6	93.7	93.7	93.6
0.0	90.9	92.6	93.5	94.2	94.3	94.4	94.5	94.5	94.5
5.0	91.8	93.4	94.4	95.1	95.2	95.3	95.4	95.4	95.3
10.0	92.6	94.3	95.2	95.9	96.0	96.1	96.2	96.2	96.2
15.0	93.4	95.1	96.1	96.8	96.9	97.0	97.1	97.1	97.0
18.0	93.9	95.6	96.6	97.3	97.4	97.5	*97.6*	*97.6*	*97.5*
20.0	94.2	95.9	96.9	97.6	97.7	*97.8*	*97.9*	*97.9*	*97.7*
21.0	94.4	96.1	97.0	97.8	*97.9*	*98.0*	*98.1*	*98.0*	*97.8*
22.0	94.5	96.2	97.2	97.9	*98.0*	*98.1*	*98.3*	*98.0*	*97.9*
23.0	94.7	96.4	97.4	*98.1*	*98.2*	*98.3*	*98.3*	*98.1*	*98.0*
24.0	94.9	96.6	97.5	*98.3*	*98.4*	*98.5*	*98.3*	*98.1*	*98.1*
25.0	95.0	96.7	97.7	*98.4*	*98.5*	*98.5*	*98.3*	*98.1*	*98.1*
26.0	95.2	96.9	97.9	*98.6*	*98.7*	*98.4*	*98.2*	*98.1*	*98.2*
28.0	95.5	97.2	*98.2*	*98.9*	*98.5*	*98.2*	*98.1*	*98.1*	*98.2*
30.0	95.8	97.5	*98.5*	*98.5*	*98.1*	*97.9*	*98.0*	*98.1*	*98.2*
32.0	96.1	97.9	*98.2*	*98.0*	*97.7*	*97.6*	*97.8*	*97.8*	*97.7*
34.0	96.4	*97.5*	*97.6*	*97.4*	*97.3*	*97.3*	*97.5*	*97.3*	*97.3*
36.0	96.7	*97.1*	*97.2*	*97.0*	*97.0*	*97.0*	*97.0*	*96.9*	*96.8*
38.0	*96.5*	*96.7*	*96.8*	*96.6*	*96.6*	*96.6*	*96.5*	*96.5*	*96.4*
40.0	*96.0*	*96.3*	*96.3*	*96.2*	*96.2*	*96.1*	*96.1*	*96.0*	*96.0*
42.0	*95.6*	*95.9*	*95.9*	*95.7*	*95.7*	*95.7*	*95.7*	*95.6*	*95.5*
44.0	*95.3*	*95.5*	*95.5*	*95.3*	*95.3*	*95.3*	*95.2*	*95.1*	*95.1*
46.0	*94.9*	*95.1*	*95.1*	*94.9*	*94.9*	*94.8*	*94.8*	*94.7*	
48.0	*94.5*	*94.6*	*94.6*	*94.5*	*94.4*	*94.4*	*94.3*		
50.0	*94.2*	*94.2*	*94.2*	*94.1*	*94.1*	*94.0*			
52.0	*93.7*	*93.8*	*93.9*	*93.8*	*93.7*				
54.0	*93.3*	*93.5*	*93.6*	*93.4*					
56.0	*92.9*	*93.2*	*93.2*						
58.0	*92.6*	*92.9*							
60.0	*92.2*								
62.0									

BELOW CORNER POINT
ABOVE CORNER POINT

V2533-A5	GO-AROUND N1	AIR COND ON
CORRECTIONS FOR AIR BLEED		
AIR CONDITIONING OFF		ADD 1.0 TO N1
ENGINE ANTI ICE ON		SUBTRACT .1 FROM N1 ABOVE CORNER POINT
ENGINE ANTI ICE AND WING ANTI ICE ON		SUBTRACT .7 FROM N1 BELOW CORNER POINT AND .8 ABOVE CORNER POINT

TAT	PRESSURE ALTITUDE (FT)									
(°C)	6000.	7000.	8000.	9000.	10000.	11000.	12000.	13000.	14000.	14500.
–60.0	83.5	83.4	83.4	83.3	83.2	83.2	83.2	83.2	83.3	83.3
–50.0	85.4	85.4	85.3	85.2	85.2	85.2	85.2	85.2	85.2	85.2
–40.0	87.3	87.3	87.2	87.1	87.1	87.1	87.1	87.1	87.1	87.1
–30.0	89.2	89.1	89.1	89.0	88.9	88.9	88.9	88.9	88.9	89.0
–20.0	91.0	90.9	90.9	90.8	90.7	90.7	90.7	90.7	90.7	90.8
–15.0	91.9	91.8	91.8	91.7	91.6	91.6	91.6	91.6	91.6	91.7
–10.0	92.8	92.7	92.7	92.6	92.5	92.5	92.5	92.5	92.5	92.5
–5.0	93.7	93.6	93.5	93.5	93.4	93.4	93.4	93.4	93.4	93.4
0.0	94.5	94.5	94.4	94.3	94.2	94.2	94.2	94.2	94.3	94.3
2.0	94.9	94.8	94.8	94.7	94.6	94.6	94.6	94.6	94.6	94.6
4.0	95.2	95.2	95.1	95.0	94.9	94.9	94.9	94.9	94.9	95.0
6.0	95.6	95.5	95.4	95.3	95.3	95.3	95.3	95.3	95.3	95.3
8.0	95.9	95.8	95.8	95.7	95.6	95.6	95.6	95.6	95.6	95.7
10.0	96.2	96.2	96.1	96.0	95.9	95.9	95.9	95.9	96.0	96.0
12.0	96.6	96.5	96.5	96.4	96.3	96.3	96.3	96.3	96.3	96.3
14.0	96.9	96.9	96.8	96.7	96.6	96.6	96.6	96.6	96.6	96.7
16.0	97.3	97.2	97.1	97.0	97.0	96.9	96.9	96.9	97.0	97.0
18.0	*97.6*	*97.5*	*97.4*	*97.3*	*97.2*	*97.2*	*97.2*	*97.2*	*97.2*	*97.3*
19.0	*97.8*	*97.7*	*97.6*	*97.5*	*97.4*	*97.3*	*97.4*	*97.3*	*97.4*	*97.5*
20.0	*97.9*	*97.7*	*97.7*	*97.6*	*97.5*	*97.5*	*97.4*	*97.4*	*97.5*	*97.7*
21.0	*98.0*	*97.8*	*97.9*	*97.7*	*97.6*	*97.6*	*97.5*	*97.5*	*97.7*	*97.8*
22.0	*98.0*	*97.9*	*98.0*	*97.9*	*97.8*	*97.7*	*97.5*	*97.6*	*97.8*	*98.0*
24.0	*98.1*	*98.1*	*98.2*	*98.1*	*97.9*	*97.6*	*97.6*	*97.7*	*98.0*	*98.3*
26.0	*98.1*	*98.2*	*98.4*	*98.2*	*97.8*	*97.6*	*97.6*	*97.8*	*98.3*	*98.6*
28.0	*98.1*	*98.2*	*98.5*	*98.0*	*97.6*	*97.4*	*97.5*	*97.9*	*98.5*	*98.9*
30.0	*98.1*	*98.2*	*98.2*	*97.7*	*97.3*	*97.3*	*97.5*	*98.0*	*98.6*	
32.0	*97.8*	*97.7*	*97.8*	*97.2*	*97.0*	*97.1*	*97.5*	*98.0*		
34.0	*97.3*	*97.3*	*97.2*	*96.9*	*96.8*	*97.0*	*97.4*			
36.0	*96.9*	*96.8*	*96.7*	*96.5*	*96.6*	*96.9*				
38.0	*96.5*	*96.4*	*96.3*	*96.2*	*96.4*					
40.0	*96.0*	*96.0*	*95.9*	*95.9*						
42.0	*95.6*	*95.5*	*95.5*							
44.0	*95.1*	*95.1*								
46.0	*94.7*									
48.0										

BELOW CORNER POINT
ABOVE CORNER POINT

Note: This table is valid for all aircraft speeds, but the corner point temperature is given for MACH = .225.

MAXIMUM CONTINUOUS N1

Applicable to: ALL 320

V2527/27E	MAXIMUM CONTINUOUS N1					AIR COND ON *				
CORRECTIONS FOR AIR BLEED										
AIR CONDITIONING OFF										.8
NACELLE ANTI-ICE ON										–.8
ENGINE ANTI-ICE AND WING ANTI-ICE ON										–1.7

TAT	PRESSURE ALTITUDE (FT)										
(C)	0.	2000.	5000.	8000.	12000.	17000.	20000.	25000.	31000.	35000.	39000.
–50.0	71.9	72.7	74.7	79.3	81.0	83.7	85.4	86.6	80.1	82.0	82.4
–46.0	72.5	73.4	75.4	80.0	81.7	84.4	86.1	87.4	80.8	82.7	83.1
–42.0	73.1	74.0	76.1	80.7	82.5	85.1	86.9	88.1	81.5	83.4	83.8
–38.0	73.8	74.6	76.7	81.4	83.2	85.9	87.6	88.9	82.2	84.2	84.5
–34.0	74.4	75.3	77.4	82.1	83.9	86.6	88.4	89.7	82.9	84.9	85.3
–30.0	75.0	75.9	78.0	82.7	84.6	87.3	89.1	90.4	83.6	85.6	86.0
–26.0	75.6	76.5	78.7	83.4	85.3	88.0	89.8	91.1	84.3	86.3	86.7
–22.0	76.2	77.1	79.3	84.1	85.9	88.7	90.6	91.9	84.9	87.0	87.4
–18.0	76.8	77.8	79.9	84.8	86.6	89.5	91.3	92.6	85.6	87.7	87.4
–14.0	77.4	78.4	80.6	85.4	87.3	90.2	92.0	93.3	86.3	87.1	86.8
–10.0	78.0	79.0	81.2	86.1	88.0	90.8	92.7	93.7	86.9	86.7	86.5
–6.0	78.6	79.6	81.8	86.7	88.6	91.5	93.4	93.1	86.7	86.3	86.0
–2.0	79.2	80.2	82.4	87.4	89.3	92.2	93.7	92.5	86.3	85.9	85.6
2.0	79.8	80.7	83.0	88.0	90.0	92.7	93.1	92.1	85.8	85.5	85.3
6.0	80.4	81.3	83.6	88.6	90.6	92.1	92.7	91.5	85.4	85.2	85.0
10.0	80.9	81.9	84.2	89.3	91.2	91.5	92.2	90.9	85.0	84.8	84.6
14.0	81.5	82.5	84.8	89.9	90.6	90.9	91.6	90.3	84.7		
18.0	82.1	83.1	85.4	90.2	90.0	90.3	91.0	89.9			
22.0	82.6	83.6	86.0	89.8	89.6	89.9	90.6	89.8			
26.0	83.2	84.2	85.9	89.3	89.2	89.5	90.2				
30.0	83.8	84.3	85.9	88.8	88.8	89.0	90.2				
34.0	83.6	84.1	85.8	88.4	88.3	88.8					
38.0	83.5	83.8	85.9	87.8	87.6						
42.0	82.8	83.5	85.7	87.3	87.3						
46.0	82.2	83.3	85.5	86.6							
50.0	82.0	83.0	85.3								
54.0	81.7	82.6	85.1								
58.0	81.4	82.3									
62.0	81.1										
66.0											

(*) One engine inoperative - 1 pack operative on remaining engine.

Note: *This table is valid for all aircraft speeds.*

MAXIMUM CONTINUOUS N1

Applicable to: ALL 321

V2530/33	MAXIMUM CONTINUOUS N1				AIR COND ON *					
CORRECTIONS FOR AIR BLEED										
AIR CONDITIONING OFF										1.2
ENGINE ANTI ICE ON										–1.4
ENGINE ANTI ICE AND WING ANTI ICE ON										–2.6
TAT (°C)	**PRESSURE ALTITUDE (FT)**									
	0.	**2000.**	**5000.**	**8000.**	**12000.**	**17000.**	**20000.**	**25000.**	**31000.**	**35000.**	**39000.**
–50.0	75.8	76.8	78.2	79.3	81.2	83.1	83.7	81.1	83.1	85.2	85.6
–46.0	76.5	77.5	78.9	80.0	81.9	83.8	84.4	81.8	83.8	85.9	86.3
–42.0	77.2	78.1	79.6	80.7	82.6	84.6	85.2	82.5	84.6	86.7	87.1
–38.0	77.9	78.8	80.2	81.4	83.3	85.3	85.9	83.2	85.3	87.4	87.8
–34.0	78.5	79.5	80.9	82.1	84.0	86.0	86.6	83.9	86.0	88.2	88.6
–30.0	79.2	80.1	81.6	82.7	84.7	86.7	87.4	84.6	86.7	88.9	89.3
–26.0	79.8	80.8	82.3	83.4	85.4	87.4	88.1	85.3	87.5	89.6	90.0
–22.0	80.5	81.5	82.9	84.1	86.1	88.1	88.8	86.0	88.2	90.4	90.8
–18.0	81.1	82.1	83.6	84.8	86.8	88.8	89.5	86.7	88.9	91.1	90.7
–14.0	81.7	82.7	84.2	85.4	87.5	89.5	90.2	87.3	89.6	90.6	90.2
–10.0	82.4	83.4	84.9	86.1	88.1	90.2	90.9	88.0	90.2	90.2	89.6
–6.0	83.0	84.0	85.5	86.7	88.8	90.9	91.6	88.7	90.0	89.7	89.1
–2.0	83.6	84.6	86.2	87.4	89.5	91.6	91.9	89.3	89.5	89.1	88.6
2.0	84.2	85.3	86.8	88.0	90.1	92.1	91.6	89.0	89.0	88.6	88.3
6.0	84.8	85.9	87.4	88.6	90.8	91.5	91.2	88.7	88.6	88.2	87.8
10.0	85.4	86.5	88.0	89.3	91.4	90.9	90.7	88.4	88.2	87.7	87.3
14.0	86.0	87.1	88.7	89.9	90.7	90.2	90.2	87.9	87.7		
18.0	86.6	87.7	89.3	90.2	90.0	89.8	89.9	87.4			
22.0	87.2	88.3	89.9	89.7	89.6	89.4	89.5	86.9			
26.0	87.8	88.9	89.5	89.3	89.1	89.0	89.1				
30.0	88.4	88.8	89.0	88.9	88.6	88.6	89.2				
34.0	88.2	88.4	88.6	88.6	88.4	88.3					
38.0	87.5	87.7	88.4	88.0	88.0						
42.0	86.8	87.2	88.1	87.8	87.9						
46.0	86.3	86.8	87.7	87.6							
50.0	85.7	86.3	87.3								
54.0	85.1	85.9	87.1								
58.0	84.4	85.2									
62.0	83.8										
66.0											

* One engine inoperative – 1 pack operative on remaining engine.

Note: This table is valid for all aircraft speeds.

MAXIMUM CLIMB N1

Applicable to: ALL 320

V2527E-A5	MAXIMUM CLIMB N1	AIR COND ON								
CORRECTIONS FOR AIR BLEED										
AIR CONDITIONING OFF										.800
ENGINE ANTI ICE ON										–.800
ENGINE ANTI ICE AND WING ANTI ICE ON										–1.300
TAT (°C)	PRESSURE ALTITUDE (FT)										
	0.	2000.	5000.	8000.	12000.	17000.	20000.	25000.	31000.	35000.	39000.
–50.0	71.3	72.1	73.1	74.0	75.1	76.5	77.4	78.3	80.2	82.2	82.7
–46.0	72.0	72.7	73.8	74.7	75.8	77.2	78.1	79.0	80.9	83.0	83.4
–42.0	72.6	73.4	74.4	75.3	76.5	77.9	78.8	79.7	81.7	83.7	84.1
–38.0	73.2	74.0	75.0	76.0	77.1	78.6	79.5	80.4	82.4	84.4	84.9
–34.0	73.8	74.6	75.7	76.6	77.8	79.2	80.1	81.1	83.1	85.1	85.6
–30.0	74.4	75.2	76.3	77.2	78.4	79.9	80.8	81.8	83.8	85.8	86.3
–26.0	75.1	75.9	76.9	77.9	79.1	80.6	81.5	82.4	84.4	86.6	87.0
–22.0	75.7	76.5	77.5	78.5	79.7	81.2	82.1	83.1	85.1	87.3	87.7
–18.0	76.3	77.1	78.2	79.1	80.3	81.8	82.8	83.7	85.8	87.9	87.7
–14.0	76.9	77.7	78.8	79.7	80.9	82.5	83.4	84.4	86.5	87.4	87.1
–10.0	77.4	78.3	79.4	80.4	81.6	83.1	84.1	85.0	87.1	86.9	86.7
–6.0	78.0	78.9	80.0	81.0	82.2	83.7	84.7	85.7	86.9	86.5	86.3
–2.0	78.6	79.5	80.6	81.6	82.8	84.4	85.3	86.3	86.5	86.1	85.9
2.0	79.2	80.0	81.2	82.2	83.4	85.0	86.0	86.1	86.0	85.7	85.5
6.0	79.8	80.6	81.8	82.8	84.0	85.6	86.3	85.7	85.5	85.4	85.2
10.0	80.3	81.2	82.3	83.4	84.6	86.0	86.0	85.2	85.2	85.1	84.9
14.0	80.9	81.8	82.9	83.9	85.2	85.5	85.6	84.8	84.9	84.7	84.7
18.0	81.5	82.3	83.5	84.5	85.4	85.1	85.1	84.4	84.4		
22.0	82.0	82.9	84.1	85.1	85.0	84.7	84.7	83.9	83.9		
26.0	82.6	83.5	84.6	84.9	84.5	84.2	84.3	83.4	83.9		
30.0	83.1	84.0	84.6	84.4	84.0	83.8	83.8	82.9			
34.0	83.7	84.2	84.0	83.8	83.5	83.3	83.4	83.1			
38.0	83.6	83.5	83.4	83.3	83.1	82.9	83.1				
42.0	82.9	82.9	82.9	82.9	82.7	82.7					
46.0	82.3	82.3	82.4	82.5	82.3						
50.0	81.7	81.8	82.0	82.1	82.3						
54.0	81.3	81.5	81.6								
58.0	80.7	80.8									
62.0	80.0										
66.0											

Note: This table is valid for all aircraft speeds.

MAXIMUM CLIMB N1

Applicable to: ALL 321

V2533–A5	MAXIMUM CLIMB N1				AIR COND ON						
CORRECTIONS FOR AIR BLEED											
AIR CONDITIONING OFF										1.5	
ENGINE ANTI ICE ON										–1.2	
ENGINE ANTI ICE AND WING ANTI ICE ON										–2.1	
TAT (°C)	PRESSURE ALTITUDE (FT)										
	0.	2000.	5000.	8000.	12000.	17000.	20000.	25000.	31000.	35000.	39000.
–50.0	72.3	73.3	74.8	76.0	77.4	79.1	80.0	81.5	83.8	86.1	86.6
–46.0	72.9	74.0	75.4	76.6	78.0	79.8	80.7	82.2	84.5	86.9	87.4
–42.0	73.6	74.6	76.1	77.3	78.7	80.5	81.4	82.9	85.2	87.6	88.1
–38.0	74.2	75.3	76.7	78.0	79.4	81.2	82.1	83.6	86.0	88.4	88.9
–34.0	74.8	75.9	77.4	78.6	80.1	81.9	82.8	84.3	86.7	89.2	89.6
–30.0	75.5	76.6	78.0	79.3	80.8	82.5	83.5	85.0	87.4	89.9	90.4
–26.0	76.1	77.2	78.7	79.9	81.4	83.2	84.2	85.7	88.1	90.6	91.1
–22.0	76.7	77.8	79.3	80.6	82.1	83.9	84.8	86.4	88.9	91.4	91.9
–18.0	77.3	78.4	79.9	81.2	82.7	84.6	85.5	87.1	89.6	92.1	91.8
–14.0	77.9	79.0	80.6	81.8	83.4	85.2	86.2	87.8	90.3	91.5	91.1
–10.0	78.5	79.6	81.2	82.5	84.0	85.9	86.8	88.5	91.0	90.9	90.4
–6.0	79.1	80.2	81.8	83.1	84.6	86.5	87.5	89.1	90.6	90.3	89.7
–2.0	79.7	80.8	82.4	83.7	85.3	87.2	88.2	89.8	89.9	89.5	89.0
2.0	80.3	81.4	83.0	84.3	85.9	87.8	88.8	89.3	89.3	88.9	88.6
6.0	80.9	82.0	83.6	84.9	86.5	88.4	89.2	88.9	88.8	88.5	88.1
10.0	81.4	82.6	84.2	85.6	87.1	88.8	88.8	88.6	88.4	88.0	
14.0	82.0	83.2	84.8	86.2	87.8	88.3	88.3	88.1	87.9		
18.0	82.6	83.8	85.4	86.8	87.9	87.8	87.9	87.7	87.4		
22.0	83.1	84.3	86.0	87.3	87.4	87.3	87.3	87.1			
26.0	83.7	84.9	86.6	87.0	86.8	86.7	86.7	86.6			
30.0	84.3	85.5	86.4	86.4	86.3	86.2	86.2				
34.0	84.8	85.6	85.9	85.8	85.7	85.6	85.7				
38.0	84.7	85.0	85.2	85.2	85.0	84.9					
42.0	83.9	84.2	84.5	84.5	84.3						
46.0	83.1	83.5	83.8								
50.0	82.4	82.7	83.0								
54.0	81.6	82.0									
58.0	80.7										
62.0											
66.0											

Note: This table is valid for all aircraft speeds.

MAXIMUM CRUISE N1

Applicable to: ALL 320

V2527/27E	MAXIMUM CRUISE N1	AIR COND ON
CORRECTIONS FOR AIR BLEED		
AIR CONDITIONING OFF		.800
ENGINE ANTI ICE ON		–.800
ENGINE ANTI ICE AND WING ANTI ICE ON		–1.300

TAT	PRESSURE ALTITUDE (FT)										
(°C)	0.	2000.	5000.	8000.	12000.	17000.	20000.	25000.	31000.	35000.	39000.
–50.0	67.1	68.1	69.4	70.7	72.1	73.7	74.7	75.7	77.4	79.1	79.4
–46.0	67.7	68.7	70.0	71.3	72.7	74.4	75.4	76.4	78.1	79.8	80.1
–42.0	68.3	69.3	70.6	71.9	73.4	75.0	76.1	77.0	78.8	80.5	80.8
–38.0	68.9	69.9	71.3	72.6	74.0	75.7	76.7	77.7	79.5	81.1	81.5
–34.0	69.5	70.4	71.9	73.2	74.6	76.3	77.4	78.4	80.2	81.8	82.2
–30.0	70.1	71.0	72.5	73.8	75.3	77.0	78.0	79.0	80.8	82.5	82.9
–26.0	70.7	71.6	73.1	74.4	75.9	77.6	78.6	79.7	81.5	83.2	83.5
–22.0	71.2	72.2	73.6	75.0	76.5	78.2	79.3	80.3	82.1	83.9	84.2
–18.0	71.8	72.8	74.2	75.6	77.1	78.8	79.9	80.9	82.8	84.5	84.3
–14.0	72.4	73.3	74.8	76.2	77.7	79.5	80.5	81.6	83.4	84.2	84.0
–10.0	72.9	73.9	75.4	76.8	78.3	80.1	81.1	82.2	84.1	83.9	83.7
–6.0	73.5	74.5	75.9	77.3	78.9	80.7	81.8	82.8	83.9	83.5	83.3
–2.0	74.0	75.0	76.5	77.9	79.5	81.3	82.4	83.4	83.5	83.1	82.9
2.0	74.6	75.6	77.1	78.5	80.1	81.9	83.0	83.1	83.1	82.8	82.6
6.0	75.1	76.1	77.6	79.1	80.6	82.5	83.3	82.6	82.5	82.3	82.1
10.0	75.6	76.7	78.2	79.6	81.2	82.8	82.8	82.0	81.9	81.7	81.5
14.0	76.2	77.2	78.7	80.2	81.8	82.2	82.3	81.4	81.4	81.2	81.2
18.0	76.7	77.7	79.3	80.7	81.9	81.6	81.7	80.9	80.9		
22.0	77.2	78.3	79.8	81.3	81.2	80.9	81.1	80.4	80.3		
26.0	77.7	78.8	80.4	80.9	80.6	80.4	80.6	79.9	80.3		
30.0	78.3	79.3	80.2	80.3	80.0	80.0	80.2	79.4			
34.0	78.8	79.4	79.6	79.7	79.4	79.4	79.6	79.6			
38.0	78.5	78.7	78.7	78.8	78.8	78.8	79.3				
42.0	77.5	77.6	77.8	78.1	78.1	78.5					
46.0	76.5	76.7	77.1	77.5	77.5						
50.0	75.5	75.9	76.4	76.8	77.4						
54.0	74.7	75.1	75.6								
58.0	74.0	74.4									
62.0	73.2										
66.0											

Note: This table is valid for all aircraft speeds.

MAXIMUM CRUISE N1

Applicable to: ALL 321

V2533–A5	MAXIMUM CRUISE N1			AIR COND ON						
CORRECTIONS FOR AIR BLEED										
AIR CONDITIONING OFF										1.5
ENGINE ANTI ICE ON										–1.2
ENGINE ANTI ICE AND WING ANTI ICE ON										–2.1
TAT	PRESSURE ALTITUDE (FT)										
(°C)	0.	2000.	5000.	8000.	12000.	17000.	20000.	25000.	31000.	35000.	39000.
–50.0	68.9	70.1	71.8	73.1	74.6	76.5	77.4	78.4	80.1	82.3	82.8
–46.0	69.5	70.8	72.4	73.7	75.3	77.2	78.1	79.1	80.8	83.0	83.5
–42.0	70.1	71.4	73.1	74.4	76.0	77.8	78.7	79.8	81.5	83.7	84.2
–38.0	70.7	72.0	73.7	75.0	76.6	78.5	79.4	80.5	82.2	84.5	85.0
–34.0	71.3	72.6	74.3	75.6	77.3	79.2	80.1	81.2	82.9	85.2	85.7
–30.0	71.9	73.2	74.9	76.3	77.9	79.8	80.8	81.9	83.6	85.9	86.4
–26.0	72.5	73.8	75.5	76.9	78.5	80.5	81.4	82.5	84.3	86.6	87.1
–22.0	73.1	74.4	76.2	77.5	79.2	81.1	82.1	83.2	84.9	87.3	87.8
–18.0	73.7	75.0	76.8	78.1	79.8	81.8	82.7	83.9	85.6	88.0	87.7
–14.0	74.2	75.6	77.4	78.7	80.4	82.4	83.4	84.5	86.3	87.4	87.0
–10.0	74.8	76.2	77.9	79.4	81.0	83.1	84.0	85.2	86.9	86.9	86.5
–6.0	75.4	76.7	78.5	80.0	81.7	83.7	84.7	85.8	86.8	86.6	86.2
–2.0	75.9	77.3	79.1	80.6	82.3	84.3	85.3	86.5	86.5	86.3	85.9
2.0	76.5	77.9	79.7	81.1	82.9	84.9	85.9	86.3	86.2	85.9	85.6
6.0	77.0	78.4	80.3	81.7	83.5	85.5	86.3	86.0	85.8	85.5	85.1
10.0	77.6	79.0	80.9	82.3	84.1	85.8	85.8	85.6	85.4	85.0	
14.0	78.1	79.5	81.4	82.9	84.7	85.2	85.3	85.0	84.9		
18.0	78.7	80.1	82.0	83.5	84.8	84.6	84.7	84.5	84.4		
22.0	79.2	80.6	82.6	84.0	84.2	84.0	84.1	83.9			
26.0	79.8	81.2	83.1	83.7	83.5	83.4	83.4	83.4			
30.0	80.3	81.7	82.9	83.0	82.8	82.8	82.9				
34.0	80.8	81.8	82.1	82.2	82.1	82.1	82.3				
38.0	80.6	81.0	81.4	81.5	81.4	81.4					
42.0	79.7	80.2	80.6	80.7	80.5						
46.0	78.2	78.9	79.3								
50.0	76.8	77.4	78.0								
54.0	75.4	76.1									
58.0	74.1										
62.0											
66.0											

Note: This table is valid for all aircraft speeds.

PERFORMANCE

TAKEOFF

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PER-TOF-THR-FLX-40 RTOW CALCULATION	A	1	Documentation update: Addition of "RTOW CALCULATION" documentary unit
PER-TOF-THR-FLX-40 DETERMINATION OF FLEXIBLE TEMPERATURE AND CORRESPONDING EPR	B	2	Documentation update: Addition of "DETERMINATION OF FLEXIBLE TEMPERATURE AND CORRESPONDING EPR" documentary unit
PER-TOF-ACA-05 Introduction	A	1	Update of the technical wording
PER-TOF-ACA-10-05 TAKEOFF SPEEDS	A	1	Documentation update: Addition of "TAKEOFF SPEEDS" documentary unit
PER-TOF-ACA-10-05 TAKEOFF DISTANCES	B	2	Documentation update: Addition of "TAKEOFF DISTANCES" documentary unit
PER-TOF-ACA-10-05 LINE-UP ALLOWANCE	C	3	Effectivity update: The information no longer applies to MSN 0633, 0993, 1024, 1695, 1984, 2021.
			Effectivity update: The information now also applies to MSN 5362, 5429.
PER-TOF-ACA-10-05 LINE-UP ALLOWANCE	C	4	Documentation update: Addition of "LINE-UP ALLOWANCE " documentary unit
PER-TOF-ACA-10-05 LINE-UP ALLOWANCE	C	5	Effectivity update: The information no longer applies to MSN 0756, 0784, 0812, 0930, 1253, 1721, 2229, 2238, 2428, 4023, 4247, 5024, 5030.
PER-TOF-ACA-10-05 LINE-UP ALLOWANCE	C	6	Documentation update: Addition of "LINE-UP ALLOWANCE " documentary unit
PER-TOF-ACA-10-05 MAXIMUM TAKEOFF WEIGHT	D	7	Documentation update: Addition of "MAXIMUM TAKEOFF WEIGHT" documentary unit
PER-TOF-ACA-10-10 ALL ENGINE TAKEOFF	A	1	Effectivity update: The information no longer applies to MSN 0633, 0993, 1024, 1695, 1984, 2021.
			Effectivity update: The information now also applies to MSN 5362, 5429.
PER-TOF-ACA-10-10 ALL ENGINE TAKEOFF	A	2	Documentation update: Addition of "ALL ENGINE TAKEOFF" documentary unit
PER-TOF-ACA-10-10 ALL ENGINE TAKEOFF	A	3	Effectivity update: The information no longer applies to MSN 0756, 0784, 0812, 0930, 1253, 1721, 2229, 2238, 2428, 4023, 4247, 5024, 5030.
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PER-TOF-ACA-10-10 THRUST SELECTION	B	5	Documentation update: Addition of "THRUST SELECTION" documentary unit
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PER-TOF-ACA-10-10 MEL/CDL AND SPECIAL OPERATIONS ITEMS	D	7	Documentation update: Addition of "MEL/CDL AND SPECIAL OPERATIONS ITEMS" documentary unit

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PER-TOF-ACA-10-20 MCDU	A	1	Documentation update: Addition of "MCDU" documentary unit
PER-TOF-ACA-10-20 ACARS RTOW PRINTOUT	B	2	Documentation update: Addition of "ACARS RTOW PRINTOUT" documentary unit
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 1	C	3	Effectivity update: The information no longer applies to MSN 0633, 0993, 1024, 1695, 1984, 2021.
			Effectivity update: The information now also applies to MSN 5362, 5429.
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 1	C	4	Documentation update: Addition of "ACARS RTOW Printout — Examples — Example 1" documentary unit
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 1	C	5	Effectivity update: The information no longer applies to MSN 0756, 0784, 0812, 0930, 1253, 1721, 2229, 2238, 2428, 4023, 4247, 5024, 5030.
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 1	C	6	Documentation update: Addition of "ACARS RTOW Printout — Examples — Example 1" documentary unit
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			Effectivity update: The information now also applies to MSN 5362, 5429.
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 2	C	8	Documentation update: Addition of "ACARS RTOW Printout — Examples — Example 2" documentary unit
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 2	C	9	Effectivity update: The information no longer applies to MSN 0756, 0784, 0812, 0930, 1253, 1721, 2229, 2238, 2428, 4023, 4247, 5024, 5030.
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 2	C	10	Documentation update: Addition of "ACARS RTOW Printout — Examples — Example 2" documentary unit
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 3	C	11	Effectivity update: The information now also applies to MSN 5362, 5429.
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 3	C	12	Documentation update: Addition of "ACARS RTOW Printout — Examples — Example 3" documentary unit
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 3	C	13	Documentation update: Addition of "ACARS RTOW Printout — Examples — Example 3" documentary unit
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 4	C	14	Effectivity update: The information now also applies to MSN 5362, 5429.

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PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 4	C	16	Documentation update: Addition of "ACARS RTOW Printout — Examples — Example 4" documentary unit
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PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 5	C	18	Documentation update: Addition of "ACARS RTOW Printout — Examples — Example 5" documentary unit
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 5	C	19	Documentation update: Addition of "ACARS RTOW Printout — Examples — Example 5" documentary unit
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 6	C	20	Effectivity update: The information now also applies to MSN 5362, 5429.
PER-TOF-ACA-10-20 ACARS RTOW Printout — Examples — Example 6	C	21	Documentation update: Addition of "ACARS RTOW Printout — Examples — Example 6" documentary unit
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PER-TOF-ACA-10-20 RUNWAY CODES - Minimum Ground Roll (MR)	D	25	Documentation update: Addition of "RUNWAY CODES - Minimum Ground Roll (MR)" documentary unit
PER-TOF-ACA-10-20 RUNWAY CODES - Minimum Ground Roll (MR)	D	26	Documentation update: Addition of "RUNWAY CODES - Minimum Ground Roll (MR)" documentary unit
PER-TOF-ACA-10-20 RUNWAY CODES - Runway Data	D	27	Documentation update: Addition of "RUNWAY CODES - Runway Data" documentary unit
PER-TOF-ACA-10-20 RUNWAY CODES - EXAMPLE 8	D	28	Documentation update: Addition of "RUNWAY CODES - EXAMPLE 8" documentary unit
PER-TOF-ACA-10-20 RUNWAY CODES - EXAMPLE 9	D	29	Documentation update: Addition of "RUNWAY CODES - EXAMPLE 9" documentary unit

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PER-TOF-ACA-10-30 BACKUP PROCEDURES	A	1	Documentation update: Addition of "BACKUP PROCEDURES" documentary unit
PER-TOF-ACA-10-30 ALTERNATE SEND	B	2	Documentation update: Addition of "ALTERNATE SEND" documentary unit
PER-TOF-ACA-10-30 SMS RTOW	C	3	Documentation update: Addition of "SMS RTOW" documentary unit
PER-TOF-ACA-10-30 SMS RTOW CHECKING AND RECORDING	D	4	Documentation update: Addition of "SMS RTOW CHECKING AND RECORDING" documentary unit
PER-TOF-ACA-10-30 WEB RTOW	E	5	Documentation update: Addition of "WEB RTOW" documentary unit
PER-TOF-ACA-10-30 WEB RTOW DATA CHECKING AND RECORDING	F	6	Documentation update: Addition of "WEB RTOW DATA CHECKING AND RECORDING" documentary unit
PER-TOF-ACA-10-30 SIMPLIFIED RTOW CHARTS - Introduction	G	7	Documentation update: Addition of "SIMPLIFIED RTOW CHARTS - Introduction " documentary unit
PER-TOF-ACA-10-30 SIMPLIFIED RTOW CHARTS - Restrictions	G	8	Documentation update: Addition of "SIMPLIFIED RTOW CHARTS - Restrictions" documentary unit
PER-TOF-ACA-10-30 SIMPLIFIED RTOW CHARTS - Validity	G	9	Documentation update: Addition of "SIMPLIFIED RTOW CHARTS - Validity" documentary unit
PER-TOF-ACA-10-30 SIMPLIFIED RTOW CHARTS - Chart glossary	G	10	Documentation update: Addition of "SIMPLIFIED RTOW CHARTS - Chart glossary" documentary unit
PER-TOF-ACA-10-30 SIMPLIFIED RTOW CHARTS - Example chart	G	11	Effectivity update: The information no longer applies to MSN 0633, 0993, 1024, 1695, 1984, 2021.
			Effectivity update: The information now also applies to MSN 5362, 5429.
PER-TOF-ACA-10-30 SIMPLIFIED RTOW CHARTS - Example chart	G	12	Documentation update: Addition of "SIMPLIFIED RTOW CHARTS - Example chart" documentary unit
PER-TOF-ACA-10-30 SIMPLIFIED RTOW CHARTS - Example chart	G	13	Effectivity update: The information no longer applies to MSN 0756, 0784, 0812, 0930, 1253, 1721, 2229, 2238, 2428, 4023, 4247, 5024, 5030.
PER-TOF-ACA-10-30 SIMPLIFIED RTOW CHARTS - Example chart	G	14	Documentation update: Addition of "SIMPLIFIED RTOW CHARTS - Example chart" documentary unit
PER-TOF-ACA-10-30 SIMPLIFIED RTOW CHARTS - Takeoff weight calculation	G	15	Documentation update: Addition of "SIMPLIFIED RTOW CHARTS - Takeoff weight calculation" documentary unit

Localization Title	Toc Index	ID	Reason
PER-TOF-ACA-10-30 SIMPLIFIED RTOW CHARTS - Example chart	G	16	Effectivity update: The information no longer applies to MSN 0633, 0993, 1024, 1695, 1984, 2021.
			Effectivity update: The information now also applies to MSN 5362, 5429.
PER-TOF-ACA-10-30 SIMPLIFIED RTOW CHARTS - Example chart	G	17	Documentation update: Addition of "SIMPLIFIED RTOW CHARTS - Example chart" documentary unit
PER-TOF-ACA-10-30 SIMPLIFIED RTOW CHARTS - Example chart	G	18	Effectivity update: The information no longer applies to MSN 0756, 0784, 0812, 0930, 1253, 1721, 2229, 2238, 2428, 4023, 4247, 5024, 5030.
PER-TOF-ACA-10-30 SIMPLIFIED RTOW CHARTS - Example chart	G	19	Documentation update: Addition of "SIMPLIFIED RTOW CHARTS - Example chart" documentary unit
PER-TOF-ACA-10-30 DEDICATED SIMPLIFIED RTOW CHARTS - Chart glossary	H	20	Documentation update: Addition of "DEDICATED SIMPLIFIED RTOW CHARTS - Chart glossary" documentary unit
PER-TOF-ACA-10-30 DEDICATED SIMPLIFIED RTOW CHARTS - Takeoff weight calculation	H	21	Documentation update: Addition of "DEDICATED SIMPLIFIED RTOW CHARTS - Takeoff weight calculation" documentary unit
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PER-TOF-TOD-25-10 SPEEDS LIMITED BY VMC	A	1	Standardization of the layout of "Speeds limited by VMC" tables.
PER-TOF-TOD-25-10 SPEEDS LIMITED BY VMC	A	2	Standardization of the layout of "Speeds limited by VMC" tables.
PER-TOF-CTA-20 DEFINITIONS	A	1	**Update of the technical wording**
PER-TOF-CTA-20 WET AND CONTAMINATED PERFORMANCE	B	2	Documentation update: Addition of "WET AND CONTAMINATED PERFORMANCE" documentary unit

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DEFINITION OF FLEXIBLE TAKEOFF

DEFINITION OF FLEXIBLE TAKEOFF

Applicable to: ALL

In many cases the aircraft takes off with a weight lower than the maximum permissible takeoff weight. When this happens, it can meet the required performance (runway, second segment, obstacle,...) with a decreased thrust that is adapted to the weight : this is called FLEXIBLE TAKEOFF and the thrust is called FLEXIBLE TAKEOFF THRUST.
The use of flexible takeoff thrust saves engine life.

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USE OF FLEXIBLE TAKEOFF

USE OF FLEXIBLE TAKEOFF

Applicable to: ALL

The pilot can use flexible takeoff when the actual takeoff weight is lower than the maximum permissible takeoff weight for the actual temperature. The maximum permissible takeoff weight decreases when temperature increases, so it is possible to assume a temperature at which the actual takeoff weight would be the limiting one. This temperature is called FLEXIBLE TEMPERATURE or assumed temperature and is entered in the FADEC via the MCDU PERF TO page in order to get the adapted thrust.

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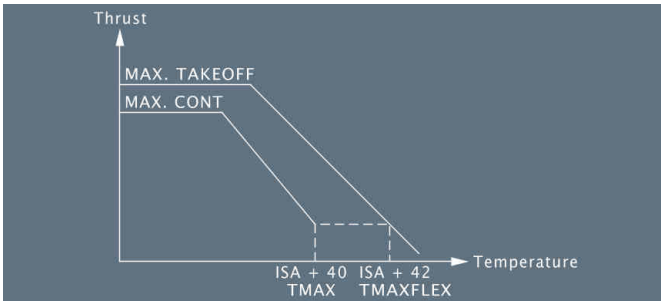
REQUIREMENTS

REQUIREMENTS

Applicable to: ALL 321

- Thrust must not be reduced by more than 25 % of the full rated takeoff thrust.
- The flexible takeoff EPR cannot be lower than the Max climb EPR at the same flight conditions. The FADEC takes the above two constraints into account to determine flexible EPR.
- The flexible takeoff thrust cannot be lower than the Max Continuous thrust used for the final takeoff flight path computation (at ISA +40).
  This constraint limits the maximum flexible temperature at ISA + 42 (57 °C at sea level).
- The flexible temperature cannot be lower than the flat rating temperature, TREF (See Note), or the actual temperature (OAT).



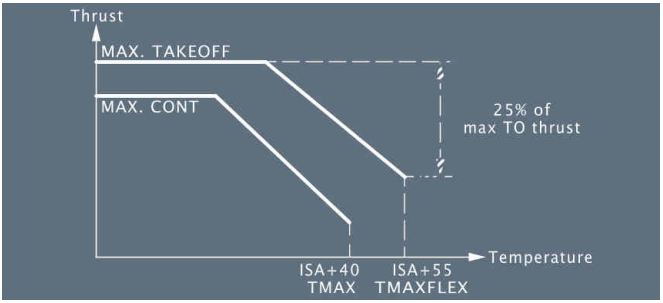
Note: *Tref being a function of the speed and the pressure-altitude, read it on the takeoff chart.*

- Flexible takeoff is not permitted on contaminated runways.
- The operator should check the maximum thrust (TOGA) at regular intervals in order to detect any engine deterioration, or maintain an adequate engine performance monitoring program to follow up the engine parameters.

REQUIREMENTS

Applicable to: ALL 320

- Thrust must not be reduced by more than 25 % of the full rated takeoff thrust.
- The flexible takeoff EPR cannot be lower than the Max climb EPR at the same flight conditions. The FADEC takes the above two constraints into account to determine flexible EPR. The above two constraints also limit the maximum flexible temperature at ISA + 55 (70 °C at sea level).
- The flexible takeoff thrust cannot be lower than the Max Continuous thrust used for the final takeoff flight path computation (at ISA +40).
- The flexible temperature cannot be lower than the flat rating temperature, TREF (See Note), or the actual temperature (OAT).



Note: *TREF being a function of pressure altitude, read it on the takeoff chart.*

- Flexible takeoff is not permitted on contaminated runways.
- The operator should check the maximum thrust (TOGA) at regular intervals in order to detect any engine deterioration, or maintain an adequate engine performance monitoring program to follow up the engine parameters.

RECOMMENDATION

RTOW CALCULATION

Applicable to: ALL

1

Request RTOW data by using ACARS RTOW function. Backup systems are available if the ACARS RTOW function fails. Refer to PER-TOF-TOC-ACA

DETERMINATION OF FLEXIBLE TEMPERATURE AND CORRESPONDING EPR

Applicable to: ALL

2

- For guidance on flexible temperature computation:
  - when using ACARS RTOW function. Refer to PER-TOF-TOC-ACR
- Corresponding EPR
  Displayed on the ECAM upper display when on the ground provided that:
  - Flexible temperature is entered in the FMGS's MCDU and
  - Engine is running or thrust lever is in FLX TO when engine is not running.

It can also be determined with the TAKE-OFF EPR chart

TAKEOFF PROCEDURE

Applicable to: ALL

Depending on environmental takeoff conditions, the following procedure is recommended.

CONDITIONS	PROCEDURE	REASON
Dry or wet well paved runway	- Use the flap setting giving the highest flexible temperature. - When flexible temperature difference between two flap settings is low, use the highest flap setting.	Extend engine life and save maintenance costs.
High altitude takeoff	Use CONF2/CONF3	Improve comfort
Badly paved runway or Accelerate stop distance limited runway	Use CONF2/CONF3 or Move towards left side of the takeoff chart	Improve comfort Improve stopping distance
Windshear expected along takeoff path	Use maximum thrust	Maintain acceleration capability
Contaminated runway	Use maximum thrust (flex forbidden)	Improve stopping distance Decrease time on runway. Required by regulations.

INTRODUCTION

Applicable to: ALL

1 The ACARS-RTOW system provides Crew with take-off data through the ACARS. Crew input the request on the MCDU and the request will be sent to the ground computer through ACARS for computation. The result will then be transmitted through ACARS to the flight deck printer. The whole process is fully automatic and does not involve any manual interaction except for the crew making the input request.
The computation is a real time computation process, not involving any pre-computed chart reading or interpolation process. This means that the results may not be the same as the RTOW Chart output.

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DEFINITIONS

TAKEOFF SPEEDS

Applicable to: ALL

1

V1, the Committal Speed for Takeoff, is the maximum speed at which the pilot must take the first action (e.g. reduce thrust, apply brakes) to stop the aircraft within the ASDA; V1 is also the minimum speed, following a failure of the critical engine, at which the pilot can continue the takeoff and achieve the required screen height within the TODA.

VR, the Rotation Speed, is the speed at which rotation is initiated during takeoff and permits the attainment of V2 at the 35 ft screen height. VR must not be less than 1.05Vmca nor greater than the maximum tyre speed.

V2, the Takeoff Safety Speed, is the minimum speed reached at the 35 ft screen height with one engine inoperative and is maintained to the point where acceleration to flap retraction is initiated. V2 must not be less than 1.1Vmca or 1.13Vs1g nor greater than 1.40Vs1g.

TAKEOFF DISTANCES

Applicable to: ALL

2

TAKEOFF RUN AVAILABLE (TORA) is the length of the runway available and suitable for the ground run of an aircraft taking off. In most cases this corresponds to the physical length of the runway.
CLEARWAY (TODA-TORA=CW) is an obstacle-free, controlled area beyond the end of the runway.
STOPWAY is a controlled area beyond the end of the runway capable of supporting the aircraft without significant damage.
TAKEOFF DISTANCE AVAILABLE (TODA) is the length of the TORA plus the length of any available Clearway.
ACCELERATE STOP DISTANCE AVAILABLE (ASDA) is the length of the TORA plus the length of any available Stopway. ASDA is also known as Emergency Distance Available.

ACCELERATE STOP DISTANCE REQUIRED (ASDR) for either the engine-out or the all engine case is the sum of:
a. Acceleration distance from brake release to V1.
b. Distance from V1 to application of full braking.
c. Stopping distance with full braking applied.

Time intervals of one second minimum between the engine failure speed (Vef) and V1, and two seconds between V1 and application of the first stopping action, are built into the engine out accelerate stop distance. The ASDR is the greater of either the engine out or the all engine accelerate stop distances.
BALANCED FIELD length occurs when the ASDR equals the TODA.

LINE-UP ALLOWANCE

3 **Applicable to: ALL 320**

4

The following corrections to TODA and ASDA are taken into account when calculating take-off performance:

Aircraft	TODA Correction	ASDA Correction
A320	10.9 m	23.6 m

90° Runway Entry

Aircraft	TODA Correction	ASDA Correction
A320	16.5 m	29.1 m

180° Turnaround

90 ° line-up allowance is normally considered for 90 ° taxiway entry to the runway.
180 ° line-up allowance is normally considered for 180 ° turnaround on the runway.
No line up allowance is considered for runways with displaced takeoff thresholds, or ample turning aprons.
The exception to this is HKG where the runway alignment loss for intersection departures is already accounted for and is significantly in excess of the allowance required for all Dragonair aircraft.
Therefore, for HKG intersection departures, no line-up allowance is considered.
The line-up allowance can be viewed from the ACARS RTOW using the RWY CODE 'LST' selection.

LINE-UP ALLOWANCE

5 **Applicable to: ALL 321**

6

The following corrections to TODA and ASDA are taken into account when calculating take-off performance:

Aircraft	TODA Correction	ASDA Correction
A321	12.0 m	28.9 m

90° Runway Entry

Aircraft	TODA Correction	ASDA Correction
A321	20.9 m	37.8 m

180° Turnaround

90 ° line-up allowance is normally considered for 90 ° taxiway entry to the runway.
180 ° line-up allowance is normally considered for 180 ° turnaround on the runway.
No line up allowance is considered for runways with displaced takeoff thresholds, or ample turning aprons.
The exception to this is HKG where the runway alignment loss for intersection departures is already accounted for and is significantly in excess of the allowance required for all Dragonair aircraft.
Therefore, for HKG intersection departures, no line-up allowance is considered.
The line-up allowance can be viewed from the ACARS RTOW using the RWY CODE ‘LST’ selection.

MAXIMUM TAKEOFF WEIGHT

Applicable to: ALL

7

The maximum takeoff weight is subject to structural limitations but can be further restricted by performance requirements to satisfy the field length, climb gradient or obstacle clearance requirements. Occasionally it may also be limited by brake energy or tyre speeds.

A field length limited takeoff weight is obtained by calculation assuming that the takeoff is discontinued from V1 following an engine failure at Vef. The calculation considers the TODA, ASDA and runway slope. Allowances are also made for the effects of pressure altitude, temperature and surface wind.

a. A climb performance limited takeoff weight results when the gross climb gradient with one engine inoperative is equal to the minimum 2.4 %required in the second segment of the takeoff flight path, for the specified conditions of temperature and pressure altitude. The second segment is at takeoff thrust with flap remaining at the takeoff setting and the landing gear retracted.
b. The takeoff weights may be limited by the requirement to clear obstacles in the net takeoff path by 35 ft with one engine inoperative. The net flight path is the gross flight path gradient capability of the aircraft reduced by 0.8 % to allow for in-service deterioration.
c. Under normal conditions the brake energy capacity of the aircraft is sufficient to handle a stop from V1. Heavy takeoff weights combined with high elevation, downhill slope or tailwind could result in the Maximum Brake Energy Speed (Vmbe) limiting V1.
d. Takeoff speeds are not normally limited by the rated tyre speeds. However, this limitation may occur at high elevation airfields where takeoff ground speeds are high.

MAXIMUM STRUCTURAL TAKEOFF WEIGHT. This limitation is provided in the Flight Manual and in the Limitations chapter of the FCOM. *Refer to LIM-11.*
MAXIMUM PERMISSIBLE TAKEOFF WEIGHT (MTOW) is a performance weight limitation read directly from the Performance Charts or calculated using relevant computer software.
REGULATED TAKEOFF WEIGHT (RTOW) is the lesser of the maximum permissible takeoff weight (MTOW) and the maximum structural takeoff weight.
In addition to the limitations imposed by the RTOW, the takeoff weight can also be limited by the maximum ZFW, maximum weight at top-of-climb limited by climb thrust or buffet margin and the RLW. For flights over mountainous terrain, obstacle clearance in the event of an engine failure en-route may further limit the takeoff weight.

Intentionally left blank

TAKEOFF PERFORMANCE

ALL ENGINE TAKEOFF

1 **Applicable to: ALL 320**

2

The local airport authority publishes SIDs in order to control the flow of air traffic departing from particular runways after takeoff. In constructing the SID, the airport authority may require minimum climb gradients or minimum altitudes at certain points along the SID flight path. This can be due to:

a. Geographical terrain. Minimum gradients are used to ensure a safe margin of terrain clearance during takeoff.
b. Minimum Altitude constraints to manage the flow of traffic arriving and departing within the aerodrome.
c. Other ATC purposes, such as noise abatement procedures.

Normally, all engine performance will be sufficient to achieve most airport SID gradient requirements. When certain SID gradients are not achievable for MTOW operations, then some restrictions may apply (e.g. increased flap retraction altitude, limited take-off weight, etc), and a special note will be published for crew guidance.

CLIMB GRADIENT

Gradient requirements depicted on SID and Approach charts are for All Engines Operating. All ports are analysed prior to the commencement of operations and if the required terrain clearance cannot be achieved with an engine inoperative, an Engine Inoperative procedure will be detailed on the relevant Port Page.
A320 aircraft with All Engines Operating achieve a gradient well in excess of that required for most SID and missed approach procedures.
The minimum climb gradient for A320 aircraft with All Engines Operating up to the acceleration altitude is 15.1 % (ISA +15 °C).

ALL ENGINE TAKEOFF

3 **Applicable to: ALL 321**

4

The local airport authority publishes SIDs in order to control the flow of air traffic departing from particular runways after takeoff. In constructing the SID, the airport authority may require minimum climb gradients or minimum altitudes at certain points along the SID flight path. This can be due to:

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Gradient requirements depicted on SID and Approach charts are for All Engines Operating. All ports are analysed prior to the commencement of operations and if the required terrain clearance cannot be achieved with an engine inoperative, an Engine Inoperative procedure will be detailed on the relevant Port Page.

A321 aircraft with All Engines Operating achieve a gradient well in excess of that required for most SID and missed approach procedures.

The minimum climb gradient for A321 aircraft with All Engines Operating up to the acceleration altitude is 13.2 % (ISA +15 °C).

THRUST SELECTION

Applicable to: ALL

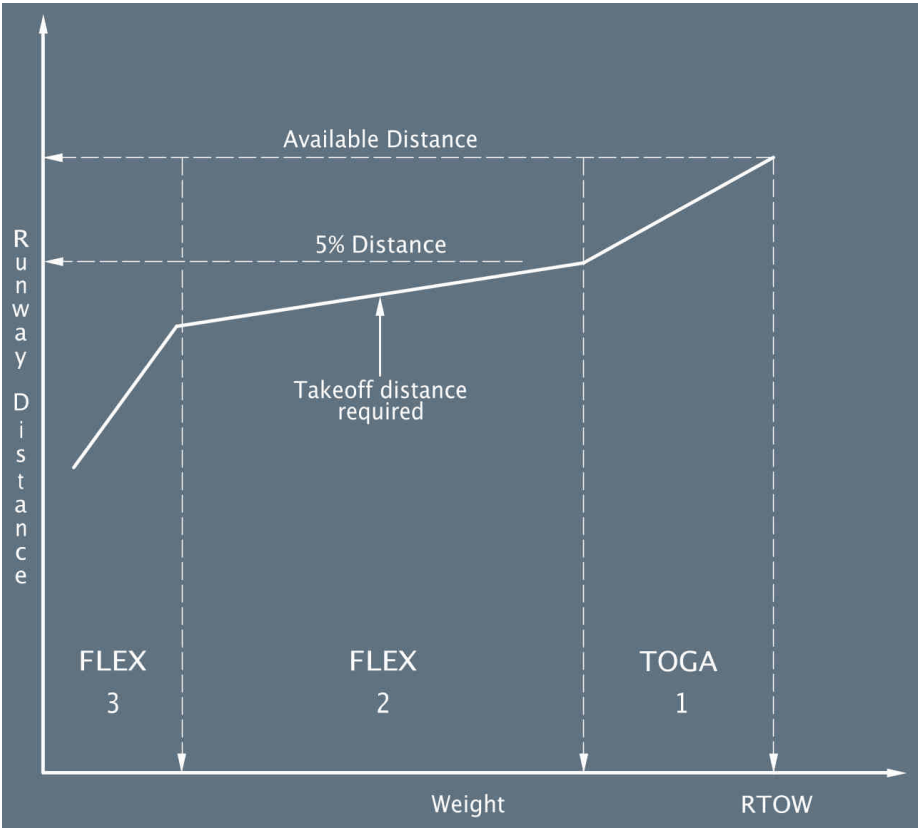
5

THRUST RATING

Available options are "OPT"and "TOGA". The default setting is "OPT". When "OPT"is set, the program will select FLEX TEMP or TOGA in accordance with the input conditions.
If takeoff conditions or MEL dispatch do not allow FLEX Temperature to be used, only TOGA data will be provided.
If "OPT"is entered during MEL dispatch, the program will select the thrust rating as per the MEL/CDL if specified. An error message will be returned if Crew request a thrust rating other than that allowed in the MEL/CDL.
Some airports may have a predefined thrust rating due to noise abatement, or other operating requirements. When "OPT"is selected, the predefined thrust rating if specified will be used automatically. Crew are allowed to choose a thrust rating other than OPT, but may receive a warning or a prohibition on the output if a Port page requirement is applicable.

TOGA/FLEX TEMP SELECTION LOGIC

FLEX temperature will be used when surplus distances of 5 % for all of TODA/TORA/ASDA are available.
The graph below shows the relationship between runway length, the A/C WT and the thrust.



REGION 1:

ACT TOW is at or below RTOW but has not reached the weight where a distance surplus of 5 % of declared distance is available, hence TOGA thrust is used.

REGION 2:

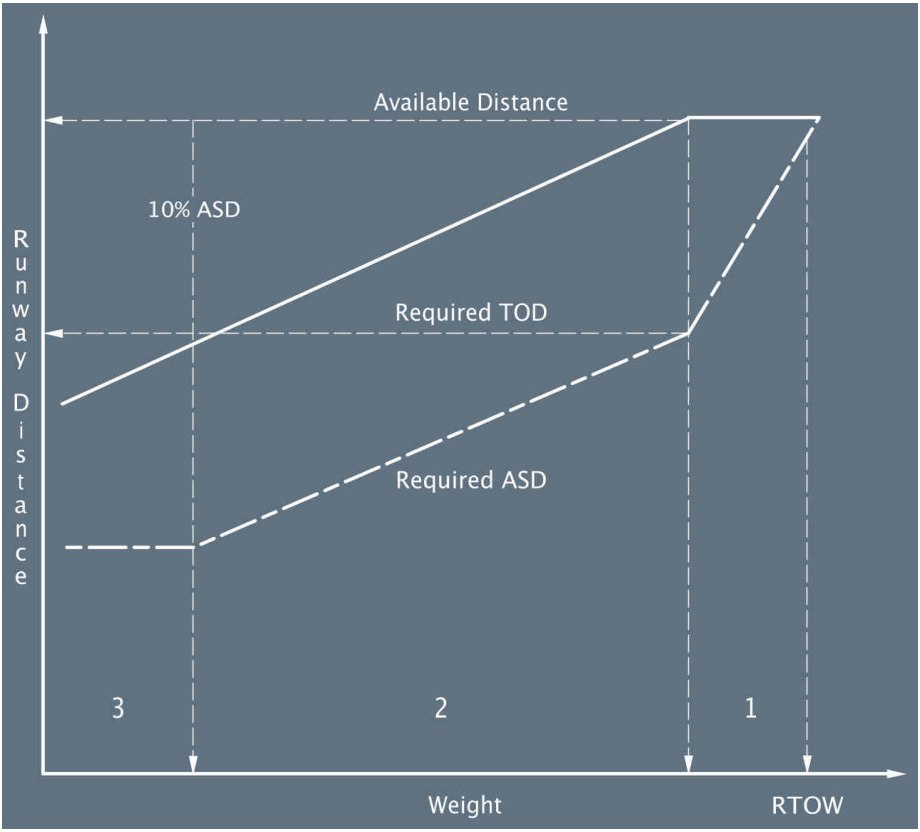
ACT TOW is such that a surplus of 5 % of declared distance is available. Any reduction in Weight would result in an increase in FLEX Temp until the maximum FLEX Temp is reached. The runway distance required will remain fairly constant. The FLEX Temp calculation is based on 95 % of the declared runway distance.

REGION 3:

When the FLEX Temperature reaches the maximum, further reduction in ACT TOW will decrease the runway distance required.

TAKEOFF MARGIN LOGIC

The default logic is to maximize stopping margin and increases the probability of Continued Takeoff.
When the stopping distance surplus on DRY runway exceeds 10% of the ASDA (15 % for a WET or Contaminated runway, or takeoff with MEL items) then the remaining surplus is distributed evenly to the Continued takeoff situation and the Rejected takeoff situation.
The graph below shows the relationship of ASDR/TODR with ATOW.



REGION 1:

ACT TOW is less than or equal to RTOW but has not reached the 10 % (15 % for a WET or Contaminated runway, or takeoff with MEL items) surplus margin in ASD. Hence only stopping margin is available in this region.

REGION 2:

ACT TOW is low enough that stopping margin exceeds the prescribed value of the ASDA. Surplus beyond the prescribed value is distributed evenly between Continued Takeoff and Reject Takeoff.

REGION 3:

The increase in stopping margin slows down when limited by Vmcg. Go margin continues to increase as takeoff weight decreases.

SUPPLEMENTARY INFORMATION

Applicable to: ALL

6

CONFIG SELECTION

Available options are "OPT", "1", "2" and "3". The default setting is "OPT".
When "OPT"is set, the CONF will be selected in accordance with a predefined priority list.
Some airports may have predefined CONF settings due to noise abatement, or other operating requirements. When "OPT"is selected, the predefined CONF setting if specified will be used automatically. Crew are allowed to choose a CONF setting other than OPT, but will receive a warning or a prohibition on the output if a Port page requirement is applicable.
If "OPT"is selected during MEL dispatch, the program will select the CONF as per the MEL/CDL Manual if specified. An error message may be returned if crew request a CONF other than that specified in the MEL/CDL Manual.

THRUST REVERSE PERFORMANCE CREDIT

When thrust reverse credit is applied, ACARS RTOW assumes the application of maximum reverse thrust during a RTO deceleration.

Thrust reverse credit is applied as below:

Dry Rwy	:	Thrust reverse credit is not applied. If used during RTO it will provide a performance benefit.
Wet / Contaminated Rwy	:	Thrust reverse credit applied, unless listed as unserviceable during initial ACARS RTOW performance request.

IMPROVED CLIMB

Whenever the takeoff is critical, improved climb can provide an increase in the RTOW. Improved climb is automatically selected, and cannot be selected manually

WEIGHT BAND

The Weight Band is provided to reduce crew workload when a minor change in aircraft weight occurs. As long as the ACT TOW is within the weight band, there is no requirement to recalculate the takeoff data.

EFFECT OF QNH & TEMPERATURE

Flex take-off calculations incorporate a 2 hpa pad, thus the takeoff data need not be recalculated unless the QNH decreases more than 2 hpa.
For Flex take-offs, a rise in OAT does not require the data to be recalculated provided the OAT does not exceed the Flex Temperature.
However, for TOGA takeoffs, a rise in OAT requires a new RTOW calculation.

SUPPLEMENTARY DATA

The highest RTOW and associated CONF and thrust rating is provided in the supplementary data area to facilitate weight or fuel uplift planning. The CONF and thrust rating displayed may be different from that displayed in the main output.

MEL/CDL AND SPECIAL OPERATIONS ITEMS

Applicable to: ALL

7

PERFORMANCE RELATED FAILURES

Dispatch with up to two aircraft performance defects may be permitted on dry, wet, or contaminated runways. In most cases, reductions will be required to the performance limited takeoff weight (MTOW), V speeds or both. This will be done automatically within the ACARS RTOW system.

Provided takeoff performance can be computed using ACARS RTOW, dispatch with single or multiple failures, for the specified runway condition, is permitted. Additionally, ACARS RTOW, WEB RTOW and SMS RTOW are the only authorized method for takeoff performance calculation with performance defects.

Simplified RTOW Charts are valid for use with reversers inoperative. Refer to aircraft MEL for specific defect items.

Defects within the Configuration Deviation List (CDL), which affect takeoff performance, can also be considered directly through ACARS RTOW. One CDL item only can be entered directly as a corresponding ATA code into the takeoff performance request

MEL

Input codes for MEL items that require takeoff performance adjustments are stated in the MEL. Only MEL items that require takeoff performance adjustments are permitted for entry. Codes must be entered with "dashes" and appended with an alphabetic character at the end of the ATA number such as "78-30-01A".

CDL

Input codes or weight decrements for CDL items that require takeoff performance adjustments are stated in the CDL. Only CDL items that require takeoff performance adjustments are permitted for entry. Codes must be entered with "dashes" such as "52–22". Input without a "dash" will be treated as a manual weight decrement e.g. 5222 means a 5222 KG reduction.

This is because for some CDL items, the weight penalty is given as a "per part" adjustment. Without knowing how many parts are missing/defective, the system is unable to provide the takeoff performance adjustment. Hence, for these cases the CDL input code is not used, and crew should instead add up the total weight penalty and input it into the CDL/SP OPS input field.

The system will then work out the takeoff performance adjustment based on the input weight penalty. For example, if the CDL penalty for each part missing is 200 kg, then for two parts missing, the crew should enter 400 into the CDL/SP OPS field. Input instructions are also available in the MEL/CDL.

When more than one method of dispatch is possible under the same CDL number, then the input code would normally be appended with an alphabetic character to the end of the ATA number. For

example, the CDL input code for "lower wing tip fence missing" is "57-01A" while the CDL input code for "complete wing tip fence missing" is "57-01B".
The system is unable to handle multiple CDL code entries. For dispatch with multiple CDL items the total weight penalty must be calculated manually and the result entered into the CDL/SP OPS field. For example, if the penalty for one CDL item is 363 Kg, and another 205 Kg, the total weight penalty is 568 kg. Enter 568 in the CDL/SP OPS field.
If the multiple CDL performance adjustments involve takeoff speeds adjustment, then ACARS RTOW must not be used. The Operations Engineers must specially provide these complex calculations.
A mix of CDL and MEL calculations may be possible, but crew must ensure the configurations are set in accordance with the MEL/CDL operations restrictions.

SPECIAL OPERATIONS

Input codes for Special Operations are included in the MEL/CDL.

ACARS DESCRIPTION

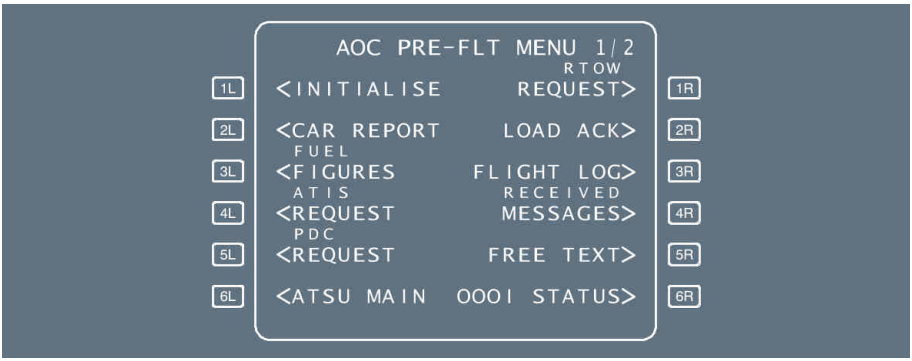
MCDU

Applicable to: ALL

1

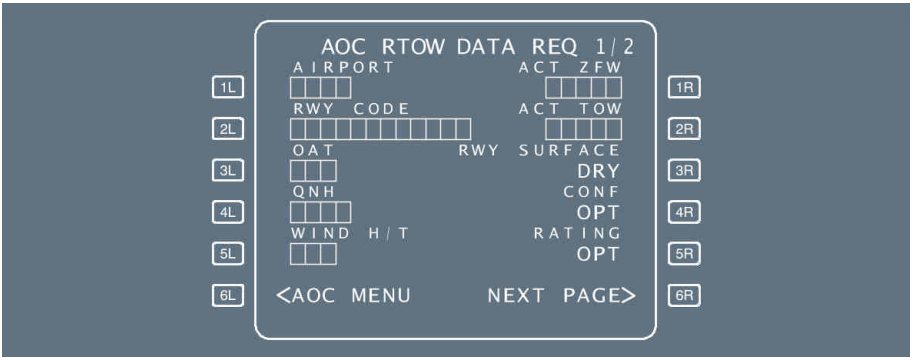
All entered data will remain on the input screen to facilitate multiple requests. All fields will be reset to default values after landing. All compulsory input fields, such as A/C Weight, are displayed as boxes and have to be completed.

ACARS PRE-FLT MENU 1/2



[1R] RTOW REQUEST : Press to display ACARS RTOW DATA REQ page.

ACARS RTOW DATA REQ 1/2



Keys [1L], [2L], [3L], [4L], [5L], [1R] and [2R] are compulsory inputs.

[1L] AIRPORT : Enter the 4 letter or 3 letter departure airport code e.g. VHHH or HKG.

[2L] RWY CODE : Enter Runway/Taxiway Code, e.g. 25LJ10. Enter "ALL" for a list of runway codes, or "LST" for a list of runway length data.

[3L] OAT : Enter airport OAT in degrees C. Examples of valid entries are 5, 32, -5, or -10 etc.

[4L] QNH : Enter airport QNH in HPa. Examples of valid entries are 950, 1040 etc.

[5L] WIND H/T : Enter Head or Tail wind component in Kt. Examples of valid entries are 4H, 12H, 1T or 13T etc.

[1R] ACT ZFW : Enter aircraft actual zero fuel weight in decimal tons, e.g. 57.8.

[2R] ACT TOW : Enter aircraft actual take off weight in decimal tons, e.g. 70.1.

[3R] RWY SURFACE : Default is DRY for dry runway. Available options are:

- DRY or D for dry
- WET or W for wet
- WT6 for Standing Water 6.3 mm (1/4")
- WT12 for Standing Water 12.7 mm (1/2")
- SH6 for Slush 6.3 mm (1/4")
- SH12 for Slush 12.7 mm (1/2")
- CSNW for Compact Snow.

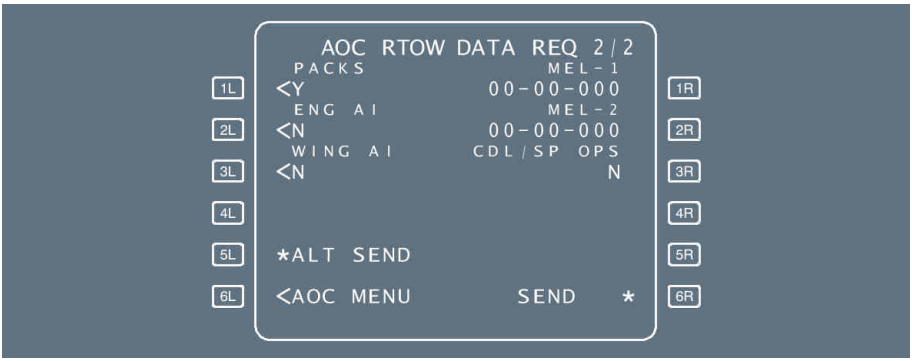
Enter "ALL" for a complete list of available runway surface codes.

[4R] CONF : Displays OPT as default for optimum configuration setting which is determined by the program based on the actual conditions. Flight Crew can select any one of the following options:

- 1 for CONF 1+F
- 2 for CONF 2
- 3 for CONF 3

[5R] RATING : Displays OPT as default for optimum thrust rating and Flex Temperature, which are determined by the program according to the ACT TOW and input conditions. The other available option is TOGA. If TOGA is manually entered, then a Flex Temp will not be provided.

ACARS RTOW DATA REQ 2/2



[1L] PACKS : Default is Packs On - Y. Push to toggle Packs Off - N.

[2L] ENG AI : Default is Engine Anti-ice - N. Push to toggle Engine Anti-ice - Y.

[3L] WING AI : Default is Wing Anti-ice - N. Push to toggle Wing Anti-ice - Y.

[5L] ALT SEND : Backup key for use when no response from primary SEND.

[1R] MEL – 1 : Displays 00-00-000 as default for no MEL item. Enter MEL number in accordance with the MEL Operational Procedure, e.g. 73-20-04A . Refer to MEL-HOW TO USE for details.

[2R] MEL – 2 : Permits entry of additional MEL item if required. Input rule same as MEL –1.

[3R] CDL/SP OPS : Display N for NO CDL or NO Special Operations. This entry is to be used for CDL or Special Operations. A CDL code or a weight reduction can be input for CDL, which is available in the CDL Manual. Refer to CDL-GENERAL for details.

[6R] SEND : Press to send the request. All entered data will remain on the page so that it can be modified for multiple requests. All fields will be reset to the default values after landing.

ACARS RTOW PRINTOUT

Applicable to: ALL

2

Output will be transmitted to the flight deck through the printer. The message is divided into three parts.
The first part is a printout of the input parameters (and WIP information, warning message or error message if any) for verification purpose.
The second part is the Main Output, which includes the weight band, CONF, thrust, take-off speeds and engine out acceleration height.
The third part is the supplementary output, which contains RTOW with the associated CONF, and thrust information if any.
Put the printout in the Flight Documents Envelope after use. If more than one printout is produced, only return the one used for takeoff.

ACARS RTOW PRINTOUT — EXAMPLES

3 **Applicable to: ALL 320**

4

NORMAL ACARS RTOW OUTPUT

```
B-HSP     KA900   03JUN12   EDNO 9EF  -------------line 1
VHHH:HKG  25LJ10                      --------------line 2
+26C      1007HPA  0HEAD    WET       --------------line 3

PACKS ON / ANTI-ICE OFF                --------------line 4

-----------------------------------------------
ATOW  70.1               (69.4 - 70.5)   ----------line 5

V1  140  (VMIN 113)        25L TWY J10   ----------line 6
VR  151                                  ----------line 7
V2  153                         CONF 1  (ONE)  -----line 8
                               FLEX 63  (F63)  -----line 9

                       EO ACC 1500 AAL----------  line 10
-----------------------------------------------

SUPPLEMENTARY :
RTOW * 82.4 CONF 3 TOGA                --------------line 11
```

Line 1	Aircraft Registration Number, Flight Number, Date and 3-figure RTOW Edition number (EDNO).
Line 2	Departure Port in 4 letter and 3 letter code, Runway Code.
Line 3	OAT, QNH, wind component and runway surface condition. QNH has 2hPa buffer. Buffers are not incorporated for wind or temperature.
Line 4	Air Conditioning ON or OFF, Anti-ice ON or OFF.
Line 5	Actual TOW in tons, valid weight band in tons.
Line 6	V1, minimum V1 controlled by VMCG and runway full name.
Line 7	VR
Line 8	V2 and take-off configuration. Configuration is repeated in brackets.
Line 9	Flex temperature (repeated in brackets).
Line 10	Engine out acceleration height AAL in feet. Engine Out Acceleration Height is temperature-corrected in cold conditions. Use the higher of the ACARS RTOW figure and that on the Port Page.

Line 11 RTOW, corresponding configuration and thrust rating. An "*" denotes that the RTOW is approach climb limited using CONF 3.

5 **Applicable to: ALL 321**

6

NORMAL ACARS RTOW OUTPUT

```
B-HTI      KA900   03JUN12    EDNO 9XD  -------------line 1
VHHH:HKG   25LJ10                      --------------line 2
+26C       1007HPA  0HEAD     WET       --------------line 3

PACKS ON / ANTI-ICE OFF                 --------------line 4

-----------------------------------------------
ATOW  84.3                (83.5 - 84.5)   ----------line 5

V1  145  (VMIN 113)         25L TWY J10   ----------line 6
VR  165                                   ----------line 7
V2  168                           CONF 1  (ONE)  -----line 8
                                 FLEX 48  (F48)  -----line 9

                        EO ACC 1500 AAL----------  line 10
-----------------------------------------------

SUPPLEMENTARY :
RTOW * 97.2 CONF 1 TOGA                 --------------line 11
```

Line 1	Aircraft Registration Number, Flight Number, Date and 3-figure RTOW Edition number (EDNO).
Line 2	Departure Port in 4 letter and 3 letter code, Runway Code.
Line 3	OAT, QNH, wind component and runway surface condition. QNH has 2hPa buffer. Buffers are not incorporated for wind or temperature.
Line 4	Air Conditioning ON or OFF, Anti-ice ON or OFF.
Line 5	Actual TOW in tons, valid weight band in tons.
Line 6	V1, minimum V1 controlled by VMCG and runway full name.
Line 7	VR
Line 8	V2 and take-off configuration. Configuration is repeated in brackets.
Line 9	Flex temperature (repeated in brackets).
Line 10	Engine out acceleration height AAL in feet. Engine Out Acceleration Height is temperature-corrected in cold conditions. Use the higher of the ACARS RTOW figure and that on the Port Page.

Line 11 RTOW, corresponding configuration and thrust rating. An "*" denotes that the RTOW is approach climb limited using CONF 3.

7 **Applicable to: ALL 320**

8

ACARS RTOW INTERSECTION DEPARTURE WITH MEL DATA

```
B-HSP     KA800     03JUN12    EDNO  9FC
VHHH:HKG 25LJ10
+30C        1006HPA         5HEAD         WET

PACKS ON / ANTI-ICE OFF


MEL : 27-64-02A
SPLR 1 OR 3

-------------------------------------------
ATOW  70.1                  (69.4 - 70.3)

V1 139  (VMIN 113)            25L TWY J10
VR 150
V2 151                              CONF 1 (ONE)
                                   FLEX 63 (F63)

                          EO ACC 1500 AAL
-------------------------------------------
SUPPLEMENTARY :
RTOW * 82.4 CONF 3 TOGA
```

RTOW Edition number

MEL Remark

9 **Applicable to: ALL 321**

10

ACARS RTOW INTERSECTION DEPARTURE WITH MEL DATA

```
B-HTI     KA800     03JUN12    EDNO  9XF
VHHH:HKG 25LJ10
+30C        1006HPA         5HEAD         WET

PACKS ON / ANTI-ICE OFF


MEL : 27-64-02A
SPLR 1 OR 3

-------------------------------------------
ATOW  84.3                          (83.5 - 84.5)

V1 144   (VMIN 113)            25L TWY J10
VR 165
V2 168                                CONF 1 (ONE)
                                     FLEX 48 (F48)

                           EO ACC 1500 AAL
-------------------------------------------
SUPPLEMENTARY :
RTOW * 97.0 CONF 1 TOGA
```

RTOW Edition number

MEL Remark

11 **Applicable to: ALL 320**

12

OUTPUT WITH "RTOW < ATOW, TAKEOFF NOT ALLOWED".

ATOW is greater than RTOW, take-off is not possible unless ATOW is reduced to RTOW. Alternatively, consider PACKS OFF computation.

```
B-HSP     KA361     03JUN12    EDNO 9FF
RJAA:NRT 16L
+29C        1006HPA         5TAIL         WET

PACKS ON / ANTI-ICE OFF

-------------------------------------------
ATOW  74.1                      (---.- - ---.-)

** ATOW > RTOW, TAKEOFF NOT ALLOWED **
   CONSIDER PACKS OFF CALCULATION



-------------------------------------------

SUPPLEMENTARY :
RTOW  72.3  CONF 2 TOGA
```

Highest RTOW for the input weather conditions

Applicable to: ALL 321

13

OUTPUT WITH "RTOW < ATOW, TAKEOFF NOT ALLOWED"

```
B-HTI     KA361     03JUN12    EDNO 9XR
RJAA:NRT 16L
+29C        1006HPA         5TAIL         WET

PACKS ON / ANTI-ICE OFF

-------------------------------------------
ATOW  85.4                      (---.- - ---.-)

** ATOW > RTOW, TAKEOFF NOT ALLOWED **
   CONSIDER PACKS OFF CALCULATION


-------------------------------------------

SUPPLEMENTARY :
RTOW  84.3  CONF 2 TOGA
```

Highest RTOW for the input weather conditions

14 **Applicable to: ALL 320**

15

ACARS RTOW OUTPUT (FULL LENGTH) WITH WIP WARNING

```
B-HSP     KA060    03JUN12    EDNO 9FK
WBKK:BKI 02
+29C        1006HPA         5TAIL         DRY

PACKS ON / ANTI-ICE OFF

WARNING:
WIP NOTAMED ON THIS RWY.
CHECK CORRECT RWY CODE IS USED WHEN WIP ACTIVE.
SEE NOTAMS FOR DETAILS.
-------------------------------------------
ATOW  68.7                        (68.1 - 69.1)

V1 149   (VMIN 113)                          02
VR 149
V2 151                                  CONF 1 (ONE)
                                       FLEX 50 (F50)

                                 EO ACC 1500 AAL
-------------------------------------------

SUPPLEMENTARY :
RTOW  73.2 CONF 1 TOGA
```

Runway WIP Warning

Applicable to: ALL 321

16

ACARS RTOW OUTPUT (FULL LENGTH) WITH WIP WARNING

```
B-HTI     KA060    03JUN12    EDNO 9XX
WBKK:BKI 02
+29C         1006HPA         5TAIL         DRY

PACKS ON / ANTI-ICE OFF

WARNING:
WIP NOTAMED ON THIS RWY.
CHECK CORRECT RWY CODE IS USED WHEN WIP ACTIVE.
SEE NOTAMS FOR DETAILS.
-------------------------------------------
ATOW  78.6                        (77.9 - 79.0)

V1 151   (VMIN 111)                          02
VR 152
V2 156                                   CONF 1 (ONE)
                                        FLEX 39 (F39)

                                EO ACC 1500 AAL
-------------------------------------------

SUPPLEMENTARY :
RTOW  85.0 CONF 1 TOGA
```

Runway WIP Warning

17 Applicable to: ALL 320

18

ACARS RTOW OUTPUT WITH WIP REMARK

```
B-HSP     KA060     03JUN12    EDNO 9FL
WBKK:BKI  02WIP4
+29C        1006HPA         5TAIL         DRY

PACKS ON / ANTI-ICE OFF

DECLARED DISTANCES(FT) FOR WIP RWY:
  TORA   TODA   ASDA
 10105  10105  10105
-------------------------------------------
ATOW   68.7                        (68.1 - 68.9)

V1 148   (VMIN 113)                    02 WIP 4
VR 151
V2 153                                   CONF 1 (ONE)
                                        FLEX 50 (F50)

                                 EO ACC 1500 AAL
-------------------------------------------

SUPPLEMENTARY :
RTOW   73.2 CONF 1 TOGA
```

Runway WIP Remark

Applicable to: ALL 321

19

ACARS RTOW OUTPUT WITH WIP REMARK

```
B-HTI     KA060     03JUN12    EDNO 9YA
WBKK:BKI 02WIP4
+29C        1006HPA        5TAIL        DRY

PACKS ON / ANTI-ICE OFF

DECLARED DISTANCES(FT) FOR WIP RWY:
  TORA   TODA   ASDA
 10105 10105 10105
-------------------------------------------
ATOW  78.6                        (77.9 - 78.8)

V1 150   (VMIN 111)                    02 WIP 4
VR 151
V2 156                                   CONF 1 (ONE)
                                        FLEX 39 (F39)

                                EO ACC 1500 AAL
-------------------------------------------

SUPPLEMENTARY :
RTOW  84.8 CONF 1 TOGA
```

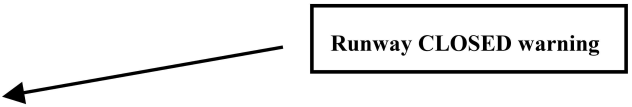
Runway WIP Remark

20 **Applicable to: ALL 320**

21

ACARS RTOW OUTPUT WITH RUNWAY CLOSED WARNING

```
B-HSP     KA722     03JUN12    EDNO 9MN
WMKK:KUL 14R
+29C        1006HPA        5TAIL        DRY

PACKS ON / ANTI-ICE OFF


WARNING:
RWY NOTAMED CLOSED.
SEE NOTAMS FOR DETAILS.
-------------------------------------------
ATOW   68.7                      (68.1 - 69.5)

V1 147  (VMIN 123)                        14R
VR 150
V2 151                                 CONF 1 (ONE)
                                       FLEX 63 (F63)

                                EO ACC 1500 AAL
-------------------------------------------

SUPPLEMENTARY :
RTOW   80.7 CONF 3 TOGA
```



Applicable to: ALL 321

22

ACARS RTOW OUTPUT WITH RUNWAY CLOSED WARNING

```
B-HTI     KA722     03JUN12    EDNO 9YG
WMKK:KUL 14R
+29C        1006HPA         5TAIL         DRY

PACKS ON / ANTI-ICE OFF


WARNING:
RWY NOTAMED CLOSED.
SEE NOTAMS FOR DETAILS.
---------------------------------------------
ATOW    84.3                          (83.5-84.7)

V1 154   (VMIN 111)                          14R
VR 158
V2 161                                    CONF 1 (ONE)
                                         FLEX 45 (F45)

                                EO ACC 1500 AAL
---------------------------------------------

SUPPLEMENTARY :
RTOW    94.5 CONF 1 TOGA
```

Runway CLOSED warning

Applicable to: ALL

23

ACARS RTOW OUTPUT WITH MINIMUM GROUND ROLL FUNCTION

```
B-HTI     KA000     03JUN12    EDNO 9TJ
WARR:SUB 28MR
+20C       1013HPA         0HEAD          DRY

PACKS ON / ANTI-ICE OFF

-------------------------------------------
ATOW   84.0                        (83.2 - 84.2)

V1 148   (VMIN 112)          28 MIN GROUND ROLL
VR 151
V2 156                                    CONF 1 (ONE)
                                         FLEX 41 (F41)

                                  EO ACC 1500 AAL
-------------------------------------------

SUPPLEMENTARY :
RTOW * 92.6 CONF 1 TOGA

ver 11501193HTI              RTOW EDNO 9TJ
```

Minimum Ground Roll (MR)

RUNWAY CODES

Applicable to: ALL

24

For full length takeoff the runway code is the same as the runway designator e.g. 07R.

RUNWAY INTERSECTION AND SID

When taxiway intersection takeoff is used, taxiway designator is appended to the end of the runway designator, e.g. HKG 07RJ2 for runway 07R intersection with taxiway J2. When runway data is associated with a particular SID takeoff procedure, a dedicated runway code will be provided, such as 28RXCUSH which stands for 28R takeoff with SIDs except CUIT2/SHOR1. Special runway codes, if applicable, are annotated in the Port Pages.

WIP/OBS

When there is runway work, runway code will be appended with an indicator e.g. 07RWIP for runway work with runway distance change and 07ROBS for temporary obstacles with or without runway distance change. The WIP/OBS runway code will be effective 1 day earlier than the published effective date and be removed 1 day after the published expiry date. Crew are required to check the effectivity of the runway work. When runway work is effective, a warning will be added to the printout if normal runway code is entered. During the effective period the WIP/OBS runway codes are included in the Company Notams.

RUNWAY CLOSED

When a runway is closed for operation, a warning will be added to the printout if the concerned runway is selected. This warning will be effective in a similar way to WIP/OBS i.e. 1 day earlier than the published effective date and be removed 1 day after the published expiry date. Crew are required to check the effectivity of the runway work.

Applicable to: ALL 320

25

MINIMUM GROUND ROLL (MR)

In order to cater for cases where a runway surface has deteriorated to the extent that a minimum ground roll take-off is desirable, a Minimum Ground Roll feature is available.
Minimum Ground Roll option will be promulgated via Company NOTAM when required. The function will then be available for the specified port/runway. The function is activated by entering “MR”after the runway designator, e.g. “20MR” or “07RJ2MR.” Data is normally available for the full length and first usable intersections from the affected runway thresholds.
The RTOW computation is based on the affected runway being shortened by 2 000 ft (1 000 ft for shorter runways). Additionally, the maximum Flex temperature is reduced to ISA+43 (58 °C).
When MR is promulgated, its use is preferred but not mandatory. If RTOW data for the full runway length is required, the Commander may select normal data at his discretion. Similarly, a TOGA thrust take-off may be computed using MR or normal data as necessary.

Applicable to: ALL 321

26

MINIMUM GROUND ROLL (MR)

In order to cater for cases where a runway surface has deteriorated to the extent that a minimum ground roll take-off is desirable, a Minimum Ground Roll feature is available.
Minimum Ground Roll option will be promulgated via Company NOTAM when required. The function will then be available for the specified port/runway. The function is activated by entering “MR”after the runway designator, e.g. “20MR” or “07RJ2MR.” Data is normally available for the full length and first usable intersections from the affected runway thresholds.
The RTOW computation is based on the affected runway being shortened by 2 000 ft (1 000 ft for shorter runways). Additionally, the maximum Flex temperature is reduced to ISA+28 (43 °C).
When MR is promulgated, its use is preferred but not mandatory. If RTOW data for the full runway length is required, the Commander may select normal data at his discretion. Similarly, a TOGA thrust take-off may be computed using MR or normal data as necessary.

Applicable to: ALL

27

RUNWAY DATA

If "ALL" is entered as the runway code, then a complete list of runway codes including TORA (in feet) will be returned.
If "LST" is entered as the runway code, then a complete list of runway length data (in feet), runway slope and line up allowance will be returned.

Applicable to: ALL

28

ACARS RTOW PRINTOUT FOR RUNWAY CODE "ALL"

```
B-HSG     KA946     03JUN12    EDNO 9NQ
VHHH:HKG

+30C       1013HPA        0HEAD           DRY


AVAILABLE RWY:
CODE          FULL NAME                TORA
07L           07L                      12467
07LA2         07L TWY A2               11814
07LA3         07L TWY A3               10846
25R           25R                      12467
25RA11        25R TWY A11              11814
07R           07R                      12467
07RJ2         07R TWY J2               11814
07RJ3         07R TWY J3               10269
25L           25L                      12467
25LJ10        25L TWY J10              11814
25LJ9         25L TWY J9               10499
----------------------------------------

----------------------------------------


ver 11501192HSP             RTOW EDNO 9NQ
```

Applicable to: ALL

29

ACARS RTOW PRINTOUT FOR RUNWAY CODE "LST"

```
B-HSG     KA213     03JUN12    EDNO 9SH
VTSP:HKT

+30C       1013HPA        0HEAD           DRY


AVAILABLE RWY:
CODE          TORA  TODA  ASDA  SLOPE  LU
09             9843  9843 10039 0.75U  90
09B            9102  9102  9299 0.75U  90
27             9843  9843 10039 0.50D 180
27G            8360  8360  8556 0.50D  90
----------------------------------------

----------------------------------------


ver 11501192HSP              RTOW EDNO 9NR
```

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ACARS BACKUP PROCEDURES

BACKUP PROCEDURES

Applicable to: ALL

1

When the ACARS system or ground computer is inoperative, various backup systems are available for use. These include "ALT SEND" on the ACARS RTOW page, SMS RTOW, SIMPLIFIED RTOW Charts and WEB RTOW.
If the ACARS system and ground computer are working properly, but a calculation error message is returned, then re-submit the request with the same conditions or select other available options. If that does not resolve the problem, then use SIMPLIFIED RTOW Charts and report the case through the CAR.

ALTERNATE SEND

Applicable to: ALL

2

An "ALT SEND" button is available on the ACARS RTOW input screen. When a communication failure is caused by the ground mainframe system, such as during routine system maintenance, using "ALT SEND" may allow the system to bypass the failure by using a different communication path. This will not help when the communication failure is caused by:

- Aircraft system failure
- Lack of ACARS coverage, or
- Ground system RTOW calculator malfunction

The response time may be longer than that of the normal "SEND" function, typically from 3 to 10 minutes depending on communication traffic. Avoid making several requests from "ALT SEND" as this will only result in a further deterioration of the response time.

SMS RTOW

Applicable to: ALL

3

SMS RTOW TELEPHONE NUMBER: (+852) 9180 7577

Note: SMS RTOW may not be available in Japan and Korea for some mobile phones and service providers.

Takeoff data can be obtained via a mobile phone's SMS feature using one of the following methods:

1. Create a text message containing the seven parameters with a blank space between each parameter. The parameters are NOT case sensitive and the order of parameters is NOT significant.

   The seven parameters are as follows:
   - "rtow" - a mandatory keyword
   - Aircraft registration - "hsp"
   - Port code - "hkt" or "vtsp"
   - Runway - "r03" (put letter "r" in front of runway to distinguish from other parameters), "r25r"
   - OAT - "-5", "25"
   - Wind component - "0h", "5t", "10h" (must contain "h" or "t")
   - QNH - "1013"

   For example,

hsp	rtow	hkg	r25lj9	0h	26	1007

   Then send to (+852) 9180 7577. A template containing the recognised parameters will be returned.
   For Example:

ACREG=HSP	PORT=HKG	RWY=25LJ9	OAT=26	QNH=1007	
WIND=0H	TOW=???	SURFACE=DRY	CONF=OPT	RATING=OPT	
PACK=Y	ENG-AI=N	WNG-AI=N	MEL1=N	MEL2=N	CDL=N

   "REPLY" or "FORWARD" the message (depends on phone model) and edit the information if required then send to (+852) 9180 7577 for takeoff data calculation.

   ********** OR **********

2. Send the keyword "rtow" to (+852) 9180 7577. The program will then return the following template:

ACREG=???	PORT=???	RWY=R??	OAT=??	QNH=???
WIND=?H	TOW=???	SURFACE=DRY	FLAP=OPT	RATING=OPT
PACK=DEFAULT	ANTIICE=DEFAULT	MEL1=N	MEL2=N	CDL=N

   "REPLY" or "FORWARD" the message (depends on phone model) and replace the "?" with appropriate values then send to (+852) 9180 7577 for takeoff data calculation.

For either method takeoff data will be returned in the following formats:

- Normal output:

HSP	03JUN12	HKG	25LJ9	+26C	1007HPA	0H	DRY
PACKS	ON	ANTI-ICE	OFF	TOW	68.7 (68.1-68.9)		
CONF	2	F64	145/146/149	111	1500	EDNo:8HE	

Decode:

ATOW	68.7T
Valid weight band	68.1-68.9T
CONF	2
Take-off thrust	FLEX 64C
V1/VR/V2	145/146/149
Vmin	111
EO ACC HT	1500 feet AAL
RTOW Edition No	8HE (for input into the RTOW EDNO field in ACARS CAR)

Crew shall transfer the output to the Takeoff Data Form or page 2 of the CFP and crosscheck the data.

- When RTOW <ATOW (takeoff not possible with the given ATOW):

HTI	03JUN12	FUK	16	+28C	1004HPA	5T	DRY	PACKS	ON
ANTI-ICE		OFF	ATOW > RTOW,		(RTOW	86.5	CONF	1	TOGA)
EDNo:8HF									

Decode:

Highest RTOW	86.5T
CONF	1
Take-off thrust	TOGA

SMS RTOW CHECKING AND RECORDING

Applicable to: ALL

4

1. SMS Take-off data may be requested after receipt of the final ZFW.
2. Both Crew members shall independently check data entered in the SMS on-screen template before sending.
3. Data to be used for take-off shall be recorded on the Take-off Data form (or on CFP page 2 if no forms are available). Both crew members shall independently check that the data entered on the form/CFP agrees with the on-screen SMS Take-off data.
4. Take-off data shall be checked, validated and inserted in the MCDU PERF TO page in accordance with normal procedures for an ACARS RTOW printout.
5. Insert EDNO in the ACARS CAR.

WEB RTOW

Applicable to: ALL

5

The WEB RTOW system is available through the company intranet (Dragonet).
Crew can obtain the RTOW data by either going to the company office and accessing the terminal themselves, OR, by completing a WEB RTOW proforma from the spare documents envelope and asking the ground staff to send the completed form to HKG dispatch.

WEB RTOW DATA CHECKING AND RECORDING

Applicable to: ALL

6

1. Web Take-off data may be requested after receipt of the final ZFW.
2. Both crew members shall independently check data entered on the WEB –RTOW DATA FORM before handing it to Station staff.
3. Web Take-off data should be retrieved and presented to the crew via a printed document.
4. Take-off data shall be checked, validated, and inserted in the MCDU PERF TO page in accordance with normal procedures for an ACARS RTOW printout.
5. Insert EDNO in the ACARS CAR.

SAMPLE WEB RTOW DATA FORM

Reverse side: Take-Off Data Form

DRAGONAIR

WEB – RTOW DATA FORM

AIRBUS

Fill in or Circle as appropriate

A/C REG: _____ DATE: _____

AIRPORT: _____ FLIGHT NO: _____

CAPTAIN: _____

RWY CODE: _____ ACT TOW: _____ x1000 Kgs
e.g. 07RJ1

OAT: _____ °C RWY SURFACE: D (default) or _____

QNH: _____ Hpa FLAPS: OPT (default) or _____

WIND: _____ H/T RATING: OPT (Default) or _____
(select H or T)

PACKS: Y (default) or N MEL-1: Normal (default) or _____

NAC AI: N (default) or Y MEL-2: Normal (default) or _____

WING AI: N (default) or Y CDL / SP OPS: N(default) or _____

To Be Completed by Ground Staff

1. Request the ACARS-RTOW through Dragonet or CX CFD Web Site if available, otherwise
2. Fax this page to HKG Despatch +852 31932113
   - Please fill in your fax number here for fax reply (_____)
   - Follow up by either telex HKGOWKA or phone call to HKG Despatch, +852 31933800
3. Deliver the output to crew.
4. Return this form to Crew for data verification.

SIMPLIFIED RTOW CHARTS

Applicable to: ALL

7

INTRODUCTION

ACARS RTOW is to be used as the primary data source for all RTOW calculations. Simplified RTOW Charts are designed as a fallback in case ACARS RTOW, including backup methods, are not available. To cover as many ports as possible, the data is conservative and may not be usable for heavier weights and/or shorter runways.

Note: *1. Simplified RTOW Charts shall not be used if the applicability of the airport/runway is in doubt.*

2. Dedicated Simplified RTOW Charts may be available for specific airports / runways to cater for special operations such as freighter or charter flights to offline airports, or where inclusion in either Group A or Group B would impose significant performance penalties at other airports within the groups.

Applicable to: ALL

8

RESTRICTIONS

The use of Simplified RTOW Chart is prohibited:

- If temporary obstacles are present in the takeoff direction.
- If WIP affects the runway length.
- For contaminated or slippery runways.
- Performance-related MEL dispatch (except reverser inoperative, see below).

Interpolation or extrapolation is not allowed.

Applicable to: ALL

9

VALIDITY

Group A Charts provides sufficient takeoff performance for airports that require a lower climb gradient.
Group B Charts provide increased departure performance for airports that require a higher than normal climb gradient.
Dedicated Simplified RTOW charts meet all takeoff gradient requirements for the captioned airport runway.
Charts are valid only for the airports listed in the Group Label Box, or for the captioned airport runway.

QNH

Charts are provided for QNH values of 990 hPa and 1005 hPa.

WIND

Charts are normally provided for a maximum tailwind component of 5 knots.

THRUST

Maximum rated thrust (TOGA) must be used. The use of flex temperature is prohibited.

REVERSER INOPERATIVE

Charts are valid for reversers inoperative.

ENGINE ANTI-ICE

Charts are based on Engine Anti-ice ON.

AIR CONDITIONING (A/C)

Unless otherwise stated, charts are based on PACKS OFF.

Applicable to: ALL

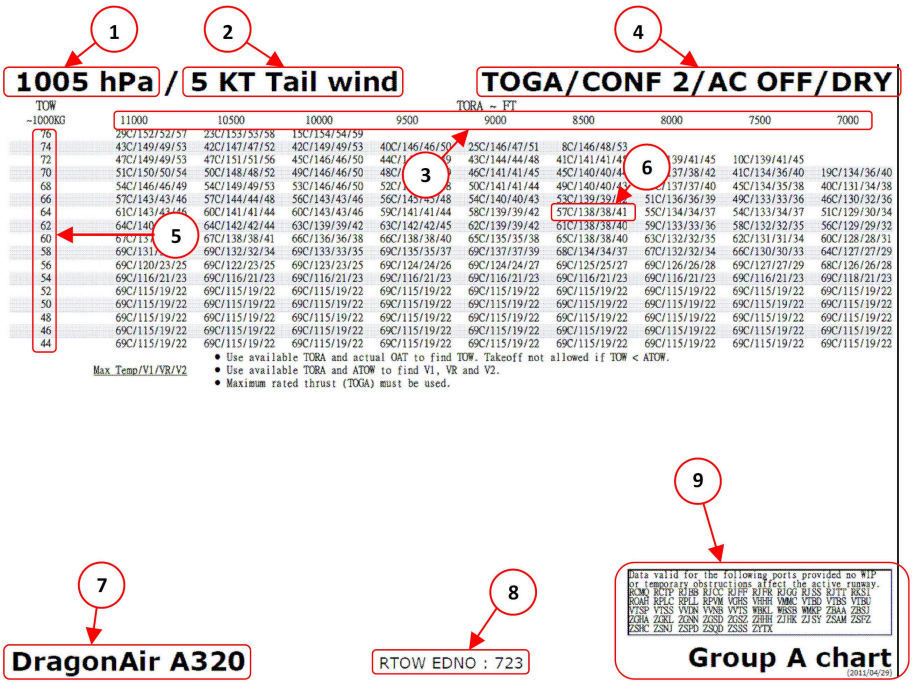
10

CHART GLOSSARY

1. Minimum QNH.
2. Maximum Tail Wind component.
3. TORA - Available TORA in 500 feet increments.
4. Takeoff configuration and surface conditions.
5. Takeoff Weight in units of 1 000 kg.
6. Maximum allowable ambient temperature/V1/VR/V2 for the Takeoff Weight and TORA.
7. Aircraft Type.
8. Edition number of the chart - to be entered in the ACARS CAR.
9. Group A Chart Label and list of included airports.

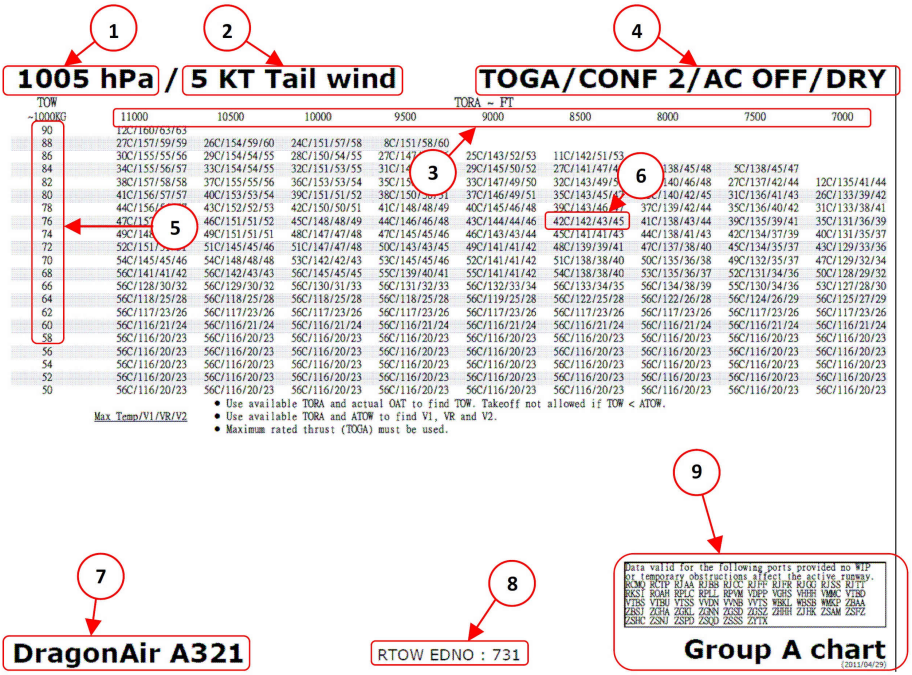
11 **Applicable to: ALL 320**

12



13 **Applicable to: ALL 321**

14



TOW ~1000KG	TORA ~ FT 11000	10500	10000	9500	9000	8500	8000	7500	7000
90	12C/160/63/63								
88	27C/157/59/59	26C/154/59/60	24C/151/57/58	8C/151/58/60					
86	30C/155/55/56	29C/154/54/55	28C/150/54/55	27C/147	25C/143/52/53	11C/142/51/53			
84	34C/155/56/57	33C/154/54/55	32C/151/53/55	31C/14	29C/145/50/52	27C/141/47/4	138/45/48	5C/138/45/47	
82	38C/157/58/58	37C/155/55/56	36C/153/53/54	35C/15	33C/147/49/50	32C/143/49/5	140/46/48	27C/137/42/44	12C/135/41/44
80	41C/156/57/57	40C/153/53/54	39C/151/51/52	38C/150/	37C/146/49/51	35C/143/45/4	140/42/45	31C/136/41/43	26C/133/39/42
78	44C/156/	43C/152/52/53	42C/150/50/51	41C/148/48/49	40C/145/46/48	39C/143/46/4	37C/139/42/44	35C/136/40/42	31C/133/38/41
76	47C/15	46C/151/51/52	45C/148/48/49	44C/146/46/48	43C/144/44/46	42C/142/43/45	41C/138/43/44	39C/135/39/41	35C/131/36/39
74	49C/14	49C/151/51/51	48C/147/47/48	47C/145/45/46	46C/143/43/44	45C/141/41/43	44C/138/41/43	42C/134/37/39	40C/131/35/37
72	52C/151/	51C/145/45/46	51C/147/47/48	50C/143/43/45	49C/141/41/42	48C/139/39/41	47C/137/38/40	45C/134/35/37	43C/129/33/36
70	54C/145/45/46	54C/148/48/48	53C/142/42/43	53C/145/45/46	52C/141/41/42	51C/138/38/40	50C/135/36/38	49C/132/35/37	47C/129/32/34
68	56C/141/41/42	56C/142/43/43	56C/145/45/45	55C/139/40/41	55C/141/41/42	54C/138/38/40	53C/135/36/37	52C/131/34/36	50C/128/29/32
66	56C/128/30/32	56C/129/30/32	56C/130/31/33	56C/131/32/33	56C/132/33/34	56C/133/34/35	56C/134/38/39	55C/130/34/36	53C/127/28/30
64	56C/118/25/28	56C/118/25/28	56C/118/25/28	56C/118/25/28	56C/119/25/28	56C/122/25/28	56C/122/26/28	56C/124/26/29	56C/125/27/29
62	56C/117/23/26	56C/117/23/26	56C/117/23/26	56C/117/23/26	56C/117/23/26	56C/117/23/26	56C/116/23/26	56C/117/23/26	56C/117/23/26
60	56C/116/21/24	56C/116/21/24	56C/116/21/24	56C/116/21/24	56C/116/21/24	56C/116/21/24	56C/116/21/24	56C/116/21/24	56C/116/21/24
58	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23
56	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23
54	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23
52	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23
50	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23	56C/116/20/23

Max Temp/V1/VR/V2

- Use available TORA and actual OAT to find TOW. Takeoff not allowed if TOW < ATOW.
- Use available TORA and ATOW to find V1, VR and V2.
- Maximum rated thrust (TOGA) must be used.

Data valid for the following ports provided no WIP or temporary obstructions affect the active runway.
RKNO RKTP RJAA RJBB RJCC RJFF RJFK RJGG RJSS RJTT
RKSI RJAH RPLC RPLL RPVM VDPP VGHS VHHH VMMC VTBD
VTBS VTBU VTSS VVDN VVNB VVTS WBKL WBSB WMKP ZBAA
ZBSJ ZGHA ZGKL ZGNN ZGSD ZGSZ ZHHH ZJSK ZSAM ZSFZ
ZSHC ZSNJ ZSPD ZSQD ZSSS ZYTX

Applicable to: ALL

15

TAKEOFF WEIGHT CALCULATION

1. Determine Available TORA by checking NAVTECH Aerodrome Chart (normally chart 10-1).
2. If the airport is not in Group A, check if the Group B chart is valid. If not, check if a Dedicated Simplified RTOW chart is available.
3. For method of calculation, refer to Example Chart.

Example Data:

- QNH = 1007
- Wind = 2 KT TWC
- OAT = 31 °C
- Runway surface = DRY
- Available TORA = 9 800 ft(round down to next 500 ft)
- ·Actual TOW (rounded up to next 2.0T)

16 **Applicable to: ALL 320**

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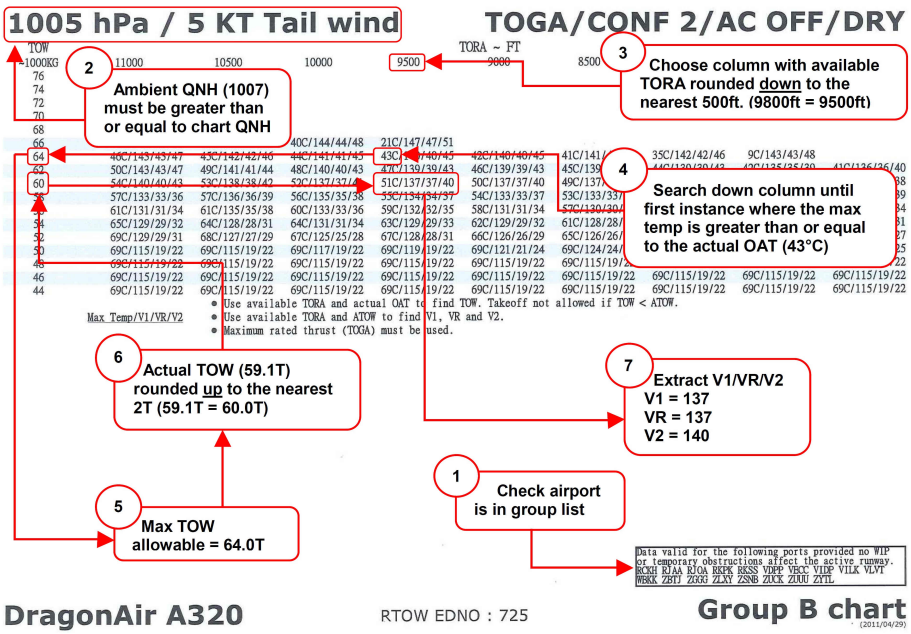

18 **Applicable to: ALL 321**

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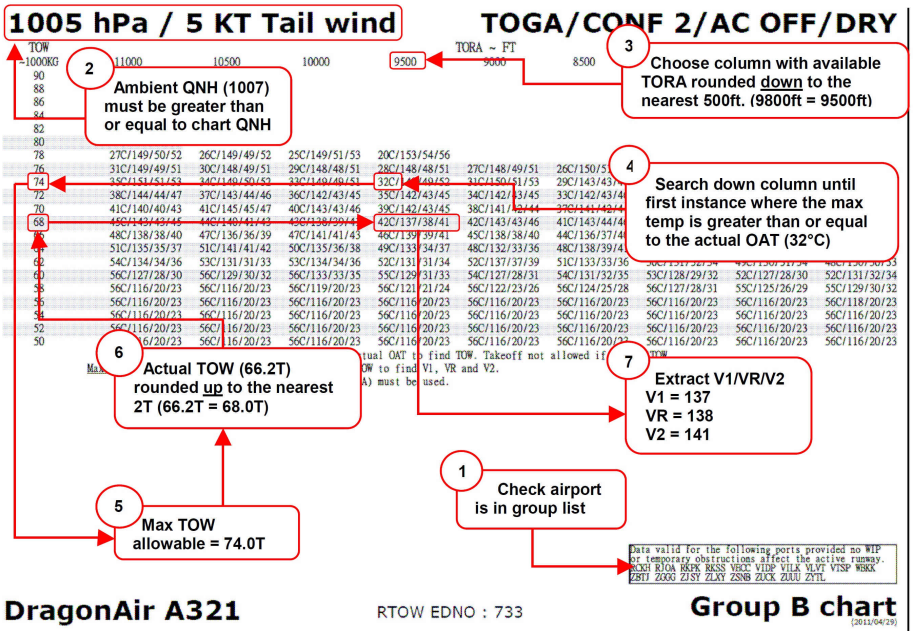


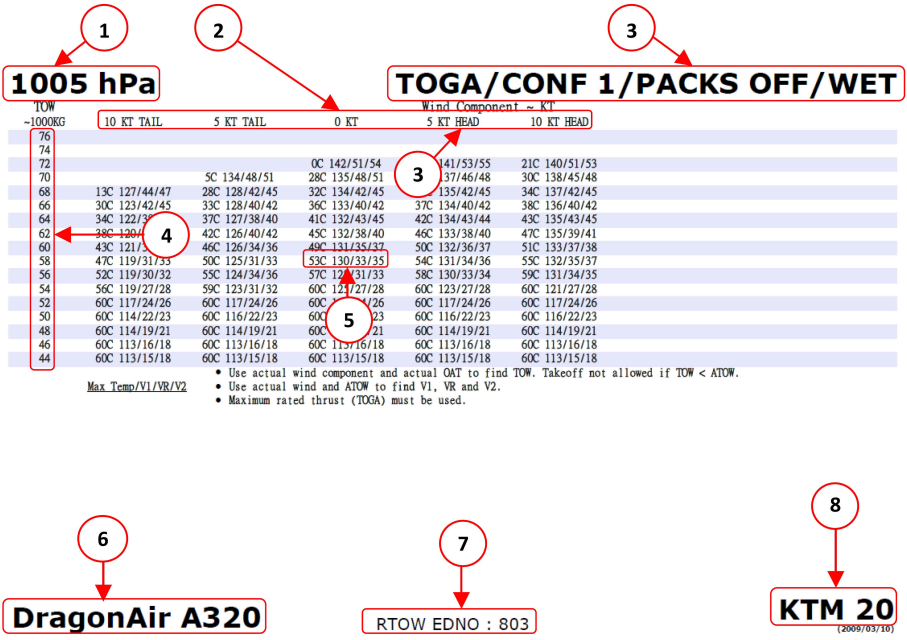
DEDICATED SIMPLIFIED RTOW CHARTS

Applicable to: ALL

20

CHART GLOSSARY

1. Minimum QNH.
2. Wind component.
3. Takeoff configuration and surface conditions.
4. Takeoff Weight in units of 2 000 kg.
5. Maximum allowable ambient temperature/V1/VR/V2 for the Takeoff Weight and wind component.
6. Aircraft Type.
7. Edition number of the chart - to be entered in the ACARS CAR.
8. Airport and runway label.



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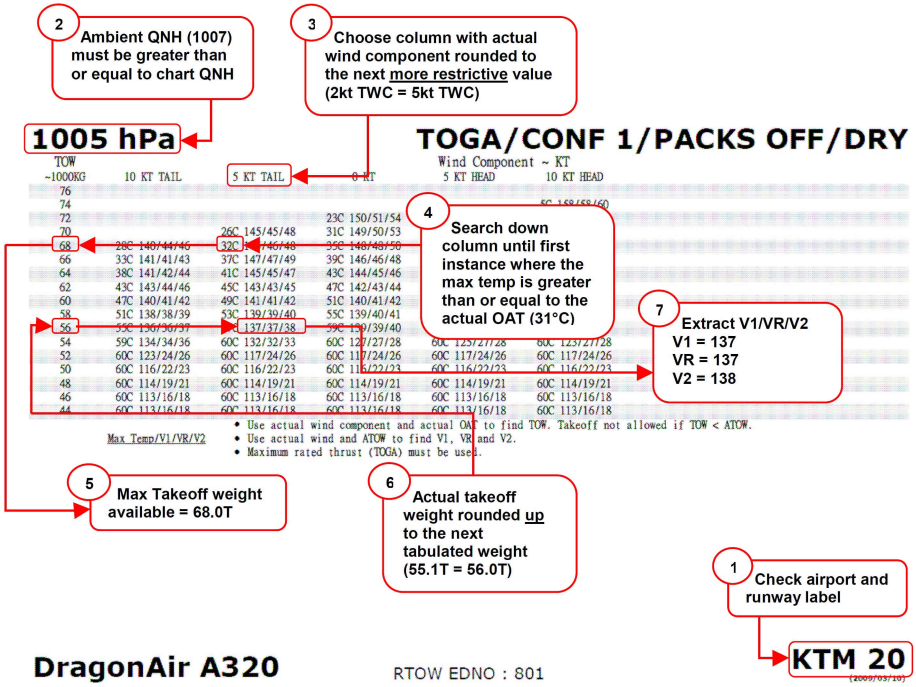
TAKEOFF WEIGHT CALCULATION

1. Check the airport and runway label.
2. For method of calculation, refer to Example Chart.

Example Data:

- QNH = 1007
- Wind = 2 KT HWC
- OAT = 31 °C
- Runway surface = WET
- Actual TOW 55.1T (round up to next published weight)



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SIMPLIFIED RTOW DATA CHECKING AND RECORDING

1. Simplified Take-off data may be calculated after receipt of the final ZFW.
2. Both crewmembers shall independently calculate the takeoff Data.
3. Data to be used for take-off shall be recorded on the Take-off Data form (or on CFP page 2 if no forms are available). Record the actual TOW rounded up to the next tabulated weight in the WEIGHT RANGE field on the form (e.g. ATOW 55.1 => record 56.0).
4. Both crew members shall independently check the data entered on the form.
5. Take-off data shall be checked, validated and inserted in the MCDU PERF TO page in accordance with normal procedures for an ACARS RTOW printout.

   Note: *Simplified Take-off data does not provide an "allowable weight band". If loadsheet TOW exceeds the ATOW on the Take-off Data form rounded up to the next published weight, new data shall be calculated.*

6. Insert Chart EDNO in the ACARS CAR.

SAMPLE TAKE-OFF DATA FORM

Reverse side: Web-RTOW Data Form

TAKE-OFF DATA FORM

☐ SMS / ☐ SIMPLIFIED CHART / ☐ PRINTER INOP

A/C REG B-..... KA..... DATE..... EDNO.....
PORT.....
TEMP..... .....HPA WIND..... RWY COND.....

AC: ON / OFF ENG / WING / ALL ANTI-ICE: ON / OFF
MEL / CDL / SP OPS .....
.....

FZFW .....
+ T/O FUEL .....

= ATOW ..... WEIGHT RANGE (..... - .....)

V1..... (VMIN.....) RWY.....
VR.....
V2..... CONF.....
TOGA / FLEX.....

EO ACC ..... AAL

SUPPLEMENTARY:
RTOW..... CONF..... TOGA / FLEX.....

SPEEDS LIMITED BY VMC

SPEEDS LIMITED BY VMC

Applicable to: ALL 321

1 All takeoff speeds have a minimum value limited by control. These minimum speeds are usually provided on each RTOW chart. If these speeds are not available, use the following conservative values. These speeds may be slightly higher than the minimum control speeds displayed on the RTOW chart.

MINIMUM V1 (KT IAS)

CONF	PRESSURE ALTITUDE (FT)											
	-1 000	0	1 000	2 000	3 000	4 000	5 000	6 000	8 000	9 200	12 000	14 100
1 + F	115	115	114	112	110	109	107	105	101	100	100	100
2	115	115	114	112	110	109	107	105	101	100	100	100
3	113	113	112	110	109	107	105	103	100	100	100	100

MINIMUM VR (KT IAS)

CONF	PRESSURE ALTITUDE (FT)											
	-1 000	0	1 000	2 000	3 000	4 000	5 000	6 000	8 000	9 200	12 000	14 100
1 + F	121	121	119	118	116	113	111	109	106	103	100	100
2	121	121	119	118	116	113	111	109	106	103	100	100
3	119	119	117	116	114	112	110	108	104	102	100	100

MINIMUM V2 (KT IAS)

CONF	PRESSURE ALTITUDE (FT)											
	-1 000	0	1 000	2 000	3 000	4 000	5 000	6 000	8 000	9 200	12 000	14 100
1 + F	126	126	124	122	120	117	115	113	109	106	100	100
2	125	125	123	121	119	117	114	112	108	106	100	100
3	125	125	123	121	119	117	115	112	108	106	100	100

SPEEDS LIMITED BY VMC

Applicable to: ALL 320

2 All takeoff speeds have a minimum value limited by control. These minimum speeds are usually provided on each RTOW chart. If these speeds are not available, use the following conservative values. These speeds may be slightly higher than the minimum control speeds displayed on the RTOW chart.

MINIMUM V1 (KT IAS)

CONF	PRESSURE ALTITUDE (FT)									
	-1 000	0	1 000	2 000	3 000	4 000	6 000	8 000	9 200	14 100
1 + F	116	116	115	115	113	112	109	107	105	99
2	114	114	113	113	111	110	107	105	103	97
3	114	113	113	112	111	110	107	104	103	97

MINIMUM VR (KT IAS)

CONF	PRESSURE ALTITUDE (FT)									
	-1 000	0	1 000	2 000	3 000	4 000	6 000	8 000	9 200	14 100
1 + F	121	120	120	119	118	116	113	111	109	101
2	119	118	118	117	116	115	111	109	107	99
3	119	118	117	117	115	114	111	108	107	99

MINIMUM V2 (KT IAS)

CONF	PRESSURE ALTITUDE (FT)									
	-1 000	0	1 000	2 000	3 000	4 000	6 000	8 000	9 200	14 100
1 + F	124	123	122	122	120	119	116	113	111	103
2	124	123	122	122	121	119	116	113	111	103
3	124	123	122	122	121	119	116	113	111	103

V2 LIMITED BY VMU/VMCA

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)

Applicable to: ALL 320

The following tables, one per configuration, provide the V2 limited by minimum unstick speed and minimum control speed in the air.

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)								
CONFIGURATION 1+F								
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)							
	45	50	55	60	65	70	75	80
-1000	124	124	129	135	140	146	151	156
0	123	123	129	135	140	146	151	156
1000	122	123	129	135	140	146	151	156
2000	122	123	129	135	140	146	151	156
3000	121	123	129	135	140	146	151	156
4000	119	123	129	135	140	146	151	156
5000	118	123	129	135	140	146	151	156
6000	118	123	129	135	140	146	151	156
7000	118	123	129	135	140	146	151	156
8000	118	123	129	135	140	146	151	156
9000	118	123	129	135	140	146	151	156

TAB M MD2QC69C A320[0096]232

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)								
CONFIGURATION 2								
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)							
	45	50	55	60	65	70	75	80
-1000	124	124	124	130	135	141	146	150
0	123	123	124	130	135	141	146	150
1000	122	122	124	130	135	141	146	150
2000	122	122	124	130	135	141	146	150
3000	121	121	124	130	135	141	146	150
4000	119	119	124	130	135	141	146	150
5000	118	118	124	130	135	141	146	150
6000	116	118	124	130	135	141	146	150
7000	115	118	124	130	135	141	146	150
8000	113	118	124	130	135	141	146	150
9000	112	118	124	130	135	141	146	150

TAB M MD2QC69C A320[0096]232

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)								
CONFIGURATION 3								
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)							
	45	50	55	60	65	70	75	80
-1000	124	124	124	124	129	135	139	144
0	123	123	123	124	129	135	139	144
1000	122	122	122	124	129	135	139	144
2000	122	122	122	124	129	135	139	144
3000	121	121	121	124	129	135	139	144
4000	119	119	119	124	129	135	139	144
5000	118	118	119	124	129	135	139	144
6000	116	116	119	124	129	135	139	144
7000	115	115	119	124	129	135	139	144
8000	113	114	119	124	129	135	139	144
9000	112	114	119	124	129	135	139	144

TAB M MD2QC69C A320|0096|232

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)

Applicable to: ALL 321

The following tables, one per configuration, provide the V2 limited by minimum unstick speed and minimum control speed in the air.

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)

CONFIGURATION 1+F

PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)										
	46	50	55	60	65	70	75	80	85	90	93
–1000	125	125	127	133	138	143	148	152	156	161	164
0	125	125	127	133	138	143	148	152	156	161	164
1000	123	123	127	133	138	143	148	152	156	161	164
2000	122	122	127	133	138	143	147	152	156	161	164
3000	119	121	127	132	138	143	147	152	156	162	164
4000	117	121	127	132	138	143	147	152	157	162	165
5000	116	121	127	132	138	143	147	152	157	162	165
6000	116	121	126	132	137	143	147	152	157	163	166
7000	116	121	126	132	137	143	148	153	158	163	166
8000	116	120	126	132	137	143	148	153	158	163	166
9000	115	120	126	132	137	143	148	153	158	164	167
10000	115	120	126	132	137	143	149	154	159	164	167
11000	115	120	126	132	138	144	149	154	159	164	167
12000	115	120	126	132	138	144	149	154	160	165	168
13000	115	120	126	132	138	144	150	155	160	165	168
14000	115	120	126	132	139	145	150	155	160	166	169

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)											
CONFIGURATION 2											
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)										
	46	50	55	60	65	70	75	80	85	90	93
–1000	124	124	124	125	130	135	139	143	147	151	154
0	124	124	124	125	130	135	139	143	147	151	154
1000	122	122	122	125	130	134	139	143	147	151	154
2000	121	121	121	125	130	134	139	143	147	152	154
3000	118	118	120	125	130	134	139	143	147	152	154
4000	116	116	119	125	130	134	139	143	147	152	155
5000	114	114	119	124	130	134	139	143	148	152	155
6000	112	114	119	124	129	134	139	143	148	152	155
7000	110	114	119	124	129	134	139	144	148	153	155
8000	109	114	119	124	129	134	139	144	148	153	156
9000	109	113	119	124	129	135	139	144	149	153	156
10000	109	113	119	124	130	135	140	144	149	153	156
11000	109	113	119	124	130	135	140	145	149	154	156
12000	109	113	119	124	130	135	140	145	149	154	157
13000	108	113	119	124	130	135	140	145	150	154	157
14000	108	113	119	125	130	136	141	145	150	155	157

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)											
CONFIGURATION 3											
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)										
	46	50	55	60	65	70	75	80	85	90	93
–1000	124	124	124	124	124	129	133	137	140	144	147
0	124	124	124	124	124	129	133	137	140	145	147
1000	123	123	123	123	124	129	133	137	141	145	147
2000	121	121	121	121	124	129	133	137	141	145	147
3000	119	119	119	119	124	129	133	137	141	145	148
4000	116	116	116	119	124	128	133	137	141	145	148
5000	114	114	114	119	124	128	133	137	141	146	148
6000	112	112	114	119	124	128	133	137	141	146	148
7000	110	110	114	119	124	129	133	137	142	146	148
8000	108	109	114	119	124	129	133	137	142	146	149
9000	106	108	113	119	124	129	133	138	142	146	149
10000	104	108	113	119	124	129	134	138	142	147	149
11000	104	108	113	119	124	129	134	138	142	147	149
12000	104	108	113	119	124	129	134	138	143	147	150
13000	103	108	113	119	124	130	134	139	143	147	150
14000	103	108	114	119	125	130	134	139	143	148	150

DEFINITIONS

Applicable to: ALL

[1]

DAMP	:	A runway is damp when the surface is not dry, but when the water on it does not give it a shiny appearance.
WET	:	A runway is considered as wet when the surface has a shiny appearance due to a thin layer of water. When this layer does not exceed 3 mm depth, there is no substantial risk of hydroplaning.
STANDING WATER	:	is caused by heavy rainfall and /or insufficient runway drainage with a depth of more than 3 mm.
SLUSH	:	is water saturated with snow which spatters when stepping firmly on it. It is encountered at temperatures around 5 °C and its density is approximately 0.85 kg/l (7.1 lb/US Gal).
WET SNOW	:	is a condition where, if compacted by hand, snow will stick together and tend to form a snowball. Its density is approximately 0.4 kg/l (3.35 lb/US Gal).
DRY SNOW	:	is a condition where snow can be blown if loose, or if compacted by hand, will fall apart again upon release. Its density is approximately 0.2 kg/l (1.7 lb/US Gal).
COMPACTED SNOW	:	is a condition where snow has been compressed (a typical friction coefficient is 0.2).
ICY	:	is a condition where the friction coefficient is 0.05 or below.

1. WET RUNWAY and EQUIVALENT

Equivalent of a wet runway is a runway covered with or less than :
- 3 mm (0.12 in) slush
- 3 mm (0.12 in) water
- 4 mm (0.16 in) wet snow
- 15 mm (0.59 in) dry snow

2. CONTAMINATED RUNWAY

An equivalence between depth of slush and snow has been defined :
- 12.7 mm (1/2 in) wet snow is equivalent to 6.3 mm (1/4 in) slush
- 25.4 mm (1 in) wet snow is equivalent to 12.7 mm (1/2 in) slush
- 50.8 mm (2 in) dry snow is equivalent to 6.3 mm (1/4 in) slush
- 101.6 mm (4 in) dry snow is equivalent to 12.7 mm (1/2 in) slush

Note: 1. On a damp runway no performance degradation should be considered.

2. It is not recommended to take off from a runway covered with more than 4 in of dry snow or 1 in of wet snow.

WET AND CONTAMINATED PERFORMANCE

Applicable to: ALL

2

The regulations for takeoff on a wet/contaminated runway require full credit to be taken for thrust reversers and the screen height to be reduced from the dry runway screen height of 35 ft to not less than 15 ft. This allows a lower V1 in order to improve the chance of stopping on a wet/contaminated runway.
Thrust reversers are not required for dispatch on wet/contaminated runways. However, if available, full reverse thrust must be used when rejecting take-off on a wet/contaminated runway.

ACARS RTOW and the associated backup is the only authorized method for performance calculation. Actual runway surface conditions should be entered directly into the program using the following codes:

- DRY or D for dry
- WET or W for wet
- WT6 for Standing Water 6.3 mm (1/4")
- WT12 for Standing Water 12.7 mm (1/2")
- SH6 for Slush 6.3 mm (1/4")
- SH12 for Slush 12.7 mm (1/2")
- CSNW for Compact Snow.

Enter "ALL" for a complete list of available runway surface codes.
Provided takeoff performance can be computed using ACARS RTOW, dispatch with the specified wet/contaminated runway conditions is permitted. However, the reduced crosswind tables must still be observed. *Refer to LIM-12*.

PERFORMANCE

FLIGHT PLANNING

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PER-FPL-FLP-FTK FUEL TANKERING

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Localization Title	Toc Index	ID	Reason
PER-FPL-FLP-QFP-10 INTRODUCTION	A	1	Addition of the engine model CFM56-5B/3 (Tech Insertion Program) in order to clarify the fuel consumption increase to be considered.

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GENERAL

Applicable to: ALL

Use this flight planning chapter when no precalculated flight plan is available.

It contains the following general graphs and tables :
- Maximum and optimum cruise altitudes for M .78 and long range speed
- Optimum altitude on short stage
- Ground mile to air mile conversion for M .78 and long range speed

The integrated range method includes the following tables :
- Integrated cruise tables for M .78 for flight levels from FL 290 to FL 390,
- Integrated cruise tables for long range speed for flight levels from FL 100 to FL 390,
- Climb, step climb and descent correction tables.

These tables allow the flight planning to be done segment by segment.
For calculation tables, *Refer to PER-FPL-FLP-CAT CALCULATION TABLE*. And for a comprehensive example to show how to use them, *Refer to PER-FPL-FLP-CAT EXAMPLE*.
For the quick determination method, *Refer to PER-FPL-FLP-QFP-40 FLIGHT PLANNING M.78* and *Refer to PER-FPL-FLP-QFP-50 FLIGHT PLANNING LRC*.

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MINIMUM RECOMMENDED FUEL REQUIREMENTS

Applicable to: ALL 320

The total fuel quantity required to fly a given sector is the sum of the following quantities:

TAXI FUEL

Quantity required for startup and taxi. Fuel calculation is based on a consumption of 11.5 kg/min or 25 lb/min
Average quantity (12 min) → 140 kg or 300 lb

TRIP FUEL

Fuel required from departure to destination includes the following quantities:
- Takeoff and climb at selected speed.
- Cruise at selected speed.
- Descent from cruising level to 1 500 ft above destination airport.
- Approach and landing. Fuel calculation is based on a consumption of 20 kg/min or 45 lb/min
  Average quantity (6 min IFR) →120 kg or 270 lb

RESERVE FUEL

This quantity includes :

"EN ROUTE" RESERVE FUEL (CONTINGENCY FUEL)

- According to national regulations and company policy (generally based on a percentage of trip fuel).

ALTERNATE FUEL

- Fuel required to fly from destination to alternate airport.

It includes go-around 100 kg or 220 lb, climb to cruising level, cruise at long range speed, descent and approach procedure.
80 kg or 180 lb for 4 min VFR

HOLDING FUEL

Calculation of holding fuel should take into account the altitude of the alternate and the landing weight at the alternate. To use holding charts *Refer to PER-HLD-GEN GENERAL*.
A conservative quantity corresponding to a 30 min holding at 1 500 ft above alternate airport elevation at "green dot" speed in the clean configuration is 1 200 kg or 2 700 lb

APU FUEL

During ground operations, APU fuel consumption is about 130 kg/h or 290 lb/h (Packs ON, 90 KVA load on APU GEN).

MINIMUM RECOMMENDED FUEL REQUIREMENTS

Applicable to: ALL 321

The total fuel quantity required to fly a given sector is the sum of the following quantities:

TAXI FUEL

Quantity required for startup and taxi. Fuel calculation is based on a consumption of 13.5 kg/min or 30 lb/min
Average quantity (12 min) → 160 kg or 360 lb

TRIP FUEL

Fuel required from departure to destination includes the following quantities:
- Takeoff and climb at selected speed.
- Cruise at selected speed.
- Descent from cruising level to 1 500 ft above destination airport.
- Approach and landing. Fuel calculation is based on a consumption of 23 kg/min or 50 lb/min
  Average quantity (6 min IFR) →140 kg or 310 lb

RESERVE FUEL

This quantity includes :

"EN ROUTE" RESERVE FUEL (CONTINGENCY FUEL)

- According to national regulations and company policy (generally based on a percentage of trip fuel).

ALTERNATE FUEL

Fuel required to fly from destination to alternate airport.
It includes go-around 120 kg or 270 lb, climb to cruising level, cruise at long range speed, descent and approach procedure.
100 kg or 220 lb for 4 min VFR

HOLDING FUEL

Calculation of holding fuel should take into account the altitude of the alternate and the landing weight at the alternate. To use holding charts *Refer to PER-HLD-GEN GENERAL*.
A conservative quantity corresponding to a 30 min holding at 1 500 ft above alternate airport elevation at "green dot" speed in the clean configuration is 1 450 kg or 3 200 lb

APU FUEL

During ground operations, APU fuel consumption is about 130 kg/h or 290 lb/h (Packs ON, 90 KVA load on APU GEN).

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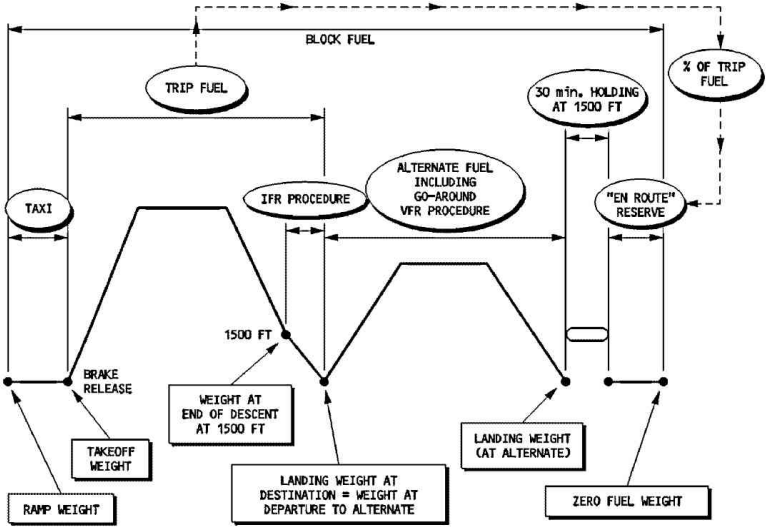
FLIGHT PLAN

Applicable to: ALL

When no precalculated flight plan is available, flight planning can be determined by using the tables given in this chapter.

Fuel policy will be the same as for precalculated flight plan.

The graph on the following page defines the different terms used in this chapter.



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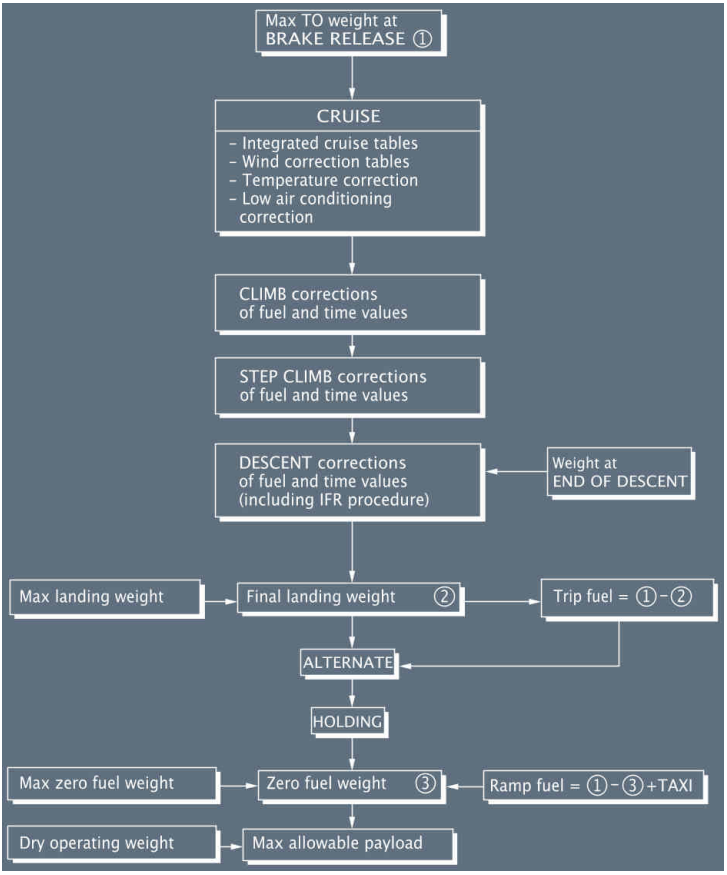
GENERAL

Applicable to: ALL

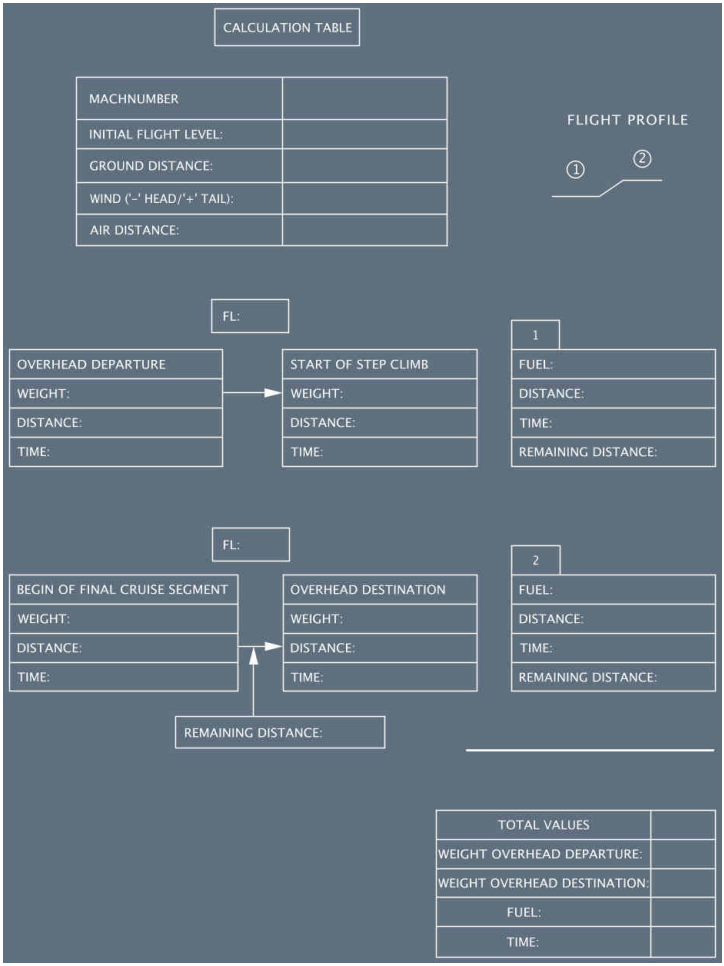


The following tables can be used for the flight planning.
The first table allows the planner to calculate fuel and time during cruise, with a possible step climb (*Refer to PER-FPL-FLP-CAT CALCULATION TABLE*).
The second table shows the fuel and time planning for the whole flight plan (*Refer to PER-FPL-FLP-CAT CALCULATION TABLE*).
At the end of the section an example shows how to use both tables for a given mission.

Note: - *Differences in fuel consumption during step climb sections will be taken into account in the calculation table (Refer to PER-FPL-FLP-CAT CALCULATION TABLE).*
- *To find optimum aircraft weight to proceed to next flight level (4 000 ft step) (Refer to PER-CRZ-ALT-10 CRUISE LEVEL CHARTS GENERAL).*
- *Integrated cruise tables are established for ISA conditions only. Corrections due to differences from ISA temperature are included in the calculation table (Refer to PER-FPL-FLP-CAT CALCULATION TABLE).*
- *Overhead departure weight is assumed to be equal to weight at brake release.*
- *Overhead destination weight must be entered in the calculation table (Refer to PER-FPL-FLP-CAT CALCULATION TABLE).*

CALCULATION TABLE

Applicable to: ALL



1	(1)	Max TO Weight at BRAKE RELEASE ▼	►				•	
2		WEIGHT Overhead Destination	►				•	
3		- Temperature Correction for CRUISE	-				•	
4		+ Correction for Low Air Conditioning	+				•	

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5		- CLIMB correction	-				•		
6		+ TO Altitude correction	+				•		
7		- STEP CLIMB correction	-				•		
8		= Corrected Weight Overhead Destination	=				•		
9		+ DESCENT correction (including 6 min IFR)	+				•		
10	(2)	Landing Weight at Destination	=				•		
11		- ALTERNATE Fuel	-				•		
12		= ALTERNATE Landing Weight	=				•		
13		- HOLDING	-				•		
14		= Weight at END OF HOLDING	=				•		
15		TRIP FUEL (1) - (2)			•		//////////////		
16		- "En Route" Reserve	-				•		
17	(3)	ZERO FUEL WEIGHT	=				•		
18		- OPERATING WEIGHT EMPTY	-				•		
19		= Max Allowable Payload	=				•		

BLOCK FUEL CALCULATION									
20		Required Fuel (1) - (3)	►				•		
21		+ Taxi	+				•		
22		= Block Fuel	=				•		

FLIGHT TIME CALCULATION (H. MIN)									
23		Time from integrated Cruise Tables	►			•			
24		+ CLIMB Correction	+			•			
25		+ DESCENT Correction (including 6 min IFR)	+			•			
26		= Flight Time	=			•			

Note: *Line 3 : temperature correction :*
0.015 (kg/°C/NM) x ΔISA (°C) x air distance (NM) or
0.033 (lb/°C/NM) x ΔISA (°C) x air distance (NM)

Line 6 : TO altitude correction :
0.5 (kg/1 000 kg /1 000 ft) x TOW (1 000 kg) x airport elevation (1 000 ft) or
0.5 (lb/1 000 lb /1 000 ft) x TOW (1 000 lb) x airport elevation (1 000 ft)

Line 10 : Check that landing weight at destination is lower than maximum landing weight.

Line 17 : Check that the zero fuel weight is lower than maximum zero fuel weight.

Line 22 : Check that the block fuel value is lower than maximum tank capacity.

EXAMPLE

Applicable to: ALL 320

DATA

- TO weight : 72 000 kg
- Ground distance to destination : 2 000 nm
- Wind : –50 kt (head wind)
- Selected initial FL : 350
- Mach number : M .78
- Temperature : ISA +10

DETERMINATION OF CRUISE FUEL AND TIME

A : Enter the chosen flight Mach number, flight level, ground distance to be covered and forecast windspeed in the calculation table (See CALCULATION TABLE).
Calculate the air distance (*Refer to PER-OPD-CON-AEO M.78*)
here : M .78, 50 kt head wind, 2 000 nm ground distance
→air distance : 2 248 nm

CRUISE TABLE FL350

B : Read from integrated cruise table (M .78, FL 350) the values for time and distance for a weight of 72 000 kg (*Refer to PER-FPL-FLP-ICR-20 INTEGRATED CRUISE - M.78 FL350*) :
→distance : 6 589 nm →time : 879 min

C : Read from *Refer to PER-CRZ-ALT-10 CRUISE LEVEL CHARTS GENERAL* the value for the optimum aircraft weight to proceed to FL 390 →62 000 kg

D : Enter integrated cruise table (M .78, FL 350) and read the values for a weight of 62 000 kg (begin of first step climb)
→distance : 4 703 nm →time : 628 min

E : Calculate the values for the first cruise segment :

Fuel	:	72 000 –62 000 = 10 000 kg
Distance	:	6 589 –4 703 = 1 886 nm
Time	:	879 –628 = 251 min
Remaining distance	:	2 248 –1 886 = 362 nm

CRUISE TABLE FL390

F : Read from integrated cruise table (M .78, FL 390) the values for time and distance for the weight of 62 000 kg (*Refer to PER-FPL-FLP-ICR-20 INTEGRATED CRUISE - M.78 FL390*)
→distance : 5 084 nm →time : 682 min

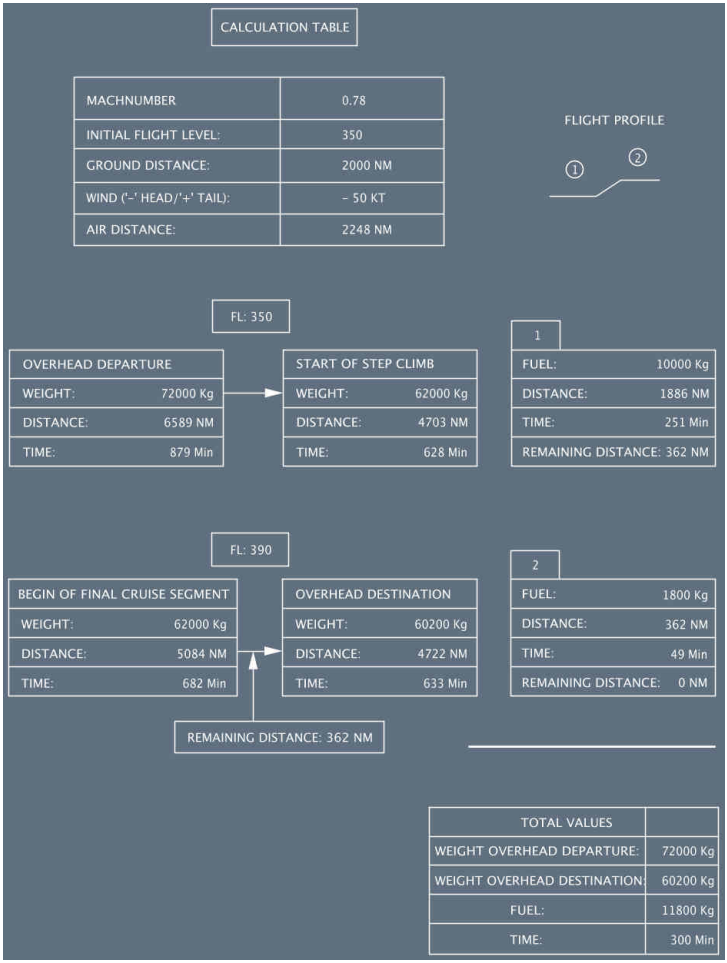
G : Subtract remaining distance : 5 084 –362 = 4 722 nm

H : Interpolate in integrated cruise table (M .78, FL 390) the weight and time values corresponding to the distance of 4 722 nm
→weight : 60 200 kg →time : 633 min

I : Calculate values for the second cruise segment :
Fuel : 62 000 –60 200 = 1 800 kg
Distance : 5 084–4 722 = 362 nm
Time : 682–633 = 49 min
Crosscheck that remaining air distance equals zero.

J : Fill in the final table with weight overhead departure (72 000 kg) and weight overhead destination (60 200 kg).

K : Calculate total values :
Fuel : 72 000 –60 200 = 11 800 kg
Time : 251 + 49 = 300 min = 5 h



DATA

- TO weight : 72 000 kg
- Ground distance to destination : 2 000 nm
- Wind : –50 kt
- Selected first flight level : FL 350
- M .78
- Temperature : ISA +10 along the whole flight profile

- Airport elevation : 1 500 ft
- Normal air conditioning

STEPS

1 : Fill in Max TO weight → 72 000 kg

2 : Enter the integrated cruise table corresponding to the chosen FL with TO weight at brake release point and calculate weight overhead destination. (See CALCULATION TABLE). Fill in → 60 200 kg

3 : Apply temperature correction for given air distance :
2 248 nm ×10 °C ×0.015/°C/NM = 337 kg (enter 400 kg into table)

4 : Correction for low air conditioning → here = 0

5 : Subtract climb correction for chosen FL (*Refer to PER-FPL-FLP-ICR-40 CLIMB CORRECTION*) → 1 050 kg

6 : Add TO altitude correction 0.5 x 72 x 1.5 = 54 kg (enter100 kg into table)

7 : Subtract value for step climb correction : 50 kg (enter 100 kg into table)

8 : Calculate corrected weight overhead destination → 58 700 kg

9 : Enter weight overhead destination and find descent correction (including 6 min IFR) (*Refer to PER-FPL-FLP-ICR-60 DESCENT CORRECTION*) → 300 kg

10 : Calculate landing weight at destination → 59 000 kg

11 : Subtract alternate fuel, e.g. : 100 nm at FL 100
(*Refer to PER-FPL-FLP-ALN-20 CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT*) → 984 kg
Landing weight at alternate → 59 000 - 984 = 58 016 kg
Correction due to deviation from reference landing weight at alternate (*Refer to PER-FPL-FLP-ALN-20 ALTERNATE PLANNING ISA*) → 6 x (58.0 - 55) = 18 kg
Corrected alternate fuel → 1 002 kg

12 : Calculate alternate landing weight → 58 000 kg

13 : Subtract holding fuel (*Refer to PER-HLD-GEN GENERAL*) → 1 098 kg

14 : Calculate weight at end of holding → 56 200 kg

15 : Calculate trip fuel → 13 000 kg

16 : Subtract “En Route” reserve (standard amount is 5 % of trip fuel) → 650 kg

17 : Calculate zero fuel weight → 56 200 kg

18-19: Subtract dry operating weight to obtain maximum allowable payload.

20-22: Calculate ramp fuel (*Refer to PER-FPL-GEN-MFR MINIMUM RECOMMENDED FUEL REQUIREMENTS* for taxi fuel).

23-26: Calculate flight time :

(See CALCULATION TABLE,
Refer to PER-FPL-FLP-ICR-40 CLIMB CORRECTION,
Refer to PER-FPL-FLP-ICR-60 DESCENT CORRECTION).

1	(1)	Max TO Weight at BRAKE RELEASE ▼	►		7	2	•	0
2		WEIGHT Overhead Destination	►		6	0	•	2
3		- Temperature Correction for CRUISE	-			0	•	4
4		+ Correction for Low Air Conditioning	+			0	•	0
5		- CLIMB correction	-			1	•	1
6		+ TO Altitude correction	+			0	•	1
7		- STEP CLIMB correction	-			0	•	1
8		= Corrected Weight Overhead Destination	=		5	8	•	7
9		+ DESCENT correction (including 6 min IFR)	+			0	•	3
10	(2)	Landing Weight at Destination	=		5	9	•	0
11		- ALTERNATE Fuel	-			1	•	0
12		= ALTERNATE Landing Weight	=		5	8	•	0
13		- HOLDING	-			1	•	1
14		= Weight at END OF HOLDING	=		5	6	•	9
15		TRIP FUEL (1) - (2) 1 3 • 0	//////////////					
16		- "En Route" Reserve	-			0	•	7
17	(3)	ZERO FUEL WEIGHT	=		5	6	•	2
18		- OPERATING WEIGHT EMPTY	-		4	1	•	3
19		= Max Allowable Payload	=		1	4	•	9

BLOCK FUEL CALCULATION								
20		Required Fuel (1) - (3)	►		1	5	•	8
21		+ Taxi	+			0	•	2
22		= Block Fuel	=		1	6	•	0

FLIGHT TIME CALCULATION (H. MIN)								
23		Time from integrated Cruise Tables	►		5	•	0	0
24		+ CLIMB Correction	+		0	•	0	5
25		+ DESCENT Correction (including 6 min IFR)	+		0	•	1	0
26		= Flight Time	=		5	•	1	5

Note: *Line 3 : temperature correction:*
0.015 (kg/°C/NM) x ΔISA (°C) x air distance (NM)
Line 6 : TO altitude correction:
0.5 (kg/1 000 kg/1 000 ft) x TOW (1 000 kg) x airport elevation (1 000 ft).

Line 10 : Check that landing weight at destination is lower than maximum landing weight.

Line 17 : Check that the zero fuel weight is lower than maximum zero fuel weight.

Line 22 : Check that the block fuel value is lower than maximum tank capacity.

EXAMPLE

Applicable to: ALL 321

DATA

- TO weight : 72 000 kg
- Ground distance to destination : 2 000 nm
- Wind : –50 kt (head wind)
- Selected initial FL : 350
- Mach number : M .78
- Temperature : ISA +10

DETERMINATION OF CRUISE FUEL AND TIME

A : Enter the chosen flight Mach number, flight level, ground distance to be covered and forecast windspeed in the calculation table (See CALCULATION TABLE).
Calculate the air distance (*Refer to PER-OPD-CON-AEO M.78*)
here : M .78, 50 kt head wind, 2 000 nm ground distance
→air distance : 2 248 nm

CRUISE TABLE FL350

B : Read from integrated cruise table (M .78, FL 350) the values for time and distance for a weight of 72 000 kg (*Refer to PER-FPL-FLP-ICR-20 INTEGRATED CRUISE - M.78 FL350*) :
→distance : 4 607 nm →time : 615 min

C : Read from *Refer to PER-CRZ-ALT-10 CRUISE LEVEL CHARTS GENERAL* the value for the optimum aircraft weight to proceed to FL 390 →68 000 kg

D : Enter integrated cruise table (M .78, FL 350) and read the values for a weight of 68 000 kg (begin of first step climb)
→distance : 3 900 nm →time : 521 min

E : Calculate the values for the first cruise segment :

Fuel	:	72 000 –68 000 = 4 000 kg
Distance	:	4 607 –3 900 = 707 nm
Time	:	615 –521 = 94 min
Remaining distance	:	2 248 –707 = 1 541 nm

CRUISE TABLE FL390

F : Read from integrated cruise table (M .78, FL 390) the values for time and distance for the weight of 68 000 kg (*Refer to PER-FPL-FLP-ICR-20 INTEGRATED CRUISE - M.78 FL390*)
→distance : 4 174 nm →time : 560 min

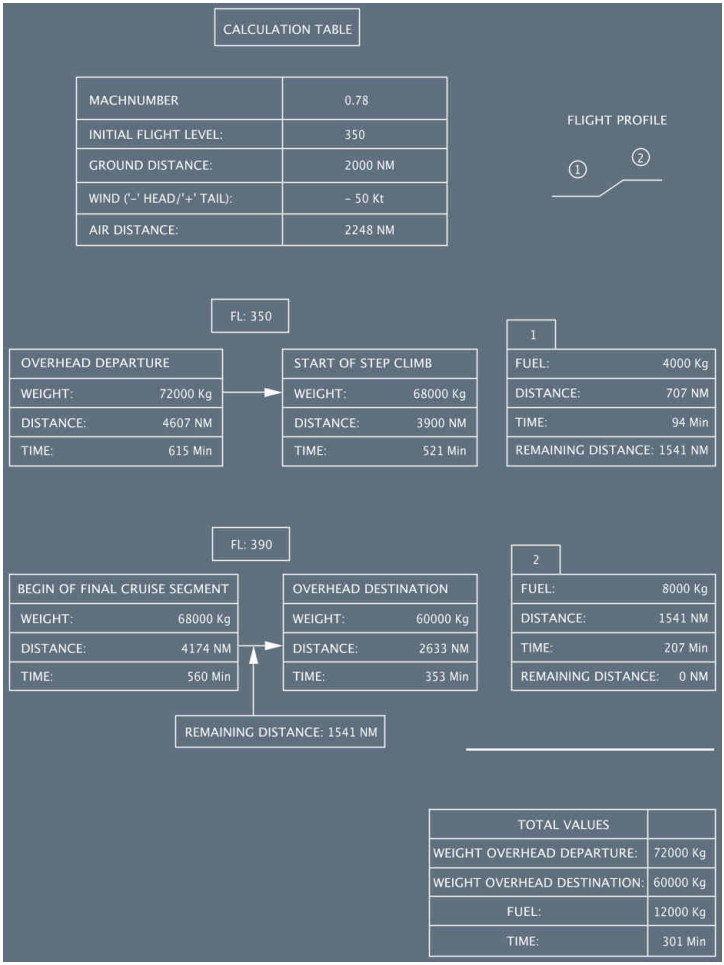
G : Subtract remaining distance : 4 174 –1 541 = 2 633 nm

H : Interpolate in integrated cruise table (M .78, FL 390) the weight and time values corresponding to the distance of 2 633 nm
→weight : 60 000 kg →time : 353 min

I : Calculate values for the second cruise segment :
Fuel : 68 000 –60 000 = 8 000 kg
Distance : 4 174 –2 633 = 1 541 nm
Time : 560 –353 = 207 min
Crosscheck that remaining air distance equals zero.

J : Fill in the final table with weight overhead departure (72 000 kg) and weight overhead destination (60 000 kg).

K : Calculate total values :
Fuel : 72 000 –60 000 = 12 000 kg
Time : 94 + 207 = 301 min = 5 h 01 min



DATA

- TO weight : 72 000 kg
- Ground distance to destination : 2 000 nm
- Wind : –50 kt
- Selected first flight level : FL 350
- M .78
- Temperature : ISA +10 along the whole flight profile

- Airport elevation : 1 500 ft
- Normal air conditioning

STEPS

1 : Fill in Max TO weight → 72 000 kg

2 : Enter the integrated cruise table corresponding to the chosen FL with TO weight at brake release point and calculate weight overhead destination. (See CALCULATION TABLE). Fill in → 60 000 kg

3 : Apply temperature correction for given air distance :
2 248 nm ×10 °C ×0.015/°C/NM = 337 kg (enter 400 kg into table)

4 : Correction for low air conditioning → here = 0

5 : Subtract climb correction for chosen FL (*Refer to PER-FPL-FLP-ICR-40 CLIMB CORRECTION*) → 1 000 kg

6 : Add TO altitude correction 0.5 × 72 × 1.5 = 54 kg (enter100 kg into table)

7 : Subtract value for step climb correction : 70 kg (enter 100 kg into table)

8 : Calculate corrected weight overhead destination → 58 600 kg

9 : Enter weight overhead destination and find descent correction (including 6 min IFR) (*Refer to PER-FPL-FLP-ICR-60 DESCENT CORRECTION*) → 200 kg

10 : Calculate landing weight at destination → 58 800 kg

11 : Subtract alternate fuel, e.g. : 100 nm at FL 100
(*Refer to PER-FPL-FLP-ALN-20 CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT*) → 1 098 kg
Landing weight at alternate → 58 800 - 1 098 = 57 702 kg
Correction due to deviation from reference landing weight at alternate (*Refer to PER-FPL-FLP-ALN-20 ALTERNATE PLANNING ISA*) → 6 × (57.7 - 60) = –13.8 kg
Corrected alternate fuel → 1 085 kg

12 : Calculate alternate landing weight → 57 700 kg

13 : Subtract holding fuel (*Refer to PER-HLD-GEN GENERAL*) → 1 200 kg

14 : Calculate weight at end of holding → 56 500 kg

15 : Calculate trip fuel → 13 200 kg

16 : Subtract “En Route” reserve (standard amount is 5 % of trip fuel) → 660 kg

17 : Calculate zero fuel weight → 55 800 kg

18-19: Subtract dry operating weight to obtain maximum allowable payload.

20-22: Calculate ramp fuel (*Refer to PER-FPL-GEN-MFR MINIMUM RECOMMENDED FUEL REQUIREMENTS* for taxi fuel).

23-26: Calculate flight time :

(See CALCULATION TABLE,
Refer to PER-FPL-FLP-ICR-40 CLIMB CORRECTION,
Refer to PER-FPL-FLP-ICR-60 DESCENT CORRECTION).

1	(1)	Max TO Weight at BRAKE RELEASE ▼	►		7	2	•	0
2		WEIGHT Overhead Destination	►		6	0	•	0
3		- Temperature Correction for CRUISE	-			0	•	4
4		+ Correction for Low Air Conditioning	+			0	•	0
5		- CLIMB correction	-			1	•	0
6		+ TO Altitude correction	+			0	•	1
7		- STEP CLIMB correction	-			0	•	1
8		= Corrected Weight Overhead Destination	=		5	8	•	6
9		+ DESCENT correction (including 6 min IFR)	+			0	•	2
10	(2)	Landing Weight at Destination	=		5	8	•	8
11		- ALTERNATE Fuel	-			1	•	1
12		= ALTERNATE Landing Weight	=		5	7	•	7
13		- HOLDING	-			1	•	2
14		= Weight at END OF HOLDING	=		5	6	•	5
15		TRIP FUEL (1) - (2) 1 3 • 2	//////////////					
16		- "En Route" Reserve	-			0	•	7
17	(3)	ZERO FUEL WEIGHT	=		5	5	•	8
18		- OPERATING WEIGHT EMPTY	-		4	8	•	5
19		= Max Allowable Payload	=			7	•	3

BLOCK FUEL CALCULATION								
20		Required Fuel (1) - (3)	►		1	6	•	2
21		+ Taxi	+			0	•	2
22		= Block Fuel	=		1	6	•	4

FLIGHT TIME CALCULATION (H. MIN)								
23		Time from integrated Cruise Tables	►		5	•	0	1
24		+ CLIMB Correction	+		0	•	0	4
25		+ DESCENT Correction (including 6 min IFR)	+		0	•	1	0
26		= Flight Time	=		5	•	1	5

Note: *Line 3 : temperature correction:*
0.015 (kg/°C/NM) x ΔISA (°C) x air distance (NM)
Line 6 : TO altitude correction:
0.5 (kg/1 000 kg/1 000 ft) x TOW (1 000 kg) x airport elevation (1 000 ft).

Line 10 : Check that landing weight at destination is lower than maximum landing weight.

Line 17 : Check that the zero fuel weight is lower than maximum zero fuel weight.

Line 22 : Check that the block fuel value is lower than maximum tank capacity.

OPTIMUM AND MAXIMUM ALTITUDES

DEFINITIONS

Applicable to: ALL

- Optimum altitude : The altitude at which the airplane covers the maximum distance per kilogram (pound) of fuel (best specific range). It depends on the actual weight and deviation from ISA.
- Maximum altitude is defined as the lower of :
  - maximum altitude at maximum cruise thrust in level flight and
  - maximum altitude at maximum climb thrust with 300 ft/min vertical speed.

Note: Definition of the maximum altitude in the FMGC is different (Refer to DSC-22_20-40-30 Other Computations - Recommended Maximum Altitude (REC MAX)).

CRUISE LEVEL CHARTS - GENERAL

Applicable to: ALL

These charts have been established for a center of gravity at 33 % MAC.
Maximum and optimum altitudes are given for different temperatures at long range speed and M 78.

Note: The n = 1.3 g (1.4 g) curve indicates the buffet margin.

CRUISE LEVEL CHARTS - OPTIMUM WEIGHT FOR 4000 FEET STEP CLIMB

Applicable to: ALL 320

STEP CLIMB FROM/TO	WEIGHT (1 000 kg/1 000 lb)					
	≤ISA + 10		ISA + 15		ISA + 20	
	LR	M 0.78	LR	M 0.78	LR	M 0.78
310/350	75/165	75/165	74/163	73/160	70/154	69/152
330/370	68/149	69/152	68/149	67/147	64/141	64/141
350/390	61/134	62/136	61/134	61/134	58/127	57/125

CRUISE LEVEL CHARTS - OPTIMUM WEIGHT FOR 4000 FEET STEP CLIMB

Applicable to: ALL 321

STEP CLIMB FROM/TO	WEIGHT (1 000 kg/1 000 lb)					
	≤ISA + 10		ISA + 15		ISA + 20	
	LR	M 0.78	LR	M 0.78	LR	M 0.78
310/350	82/180	82/180	80/176	80/176	77/169	76/167
330/370	74/163	75/165	73/160	73/160	69/152	69/152
350/390	67/147	68/149	66/145	66/145	63/138	63/138

CRUISE LEVEL CHARTS - BLEED CORRECTIONS

Applicable to: ALL 320

BLEED CORRECTIONS

	ENGINE ANTI ICE	TOTAL ANTI ICE
≤ISA + 10	Max Alt. : - 900 ft Opt Alt. : No corr.	Max Alt. : -1 700 ft Opt Alt. : No corr.
ISA + 15	Max Alt. : -1 400 ft Opt Alt. : No corr.	Max Alt. : -2 800 ft Opt Alt. : -1 400 ft
ISA + 20	Max Alt. : -1 700 ft Opt Alt. : -1 500 ft	Max Alt. : -2 800 ft Opt Alt. : -2 000 ft

CRUISE LEVEL CHARTS - BLEED CORRECTIONS

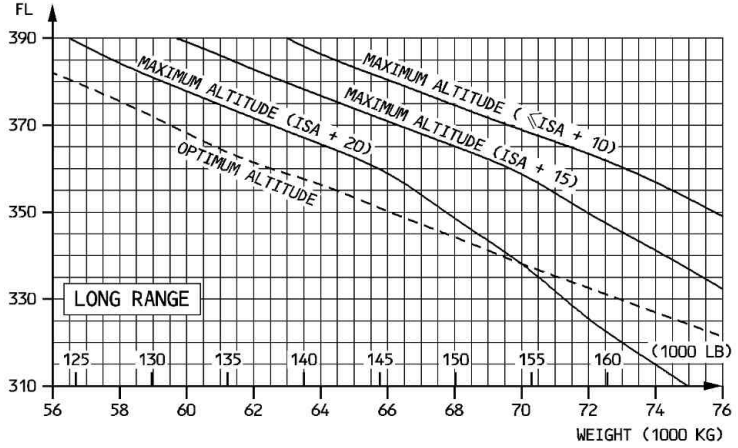
Applicable to: ALL 321

BLEED CORRECTIONS

	ENGINE ANTI ICE	TOTAL ANTI ICE
≤ISA + 10	Max Alt. : - 500 ft Opt Alt. : - 300 ft	Max Alt. : -1 100 ft Opt Alt. : - 300 ft
ISA + 15	Max Alt. : - 700 ft Opt Alt. : - 300 ft	Max Alt. : -1 500 ft Opt Alt. : - 600 ft
ISA + 20	Max Alt. : -1 000 ft Opt Alt. : -1 000 ft	Max Alt. : -2 300 ft Opt Alt. : -2 300 ft

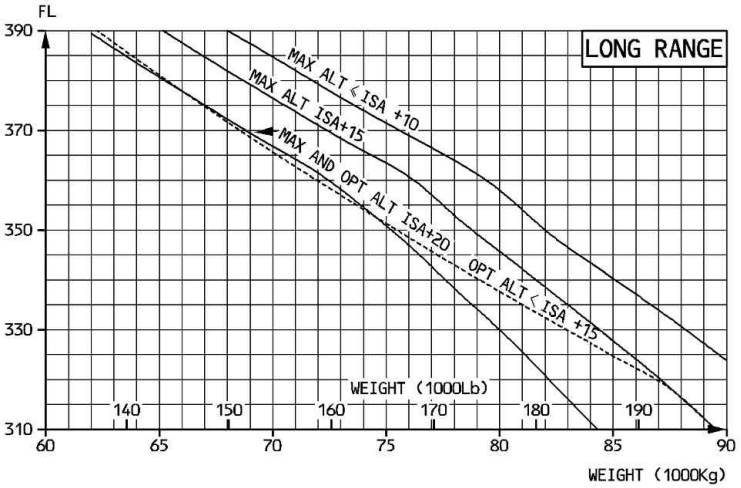
CRUISE LEVEL CHARTS - LONG RANGE SPEED

Applicable to: ALL 320



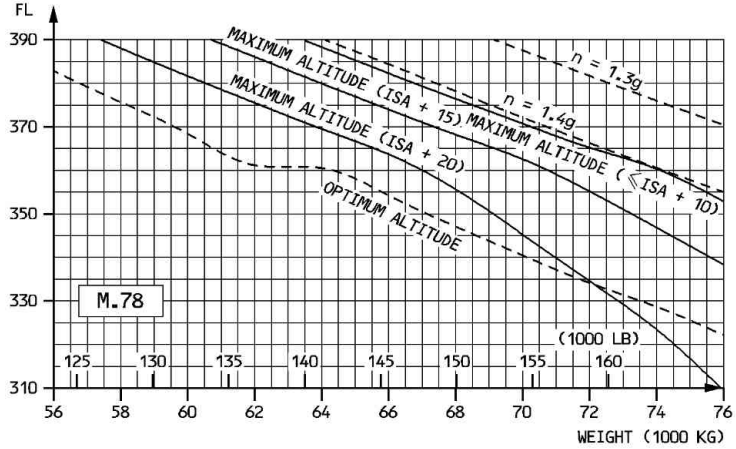
CRUISE LEVEL CHARTS - LONG RANGE SPEED

Applicable to: ALL 321



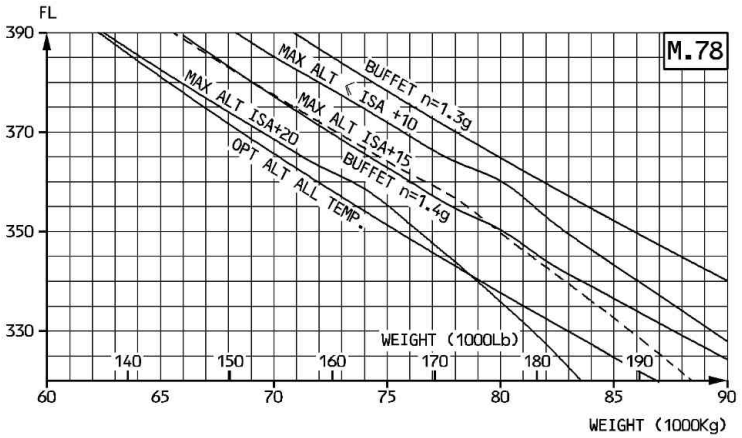
CRUISE LEVEL CHARTS - M.78

Applicable to: ALL 320



CRUISE LEVEL CHARTS - M.78

Applicable to: ALL 321



OPTIMUM ALTITUDE ON SHORT STAGE

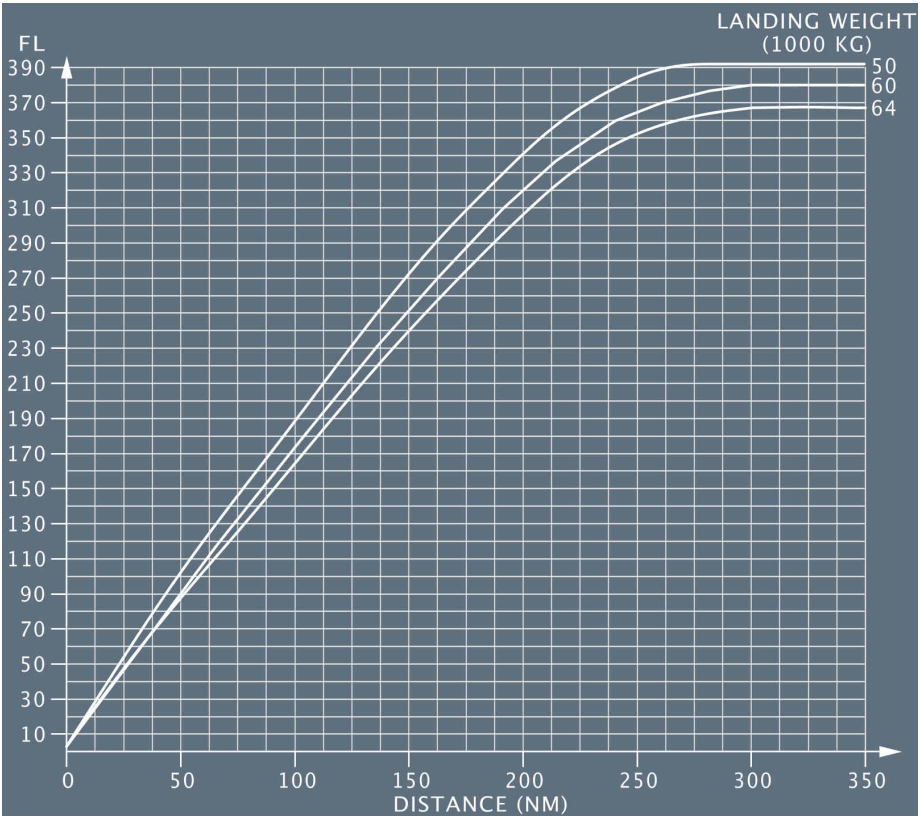
OPTIMUM ALTITUDE ON SHORT STAGE

Applicable to: ALL 320

According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.

It includes the following profiles:
- Takeoff
- Climb: 250 kt/300 kt/M .78
- Long range cruise (during at least 5 min)
- Descent: M .78/300 kt/250 kt
- Approach and landing

and it is established for:
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF


FL
390
370
350
330
310
290
270
250
230
210
190
170
150
130
110
90
70
50
30
10
0
50
100
150
200
250
300
350
DISTANCE (NM)
LANDING WEIGHT
(1000 KG)
50
60
64

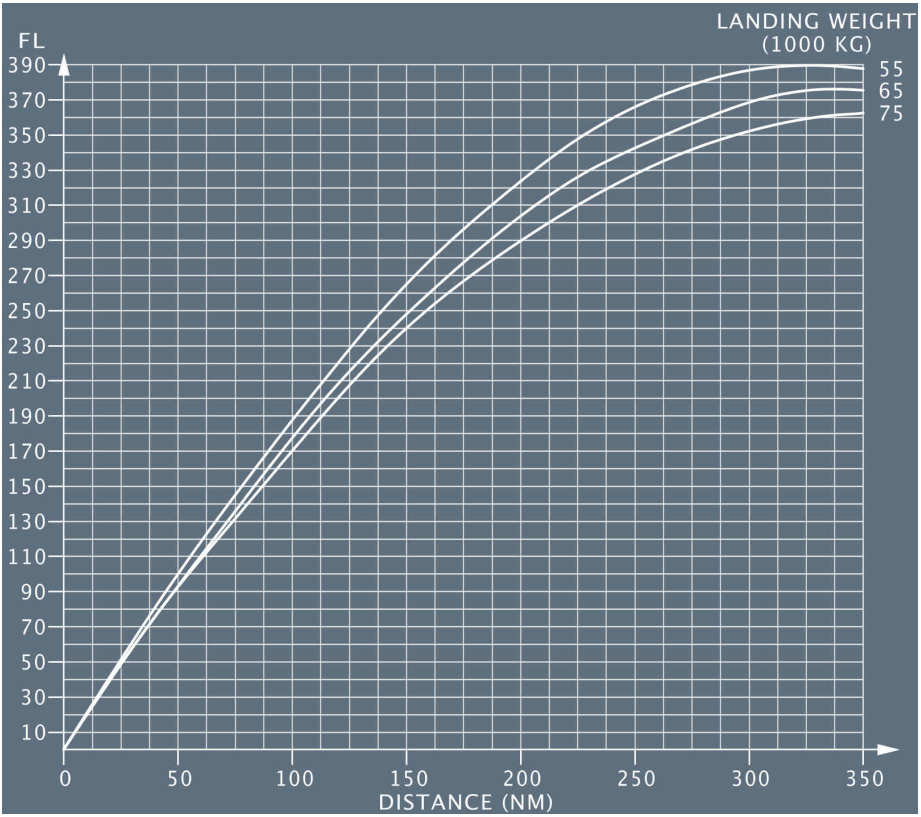
OPTIMUM ALTITUDE ON SHORT STAGE

Applicable to: ALL 321

According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.

It includes the following profiles:
- Takeoff
- Climb: 250 kt/300 kt/M .78
- Long range cruise (during at least 5 min)
- Descent: M .78/300 kt/250 kt
- Approach and landing

and it is established for:
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF


FL
390
370
350
330
310
290
270
250
230
210
190
170
150
130
110
90
70
50
30
10
LANDING WEIGHT
(1000 KG)
55
65
75
0
50
100
150
200
250
300
350
DISTANCE (NM)

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GENERAL

GENERAL

Applicable to: ALL

Integrated cruise tables allow the planner to calculate the cruise fuel consumption and the cruise time required to cover a given air distance.
In the tables, the difference between two gross weights represents the fuel consumption. The difference between the corresponding distances and times respectively represents the cruise distance covered and the cruise time for this fuel consumption.
Integrated cruise tables are established for M .78 at fixed levels from FL 290 to FL 390 and for long range speed at fixed levels from FL 100 to FL 390.
Corrections are given on separate tables to allow for step climbs and to take into account the climb and the descent phases.

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INTEGRATED CRUISE AT A GIVEN MACH NUMBER

INTEGRATED CRUISE - M.78 FL290

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%
TAS= 462KT

DISTANCE (NM)
TIME (MIN)

M.78 **FL290**

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40			2 0	38 5	75 10	111 14	148 19	184 24	221 29	257 33
42	294 38	330 43	367 48	403 52	440 57	476 62	513 67	549 71	586 76	622 81
44	658 86	695 90	731 95	767 100	804 104	840 109	876 114	913 119	949 123	985 128
46	1022 133	1058 137	1094 142	1130 147	1167 152	1203 156	1239 161	1275 166	1312 170	1348 175
48	1384 180	1420 185	1456 189	1492 194	1529 199	1565 203	1601 208	1637 213	1673 217	1709 222
50	1745 227	1781 231	1817 236	1853 241	1889 246	1925 250	1961 255	1997 260	2033 264	2069 269
52	2105 274	2141 278	2177 283	2213 288	2249 292	2285 297	2321 302	2356 306	2392 311	2428 316
54	2464 320	2500 325	2535 330	2571 334	2607 339	2643 343	2678 348	2714 353	2750 357	2785 362
56	2821 367	2856 371	2892 376	2928 380	2963 385	2999 390	3034 394	3070 399	3105 404	3141 408
58	3176 413	3212 417	3247 422	3282 427	3318 431	3353 436	3388 440	3424 445	3459 450	3494 454
60	3530 459	3565 463	3600 468	3635 472	3670 477	3705 482	3740 486	3775 491	3810 495	3845 500
62	3880 504	3915 509	3950 513	3985 518	4020 522	4055 527	4089 531	4124 536	4159 540	4193 545
64	4228 549	4262 554	4297 558	4331 563	4366 567	4400 572	4434 576	4469 581	4503 585	4537 590
66	4571 594	4605 599	4640 603	4674 607	4708 612	4742 616	4775 621	4809 625	4843 629	4877 634
68	4911 638	4944 643	4978 647	5012 651	5045 656	5079 660	5112 664	5146 669	5179 673	5213 677
70	5246 682	5279 686	5312 690	5346 695	5379 699	5412 703	5445 708	5478 712	5511 716	5544 721
72	5577 725	5610 729	5642 733	5675 738	5708 742	5741 746	5773 750	5806 755	5838 759	5871 763
74	5903 767	5936 771	5968 776	6000 780	6033 784	6065 788	6097 792	6129 797	6161 801	6193 805
76	6226 809	6257 813	6289 817	6321 822	6353 826	6385 830	6417 834	6448 838	6480 842	6512 846

LOW AIR CONDITIONING △FUEL = – 0.4 %
ENGINE ANTI ICE ON △FUEL = + 3 %
TOTAL ANTI ICE ON △FUEL = + 5.5 %

10F-08F0A320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 02901 .780 .000 .000 0 FCOM-N0-02-05-30-002-140

INTEGRATED CRUISE - M.78 FL290

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%
TAS= 462KT

DISTANCE (NM)
TIME (MIN)

M.78 FL290

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
48	0 0	34 4	69 9	103 13	137 18	171 22	205 27	240 31	274 36	308 40
50	342 44	376 49	410 53	444 58	478 62	512 67	546 71	580 75	614 80	648 84
52	682 89	716 93	750 97	784 102	818 106	852 111	885 115	919 119	953 124	986 128
54	1020 133	1054 137	1087 141	1121 146	1155 150	1188 154	1222 159	1255 163	1289 167	1322 172
56	1356 176	1389 181	1422 185	1456 189	1489 194	1522 198	1556 202	1589 206	1622 211	1655 215
58	1688 219	1721 224	1754 228	1788 232	1821 237	1854 241	1887 245	1919 249	1952 254	1985 258
60	2018 262	2051 267	2084 271	2116 275	2149 279	2182 284	2215 288	2247 292	2280 296	2312 301
62	2345 305	2377 309	2410 313	2442 317	2475 322	2507 326	2539 330	2572 334	2604 338	2636 343
64	2669 347	2701 351	2733 355	2765 359	2797 364	2829 368	2861 372	2893 376	2925 380	2957 384
66	2989 388	3021 393	3052 397	3084 401	3116 405	3148 409	3179 413	3211 417	3243 421	3274 426
68	3306 430	3337 434	3369 438	3400 442	3432 446	3463 450	3495 454	3526 458	3557 462	3589 466
70	3620 470	3651 475	3682 479	3713 483	3744 487	3776 491	3806 495	3837 499	3868 503	3899 507
72	3930 511	3961 515	3992 519	4023 523	4054 527	4084 531	4115 535	4146 539	4176 543	4207 547
74	4238 551	4268 555	4298 559	4329 563	4359 567	4390 571	4420 574	4450 578	4481 582	4511 586
76	4541 590	4571 594	4602 598	4632 602	4662 606	4692 610	4722 614	4752 618	4782 621	4812 625
78	4842 629	4871 633	4901 637	4931 641	4961 645	4991 649	5020 652	5050 656	5079 660	5109 664
80	5139 668	5168 672	5197 675	5227 679	5256 683	5286 687	5315 691	5344 695	5373 698	5403 702
82	5432 706	5461 710	5490 714	5519 717	5548 721	5577 725	5606 729	5635 732	5664 736	5693 740
84	5722 744	5751 747	5779 751	5808 755	5837 759	5865 762	5894 766	5922 770	5951 773	5979 777
86	6008 781	6036 785	6065 788	6093 792	6121 796	6150 799	6178 803	6206 807	6234 810	6262 814
88	6291 818	6319 821	6347 825	6375 828	6403 832	6430 836	6458 839	6486 843	6514 847	6542 850

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1 0 0 0 00 02901 780 000 000 0 FCOM-N0-02-05-30-002-158

INTEGRATED CRUISE - M.78 FL310

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%
TAS= 458KT

DISTANCE (NM)
TIME (MIN)

M.78 FL310

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40			2 0	42 5	81 11	121 16	160 21	200 26	239 31	279 37
42	318 42	358 47	397 52	437 57	476 62	515 68	555 73	594 78	634 83	673 88
44	712 93	752 99	791 104	830 109	870 114	909 119	948 124	987 129	1027 135	1066 140
46	1105 145	1144 150	1184 155	1223 160	1262 165	1301 171	1340 176	1379 181	1418 186	1458 191
48	1497 196	1536 201	1575 206	1614 212	1653 217	1692 222	1731 227	1770 232	1808 237	1847 242
50	1886 247	1925 252	1964 257	2003 263	2042 268	2080 273	2119 278	2158 283	2197 288	2235 293
52	2274 298	2313 303	2351 308	2390 313	2429 318	2467 323	2506 328	2544 334	2583 339	2621 344
54	2660 349	2698 354	2736 359	2775 364	2813 369	2852 374	2890 379	2928 384	2966 389	3004 394
56	3043 399	3081 404	3119 409	3157 414	3195 419	3233 424	3270 429	3308 434	3346 439	3384 444
58	3422 449	3459 453	3497 458	3534 463	3572 468	3609 473	3647 478	3684 483	3721 488	3759 493
60	3796 498	3833 503	3870 507	3907 512	3944 517	3981 522	4018 527	4055 532	4092 536	4129 541
62	4166 546	4202 551	4239 556	4275 560	4312 565	4348 570	4385 575	4421 580	4457 584	4494 589
64	4530 594	4566 599	4602 603	4638 608	4674 613	4711 618	4746 622	4782 627	4818 632	4854 636
66	4890 641	4925 646	4961 650	4996 655	5032 660	5067 664	5103 669	5138 674	5173 678	5208 683
68	5244 687	5279 692	5314 697	5349 701	5384 706	5419 710	5454 715	5488 720	5523 724	5558 729
70	5593 733	5627 738	5662 742	5696 747	5731 751	5765 756	5800 760	5834 765	5868 769	5903 774
72	5937 778	5971 783	6005 787	6039 792	6073 796	6107 801	6141 805	6175 809	6209 814	6242 818
74	6276 823	6310 827	6343 832	6377 836	6411 840	6444 845	6477 849	6511 854	6544 858	6577 862
76	6611 867	6644 871	6677 875	6710 880	6743 884	6776 888	6809 893	6842 897	6875 901	6907 906

LOW AIR CONDITIONING △FUEL = − 0.4 %

ENGINE ANTI ICE ON △FUEL = + 3 %

TOTAL ANTI ICE ON △FUEL = + 5.5 %

10F -08F0A320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03101 .780 .000 .000 0 FCOM-N0-02-05-30-003-140

INTEGRATED CRUISE - M.78 FL310

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%
TAS= 458KT

DISTANCE (NM)
TIME (MIN)

M.78 FL310

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
48	0 0	37 5	74 10	110 14	147 19	184 24	220 29	257 34	294 38	330 43
50	367 48	403 53	440 58	476 62	513 67	549 72	585 77	622 82	658 86	694 91
52	731 96	767 101	803 105	839 110	875 115	911 119	947 124	983 129	1019 134	1055 138
54	1091 143	1127 148	1163 152	1199 157	1234 162	1270 167	1306 171	1341 176	1377 181	1413 185
56	1448 190	1484 194	1519 199	1554 204	1590 208	1625 213	1660 218	1696 222	1731 227	1766 232
58	1801 236	1836 241	1871 245	1906 250	1941 255	1976 259	2011 264	2046 268	2081 273	2116 277
60	2151 282	2185 286	2220 291	2255 296	2289 300	2324 305	2358 309	2393 314	2427 318	2462 323
62	2496 327	2530 332	2565 336	2599 341	2633 345	2668 350	2702 354	2736 359	2770 363	2804 368
64	2838 372	2872 376	2906 381	2940 385	2973 390	3007 394	3041 399	3075 403	3108 407	3142 412
66	3176 416	3209 421	3243 425	3276 429	3310 434	3343 438	3376 443	3410 447	3443 451	3476 456
68	3509 460	3542 464	3576 469	3609 473	3642 477	3675 482	3708 486	3740 490	3773 495	3806 499
70	3839 503	3872 508	3904 512	3937 516	3970 520	4002 525	4035 529	4067 533	4100 537	4132 542
72	4165 546	4197 550	4229 554	4261 559	4294 563	4326 567	4358 571	4390 576	4422 580	4454 584
74	4486 588	4518 592	4550 596	4582 601	4614 605	4645 609	4677 613	4709 617	4740 621	4772 626
76	4803 630	4835 634	4866 638	4898 642	4929 646	4961 650	4992 654	5023 658	5054 663	5085 667
78	5116 671	5147 675	5178 679	5209 683	5240 687	5271 691	5302 695	5333 699	5364 703	5394 707
80	5425 711	5456 715	5486 719	5517 723	5547 727	5578 731	5608 735	5638 739	5669 743	5699 747
82	5729 751	5760 755	5790 759	5820 763	5850 767	5880 771	5910 775	5940 779	5970 783	5999 787
84	6029 790	6059 794	6089 798	6118 802	6148 806	6177 810	6207 814	6236 818	6266 821	6295 825
86	6324 829	6354 833	6383 837	6412 841	6441 844	6470 848	6499 852	6528 856	6557 860	6586 863
88	6615 867	6643 871	6672 875	6700 878	6729 882	6758 886	6786 890	6814 893	6843 897	6871 901

ECON AIR CONDITIONING △FUEL = − 0.6 %
ENGINE ANTI ICE ON △FUEL = + 2 %
TOTAL ANTI ICE ON △FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1 0 0 00 03101 780 000 000 0 FCOM-N0-02-05-30-003-158

INTEGRATED CRUISE - M.78 FL330

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%
TAS= 454KT

DISTANCE (NM)
TIME (MIN)

M.78 FL330

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40			2 0	45 6	88 12	131 17	173 23	216 29	259 34	302 40
42	344 46	387 51	430 57	472 62	515 68	558 74	600 79	643 85	686 91	728 96
44	771 102	813 108	856 113	898 119	941 124	983 130	1025 136	1068 141	1110 147	1153 152
46	1195 158	1237 164	1279 169	1322 175	1364 180	1406 186	1448 192	1490 197	1533 203	1575 208
48	1617 214	1659 219	1701 225	1743 230	1785 236	1827 242	1869 247	1910 253	1952 258	1994 264
50	2036 269	2078 275	2119 280	2161 286	2202 291	2244 297	2285 302	2327 308	2368 313	2410 319
52	2451 324	2492 330	2533 335	2574 340	2616 346	2657 351	2698 357	2738 362	2779 368	2820 373
54	2861 378	2901 384	2942 389	2983 394	3023 400	3064 405	3104 411	3144 416	3184 421	3225 426
56	3265 432	3305 437	3345 442	3385 448	3425 453	3465 458	3505 464	3544 469	3584 474	3624 479
58	3663 484	3703 490	3742 495	3781 500	3821 505	3860 511	3899 516	3938 521	3977 526	4016 531
60	4055 536	4094 541	4133 547	4172 552	4210 557	4249 562	4288 567	4326 572	4365 577	4403 582
62	4441 587	4480 592	4518 598	4556 603	4594 608	4632 613	4670 618	4708 623	4746 628	4784 633
64	4821 638	4859 643	4896 648	4934 653	4972 658	5009 663	5046 667	5084 672	5121 677	5158 682
66	5196 687	5233 692	5270 697	5307 702	5344 707	5381 712	5417 716	5454 721	5491 726	5527 731
68	5564 736	5601 741	5637 746	5673 750	5710 755	5746 760	5782 765	5819 770	5855 774	5891 779
70	5927 784	5963 789	5999 793	6034 798	6070 803	6106 808	6142 812	6177 817	6213 822	6248 826
72	6283 831	6319 836	6354 840	6389 845	6424 850	6459 854	6494 859	6528 863	6563 868	6598 873
74	6633 877	6667 882	6701 886	6735 891	6770 895	6804 900	6838 904	6871 909	6905 913	6939 918
76	6973 922	7006 927	7040 931	7073 935	7106 940	7140 944	7173 949	7206 953	7239 957	7272 962

LOW AIR CONDITIONING
△FUEL = – 0.4 %

ENGINE ANTI ICE ON
△FUEL = + 3 %

TOTAL ANTI ICE ON
△FUEL = + 5.5 %

10F -08F0A320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03301 .780 .000 .000 0 FCOM-N0-02-05-30-004-140

INTEGRATED CRUISE - M.78 FL330

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%
TAS= 454KT

DISTANCE (NM)
TIME (MIN)

M.78 **FL330**

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
48	0 0	39 5	78 10	118 16	157 21	196 26	235 31	274 36	313 41	352 47
50	391 52	430 57	469 62	508 67	547 72	585 77	624 83	663 88	701 93	740 98
52	778 103	817 108	855 113	894 118	932 123	970 128	1008 133	1047 138	1085 143	1123 149
54	1161 154	1199 159	1237 164	1275 169	1313 174	1351 179	1388 184	1426 189	1464 194	1501 199
56	1539 204	1576 209	1614 213	1651 218	1689 223	1726 228	1764 233	1801 238	1838 243	1875 248
58	1912 253	1949 258	1986 263	2023 268	2060 273	2097 277	2134 282	2171 287	2208 292	2245 297
60	2281 302	2318 307	2354 311	2391 316	2427 321	2464 326	2500 331	2536 335	2573 340	2609 345
62	2645 350	2681 355	2717 359	2753 364	2789 369	2826 374	2861 378	2897 383	2933 388	2969 393
64	3005 397	3040 402	3076 407	3111 411	3147 416	3182 421	3218 426	3253 430	3288 435	3324 440
66	3359 444	3394 449	3429 454	3464 458	3499 463	3534 467	3569 472	3604 477	3639 481	3674 486
68	3708 490	3743 495	3777 500	3812 504	3847 509	3881 513	3915 518	3950 522	3984 527	4018 531
70	4053 536	4087 540	4121 545	4155 550	4189 554	4223 559	4257 563	4290 567	4324 572	4358 576
72	4392 581	4425 585	4459 590	4492 594	4526 599	4560 603	4593 607	4626 612	4659 616	4693 621
74	4726 625	4759 629	4792 634	4825 638	4858 643	4891 647	4924 651	4956 656	4989 660	5022 664
76	5055 669	5087 673	5120 677	5152 681	5185 686	5217 690	5249 694	5281 699	5314 703	5346 707
78	5378 711	5410 715	5442 720	5474 724	5505 728	5537 732	5569 737	5600 741	5632 745	5664 749
80	5695 753	5726 757	5758 762	5789 766	5820 770	5852 774	5883 778	5914 782	5944 786	5975 790
82	6006 794	6037 798	6068 803	6098 807	6129 811	6160 815	6190 819	6220 823	6251 827	6281 831
84	6311 835	6341 839	6371 843	6401 847	6431 851	6461 855	6491 858	6520 862	6550 866	6579 870
86	6609 874	6638 878	6667 882	6696 886	6726 890	6755 893	6784 897	6813 901	6841 905	6870 909
88	6899 912	6927 916	6956 920	6984 924	7012 927	7041 931	7069 935	7097 939		

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1 0 0 00 03301 780 000 000 0 FCOM-N0-02-05-30-004-158

INTEGRATED CRUISE - M.78 FL350

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%
TAS= 450KT

DISTANCE (NM)
TIME (MIN)

M.78 FL350

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40			2 0	49 6	95 13	141 19	188 25	234 31	280 37	326 44
42	372 50	419 56	465 62	511 68	557 74	603 80	649 87	695 93	741 99	787 105
44	833 111	878 117	924 123	970 129	1016 136	1062 142	1107 148	1153 154	1198 160	1244 166
46	1289 172	1334 178	1380 184	1425 190	1470 196	1515 202	1560 208	1605 214	1650 220	1695 226
48	1740 232	1785 238	1829 244	1874 250	1919 256	1963 262	2008 268	2052 274	2096 280	2140 286
50	2185 292	2229 297	2273 303	2316 309	2360 315	2404 321	2448 327	2491 332	2535 338	2579 344
52	2622 350	2665 356	2709 361	2752 367	2795 373	2838 379	2881 385	2924 390	2967 396	3010 402
54	3053 407	3095 413	3138 419	3180 424	3223 430	3265 436	3307 441	3349 447	3392 453	3434 458
56	3476 464	3518 469	3559 475	3601 481	3643 486	3685 492	3726 497	3767 503	3809 508	3850 514
58	3892 519	3933 525	3974 530	4015 536	4056 541	4097 547	4138 552	4179 558	4219 563	4260 569
60	4301 574	4341 579	4382 585	4422 590	4462 596	4503 601	4543 606	4583 612	4623 617	4663 622
62	4703 628	4743 633	4783 638	4822 644	4862 649	4902 654	4941 659	4981 665	5020 670	5059 675
64	5099 680	5138 686	5177 691	5216 696	5255 701	5294 706	5332 712	5371 717	5409 722	5448 727
66	5487 732	5525 737	5563 742	5601 747	5639 752	5677 758	5714 763	5752 768	5790 773	5827 778
68	5865 783	5902 788	5939 793	5976 797	6013 802	6050 807	6086 812	6123 817	6159 822	6196 827
70	6232 832	6268 837	6304 841	6340 846	6376 851	6412 856	6448 860	6483 865	6519 870	6554 875
72	6589 879	6624 884	6659 889	6694 893	6729 898	6764 903	6798 907	6833 912	6867 916	6902 921
74	6936 926	6970 930	7004 935	7037 939	7071 944	7105 948	7138 953	7171 957	7204 961	7237 966
76	7270 970	7303 975	7336 979	7370 983	7403 988					

LOW AIR CONDITIONING △FUEL = − 0.4 %
ENGINE ANTI ICE ON △FUEL = + 3 %
TOTAL ANTI ICE ON △FUEL = + 5.5 %

10F -08F0A320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03501 .780 .000 .000 0 FCOM-N0-02-05-30-005-140

INTEGRATED CRUISE - M.78 FL350

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%
TAS= 450KT

DISTANCE (NM)
TIME (MIN)

M.78 **FL350**

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
48	0 0	42 6	83 11	125 17	167 22	209 28	250 33	291 39	333 44	374 50
50	416 55	457 61	498 66	539 72	580 77	622 83	662 88	703 94	744 99	785 105
52	826 110	867 116	907 121	948 126	988 132	1029 137	1069 143	1110 148	1150 153	1190 159
54	1231 164	1271 170	1311 175	1351 180	1391 186	1431 191	1471 196	1510 202	1550 207	1590 212
56	1630 217	1669 223	1709 228	1748 233	1788 239	1827 244	1866 249	1906 254	1945 260	1984 265
58	2023 270	2062 275	2101 280	2140 286	2179 291	2218 296	2256 301	2295 306	2333 311	2372 317
60	2411 322	2449 327	2487 332	2526 337	2564 342	2602 347	2640 352	2678 357	2716 362	2754 368
62	2792 373	2830 378	2868 383	2905 388	2943 393	2981 398	3018 403	3056 408	3093 413	3130 418
64	3168 423	3205 428	3242 433	3279 438	3316 443	3353 447	3390 452	3427 457	3464 462	3500 467
66	3537 472	3574 477	3610 482	3647 487	3683 492	3720 496	3756 501	3792 506	3828 511	3864 516
68	3900 521	3936 525	3972 530	4008 535	4044 540	4080 544	4115 549	4151 554	4186 559	4222 563
70	4257 568	4292 573	4328 578	4363 582	4398 587	4433 592	4468 596	4503 601	4537 606	4572 610
72	4607 615	4641 619	4676 624	4710 629	4745 633	4779 638	4813 642	4847 647	4882 651	4916 656
74	4950 661	4983 665	5017 670	5051 674	5085 679	5118 683	5152 687	5185 692	5218 696	5252 701
76	5285 705	5318 710	5351 714	5384 718	5416 723	5449 727	5482 732	5514 736	5547 740	5579 745
78	5612 749	5644 753	5676 757	5708 762	5740 766	5772 770	5803 774	5835 779	5866 783	5898 787
80	5929 791	5961 795	5992 800	6023 804	6054 808	6085 812	6115 816	6146 820	6177 824	6207 828
82	6238 832	6268 836	6298 840	6328 844	6358 848	6388 852				
84										
86										
88										

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1 0 0 0 00 03501 780 000 000 0 FCOM-N0-02-05-30-005-158

INTEGRATED CRUISE - M.78 FL370

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%
TAS= 447KT

DISTANCE (NM)
TIME (MIN)

M.78 FL370

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40			2 0	52 7	102 14	152 20	202 27	251 34	301 40	350 47
42	400 54	449 60	499 67	548 73	597 80	646 87	695 93	744 100	793 106	842 113
44	891 119	939 126	988 132	1036 139	1085 145	1133 152	1181 158	1229 165	1277 171	1325 178
46	1374 184	1421 191	1469 197	1517 203	1564 210	1612 216	1659 223	1706 229	1754 235	1801 242
48	1848 248	1895 254	1942 260	1988 267	2035 273	2082 279	2128 285	2175 292	2221 298	2268 304
50	2314 310	2360 316	2406 323	2452 329	2498 335	2544 341	2589 347	2635 353	2680 359	2726 366
52	2771 372	2816 378	2861 384	2906 390	2952 396	2997 402	3041 408	3086 414	3131 420	3176 426
54	3220 432	3265 438	3309 444	3353 450	3398 456	3442 462	3486 467	3530 473	3574 479	3618 485
56	3662 491	3705 497	3749 503	3792 509	3836 514	3879 520	3922 526	3965 532	4008 538	4051 543
58	4095 549	4137 555	4180 561	4222 566	4265 572	4308 578	4350 583	4392 589	4434 595	4476 600
60	4518 606	4560 612	4601 617	4643 623	4684 628	4726 634	4767 639	4807 645	4848 650	4889 656
62	4930 661	4970 667	5011 672	5051 677	5091 683	5131 688	5171 694	5211 699	5250 704	5290 709
64	5330 715	5369 720	5408 725	5447 730	5486 736	5525 741	5563 746	5601 751	5640 756	5678 761
66	5716 767	5754 772	5792 777	5830 782	5867 787	5905 792	5942 797	5979 802	6016 807	6053 812
68	6091 817	6127 822	6163 827	6200 831	6236 836	6273 841	6308 846	6344 851	6380 856	6415 860
70	6451 865	6487 870	6522 875	6558 879						
72										
74										
76										

LOW AIR CONDITIONING △FUEL = − 0.4 %
ENGINE ANTI ICE ON △FUEL = + 3 %
TOTAL ANTI ICE ON △FUEL = + 5.5 %

10F -08F0A320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03701 .780 .000 .000 0 FCOM-N0-02-05-30-006-140

INTEGRATED CRUISE - M.78 FL370

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%
TAS= 447KT

DISTANCE (NM)
TIME (MIN)

M.78 FL370

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
48	0 0	44 6	88 12	132 18	176 24	220 30	264 35	308 41	352 47	395 53
50	439 59	483 65	526 71	569 76	613 82	656 88	699 94	742 100	785 105	828 111
52	872 117	914 123	957 128	1000 134	1042 140	1085 146	1128 151	1170 157	1212 163	1255 168
54	1297 174	1339 180	1381 185	1423 191	1465 196	1507 202	1549 208	1590 213	1632 219	1674 224
56	1715 230	1757 236	1798 241	1839 247	1881 252	1922 258	1963 263	2004 269	2045 274	2086 280
58	2126 285	2167 291	2208 296	2248 302	2289 307	2329 312	2369 318	2410 323	2450 329	2490 334
60	2530 339	2570 345	2610 350	2650 355	2690 361	2729 366	2769 371	2808 377	2848 382	2887 387
62	2927 392	2966 398	3005 403	3044 408	3083 413	3122 419	3160 424	3199 429	3238 434	3276 439
64	3315 445	3353 450	3392 455	3430 460	3468 465	3506 470	3544 475	3582 480	3620 485	3657 491
66	3695 496	3733 501	3770 506	3807 511	3845 516	3882 521	3919 526	3956 531	3993 535	4030 540
68	4067 545	4103 550	4140 555	4176 560	4212 565	4249 570	4285 575	4321 579	4357 584	4393 589
70	4429 594	4464 599	4499 603	4535 608	4570 613	4606 618	4641 622	4675 627	4710 632	4745 636
72	4780 641	4814 646	4849 650	4883 655	4917 659	4952 664	4985 669	5019 673	5053 678	5087 682
74	5120 687	5154 691	5187 696	5220 700	5253 704	5286 709	5318 713	5351 718	5383 722	5416 726
76	5448 731	5480 735	5513 739							
78										
80										
82										
84										
86										
88										

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1 0 0 0 00 03701 780 000 000 0 FCOM-N0-02-05-30-006-158

INTEGRATED CRUISE - M.78 FL390

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%
TAS= 447KT

DISTANCE (NM)
TIME (MIN)

M.78 FL390

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
40			3 0	55 7	108 14	161 22	213 29	265 36	317 43	370 50
42	422 57	474 64	526 70	577 77	629 84	681 91	732 98	784 105	835 112	886 119
44	937 126	988 133	1039 139	1090 146	1140 153	1191 160	1241 166	1292 173	1342 180	1392 187
46	1442 193	1492 200	1542 207	1592 213	1642 220	1691 227	1741 233	1790 240	1839 247	1888 253
48	1938 260	1987 266	2035 273	2084 280	2133 286	2182 293	2230 299	2279 306	2327 312	2375 319
50	2424 325	2472 331	2519 338	2567 344	2615 351	2663 357	2710 363	2758 370	2805 376	2853 383
52	2900 389	2947 395	2994 401	3040 408	3087 414	3134 420	3180 427	3227 433	3273 439	3319 445
54	3366 451	3411 457	3457 464	3502 470	3548 476	3593 482	3638 488	3683 494	3728 500	3773 506
56	3818 512	3862 518	3906 524	3950 530	3994 536	4038 542	4081 547	4125 553	4168 559	4211 565
58	4255 571	4297 576	4340 582	4383 588	4425 593	4468 599	4510 605	4551 610	4593 616	4635 622
60	4677 627	4718 633	4759 638	4800 644	4841 649	4883 655	4923 660	4963 666	5004 671	5044 676
62	5084 682	5123 687	5163 692	5202 698	5241 703	5280 708	5320 713	5359 719	5398 724	
64										
66										
68										
70										
72										
74										
76										

LOW AIR CONDITIONING △FUEL = − 0.4 %
ENGINE ANTI ICE ON △FUEL = + 3 %
TOTAL ANTI ICE ON △FUEL = + 5.5 %

10F -08F0A320-232 IAE V2527-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03901 .780 .000 .000 0 FCOM-N0-02-05-30-007-140

INTEGRATED CRUISE - M.78 FL390

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%
TAS= 447KT

DISTANCE (NM)
TIME (MIN)

M.78 FL390

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8
48	0 0	46 6	93 12	139 19	185 25	231 31	277 37	323 43	369 49	415 56
50	461 62	506 68	551 74	597 80	642 86	688 92	733 98	778 104	822 110	867 116
52	912 122	957 128	1001 134	1046 140	1091 146	1135 152	1179 158	1223 164	1267 170	1312 176
54	1356 182	1399 188	1443 194	1487 199	1530 205	1574 211	1617 217	1660 223	1704 228	1747 234
56	1790 240	1833 246	1875 252	1918 257	1961 263	2004 269	2046 274	2088 280	2130 286	2173 291
58	2215 297	2257 303	2298 308	2340 314	2382 319	2424 325	2465 331	2506 336	2547 342	2589 347
60	2630 353	2671 358	2711 364	2752 369	2793 375	2833 380	2874 385	2914 391	2954 396	2994 402
62	3034 407	3074 412	3114 418	3153 423	3193 428	3232 434	3271 439	3310 444	3349 449	3388 454
64	3427 460	3466 465	3504 470	3542 475	3581 480	3619 485	3657 490	3694 495	3732 501	3770 506
66	3807 511	3844 516	3881 521	3918 526	3955 530	3992 535	4029 540	4065 545	4101 550	4138 555
68	4174 560	4209 565	4245 569	4280 574	4316 579	4352 584				
70										
72										
74										
76										
78										
80										
82										
84										
86										
88										

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1 0 .0 .00 03901 .780 .000 .000 0 FCOM-N0-02-05-30-007-158

INTEGRATED CRUISE AT LONG RANGE CRUISE SPEED

INTEGRATED CRUISE - LR FL100

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL100

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	32 7	62 14	92 21	121 28	151 34	181 41	211 48	262
42	241 55	270 61	300 68	329 75	359 81	389 88	418 95	447 101	477 108	506 115	265
44	535 121	564 128	593 134	623 141	652 147	681 154	710 160	739 166	767 173	796 179	268
46	825 186	854 192	882 198	911 205	940 211	968 217	997 223	1025 230	1053 236	1082 242	271
48	1110 248	1138 254	1166 261	1195 267	1223 273	1251 279	1279 285	1307 291	1334 297	1362 303	275
50	1390 309	1418 315	1445 321	1473 327	1501 332	1528 338	1556 344	1583 350	1610 356	1638 361	280
52	1665 367	1692 373	1719 379	1746 384	1773 390	1801 396	1827 401	1854 407	1881 412	1908 418	286
54	1935 423	1962 429	1988 434	2015 440	2041 445	2068 451	2094 456	2121 462	2147 467	2174 472	291
56	2200 478	2226 483	2253 488	2279 494	2305 499	2331 504	2357 509	2383 515	2409 520	2435 525	296
58	2461 530	2487 535	2512 540	2538 546	2564 551	2590 556	2615 561	2641 566	2666 571	2692 576	300
60	2717 581	2743 586	2768 591	2793 596	2819 601	2844 606	2869 611	2894 616	2919 620	2944 625	305
62	2969 630	2994 635	3019 640	3044 645	3069 649	3094 654	3119 659	3143 664	3168 668	3193 673	309
64	3217 678	3242 683	3266 687	3291 692	3315 697	3340 701	3364 706	3388 710	3413 715	3437 720	314
66	3461 724	3485 729	3509 733	3533 738	3557 742	3581 747	3605 751	3629 755	3653 760	3677 764	319
68	3701 769	3725 773	3748 777	3772 781	3796 786	3819 790	3843 794	3866 798	3890 803	3913 807	328
70	3937 811	3960 815	3983 819	4007 823	4030 827	4053 831	4077 835	4100 840	4123 844	4146 848	339
72	4169 852	4192 855	4215 859	4238 863	4261 867	4284 871	4307 875	4329 879	4352 883	4375 886	349
74	4398 890	4420 894	4443 898	4466 901	4488 905	4511 909	4533 913	4556 916	4578 920	4601 924	360
76	4624 927	4646 931	4668 935	4691 938	4713 942	4735 945	4758 949	4780 953	4802 956	4825 960	369

LOW AIR CONDITIONING
ΔFUEL = – 0.3 %

ENGINE ANTI ICE ON
ΔFUEL = + 2 %

TOTAL ANTI ICE ON
ΔFUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 01001 .990 .000 .000 0 FCOM-N0-02-05-30-008-140

INTEGRATED CRUISE - LR FL100

Applicable to: ALL 321

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR		FL100	
WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	25 5	50 11	76 16	101 22	126 27	151 32	176 38	201 43	226 48	277
50	251 54	276 59	300 64	325 70	350 75	375 80	399 85	424 90	449 95	473 101	282
52	498 106	522 111	546 116	571 121	595 126	620 131	644 136	668 141	692 146	717 151	288
54	741 156	765 161	789 166	813 171	837 175	861 180	885 185	909 190	932 195	956 200	294
56	980 204	1004 209	1028 214	1051 219	1075 223	1099 228	1122 233	1146 237	1169 242	1193 247	299
58	1216 251	1240 256	1263 260	1286 265	1310 270	1333 274	1356 279	1379 283	1402 288	1426 292	304
60	1449 297	1472 301	1495 306	1518 310	1541 315	1564 319	1587 323	1610 328	1633 332	1655 337	309
62	1678 341	1701 345	1724 350	1747 354	1769 358	1792 363	1815 367	1837 371	1860 375	1882 380	314
64	1905 384	1927 388	1950 392	1972 396	1995 401	2017 405	2039 409	2062 413	2084 417	2106 421	319
66	2128 425	2151 429	2173 433	2195 437	2217 441	2239 445	2261 449	2283 453	2305 457	2327 461	331
68	2349 465	2371 469	2393 472	2415 476	2437 480	2459 484	2480 488	2502 491	2524 495	2546 499	340
70	2567 503	2589 507	2611 510	2632 514	2654 518	2675 521	2697 525	2718 529	2740 532	2761 536	347
72	2783 540	2804 543	2826 547	2847 551	2868 554	2890 558	2911 561	2932 565	2954 569	2975 572	353
74	2996 576	3017 579	3039 583	3060 586	3081 590	3102 594	3123 597	3144 601	3165 604	3186 608	357
76	3207 611	3228 615	3249 618	3270 621	3291 625	3312 628	3333 632	3354 635	3375 639	3395 642	362
78	3416 645	3437 649	3458 652	3479 656	3499 659	3520 662	3541 666	3561 669	3582 672	3603 676	366
80	3623 679	3644 682	3664 686	3685 689	3705 692	3726 696	3746 699	3767 702	3787 706	3808 709	371
82	3828 712	3849 715	3869 719	3889 722	3910 725	3930 728	3950 732	3970 735	3991 738	4011 741	375
84	4031 744	4051 747	4072 750	4092 753	4112 756	4132 759	4153 762	4173 765	4193 768	4213 771	402
86	4233 774	4253 777	4273 780	4294 783	4314 786	4334 789	4354 792	4374 795	4394 798	4414 801	402
88	4434 804	4454 807	4474 810	4494 813	4514 816	4534 819	4554 822	4574 825	4594 828	4614 831	402
ECON AIR CONDITIONING △FUEL = – 0.6 %				ENGINE ANTI ICE ON △FUEL = + 2 %				TOTAL ANTI ICE ON △FUEL = + 5 %			

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 01001 .990 .000 .000 0 FCOM-N0-02-05-30-008-158

INTEGRATED CRUISE - LR FL120

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL120

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	33 7	64 15	96 22	127 29	158 36	189 43	221 50	265
42	252 57	283 64	314 70	345 77	376 84	407 91	437 98	468 105	498 112	529 118	268
44	560 125	590 132	620 138	651 145	681 152	712 158	742 165	772 172	802 178	832 185	272
46	862 191	892 198	921 204	951 210	981 217	1011 223	1040 229	1069 236	1099 242	1128 248	277
48	1158 255	1187 261	1216 267	1245 273	1275 279	1304 285	1333 291	1361 298	1390 304	1419 310	283
50	1448 316	1477 322	1505 328	1534 333	1563 339	1591 345	1620 351	1648 357	1676 363	1705 369	288
52	1733 374	1761 380	1789 386	1817 392	1845 397	1874 403	1901 409	1929 414	1957 420	1985 426	293
54	2013 431	2040 437	2068 442	2096 448	2123 453	2151 459	2178 464	2205 470	2233 475	2260 480	299
56	2287 486	2314 491	2342 496	2369 502	2396 507	2423 512	2450 518	2477 523	2503 528	2530 533	304
58	2557 539	2584 544	2610 549	2637 554	2663 559	2690 564	2716 569	2743 574	2769 580	2795 585	309
60	2822 590	2848 595	2874 600	2900 605	2926 610	2952 615	2978 619	3004 624	3030 629	3056 634	314
62	3082 639	3107 644	3133 649	3159 653	3184 658	3210 663	3235 667	3261 672	3286 677	3312 681	320
64	3337 686	3362 690	3388 695	3413 700	3438 704	3463 709	3488 713	3513 717	3538 722	3563 726	332
66	3588 731	3613 735	3638 739	3663 743	3687 748	3712 752	3737 756	3761 760	3786 765	3810 769	343
68	3835 773	3859 777	3884 781	3908 785	3933 789	3957 793	3981 797	4005 801	4030 805	4054 809	356
70	4078 813	4102 817	4126 821	4151 825	4175 829	4199 833	4223 837	4247 841	4271 845	4295 849	365
72	4319 852	4342 856	4366 860	4390 864	4414 868	4438 871	4461 875	4485 879	4509 882	4533 886	377
74	4556 890	4580 894	4604 897	4627 901	4651 905	4674 908	4698 912	4722 916	4745 919	4769 923	384
76	4792 927	4816 930	4839 934	4862 938	4886 941	4909 945	4933 948	4956 952	4979 956	5003 959	387

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.3 %	△FUEL = + 2 %	△FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 01201 .990 .000 .000 0 FCOM-N0-02-05-30-009-140

INTEGRATED CRUISE - LR FL120

Applicable to: ALL 321

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR		FL120	
WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	26 5	53 11	79 16	105 22	131 27	157 33	183 38	209 44	236 49	285
50	262 54	287 60	313 65	339 70	365 76	391 81	416 86	442 91	468 97	493 102	291
52	519 107	544 112	570 117	595 122	621 127	646 132	671 137	697 142	722 148	747 153	297
54	772 158	797 162	822 167	847 172	872 177	897 182	922 187	947 192	972 197	997 202	303
56	1022 207	1046 211	1071 216	1096 221	1120 226	1145 230	1170 235	1194 240	1219 245	1243 249	308
58	1268 254	1292 259	1316 263	1341 268	1365 273	1389 277	1413 282	1438 286	1462 291	1486 295	314
60	1510 300	1534 304	1558 309	1582 313	1606 318	1630 322	1654 326	1678 331	1702 335	1725 339	321
62	1749 344	1773 348	1797 352	1820 356	1844 361	1868 365	1891 369	1915 373	1938 377	1962 382	332
64	1985 386	2009 390	2032 394	2055 398	2079 402	2102 406	2125 410	2148 414	2172 418	2195 422	341
66	2218 426	2241 430	2264 434	2287 438	2310 442	2333 446	2356 450	2379 454	2402 458	2425 462	348
68	2448 466	2471 470	2494 473	2517 477	2539 481	2562 485	2585 489	2608 493	2630 496	2653 500	353
70	2676 504	2698 508	2721 512	2743 515	2766 519	2788 523	2811 527	2833 530	2856 534	2878 538	358
72	2901 542	2923 545	2945 549	2968 553	2990 556	3012 560	3034 564	3057 567	3079 571	3101 574	363
74	3123 578	3145 582	3168 585	3190 589	3212 593	3234 596	3256 600	3278 603	3300 607	3322 610	367
76	3344 614	3366 617	3387 621	3409 624	3431 628	3453 631	3475 635	3496 638	3518 642	3540 645	372
78	3562 649	3583 652	3605 656	3627 659	3648 663	3670 666	3691 669	3713 673	3734 676	3756 680	376
80	3777 683	3799 686	3821 690	3842 693	3864 696	3885 700	3907 703	3928 706	3950 710	3972 713	380
82	3993 716	4015 719	4036 723	4058 726	4080 729	4101 733	4123 736	4144 739	4166 743	4188 746	394
84	4209 749	4231 753	4252 756	4274 759	4295 762	4317 766	4339 769	4360 772	4382 776	4403 779	390
86	4424 782	4446 786	4467 789	4489 792	4510 796	4532 799	4553 802	4574 806	4596 809	4617 812	389
88	4638 815	4660 819	4681 822	4702 825	4724 828	4745 832	4766 835	4787 838	4808 842	4830 845	389
ECON AIR CONDITIONING △FUEL = – 0.6 %				ENGINE ANTI ICE ON △FUEL = + 2 %				TOTAL ANTI ICE ON △FUEL = + 5 %			

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 01201 .990 .000 .000 0 FCOM-N0-02-05-30-009-158

INTEGRATED CRUISE - LR FL150

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL150

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	35 8	69 15	102 22	135 30	168 37	202 44	235 51	271
42	268 59	301 66	333 73	366 80	399 87	432 94	464 101	497 108	529 115	562 121	277
44	594 128	626 135	658 142	690 149	722 155	755 162	786 169	818 175	850 182	882 189	283
46	913 195	945 202	976 208	1008 215	1039 221	1070 228	1102 234	1133 240	1164 247	1195 253	289
48	1226 259	1257 266	1287 272	1318 278	1349 284	1380 291	1410 297	1441 303	1471 309	1502 315	295
50	1532 321	1562 327	1592 333	1623 339	1653 345	1683 351	1713 357	1743 363	1772 369	1802 375	300
52	1832 380	1862 386	1891 392	1921 398	1950 404	1980 409	2009 415	2038 421	2067 426	2097 432	306
54	2126 438	2155 443	2184 449	2213 454	2241 460	2270 465	2299 471	2328 476	2356 481	2385 487	312
56	2414 492	2442 497	2470 503	2499 508	2527 513	2555 518	2584 523	2612 528	2640 534	2668 539	322
58	2696 544	2724 549	2751 554	2779 558	2807 563	2835 568	2862 573	2890 578	2918 583	2945 587	336
60	2973 592	3000 597	3027 601	3055 606	3082 611	3109 615	3136 620	3163 625	3191 629	3218 634	350
62	3245 638	3272 643	3299 647	3326 651	3353 656	3379 660	3406 665	3433 669	3460 673	3486 678	360
64	3513 682	3540 686	3566 690	3593 695	3620 699	3646 703	3673 707	3699 711	3726 716	3752 720	376
66	3779 724	3805 728	3831 732	3858 736	3884 741	3910 745	3937 749	3963 753	3989 757	4015 761	380
68	4042 765	4068 769	4094 774	4120 778	4146 782	4172 786	4199 790	4225 794	4251 798	4277 802	383
70	4303 806	4329 810	4355 814	4381 818	4407 822	4433 826	4459 830	4485 834	4511 838	4536 843	385
72	4562 847	4588 851	4614 855	4640 859	4666 863	4692 867	4717 871	4743 875	4769 879	4795 883	386
74	4821 887	4846 891	4872 895	4898 899	4923 903	4949 907	4975 911	5000 915	5026 919	5052 923	386
76	5077 926	5103 930	5128 934	5154 938	5179 942	5205 946	5230 950	5256 954	5281 958	5307 962	388

LOW AIR CONDITIONING
△FUEL = – 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 01501 .990 .000 .000 0 FCOM-N0-02-05-30-010-140

INTEGRATED CRUISE - LR FL150

Applicable to: ALL 321

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR		FL150	
WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	28 6	56 11	84 17	112 22	140 28	168 33	195 39	223 44	251 50	300
50	279 55	306 61	334 66	361 71	389 77	416 82	444 87	471 93	498 98	525 103	305
52	553 109	580 114	607 119	634 124	661 129	688 135	715 140	742 145	769 150	796 155	311
54	822 160	849 165	876 170	902 175	929 180	956 184	982 189	1009 194	1035 199	1062 204	322
56	1088 208	1114 213	1141 218	1167 223	1193 227	1219 232	1245 237	1272 241	1298 246	1324 250	333
58	1350 255	1376 260	1402 264	1427 269	1453 273	1479 278	1505 282	1531 287	1556 291	1582 296	341
60	1608 300	1633 304	1659 309	1684 313	1710 318	1735 322	1761 326	1786 331	1812 335	1837 339	347
62	1862 344	1888 348	1913 352	1938 356	1963 361	1989 365	2014 369	2039 373	2064 378	2089 382	353
64	2114 386	2139 390	2164 394	2189 399	2214 403	2239 407	2264 411	2288 415	2313 419	2338 423	358
66	2363 427	2387 432	2412 436	2437 440	2461 444	2486 448	2510 452	2535 456	2559 460	2584 464	363
68	2608 468	2633 472	2657 475	2681 479	2706 483	2730 487	2754 491	2778 494	2803 498	2827 502	368
70	2851 505	2875 509	2900 513	2924 516	2948 520	2972 524	2996 527	3020 531	3045 535	3069 538	397
72	3093 542	3117 546	3141 549	3165 553	3189 557	3213 561	3238 564	3262 568	3286 572	3310 576	396
74	3335 579	3359 583	3383 587	3407 591	3431 594	3455 598	3479 602	3504 606	3528 610	3552 613	384
76	3576 617	3600 621	3624 625	3648 628	3672 632	3696 636	3720 640	3744 643	3767 647	3791 651	384
78	3815 654	3839 658	3863 662	3887 666	3910 669	3934 673	3958 677	3982 680	4005 684	4029 688	384
80	4053 691	4076 695	4100 699	4123 702	4147 706	4171 710	4194 713	4217 717	4241 721	4264 724	386
82	4288 728	4311 732	4335 735	4358 739	4381 742	4405 746	4428 750	4451 753	4475 757	4498 761	387
84	4521 764	4544 768	4567 771	4591 775	4614 778	4637 782	4660 786	4683 789	4706 793	4729 796	388
86	4752 800	4775 803	4798 807	4821 810	4844 814	4867 818	4890 821	4913 825	4936 828	4958 832	389
88	4981 835	5004 838	5027 842	5049 845	5072 849	5095 852	5117 856	5140 859	5163 863	5185 866	392
ECON AIR CONDITIONING △FUEL = – 0.6 %				**ENGINE ANTI ICE ON** △FUEL = + 2 %				**TOTAL ANTI ICE ON** △FUEL = + 5 %			

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 01501 .990 .000 .000 0 FCOM-N0-02-05-30-010-158

INTEGRATED CRUISE - LR FL170

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE
(NM)
TIME (MIN)

LR FL170

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	36 8	71 15	106 23	140 30	175 37	209 45	244 52	279
42	278 59	312 66	346 73	380 80	414 88	448 95	482 102	516 109	549 116	583 123	285
44	617 130	650 136	683 143	716 150	750 157	783 164	816 170	849 177	882 184	915 190	292
46	948 197	980 203	1013 210	1045 217	1078 223	1110 230	1142 236	1174 242	1207 249	1239 255	297
48	1271 262	1303 268	1335 274	1366 280	1398 286	1430 293	1461 299	1493 305	1524 311	1556 317	304
50	1587 323	1618 329	1649 335	1680 341	1711 347	1743 353	1773 359	1804 365	1835 371	1866 376	310
52	1896 382	1927 388	1957 393	1988 399	2018 405	2049 410	2079 416	2109 421	2139 427	2169 432	323
54	2199 437	2229 443	2259 448	2289 453	2319 458	2348 464	2378 469	2407 474	2437 479	2466 484	336
56	2496 489	2525 494	2554 499	2584 504	2613 509	2642 514	2671 519	2700 524	2729 528	2758 533	352
58	2788 538	2816 543	2845 547	2874 552	2903 557	2932 561	2960 566	2989 571	3018 575	3047 580	366
60	3075 584	3104 589	3132 593	3161 598	3189 603	3218 607	3246 612	3275 616	3303 621	3332 625	376
62	3360 630	3388 634	3417 639	3445 643	3473 647	3501 652	3530 656	3558 661	3586 665	3614 670	380
64	3642 674	3670 678	3699 683	3727 687	3755 692	3783 696	3811 701	3839 705	3867 709	3895 714	382
66	3923 718	3951 722	3979 727	4007 731	4035 736	4062 740	4090 744	4118 749	4146 753	4174 757	383
68	4202 762	4229 766	4257 770	4285 775	4313 779	4340 783	4368 788	4396 792	4424 796	4451 801	383
70	4479 805	4506 809	4534 814	4562 818	4589 822	4617 827	4644 831	4672 835	4699 839	4727 844	385
72	4754 848	4781 852	4809 856	4836 861	4863 865	4891 869	4918 873	4945 878	4973 882	5000 886	386
74	5027 890	5054 894	5081 899	5109 903	5136 907	5163 911	5190 915	5217 920	5244 924	5271 928	388
76	5298 932	5325 936	5352 940	5379 945	5406 949	5433 953	5460 957	5486 961	5513 965	5540 969	389

LOW AIR CONDITIONING △FUEL = – 0.3 %
ENGINE ANTI ICE ON △FUEL = + 2 %
TOTAL ANTI ICE ON △FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 01701 .990 .000 .000 0 FCOM-N0-02-05-30-011-140

INTEGRATED CRUISE - LR FL170

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0%

DISTANCE (NM)
TIME (MIN)

LR FL170

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	29 6	58 11	88 17	117 23	146 28	175 34	204 39	233 45	262 50	309
50	291 56	319 61	348 66	377 71	406 77	434 82	463 87	491 93	520 98	548 103	321
52	577 108	605 113	633 118	661 123	690 128	718 134	746 138	774 143	802 148	830 153	331
54	858 158	886 163	914 168	941 173	969 178	997 183	1025 188	1052 192	1080 197	1107 202	340
56	1135 207	1163 212	1190 216	1217 221	1245 226	1272 230	1300 235	1327 240	1354 244	1381 249	347
58	1409 254	1436 258	1463 263	1490 268	1517 272	1544 277	1571 281	1598 286	1625 290	1651 295	352
60	1678 299	1705 304	1732 308	1758 313	1785 317	1812 322	1838 326	1865 330	1891 334	1918 339	358
62	1945 343	1971 347	1997 351	2024 355	2050 359	2076 363	2103 367	2129 371	2155 375	2182 379	389
64	2208 383	2234 387	2260 392	2287 396	2313 400	2339 404	2365 408	2392 412	2418 416	2444 420	390
66	2470 424	2496 428	2523 432	2549 436	2575 441	2601 445	2628 449	2654 453	2680 457	2706 461	384
68	2732 465	2758 469	2785 473	2811 478	2837 482	2863 486	2889 490	2915 494	2941 498	2967 502	381
70	2993 506	3019 510	3045 514	3071 519	3096 523	3122 527	3148 531	3174 535	3200 539	3225 543	380
72	3251 547	3277 551	3303 555	3328 559	3354 563	3380 567	3405 571	3431 575	3456 579	3482 583	381
74	3507 587	3533 591	3558 595	3583 599	3609 603	3634 607	3659 611	3685 615	3710 619	3735 623	383
76	3761 627	3786 631	3811 635	3836 639	3861 643	3886 646	3911 650	3937 654	3962 658	3987 662	384
78	4012 666	4037 670	4061 674	4086 678	4111 682	4136 685	4161 689	4186 693	4211 697	4235 701	385
80	4260 705	4285 708	4310 712	4334 716	4359 720	4383 724	4408 728	4433 731	4457 735	4482 739	387
82	4506 743	4530 746	4555 750	4579 754	4604 758	4628 761	4652 765	4676 769	4701 773	4725 776	390
84	4749 780	4773 784	4797 787	4822 791	4846 795	4870 798	4894 802	4918 806	4942 809	4966 813	392
86	4990 817	5013 820	5037 824	5061 827	5085 831	5109 835	5132 838	5156 842	5180 845	5203 849	396
88	5227 852	5251 856	5274 859	5298 863	5321 866	5345 870	5368 873	5392 877	5415 880	5439 884	400

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.6 %	△FUEL = + 2 %	△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 01701 .990 .000 .000 0 FCOM-N0-02-05-30-011-158

INTEGRATED CRUISE - LR FL190

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL190

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	38 8	74 15	110 23	146 30	181 37	217 45	253 52	287
42	289 60	324 67	359 74	394 81	430 88	465 95	500 102	534 109	569 116	604 123	293
44	639 130	673 137	708 144	742 151	776 158	811 165	845 171	879 178	913 185	947 191	300
46	981 198	1014 205	1048 211	1081 218	1115 224	1148 231	1182 237	1215 243	1248 250	1281 256	306
48	1314 262	1347 268	1380 274	1413 280	1446 286	1478 292	1511 298	1543 304	1576 310	1608 316	321
50	1640 322	1672 327	1705 333	1737 339	1769 344	1801 350	1832 355	1864 361	1896 366	1928 372	336
52	1959 377	1991 383	2022 388	2054 393	2085 399	2117 404	2148 409	2179 414	2210 419	2242 424	352
54	2273 429	2304 434	2335 439	2366 444	2397 449	2428 454	2459 459	2490 464	2520 469	2551 474	371
56	2582 479	2613 484	2644 489	2674 494	2705 499	2736 504	2766 509	2797 513	2827 518	2858 523	375
58	2888 528	2919 533	2949 538	2980 542	3010 547	3041 552	3071 557	3101 562	3132 567	3162 571	378
60	3192 576	3223 581	3253 586	3283 590	3313 595	3344 600	3374 605	3404 610	3434 614	3464 619	379
62	3494 624	3524 629	3554 633	3585 638	3615 643	3645 648	3675 652	3705 657	3734 662	3764 666	380
64	3794 671	3824 676	3854 681	3884 685	3914 690	3944 695	3973 699	4003 704	4033 709	4062 713	381
66	4092 718	4122 723	4151 727	4181 732	4211 736	4240 741	4270 746	4299 750	4329 755	4358 759	383
68	4387 764	4417 769	4446 773	4476 778	4505 782	4534 787	4563 791	4593 796	4622 801	4651 805	385
70	4680 810	4710 814	4739 819	4768 823	4797 828	4826 832	4855 837	4884 841	4913 846	4942 851	385
72	4971 855	5000 860	5029 864	5057 869	5086 873	5115 878	5144 882	5172 887	5201 891	5230 895	384
74	5258 900	5287 904	5315 909	5344 913	5372 918	5401 922	5429 926	5457 931	5486 935	5514 940	385
76	5542 944	5571 948	5599 953	5627 957	5655 961	5683 966	5711 970	5739 974	5767 979	5795 983	388

LOW AIR CONDITIONING △FUEL = − 0.3 %
ENGINE ANTI ICE ON △FUEL = + 2 %
TOTAL ANTI ICE ON △FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 01901 .990 .000 .000 0 FCOM-N0-02-05-30-012-140

INTEGRATED CRUISE - LR FL190

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0%

DISTANCE (NM)
TIME (MIN)

LR FL190

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	30 6	61 11	91 17	122 22	152 28	183 33	213 38	243 44	273 49	329
50	303 55	333 60	363 65	393 70	423 76	453 81	483 86	513 91	542 97	572 102	338
52	602 107	631 112	661 117	690 122	720 128	749 133	779 138	808 143	837 148	867 153	344
54	896 158	925 163	954 168	983 173	1012 178	1042 183	1070 188	1099 192	1128 197	1157 202	350
56	1186 207	1215 212	1243 217	1272 222	1301 226	1329 231	1358 236	1387 240	1415 245	1444 249	356
58	1472 254	1501 258	1529 263	1557 267	1586 272	1614 276	1643 281	1671 285	1699 290	1728 294	387
60	1756 298	1784 303	1812 307	1841 311	1869 316	1897 320	1925 324	1953 329	1980 333	2008 337	382
62	2036 342	2064 346	2092 350	2120 355	2148 359	2176 363	2205 368	2233 372	2261 377	2289 381	389
64	2317 386	2345 390	2373 395	2401 399	2429 404	2457 408	2485 413	2513 417	2541 422	2569 426	377
66	2597 430	2625 435	2652 439	2680 444	2708 448	2736 452	2763 457	2791 461	2819 465	2846 470	378
68	2874 474	2901 479	2929 483	2956 487	2984 492	3011 496	3038 500	3066 505	3093 509	3120 513	380
70	3148 517	3175 522	3202 526	3229 530	3256 535	3283 539	3311 543	3338 547	3365 552	3392 556	381
72	3419 560	3446 564	3472 569	3499 573	3526 577	3553 581	3580 585	3607 590	3633 594	3660 598	382
74	3687 602	3713 606	3740 610	3767 615	3793 619	3820 623	3846 627	3872 631	3899 635	3925 639	384
76	3952 643	3978 647	4004 651	4030 655	4057 660	4083 664	4109 668	4135 672	4161 676	4187 680	387
78	4213 684	4239 688	4265 692	4291 696	4317 700	4343 704	4369 708	4395 712	4420 715	4446 719	390
80	4472 723	4498 727	4523 731	4549 735	4574 739	4600 743	4625 747	4651 750	4676 754	4702 758	394
82	4727 762	4752 766	4778 769	4803 773	4828 777	4854 781	4879 785	4904 788	4929 792	4954 796	400
84	4979 799	5004 803	5029 807	5054 810	5079 814	5104 818	5129 821	5154 825	5179 829	5203 832	406
86	5228 836	5253 840	5278 843	5302 847	5327 850	5352 854	5376 857	5401 861	5425 865	5450 868	412
88	5474 872	5499 875	5523 879	5548 882	5572 886	5596 889	5621 893	5645 896	5669 900	5693 903	416

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 01901 .990 .000 .000 0 FCOM-N0-02-05-30-012-158

INTEGRATED CRUISE - LR FL210

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL210

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	39 8	76 15	114 23	151 30	187 38	224 45	261 52	296
42	298 60	334 67	371 74	407 81	444 88	480 96	516 102	552 109	588 116	624 123	303
44	660 130	695 137	731 144	766 150	802 157	837 164	872 170	907 176	942 183	977 189	314
46	1012 196	1047 202	1082 208	1116 214	1151 220	1186 226	1220 232	1254 238	1288 244	1322 250	333
48	1357 256	1391 261	1425 267	1459 273	1492 279	1526 284	1560 290	1594 295	1627 301	1661 306	352
50	1695 312	1728 317	1762 323	1795 328	1829 334	1862 339	1895 344	1929 350	1962 355	1995 360	369
52	2028 366	2061 371	2095 376	2128 382	2161 387	2194 392	2227 398	2260 403	2293 408	2326 413	373
54	2359 419	2392 424	2424 429	2457 434	2490 440	2523 445	2556 450	2588 455	2621 461	2654 466	376
56	2687 471	2719 476	2752 481	2784 487	2817 492	2850 497	2882 502	2915 507	2947 512	2980 518	377
58	3012 523	3045 528	3077 533	3109 538	3142 543	3174 548	3206 554	3239 559	3271 564	3303 569	378
60	3335 574	3367 579	3400 584	3432 589	3464 594	3496 599	3528 604	3560 609	3592 614	3624 619	379
62	3656 625	3688 630	3719 635	3751 640	3783 645	3815 650	3846 654	3878 659	3910 664	3942 669	381
64	3973 674	4005 679	4036 684	4068 689	4099 694	4131 699	4162 704	4194 709	4225 714	4256 719	382
66	4288 724	4319 729	4350 734	4381 739	4413 744	4444 749	4475 753	4506 758	4537 763	4568 768	380
68	4599 773	4630 778	4661 783	4691 787	4722 792	4753 797	4784 802	4814 807	4845 811	4875 816	382
70	4906 821	4936 826	4967 830	4997 835	5028 840	5058 845	5088 849	5118 854	5148 859	5179 863	385
72	5209 868	5239 873	5269 877	5299 882	5328 887	5358 891	5388 896	5418 900	5448 905	5477 909	388
74	5507 914	5537 918	5566 923	5596 928	5625 932	5655 937	5684 941	5713 945	5742 950	5772 954	391
76	5801 959	5830 963	5859 968	5888 972	5917 976	5946 981	5975 985	6004 989	6033 994	6062 998	395

LOW AIR CONDITIONING
△FUEL = – 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02101 .990 .000 .000 0 FCOM-N0-02-05-30-013-140

INTEGRATED CRUISE - LR FL210

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0%

DISTANCE (NM)
TIME (MIN)

LR FL210

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	32 6	64 11	96 17	127 22	159 28	191 33	223 39	254 44	286 50	342
50	317 55	349 61	380 66	412 71	443 77	474 82	505 87	537 93	568 98	599 103	349
52	630 108	661 113	692 119	723 124	754 129	785 134	815 138	846 143	877 148	908 153	355
54	939 158	970 163	1000 168	1031 173	1062 177	1093 182	1124 187	1154 192	1185 197	1216 202	380
56	1247 207	1277 212	1308 217	1339 222	1370 227	1400 231	1431 236	1461 241	1492 246	1523 251	375
58	1553 256	1584 261	1614 266	1645 271	1675 276	1705 281	1736 285	1766 290	1796 295	1827 300	374
60	1857 305	1887 310	1917 314	1947 319	1977 324	2008 329	2037 334	2067 339	2097 343	2127 348	374
62	2157 353	2187 358	2217 362	2247 367	2276 372	2306 377	2336 381	2365 386	2395 391	2425 395	376
64	2454 400	2484 405	2513 410	2543 414	2572 419	2601 424	2631 428	2660 433	2689 437	2719 442	377
66	2748 447	2777 451	2806 456	2835 461	2864 465	2893 470	2922 474	2951 479	2980 483	3009 488	379
68	3038 493	3067 497	3096 502	3124 506	3153 511	3182 515	3210 520	3239 524	3267 529	3296 533	381
70	3325 538	3353 542	3381 546	3410 551	3438 555	3466 560	3495 564	3523 568	3551 573	3579 577	384
72	3607 582	3635 586	3663 590	3691 594	3719 599	3747 603	3775 607	3803 612	3831 616	3858 620	387
74	3886 624	3914 629	3941 633	3969 637	3996 641	4024 645	4051 650	4079 654	4106 658	4134 662	393
76	4161 666	4188 670	4216 674	4243 678	4270 683	4297 687	4324 691	4351 695	4378 699	4405 703	398
78	4432 707	4459 711	4486 715	4513 719	4540 723	4567 727	4594 730	4620 734	4647 738	4674 742	405
80	4700 746	4727 750	4754 754	4780 758	4807 762	4833 766	4860 769	4886 773	4912 777	4939 781	410
82	4965 785	4991 788	5018 792	5044 796	5070 800	5096 804	5122 807	5148 811	5175 815	5201 819	415
84	5227 822	5253 826	5279 830	5304 833	5330 837	5356 841	5382 845	5408 848	5434 852	5459 856	418
86	5485 859	5511 863	5537 867	5562 870	5588 874	5613 878	5639 881	5664 885	5690 888	5715 892	420
88	5741 896	5766 899	5791 903	5817 906	5842 910	5867 913	5892 917	5918 920	5943 924	5968 927	424

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 02101 .990 .000 .000 0 FCOM-N0-02-05-30-013-158

INTEGRATED CRUISE - LR FL230

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL230

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	40 8	79 15	117 22	155 29	194 36	232 43	270 50	308
42	308 58	345 64	383 71	420 78	458 85	495 91	533 98	570 104	607 111	644 117	328
44	681 124	718 130	754 136	791 142	828 149	865 155	901 161	938 167	974 173	1010 179	349
46	1047 185	1083 191	1119 196	1155 202	1192 208	1228 214	1264 220	1300 226	1336 232	1372 237	367
48	1408 243	1443 249	1479 255	1515 261	1551 266	1587 272	1622 278	1658 284	1694 289	1729 295	371
50	1765 301	1800 307	1836 312	1871 318	1907 324	1942 329	1978 335	2013 341	2049 346	2084 352	373
52	2119 358	2155 363	2190 369	2225 375	2260 380	2296 386	2331 392	2366 397	2401 403	2436 409	374
54	2471 414	2506 420	2541 425	2576 431	2611 437	2646 442	2681 448	2715 453	2750 459	2785 464	375
56	2820 470	2854 475	2889 481	2924 486	2958 492	2993 497	3027 503	3062 508	3096 514	3131 519	377
58	3165 525	3200 530	3234 536	3268 541	3302 546	3337 552	3371 557	3405 563	3439 568	3473 574	378
60	3507 579	3541 584	3575 590	3609 595	3643 601	3677 606	3711 611	3744 617	3778 622	3812 627	377
62	3845 633	3879 638	3912 643	3946 649	3979 654	4013 659	4046 665	4079 670	4112 675	4146 680	378
64	4179 686	4212 691	4245 696	4278 701	4311 706	4344 711	4376 717	4409 722	4442 727	4474 732	381
66	4507 737	4539 742	4572 747	4604 752	4637 757	4669 762	4701 767	4734 772	4766 777	4798 782	384
68	4830 787	4862 792	4894 797	4926 802	4958 807	4990 812	5021 817	5053 822	5085 827	5116 831	388
70	5148 836	5180 841	5211 846	5242 851	5274 855	5305 860	5336 865	5367 870	5399 874	5430 879	392
72	5461 884	5492 889	5523 893	5554 898	5585 902	5615 907	5646 912	5677 916	5707 921	5738 925	397
74	5769 930	5799 934	5829 939	5860 943	5890 948	5921 952	5951 956	5981 961	6011 965	6041 970	407
76	6072 974	6101 978	6131 983	6161 987	6191 991	6221 996	6251 1000	6281 1004	6311 1008	6340 1013	414

LOW AIR CONDITIONING △FUEL = − 0.3 %
ENGINE ANTI ICE ON △FUEL = + 2 %
TOTAL ANTI ICE ON △FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02301 .990 .000 .000 0 FCOM-N0-02-05-30-014-140

INTEGRATED CRUISE - LR FL230

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0%

DISTANCE (NM)
TIME (MIN)

LR FL230

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	34 5	67 11	101 16	134 21	168 27	201 32	234 37	268 43	301 48	379
50	335 53	368 59	402 64	435 70	469 75	502 80	535 86	569 91	602 97	635 102	373
52	669 107	702 113	735 118	768 123	801 129	835 134	868 140	901 145	934 150	967 156	370
54	1000 161	1033 166	1065 172	1098 177	1131 182	1164 188	1197 193	1229 198	1262 203	1295 209	370
56	1327 214	1360 219	1392 224	1424 230	1457 235	1489 240	1522 245	1554 250	1586 256	1618 261	372
58	1650 266	1682 271	1715 276	1747 281	1779 287	1811 292	1842 297	1874 302	1906 307	1938 312	374
60	1970 317	2001 322	2033 327	2065 332	2096 337	2128 342	2159 348	2191 353	2222 358	2254 363	375
62	2285 368	2316 373	2348 377	2379 382	2410 387	2441 392	2472 397	2503 402	2534 407	2565 412	377
64	2596 417	2627 422	2658 427	2689 431	2719 436	2750 441	2781 446	2811 451	2842 455	2872 460	380
66	2903 465	2933 470	2964 475	2994 479	3024 484	3055 489	3085 493	3115 498	3145 503	3175 507	383
68	3205 512	3235 517	3265 521	3295 526	3325 530	3354 535	3384 539	3414 544	3443 548	3473 553	389
70	3503 557	3532 562	3562 566	3591 571	3620 575	3650 580	3679 584	3708 588	3738 593	3767 597	396
72	3796 602	3825 606	3854 610	3883 615	3912 619	3941 623	3970 627	3999 632	4028 636	4057 640	403
74	4085 644	4114 649	4143 653	4171 657	4200 661	4229 665	4257 669	4285 674	4314 678	4342 682	408
76	4371 686	4399 690	4427 694	4456 698	4484 702	4512 707	4540 711	4568 715	4597 719	4625 723	413
78	4653 727	4681 731	4709 735	4737 739	4765 743	4792 747	4820 751	4848 755	4876 759	4903 763	415
80	4931 767	4959 771	4986 775	5014 779	5041 783	5069 787	5096 791	5124 794	5151 798	5178 802	419
82	5206 806	5233 810	5260 814	5287 818	5314 821	5341 825	5368 829	5395 833	5422 836	5449 840	425
84	5476 844	5503 848	5530 851	5556 855	5583 859	5610 863	5636 866	5663 870	5690 874	5716 877	430
86	5743 881	5769 885	5795 888	5822 892	5848 895	5875 899	5901 903	5927 906	5953 910	5979 913	436
88	6006 917	6032 921	6058 924	6084 928	6110 931	6136 935	6161 938	6187 942	6213 945	6239 949	438

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 02301 .990 .000 .000 0 FCOM-N0-02-05-30-014-158

INTEGRATED CRUISE - LR FL250

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL250

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	42 7	82 14	122 21	161 27	201 34	240 40	280 47	342
42	319 54	359 60	398 67	437 73	476 79	516 86	555 92	594 99	633 105	672 111	364
44	711 118	750 124	788 130	827 137	866 143	905 149	943 156	982 162	1021 168	1059 174	368
46	1098 181	1136 187	1175 193	1213 199	1252 206	1290 212	1329 218	1367 224	1405 230	1444 237	370
48	1482 243	1520 249	1558 255	1597 261	1635 268	1673 274	1711 280	1749 286	1787 292	1825 298	371
50	1863 304	1901 310	1939 316	1976 323	2014 329	2052 335	2090 341	2127 347	2165 353	2202 359	373
52	2240 365	2277 371	2315 377	2352 383	2390 389	2427 395	2464 401	2502 407	2539 413	2576 419	375
54	2613 425	2650 431	2687 437	2724 442	2761 448	2798 454	2835 460	2872 466	2909 472	2945 478	374
56	2982 484	3019 490	3055 496	3092 501	3128 507	3165 513	3201 519	3237 525	3273 531	3310 536	374
58	3346 542	3382 548	3418 554	3453 559	3489 565	3525 571	3561 576	3597 582	3632 588	3668 593	376
60	3703 599	3739 604	3774 610	3809 616	3845 621	3880 627	3915 632	3950 638	3985 643	4020 649	380
62	4055 654	4090 660	4125 665	4159 670	4194 676	4229 681	4263 687	4298 692	4332 697	4366 703	384
64	4401 708	4435 713	4469 718	4503 724	4537 729	4571 734	4605 739	4639 745	4673 750	4706 755	388
66	4740 760	4774 765	4807 770	4841 775	4874 780	4908 785	4941 790	4974 795	5007 800	5040 805	394
68	5074 810	5107 815	5139 820	5172 825	5205 830	5238 835	5271 839	5304 844	5336 849	5369 854	404
70	5402 858	5434 863	5466 868	5499 873	5531 877	5564 882	5596 887	5628 891	5660 896	5692 901	411
72	5724 905	5756 910	5788 914	5820 919	5852 924	5884 928	5916 933	5947 937	5979 942	6011 946	417
74	6043 951	6074 955	6105 960	6137 964	6168 969	6200 973	6231 978	6262 982	6294 987	6325 991	421
76	6356 995	6387 1000	6418 1004	6449 1009	6480 1013	6511 1017	6542 1022	6573 1026	6604 1030	6635 1035	424

LOW AIR CONDITIONING △FUEL = − 0.3 %
ENGINE ANTI ICE ON △FUEL = + 2 %
TOTAL ANTI ICE ON △FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02501 .990 .000 .000 0 FCOM-N0-02-05-30-015-140

INTEGRATED CRUISE - LR FL250

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0%

DISTANCE (NM)
TIME (MIN)

LR FL250

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	36 6	72 12	108 18	144 24	180 29	215 35	251 41	287 47	323 53	366
50	358 59	394 64	429 70	465 76	500 82	536 88	571 93	606 99	642 105	677 111	367
52	712 116	747 122	782 128	817 133	852 139	887 145	922 150	957 156	991 162	1026 167	369
54	1061 173	1095 178	1130 184	1164 190	1199 195	1233 201	1268 206	1302 212	1336 217	1371 223	371
56	1405 228	1439 234	1473 239	1507 245	1541 250	1575 256	1609 261	1643 267	1677 272	1711 277	372
58	1744 283	1778 288	1811 293	1845 299	1879 304	1912 309	1945 315	1979 320	2012 325	2045 331	376
60	2078 336	2111 341	2144 346	2178 351	2211 357	2244 362	2276 367	2309 372	2342 377	2375 382	379
62	2407 388	2440 393	2472 398	2505 403	2537 408	2570 413	2602 418	2634 423	2666 428	2699 433	385
64	2731 437	2763 442	2795 447	2827 452	2859 457	2891 462	2922 467	2954 471	2986 476	3017 481	392
66	3049 486	3081 491	3112 495	3144 500	3175 505	3207 509	3238 514	3269 519	3300 523	3332 528	399
68	3363 533	3394 537	3425 542	3456 546	3487 551	3518 556	3549 560	3580 565	3610 569	3641 574	405
70	3672 578	3703 583	3733 587	3764 592	3795 596	3825 601	3856 605	3886 609	3916 614	3947 618	409
72	3977 623	4007 627	4037 632	4068 636	4098 640	4128 645	4158 649	4188 653	4218 658	4248 662	412
74	4278 666	4307 671	4337 675	4367 679	4397 683	4426 688	4456 692	4485 696	4515 700	4544 704	417
76	4574 709	4603 713	4632 717	4661 721	4691 725	4720 729	4749 733	4778 737	4807 741	4836 745	424
78	4865 750	4894 754	4922 758	4951 762	4980 766	5009 770	5037 774	5066 778	5094 781	5123 785	430
80	5152 789	5180 793	5208 797	5237 801	5265 805	5293 809	5321 813	5350 817	5378 821	5406 824	434
82	5434 828	5462 832	5490 836	5518 840	5546 844	5574 847	5601 851	5629 855	5657 859	5684 863	437
84	5712 866	5739 870	5767 874	5794 878	5822 881	5849 885	5877 889	5904 892	5931 896	5958 900	440
86	5986 904	6013 907	6040 911	6067 914	6094 918	6121 922	6148 925	6175 929	6201 933	6228 936	444
88	6255 940	6282 943	6308 947	6335 950	6362 954	6388 958	6415 961	6441 965	6468 968	6494 972	448

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 02501 .990 .000 .000 0 FCOM-N0-02-05-30-015-158

INTEGRATED CRUISE - LR FL270

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL270

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	44 7	86 14	129 21	171 28	213 35	255 42	297 49	365
42	339 55	380 62	422 69	464 76	506 83	548 90	589 96	631 103	673 110	714 117	367
44	756 124	797 130	839 137	880 144	922 151	963 157	1004 164	1046 171	1087 177	1128 184	368
46	1169 191	1210 197	1251 204	1292 211	1333 217	1374 224	1415 231	1456 237	1497 244	1537 250	370
48	1578 257	1619 264	1659 270	1700 277	1740 283	1781 290	1821 296	1862 303	1902 309	1942 316	371
50	1982 323	2022 329	2063 336	2103 342	2143 349	2183 355	2222 361	2262 368	2302 374	2341 381	370
52	2381 387	2420 393	2460 400	2499 406	2539 413	2578 419	2617 425	2656 431	2695 438	2734 444	371
54	2773 450	2812 456	2850 463	2889 469	2928 475	2966 481	3005 487	3043 493	3081 499	3120 506	374
56	3158 512	3196 518	3234 524	3272 530	3310 536	3348 542	3385 548	3423 553	3461 559	3498 565	378
58	3536 571	3573 577	3610 583	3647 589	3685 594	3722 600	3759 606	3796 612	3832 617	3869 623	383
60	3906 629	3943 634	3979 640	4016 646	4052 651	4089 657	4125 662	4161 668	4197 673	4233 679	388
62	4270 684	4305 690	4341 695	4377 700	4413 706	4449 711	4484 716	4520 722	4555 727	4591 732	399
64	4626 737	4661 742	4697 748	4732 753	4767 758	4802 763	4837 768	4872 773	4907 778	4942 783	407
66	4977 789	5011 794	5046 799	5081 804	5115 809	5150 814	5184 819	5219 824	5253 829	5287 833	413
68	5322 838	5356 843	5390 848	5424 853	5458 858	5492 863	5526 868	5560 873	5594 877	5628 882	418
70	5662 887	5695 892	5729 897	5762 901	5796 906	5829 911	5863 916	5896 920	5929 925	5962 930	419
72	5996 935	6029 939	6062 944	6095 948	6128 953	6160 958	6193 962	6226 967	6258 971	6291 976	426
74	6324 980	6356 985	6388 989	6421 994	6453 998	6485 1003	6517 1007	6549 1011	6582 1016	6614 1020	433
76	6646 1025	6677 1029	6709 1033	6741 1038	6773 1042	6805 1046	6836 1051	6868 1055	6899 1059	6931 1063	440

LOW AIR CONDITIONING △FUEL = − 0.3 %
ENGINE ANTI ICE ON △FUEL = + 2 %
TOTAL ANTI ICE ON △FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02701 .990 .000 .000 0 FCOM-N0-02-05-30-016-140

INTEGRATED CRUISE - LR FL270

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0%

DISTANCE (NM)
TIME (MIN)

LR FL270

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	38 6	76 12	114 19	152 25	189 31	227 37	265 43	302 49	340 56	366
50	378 62	415 68	452 74	490 80	527 86	564 92	601 98	638 104	675 110	713 116	368
52	750 122	786 128	823 134	860 140	897 146	933 152	970 158	1006 164	1043 169	1079 175	370
54	1116 181	1152 187	1188 193	1224 199	1260 204	1296 210	1332 216	1368 221	1404 227	1440 233	374
56	1475 239	1511 244	1547 250	1582 255	1618 261	1653 267	1688 272	1723 278	1759 283	1794 289	379
58	1829 294	1864 299	1899 305	1934 310	1969 316	2003 321	2038 326	2073 332	2107 337	2142 342	386
60	2176 348	2211 353	2245 358	2279 363	2314 368	2348 374	2382 379	2416 384	2450 389	2484 394	394
62	2518 399	2552 404	2586 409	2619 414	2653 419	2687 424	2720 429	2754 434	2787 439	2821 444	401
64	2854 449	2888 454	2921 459	2954 464	2987 469	3021 474	3054 479	3087 483	3120 488	3153 493	405
66	3186 498	3218 503	3251 508	3284 512	3317 517	3349 522	3382 527	3414 531	3447 536	3479 541	408
68	3512 546	3544 550	3576 555	3608 560	3640 564	3673 569	3704 573	3736 578	3768 582	3800 587	414
70	3832 592	3864 596	3895 601	3927 605	3958 610	3990 614	4021 618	4053 623	4084 627	4115 632	421
72	4147 636	4178 640	4209 645	4240 649	4271 654	4302 658	4333 662	4364 667	4395 671	4426 675	427
74	4456 679	4487 684	4518 688	4548 692	4579 696	4609 701	4640 705	4670 709	4700 713	4731 717	430
76	4761 722	4791 726	4821 730	4851 734	4881 738	4911 742	4941 746	4971 751	5001 755	5030 759	434
78	5060 763	5090 767	5119 771	5149 775	5178 779	5208 783	5237 787	5267 791	5296 795	5325 799	439
80	5355 803	5384 807	5413 811	5442 815	5471 819	5500 823	5529 826	5558 830	5586 834	5615 838	443
82	5644 842	5673 846	5701 850	5730 853	5758 857	5787 861	5815 865	5844 869	5872 872	5900 876	447
84	5929 880	5957 884	5985 887	6013 891	6041 895	6069 899	6097 902	6125 906	6153 910	6181 913	451
86	6209 917	6237 921	6265 924	6292 928	6320 932	6348 935	6375 939	6403 943	6430 946	6458 950	455
88	6485 953	6512 957	6540 961	6567 964	6594 968	6622 971	6649 975	6676 978	6703 982	6730 986	457

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 02701 .990 .000 .000 0 FCOM-N0-02-05-30-016-158

INTEGRATED CRUISE - LR FL290

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL 290

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	47 8	92 15	138 23	182 30	227 37	272 45	317 52	365
42	362 59	407 67	451 74	496 81	540 89	585 96	629 103	674 110	718 118	762 125	367
44	807 132	851 139	895 146	939 154	983 161	1027 168	1071 175	1115 182	1158 190	1202 197	367
46	1246 204	1289 211	1333 218	1376 225	1419 232	1463 239	1506 246	1549 253	1592 260	1635 267	367
48	1678 274	1720 281	1763 288	1806 295	1848 302	1891 309	1933 316	1975 323	2017 329	2060 336	369
50	2102 343	2144 350	2185 357	2227 363	2269 370	2311 377	2352 383	2393 390	2435 396	2476 403	372
52	2517 410	2558 416	2599 423	2640 429	2681 436	2722 442	2762 449	2803 455	2843 461	2884 468	377
54	2924 474	2964 480	3004 487	3044 493	3084 499	3124 505	3164 512	3204 518	3243 524	3283 530	382
56	3323 536	3362 542	3401 548	3440 554	3479 560	3519 566	3558 572	3596 578	3635 583	3674 589	392
58	3713 595	3751 601	3790 607	3828 612	3867 618	3905 624	3943 629	3981 635	4020 641	4058 646	401
60	4096 652	4134 657	4171 663	4209 668	4247 674	4285 680	4322 685	4360 690	4397 696	4434 701	408
62	4472 707	4509 712	4546 718	4583 723	4620 728	4658 734	4694 739	4731 744	4768 750	4805 755	413
64	4842 760	4878 766	4915 771	4951 776	4988 781	5024 787	5060 792	5096 797	5132 802	5168 807	415
66	5205 812	5240 817	5276 822	5312 828	5347 833	5383 838	5419 843	5454 847	5489 852	5525 857	423
68	5560 862	5595 867	5630 872	5665 877	5700 882	5735 887	5770 891	5804 896	5839 901	5874 906	431
70	5909 910	5943 915	5977 920	6012 925	6046 929	6080 934	6114 939	6148 943	6182 948	6217 953	438
72	6251 957	6284 962	6318 966	6352 971	6385 976	6419 980	6453 985	6486 989	6519 994	6553 998	439
74	6586 1003	6619 1007	6652 1012	6685 1016	6718 1021	6751 1025	6784 1029	6816 1034	6849 1038	6882 1043	444
76	6914 1047	6947 1051	6979 1056	7011 1060	7044 1064	7076 1069	7108 1073	7140 1077	7172 1081	7204 1086	448

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.3 %	△FUEL = + 2 %	△FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 02901 .990 .000 .000 0 FCOM-N0-02-05-30-017-140

INTEGRATED CRUISE - LR FL290

Applicable to: ALL 321

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR		FL290	
WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	40 6	80 13	119 19	159 26	199 32	238 39	278 45	317 51	357 58	368
50	396 64	435 71	474 77	513 83	552 89	591 96	630 102	669 108	708 114	746 120	372
52	785 126	823 132	862 139	900 145	938 151	976 157	1014 163	1052 168	1090 174	1128 180	379
54	1166 186	1204 192	1241 198	1279 204	1317 209	1354 215	1391 221	1429 227	1466 232	1503 238	386
56	1540 244	1577 249	1614 255	1651 261	1688 266	1725 272	1762 277	1798 283	1835 288	1872 294	394
58	1908 299	1945 305	1981 310	2017 316	2053 321	2090 326	2126 332	2162 337	2198 343	2234 348	400
60	2270 353	2306 359	2341 364	2377 369	2413 374	2448 380	2484 385	2519 390	2554 395	2590 401	403
62	2625 406	2660 411	2695 416	2730 421	2765 426	2800 431	2835 436	2870 441	2904 446	2939 451	410
64	2974 456	3008 461	3043 466	3077 471	3111 476	3146 481	3180 486	3214 491	3248 495	3282 500	418
66	3316 505	3350 510	3383 515	3417 519	3451 524	3485 529	3518 534	3551 538	3585 543	3618 548	424
68	3652 552	3685 557	3718 562	3751 566	3784 571	3817 576	3850 580	3883 585	3916 589	3949 594	427
70	3982 598	4014 603	4047 607	4079 612	4112 616	4144 621	4176 625	4208 630	4241 634	4273 639	432
72	4305 643	4337 648	4369 652	4401 656	4433 661	4465 665	4496 669	4528 674	4560 678	4591 682	436
74	4623 687	4654 691	4686 695	4717 699	4748 704	4780 708	4811 712	4842 716	4873 721	4904 725	441
76	4935 729	4966 733	4997 737	5027 741	5058 746	5089 750	5120 754	5150 758	5181 762	5211 766	445
78	5242 770	5272 774	5302 778	5333 782	5363 786	5393 790	5423 794	5453 798	5483 802	5513 806	449
80	5543 810	5573 814	5603 818	5633 822	5663 826	5692 830	5722 834	5751 838	5781 842	5811 846	452
82	5840 849	5869 853	5899 857	5928 861	5957 865	5987 869	6016 873	6045 876	6074 880	6103 884	455
84	6132 888	6161 892	6190 895	6218 899	6247 903	6276 907	6305 910	6333 914	6362 918	6390 922	458
86	6419 925	6447 929	6476 933	6504 936	6532 940	6561 944	6589 947	6617 951	6645 955	6673 958	461
88	6701 962	6729 966	6757 969	6785 973	6813 977	6841 980	6869 984	6896 987	6924 991	6952 994	462
ECON AIR CONDITIONING △FUEL = – 0.6 %				**ENGINE ANTI ICE ON** △FUEL = + 2 %				**TOTAL ANTI ICE ON** △FUEL = + 5 %			

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 02901 .990 .000 .000 0 FCOM-N0-02-05-30-017-158

INTEGRATED CRUISE - LR FL310

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL310

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			2 0	50 8	98 16	146 24	194 32	242 40	289 48	337 56	363
42	384 64	432 71	479 79	526 87	573 95	621 102	667 110	714 118	761 126	808 133	363
44	854 141	901 149	947 156	993 164	1039 171	1086 179	1131 186	1177 194	1223 201	1269 209	366
46	1315 216	1360 223	1405 231	1450 238	1496 245	1541 253	1586 260	1630 267	1675 274	1720 282	370
48	1765 289	1809 296	1853 303	1897 310	1942 317	1986 324	2030 331	2073 338	2117 345	2161 352	375
50	2205 359	2248 365	2291 372	2334 379	2378 386	2421 392	2464 399	2506 405	2549 412	2592 419	381
52	2634 425	2677 432	2719 438	2761 444	2804 451	2846 457	2888 464	2930 470	2971 476	3013 482	393
54	3055 489	3097 495	3138 501	3180 507	3221 513	3262 519	3303 526	3344 532	3386 538	3427 544	401
56	3468 550	3508 556	3549 562	3590 568	3630 574	3671 580	3711 586	3752 592	3792 597	3832 603	407
58	3872 609	3912 615	3952 621	3992 627	4032 633	4072 638	4111 644	4151 650	4190 655	4230 661	410
60	4269 667	4308 672	4347 678	4386 683	4425 689	4464 695	4502 700	4541 706	4580 711	4618 716	418
62	4657 722	4695 727	4733 733	4771 738	4809 743	4847 749	4885 754	4923 759	4961 764	4998 770	427
64	5036 775	5073 780	5111 785	5148 790	5185 795	5223 801	5260 806	5297 811	5334 816	5371 821	433
66	5408 826	5444 831	5481 836	5517 841	5554 846	5590 851	5626 856	5663 861	5699 866	5735 871	436
68	5771 876	5807 881	5842 886	5878 890	5914 895	5950 900	5985 905	6020 910	6056 914	6091 919	441
70	6126 924	6161 929	6196 933	6231 938	6266 943	6301 947	6335 952	6370 957	6404 961	6439 966	446
72	6473 970	6508 975	6542 979	6576 984	6610 988	6644 993	6678 997	6712 1002	6746 1006	6779 1011	452
74	6813 1015	6847 1019	6880 1024	6914 1028	6947 1033	6981 1037	7014 1041	7047 1046	7080 1050	7113 1054	458
76	7146 1059	7179 1063	7212 1067	7245 1071	7278 1076	7310 1080	7343 1084	7375 1088	7408 1093	7440 1097	460

LOW AIR CONDITIONING
△FUEL = – 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03101 .990 .000 .000 0 FCOM-N0-02-05-30-018-140

INTEGRATED CRUISE - LR FL310

Applicable to: ALL 321

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR		FL310	
WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	41 7	83 13	124 20	166 26	207 33	248 39	289 46	331 52	372 58	378
50	413 65	453 71	494 77	535 84	575 90	616 96	656 102	696 108	737 115	777 121	387
52	817 127	857 133	897 139	937 145	977 151	1017 157	1056 163	1096 169	1135 175	1175 181	394
54	1214 187	1253 193	1292 199	1332 205	1371 211	1410 217	1449 222	1487 228	1526 234	1565 240	398
56	1604 245	1642 251	1681 257	1719 262	1757 268	1796 274	1834 279	1872 285	1910 290	1948 296	404
58	1986 302	2023 307	2061 312	2098 318	2136 323	2173 329	2211 334	2248 340	2285 345	2322 350	412
60	2359 356	2396 361	2433 366	2470 371	2507 377	2544 382	2580 387	2616 392	2653 397	2689 403	419
62	2726 408	2762 413	2798 418	2834 423	2870 428	2906 433	2942 438	2978 443	3013 448	3049 453	423
64	3085 458	3120 463	3156 468	3191 473	3226 478	3262 483	3297 488	3332 493	3367 498	3402 503	428
66	3437 507	3471 512	3506 517	3541 522	3575 527	3610 531	3644 536	3678 541	3713 546	3747 550	433
68	3781 555	3815 560	3849 564	3883 569	3917 574	3951 578	3985 583	4019 587	4052 592	4086 596	438
70	4120 601	4153 606	4186 610	4220 615	4253 619	4286 624	4319 628	4352 632	4385 637	4418 641	443
72	4451 646	4484 650	4517 655	4550 659	4582 663	4615 668	4648 672	4680 676	4712 681	4745 685	447
74	4777 689	4809 694	4842 698	4874 702	4906 707	4938 711	4970 715	5002 719	5034 724	5066 728	450
76	5097 732	5129 736	5161 740	5192 744	5224 749	5255 753	5287 757	5318 761	5349 765	5380 769	453
78	5412 773	5443 778	5474 782	5505 786	5536 790	5567 794	5598 798	5628 802	5659 806	5690 810	456
80	5721 814	5751 818	5782 822	5812 826	5842 830	5873 834	5903 838	5933 842	5964 846	5994 850	458
82	6024 854	6054 858	6084 862	6114 865	6144 869	6174 873	6203 877	6233 881	6263 885	6292 889	459
84	6322 893	6351 896	6381 900	6410 904	6440 908	6469 912	6498 916	6527 919	6556 923	6586 927	460
86	6615 931	6644 934	6673 938	6701 942	6730 946	6759 950	6788 953	6816 957	6845 961	6874 964	461
88	6902 968	6931 972	6959 975	6987 979	7016 983	7044 987	7072 990	7100 994	7128 997	7156 1001	462
ECON AIR CONDITIONING △FUEL = – 0.6 %				ENGINE ANTI ICE ON △FUEL = + 2 %				TOTAL ANTI ICE ON △FUEL = + 5 %			

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03101 .990 .000 .000 0 FCOM-N0-02-05-30-018-158

INTEGRATED CRUISE - LR FL330

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL330

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			3 0	53 9	103 17	154 25	204 34	254 42	303 50	353 58	362
42	403 66	453 74	502 83	551 91	601 99	650 107	699 115	747 123	796 130	845 138	366
44	893 146	941 154	990 162	1038 169	1086 177	1134 185	1181 192	1229 200	1276 208	1324 215	371
46	1371 223	1418 230	1465 237	1512 245	1559 252	1606 259	1652 266	1698 274	1745 281	1791 288	381
48	1837 295	1883 302	1929 309	1975 316	2020 323	2066 330	2111 337	2157 343	2202 350	2247 357	392
50	2293 364	2337 371	2382 377	2427 384	2472 391	2517 397	2561 404	2605 410	2650 417	2694 424	401
52	2738 430	2782 437	2826 443	2870 450	2914 456	2958 463	3001 469	3045 475	3088 482	3131 488	405
54	3175 494	3218 501	3260 507	3303 513	3346 519	3389 526	3431 532	3474 538	3516 544	3558 550	411
56	3600 556	3642 562	3684 568	3726 574	3768 580	3809 586	3851 591	3892 597	3933 603	3975 609	421
58	4016 615	4057 620	4098 626	4139 632	4180 638	4220 643	4261 649	4301 655	4342 660	4382 666	428
60	4422 671	4462 677	4502 682	4542 688	4582 694	4622 699	4661 704	4701 710	4740 715	4779 721	431
62	4819 726	4858 732	4896 737	4935 742	4974 747	5013 753	5052 758	5090 763	5128 768	5167 774	437
64	5205 779	5243 784	5281 789	5319 794	5357 799	5395 805	5432 810	5470 815	5507 820	5545 825	442
66	5582 830	5619 835	5656 840	5694 844	5731 849	5768 854	5804 859	5841 864	5878 869	5914 874	451
68	5951 878	5987 883	6023 888	6060 893	6096 898	6132 902	6168 907	6204 912	6240 916	6276 921	455
70	6312 926	6347 931	6383 935	6418 940	6454 945	6489 949	6524 954	6559 958	6595 963	6630 968	457
72	6665 972	6700 977	6734 981	6769 986	6804 991	6839 995	6873 1000	6907 1004	6941 1009	6976 1013	457
74	7010 1018	7044 1022	7078 1026	7112 1031	7146 1035	7179 1040	7213 1044	7246 1049	7280 1053	7313 1057	458
76	7347 1062	7380 1066	7413 1070	7446 1075	7479 1079	7512 1083	7544 1088	7577 1092	7609 1096	7642 1100	458

LOW AIR CONDITIONING △FUEL = − 0.3 %
ENGINE ANTI ICE ON △FUEL = + 2 %
TOTAL ANTI ICE ON △FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03301 .990 .000 .000 0 FCOM-N0-02-05-30-019-140

INTEGRATED CRUISE - LR FL330

Applicable to: ALL 321

INTEGRATED CRUISE											
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		DISTANCE (NM) TIME (MIN)		LR		FL330	
WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	43 7	86 13	130 20	173 26	216 33	259 40	302 46	345 53	387 59	391
50	430 66	472 72	515 78	557 85	599 91	642 97	684 104	725 110	767 116	809 122	396
52	851 129	892 135	934 141	975 147	1016 153	1058 159	1099 165	1140 171	1180 177	1221 183	405
54	1262 189	1303 195	1343 201	1384 207	1424 212	1464 218	1504 224	1544 230	1584 236	1624 241	413
56	1664 247	1704 253	1744 258	1783 264	1823 270	1862 275	1901 281	1941 286	1980 292	2019 298	418
58	2058 303	2097 309	2135 314	2174 320	2213 325	2251 330	2289 336	2328 341	2366 347	2404 352	423
60	2442 357	2480 363	2518 368	2556 373	2594 378	2632 384	2669 389	2707 394	2744 399	2781 405	428
62	2819 410	2856 415	2893 420	2930 425	2967 430	3004 435	3041 440	3077 445	3114 450	3151 455	434
64	3187 460	3224 465	3260 470	3296 475	3332 480	3369 485	3405 490	3441 495	3477 500	3512 505	439
66	3548 510	3584 514	3620 519	3655 524	3691 529	3726 534	3761 538	3797 543	3832 548	3867 552	443
68	3902 557	3937 562	3972 567	4007 571	4042 576	4077 581	4111 585	4146 590	4180 594	4215 599	446
70	4249 604	4284 608	4318 613	4352 617	4386 622	4420 626	4454 631	4488 635	4522 640	4556 644	449
72	4590 649	4623 653	4657 658	4690 662	4724 667	4757 671	4790 676	4824 680	4857 684	4890 689	453
74	4923 693	4956 697	4989 702	5022 706	5055 710	5088 715	5120 719	5153 723	5185 728	5218 732	455
76	5250 736	5283 740	5315 745	5347 749	5379 753	5412 757	5444 762	5476 766	5507 770	5539 774	456
78	5571 778	5603 782	5634 787	5666 791	5698 795	5729 799	5761 803	5792 807	5823 811	5854 816	457
80	5886 820	5917 824	5948 828	5979 832	6010 836	6041 840	6071 844	6102 848	6133 852	6163 856	458
82	6194 860	6224 864	6255 868	6285 872	6315 876	6346 880	6376 884	6406 888	6436 892	6466 896	458
84	6496 899	6525 903	6555 907	6585 911	6614 915	6644 919	6673 923	6702 926	6732 930	6761 934	459
86	6790 938	6819 942	6848 945	6877 949	6906 953	6935 957	6963 960	6992 964	7020 968	7049 972	460
88	7077 975	7105 979									460
ECON AIR CONDITIONING △FUEL = − 0.6 %				ENGINE ANTI ICE ON △FUEL = + 2 %				TOTAL ANTI ICE ON △FUEL = + 5 %			

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03301 .990 .000 .000 0 FCOM-N0-02-05-30-019-158

INTEGRATED CRUISE - LR FL350

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL350

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			3 0	55 9	107 17	160 26	212 34	263 42	315 51	367 59	367
42	419 67	470 75	521 83	572 91	623 99	674 107	725 115	775 123	825 131	876 139	379
44	926 146	976 154	1026 162	1076 169	1126 177	1175 185	1225 192	1274 200	1323 207	1372 214	390
46	1422 222	1470 229	1519 237	1567 244	1616 251	1665 258	1713 266	1761 273	1809 280	1857 287	398
48	1905 295	1953 302	2000 309	2048 316	2095 323	2143 330	2190 337	2236 344	2283 350	2330 357	401
50	2377 364	2423 371	2469 378	2516 384	2562 391	2608 398	2654 404	2699 411	2745 417	2790 424	412
52	2836 430	2881 437	2926 443	2971 449	3016 456	3061 462	3106 468	3150 475	3194 481	3239 487	422
54	3283 494	3327 500	3371 506	3415 512	3459 518	3503 524	3546 530	3589 536	3632 543	3676 549	426
56	3719 555	3761 560	3804 566	3847 572	3889 578	3932 584	3974 590	4016 596	4058 601	4100 607	432
58	4143 613	4184 619	4226 624	4267 630	4309 636	4350 641	4391 647	4432 652	4473 658	4514 664	438
60	4555 669	4596 674	4636 680	4677 685	4717 691	4757 696	4797 701	4837 707	4877 712	4917 717	447
62	4957 723	4997 728	5037 733	5076 739	5116 744	5155 749	5194 754	5233 759	5272 765	5311 770	451
64	5351 775	5389 780	5428 785	5466 790	5505 795	5544 801	5582 806	5620 811	5658 816	5696 821	453
66	5735 826	5772 831	5810 836	5848 841	5885 846	5923 851	5960 856	5997 861	6034 866	6072 870	453
68	6109 875	6145 880	6182 885	6218 890	6255 895	6292 900	6328 904	6364 909	6400 914	6436 919	454
70	6472 923	6508 928	6543 933	6579 938	6614 942	6650 947	6685 952	6720 956	6755 961	6790 965	454
72	6825 970	6860 975	6894 979	6929 984	6963 988	6998 993	7032 997	7066 1002	7100 1006	7134 1011	454
74	7168 1015	7201 1020	7234 1024	7267 1029	7301 1033	7334 1037	7367 1042	7400 1046	7434 1051	7467 1055	454
76											

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.3 %	△FUEL = + 2 %	△FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03501 .990 .000 .000 0 FCOM-N0-02-05-30-020-140

INTEGRATED CRUISE - LR FL350

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0%

DISTANCE (NM)
TIME (MIN)

LR FL350

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	45 7	90 13	134 20	179 26	224 33	268 40	312 46	357 53	401 59	404
50	445 65	489 72	533 78	576 85	620 91	664 97	707 103	750 110	793 116	836 122	411
52	879 128	922 135	965 141	1007 147	1050 153	1093 159	1135 165	1177 171	1219 177	1261 183	417
54	1303 189	1345 195	1386 201	1428 207	1470 212	1511 218	1552 224	1593 230	1634 236	1676 241	423
56	1717 247	1757 253	1798 259	1839 264	1879 270	1920 276	1960 281	2000 287	2040 292	2080 298	429
58	2121 303	2160 309	2200 314	2240 320	2280 325	2319 331	2359 336	2398 341	2437 347	2476 352	435
60	2516 358	2555 363	2593 368	2632 373	2671 379	2710 384	2748 389	2787 395	2825 400	2864 405	439
62	2902 410	2940 415	2978 420	3016 426	3054 431	3092 436	3130 441	3168 446	3205 451	3243 456	443
64	3281 461	3318 466	3355 471	3392 476	3429 481	3467 486	3503 491	3540 496	3577 501	3614 506	446
66	3651 511	3687 516	3724 521	3760 525	3796 530	3833 535	3869 540	3905 545	3941 550	3977 554	450
68	4013 559	4049 564	4084 569	4120 573	4156 578	4191 583	4227 588	4262 592	4297 597	4333 602	451
70	4368 606	4403 611	4438 616	4473 620	4507 625	4542 629	4577 634	4611 639	4646 643	4680 648	452
72	4715 652	4749 657	4783 661	4817 666	4851 670	4885 675	4919 679	4953 684	4987 688	5020 693	453
74	5054 697	5088 702	5121 706	5154 710	5188 715	5221 719	5254 724	5287 728	5320 732	5353 737	454
76	5386 741	5419 745	5451 750	5484 754	5516 758	5549 762	5581 767	5613 771	5645 775	5677 779	455
78	5710 784	5741 788	5773 792	5805 796	5836 800	5868 804	5899 809	5930 813	5962 817	5993 821	456
80	6024 825	6055 829	6086 833	6116 837	6147 841	6178 845	6208 849	6238 853	6269 857	6299 861	456
82	6329 865										456
84											
86											
88											

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03501 .990 .000 .000 0 FCOM-N0-02-05-30-020-158

INTEGRATED CRUISE - LR FL370

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL370

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			3 0	57 9	111 17	165 25	219 34	273 42	327 50	380 58	388
42	434 66	487 74	540 82	593 90	646 98	699 106	751 114	804 122	856 130	908 138	396
44	961 146	1012 153	1064 161	1115 169	1167 176	1218 184	1269 191	1320 199	1370 206	1421 214	401
46	1472 221	1522 228	1572 235	1622 243	1672 250	1722 257	1771 264	1821 271	1870 278	1919 285	413
48	1969 292	2017 299	2066 306	2115 313	2163 320	2212 327	2260 334	2308 341	2355 347	2403 354	420
50	2451 361	2498 368	2546 374	2593 381	2640 387	2687 394	2733 400	2780 407	2826 413	2873 420	426
52	2919 426	2965 433	3011 439	3057 445	3102 452	3148 458	3193 464	3238 470	3283 476	3328 482	433
54	3374 489	3418 495	3462 501	3507 507	3551 513	3596 519	3640 525	3684 530	3728 536	3771 542	442
56	3815 548	3859 554	3902 560	3945 566	3989 571	4032 577	4075 583	4118 589	4160 594	4203 600	448
58	4246 606	4288 611	4331 617	4373 623	4415 628	4457 634	4499 639	4541 645	4582 650	4624 656	451
60	4666 662	4707 667	4748 672	4789 678	4830 683	4871 689	4912 694	4952 700	4992 705	5033 710	451
62	5073 716	5113 721	5153 726	5193 732	5232 737	5272 742	5311 747	5351 753	5390 758	5429 763	451
64	5468 768	5507 773	5545 778	5584 784	5622 789	5661 794	5699 799	5737 804	5775 809	5812 814	451
66	5850 819	5888 824	5925 829	5962 834	6000 839	6037 844	6074 849	6110 854	6147 858	6184 863	452
68	6221 868	6256 873	6292 878	6328 882	6364 887	6400 892	6436 897	6471 902	6507 906		451
70											
72											
74											
76											

LOW AIR CONDITIONING △FUEL = − 0.3 %
ENGINE ANTI ICE ON △FUEL = + 2 %
TOTAL ANTI ICE ON △FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03701 .990 .000 .000 0 FCOM-N0-02-05-30-021-140

INTEGRATED CRUISE - LR FL370

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0%

DISTANCE (NM)
TIME (MIN)

LR FL370

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	46 7	92 13	138 20	184 26	230 33	276 40	321 46	367 52	412 59	417
50	458 65	503 72	548 78	592 84	637 91	682 97	726 103	771 109	815 116	859 122	423
52	904 128	947 134	991 140	1035 146	1079 152	1123 159	1166 165	1209 170	1252 176	1295 182	430
54	1339 188	1381 194	1424 200	1467 206	1510 212	1552 218	1594 224	1637 229	1679 235	1721 241	436
56	1763 247	1805 252	1847 258	1888 264	1930 269	1972 275	2013 281	2054 286	2095 292	2137 297	439
58	2178 303	2219 309	2259 314	2300 320	2341 325	2382 331	2422 336	2462 341	2502 347	2542 352	443
60	2583 358	2622 363	2662 368	2702 374	2742 379	2782 384	2821 389	2860 395	2900 400	2939 405	447
62	2978 410	3017 416	3056 421	3095 426	3134 431	3172 436	3211 442	3249 447	3288 452	3326 457	449
64	3364 462	3402 467	3440 472	3478 477	3516 482	3554 487	3591 492	3629 497	3666 502	3704 507	450
66	3741 512	3778 517	3815 522	3852 527	3889 532	3926 537	3963 542	3999 546	4036 551	4072 556	451
68	4109 561	4145 566	4181 571	4217 575	4253 580	4289 585	4325 590	4360 594	4396 599	4432 604	452
70	4467 609	4502 613	4537 618	4572 622	4607 627	4642 632	4677 636	4712 641	4746 645	4781 650	453
72	4815 655	4849 659	4883 664	4917 668	4951 673	4985 677	5018 682	5052 686	5085 690	5119 695	453
74	5152 699	5185 704	5217 708	5250 712	5282 716	5315 721	5347 725	5380 729	5413 734		453
76											
78											
80											
82											
84											
86											
88											

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03701 .990 .000 .000 0 FCOM-N0-02-05-30-021-158

INTEGRATED CRUISE - LR FL390

Applicable to: ALL 320

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM)
TIME (MIN)

LR FL390

WEIGHT (1000KG)	0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
40			3 0	59 9	115 17	171 25	226 33	281 41	336 49	391 57	401
42	447 66	501 73	555 81	610 89	664 97	718 105	772 112	825 120	879 128	932 135	414
44	986 143	1038 151	1091 158	1144 165	1196 173	1249 180	1301 188	1352 195	1404 202	1456 209	420
46	1507 217	1558 224	1609 231	1660 238	1711 245	1762 252	1812 259	1862 266	1912 273	1962 280	429
48	2012 287	2061 293	2110 300	2160 307	2209 314	2258 320	2307 327	2355 333	2404 340	2452 347	437
50	2501 353	2549 360	2596 366	2644 372	2692 379	2740 385	2787 392	2834 398	2882 404	2929 410	446
52	2976 417	3022 423	3069 429	3115 435	3162 442	3209 448	3254 454	3300 460	3346 466	3392 472	450
54	3438 478	3483 484	3528 490	3573 496	3618 502	3664 508	3708 514	3752 520	3797 526	3841 532	450
56	3885 538	3929 544	3973 550	4016 555	4060 561	4103 567	4146 573	4189 578	4232 584	4275 590	451
58	4318 595	4360 601	4402 607	4444 612	4486 618	4528 623	4570 629	4611 634	4652 640	4694 645	452
60	4735 651	4776 656	4816 662	4857 667	4898 672	4938 678	4978 683	5018 688	5058 694	5098 699	452
62	5138 704	5177 710	5216 715	5255 720	5295 725	5334 730					451
64											
66											
68											
70											
72											
74											
76											

LOW AIR CONDITIONING △FUEL = − 0.3 %
ENGINE ANTI ICE ON △FUEL = + 2 %
TOTAL ANTI ICE ON △FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 22200000C5KG330 0 018590 0 0 1 1.0 .0 .00 03901 .990 .000 .000 0 FCOM-N0-02-05-30-022-140

INTEGRATED CRUISE - LR FL390

Applicable to: ALL 321

INTEGRATED CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0%

DISTANCE (NM)
TIME (MIN)

LR FL390

WEIGHT (1000KG)	.0	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	TAS (KT)
48	0 0	47 7	94 13	142 20	189 26	236 33	283 39	329 45	376 52	423 58	432
50	469 65	515 71	561 77	607 84	653 90	699 96	745 102	790 109	836 115	881 121	438
52	926 127	971 133	1016 139	1061 145	1106 151	1151 157	1195 163	1239 169	1283 175	1328 181	441
54	1372 187	1415 193	1459 199	1503 205	1546 211	1590 217	1633 222	1676 228	1719 234	1763 240	446
56	1806 245	1848 251	1891 257	1933 263	1976 268	2018 274	2060 280	2102 285	2144 291	2186 296	449
58	2228 302	2270 307	2311 313	2353 318	2394 324	2435 330	2476 335	2517 340	2558 346	2599 351	450
60	2640 357	2680 362	2720 367	2761 373	2801 378	2841 384	2881 389	2921 394	2961 399	3001 405	451
62	3040 410	3080 415	3119 420	3158 426	3197 431	3236 436	3275 441	3314 446	3352 451	3391 456	452
64	3429 461	3467 467	3505 472	3543 477	3581 482	3619 487	3656 492	3694 496	3731 501	3768 506	453
66	3806 511	3842 516	3879 521	3916 526	3952 531	3989 536	4025 540	4060 545	4096 550	4132 554	453
68	4168 559	4204 564									453
70											
72											
74											
76											
78											
80											
82											
84											
86											
88											

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10C -08F0A321-131 IAE V2530-A5 22100000C5KG330 0 018590 0 0 1 1.0 .0 .00 03901 .990 .000 .000 0 FCOM-N0-02-05-30-022-158

CLIMB CORRECTION

CLIMB CORRECTION

Applicable to: ALL 320

The planner must correct the values for the fuel and the time obtained from the integrated cruise tables with the numbers given in the following tables. The tables which are established for M .78 and long range speed, take into account climbing from the brake release point at 250 kt/300 kt/M .78.

M .78 AND LONG RANGE SPEED

CORRECTION ON FUEL CONSUMPTION (1 000 KG)									
FL	WEIGHT AT BRAKE RELEASE (1 000 KG)								Time Correction
	50	54	58	62	66	70	74	78	
390	0.8	0.9	0.9	1.0	-	-	-	-	4 min
370	0.8	0.9	0.9	1.0	1.0	1.0	-	-	4 min
350	0.8	0.8	0.9	0.9	1.0	1.0	1.1	-	5 min
330	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.1	5 min
310	0.7	0.8	0.8	0.9	0.9	0.9	1.0	1.1	5 min
290	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0	5 min
270	0.6	0.7	0.7	0.8	0.8	0.9	0.9	1.0	5 min
250	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	5 min
200	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	5 min
150	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	4 min
100	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	3 min

CLIMB CORRECTION

Applicable to: ALL 321

The planner must correct the values for the fuel and the time obtained from the integrated cruise tables with the numbers given in the following tables. The tables which are established for M .78 and long range speed, take into account climbing from the brake release point at 250 kt/300 kt/M .78.

M .78 AND LONG RANGE SPEED

CORRECTION ON FUEL CONSUMPTION (1 000 KG)									
FL	WEIGHT AT BRAKE RELEASE (1 000 KG)								Time Correction
	60	64	68	72	76	80	84	88	
390	1.0	1.0	1.1						4 min
370	0.9	1.0	1.1	1.1	1.1				4 min
350	0.9	1.0	1.0	1.1	1.1	1.2			4 min
330	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	5 min
310	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	5 min
290	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	5 min
270	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.1	5 min
250	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0	5 min
200	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.9	5 min
150	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	4 min
100	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	3 min

STEP CLIMB CORRECTION

STEP CLIMB CORRECTION

Applicable to: ALL 320

When the flight includes one or more step climbs (2 000 ft below FL 290, 4 000 ft above), apply a correction of 50 kg per step climb to the fuel consumption.

STEP CLIMB CORRECTION

Applicable to: ALL 321

When the flight includes one or more step climbs (2 000 ft below FL 290, 4 000 ft above), apply a correction of 70 kg per step climb to the fuel consumption.

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DESCENT CORRECTION

DESCENT CORRECTION

Applicable to: ALL 320

Correct the fuel and time values determined in the integrated cruise tables as follows to take into account the descent down to 1 500 ft followed by a 6 min IFR approach and landing.

CORRECTION ON FUEL CONSUMPTION (1 000 kg)								
FL	WEIGHT OVERHEAD DESTINATION (1 000 kg)							Time Correction
	46	50	54	58	62	66	70	
390	0.2	0.2	0.2	0.3	0.3	-	-	10 min
370	0.2	0.2	0.2	0.2	0.3	0.3	0.4	10 min
350	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
330	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
310	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
290	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
270	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
250	0.2	0.2	0.2	0.2	0.3	0.3	0.3	11 min
200	0.2	0.2	0.2	0.2	0.3	0.3	0.3	10 min
150	0.1	0.2	0.2	0.2	0.2	0.2	0.2	10 min
100	0.1	0.1	0.1	0.1	0.1	0.2	0.2	9 min

DESCENT CORRECTION

Applicable to: ALL 321

Correct the fuel and time values determined in the integrated cruise tables as follows to take into account the descent down to 1 500 ft followed by a 6 min IFR approach and landing.

CORRECTION ON FUEL CONSUMPTION (1 000 kg)								
FL	WEIGHT OVERHEAD DESTINATION (1 000 kg)							Time Correction
	60	64	68	72	76	80	84	
390	0.1	0.2	0.2					10 min
370	0.1	0.2	0.2	0.3	0.3			10 min
350	0.1	0.2	0.2	0.2	0.2	0.3		10 min
330	0.1	0.2	0.2	0.2	0.2	0.3	0.3	10 min
310	0.1	0.2	0.2	0.2	0.2	0.3	0.3	10 min
290	0.1	0.2	0.2	0.2	0.2	0.2	0.3	10 min
270	0.1	0.2	0.2	0.2	0.2	0.2	0.3	11 min
250	0.1	0.2	0.2	0.2	0.2	0.2	0.2	11 min
200	0.1	0.1	0.1	0.2	0.2	0.2	0.2	10 min
150	0.1	0.1	0.1	0.1	0.1	0.1	0.1	9 min
100	0	0	0	0	0	0.1	0.1	9 min

INTRODUCTION

INTRODUCTION

Applicable to: ALL 320

The following flight planning tables allow the planner to determine trip fuel consumption and trip time required to cover a given air distance.

These tables are established for:
- Takeoff
- Climb profile 250 kt/300 kt/M 0.78
- Cruise Mach number M 0.78/LR
- Descent profile M 0.78/300 kt/250 kt
- Approach and landing 120 kg - 6 min IFR
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

They are based upon a reference landing weight of 55 000 kg.

Note: *1. In the tables, the asterisk (*) means that a step climb of 4 000 ft must be flown to reach the corresponding FL.*
2. To obtain a flight plan at optimum cruise level, the highest flight level desired within the flight has to be selected in the table.
3. For each degree Celcius above ISA temperature apply fuel correction 0.015 (kg/°C/NM) x ΔISA (°C) x Air Distance (NM).

INTRODUCTION

Applicable to: ALL 321

1 The following flight planning tables allow the planner to determine trip fuel consumption and trip time required to cover a given air distance.

These tables are established for:
- Takeoff
- Climb profile 250 kt/300 kt/M 0.78
- Cruise Mach number M 0.78/LR
- Descent profile M 0.78/300 kt/250 kt
- Approach and landing 140 kg - 6 min IFR
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

They are based upon a reference landing weight of 60 000 kg and have been calculated using databases for CFM 56–5–B /P. If the engines fitted on the aircraft are neither /P, nor /3, the fuel consumption has to be increased by 3 % .

Note: *1. In the tables, the asterisk (*) means that a step climb of 4 000 ft must be flown to reach the corresponding FL.*
2. To obtain a flight plan at optimum cruise level, the highest flight level desired within the flight has to be selected in the table.
3. For each degree Celcius above ISA temperature apply fuel correction 0.015 (kg/°C/NM) x ΔISA (°C) x Air Distance (NM).

CORRECTION FOR DEVIATION FROM REFERENCE LANDING WEIGHT

CORRECTION FOR DEVIATION FROM REFERENCE LANDING WEIGHT

Applicable to: ALL

The fuel consumption must be corrected when the actual landing weight is different from the reference landing weight.
If it is lower (or greater) than the reference landing weight, subtract (or add) the value given in the correction part of the table per 1 000 kg below (or above) the reference landing weight.

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EXAMPLE

EXAMPLE

Applicable to: ALL 320

The following is an example of a complete flight plan based on the assumptions:
- Zero fuel weight: 60 000 kg = landing weight at alternate airport
- Cruise M .78 at FL 370
- Ground distance from departure to destination: 1 800 nm
- Average wind during flight: -40 kt (headwind)
- ISA conditions
- “En route” reserve: 5 %
- Ground distance from destination to alternate: 200 nm, no wind at FL 200

To calculate the flight plan, a reverse calculation is needed, i.e. start with the landing weight at alternate (the schematic *Refer to PER-FPL-GEN-FPL FLIGHT PLAN* gives an overview of the calculation to be performed).

1. Alternate fuel and time

   - *Refer to PER-FPL-FLP-ALN-20 ALTERNATE PLANNING ISA* ;
     Alternate time : 38 min
     Alternate fuel : 1 573 + 9 × (60 – 55) = 1 618 kg

2. Holding fuel and time

   - A 30 min holding is assumed at 1 500 ft. (*Refer to PER-HLD-HLD CONF 0 - GREEN DOT SPEED*), holding fuel = 1 090 kg

3. At destination, the landing weight = 60 000 + 1 618 + 1 090 = 62 708 kg
4. Evaluation of the air distance between departure and destination.

   - The “Ground distance/Air distance” conversion table (*Refer to PER-OPD-CON-AEO M.78*) shows that the corresponding air distance is: 1 975 nm.

5. Trip fuel and time

   - Enter air distance and flight level 370 (*Refer to PER-FPL-FLP-QFP-40 FLIGHT PLANNING M.78*), read the corresponding values of fuel consumption and time, for the reference landing weight and without deviation from ISA.
     Fuel : 10 205 kg
     Time = 4 h 37 min
   - Correction for landing weight
     Δfuel consumption : 146 × (62.7 – 55) = 1 124 kg
     Trip reserves (5 %) : 0.05 × (10 205 + 1 124) = 567 kg

6. Taxi fuel = 140 kg (*Refer to PER-FPL-GEN-MFR MINIMUM RECOMMENDED FUEL REQUIREMENTS*)
7. Total fuel on board (Block fuel) :
   10 205 + 1 124 + 567 + 1 090 + 1 618 + 140 = 14 744 kg

EXAMPLE

Applicable to: ALL 321

The following is an example of a complete flight plan based on the assumptions:
- Zero fuel weight: 65 000 kg = landing weight at alternate airport
- Cruise M .78 at FL 370
- Ground distance from departure to destination: 1 800 nm
- Average wind during flight: -40 kt (headwind)
- ISA conditions
- “En route” reserve: 5 %
- Ground distance from destination to alternate: 200 nm, no wind at FL 200

To calculate the flight plan, a reverse calculation is needed, i.e. start with the landing weight at alternate (the schematic *Refer to PER-FPL-GEN-FPL FLIGHT PLAN* gives an overview of the calculation to be performed).

1. Alternate fuel and time

   - *Refer to PER-FPL-FLP-ALN-20 ALTERNATE PLANNING ISA* ;
     Alternate time : 38 min
     Alternate fuel : 1 725 + 9 × (65 – 60) = 1 770 kg

2. Holding fuel and time

   - A 30 min holding is assumed at 1 500 ft. (*Refer to PER-HLD-HLD CONF 0 - GREEN DOT SPEED*), holding fuel = 1 305 kg

3. At destination, the landing weight = 65 000 + 1 770 + 1 305 = 68 075 kg
4. Evaluation of the air distance between departure and destination.

   - The “Ground distance/Air distance” conversion table (*Refer to PER-OPD-CON-AEO M.78*) shows that the corresponding air distance is: 1 975 nm.

5. Trip fuel and time

   - Enter air distance and flight level 370 (*Refer to PER-FPL-FLP-QFP-40 FLIGHT PLANNING M.78*), read the corresponding values of fuel consumption and time, for the reference landing weight and without deviation from ISA.
     Fuel : 11 299 kg
     Time = 4 h 37 min
   - Correction for landing weight
     Δfuel consumption : 149 × (68.075 – 60) = 1 204 kg
     Trip reserves (5 %) : 0.05 × (11 299 + 1 204) = 626 kg

6. Taxi fuel = 160 kg (*Refer to PER-FPL-GEN-MFR MINIMUM RECOMMENDED FUEL REQUIREMENTS*)
7. Total fuel on board (Block fuel) :
   11 299 + 1 204 + 626 + 1 305 + 1 770 + 160 = 16 364 kg

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FLIGHT PLANNING AT A GIVEN MACH NUMBER

FLIGHT PLANNING M.78

Applicable to: ALL 320

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
200	1615 0.39	1603 0.39	1600 0.39	1601 0.39			11	14	
225	1757 0.42	1736 0.42	1726 0.42	1722 0.42	1722 0.42		12	15	16
250	1899 0.45	1869 0.45	1853 0.46	1843 0.46	1838 0.46	1841 0.46	12	16	18
275	2042 0.49	2003 0.49	1979 0.49	1964 0.49	1955 0.49	1955 0.49	13	17	19
300	2184 0.52	2136 0.52	2106 0.52	2085 0.52	2071 0.52	2069 0.52	13	18	21
325	2327 0.55	2269 0.55	2233 0.55	2206 0.56	2187 0.56	2183 0.56	14	19	22
350	2469 0.58	2402 0.59	2359 0.59	2328 0.59	2304 0.59	2297 0.59	15	20	24
375	2612 1.02	2536 1.02	2486 1.02	2449 1.02	2420 1.02	2412 1.02	15	21	26
400	2754 1.05	2669 1.05	2613 1.05	2571 1.06	2537 1.06	2527 1.06	16	22	27
425	2897 1.08	2803 1.08	2740 1.09	2693 1.09	2654 1.09	2642 1.09	16	23	29
450	3040 1.11	2936 1.12	2868 1.12	2815 1.12	2771 1.13	2757 1.13	17	24	30
475	3182 1.15	3070 1.15	2995 1.15	2937 1.16	2888 1.16	2873 1.16	17	25	32
500	3325 1.18	3204 1.18	3123 1.19	3059 1.19	3005 1.19	2988 1.19	18	26	33
525	3468 1.21	3338 1.22	3250 1.22	3181 1.22	3123 1.23	3104 1.23	19	27	35
550	3611 1.24	3472 1.25	3378 1.25	3303 1.26	3240 1.26	3220 1.26	19	28	37
575	3754 1.28	3606 1.28	3506 1.29	3426 1.29	3358 1.29	3337 1.29	20	29	38
600	3897 1.31	3741 1.31	3634 1.32	3548 1.32	3475 1.33	3453 1.33	20	30	40
625	4040 1.34	3875 1.35	3762 1.35	3671 1.36	3593 1.36	3570 1.36	21	31	42
650	4183 1.37	4010 1.38	3890 1.39	3794 1.39	3711 1.39	3687 1.39	22	32	43
675	4327 1.41	4145 1.41	4018 1.42	3917 1.42	3830 1.43	3804 1.43	22	33	45
700	4470 1.44	4279 1.45	4147 1.45	4040 1.46	3948 1.46	3922 1.46	23	34	47
725	4613 1.47	4414 1.48	4276 1.49	4163 1.49	4066 1.49	4039 1.49	23	35	48
750	4757 1.51	4550 1.51	4404 1.52	4286 1.52	4185 1.53	4157 1.53	24	36	51
775	4900 1.54	4685 1.54	4533 1.55	4410 1.56	4304 1.56	4276 1.56	25	37	53
800	5044 1.57	4820 1.58	4662 1.58	4534 1.59	4423 2.00	4394 2.00	25	38	54
825	5187 2.00	4956 2.01	4792 2.02	4657 2.03	4542 2.03	4513 2.03	26	39	56

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.4 %	△FUEL = + 3 %	△FUEL = + 5.5 %

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7800 .00200 120 0300350 55 0 100100 40100 18590 FCOM-N0-02-05-40-003-140

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
825	5187 2.00	4956 2.01	4792 2.02	4657 2.03	4542 2.03	4513 2.03	26	39	56
850	5331 2.04	5091 2.04	4921 2.05	4781 2.06	4661 2.06	4632 2.06	27	40	58
875	5475 2.07	5227 2.08	5050 2.08	4905 2.09	4781 2.10	4751 2.10	28	41	60
900	5618 2.10	5363 2.11	5180 2.12	5029 2.13	4901 2.13	4871 2.13	28	42	61
925	5762 2.13	5499 2.14	5310 2.15	5153 2.16	5020 2.16	4991 2.16	29	44	63
950	5906 2.17	5635 2.17	5439 2.18	5278 2.19	5140 2.20	5111 2.20	30	45	65
975	6050 2.20	5771 2.21	5569 2.22	5402 2.23	5260 2.23	5231 2.23	30	46	67
1000	6194 2.23	5907 2.24	5699 2.25	5527 2.26	5380 2.26	5351 2.26	31	47	69
1025	6338 2.26	6043 2.27	5830 2.28	5652 2.29	5501 2.30	5472 2.30	32	48	70
1050	6482 2.30	6180 2.31	5960 2.32	5776 2.33	5621 2.33	5593 2.33	33	49	72
1075	6626 2.33	6316 2.34	6090 2.35	5901 2.36	5742 2.37	5714 2.37	33	50	74
1100	6770 2.36	6453 2.37	6221 2.38	6026 2.39	5862 2.40	5835 2.40	34	51	76
1125	6914 2.39	6590 2.40	6351 2.42	6152 2.43	5983 2.43	5957 2.43	35	52	78
1150	7058 2.43	6727 2.44	6482 2.45	6277 2.46	6104 2.47	6079 2.47	36	53	80
1175	7203 2.46	6864 2.47	6613 2.48	6402 2.49	6225 2.50	6201 2.50	37	55	81
1200	7347 2.49	7001 2.50	6744 2.51	6528 2.53	6347 2.53	6323 2.53	37	56	83
1225	7492 2.52	7138 2.54	6875 2.55	6654 2.56	6468 2.57	6446 2.57	38	57	85
1250	7636 2.56	7276 2.57	7007 2.58	6780 2.59	6590 3.00	6569 3.00	39	58	87
1275	7781 2.59	7413 3.00	7138 3.01	6906 3.03	6712 3.03	6692 3.03	40	59	89
1300	7925 3.02	7551 3.03	7270 3.05	7032 3.06	6834 3.07	6815 3.07	41	60	91
1325	8070 3.05	7689 3.07	7402 3.08	7158 3.09	6956 3.10	6939 3.10	42	61	93
1350	8215 3.09	7827 3.10	7534 3.11	7285 3.13	7078 3.13	7064 3.13	43	62	95
1375	8360 3.12	7965 3.13	7666 3.15	7411 3.16	7201 3.17	7188 3.17	43	64	97
1400	8504 3.15	8103 3.17	7798 3.18	7538 3.19	7323 3.20	7313 3.20	44	65	99
1425	8649 3.19	8241 3.20	7930 3.21	7665 3.23	7446 3.24	7438 3.24	45	66	101
1450	8794 3.22	8379 3.23	8063 3.25	7792 3.26	7569 3.27	7563 3.27	46	67	103

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.4 %	△FUEL = + 3 %	△FUEL = + 5.5 %

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7800 .00200 120 0300350 55 0 100100 40100 18590 FCOM-N0-02-05-40-004-140

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1450	8794 3.22	8379 3.23	8063 3.25	7792 3.26	7569 3.27	7563 3.27	46	67	103
1475	8940 3.25	8518 3.26	8196 3.28	7919 3.29	7693 3.30	7689 3.30	47	68	105
1500	9085 3.28	8657 3.30	8328 3.31	8046 3.33	7816 3.34	7814 3.34	48	69	107
1525	9231 3.32	8795 3.33	8461 3.35	8174 3.36	7939 3.37	7940 3.37	49	71	109
1550	9377 3.35	8934 3.36	8594 3.38	8301 3.39	8063 3.40	8067 3.40	50	72	111
1575	9523 3.38	9073 3.40	8727 3.41	8429 3.43	8187 3.44	8193 3.44	50	73	113
1600	9669 3.41	9213 3.43	8861 3.45	8557 3.46	8311 3.47	8320 3.47	51	74	115
1625	9815 3.45	9352 3.46	8994 3.48	8685 3.50	8435 3.50	8447 3.50	52	75	117
1650	9962 3.48	9492 3.49	9128 3.51	8813 3.53	8559 3.54	8575 3.54	53	76	119
1675	10108 3.51	9631 3.53	9261 3.54	8941 3.56	8683 3.57	8703 3.57	54	78	121
1700	10255 3.54	9771 3.56	9395 3.58	9069 4.00	8808 4.01	8831 4.01	55	79	123
1725	10401 3.58	9911 3.59	9530 4.01	9198 4.03	8933 4.04	8959 4.04	56	80	125
1750	10548 4.01	10051 4.03	9664 4.04	9326 4.06	9058 4.07	9087 4.07	57	81	127
1775	10695 4.04	10191 4.06	9798 4.08	9455 4.10	9183 4.11	9216 4.11	58	82	129
1800	10842 4.07	10332 4.09	9933 4.11	9584 4.13	9309 4.14	9345 4.14	59	84	132
1825	10988 4.11	10472 4.12	10068 4.14	9713 4.16	9436 4.17	9475 4.17	60	85	134
1850	11135 4.14	10613 4.16	10203 4.18	9842 4.20	9563 4.21	9605 4.21	61	86	136
1875	11282 4.17	10754 4.19	10338 4.21	9972 4.23	9691 4.24	9747 4.24*	62	87	138
1900	11430 4.20	10895 4.22	10473 4.24	10101 4.26	9819 4.27	9877 4.27*	63	89	140
1925	11577 4.24	11036 4.26	10608 4.28	10231 4.30	9948 4.31	10006 4.31*	64	90	142
1950	11724 4.27	11177 4.29	10744 4.31	10361 4.33	10076 4.34	10136 4.34*	65	91	144
1975	11872 4.30	11318 4.32	10879 4.34	10491 4.36	10205 4.37	10266 4.38*	66	93	146
2000	12019 4.33	11460 4.35	11015 4.38	10621 4.40	10334 4.41	10396 4.41*	67	94	149
2025	12167 4.37	11601 4.39	11151 4.41	10751 4.43	10464 4.44	10526 4.44*	68	95	151
2050	12314 4.40	11743 4.42	11287 4.44	10881 4.46	10593 4.48	10657 4.48*	70	97	153
2075	12462 4.43	11885 4.45	11424 4.48	11012 4.50	10723 4.51	10787 4.51*	71	98	155

LOW AIR CONDITIONING
△FUEL = − 0.4 %

ENGINE ANTI ICE ON
△FUEL = + 3 %

TOTAL ANTI ICE ON
△FUEL = + 5.5 %

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7800 .00200 120 0300350 55 0 100100 40100 18590 FCOM-N0-02-05-40-005-140

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2075	12462 4.43	11885 4.45	11424 4.48	11012 4.50	10723 4.51	10787 4.51*	71	98	155
2100	12610 4.47	12027 4.49	11560 4.51	11143 4.53	10853 4.54	10918 4.54*	72	99	157
2125	12758 4.50	12169 4.52	11696 4.54	11273 4.56	10983 4.58	11049 4.58*	73	101	160
2150	12906 4.53	12311 4.55	11833 4.57	11404 5.00	11114 5.01	11180 5.01*	74	102	162
2175	13054 4.56	12453 4.59	11970 5.01	11535 5.03	11245 5.04	11311 5.04*	75	103	165
2200	13202 5.00	12596 5.02	12107 5.04	11667 5.06	11376 5.08	11442 5.08*	76	105	167
2225	13351 5.03	12739 5.05	12244 5.07	11798 5.10	11507 5.11	11574 5.11*	77	106	169
2250	13499 5.06	12881 5.08	12381 5.11	11929 5.13	11639 5.14	11705 5.14*	79	107	171
2275	13647 5.09	13024 5.12	12519 5.14	12061 5.16	11770 5.18	11837 5.18*	80	109	173
2300	13796 5.13	13168 5.15	12657 5.17	12193 5.20	11902 5.21	11970 5.21*	81	110	175
2325	13945 5.16	13311 5.18	12794 5.21	12325 5.23	12035 5.25	12102 5.24*	82	112	178
2350	14093 5.19	13454 5.22	12932 5.24	12457 5.26	12167 5.28	12235 5.28*	83	113	180
2375	14242 5.22	13598 5.25	13071 5.27	12589 5.30	12300 5.31	12367 5.31*	84	115	182
2400	14391 5.26	13741 5.28	13209 5.31	12722 5.33	12433 5.35	12501 5.34*	86	116	184
2425	14540 5.29	13885 5.31	13347 5.34	12854 5.37	12567 5.38	12634 5.38*	87	117	187
2450	14691 5.32	14029 5.35	13486 5.37	12987 5.40	12701 5.41	12768 5.41*	88	119	189
2475	14842 5.35	14173 5.38	13625 5.41	13120 5.43	12835 5.45	12901 5.44*	89	120	191
2500	14993 5.39	14317 5.41	13764 5.44	13253 5.47	12969 5.48	13035 5.48*	90	122	193
2525	15144 5.42	14462 5.45	13903 5.47	13387 5.50	13104 5.51	13170 5.51*	92	123	196
2550	15295 5.45	14606 5.48	14042 5.51	13520 5.53	13239 5.55	13304 5.54*	93	125	198
2575	15446 5.48	14751 5.51	14181 5.54	13654 5.57	13374 5.58	13439 5.58*	94	126	200
2600	15598 5.52	14896 5.54	14321 5.57	13787 6.00	13510 6.01	13574 6.01*	95	128	202
2625	15750 5.55	15041 5.58	14461 6.00	13921 6.03	13645 6.05	13709 6.04*	96	129	205
2650	15901 5.58	15186 6.01	14600 6.04	14055 6.07	13781 6.08	13844 6.08*	97	131	207
2675	16053 6.01	15332 6.04	14740 6.07	14189 6.10	13918 6.12	13980 6.11*	99	132	209
2700	16205 6.05	15478 6.08	14880 6.10	14324 6.13	14054 6.15	14115 6.15*	100	134	211

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.4 %	△FUEL = + 3 %	△FUEL = + 5.5 %

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7800 .00200 120 0300350 55 0 100100 40100 18590 FCOM-N0-02-05-40-006-140

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2700	16205 6.05	15478 6.08	14880 6.10	14324 6.13	14054 6.15	14115 6.15*	100	134	211
2725	16358 6.08	15624 6.11	15020 6.14	14458 6.17	14191 6.18	14251 6.18*	101	135	214
2750	16510 6.11	15770 6.14	15160 6.17	14593 6.20	14328 6.22	14387 6.21*	102	137	216
2775	16662 6.15	15916 6.17	15301 6.20	14727 6.23	14466 6.25	14524 6.25*	104	138	218
2800	16815 6.18	16062 6.21	15441 6.24	14862 6.27	14603 6.28	14660 6.28*	105	140	221
2825	16968 6.21	16209 6.24	15582 6.27	14998 6.30	14741 6.32	14797 6.31*	106	142	223
2850	17121 6.24	16355 6.27	15723 6.30	15134 6.33	14879 6.35	14934 6.35*	107	143	225
2875	17273 6.28	16502 6.31	15864 6.34	15270 6.37	15018 6.38	15071 6.38*	109	145	228
2900	17427 6.31	16649 6.34	16005 6.37	15407 6.40	15157 6.42	15209 6.41*	110	147	230
2925	17580 6.34	16796 6.37	16146 6.40	15543 6.43	15297 6.45	15347 6.45*	111	148	232
2950	17733 6.37	16943 6.40	16288 6.44	15680 6.47	15437 6.49	15485 6.48*	113	150	235
2975	17887 6.41	17091 6.44	16429 6.47	15817 6.50	15578 6.52	15624 6.51*	114	152	237
3000	18040 6.44	17238 6.47	16571 6.50	15954 6.53	15719 6.55	15762 6.55*	115	154	239
3025	18194 6.47	17386 6.50	16713 6.54	16092 6.57	15860 6.59	15901 6.58*	117	155	242
3050	18348 6.50	17534 6.54	16855 6.57	16229 7.00	16001 7.02	16040 7.01*	118	157	244
3075	18502 6.54	17682 6.57	16997 7.00	16367 7.03	16143 7.05	16180 7.05*	119	159	246
3100	18657 6.57	17830 7.00	17140 7.03	16505 7.07	16285 7.09	16319 7.08*	121	161	248

LOW AIR CONDITIONING
△FUEL = − 0.4 %

ENGINE ANTI ICE ON
△FUEL = + 3 %

TOTAL ANTI ICE ON
△FUEL = + 5.5 %

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7800 .00200 120 0300350 55 0 100100 40100 18590 FCOM-N0-02-05-40-007-140

FLIGHT PLANNING M.78

Applicable to: ALL 321

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. LANDING WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
200	1768 0.38	1756 0.38	1751 0.39	1751 0.39			14	16	
225	1923 0.42	1903 0.42	1890 0.42	1884 0.42	1885 0.42		14	17	18
250	2078 0.45	2050 0.45	2030 0.45	2017 0.45	2013 0.45	2016 0.45	15	18	20
275	2233 0.48	2197 0.48	2169 0.48	2150 0.49	2141 0.49	2142 0.49	16	19	22
300	2389 0.51	2344 0.52	2309 0.52	2284 0.52	2270 0.52	2268 0.52	17	20	23
325	2545 0.55	2491 0.55	2449 0.55	2417 0.55	2398 0.55	2394 0.55	18	21	25
350	2700 0.58	2638 0.58	2589 0.58	2551 0.59	2527 0.59	2521 0.59	18	22	26
375	2856 1.01	2786 1.01	2729 1.02	2685 1.02	2656 1.02	2647 1.02	19	23	28
400	3012 1.04	2933 1.05	2869 1.05	2819 1.05	2785 1.05	2774 1.05	20	24	29
425	3168 1.08	3081 1.08	3009 1.08	2953 1.09	2914 1.09	2901 1.09	21	25	31
450	3324 1.11	3229 1.11	3150 1.12	3087 1.12	3044 1.12	3028 1.12	22	26	32
475	3480 1.14	3377 1.15	3290 1.15	3221 1.15	3173 1.16	3155 1.16	22	27	34
500	3637 1.18	3525 1.18	3431 1.18	3356 1.19	3303 1.19	3283 1.19	23	28	36
525	3793 1.21	3673 1.21	3572 1.22	3490 1.22	3433 1.22	3411 1.22	24	29	37
550	3950 1.24	3821 1.24	3713 1.25	3625 1.25	3563 1.26	3539 1.26	25	30	39
575	4107 1.27	3970 1.28	3854 1.28	3760 1.29	3693 1.29	3667 1.29	26	31	41
600	4264 1.31	4119 1.31	3996 1.32	3895 1.32	3824 1.32	3796 1.32	27	32	42
625	4421 1.34	4267 1.34	4137 1.35	4031 1.35	3955 1.36	3925 1.36	27	33	44
650	4578 1.37	4416 1.38	4279 1.38	4166 1.39	4086 1.39	4055 1.39	28	34	46
675	4736 1.40	4565 1.41	4421 1.41	4302 1.42	4217 1.42	4184 1.42	29	35	48
700	4893 1.44	4715 1.44	4563 1.45	4438 1.45	4348 1.46	4314 1.46	30	36	50
725	5051 1.47	4864 1.47	4705 1.48	4574 1.49	4480 1.49	4444 1.49	31	38	51
750	5208 1.50	5013 1.51	4847 1.51	4710 1.52	4611 1.52	4574 1.52	32	39	53
775	5366 1.53	5163 1.54	4989 1.55	4846 1.55	4743 1.56	4705 1.56	33	40	55
800	5524 1.57	5312 1.57	5132 1.58	4982 1.59	4875 1.59	4835 1.59	33	41	57
825	5682 2.00	5462 2.01	5274 2.01	5119 2.02	5007 2.03	4966 2.03	34	42	58

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 2.5 %	△FUEL = + 5 %

FLIP22B A321-131 IAE V2530-A53420 03301.000011 0250300 .7800 .000200 140 0300350 60 0 100 45 45 45 18590 FCOM-N0-02-05-40-003-150

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. LANDING WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
825	5682 2.00	5462 2.01	5274 2.01	5119 2.02	5007 2.03	4966 2.03	34	42	58
850	5840 2.03	5612 2.04	5417 2.05	5255 2.05	5140 2.06	5097 2.06	35	43	60
875	5999 2.06	5762 2.07	5560 2.08	5392 2.09	5272 2.09	5229 2.09	36	44	62
900	6157 2.10	5912 2.10	5703 2.11	5529 2.12	5405 2.13	5360 2.13	37	45	64
925	6316 2.13	6063 2.14	5846 2.15	5666 2.16	5537 2.16	5492 2.16	38	46	66
950	6474 2.16	6213 2.17	5989 2.18	5803 2.19	5670 2.19	5624 2.19	39	47	67
975	6633 2.19	6364 2.20	6133 2.21	5941 2.22	5803 2.23	5756 2.23	40	49	69
1000	6792 2.23	6514 2.24	6276 2.25	6078 2.26	5937 2.26	5889 2.26	41	50	71
1025	6951 2.26	6665 2.27	6420 2.28	6216 2.29	6070 2.29	6022 2.29	41	51	73
1050	7110 2.29	6816 2.30	6563 2.31	6354 2.32	6204 2.33	6155 2.33	42	52	75
1075	7269 2.32	6967 2.33	6707 2.35	6492 2.36	6338 2.36	6288 2.36	43	53	77
1100	7428 2.36	7118 2.37	6851 2.38	6630 2.39	6471 2.39	6421 2.39	44	54	78
1125	7588 2.39	7269 2.40	6996 2.41	6768 2.42	6606 2.43	6555 2.43	45	55	80
1150	7748 2.42	7421 2.43	7140 2.44	6907 2.46	6740 2.46	6689 2.46	46	57	82
1175	7907 2.46	7572 2.47	7284 2.48	7045 2.49	6874 2.50	6823 2.50	47	58	84
1200	8067 2.49	7724 2.50	7429 2.51	7184 2.52	7009 2.53	6957 2.53	48	59	86
1225	8227 2.52	7876 2.53	7574 2.54	7323 2.56	7144 2.56	7092 2.56	49	60	88
1250	8387 2.55	8028 2.56	7718 2.58	7462 2.59	7279 3.00	7227 3.00	50	61	90
1275	8548 2.59	8180 3.00	7863 3.01	7601 3.02	7414 3.03	7362 3.03	51	62	92
1300	8708 3.02	8332 3.03	8009 3.04	7740 3.06	7549 3.06	7497 3.06	51	64	93
1325	8869 3.05	8484 3.06	8154 3.08	7880 3.09	7685 3.10	7633 3.10	52	65	95
1350	9030 3.08	8637 3.10	8299 3.11	8019 3.12	7820 3.13	7769 3.13	53	66	97
1375	9191 3.12	8790 3.13	8445 3.14	8159 3.16	7956 3.16	7905 3.16	54	67	99
1400	9352 3.15	8943 3.16	8591 3.18	8299 3.19	8092 3.20	8041 3.20	55	68	101
1425	9513 3.18	9096 3.20	8737 3.21	8439 3.22	8229 3.23	8178 3.23	56	70	103
1450	9674 3.21	9249 3.23	8883 3.24	8580 3.26	8365 3.27	8314 3.27	57	71	105

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.6 %	△FUEL = + 2.5 %	△FUEL = + 5 %

FLIP22B A321-131 IAE V2530-A53420 03301.000011 0250300 .7800 .000200 140 0300350 60 0 100 45 45 45 18590 FCOM-N0-02-05-40-004-150

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. LANDING WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1450	9674 3.21	9249 3.23	8883 3.24	8580 3.26	8365 3.27	8314 3.27	57	71	105
1475	9836 3.25	9403 3.26	9030 3.28	8720 3.29	8503 3.30	8452 3.30	58	72	107
1500	9998 3.28	9556 3.29	9176 3.31	8861 3.32	8640 3.33	8591 3.33	59	73	109
1525	10159 3.31	9710 3.33	9323 3.34	9002 3.36	8778 3.37	8730 3.37	60	75	111
1550	10321 3.34	9864 3.36	9470 3.38	9143 3.39	8916 3.40	8870 3.40	61	76	113
1575	10483 3.38	10018 3.39	9617 3.41	9285 3.42	9054 3.43	9010 3.43	62	77	115
1600	10646 3.41	10172 3.43	9764 3.44	9426 3.46	9193 3.47	9151 3.47	63	78	117
1625	10808 3.44	10326 3.46	9912 3.47	9568 3.49	9332 3.50	9292 3.50	64	80	119
1650	10970 3.47	10480 3.49	10059 3.51	9710 3.52	9471 3.53	9433 3.53	65	81	121
1675	11133 3.51	10635 3.52	10207 3.54	9852 3.56	9610 3.57	9575 3.57	66	82	123
1700	11296 3.54	10790 3.56	10355 3.57	9995 3.59	9750 4.00	9723 4.00*	67	84	125
1725	11458 3.57	10945 3.59	10503 4.01	10137 4.03	9889 4.03	9866 4.04*	68	85	127
1750	11621 4.00	11099 4.02	10651 4.04	10280 4.06	10029 4.07	10008 4.07*	69	86	129
1775	11784 4.04	11255 4.06	10799 4.07	10423 4.09	10170 4.10	10150 4.10*	70	87	131
1800	11948 4.07	11410 4.09	10948 4.11	10566 4.13	10310 4.14	10293 4.14*	71	89	134
1825	12111 4.10	11565 4.12	11096 4.14	10709 4.16	10451 4.17	10436 4.17*	72	90	136
1850	12275 4.14	11721 4.15	11245 4.17	10852 4.19	10592 4.20	10579 4.20*	73	92	138
1875	12438 4.17	11876 4.19	11394 4.21	10996 4.23	10733 4.24	10722 4.24*	74	93	140
1900	12602 4.20	12032 4.22	11543 4.24	11139 4.26	10874 4.27	10866 4.27*	75	94	142
1925	12766 4.23	12188 4.25	11692 4.27	11283 4.29	11016 4.30	11009 4.30*	76	96	144
1950	12930 4.27	12344 4.29	11842 4.31	11427 4.33	11157 4.34	11153 4.34*	77	97	146
1975	13094 4.30	12501 4.32	11991 4.34	11571 4.36	11299 4.37	11297 4.37*	78	98	149
2000	13258 4.33	12657 4.35	12141 4.37	11716 4.39	11442 4.40	11441 4.40*	79	100	151
2025	13423 4.36	12813 4.38	12291 4.40	11860 4.43	11584 4.44	11586 4.44*	80	101	153
2050	13587 4.40	12970 4.42	12441 4.44	12005 4.46	11727 4.47	11730 4.47*	81	102	155
2075	13752 4.43	13127 4.45	12591 4.47	12150 4.49	11870 4.51	11875 4.50*	82	104	158

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 2.5 %	△FUEL = + 5 %

FLIP22B A321-131 IAE V2530-A53420 03301.000011 0250300 .7800 .000200 140 0300350 60 0 100 45 45 45 18590 FCOM-N0-02-05-40-005-150

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. LANDING WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2075	13752 4.43	13127 4.45	12591 4.47	12150 4.49	11870 4.51	11875 4.50*	82	104	158
2100	13917 4.46	13284 4.48	12741 4.50	12295 4.53	12013 4.54	12020 4.54*	83	105	160
2125	14082 4.49	13441 4.52	12892 4.54	12440 4.56	12156 4.57	12165 4.57*	84	107	162
2150	14247 4.53	13598 4.55	13042 4.57	12585 4.59	12300 5.01	12310 5.00*	85	108	164
2175	14413 4.56	13756 4.58	13193 5.00	12731 5.03	12444 5.04	12456 5.04*	86	110	166
2200	14579 4.59	13913 5.01	13344 5.04	12877 5.06	12588 5.07	12602 5.07*	87	111	169
2225	14744 5.02	14071 5.05	13495 5.07	13023 5.09	12732 5.11	12748 5.10*	88	112	171
2250	14910 5.06	14229 5.08	13647 5.10	13169 5.13	12877 5.14	12894 5.14*	89	114	173
2275	15076 5.09	14387 5.11	13798 5.14	13315 5.16	13021 5.17	13040 5.17*	90	115	175
2300	15243 5.12	14546 5.15	13950 5.17	13462 5.19	13166 5.21	13187 5.20*	91	117	177
2325	15409 5.15	14704 5.18	14101 5.20	13608 5.23	13312 5.24	13334 5.24*	93	118	180
2350	15575 5.19	14863 5.21	14254 5.24	13755 5.26	13457 5.28	13481 5.27*	94	120	182
2375	15742 5.22	15022 5.24	14406 5.27	13902 5.29	13603 5.31	13628 5.31*	95	121	184
2400	15909 5.25	15181 5.28	14559 5.30	14049 5.33	13749 5.34	13775 5.34*	96	123	186
2425	16076 5.29	15340 5.31	14711 5.34	14197 5.36	13895 5.38	13923 5.37*	97	124	189
2450	16243 5.32	15499 5.34	14864 5.37	14345 5.39	14042 5.41	14071 5.41*	98	126	191
2475	16410 5.35	15659 5.38	15017 5.40	14493 5.43	14189 5.44	14219 5.44*	99	128	193
2500	16577 5.38	15818 5.41	15171 5.43	14641 5.46	14337 5.48	14368 5.47*	100	129	195
2525	16745 5.42	15978 5.44	15324 5.47	14790 5.50	14485 5.51	14517 5.51*	101	131	198
2550	16912 5.45	16138 5.47	15478 5.50	14939 5.53	14633 5.54	14666 5.54*	102	132	200
2575	17080 5.48	16298 5.51	15631 5.53	15088 5.56	14781 5.58	14815 5.57*	104	134	202
2600	17248 5.51	16458 5.54	15785 5.57	15237 6.00	14930 6.01	14965 6.01*	105	135	204
2625	17416 5.55	16619 5.57	15939 6.00	15386 6.03	15079 6.04	15115 6.04*	106	137	207
2650	17584 5.58	16779 6.01	16094 6.03	15536 6.06	15228 6.08	15265 6.07*	107	139	209
2675	17753 6.01	16940 6.04	16248 6.07	15685 6.10	15377 6.11	15415 6.11*	108	140	211
2700	17921 6.04	17101 6.07	16403 6.10	15835 6.13	15527 6.15	15565 6.14*	109	142	214

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP22B A321-131 IAE V2530-A53420 03301.000011 0250300 .7800 .000200 140 0300350 60 0 100 45 45 45 18590 FCOM-N0-02-05-40-006-150

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. LANDING WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2700	17921 6.04	17101 6.07	16403 6.10	15835 6.13	15527 6.15	15565 6.14*	109	142	214
2725	18090 6.08	17262 6.10	16557 6.13	15985 6.16	15677 6.18	15716 6.17*	110	143	216
2750	18259 6.11	17423 6.14	16712 6.17	16135 6.20	15827 6.21	15867 6.21*	112	145	218
2775	18428 6.14	17584 6.17	16867 6.20	16286 6.23	15978 6.25	16018 6.24*	113	147	221
2800	18597 6.17	17746 6.20	17023 6.23	16437 6.26	16128 6.28	16169 6.27*	114	148	223
2825	18766 6.21	17907 6.24	17178 6.27	16587 6.30	16279 6.31	16321 6.31*	115	150	226
2850	18936 6.24	18069 6.27	17334 6.30	16738 6.33	16431 6.35	16473 6.34*	116	152	228
2875	19106 6.27	18231 6.30	17490 6.33	16890 6.36	16582 6.38	16625 6.37*	117	153	230
2900	19276 6.30	18393 6.33	17646 6.37	17041 6.40	16734 6.41	16777 6.41*	119	155	232
2925	19446 6.34	18556 6.37	17802 6.40	17193 6.43	16886 6.45	16929 6.44*	120	157	235
2950	19616 6.37	18718 6.40	17958 6.43	17344 6.46	17038 6.48	17082 6.47*	121	158	237
2975	19787 6.40	18881 6.43	18114 6.47	17496 6.50	17191 6.52	17235 6.51*	122	160	239
3000	19958 6.44	19044 6.47	18271 6.50	17649 6.53	17344 6.55	17388 6.54*	123	162	242
3025	20129 6.47	19207 6.50	18428 6.53	17801 6.56	17497 6.58	17541 6.58*	125	163	244
3050	20300 6.50	19370 6.53	18585 6.56	17954 7.00	17650 7.02	17695 7.01*	126	165	246
3075	20472 6.53	19534 6.56	18742 7.00	18107 7.03	17804 7.05	17849 7.04*	127	167	249
3100	20643 6.57	19698 7.00	18900 7.03	18260 7.06	17954 7.08*	18003 7.08*	128	169	251

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 2.5 %	△FUEL = + 5 %

FLIP22B A321-131 IAE V2530-A53420 03301.000011 0250300 .7800 .000200 140 0300350 60 0 100 45 45 45 18590 FCOM-N0-02-05-40-007-150

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FLIGHT PLANNING AT LONG RANGE SPEED

FLIGHT PLANNING LRC

Applicable to: ALL 320

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DdescENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
200	1587 0.40	1591 0.39	1595 0.39	1601 0.39			14	15	
225	1715 0.44	1714 0.43	1715 0.43	1718 0.42	1722 0.42		15	16	17
250	1844 0.48	1838 0.47	1835 0.46	1836 0.46	1838 0.46	1842 0.46	17	18	18
275	1972 0.52	1962 0.51	1956 0.50	1954 0.49	1954 0.49	1957 0.49	18	19	20
300	2101 0.55	2086 0.54	2076 0.54	2072 0.53	2071 0.52	2072 0.52	19	21	22
325	2229 0.59	2211 0.58	2197 0.57	2190 0.56	2187 0.56	2187 0.56	21	22	24
350	2358 1.03	2335 1.02	2318 1.01	2309 1.00	2304 0.59	2303 0.59	22	24	25
375	2488 1.07	2460 1.05	2439 1.04	2427 1.03	2420 1.03	2419 1.02	23	25	27
400	2617 1.11	2584 1.09	2560 1.08	2546 1.07	2537 1.06	2535 1.06	24	27	29
425	2746 1.15	2709 1.13	2682 1.11	2665 1.10	2654 1.09	2651 1.09	26	28	31
450	2876 1.18	2834 1.16	2804 1.15	2784 1.14	2772 1.13	2768 1.12	27	30	33
475	3006 1.22	2960 1.20	2925 1.18	2904 1.17	2889 1.16	2885 1.16	28	31	34
500	3136 1.26	3085 1.24	3047 1.22	3023 1.21	3007 1.19	3002 1.19	30	33	36
525	3266 1.30	3210 1.27	3170 1.26	3143 1.24	3125 1.23	3119 1.22	31	34	38
550	3396 1.34	3336 1.31	3292 1.29	3263 1.28	3242 1.26	3236 1.26	32	36	40
575	3527 1.37	3462 1.35	3415 1.33	3383 1.31	3361 1.29	3354 1.29	34	38	42
600	3657 1.41	3588 1.38	3537 1.36	3504 1.35	3479 1.33	3472 1.32	35	39	44
625	3788 1.45	3714 1.42	3660 1.40	3624 1.38	3598 1.36	3590 1.36	36	41	46
650	3919 1.49	3840 1.46	3783 1.43	3745 1.41	3716 1.39	3708 1.39	38	42	47
675	4050 1.52	3967 1.49	3906 1.47	3866 1.45	3835 1.43	3827 1.42	39	44	49
700	4181 1.56	4093 1.53	4029 1.50	3987 1.48	3954 1.46	3946 1.46	40	45	51
725	4312 2.00	4220 1.57	4153 1.54	4108 1.52	4073 1.49	4065 1.49	42	47	53
750	4444 2.04	4347 2.00	4276 1.57	4230 1.55	4193 1.53	4184 1.52	43	49	56
775	4576 2.07	4474 2.04	4400 2.01	4351 1.59	4312 1.56	4304 1.56	44	50	57
800	4707 2.11	4601 2.08	4524 2.04	4473 2.02	4432 1.59	4424 1.59	46	52	59
825	4840 2.15	4729 2.11	4648 2.08	4596 2.06	4552 2.03	4544 2.02	47	53	61

LOW AIR CONDITIONING
△FUEL = – 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7800 .00200 120 0300350 55 0 100100 40100 18590 FCOM-N0-02-05-40-008-140

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
825	4840 2.15	4729 2.11	4648 2.08	4596 2.06	4552 2.03	4544 2.02	47	53	61
850	4972 2.19	4856 2.15	4773 2.12	4718 2.09	4672 2.06	4664 2.06	48	55	63
875	5104 2.22	4984 2.19	4897 2.15	4840 2.12	4793 2.09	4785 2.09	50	57	65
900	5237 2.26	5112 2.22	5022 2.19	4963 2.16	4913 2.13	4906 2.12	51	58	67
925	5370 2.30	5240 2.26	5147 2.22	5086 2.19	5034 2.16	5027 2.16	52	60	69
950	5502 2.33	5368 2.30	5272 2.26	5209 2.23	5155 2.19	5149 2.19	54	62	71
975	5635 2.37	5496 2.33	5397 2.29	5332 2.26	5276 2.23	5270 2.22	55	63	73
1000	5769 2.41	5625 2.37	5522 2.33	5456 2.29	5398 2.26	5392 2.26	56	65	75
1025	5902 2.45	5754 2.40	5648 2.36	5580 2.33	5519 2.29	5514 2.29	58	66	76
1050	6036 2.48	5883 2.44	5773 2.40	5704 2.36	5641 2.33	5637 2.32	59	68	78
1075	6169 2.52	6012 2.48	5899 2.43	5828 2.40	5763 2.36	5759 2.36	60	70	80
1100	6303 2.56	6141 2.51	6025 2.47	5952 2.43	5885 2.39	5882 2.39	62	71	82
1125	6438 2.59	6270 2.55	6152 2.50	6077 2.46	6007 2.43	6005 2.42	63	73	84
1150	6572 3.03	6400 2.59	6278 2.54	6201 2.50	6130 2.46	6129 2.45	64	75	86
1175	6706 3.07	6529 3.02	6405 2.57	6326 2.53	6252 2.49	6252 2.49	66	76	88
1200	6841 3.10	6659 3.06	6531 3.01	6451 2.56	6375 2.53	6376 2.52	67	78	90
1225	6976 3.14	6789 3.09	6658 3.04	6577 3.00	6498 2.56	6500 2.55	68	80	92
1250	7111 3.18	6919 3.13	6785 3.07	6702 3.03	6621 2.59	6625 2.59	70	81	94
1275	7246 3.21	7050 3.17	6913 3.11	6828 3.07	6745 3.03	6749 3.02	71	83	96
1300	7381 3.25	7181 3.20	7040 3.14	6954 3.10	6868 3.06	6874 3.05	73	85	98
1325	7517 3.28	7311 3.24	7168 3.18	7080 3.13	6992 3.09	7000 3.09	74	87	100
1350	7653 3.32	7442 3.27	7296 3.21	7207 3.17	7117 3.13	7126 3.12	75	88	102
1375	7789 3.36	7574 3.31	7424 3.25	7334 3.20	7241 3.16	7252 3.15	77	90	104
1400	7925 3.39	7705 3.35	7553 3.28	7461 3.23	7366 3.19	7378 3.19	78	92	106
1425	8061 3.43	7836 3.38	7681 3.32	7588 3.27	7490 3.23	7505 3.22	79	93	108
1450	8198 3.46	7968 3.42	7810 3.35	7715 3.30	7615 3.26	7632 3.25	81	95	110

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.3 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7801 .00200 120 0300350 55 0 100100 40100 18590 FCOM-N0-02-05-40-009-140

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1450	8198 3.46	7968 3.42	7810 3.35	7715 3.30	7615 3.26	7632 3.25	81	95	110
1475	8335 3.50	8100 3.45	7939 3.39	7843 3.33	7741 3.29	7759 3.29	82	97	112
1500	8471 3.54	8232 3.49	8068 3.42	7971 3.37	7866 3.33	7886 3.32	84	99	114
1525	8608 3.57	8364 3.53	8197 3.46	8099 3.40	7992 3.36	8014 3.35	85	100	116
1550	8746 4.01	8496 3.56	8327 3.49	8227 3.43	8117 3.39	8142 3.39	86	102	118
1575	8883 4.04	8629 4.00	8457 3.52	8356 3.47	8243 3.43	8270 3.42	88	104	120
1600	9020 4.08	8762 4.03	8586 3.56	8485 3.50	8370 3.46	8399 3.45	89	106	122
1625	9157 4.12	8895 4.07	8717 3.59	8613 3.53	8496 3.49	8528 3.49	91	107	125
1650	9295 4.15	9028 4.10	8847 4.03	8743 3.57	8623 3.53	8657 3.52	92	109	127
1675	9432 4.19	9162 4.14	8977 4.06	8872 4.00	8750 3.56	8786 3.55	94	111	129
1700	9570 4.22	9296 4.17	9108 4.10	9002 4.03	8877 3.59	8916 3.59	95	113	131
1725	9708 4.26	9430 4.21	9240 4.13	9132 4.07	9004 4.02	9046 4.02	97	114	133
1750	9846 4.30	9564 4.24	9371 4.16	9261 4.10	9132 4.06	9177 4.05	98	116	135
1775	9985 4.33	9699 4.28	9503 4.20	9391 4.13	9259 4.09	9307 4.09	100	118	137
1800	10123 4.37	9834 4.31	9635 4.23	9520 4.17	9388 4.12	9438 4.12	101	120	140
1825	10262 4.40	9969 4.35	9767 4.27	9650 4.20	9517 4.16	9569 4.15	103	122	142
1850	10401 4.44	10104 4.38	9900 4.30	9780 4.23	9646 4.19	9709 4.19*	104	123	144
1875	10540 4.48	10240 4.42	10033 4.34	9910 4.26	9775 4.22	9839 4.22*	106	125	146
1900	10679 4.51	10376 4.45	10166 4.37	10041 4.30	9905 4.26	9970 4.25*	107	127	148
1925	10818 4.55	10512 4.49	10299 4.40	10172 4.33	10035 4.29	10100 4.29*	109	129	150
1950	10958 4.58	10648 4.52	10433 4.44	10303 4.36	10166 4.32	10231 4.32*	110	130	153
1975	11097 5.02	10784 4.55	10566 4.47	10434 4.40	10296 4.36	10362 4.35*	112	132	155
2000	11237 5.05	10921 4.59	10700 4.50	10565 4.43	10427 4.39	10493 4.39*	114	134	157
2025	11377 5.09	11058 5.02	10835 4.54	10697 4.46	10558 4.42	10624 4.42*	115	136	159
2050	11517 5.12	11195 5.06	10969 4.57	10829 4.49	10689 4.46	10756 4.45*	117	138	161
2075	11658 5.16	11332 5.09	11104 5.01	10961 4.53	10821 4.49	10887 4.49*	118	139	164

LOW AIR CONDITIONING
△FUEL = − 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7801 .00200 120 0300350 55 0 100100 40100 18590 FCOM-N0-02-05-40-010-140

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2075	11658 5.16	11332 5.09	11104 5.01	10961 4.53	10821 4.49	10887 4.49*	118	139	164
2100	11798 5.20	11469 5.12	11239 5.04	11093 4.56	10952 4.52	11019 4.52*	120	141	166
2125	11939 5.23	11607 5.16	11374 5.07	11225 4.59	11084 4.56	11151 4.55*	122	143	168
2150	12080 5.27	11745 5.19	11509 5.11	11358 5.02	11217 4.59	11284 4.59*	123	145	171
2175	12221 5.30	11883 5.23	11645 5.14	11491 5.06	11349 5.02	11416 5.02*	125	147	173
2200	12362 5.34	12021 5.26	11781 5.17	11624 5.09	11482 5.06	11549 5.05*	126	149	175
2225	12504 5.37	12160 5.29	11917 5.21	11757 5.12	11615 5.09	11682 5.08*	128	150	177
2250	12646 5.41	12298 5.33	12053 5.24	11890 5.15	11749 5.12	11815 5.12*	130	152	179
2275	12788 5.44	12438 5.36	12189 5.28	12024 5.19	11882 5.16	11948 5.15*	131	154	181
2300	12930 5.48	12577 5.40	12326 5.31	12158 5.22	12016 5.19	12082 5.18*	133	156	184
2325	13072 5.51	12716 5.43	12463 5.34	12292 5.25	12150 5.22	12216 5.22*	135	158	186
2350	13214 5.55	12856 5.46	12601 5.38	12426 5.28	12285 5.26	12350 5.25*	136	160	188
2375	13357 5.58	12996 5.50	12738 5.41	12561 5.32	12419 5.29	12484 5.28*	138	162	190
2400	13500 6.02	13136 5.53	12876 5.44	12696 5.35	12555 5.32	12619 5.32*	140	164	192
2425	13643 6.05	13277 5.56	13014 5.48	12831 5.38	12690 5.36	12754 5.35*	141	165	195
2450	13786 6.09	13418 6.00	13153 5.51	12967 5.41	12826 5.39	12889 5.38*	143	167	197
2475	13929 6.12	13558 6.03	13292 5.54	13102 5.45	12962 5.42	13024 5.42*	145	169	199
2500	14073 6.16	13700 6.06	13430 5.58	13238 5.48	13098 5.46	13160 5.45*	146	171	201
2525	14217 6.19	13841 6.10	13570 6.01	13374 5.51	13235 5.49	13295 5.48*	148	173	203
2550	14361 6.23	13983 6.13	13709 6.04	13510 5.54	13372 5.52	13432 5.52*	150	175	206
2575	14505 6.26	14124 6.16	13849 6.08	13647 5.57	13509 5.56	13568 5.55*	152	177	208
2600	14649 6.30	14266 6.19	13989 6.11	13783 6.01	13646 5.59	13704 5.58*	153	179	210
2625	14793 6.33	14409 6.23	14129 6.14	13920 6.04	13784 6.02	13841 6.02*	155	181	212
2650	14938 6.37	14551 6.26	14269 6.17	14058 6.07	13922 6.06	13978 6.05*	157	183	214
2675	15082 6.40	14694 6.29	14410 6.21	14195 6.10	14061 6.09	14115 6.08*	159	185	217
2700	15227 6.44	14836 6.33	14551 6.24	14333 6.13	14199 6.12	14253 6.11*	161	186	219

LOW AIR CONDITIONING
△FUEL = − 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23C A320-232 IAE V2527-A5 3420 03301.000011 0250300 .7801 .00200 120 0300350 55 0 100100 40100 18590 FCOM-N0-02-05-40-011-140

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. LANDING WEIGHT = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2700	15227 6.44	14836 6.33	14551 6.24	14333 6.13	14199 6.12	14253 6.11*	161	186	219
2725	15373 6.47	14978 6.36	14692 6.27	14471 6.17	14338 6.16	14390 6.15*	162	188	221
2750	15518 6.51	15120 6.40	14833 6.31	14609 6.20	14477 6.19	14528 6.18*	164	191	223
2775	15663 6.55	15263 6.43	14974 6.34	14747 6.23	14617 6.22	14666 6.21*	166	193	226
2800	15809 6.58	15406 6.46	15116 6.37	14886 6.26	14757 6.25	14805 6.25*	168	195	228
2825	15955 7.02	15549 6.50	15257 6.41	15024 6.29	14897 6.29	14943 6.28*	169	197	230
2850	16101 7.05	15692 6.53	15399 6.44	15162 6.33	15037 6.32	15082 6.31*	171	199	232
2875	16248 7.09	15835 6.56	15541 6.47	15301 6.36	15178 6.35	15221 6.35*	173	201	235
2900	16394 7.12	15979 7.00	15684 6.50	15441 6.39	15320 6.39	15361 6.38*	175	203	237
2925	16541 7.16	16123 7.03	15826 6.54	15580 6.43	15462 6.42	15501 6.41*	177	205	239
2950	16688 7.19	16267 7.06	15969 6.57	15720 6.46	15604 6.45	15641 6.45*	178	207	242
2975	16835 7.23	16412 7.10	16112 7.00	15860 6.49	15747 6.49	15781 6.48*	180	209	244
3000	16982 7.26	16556 7.13	16256 7.03	16000 6.52	15890 6.52	15922 6.51*	182	211	246
3025	17130 7.30	16701 7.16	16399 7.07	16140 6.56	16033 6.55	16063 6.55*	184	213	248
3050	17277 7.33	16846 7.20	16543 7.10	16281 6.59	16177 6.59	16204 6.58*	186	215	250
3075	17425 7.37	16991 7.23	16688 7.13	16421 7.02	16321 7.02	16345 7.01*	188	217	253
3100	17573 7.40	17137 7.26	16832 7.16	16562 7.06	16465 7.05	16487 7.05*	189	220	255

LOW AIR CONDITIONING
△FUEL = − 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23C A320-232 IAE V2527-A5 3420 03301 000011 0250300 7801 00200 120 0300350 55 0 100100 40100 18590 FCOM-N0-02-05-40-012-140

FLIGHT PLANNING LRC

Applicable to: ALL 321

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. LANDING WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
200	1741 0.39	1742 0.39	1746 0.39	1750 0.39			16	16	
225	1883 0.43	1880 0.43	1880 0.42	1881 0.42	1884 0.42		17	18	18
250	2026 0.47	2019 0.46	2015 0.46	2012 0.45	2013 0.45	2017 0.45	18	20	20
275	2169 0.50	2157 0.50	2149 0.49	2144 0.49	2141 0.49	2144 0.49	20	21	22
300	2312 0.54	2296 0.53	2284 0.53	2275 0.52	2269 0.52	2271 0.52	21	22	24
325	2455 0.58	2435 0.57	2419 0.56	2407 0.56	2398 0.55	2398 0.55	23	24	25
350	2599 1.01	2574 1.00	2555 1.00	2538 0.59	2527 0.59	2526 0.59	24	25	27
375	2743 1.05	2713 1.04	2690 1.03	2670 1.03	2656 1.02	2653 1.02	25	27	29
400	2886 1.09	2852 1.08	2826 1.07	2803 1.06	2785 1.05	2781 1.05	27	28	31
425	3031 1.12	2992 1.11	2962 1.10	2935 1.09	2915 1.09	2910 1.09	28	30	32
450	3175 1.16	3132 1.15	3098 1.14	3067 1.13	3044 1.12	3038 1.12	29	31	34
475	3319 1.20	3272 1.18	3234 1.17	3200 1.16	3174 1.16	3167 1.15	31	33	36
500	3464 1.23	3412 1.22	3371 1.20	3333 1.20	3304 1.19	3296 1.19	32	34	38
525	3609 1.27	3552 1.25	3508 1.24	3466 1.23	3434 1.22	3425 1.22	34	36	39
550	3754 1.31	3693 1.29	3644 1.27	3599 1.26	3565 1.26	3554 1.25	35	37	41
575	3899 1.34	3834 1.32	3782 1.31	3733 1.30	3695 1.29	3684 1.28	36	39	43
600	4045 1.38	3975 1.36	3919 1.34	3867 1.33	3826 1.32	3814 1.32	38	40	45
625	4190 1.42	4116 1.40	4057 1.38	4001 1.37	3958 1.36	3944 1.35	39	42	47
650	4336 1.45	4258 1.43	4195 1.41	4135 1.40	4089 1.39	4075 1.38	41	43	48
675	4482 1.49	4400 1.47	4333 1.45	4270 1.43	4221 1.42	4206 1.42	42	45	50
700	4629 1.52	4541 1.50	4471 1.48	4404 1.47	4353 1.46	4337 1.45	44	46	52
725	4775 1.56	4684 1.54	4610 1.52	4539 1.50	4485 1.49	4469 1.48	45	48	54
750	4922 2.00	4826 1.57	4749 1.55	4674 1.53	4617 1.52	4600 1.52	46	49	56
775	5069 2.03	4968 2.01	4888 1.58	4809 1.57	4749 1.56	4732 1.55	48	51	58
800	5216 2.07	5111 2.04	5027 2.02	4945 2.00	4882 1.59	4864 1.58	49	52	60
825	5363 2.10	5254 2.08	5166 2.05	5080 2.04	5015 2.03	4996 2.02	51	54	62

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 2.5%	△FUEL = + 5 %

FLIP22B A321-131 IAE V2530-A53420 03301.000011 0250300 .7801 .000200 140 0300350 60 0 100 45 45 45 18590 FCOM-N0-02-05-40-008-150

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. LANDING WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
825	5363 2.10	5254 2.08	5166 2.05	5080 2.04	5015 2.03	4996 2.02	51	54	62
850	5510 2.14	5397 2.11	5306 2.09	5216 2.07	5148 2.06	5129 2.05	52	55	64
875	5658 2.18	5541 2.15	5445 2.12	5352 2.10	5281 2.09	5262 2.08	54	57	66
900	5806 2.21	5684 2.18	5585 2.15	5488 2.14	5415 2.13	5395 2.12	55	58	67
925	5954 2.25	5828 2.22	5726 2.19	5625 2.17	5548 2.16	5528 2.15	57	60	69
950	6102 2.28	5972 2.25	5866 2.22	5761 2.20	5682 2.19	5662 2.18	58	61	71
975	6251 2.32	6116 2.29	6007 2.26	5898 2.24	5816 2.23	5795 2.22	60	63	73
1000	6399 2.35	6261 2.32	6147 2.29	6035 2.27	5950 2.26	5929 2.25	61	64	75
1025	6548 2.39	6405 2.36	6289 2.33	6172 2.31	6085 2.29	6064 2.28	63	66	77
1050	6697 2.43	6550 2.39	6430 2.36	6310 2.34	6220 2.33	6198 2.32	64	67	79
1075	6846 2.46	6695 2.43	6571 2.39	6447 2.37	6355 2.36	6333 2.35	66	69	81
1100	6996 2.50	6840 2.46	6713 2.43	6585 2.41	6490 2.39	6468 2.38	67	70	83
1125	7146 2.53	6986 2.50	6855 2.46	6723 2.44	6625 2.43	6603 2.41	69	72	84
1150	7295 2.57	7131 2.53	6997 2.49	6861 2.47	6761 2.46	6739 2.45	70	73	86
1175	7446 3.00	7277 2.57	7140 2.53	7000 2.51	6896 2.49	6874 2.48	72	75	88
1200	7596 3.04	7423 3.00	7282 2.56	7139 2.54	7032 2.53	7011 2.51	73	77	90
1225	7746 3.07	7570 3.04	7425 3.00	7277 2.57	7169 2.56	7147 2.55	75	78	92
1250	7897 3.11	7716 3.07	7568 3.03	7416 3.01	7305 2.59	7283 2.58	76	80	94
1275	8048 3.15	7863 3.11	7711 3.06	7556 3.04	7442 3.03	7420 3.01	78	81	96
1300	8199 3.18	8010 3.14	7855 3.10	7695 3.07	7578 3.06	7557 3.05	79	83	98
1325	8350 3.22	8157 3.18	7999 3.13	7835 3.11	7716 3.09	7695 3.08	81	84	100
1350	8501 3.25	8304 3.21	8142 3.16	7975 3.14	7853 3.12	7832 3.11	82	86	102
1375	8653 3.29	8452 3.24	8286 3.20	8115 3.17	7990 3.16	7970 3.15	84	87	104
1400	8804 3.32	8600 3.28	8430 3.23	8255 3.21	8128 3.19	8108 3.18	85	89	106
1425	8956 3.36	8747 3.31	8573 3.27	8395 3.24	8266 3.22	8246 3.21	87	91	108
1450	9109 3.39	8896 3.35	8717 3.30	8536 3.28	8404 3.26	8385 3.24	88	92	110

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP22B A321-131 IAE V2530-A53420 03301.000011 0250300 .7801 .000200 140 0300350 60 0 100 45 45 45 18590 FCOM-N0-02-05-40-009-150

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. LANDING WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1450	9109 3.39	8896 3.35	8717 3.30	8536 3.28	8404 3.26	8385 3.24	88	92	110
1475	9261 3.43	9044 3.38	8862 3.33	8676 3.31	8543 3.29	8525 3.28	90	94	112
1500	9414 3.46	9193 3.42	9006 3.37	8817 3.34	8681 3.32	8665 3.31	92	96	114
1525	9567 3.50	9342 3.45	9151 3.40	8959 3.38	8820 3.36	8805 3.34	93	97	116
1550	9720 3.53	9491 3.48	9296 3.44	9100 3.41	8960 3.39	8946 3.38	95	99	118
1575	9874 3.57	9641 3.52	9441 3.47	9242 3.44	9099 3.42	9087 3.41	96	100	120
1600	10027 4.00	9790 3.55	9587 3.50	9384 3.48	9239 3.46	9229 3.44	98	102	122
1625	10181 4.04	9940 3.59	9733 3.54	9526 3.51	9380 3.49	9371 3.48	99	104	124
1650	10335 4.07	10090 4.02	9878 3.57	9669 3.54	9520 3.52	9514 3.51	101	105	126
1675	10489 4.11	10241 4.06	10025 4.00	9811 3.58	9661 3.56	9656 3.54	102	107	129
1700	10644 4.14	10391 4.09	10171 4.04	9954 4.01	9802 3.59	9805 3.58*	104	109	131
1725	10798 4.18	10542 4.12	10317 4.07	10097 4.04	9943 4.02	9948 4.01*	106	110	133
1750	10953 4.21	10693 4.16	10464 4.10	10240 4.08	10084 4.06	10091 4.05*	107	112	135
1775	11108 4.25	10844 4.19	10611 4.14	10384 4.11	10226 4.09	10235 4.08*	109	114	137
1800	11264 4.28	10996 4.23	10758 4.17	10528 4.14	10368 4.12	10378 4.11*	110	115	139
1825	11419 4.32	11148 4.26	10905 4.21	10671 4.18	10510 4.16	10522 4.15*	112	117	141
1850	11575 4.35	11299 4.29	11053 4.24	10816 4.21	10652 4.19	10666 4.18*	114	119	144
1875	11731 4.39	11452 4.33	11201 4.27	10960 4.24	10795 4.22	10810 4.21*	115	120	146
1900	11887 4.42	11604 4.36	11349 4.31	11105 4.28	10938 4.26	10954 4.25*	117	122	148
1925	12044 4.46	11757 4.39	11497 4.34	11249 4.31	11081 4.29	11099 4.28*	118	124	150
1950	12200 4.49	11910 4.43	11645 4.37	11394 4.34	11224 4.32	11243 4.31*	120	125	152
1975	12357 4.53	12063 4.46	11794 4.41	11540 4.37	11368 4.36	11388 4.35*	121	127	155
2000	12514 4.56	12216 4.50	11943 4.44	11685 4.41	11512 4.39	11533 4.38*	123	129	157
2025	12672 5.00	12370 4.53	12092 4.47	11831 4.44	11656 4.42	11679 4.41*	125	130	159
2050	12829 5.03	12524 4.56	12241 4.51	11977 4.47	11800 4.46	11824 4.44*	126	132	162
2075	12987 5.06	12678 5.00	12390 4.54	12123 4.51	11945 4.49	11970 4.48*	128	134	164

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 2.5 %	△FUEL = + 5 %

FLIP22B A321-131 IAE V2530-A53420 03301.000011 0250300 .7801 .000200 140 0300350 60 0 100 45 45 45 18590 FCOM-N0-02-05-40-010-150

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. LANDING WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2075	12987 5.06	12678 5.00	12390 4.54	12123 4.51	11945 4.49	11970 4.48*	128	134	164
2100	13145 5.10	12832 5.03	12540 4.57	12269 4.54	12090 4.52	12116 4.51*	130	135	166
2125	13303 5.13	12987 5.06	12690 5.01	12416 4.57	12235 4.56	12262 4.54*	131	137	168
2150	13462 5.17	13142 5.10	12840 5.04	12563 5.01	12380 4.59	12409 4.58*	133	139	170
2175	13621 5.20	13297 5.13	12990 5.07	12710 5.04	12526 5.02	12556 5.01*	134	140	173
2200	13779 5.24	13452 5.16	13141 5.11	12857 5.07	12672 5.06	12703 5.04*	136	142	175
2225	13939 5.27	13608 5.20	13292 5.14	13004 5.11	12818 5.09	12850 5.08*	138	144	177
2250	14098 5.31	13764 5.23	13443 5.17	13152 5.14	12964 5.12	12997 5.11*	139	146	179
2275	14258 5.34	13920 5.26	13594 5.21	13300 5.17	13111 5.15	13145 5.14*	141	147	181
2300	14418 5.37	14076 5.30	13746 5.24	13448 5.20	13258 5.19	13292 5.18*	143	149	184
2325	14578 5.41	14233 5.33	13897 5.27	13597 5.24	13405 5.22	13440 5.21*	145	151	186
2350	14739 5.44	14390 5.36	14049 5.30	13746 5.27	13553 5.25	13589 5.24*	146	153	188
2375	14900 5.48	14548 5.40	14202 5.34	13895 5.30	13700 5.29	13737 5.28*	148	154	190
2400	15061 5.51	14705 5.43	14354 5.37	14044 5.34	13848 5.32	13886 5.31*	150	156	193
2425	15222 5.54	14863 5.46	14507 5.40	14193 5.37	13997 5.35	14035 5.34*	151	158	195
2450	15384 5.58	15021 5.50	14661 5.44	14344 5.40	14145 5.39	14184 5.38*	153	160	197
2475	15546 6.01	15180 5.53	14814 5.47	14494 5.44	14295 5.42	14334 5.41*	155	162	199
2500	15708 6.05	15339 5.56	14968 5.50	14644 5.47	14445 5.45	14484 5.44*	156	164	202
2525	15870 6.08	15498 5.59	15122 5.54	14795 5.50	14595 5.49	14634 5.48*	158	165	204
2550	16033 6.11	15657 6.03	15276 5.57	14946 5.53	14745 5.52	14785 5.51*	160	167	206
2575	16196 6.15	15816 6.06	15430 6.00	15098 5.57	14896 5.55	14936 5.54*	161	169	209
2600	16359 6.18	15976 6.09	15585 6.04	15249 6.00	15047 5.59	15087 5.58*	163	171	211
2625	16522 6.22	16136 6.13	15740 6.07	15401 6.03	15198 6.02	15238 6.01*	165	173	213
2650	16686 6.25	16297 6.16	15895 6.10	15553 6.07	15349 6.05	15389 6.04*	167	174	215
2675	16849 6.28	16457 6.19	16050 6.13	15706 6.10	15501 6.08	15541 6.08*	168	176	218
2700	17014 6.32	16618 6.22	16206 6.17	15858 6.13	15653 6.12	15693 6.11*	170	178	220

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.6 %	△FUEL = + 2.5 %	△FUEL = + 5 %

FLIP22B A321-131 IAE V2530-A53420 03301.000011 0250300 .7801 .000200 140 0300350 60 0 100 45 45 45 18590 FCOM-N0-02-05-40-011-150

FLIGHT PLANNING FROM BRAKE RELEASE TO LANDING
CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. LANDING WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2700	17014 6.32	16618 6.22	16206 6.17	15858 6.13	15653 6.12	15693 6.11*	170	178	220
2725	17178 6.35	16779 6.26	16361 6.20	16011 6.16	15805 6.15	15845 6.14*	172	180	222
2750	17343 6.38	16941 6.29	16517 6.23	16164 6.20	15958 6.18	15998 6.17*	174	182	225
2775	17507 6.42	17103 6.32	16674 6.26	16317 6.23	16111 6.22	16150 6.21*	175	184	227
2800	17673 6.45	17265 6.35	16830 6.30	16471 6.26	16264 6.25	16303 6.24*	177	185	229
2825	17838 6.49	17427 6.39	16987 6.33	16625 6.29	16417 6.28	16456 6.27*	179	187	232
2850	18004 6.52	17589 6.42	17144 6.36	16779 6.33	16571 6.32	16610 6.31*	181	189	234
2875	18170 6.55	17752 6.45	17302 6.40	16933 6.36	16725 6.35	16763 6.34*	182	191	236
2900	18336 6.59	17915 6.48	17459 6.43	17088 6.39	16880 6.38	16917 6.37*	184	193	238
2925	18502 7.02	18079 6.52	17617 6.46	17243 6.43	17034 6.42	17071 6.41*	186	195	241
2950	18669 7.05	18243 6.55	17775 6.49	17398 6.46	17189 6.45	17226 6.44*	187	196	243
2975	18836 7.09	18407 6.58	17933 6.53	17554 6.49	17345 6.48	17381 6.47*	189	198	245
3000	19003 7.12	18571 7.01	18092 6.56	17710 6.52	17500 6.51	17535 6.51*	191	200	248
3025	19170 7.15	18736 7.05	18251 6.59	17866 6.56	17656 6.55	17691 6.54*	193	202	250
3050	19337 7.19	18899 7.08	18410 7.02	18022 6.59	17812 6.58	17846 6.57*	194	204	253
3075	19505 7.22	19062 7.11	18569 7.06	18178 7.02	17968 7.01*	18002 7.01*	196	206	255
3100	19674 7.25	19225 7.14	18729 7.09	18335 7.05	18126 7.05*	18158 7.04*	198	208	257

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP22B A321-131 IAE V2530-A53420 03301.000011 0250300 .7801 .000200 140 0300350 60 0 100 45 45 45 18590 FCOM-N0-02-05-40-012-150

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ALL ENGINES OPERATIVE

GENERAL

Applicable to: ALL 320

The alternate planning tables enable the flight crew to determine the fuel consumption and time required to cover a given air distance from go-around at destination airport to landing at alternate airport.

These tables are established for:
- Go-around: 100 kg or 220 lb
- Climb profile: 250 kt/300 kt/M .78
- Long range speed
- Descent profile: M .78/300 kt/250 kt
- Approach and landing at alternate airport: 80 kg or 180 lb (4 min)
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

Note: *1. In the tables, the asterisk (*) means that a step climb of 4 000 ft must be flown to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree Celsius above ISA temperature apply a fuel correction of
0.015 (kg/°C/NM) x ΔISA (°C) x Air distance (NM)
or 0.033 (lb/°C/NM) x ΔISA (°C) x Air distance (NM)

GENERAL

Applicable to: ALL 321

The alternate planning tables enable the flight crew to determine the fuel consumption and time required to cover a given air distance from go-around at destination airport to landing at alternate airport.

These tables are established for:
- Go-around: 120 kg or 270 lb
- Climb profile: 250 kt/300 kt/M .78
- Long range speed
- Descent profile: M .78/300 kt/250 kt
- Approach and landing at alternate airport: 100 kg or 220 lb (4 min)
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

Note: *1. In the tables, the asterisk (*) means that a step climb of 4 000 ft must be flown to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree Celsius above ISA temperature apply a fuel correction of 0.015 (kg/°C/NM) x ΔISA (°C) x Air distance (NM) or 0.033 (lb/°C/NM) x ΔISA (°C) x Air distance (NM)

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

Applicable to: ALL

The alternate planning tables are based on a reference landing weight at alternate.
The fuel consumption must be corrected when the landing weight is different from the reference landing weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1 000 kg or 1 000 lb below (or above) the reference weight.

ALTERNATE PLANNING ISA

Applicable to: ALL 320

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO-AROUND : 100 KG - CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE
DESCENT : M.78/300KT/250KT - VMC PROCEDURE : 80 KG (4MIN)

REF. LDG. WT AT ALTERNATE = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	120	140	160	180	200	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL120	FL140 FL160	FL180 FL200
20									
40	529 0.12						2		
60	680 0.16	658 0.16					3		
80	832 0.20	805 0.20	803 0.20	803 0.20	805 0.19		5	4	4
100	984 0.24	952 0.24	945 0.24	941 0.23	939 0.23	938 0.22	6	6	5
120	1136 0.28	1099 0.28	1088 0.28	1080 0.27	1072 0.26	1065 0.26	7	7	6
140	1289 0.32	1246 0.32	1230 0.32	1218 0.30	1206 0.29	1192 0.29	9	8	6
160	1441 0.36	1393 0.36	1373 0.35	1357 0.34	1340 0.33	1319 0.32	10	10	7
180	1594 0.40	1541 0.40	1517 0.39	1496 0.38	1474 0.36	1446 0.35	11	11	8
200	1747 0.45	1689 0.44	1660 0.43	1635 0.41	1608 0.39	1573 0.38	13	12	9
220	1900 0.49	1837 0.48	1804 0.47	1774 0.45	1742 0.42	1701 0.42	14	14	9
240	2054 0.53	1985 0.52	1947 0.51	1914 0.48	1877 0.46	1828 0.45	15	15	10
260	2208 0.57	2134 0.56	2091 0.55	2054 0.52	2011 0.49	1955 0.48	17	16	11
280	2361 1.01	2282 1.00	2236 0.58	2194 0.55	2146 0.52	2083 0.51	18	18	12
300	2515 1.05	2431 1.04	2380 1.02	2334 0.59	2281 0.55	2210 0.54	20	19	12
320	2670 1.09	2580 1.08	2525 1.06	2474 1.02	2416 0.58	2338 0.58	21	20	13
340	2824 1.13	2730 1.12	2670 1.10	2615 1.06	2551 1.02	2466 1.01	22	22	14
360	2979 1.17	2879 1.16	2815 1.14	2755 1.09	2686 1.05	2593 1.04	24	23	14
380	3134 1.21	3029 1.20	2960 1.17	2896 1.13	2821 1.08	2721 1.07	25	24	15
400	3289 1.25	3179 1.23	3105 1.21	3037 1.16	2957 1.11	2849 1.10	26	26	16
420	3444 1.29	3329 1.27	3251 1.25	3178 1.20	3092 1.14	2977 1.13	28	27	17
440	3599 1.33	3479 1.31	3396 1.29	3319 1.23	3227 1.18	3105 1.17	29	28	17
460	3755 1.37	3629 1.35	3542 1.32	3461 1.27	3362 1.21	3233 1.20	31	30	18
480	3911 1.41	3780 1.39	3688 1.36	3602 1.30	3498 1.24	3361 1.23	32	31	19
500	4067 1.45	3931 1.43	3834 1.40	3744 1.33	3633 1.27	3489 1.26	33	32	19

LOW AIR CONDITIONING
△FUEL = – 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23D 25.02.98 ; AERO : A320-232 01/06/97 ; MOTO : A320-232 01/06/97 ; GENE : A320-232 01/10/97 END OF FLIP FCOM-N0-02-05-50-002-140

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO-AROUND : 100 KG - CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE
DESCENT : M.78/300KT/250KT - VMC PROCEDURE : 80 KG (4MIN)

REF. LANDING WEIGHT = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 230	270	310	350	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL230 FL270	FL310 FL350	FL390
100								0
120	1063 0.25					6		0
140	1179 0.29	1190 0.28				7		0
160	1295 0.32	1295 0.31				8		0
180	1411 0.35	1400 0.34	1414 0.33			9	10	0
200	1527 0.38	1506 0.38	1512 0.36	1522 0.36		10	12	0
220	1643 0.41	1612 0.41	1611 0.39	1615 0.39		10	13	0
240	1760 0.45	1717 0.44	1710 0.42	1709 0.42		11	14	0
260	1876 0.48	1823 0.47	1809 0.45	1803 0.44	1806 0.44	12	15	16
280	1992 0.51	1929 0.50	1908 0.48	1897 0.47	1898 0.47	13	16	18
300	2109 0.54	2035 0.54	2007 0.51	1991 0.50	1990 0.49	13	17	19
320	2225 0.57	2141 0.57	2106 0.54	2086 0.53	2082 0.52	14	19	21
340	2342 1.00	2248 1.00	2205 0.57	2180 0.55	2174 0.55	15	20	22
360	2458 1.04	2354 1.03	2304 1.00	2274 0.58	2266 0.57	16	21	24
380	2575 1.07	2461 1.06	2404 1.03	2369 1.01	2359 1.00	17	22	25
400	2692 1.10	2567 1.09	2503 1.06	2464 1.04	2451 1.03	17	23	27
420	2809 1.13	2674 1.13	2603 1.09	2559 1.07	2544 1.05	18	24	28
440	2926 1.16	2781 1.16	2702 1.12	2654 1.09	2637 1.08	19	26	30
460	3043 1.20	2888 1.19	2802 1.15	2749 1.12	2730 1.11	20	27	31
480	3160 1.23	2995 1.22	2902 1.18	2844 1.15	2823 1.13	21	28	33
500	3277 1.26	3102 1.25	3002 1.21	2940 1.18	2916 1.16	21	29	35

LOW AIR CONDITIONING △FUEL = − 0.3 %
ENGINE ANTI ICE ON △FUEL = + 2 %
TOTAL ANTI ICE ON △FUEL = + 5 %

FLIP23D 25.02.98 ; AERO : A320-232 01/06/97 ; MOTO : A320-232 01/06/97 ; GENE : A320-232 01/10/97 END OF FLIP FCOM-N0-02-05-50-003-140

ALTERNATE PLANNING ISA

Applicable to: ALL 321

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO AROUND : 120 KG - CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE
DESCENT : M.78/300KT/250KT - VMC PROCEDURE : 100 KG (4MIN)

REF. LANDING WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	120	140	160	180	200	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL120	FL140 FL160	FL180 FL200
20									
40	575 0.13						3		
60	749 0.17	742 0.16	740 0.16				4	3	
80	923 0.20	909 0.20	901 0.20	895 0.19	893 0.19		5	5	4
100	1098 0.24	1077 0.24	1061 0.23	1048 0.23	1040 0.23	1033 0.22	6	6	5
120	1272 0.28	1245 0.27	1222 0.27	1202 0.26	1188 0.26	1171 0.26	7	7	6
140	1447 0.32	1412 0.31	1383 0.30	1357 0.30	1335 0.29	1308 0.29	8	8	6
160	1623 0.36	1580 0.35	1545 0.34	1511 0.33	1483 0.32	1445 0.32	9	9	7
180	1798 0.40	1749 0.38	1706 0.37	1665 0.36	1631 0.36	1583 0.35	11	10	7
200	1974 0.43	1917 0.42	1868 0.41	1820 0.40	1779 0.39	1721 0.38	12	11	8
220	2149 0.47	2086 0.46	2030 0.44	1975 0.43	1927 0.42	1858 0.42	13	12	8
240	2325 0.51	2254 0.49	2192 0.47	2130 0.47	2076 0.45	1996 0.45	14	13	9
260	2501 0.55	2423 0.53	2354 0.51	2285 0.50	2224 0.48	2134 0.48	15	14	10
280	2678 0.59	2593 0.57	2516 0.54	2440 0.53	2373 0.52	2272 0.51	16	15	10
300	2854 1.02	2762 1.00	2678 0.58	2595 0.57	2521 0.55	2410 0.54	18	16	11
320	3031 1.06	2931 1.04	2841 1.01	2751 1.00	2670 0.58	2549 0.58	19	16	11
340	3208 1.10	3101 1.07	3004 1.05	2906 1.03	2819 1.01	2687 1.01	20	17	12
360	3386 1.14	3271 1.11	3167 1.08	3062 1.07	2969 1.04	2825 1.04	21	18	12
380	3563 1.18	3441 1.15	3330 1.12	3218 1.10	3118 1.07	2964 1.07	22	19	13
400	3741 1.21	3612 1.18	3493 1.15	3374 1.13	3268 1.10	3103 1.10	23	20	13
420	3919 1.25	3782 1.22	3657 1.19	3530 1.17	3417 1.13	3241 1.14	24	21	14
440	4097 1.29	3953 1.25	3820 1.22	3687 1.20	3567 1.16	3380 1.17	26	22	14
460	4275 1.33	4124 1.29	3984 1.25	3843 1.23	3717 1.19	3519 1.20	27	23	15
480	4454 1.36	4295 1.32	4148 1.29	4000 1.27	3867 1.22	3658 1.23	28	24	15
500	4632 1.40	4466 1.36	4312 1.32	4157 1.30	4018 1.25	3798 1.26	29	25	16

ECON AIR CONDITIONING
△FUEL = − 0.4 %

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 4.5 %

FLIP23 A321-131 IAE V2530-A5 3520 03301.000010 0250300 .7801 .000200 100 120300300 60 0 100100 40100 18590 FCOM-N0-02-05-50-002-150

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO AROUND : 120 KG - CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE
DESCENT : M.78/300KT/250KT - VMC PROCEDURE : 100 KG (4MIN)

REF. LANDING WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 230	270	310	350	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL230 FL270	FL310 FL350	FL390
100								
120	1166 0.25					7		
140	1294 0.29	1298 0.28				9		0
160	1421 0.32	1415 0.31	1430 0.30			10	11	0
180	1549 0.35	1533 0.34	1540 0.33			10	12	0
200	1677 0.38	1652 0.37	1650 0.36	1658 0.36		11	13	0
220	1805 0.41	1770 0.40	1760 0.39	1763 0.38		12	14	0
240	1933 0.45	1888 0.43	1870 0.42	1867 0.41		13	15	0
260	2061 0.48	2007 0.46	1981 0.45	1972 0.44		14	17	0
280	2190 0.51	2125 0.49	2091 0.48	2077 0.47	2076 0.46	15	18	18
300	2318 0.54	2244 0.52	2202 0.50	2182 0.49	2178 0.49	16	19	20
320	2447 0.57	2363 0.55	2313 0.53	2287 0.52	2279 0.52	17	20	21
340	2575 1.00	2482 0.58	2424 0.56	2393 0.55	2381 0.54	18	21	23
360	2704 1.04	2601 1.01	2535 0.59	2498 0.57	2483 0.57	19	22	24
380	2833 1.07	2720 1.04	2646 1.02	2603 1.00	2585 1.00	20	24	26
400	2962 1.10	2839 1.07	2757 1.05	2709 1.03	2687 1.02	21	25	27
420	3091 1.13	2958 1.10	2869 1.07	2815 1.06	2789 1.05	22	26	29
440	3220 1.16	3078 1.13	2980 1.10	2921 1.08	2891 1.08	23	27	31
460	3350 1.20	3197 1.16	3092 1.13	3027 1.11	2994 1.10	24	28	32
480	3479 1.23	3317 1.19	3204 1.16	3133 1.14	3097 1.13	24	29	34
500	3609 1.26	3437 1.22	3316 1.19	3239 1.16	3200 1.16	25	31	35

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.5 %	△FUEL = + 2.5 %	△FUEL = + 5.5 %

FLIP23 A321-131 IAE V2530-A5 3520 03301 000010 0250300 .7801 .000200 100 120300300 60 0 100100 40100 18590 FCOM-N0-02-05-50-003-150

GENERAL

Applicable to: ALL

This section provides guidance to operators on when an economical benefit to perform fuel tankering exists.
Fuel tankering is mainly considered for economic reasons, when the difference in fuel prices between departure airport and destination airport is significant.
Operators may also consider fuel tankering when the fuel supply is unreliable or the fuel type is unavailable.
The operator has to take into account additional costs due to the aircraft weight increase. These costs are not negligible and the operator should consider them against fuel tankering gains.

Main additional costs to consider are:
- Reduction in takeoff thrust derate via lower flexible temperature
- Increase in engine wear as a result of higher EGT
- Increase in the use of braking devices at landing (brakes, thrust reversers, tires) due to heavier Landing Weight
- The extra fuel burn will result in an economical penalty due to possible emission taxation.

Note: *The fuel tankering method takes into account the cost for the transport of the tankered fuel.*

There are other operational aspects to consider when fuel tankering. The most common are risk of overweight landings are reduction in operation performance margins for short, hot or high elevation runways.

CALCULATION

Applicable to: ALL

The Fuel Price Ratio (FPR) is defined as the fuel price at the departure airport divided by the fuel price at the destination airport.
The Break-Even Fuel Price Ratio (BEFPR) introduces a limit fuel price ratio below which the fuel tankering becomes profitable from a fuel cost point of view.

When Fuel Price Ratio is below the BEFRP
- The advantage of the lower fuel price at departure compensates the additional fuel burn (the additional fuel burn is due to the additional fuel tankered)
- Fuel tankering maximizes the gain when as much fuel as possible is tankered
- The tankered fuel quantity is limited by:
  - Maximum fuel capacity
  - Structural or performance limited Maximum Takeoff Weight
  - Structural or performance limited Maximum Landing Weight
  - Fuel required for the next flight.

In case of Maximum Landing Weight limitation, the flight crew can limit the fuel tankered at their discretion in order to avoid possible overweight landing.
The following table shows the BEFPR versus the air distance of the first flight leg.
The table also indicates the additional fuel burn per 1 000 kg (1 000 lb) of extra fuel tankered. The total additional fuel burn must be added to the total trip fuel from the departure airport.

FUEL TANKERING TABLES

Applicable to: ALL 321

Table assumptions are:

- ISA temperature
- Optimum flight level at Long Range cruise speed
- 30 min holding at 1 500 ft at Green Dot Speed

AIR DISTANCE (nm)	BREAK EVEN FUEL PRICE RATIO	FUEL BURN FOR 1000 kg OF FUEL TANKERED (kg)
100	0.991	9
300	0.972	28
500	0.961	39
700	0.947	53
1 000	0.923	77
1 500	0.873	127
1 900	0.787	213
2 200	0.771	229
2 400	0.397	603

The following table is available for aircraft performance degradation (Performance Factor) :

AIR DISTANCE (nm)	PERF FACTOR 5%		PERF FACTOR 10%	
	BREAK EVEN FUEL PRICE RATIO	FUEL BURN PER 1000 kg OF FUEL TANKERED (kg)	BREAK EVEN FUEL PRICE RATIO	FUEL BURN PER 1000 kg OF FUEL TANKERED (kg)
100	0.99	10	0.99	10
300	0.97	30	0.969	31
500	0.959	41	0.957	43
700	0.944	56	0.94	60
1 000	0.919	81	0.913	87
1 500	0.884	116	0.805	195
1 900	0.775	225	0.791	209
2 200	0.671	329	No gain	
2 400	No gain		No gain	

FUEL TANKERING TABLES

Applicable to: ALL 320

Table assumptions are:

- ISA temperature
- Optimum flight level at Long Range cruise speed
- 30 min holding at 1 500 ft at Green Dot Speed

AIR DISTANCE (nm)	BREAK EVEN FUEL PRICE RATIO	FUEL BURN PER 1000 kg OF FUEL TANKERED (kg)
100	0.99	10
250	0.974	26
500	0.961	39
750	0.951	49
1 000	0.934	66
1 250	0.913	87
1 500	0.897	103
1 750	0.875	125
2 000	0.856	144
2 250	0.832	168
2 500	0.774	226

The following table is available for aircraft performance degradation (Performance Factor) :

AIR DISTANCE (nm)	PERF FACTOR 5%		PERF FACTOR 10%	
	BREAK EVEN FUEL PRICE RATIO	FUEL BURN PER 1000 kg OF FUEL TANKERED (kg)	BREAK EVEN FUEL PRICE RATIO	FUEL BURN PER 1000 kg OF FUEL TANKERED (kg)
100	0.99	10	0.989	11
250	0.972	28	0.98	30
500	0.96	40	0.965	35
750	0.949	51	0.946	54
1 000	0.93	70	0.927	73
1 250	0.908	92	0.907	93
1 500	0.89	110	0.884	116
1 750	0.868	132	0.861	139
2 000	0.845	155	0.836	164
2 250	0.817	183	0.772	228
2 500	No gain		No gain	

EXAMPLE

Applicable to: ALL 321

DATA :	Air distance	=	1 000 nm
	Fuel price at departure airport	=	830 $ / 1 000 kg (377 $ / 1 000 lb)
	Fuel price at destination airport	=	1000 $ / 1 000 kg (454 $ / 1 000 lb)

1. From the relation between fuel price at departure and fuel price at destination
   Current fuel price ratio = 0.83
2. Enter the Fuel Tankering table (*Refer to PER-FPL-FLP-FTK FUEL TANKERING TABLES*)
   For the defined air distance the BEFPR is 0.923, which is more than the current fuel price ratio.
   The fuel tankering is profitable.
   To determine the BEFPR, the interpolation of the table values is permitted.
   If the user wants to avoid interpolation, select the next longer air distance. This will provide a conservative value for BEFPR.
3. Determine total fuel quantity as maximum possible fuel limited by the following constraints:
   - Total fuel is less than maximum fuel tank capacity
   - TOW with fuel tankering is less than structural or performance limited maximum takeoff weight
   - LW with fuel tankering is less than structural or performance limited maximum landing weight
   - Tankered fuel is less than the trip fuel for the return flight plus total extra fuel burn.
4. Enter the table and read the fuel burn per 1 000 kg (1 000 lb) of extra fuel tankered.
   Every 1 000 kg (1000 lb) of extra fuel tankered causes an extra fuel burn of 77 kg (77 lb). Multiply this value by the amount of fuel tankered.
5. Trip fuel with fuel tankering = Trip fuel without fuel tankering + Extra fuel burn

EXAMPLE

Applicable to: ALL 320

DATA : Air distance = 1 000 nm
Fuel price at departure airport = 830 $ / 1 000 kg (377 $ / 1 000 lb)
Fuel price at destination airport = 1000 $ / 1 000 kg (454 $ / 1 000 lb)

1. From the relation between fuel price at departure and fuel price at destination
   Current fuel price ratio = 0.83
2. Enter the Fuel Tankering table (*Refer to PER-FPL-FLP-FTK FUEL TANKERING TABLES*)
   For the defined air distance the BEFPR is 0.934, which is more than the current fuel price ratio.
   The fuel tankering is profitable.
   To determine the BEFPR, the interpolation of the table values is permitted.
   If the user wants to avoid interpolation, select the next longer air distance. This will provide a conservative value for BEFPR.
3. Determine total fuel quantity as maximum possible fuel limited by the following constraints:
   - Total fuel is less than maximum fuel tank capacity
   - TOW with fuel tankering is less than structural or performance limited maximum takeoff weight
   - LW with fuel tankering is less than structural or performance limited maximum landing weight
   - Tankered fuel is less than the trip fuel for the return flight plus total extra fuel burn.
4. Enter the table and read the fuel burn per 1 000 kg (1 000 lb) of extra fuel tankered.
   Every 1 000 kg (1000 lb) of extra fuel tankered causes an extra fuel burn of 66 kg (66 lb). Multiply this value by the amount of fuel tankered.
5. Trip fuel with fuel tankering = Trip fuel without fuel tankering + Extra fuel burn

PERFORMANCE

CLIMB

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CLIMB - ISA +15 C
CLIMB - ISA +20 ..... D

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GENERAL

Applicable to: ALL

Climb tables are established at MAX CLIMB THRUST with air conditioning in normal mode and anti ice OFF.

The climb speed profile is :

- 250 kt from 1 500 ft up to FL 100
- acceleration from 250 kt to 300 kt
- climb at 300 kt then M .78 up to selected altitude.

All charts are established with a center of gravity corresponding to 33 %.

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CLIMB - ISA

Applicable to: ALL 320

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

FROM BRAKE RELEASE
TIME (MIN) **FUEL (KG)**
DISTANCE (NM) **TAS (KT)**

WEIGHT AT BRAKE RELEASE (1000KG)

FL	52	54	56	58	60	62	64
390	18 1306 113 383	19 1373 120 384	20 1443 127 385	21 1519 134 386	22 1601 143 387	24 1693 153 389	25 1798 165 391
370	16 1230 101 377	17 1289 106 377	18 1351 111 378	19 1416 117 379	20 1484 123 379	21 1557 130 380	22 1636 138 381
350	15 1166 91 370	15 1220 95 371	16 1276 100 371	17 1335 105 372	18 1396 110 373	19 1460 116 373	20 1529 122 374
330	14 1106 83 364	14 1156 86 364	15 1208 90 365	16 1261 95 365	16 1317 99 365	17 1376 104 366	18 1437 109 367
310	13 1047 75 356	13 1093 78 357	14 1141 82 357	14 1191 85 357	15 1242 89 357	16 1295 93 358	16 1352 97 358
290	12 982 67 347	12 1026 70 347	13 1070 73 347	13 1116 76 348	14 1163 79 348	14 1212 82 348	15 1263 86 348
270	10 903 57 334	11 942 60 334	11 983 62 335	12 1025 65 335	12 1067 68 335	13 1111 71 335	13 1157 74 335
250	9 830 49 322	10 866 51 322	10 903 54 322	10 941 56 322	11 980 58 323	11 1020 61 323	12 1062 63 323
240	9 795 46 316	9 830 48 316	9 865 50 316	10 902 52 316	10 939 54 316	11 977 56 317	11 1017 59 317
220	8 729 39 303	8 761 41 304	8 793 43 304	9 826 44 304	9 860 46 304	9 895 48 304	10 931 50 304
200	7 667 34 291	7 695 35 291	8 725 37 292	8 755 38 292	8 786 40 292	8 818 41 292	9 850 43 292
180	6 607 29 279	6 634 30 279	7 661 31 279	7 688 33 279	7 716 34 279	8 745 35 279	8 775 37 280
160	5 550 24 266	6 574 25 266	6 598 26 266	6 623 28 266	6 649 29 267	7 675 30 267	7 702 31 267
140	5 495 20 252	5 516 21 252	5 538 22 252	5 561 23 253	6 584 24 253	6 607 25 253	6 632 26 253
120	4 440 17 237	4 459 17 237	5 479 18 237	5 499 19 237	5 520 20 238	5 541 21 238	5 563 21 238
100	3 352 12 209	3 367 12 209	4 383 13 209	4 399 13 210	4 416 14 210	4 433 14 210	4 451 15 210
50	2 227 6 170	2 237 6 171	2 247 7 171	2 257 7 172	2 268 7 172	3 279 7 172	3 290 8 172
15	1 138 3 120	1 144 3 120	1 150 3 120	2 156 3 120	2 163 3 121	2 170 3 121	2 177 3 121

LOW AIR CONDITIONING △FUEL = − 0.4 %
HIGH AIR CONDITIONING △FUEL = + 0.4 %
ENGINE ANTI ICE ON △FUEL = + 6 %
TOTAL ANTI ICE ON △FUEL = + 11 %

10F -08FA320-232 IAE V2527-A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 0 FCOM-N0-03-05-10-002-140

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST | ISA | FROM BRAKE RELEASE
NORMAL AIR CONDITIONING | CG=33.0% | TIME (MIN) / FUEL (KG)
ANTI-ICING OFF | | DISTANCE (NM) / TAS (KT)

	WEIGHT AT BRAKE RELEASE (1000KG)						
FL	66	68	70	72	74	76	78
390							
370	23 1722 146 383	24 1817 156 384	26 1924 167 386	28 2047 180 389			
350	20 1601 128 375	22 1679 135 376	23 1762 143 377	24 1853 151 379	25 1953 161 381	27 2064 172 383	29 2193 185 385
330	19 1503 114 367	19 1571 120 368	20 1644 126 369	21 1721 132 370	23 1803 139 372	24 1892 147 373	25 1988 156 375
310	17 1411 102 359	18 1472 107 360	19 1538 112 361	19 1606 117 362	20 1679 123 363	21 1755 129 364	22 1837 136 365
290	15 1317 90 349	16 1373 94 350	17 1431 98 350	18 1492 103 351	18 1557 107 352	19 1625 113 353	20 1696 118 354
270	14 1205 77 336	14 1255 80 336	15 1306 83 337	15 1360 87 338	16 1416 91 338	17 1475 95 339	17 1537 99 340
250	12 1105 66 323	13 1149 69 324	13 1196 71 324	14 1243 74 325	14 1293 77 326	15 1345 81 326	15 1399 84 327
240	12 1058 61 317	12 1100 63 318	12 1144 66 318	13 1189 69 319	13 1236 72 319	14 1285 75 320	15 1336 78 321
220	10 968 52 305	11 1006 54 305	11 1045 56 305	11 1086 59 306	12 1127 61 307	12 1171 63 307	13 1216 66 308
200	9 884 45 292	9 918 46 293	10 954 48 293	10 990 50 293	11 1028 52 294	11 1067 54 295	11 1107 56 295
180	8 805 38 280	8 837 40 280	9 869 41 281	9 902 43 281	9 935 44 282	10 971 46 282	10 1007 48 283
160	7 730 32 267	8 758 33 267	8 787 35 268	8 817 36 268	8 847 37 269	9 879 39 270	9 911 40 270
140	6 656 27 253	7 682 28 254	7 708 29 254	7 735 30 255	7 762 31 255	8 791 33 256	8 820 34 257
120	6 585 22 238	6 608 23 239	6 632 24 239	6 656 25 240	6 680 26 241	7 705 27 241	7 732 28 242
100	4 469 15 211	5 487 16 211	5 506 17 212	5 526 17 213	5 545 18 214	5 566 19 215	5 587 19 215
50	3 302 8 173	3 314 8 173	3 325 9 174	3 337 9 175	3 350 9 176	3 362 10 177	3 375 10 178
15	2 184 4 122	2 191 4 122	2 198 4 123	2 205 4 124	2 212 4 125	2 219 4 126	2 227 4 127

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.4 %	△FUEL = + 0.4 %	△FUEL = + 6 %	△FUEL = + 11 %

10F -08FA320-232-V2527-A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.0 1 03250.000300.000 .780 0 FCOM-N0-03-05-10-003-140

CLIMB - ISA

Applicable to: ALL 321

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

FROM BRAKE RELEASE
TIME (MIN) FUEL (KG)
DISTANCE (NM) TAS (KT)

WEIGHT AT BRAKE RELEASE (1000KG)

FL	48	52	56	60	64	68	72
390	14 1129 87 382	15 1249 97 384	17 1379 108 385	19 1524 121 387	21 1689 137 390	24 1887 157 393	
370	12 1068 77 376	14 1177 86 377	15 1295 96 378	17 1423 106 380	19 1563 118 382	21 1721 131 384	23 1901 148 386
350	11 1014 70 369	13 1115 78 371	14 1223 86 372	15 1340 95 373	17 1466 104 375	18 1605 115 376	20 1759 128 378
330	11 964 63 363	12 1058 70 364	13 1158 77 365	14 1265 85 366	15 1381 93 367	17 1506 103 369	18 1643 113 370
310	10 914 57 355	11 1002 63 356	12 1095 69 357	13 1194 76 358	14 1300 83 359	15 1414 91 360	17 1538 100 362
290	9 860 51 345	10 942 56 346	11 1028 62 347	12 1119 68 348	13 1217 74 349	14 1321 81 350	15 1432 88 351
270	8 794 44 333	9 869 49 334	10 948 53 335	10 1030 58 335	11 1118 63 336	12 1211 69 337	13 1310 75 338
250	7 735 38 321	8 803 42 322	9 875 46 322	9 950 50 323	10 1029 54 324	11 1113 59 325	12 1202 64 325
240	7 707 36 315	7 772 39 316	8 840 43 317	9 912 46 317	10 987 50 318	10 1067 55 319	11 1152 59 319
220	6 653 31 303	7 712 34 304	7 775 37 305	8 840 40 305	9 909 43 306	9 981 47 307	10 1058 51 307
200	5 601 27 292	6 655 29 293	6 712 32 293	7 772 34 294	8 834 37 294	8 900 40 295	9 970 44 295
180	5 551 23 280	5 601 25 281	6 652 27 281	6 706 29 282	7 763 32 282	7 823 35 283	8 887 37 284
160	4 503 19 268	5 548 21 268	5 594 23 269	6 643 25 269	6 695 27 270	7 749 29 271	7 807 32 271
140	4 455 16 255	4 496 18 255	5 538 19 256	5 582 21 256	5 628 23 257	6 678 25 258	6 729 27 258
120	3 409 14 240	4 445 15 241	4 482 16 241	4 521 17 242	5 563 19 243	5 607 21 243	5 654 22 244
100	3 331 9 213	3 360 10 214	3 390 11 214	3 421 12 215	4 455 13 216	4 491 14 217	4 528 15 218
50	2 223 5 177	2 241 5 177	2 261 6 178	2 281 6 178	2 303 7 179	2 326 7 180	3 350 8 181
15	1 146 2 127	1 158 2 126	1 170 2 126	1 182 3 126	1 196 3 127	1 210 3 128	2 225 3 130

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 6 %

TOTAL ANTI ICE ON
△FUEL = + 12 %

10D —08F0A321–131 IAE V2530–A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 0 FCOM-N0–03–05–10–002–XXX

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

FROM BRAKE RELEASE
TIME (MIN) FUEL (KG)
DISTANCE (NM) TAS (KT)

	WEIGHT AT BRAKE RELEASE (1000KG)													
FL	72		76		80		84		88		92		96	
390														
370	23	1901	26	2120										
	148	386	168	390										
350	20	1759	22	1933	25	2135	28	2386						
	128	378	143	381	160	383	183	387						
330	18	1643	20	1794	22	1963	24	2157	27	2390	31	2686		
	113	370	125	372	138	374	154	377	174	380	200	384		
310	17	1538	18	1673	20	1821	22	1986	24	2177	27	2400	30	2671
	100	362	110	363	121	365	133	367	147	369	165	372	188	376
290	15	1432	16	1553	18	1685	19	1829	21	1993	23	2179	26	2394
	88	351	96	352	105	354	115	355	126	357	140	360	156	362
270	13	1310	14	1416	16	1530	17	1655	18	1793	20	1948	22	2122
	75	338	81	339	88	340	96	341	105	343	115	344	126	346
250	12	1202	13	1297	14	1398	15	1507	16	1628	17	1760	19	1907
	64	325	69	326	75	327	81	328	88	329	96	330	105	332
240	11	1152	12	1242	13	1338	14	1441	15	1554	16	1677	18	1814
	59	319	64	320	69	321	75	322	81	323	88	324	96	325
220	10	1058	11	1139	12	1226	12	1318	13	1418	14	1527	16	1646
	51	307	55	308	59	309	64	309	69	310	75	311	81	312
200	9	970	10	1044	10	1122	11	1205	12	1295	13	1392	14	1498
	44	295	47	296	51	297	55	297	59	298	64	299	69	300
180	8	887	9	954	9	1024	10	1100	11	1181	11	1268	12	1362
	37	284	40	284	43	285	47	285	50	286	54	287	59	288
160	7	807	8	867	8	931	9	999	9	1072	10	1151	11	1235
	32	271	34	272	37	273	40	273	43	274	46	275	50	276
140	6	729	7	784	7	842	8	903	8	969	9	1039	10	1114
	27	258	29	259	31	260	33	260	36	261	39	262	42	263
120	5	654	6	703	6	754	7	809	7	868	8	931	8	997
	22	244	24	245	26	246	28	247	30	248	32	249	35	250
100	4	528	5	568	5	610	5	654	6	701	6	751	7	805
	15	218	17	219	18	220	19	221	21	222	23	224	24	225
50	3	350	3	375	3	401	3	429	3	459	4	490	4	522
	8	181	9	183	9	184	10	186	11	187	12	189	13	191
15	2	225	2	240	2	256	2	274	2	291	2	310	2	329
	3	130	4	131	4	133	4	135	5	137	5	140	6	142

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.6 %	△FUEL = + 6 %	△FUEL = + 12 %

10D —08F0A321–131 IAE V2530–A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 0 FCOM-N0–03–05–10–003–XXX

CLIMB - ISA +10

Applicable to: ALL 320

CLIMB - 250KT/300KT/M.78														
MAX. CLIMB THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA+10 CG=33.0%				FROM BRAKE RELEASE TIME (MIN) DISTANCE (NM)				FUEL (KG) TAS (KT)	
	WEIGHT AT BRAKE RELEASE (1000KG)													
FL	52		54		56		58		60		62		64	
390	18	1370	19	1440	20	1515	21	1594	23	1681	24	1778	26	1889
	119	393	126	394	133	394	141	396	150	397	160	398	173	400
370	16	1290	17	1352	18	1417	19	1486	20	1557	21	1634	22	1717
	106	386	111	387	117	387	123	388	130	389	137	390	145	391
350	15	1222	16	1278	17	1338	17	1399	18	1463	19	1531	20	1603
	95	379	100	380	105	381	110	381	116	382	121	382	128	383
330	14	1158	15	1211	15	1265	16	1322	17	1380	17	1442	18	1506
	87	373	91	373	95	373	99	374	104	374	109	375	114	375
310	13	1095	13	1144	14	1195	15	1247	15	1300	16	1356	17	1415
	78	365	82	365	86	366	89	366	93	366	97	367	102	367
290	12	1027	12	1073	13	1120	13	1168	14	1217	15	1268	15	1322
	70	355	73	356	76	356	79	356	83	356	86	357	90	357
270	10	943	11	985	11	1027	12	1071	12	1115	13	1162	13	1210
	60	342	62	343	65	343	68	343	71	343	74	343	77	344
250	9	866	10	904	10	943	11	983	11	1024	12	1066	12	1109
	51	330	54	330	56	330	58	330	61	331	63	331	66	331
240	9	830	9	866	10	903	10	941	10	980	11	1020	11	1062
	48	324	50	324	52	324	54	324	56	324	59	324	61	325
220	8	760	8	793	9	827	9	862	9	897	10	933	10	971
	41	311	43	311	45	312	46	312	48	312	50	312	52	312
200	7	694	7	725	8	756	8	787	8	819	9	852	9	887
	35	299	37	299	38	299	40	299	41	299	43	299	45	300
180	6	632	7	660	7	688	7	717	7	746	8	776	8	807
	30	286	31	286	33	287	34	287	35	287	37	287	38	287
160	6	572	6	597	6	623	6	649	7	676	7	703	7	731
	25	273	26	273	28	274	29	274	30	274	31	274	32	274
140	5	514	5	537	5	560	6	583	6	607	6	632	6	657
	21	259	22	259	23	260	24	260	25	260	26	260	27	260
120	4	457	4	477	5	498	5	519	5	541	5	563	5	585
	17	244	18	244	19	244	20	245	21	245	21	245	22	245
100	3	365	3	381	4	397	4	414	4	432	4	450	4	468
	12	215	13	216	13	216	14	217	14	217	15	217	15	218
50	2	235	2	245	2	256	2	267	2	278	3	289	3	301
	6	178	7	179	7	179	7	179	7	180	8	180	8	180
15	1	142	1	148	1	155	2	161	2	168	2	175	2	183
	3	128	3	128	3	129	3	129	3	130	4	130	4	130
LOW AIR CONDITIONING △FUEL = − 0.4 %			HIGH AIR CONDITIONING △FUEL = + 0.4 %				ENGINE ANTI ICE ON △FUEL = + 6 %				TOTAL ANTI ICE ON △FUEL = + 11 %			

10F -08F0A320-232 IAE V2527-A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.0 1 03250.000300.000 .780 10 FCOM-N0-03-05-10-004-140

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST | ISA+10 | FROM BRAKE RELEASE
NORMAL AIR CONDITIONING | CG=33.0% | TIME (MIN) / FUEL (KG)
ANTI-ICING OFF | | DISTANCE (NM) / TAS (KT)

FL	WEIGHT AT BRAKE RELEASE (1000KG) 66	68	70	72	74	76	78
390							
370	24 1808 154 392	25 1908 164 394	27 2021 175 396	29 2152 190 398			
350	21 1680 134 384	22 1762 142 385	23 1850 150 387	25 1946 159 388	26 2051 169 390	28 2169 180 392	30 2305 194 394
330	19 1575 120 376	20 1647 126 377	21 1724 132 378	22 1805 139 379	23 1892 146 381	24 1986 155 382	26 2087 164 384
310	17 1478 107 368	18 1543 112 369	19 1611 117 369	20 1684 123 370	21 1760 129 372	22 1841 135 373	23 1927 142 374
290	16 1378 94 357	16 1437 98 358	17 1498 103 359	18 1563 108 360	19 1631 113 361	20 1702 118 362	20 1777 124 363
270	14 1260 80 344	15 1312 84 345	15 1366 87 345	16 1423 91 346	16 1482 95 347	17 1544 99 348	18 1609 104 349
250	12 1154 69 331	13 1201 72 332	13 1250 75 332	14 1300 78 333	15 1352 81 334	15 1407 84 335	16 1464 88 335
240	12 1105 64 325	12 1149 66 326	13 1195 69 326	13 1242 72 327	14 1292 75 327	14 1344 78 328	15 1397 81 329
220	10 1010 54 312	11 1050 57 313	11 1091 59 313	12 1134 61 314	12 1178 64 315	13 1224 66 315	13 1271 69 316
200	9 922 47 300	10 958 48 300	10 995 50 301	10 1034 52 301	11 1073 54 302	11 1114 56 303	12 1157 59 303
180	8 839 40 287	9 872 41 288	9 906 43 288	9 940 45 289	10 976 46 290	10 1013 48 290	10 1051 50 291
160	7 760 34 274	8 790 35 275	8 820 36 275	8 852 38 276	8 884 39 277	9 917 41 277	9 951 42 278
140	6 683 28 261	7 710 29 261	7 738 30 262	7 766 32 262	7 795 33 263	8 825 34 264	8 856 35 265
120	6 609 23 246	6 633 24 246	6 658 25 247	6 683 26 247	7 709 27 248	7 736 28 249	7 763 29 250
100	4 487 16 218	5 507 17 219	5 527 17 220	5 547 18 221	5 568 19 222	5 590 20 223	5 612 20 224
50	3 313 8 181	3 326 9 182	3 338 9 183	3 351 10 184	3 364 10 185	3 378 10 186	3 391 11 188
15	2 190 4 131	2 198 4 132	2 205 4 133	2 213 4 134	2 221 4 136	2 229 5 137	2 237 5 139

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.4 %	△FUEL = + 0.4 %	△FUEL = + 6 %	△FUEL = + 11 %

10F -08FA320-232-V2527-A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.0 1 03250.000300.000 .780 10 FCOM-N0-03-05-10-005-140

CLIMB - ISA +10

Applicable to: ALL 321

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

FROM BRAKE RELEASE
TIME (MIN) FUEL (KG)
DISTANCE (NM) TAS (KT)

WEIGHT AT BRAKE RELEASE (1000KG)

FL	48	52	56	60	64	68	72
390	14 1184 91 391	16 1310 102 392	17 1448 114 394	19 1600 127 396	22 1774 144 398	25 1983 164 401	
370	13 1120 81 384	14 1234 90 385	16 1358 100 387	17 1493 111 388	19 1641 124 390	21 1807 138 392	24 1998 155 395
350	12 1063 73 377	13 1169 81 378	14 1282 90 380	16 1405 99 381	17 1538 109 383	19 1685 121 384	21 1847 134 386
330	11 1009 66 370	12 1108 73 371	13 1213 81 372	14 1326 89 374	16 1448 98 375	17 1580 107 377	19 1724 118 378
310	10 956 60 362	11 1048 66 363	12 1146 73 364	13 1250 80 365	14 1362 87 367	16 1482 96 368	17 1612 105 369
290	9 899 53 353	10 985 59 353	11 1075 65 354	12 1171 71 355	13 1273 77 356	14 1383 84 357	15 1500 92 359
270	8 830 46 340	9 908 51 341	10 991 55 341	11 1077 60 342	12 1169 66 343	13 1267 72 344	14 1371 78 345
250	7 767 40 327	8 839 44 328	9 914 48 329	9 992 52 330	10 1075 57 330	11 1164 61 331	12 1257 67 332
240	7 737 37 321	8 806 41 322	8 877 44 323	9 952 48 324	10 1032 53 324	11 1116 57 325	11 1204 62 326
220	6 681 32 309	7 743 35 310	7 808 38 311	8 877 42 311	9 949 45 312	9 1025 49 313	10 1106 53 313
200	6 626 28 297	6 683 30 298	7 743 33 299	7 805 36 299	8 871 39 300	8 940 42 301	9 1013 45 301
180	5 574 24 285	5 626 26 286	6 680 28 287	6 737 31 287	7 796 33 288	7 859 36 288	8 926 39 289
160	4 523 20 273	5 570 22 273	5 619 24 274	6 670 26 275	6 725 28 275	7 782 31 276	7 842 33 276
140	4 474 17 259	4 516 19 260	5 560 20 260	5 606 22 261	5 655 24 262	6 706 26 262	6 761 28 263
120	3 425 14 245	4 462 15 245	4 502 17 246	4 543 18 246	5 587 20 247	5 633 21 248	6 681 23 249
100	3 344 10 217	3 374 11 218	3 405 12 218	3 439 13 219	4 474 14 220	4 511 15 221	4 550 16 222
50	2 231 5 180	2 250 6 180	2 271 6 181	2 292 6 181	2 315 7 182	2 339 8 183	3 364 8 185
15	1 151 2 129	1 163 2 128	1 176 3 128	1 189 3 128	1 203 3 129	2 218 3 130	2 234 4 132

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 6 %

TOTAL ANTI ICE ON
△FUEL = + 12 %

10D —08F0A321–131 IAE V2530–A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 10 FCOM-N0–03–05–10–004–XXX

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

FROM BRAKE RELEASE
TIME (MIN) FUEL (KG)
DISTANCE (NM) TAS (KT)

	WEIGHT AT BRAKE RELEASE (1000KG)													
FL	72		76		80		84		88		92		96	
390														
370	24	1998	27	2229										
	155	395	177	398										
350	21	1847	23	2030	26	2243	29	2509						
	134	386	149	389	168	392	193	396						
330	19	1724	21	1883	23	2061	25	2266	28	2512	32	2825		
	118	378	131	380	145	382	161	385	182	388	210	393		
310	17	1612	19	1754	20	1910	22	2084	25	2286	27	2521	31	2806
	105	369	115	371	126	373	139	375	154	377	173	380	197	384
290	15	1500	17	1627	18	1765	20	1917	22	2090	24	2286	26	2513
	92	359	100	360	110	361	120	363	132	365	146	367	163	370
270	14	1371	15	1482	16	1602	17	1733	19	1879	20	2041	22	2224
	78	345	85	346	92	347	100	348	109	350	120	351	132	353
250	12	1257	13	1357	14	1463	15	1577	16	1704	18	1843	19	1997
	67	332	72	333	78	334	85	335	92	336	100	337	109	339
240	11	1204	12	1299	13	1399	14	1507	15	1626	17	1756	18	1899
	62	326	67	326	72	327	78	328	85	329	92	330	100	332
220	10	1106	11	1191	12	1281	13	1378	14	1484	15	1598	16	1723
	53	313	57	314	62	315	67	315	72	316	78	317	84	319
200	9	1013	10	1091	10	1172	11	1260	12	1354	13	1456	14	1567
	45	301	49	302	53	303	57	303	61	304	66	305	72	306
180	8	926	9	996	9	1070	10	1149	11	1234	12	1326	12	1425
	39	289	42	290	45	290	49	291	52	292	57	293	61	294
160	7	842	8	905	8	973	9	1044	10	1120	10	1203	11	1291
	33	276	36	277	38	278	41	279	44	279	48	280	52	281
140	6	761	7	818	7	879	8	943	8	1012	9	1086	10	1165
	28	263	30	264	32	265	35	265	37	266	40	267	44	268
120	6	681	6	733	6	787	7	845	7	906	8	972	9	1042
	23	249	25	249	27	250	29	251	31	252	34	253	36	254
100	4	550	5	592	5	636	5	683	6	732	6	785	7	841
	16	222	17	223	19	224	20	225	22	227	24	228	25	229
50	3	364	3	391	3	419	3	448	4	480	4	512	4	547
	8	185	9	186	10	188	10	189	11	191	12	193	13	194
15	2	234	2	251	2	268	2	286	2	305	2	325	2	345
	4	132	4	134	4	136	5	138	5	140	5	143	6	145

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 6 %	△FUEL = + 12 %

10D —08F0A321–131 IAE V2530–A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 10 FCOM-N0–03–05–10–005–XXX

CLIMB - ISA +15

Applicable to: ALL 320

CLIMB - 250KT/300KT/M.78													
MAX. CLIMB THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA+15 CG=33.0%				FROM BRAKE RELEASE TIME (MIN) DISTANCE (NM)				FUEL (KG) TAS (KT)
	WEIGHT AT BRAKE RELEASE (1000KG)												
FL	52		54		56		58		60		62		64	
390	21	1496	22	1576	23	1662	25	1755	26	1860	28	1979		
	139	401	148	402	157	403	167	404	179	405	193	407		
370	19	1404	20	1474	21	1548	22	1626	23	1709	24	1799	26	1897
	123	394	130	395	137	395	145	396	153	397	162	398	172	399
350	17	1327	18	1390	19	1457	20	1526	21	1599	22	1678	23	1761
	111	387	117	388	123	389	129	389	136	390	143	391	151	392
330	16	1255	17	1313	17	1374	18	1437	19	1503	20	1573	21	1647
	101	381	105	381	110	382	116	382	121	383	128	383	134	384
310	15	1183	15	1237	16	1293	17	1350	17	1410	18	1473	19	1540
	90	373	95	373	99	373	104	374	108	374	114	375	119	375
290	13	1104	14	1153	14	1205	15	1257	16	1312	16	1368	17	1428
	80	363	84	363	87	363	91	363	95	364	100	364	104	364
270	12	1007	12	1052	13	1098	13	1146	14	1194	14	1245	15	1298
	68	349	71	349	74	349	78	350	81	350	84	350	88	350
250	10	920	11	961	11	1003	12	1046	12	1090	13	1136	13	1183
	58	336	61	336	63	336	66	337	69	337	72	337	75	337
240	10	880	10	918	11	958	11	999	12	1041	12	1084	13	1129
	54	329	56	330	59	330	61	330	64	330	66	330	69	331
220	9	802	9	838	9	874	10	911	10	949	11	988	11	1029
	46	316	48	317	50	317	52	317	54	317	56	317	59	317
200	8	731	8	763	8	796	9	830	9	864	9	899	10	936
	39	304	41	304	42	304	44	304	46	304	48	304	50	305
180	7	664	7	693	7	723	8	753	8	785	8	817	9	850
	33	291	35	291	36	291	38	291	39	292	41	292	42	292
160	6	600	6	626	7	653	7	681	7	709	7	738	8	768
	28	277	29	278	30	278	32	278	33	278	34	278	36	278
140	5	537	6	561	6	585	6	610	6	636	7	662	7	689
	23	263	24	263	25	264	26	264	28	264	29	264	30	264
120	5	477	5	498	5	520	5	542	5	565	6	588	6	612
	19	247	20	248	21	248	22	248	23	248	24	248	24	249
100	4	378	4	395	4	413	4	431	4	449	4	468	5	487
	13	218	14	219	14	219	15	220	15	220	16	220	17	220
50	2	243	2	253	2	264	3	276	3	288	3	300	3	312
	7	180	7	180	7	181	8	181	8	182	8	182	9	182
15	1	146	1	152	2	159	2	166	2	173	2	180	2	188
	3	128	3	128	3	128	3	129	4	129	4	130	4	130
LOW AIR CONDITIONING △FUEL = − 0.4 %			HIGH AIR CONDITIONING △FUEL = + 0.4 %				ENGINE ANTI ICE ON △FUEL = + 6 %				TOTAL ANTI ICE ON △FUEL = + 11 %			

10F -08FA320-232 IAE V2527-A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.0 1 03250.000300.000 .780 15 FCOM-N0-03-05-10-006-140

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST | ISA+15 | FROM BRAKE RELEASE
NORMAL AIR CONDITIONING | CG=33.0% | TIME (MIN) / FUEL (KG)
ANTI-ICING OFF | | DISTANCE (NM) / TAS (KT)

	WEIGHT AT BRAKE RELEASE (1000KG)						
FL	66	68	70	72	74	76	78
390							
370	28 2008 184 401	29 2132 198 403					
350	24 1852 160 393	26 1949 169 394	27 2057 180 396	29 2176 192 398	31 2311 207 400	33 2469 224 402	
330	22 1727 141 385	23 1811 149 386	24 1902 157 387	26 2000 166 389	27 2107 176 390	29 2224 188 392	31 2353 201 394
310	20 1611 125 376	21 1686 131 377	22 1766 138 378	23 1851 145 379	24 1942 153 380	25 2040 162 382	27 2145 171 383
290	18 1491 109 365	19 1558 114 366	20 1628 120 367	21 1703 126 368	21 1781 132 369	23 1865 139 370	24 1954 146 371
270	16 1353 92 351	16 1411 96 352	17 1472 100 352	18 1536 105 353	19 1603 110 354	19 1674 115 355	20 1748 121 356
250	14 1233 78 338	14 1284 81 338	15 1337 85 339	16 1393 89 339	16 1452 93 340	17 1513 97 341	18 1578 101 342
240	13 1176 72 331	14 1225 75 331	14 1275 78 332	15 1328 82 333	15 1383 85 333	16 1440 89 334	17 1500 93 335
220	12 1071 61 318	12 1114 64 318	12 1159 66 319	13 1205 69 319	13 1254 72 320	14 1304 75 320	15 1357 78 321
200	10 974 52 305	11 1013 54 305	11 1053 56 306	11 1095 58 306	12 1138 61 307	12 1183 63 307	13 1230 66 308
180	9 884 44 292	9 920 46 292	10 956 48 293	10 993 50 293	11 1032 52 294	11 1072 54 295	11 1114 56 295
160	8 799 37 279	8 831 39 279	9 864 40 280	9 897 42 280	9 932 43 281	10 968 45 281	10 1006 47 282
140	7 717 31 265	7 745 32 265	8 775 34 266	8 805 35 266	8 837 36 267	8 869 38 267	9 902 39 268
120	6 637 25 249	6 663 27 250	7 689 28 250	7 716 29 251	7 744 30 252	7 773 31 252	8 803 32 253
100	5 507 18 221	5 528 18 222	5 549 19 222	5 571 20 223	6 594 21 224	6 617 21 225	6 641 22 226
50	3 325 9 183	3 338 9 184	3 351 10 185	3 365 10 186	3 379 11 187	4 393 11 188	4 408 12 189
15	2 195 4 131	2 203 4 132	2 211 4 133	2 219 5 134	2 228 5 135	2 236 5 137	2 245 5 138

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.4 %	△FUEL = + 0.4 %	△FUEL = + 6 %	△FUEL = + 11 %

10F -08F0A320-232 IAE V2527-A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.0 1 03250.000300.000 .780 15 FCOM-N0-03-05-10-007-140

CLIMB - ISA +15

Applicable to: ALL 321

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

FROM BRAKE RELEASE
TIME (MIN) FUEL (KG)
DISTANCE (NM) TAS (KT)

WEIGHT AT BRAKE RELEASE (1000KG)

FL	48	52	56	60	64	68	72
390	16 1270 104 397	18 1409 116 399	20 1564 131 401	22 1738 148 403	25 1942 169 406		
370	14 1197 92 390	16 1323 103 392	17 1461 115 393	19 1612 128 395	22 1781 143 397	24 1974 161 400	27 2201 183 403
350	13 1134 83 384	14 1250 92 385	16 1376 102 386	18 1512 114 388	19 1662 126 390	21 1829 140 392	24 2017 157 394
330	12 1075 75 377	13 1183 83 378	15 1299 92 379	16 1423 102 381	18 1559 112 382	19 1708 124 384	21 1873 137 386
310	11 1017 68 369	12 1117 75 370	13 1224 83 371	15 1338 91 372	16 1462 100 373	18 1596 110 375	19 1743 121 376
290	10 954 60 359	11 1047 67 360	12 1145 73 361	13 1249 80 362	15 1362 88 363	16 1483 96 364	17 1614 105 365
270	9 878 52 346	10 962 57 347	11 1051 63 347	12 1145 68 348	13 1245 75 349	14 1352 82 350	15 1467 89 351
250	8 810 45 333	9 887 49 334	10 967 54 335	10 1052 59 336	11 1142 64 336	12 1238 70 337	13 1341 76 338
240	8 778 42 327	8 851 46 328	9 928 50 329	10 1008 54 329	11 1094 59 330	12 1186 64 331	13 1283 70 332
220	7 716 36 315	7 783 39 316	8 853 43 317	9 926 47 317	10 1004 51 318	10 1086 55 319	11 1174 60 319
200	6 658 31 303	7 718 34 304	7 782 37 304	8 848 40 305	9 919 44 306	9 994 47 306	10 1073 51 307
180	5 601 26 291	6 657 29 292	6 714 32 292	7 774 34 293	8 838 37 293	8 906 40 294	9 978 44 295
160	5 547 22 278	5 597 25 279	6 649 27 279	6 703 29 280	7 761 32 281	7 822 34 281	8 887 37 282
140	4 494 19 264	5 538 21 265	5 585 22 266	5 634 24 266	6 686 26 267	6 741 29 268	7 799 31 268
120	4 442 15 249	4 481 17 250	4 523 18 251	5 566 20 251	5 613 22 252	6 662 24 253	6 714 26 254
100	3 356 11 221	3 388 12 222	3 421 13 223	4 455 14 223	4 492 15 224	4 532 16 225	5 574 18 226
50	2 238 6 185	2 259 6 185	2 280 7 185	2 302 7 186	2 326 8 187	3 351 8 188	3 378 9 190
15	1 155 2 133	1 168 3 132	1 181 3 132	1 195 3 132	1 209 3 134	2 225 4 135	2 242 4 137

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 6 %	△FUEL = + 12 %

10D —08F0A321–131 IAE V2530–A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 15 FCOM-N0–03–05–10–006–XXX

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

FROM BRAKE RELEASE
TIME (MIN) FUEL (KG)
DISTANCE (NM) TAS (KT)

	WEIGHT AT BRAKE RELEASE (1000KG)						
FL	72	76	80	84	88	92	96
390							
370	27 2201 183 403						
350	24 2017 157 394	27 2234 177 397	30 2496 202 400				
330	21 1873 137 386	24 2057 153 388	26 2269 171 390	29 2518 193 394	34 2833 222 398		
310	19 1743 121 376	21 1905 133 378	23 2087 148 380	26 2293 164 383	29 2538 185 386	32 2836 211 390	
290	17 1614 105 365	19 1757 116 367	21 1915 127 368	23 2091 140 370	25 2294 155 373	28 2531 174 376	31 2814 197 379
270	15 1467 89 351	16 1591 97 352	18 1726 106 354	20 1874 116 355	21 2042 127 357	23 2232 140 359	26 2450 156 361
250	13 1341 76 338	15 1451 82 339	16 1569 89 340	17 1697 97 341	19 1840 106 342	20 2000 116 344	22 2179 127 346
240	13 1283 70 332	14 1387 76 333	15 1498 82 333	16 1618 89 334	17 1752 97 336	19 1900 106 337	21 2065 116 339
220	11 1174 60 319	12 1267 65 320	13 1367 70 321	14 1474 76 322	15 1592 82 323	17 1720 89 324	18 1863 97 325
200	10 1073 51 307	11 1157 55 308	12 1247 60 308	13 1343 65 309	14 1448 70 310	15 1561 76 311	16 1687 82 312
180	9 978 44 295	10 1054 47 295	10 1135 51 296	11 1221 55 297	12 1315 60 298	13 1416 64 299	14 1527 70 300
160	8 887 37 282	8 955 40 283	9 1028 43 283	10 1106 47 284	11 1190 50 285	11 1281 54 286	12 1379 59 287
140	7 799 31 268	7 861 34 269	8 926 36 270	9 996 39 271	9 1071 42 272	10 1152 46 273	11 1239 49 274
120	6 714 26 254	7 769 28 255	7 827 30 255	8 890 32 256	8 956 35 258	9 1028 38 259	9 1105 41 260
100	5 574 18 226	5 618 19 228	5 665 21 229	6 715 22 230	6 769 24 232	7 826 26 233	7 887 28 235
50	3 378 9 190	3 406 10 191	3 436 11 193	4 467 12 195	4 500 12 197	4 535 13 198	4 572 15 200
15	2 242 4 137	2 259 4 139	2 277 5 141	2 296 5 144	2 316 5 146	2 337 6 149	3 358 6 151

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 6 %	△FUEL = + 12 %

10D—08F0A321–131 IAE V2530–A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 15 FCOM-N0–03–05–10–007–XXX

CLIMB - ISA +20

Applicable to: ALL 320

CLIMB - 250KT/300KT/M.78												
MAX. CLIMB THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA+20 CG=33.0%				FROM BRAKE RELEASE TIME (MIN) DISTANCE (NM)			FUEL (KG) TAS (KT)
	WEIGHT AT BRAKE RELEASE (1000KG)											
FL	52		54		56		58		60		62	64
390	25	1667	26	1762	28	1866	30	1983	32	2116		
	168	409	179	410	191	411	205	412	222	414		
370	22	1557	23	1639	25	1726	26	1818	28	1919	29 2030	31 2155
	148	402	156	402	165	403	175	404	186	406	199 407	213 409
350	20	1467	21	1540	22	1617	23	1699	25	1786	26 1880	28 1983
	133	395	140	396	147	397	155	397	164	398	174 400	185 401
330	18	1383	19	1450	20	1519	21	1592	22	1669	24 1752	25 1841
	120	388	126	389	132	389	139	390	146	391	154 392	163 393
310	17	1298	18	1358	19	1422	19	1487	20	1556	21 1629	22 1707
	107	380	112	381	118	381	123	381	129	382	136 383	143 383
290	15	1202	16	1257	17	1315	17	1374	18	1435	19 1499	20 1568
	94	369	98	370	103	370	107	370	112	371	117 371	123 372
270	13	1087	14	1137	15	1188	15	1240	16	1294	17 1351	17 1410
	78	355	82	355	86	355	90	355	94	356	98 356	102 356
250	12	988	12	1032	13	1078	13	1125	14	1174	14 1224	15 1276
	66	341	69	341	73	341	76	341	79	342	82 342	86 342
240	11	942	11	984	12	1028	12	1072	13	1118	14 1165	14 1215
	61	334	64	334	67	334	70	335	73	335	76 335	79 335
220	10	855	10	893	11	933	11	973	11	1014	12 1057	12 1101
	52	320	54	321	56	321	59	321	61	321	64 321	67 322
200	9	776	9	811	9	847	10	883	10	920	11 958	11 998
	44	307	46	307	48	307	50	308	52	308	54 308	56 308
180	8	703	8	735	8	767	9	800	9	833	9 868	10 904
	37	294	39	294	40	294	42	294	44	294	46 295	48 295
160	7	634	7	662	7	691	8	720	8	751	8 782	9 814
	31	280	33	280	34	280	35	280	37	281	38 281	40 281
140	6	566	6	591	6	617	7	644	7	671	7 699	7 728
	26	265	27	265	28	265	29	266	31	266	32 266	33 266
120	5	501	5	523	6	546	6	570	6	594	6 619	6 645
	21	249	22	249	23	249	24	249	25	250	26 250	27 250
100	4	395	4	413	4	432	4	451	5	470	5 490	5 511
	14	219	15	219	16	219	16	220	17	220	18 220	18 221
50	2	252	3	264	3	275	3	287	3	300	3 312	3 326
	7	178	8	179	8	179	8	179	9	180	9 180	9 181
15	2	150	2	157	2	164	2	172	2	179	2 187	2 195
	3	123	3	124	3	124	4	124	4	125	4 125	4 126
LOW AIR CONDITIONING △FUEL = − 0.4 %			HIGH AIR CONDITIONING △FUEL = + 0.4 %				ENGINE ANTI ICE ON △FUEL = + 6 %				TOTAL ANTI ICE ON △FUEL = + 11 %	

10F 08F0A320-232 IAE V2527-A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.0 1 03250.000300.000 .780 20 FCOM-N0-03-05-10-008-142

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST | ISA+20 | FROM BRAKE RELEASE
NORMAL AIR CONDITIONING | CG=33.0% | TIME (MIN) / FUEL (KG)
ANTI-ICING OFF | | DISTANCE (NM) / TAS (KT)

FL	WEIGHT AT BRAKE RELEASE (1000KG)						
	66	68	70	72	74	76	78
390							
370	34 2299 230 411						
350	29 2096 197 402	31 2221 210 404	33 2363 226 406	36 2526 245 408			
330	26 1938 172 394	28 2043 183 395	29 2159 194 397	31 2286 208 399	33 2428 223 401	36 2590 241 403	
310	23 1792 150 384	25 1882 159 386	26 1980 168 387	28 2087 178 388	29 2203 190 390	31 2330 202 392	33 2471 216 394
290	21 1641 129 372	22 1719 136 373	23 1802 143 374	24 1891 151 375	25 1987 159 377	27 2091 169 378	28 2202 179 379
270	18 1473 107 357	19 1539 112 358	20 1608 118 358	21 1682 123 359	22 1761 130 360	23 1845 136 361	24 1934 143 362
250	16 1331 90 343	16 1389 94 343	17 1449 98 344	18 1513 103 344	19 1580 107 345	20 1651 113 346	20 1725 118 347
240	15 1267 82 336	15 1321 86 336	16 1377 90 337	17 1437 94 337	17 1499 98 338	18 1564 103 339	19 1633 107 339
220	13 1147 69 322	13 1195 72 322	14 1245 75 323	15 1297 79 323	15 1351 82 323	16 1408 86 324	17 1467 89 325
200	11 1040 59 308	12 1082 61 309	12 1127 64 309	13 1173 66 309	13 1220 69 310	14 1271 72 310	14 1323 75 311
180	10 941 50 295	10 980 52 295	11 1019 54 296	11 1061 56 296	12 1103 58 296	12 1148 61 297	13 1195 63 297
160	9 848 42 281	9 883 43 282	10 918 45 282	10 955 47 282	10 993 49 283	11 1033 51 283	11 1075 53 284
140	8 758 35 266	8 789 36 267	8 822 37 267	9 855 39 268	9 889 41 268	9 924 42 269	10 961 44 269
120	7 672 28 250	7 700 29 251	7 728 31 251	8 758 32 252	8 788 33 252	8 820 35 253	9 853 36 253
100	5 533 19 221	5 555 20 222	6 578 21 222	6 602 22 223	6 626 23 224	6 651 24 224	7 678 25 225
50	3 339 10 181	3 353 10 182	4 368 11 183	4 382 11 184	4 398 12 184	4 413 12 185	4 429 13 186
15	2 203 4 127	2 211 4 127	2 220 5 128	2 229 5 129	2 238 5 130	2 247 5 131	2 257 5 132

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.4 %	△FUEL = + 0.4 %	△FUEL = + 6 %	△FUEL = + 11 %

10F -08FA320-232 IAE V2527-A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.0 1 03250.000300.000 .780 20 FCOM-N0-03-05-10-009-140

CLIMB - ISA +20

Applicable to: ALL 321

CLIMB - 250KT/300KT/M.78														
MAX. CLIMB THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA+20 CG=33.0%						FROM BRAKE RELEASE TIME (MIN) DISTANCE (NM)				FUEL (KG) TAS (KT)
	WEIGHT AT BRAKE RELEASE (1000KG)													
FL	48		52		56		60		64		68		72	
390	18	1375	20	1533	23	1711	26	1917	30	2169				
	120	404	136	406	154	408	176	411	204	414				
370	16	1293	18	1434	20	1589	22	1763	25	1961	28	2193		
	107	397	119	398	134	400	150	402	170	405	193	408		
350	15	1222	16	1351	18	1491	20	1646	22	1819	25	2015	28	2241
	96	390	107	391	119	393	133	395	148	397	166	399	188	402
330	14	1156	15	1275	17	1404	18	1544	20	1699	22	1872	25	2066
	87	383	96	384	107	386	118	387	131	389	146	391	163	393
310	12	1091	14	1201	15	1319	17	1447	18	1587	20	1741	22	1911
	78	375	86	376	95	377	105	379	116	380	129	382	143	384
290	11	1020	13	1121	14	1229	15	1345	17	1471	18	1608	20	1757
	69	365	76	366	84	367	92	368	102	369	112	370	123	372
270	10	935	11	1027	12	1124	13	1227	15	1338	16	1457	17	1586
	59	351	65	352	72	353	78	354	86	355	94	356	103	357
250	9	860	10	943	11	1031	12	1123	13	1222	14	1329	15	1443
	51	339	56	339	61	340	67	341	73	342	80	343	87	344
240	9	825	9	904	10	987	11	1075	12	1169	13	1270	14	1378
	47	333	52	333	57	334	62	335	68	336	74	336	80	337
220	8	758	8	829	9	905	10	984	11	1069	12	1160	13	1256
	41	320	45	321	49	322	53	323	58	323	63	324	69	325
200	7	694	7	759	8	827	9	899	10	976	10	1057	11	1144
	35	308	38	309	42	310	46	310	50	311	54	312	59	312
180	6	633	7	692	7	754	8	818	9	888	9	961	10	1039
	30	296	33	296	36	297	39	298	42	298	46	299	50	300
160	5	574	6	627	6	682	7	741	8	803	8	869	9	939
	25	283	28	283	30	284	33	285	36	285	39	286	42	287
140	5	516	5	564	6	613	6	665	7	721	7	780	8	843
	21	269	23	269	25	270	27	271	30	271	32	272	35	273
120	4	460	4	502	5	546	5	592	6	641	6	694	7	750
	17	253	19	254	21	255	22	255	24	256	27	257	29	258
100	3	369	3	402	4	437	4	473	4	513	5	555	5	599
	12	225	13	225	14	226	15	227	17	228	18	229	20	230
50	2	246	2	267	2	289	2	312	3	337	3	364	3	392
	6	188	7	188	7	189	8	190	9	191	9	192	10	194
15	1	159	1	172	1	185	1	200	2	215	2	232	2	249
	3	136	3	135	3	135	3	135	4	137	4	138	4	140
ECON AIR CONDITIONING △FUEL = − 0.6 %					ENGINE ANTI ICE ON △FUEL = + 6 %						TOTAL ANTI ICE ON △FUEL = + 12 %			

10D —08F0A321—131 IAE V2530-A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 20 FCOM-N0-03-05-10-009-XXX

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

FROM BRAKE RELEASE
TIME (MIN) FUEL (KG)
DISTANCE (NM) TAS (KT)

FL	WEIGHT AT BRAKE RELEASE (1000KG)													
	72		76		80		84		88		92		96	
390														
370														
350	28	2241	32	2511										
	188	402	215	405										
330	25	2066	28	2289	31	2552	36	2878						
	163	393	183	396	208	399	240	403						
310	22	1911	25	2103	27	2322	31	2580	35	2899				
	143	384	159	386	177	389	200	392	230	396				
290	20	1757	22	1923	24	2108	27	2319	30	2571				
	123	372	136	374	150	376	167	378	188	381				
270	17	1586	19	1727	21	1882	23	2054	25	2253	28	2484	31	2757
	103	357	113	359	124	360	136	362	151	364	168	366	190	369
250	15	1443	17	1566	18	1699	20	1846	21	2013	23	2201	26	2417
	87	344	95	345	104	346	113	347	124	349	137	351	152	353
240	14	1378	16	1493	17	1619	18	1755	20	1910	22	2082	24	2278
	80	337	88	338	95	339	104	340	114	342	125	344	138	345
220	13	1256	14	1359	15	1471	16	1591	17	1725	19	1873	21	2040
	69	325	75	326	81	326	88	327	96	329	105	330	115	332
200	11	1144	12	1237	13	1336	14	1443	15	1562	17	1691	18	1836
	59	312	64	313	69	314	75	315	81	316	88	317	96	318
180	10	1039	11	1122	12	1212	13	1307	14	1412	15	1527	16	1654
	50	300	54	301	58	301	63	302	69	303	75	304	81	306
160	9	939	9	1014	10	1094	11	1179	12	1273	13	1374	14	1486
	42	287	46	288	49	288	53	289	58	290	63	292	68	293
140	8	843	8	910	9	981	10	1057	10	1140	11	1230	12	1328
	35	273	38	274	41	275	44	276	48	277	52	278	57	279
120	7	750	7	809	8	873	8	941	9	1014	10	1093	11	1179
	29	258	31	259	34	260	37	261	40	262	43	263	47	265
100	5	599	6	647	6	697	6	751	7	809	8	872	8	939
	20	230	21	231	23	233	25	234	27	236	30	237	32	239
50	3	392	3	422	4	454	4	487	4	522	4	560	5	600
	10	194	11	195	12	197	13	199	14	201	15	203	16	205
15	2	249	2	267	2	286	2	306	2	326	3	348	3	371
	4	140	5	143	5	145	6	148	6	150	7	153	7	156

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 6 %	△FUEL = + 12 %

10D—08F0A321–131 IAE V2530–A5 21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 20 FCOM-N0–03–05–10–009–XXX

PERFORMANCE

CRUISE

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Localization Title	Toc Index	ID	Reason
PER-CRZ-ECI-10 OPTIMUM MACH NUMBER	A	1	**Update of the technical wording**

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OPTIMUM MACH NUMBER

Applicable to: ALL

1 Seven tables give the optimum Mach number versus cost index, altitude and wind as calculated by the FMGC.

Refer to Part A 8.3.1.6 for Cost Index Policy.

COST INDEX 0 (MAXIMUM RANGE)

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

COST INDEX = 0 (MAXIMUM RANGE)							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
50	100.	.588	.616	.641	.665	.689	.712
	50.	.602	.628	.652	.676	.698	.720
	0.	.620	.644	.667	.688	.709	.730
	– 50.	.641	.663	.684	.703	.722	.740
	– 100.	.668	.686	.704	.722	.738	.753
55	100.	.617	.642	.665	.689	.712	.735
	50.	.629	.653	.676	.698	.720	.742
	0.	.645	.667	.689	.709	.729	.749
	– 50.	.664	.684	.703	.722	.740	.758
	– 100.	.687	.704	.721	.738	.753	.766
60	100.	.641	.664	.687	.710	.733	.752
	50.	.652	.675	.696	.718	.740	.757
	0.	.666	.687	.708	.728	.748	.763
	– 50.	.683	.702	.721	.739	.756	.769
	– 100.	.703	.720	.736	.751	.765	.773
65	100.	.662	.684	.706	.730	.750	
	50.	.672	.694	.715	.737	.756	
	0.	.685	.705	.725	.745	.762	
	– 50.	.700	.718	.736	.753	.768	
	– 100.	.718	.734	.749	.763	.773	
70	100.	.681	.702	.725	.747	.757	
	50.	.690	.711	.732	.753	.762	
	0.	.702	.721	.740	.759	.767	
	– 50.	.715	.732	.750	.766	.771	
	– 100.	.731	.746	.760	.772	.774	
75	100.	.697	.719	.741	.755		
	50.	.705	.726	.747	.760		
	0.	.716	.735	.754	.765		
	– 50.	.728	.745	.761	.770		
	– 100.	.742	.756	.769	.774		

COST INDEX 0 (MAXIMUM RANGE)

Applicable to: B-HTD, B-HTE, B-HTF

COST INDEX = 0 (MAXIMUM RANGE)

WEIGHT/WIND		FLIGHT LEVEL					
		290	310	330	350	370	390
1000kg	kt						
55	100.	.601	.624	.647	.671	.698	.726
	50.	.611	.634	.657	.682	.709	.736
	0.	.624	.646	.670	.695	.722	.747
	–50.	.646	.665	.686	.710	.735	.758
	–100.	.671	.691	.713	.734	.752	.765
60	100.	.623	.646	.670	.695	.724	.753
	50.	.633	.656	.680	.706	.733	.759
	0.	.645	.669	.693	.719	.745	.766
	–50.	.664	.685	.708	.732	.757	.773
	–100.	.690	.711	.732	.751	.764	.775
65	100.	.643	.666	.691	.719	.748	.770
	50.	.653	.677	.702	.729	.755	.773
	0.	.666	.690	.715	.741	.763	.777
	–50.	.682	.704	.728	.753	.770	.780
	–100.	.708	.729	.748	.762	.773	.782
70	100.	.662	.686	.713	.742	.766	
	50.	.673	.697	.723	.750	.770	
	0.	.685	.710	.736	.759	.775	
	–50.	.700	.723	.748	.767	.779	
	–100.	.725	.744	.759	.771	.781	
75	100.	.680	.706	.734	.761		
	50.	.691	.717	.743	.766		
	0.	.704	.729	.753	.772		
	–50.	.717	.742	.763	.776		
	–100.	.739	.756	.768	.779		
80	100.	.699	.726	.753	.772		
	50.	.709	.735	.759	.775		
	0.	.722	.746	.766	.778		
	–50.	.735	.757	.773	.781		
	–100.	.752	.765	.775	.783		
85	100.	.716	.745	.767			
	50.	.726	.752	.771			
	0.	.738	.761	.776			
	–50.	.750	.769	.779			
	–100.	.761	.771	.781			
90	100.	.734	.760	.774			
	50.	.742	.765	.776			
	0.	.753	.771	.780			
	–50.	.762	.776	.781			
	–100.	.767	.778	.783			

COST INDEX 0 (MAXIMUM RANGE)

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

COST INDEX = 0 (MAXIMUM RANGE)							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
50	100	.587	.613	.637	.662	.688	.713
	50	.598	.622	.648	.673	.698	.722
	0	.611	.634	.661	.686	.711	.733
	−50	.630	.652	.678	.704	.731	.751
	−100	.662	.680	.703	.726	.748	.762
55	100	.614	.638	.662	.688	.712	.735
	50	.623	.649	.673	.698	.721	.742
	0	.636	.662	.687	.711	.733	.751
	−50	.653	.678	.705	.731	.751	.762
	−100	.681	.703	.726	.747	.762	.772
60	100	.637	.661	.686	.710	.733	.751
	50	.648	.672	.697	.719	.740	.756
	0	.661	.685	.709	.731	.750	.758
	−50	.677	.703	.729	.749	.761	.766
	−100	.701	.724	.746	.760	.772	.778
65	100	.658	.683	.706	.729	.747	
	50	.669	.694	.716	.737	.753	
	0	.682	.706	.727	.747	.757	
	−50	.700	.726	.746	.760	.765	
	−100	.721	.744	.758	.770	.777	
70	100	.678	.702	.725	.744	.751	
	50	.689	.711	.733	.750	.751	
	0	.702	.723	.743	.755	.751	
	−50	.721	.741	.757	.764	.751	
	−100	.739	.755	.767	.776	.751	
75	100	.696	.719	.739	.753		
	50	.706	.728	.746	.757		
	0	.718	.739	.753	.759		
	−50	.737	.755	.763	.769		
	−100	.752	.765	.774	.773		

COST INDEX 0 (MAXIMUM RANGE)

Applicable to: B-HTG, B-HTH, B-HTI

COST INDEX = 0 (MAXIMUM RANGE)

WEIGHT/WIND		FLIGHT LEVEL					
1000kg	kt	290	310	330	350	370	390
55	100	.601	.624	.647	.671	.698	.726
	50	.611	.634	.657	.682	.709	.736
	0	.624	.646	.670	.695	.722	.747
	−50	.646	.665	.686	.710	.735	.758
	−100	.671	.691	.713	.734	.752	.765
60	100	.623	.646	.670	.695	.724	.753
	50	.633	.656	.680	.706	.733	.759
	0	.645	.669	.693	.719	.745	.766
	−50	.664	.685	.708	.732	.757	.773
	−100	.690	.711	.732	.751	.764	.775
65	100	.643	.666	.691	.719	.748	.770
	50	.653	.677	.702	.729	.755	.773
	0	.666	.690	.715	.741	.763	.777
	−50	.682	.704	.728	.753	.770	.780
	−100	.708	.729	.748	.762	.773	.782
70	100	.662	.686	.713	.742	.766	
	50	.673	.697	.723	.750	.770	
	0	.685	.710	.736	.759	.775	
	−50	.700	.723	.748	.767	.779	
	−100	.725	.744	.759	.771	.781	
75	100	.680	.706	.734	.761	.774	
	50	.691	.717	.743	.766	.777	
	0	.704	.729	.753	.772	.780	
	−50	.717	.742	.763	.776	.782	
	−100	.739	.756	.768	.779	.783	
80	100	.699	.726	.753	.772		
	50	.709	.735	.759	.775		
	0	.722	.746	.766	.778		
	−50	.735	.757	.773	.781		
	−100	.752	.765	.775	.783		
85	100	.716	.745	.767			
	50	.726	.752	.771			
	0	.738	.761	.776			
	−50	.750	.769	.779			
	−100	.761	.771	.781			
90	100	.734	.760				
	50	.742	.765				
	0	.753	.771				
	−50	.762	.776				
	−100	.767	.778				

COST INDEX 10 KG/MIN

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

COST INDEX = 10 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
50	100.	.627	.652	.674	.696	.717	.737
	50.	.644	.667	.688	.709	.728	.745
	0.	.664	.684	.704	.723	.740	.755
	– 50.	.686	.704	.721	.738	.753	.765
	– 100.	.713	.728	.743	.756	.767	.777
55	100.	.650	.672	.694	.714	.734	.754
	50.	.664	.686	.706	.725	.743	.760
	0.	.682	.701	.720	.737	.753	.767
	– 50.	.701	.718	.735	.750	.763	.774
	– 100.	.724	.739	.753	.765	.775	.781
60	100.	.669	.690	.711	.731	.750	.765
	50.	.682	.702	.721	.740	.757	.769
	0.	.697	.716	.733	.750	.764	.773
	– 50.	.715	.731	.746	.760	.772	.777
	– 100.	.735	.749	.762	.772	.779	.780
65	100.	.686	.707	.726	.746	.763	
	50.	.698	.717	.735	.754	.768	
	0.	.711	.729	.746	.761	.772	
	– 50.	.727	.742	.757	.769	.777	
	– 100.	.745	.758	.769	.778	.780	
70	100.	.702	.721	.741	.760	.767	
	50.	.712	.730	.748	.765	.771	
	0.	.724	.741	.757	.771	.773	
	– 50.	.738	.752	.765	.775	.775	
	– 100.	.754	.766	.775	.780	.776	
75	100.	.715	.735	.754	.765		
	50.	.724	.743	.760	.769		
	0.	.735	.751	.766	.773		
	– 50.	.747	.761	.772	.775		
	– 100.	.761	.772	.779	.777		

COST INDEX 10 KG/MIN

Applicable to: B-HTD, B-HTE, B-HTF

COST INDEX = 10 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
55	100.	.629	.652	.676	.701	.728	.753
	50.	.646	.667	.689	.714	.739	.761
	0.	.664	.686	.710	.733	.753	.765
	–50.	.691	.712	.730	.745	.759	.770
	–100.	.720	.733	.746	.758	.767	.775
60	100.	.648	.672	.697	.723	.749	.768
	50.	.663	.685	.709	.734	.758	.773
	0.	.681	.704	.728	.750	.764	.775
	–50.	.706	.726	.742	.756	.768	.778
	–100.	.730	.743	.755	.765	.774	.782
65	100.	.667	.692	.717	.743	.765	.778
	50.	.680	.703	.728	.753	.771	.780
	0.	.698	.721	.744	.761	.773	.781
	–50.	.720	.738	.753	.765	.776	.784
	–100.	.739	.751	.763	.772	.780	.786
70	100.	.686	.710	.736	.760	.775	
	50.	.697	.721	.746	.767	.778	
	0.	.714	.736	.757	.770	.780	
	–50.	.733	.749	.762	.773	.782	
	–100.	.748	.759	.769	.778	.785	
75	100.	.703	.729	.753	.772		
	50.	.713	.739	.761	.776		
	0.	.729	.751	.766	.777		
	–50.	.744	.759	.769	.780		
	–100.	.755	.766	.775	.783		
80	100.	.720	.745	.765	.778		
	50.	.730	.754	.771	.780		
	0.	.743	.762	.774	.782		
	–50.	.754	.766	.776	.783		
	–100.	.763	.771	.780	.785		
85	100.	.735	.759	.774			
	50.	.745	.766	.778			
	0.	.755	.770	.780			
	–50.	.762	.772	.782			
	–100.	.768	.777	.784			
90	100.	.749	.769	.778			
	50.	.758	.774	.781			
	0.	.764	.776	.782			
	–50.	.768	.779	.784			
	–100.	.773	.782	.785			

COST INDEX 10 KG/MIN

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

COST INDEX = 10 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
50	100	.618	.642	.669	.696	.723	.745
	50	.633	.656	.683	.711	.737	.756
	0	.657	.678	.703	.727	.749	.764
	–50	.689	.706	.725	.743	.760	.773
	–100	.723	.736	.750	.762	.773	.779
55	100	.640	.667	.693	.719	.742	.756
	50	.654	.680	.708	.735	.754	.765
	0	.674	.699	.724	.747	.762	.773
	–50	.702	.721	.739	.757	.772	.779
	–100	.731	.747	.760	.771	.778	.780
60	100	.663	.689	.714	.736	.754	.761
	50	.676	.703	.731	.751	.763	.769
	0	.694	.719	.743	.759	.771	.777
	–50	.716	.735	.753	.769	.779	.779
	–100	.742	.757	.768	.777	.780	.779
65	100	.684	.709	.731	.750	.759	
	50	.697	.724	.745	.760	.766	
	0	.713	.739	.755	.767	.776	
	–50	.731	.750	.765	.778	.779	
	–100	.751	.765	.775	.780	.779	
70	100	.702	.724	.744	.756	.751	
	50	.717	.739	.756	.763	.751	
	0	.732	.750	.764	.773	.751	
	–50	.745	.761	.775	.779	.751	
	–100	.761	.772	.779	.779	.751	
75	100	.717	.738	.753	.759		
	50	.731	.751	.761	.767		
	0	.745	.760	.769	.773		
	–50	.756	.770	.779	.773		
	–100	.768	.778	.780	.773		

COST INDEX 10 KG/MIN

Applicable to: B-HTG, B-HTH, B-HTI

COST INDEX = 10 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
55	100	.629	.652	.676	.701	.728	.753
	50	.646	.667	.689	.714	.739	.761
	0	.664	.686	.710	.733	.753	.765
	–50	.691	.712	.730	.745	.759	.770
	–100	.720	.733	.746	.758	.767	.775
60	100	.648	.672	.697	.723	.749	.768
	50	.663	.685	.709	.734	.758	.773
	0	.681	.704	.728	.750	.764	.775
	–50	.706	.726	.742	.756	.768	.778
	–100	.730	.743	.755	.765	.774	.782
65	100	.667	.692	.717	.743	.765	.778
	50	.680	.703	.728	.753	.771	.780
	0	.698	.721	.744	.761	.773	.781
	–50	.720	.738	.753	.765	.776	.784
	–100	.739	.751	.763	.772	.780	.786
70	100	.686	.710	.736	.760	.775	
	50	.697	.721	.746	.767	.778	
	0	.714	.736	.757	.770	.780	
	–50	.733	.749	.762	.773	.782	
	–100	.748	.759	.769	.778	.785	
75	100	.703	.729	.753	.772	.780	
	50	.713	.739	.761	.776	.781	
	0	.729	.751	.766	.777	.783	
	–50	.744	.759	.769	.780	.784	
	–100	.755	.766	.775	.783	.786	
80	100	.720	.745	.765	.778		
	50	.730	.754	.771	.780		
	0	.743	.762	.774	.782		
	–50	.754	.766	.776	.783		
	–100	.763	.771	.780	.785		
85	100	.735	.759	.774			
	50	.745	.766	.778			
	0	.755	.770	.780			
	–50	.762	.772	.782			
	–100	.768	.777	.784			
90	100	.749	.769				
	50	.758	.774				
	0	.764	.776				
	–50	.768	.779				
	–100	.773	.782				

COST INDEX 20 KG/MIN

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

COST INDEX = 20 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
50	100.	.661	.683	.704	.723	.741	.756
	50.	.680	.699	.718	.735	.751	.765
	0.	.699	.717	.734	.750	.763	.774
	– 50.	.723	.737	.751	.764	.775	.783
	– 100.	.747	.759	.769	.779	.787	.791
55	100.	.679	.699	.719	.737	.753	.767
	50.	.695	.713	.731	.747	.761	.773
	0.	.711	.729	.745	.759	.771	.778
	– 50.	.732	.746	.759	.771	.780	.784
	– 100.	.753	.765	.775	.784	.789	.788
60	100.	.694	.713	.732	.749	.764	.773
	50.	.708	.726	.742	.757	.770	.776
	0.	.723	.739	.754	.767	.776	.779
	– 50.	.741	.755	.767	.777	.783	.781
	– 100.	.760	.771	.780	.787	.788	.782
65	100.	.708	.726	.744	.760	.772	
	50.	.720	.737	.752	.766	.775	
	0.	.734	.749	.762	.774	.779	
	– 50.	.750	.762	.773	.780	.781	
	– 100.	.766	.777	.784	.787	.783	
70	100.	.720	.738	.754	.769	.773	
	50.	.732	.747	.762	.773	.774	
	0.	.743	.757	.769	.778	.775	
	– 50.	.758	.769	.777	.781	.776	
	– 100.	.772	.781	.785	.785	.776	
75	100.	.731	.748	.764	.771		
	50.	.741	.756	.769	.774		
	0.	.751	.764	.775	.776		
	– 50.	.764	.774	.780	.777		
	– 100.	.776	.783	.784	.778		

COST INDEX 20 KG/MIN

Applicable to: B-HTD, B-HTE, B-HTF

COST INDEX = 20 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
55	100.	.661	.683	.708	.732	.753	.765
	50.	.679	.703	.725	.743	.758	.769
	0.	.709	.725	.739	.753	.765	.773
	–50.	.726	.740	.753	.762	.770	.778
	–100.	.744	.752	.760	.769	.777	.784
60	100.	.677	.700	.724	.748	.764	.775
	50.	.695	.718	.738	.754	.766	.777
	0.	.720	.735	.748	.762	.771	.780
	–50.	.735	.748	.760	.768	.776	.784
	–100.	.750	.758	.766	.774	.782	.787
65	100.	.692	.716	.740	.760	.772	.781
	50.	.711	.732	.750	.763	.774	.783
	0.	.729	.744	.757	.769	.778	.785
	–50.	.743	.755	.766	.773	.782	.786
	–100.	.755	.763	.771	.780	.786	.788
70	100.	.707	.731	.754	.769	.779	
	50.	.726	.745	.760	.771	.781	
	0.	.739	.753	.765	.775	.783	
	–50.	.750	.762	.771	.779	.786	
	–100.	.760	.768	.776	.784	.788	
75	100.	.722	.746	.764	.777		
	50.	.738	.756	.768	.779		
	0.	.747	.761	.771	.781		
	–50.	.757	.768	.776	.784		
	–100.	.765	.773	.781	.787		
80	100.	.737	.759	.773	.781		
	50.	.750	.764	.775	.782		
	0.	.756	.767	.778	.784		
	–50.	.764	.772	.781	.786		
	–100.	.770	.778	.785	.787		
85	100.	.751	.769	.779			
	50.	.759	.771	.780			
	0.	.763	.773	.782			
	–50.	.769	.778	.785			
	–100.	.774	.782	.787			
90	100.	.762	.776	.781			
	50.	.766	.777	.783			
	0.	.769	.779	.784			
	–50.	.774	.782	.785			
	–100.	.779	.785	.787			

COST INDEX 20 KG/MIN

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

COST INDEX = 20 kg/min

WEIGHT/WIND		FLIGHT LEVEL					
1000kg	kt	290	310	330	350	370	390
50	100	.654	.677	.703	.728	.750	.766
	50	.680	.699	.720	.740	.758	.773
	0	.710	.724	.740	.757	.770	.778
	–50	.733	.744	.757	.770	.780	.783
	–100	.752	.762	.773	.781	.787	.788
55	100	.670	.697	.723	.747	.763	.774
	50	.692	.714	.735	.754	.771	.779
	0	.717	.734	.751	.767	.777	.780
	–50	.740	.753	.766	.776	.781	.781
	–100	.757	.770	.779	.785	.787	.785
60	100	.690	.716	.742	.758	.770	.777
	50	.708	.730	.751	.767	.779	.778
	0	.727	.744	.761	.774	.780	.779
	–50	.749	.761	.773	.779	.781	.779
	–100	.765	.776	.783	.785	.784	.780
65	100	.709	.736	.753	.766	.776	
	50	.724	.746	.761	.775	.778	
	0	.738	.755	.770	.779	.779	
	–50	.757	.769	.777	.780	.780	
	–100	.772	.781	.783	.784	.781	
70	100	.728	.748	.762	.771	.751	
	50	.740	.756	.770	.777	.751	
	0	.749	.765	.777	.779	.751	
	–50	.764	.774	.780	.780	.751	
	–100	.777	.782	.783	.781	.751	
75	100	.741	.758	.767	.773		
	50	.751	.765	.774	.773		
	0	.759	.774	.779	.773		
	–50	.770	.778	.780	.773		
	–100	.779	.782	.781	.773		

COST INDEX 20 KG/MIN

Applicable to: B-HTG, B-HTH, B-HTI

COST INDEX = 20 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
55	100	.661	.683	.708	.732	.753	.765
	50	.679	.703	.725	.743	.758	.769
	0	.709	.725	.739	.753	.765	.773
	–50	.726	.740	.753	.762	.770	.778
	–100	.744	.752	.760	.769	.777	.784
60	100	.677	.700	.724	.748	.764	.775
	50	.695	.718	.738	.754	.766	.777
	0	.720	.735	.748	.762	.771	.780
	–50	.735	.748	.760	.768	.776	.784
	–100	.750	.758	.766	.774	.782	.787
65	100	.692	.716	.740	.760	.772	.781
	50	.711	.732	.750	.763	.774	.783
	0	.729	.744	.757	.769	.778	.785
	–50	.743	.755	.766	.773	.782	.786
	–100	.755	.763	.771	.780	.786	.788
70	100	.707	.731	.754	.769	.779	
	50	.726	.745	.760	.771	.781	
	0	.739	.753	.765	.775	.783	
	–50	.750	.762	.771	.779	.786	
	–100	.760	.768	.776	.784	.788	
75	100	.722	.746	.764	.777	.782	
	50	.738	.756	.768	.779	.783	
	0	.747	.761	.771	.781	.785	
	–50	.757	.768	.776	.784	.786	
	–100	.765	.773	.781	.787	.787	
80	100	.737	.759	.773	.781		
	50	.750	.764	.775	.782		
	0	.756	.767	.778	.784		
	–50	.764	.772	.781	.786		
	–100	.770	.778	.785	.787		
85	100	.751	.769	.779			
	50	.759	.771	.780			
	0	.763	.773	.782			
	–50	.769	.778	.785			
	–100	.774	.782	.787			
90	100	.762	.776				
	50	.766	.777				
	0	.769	.779				
	–50	.774	.782				
	–100	.779	.785				

COST INDEX 40 KG/MIN

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

COST INDEX = 40 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
50	100.	.717	.734	.749	.763	.776	.783
	50.	.734	.748	.763	.775	.784	.790
	0.	.753	.764	.775	.786	.792	.795
	– 50.	.770	.780	.787	.795	.799	.798
	– 100.	.786	.792	.797	.800	.800	.799
55	100.	.726	.743	.757	.770	.780	.784
	50.	.741	.755	.769	.779	.786	.787
	0.	.758	.769	.780	.789	.792	.790
	– 50.	.773	.783	.790	.796	.797	.792
	– 100.	.787	.794	.799	.800	.799	.793
60	100.	.735	.751	.764	.775	.782	.780
	50.	.748	.762	.774	.783	.786	.781
	0.	.763	.774	.784	.790	.789	.782
	– 50.	.777	.786	.793	.796	.792	.784
	– 100.	.790	.796	.800	.799	.793	.787
65	100.	.743	.758	.770	.779	.781	
	50.	.755	.768	.778	.784	.782	
	0.	.768	.779	.786	.789	.784	
	– 50.	.781	.789	.793	.792	.785	
	– 100.	.792	.798	.799	.794	.787	
70	100.	.751	.764	.775	.780	.776	
	50.	.762	.773	.781	.783	.776	
	0.	.773	.782	.786	.785	.776	
	– 50.	.784	.791	.791	.787	.777	
	– 100.	.794	.797	.795	.788	.783	
75	100.	.758	.770	.778	.777		
	50.	.767	.776	.782	.778		
	0.	.777	.784	.785	.778		
	– 50.	.786	.790	.788	.779		
	– 100.	.795	.795	.790	.782		

COST INDEX 40 KG/MIN

Applicable to: B-HTD, B-HTE, B-HTF

COST INDEX = 40 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
55	100.	.720	.735	.750	.761	.769	.778
	50.	.735	.749	.757	.765	.774	.782
	0.	.745	.754	.763	.772	.780	.787
	–50.	.753	.762	.772	.781	.788	.792
	–100.	.765	.775	.784	.791	.795	.797
60	100.	.729	.743	.757	.767	.775	.783
	50.	.742	.754	.762	.771	.780	.786
	0.	.751	.759	.768	.777	.784	.789
	–50.	.758	.767	.776	.784	.790	.792
	–100.	.769	.779	.787	.792	.795	.795
65	100.	.737	.751	.763	.772	.781	.786
	50.	.749	.760	.768	.776	.784	.787
	0.	.756	.764	.773	.781	.787	.789
	–50.	.763	.772	.780	.787	.790	.790
	–100.	.773	.782	.789	.793	.794	.793
70	100.	.745	.758	.769	.778	.785	
	50.	.755	.765	.773	.781	.787	
	0.	.761	.769	.778	.785	.788	
	–50.	.767	.776	.783	.789	.790	
	–100.	.777	.785	.790	.793	.792	
75	100.	.752	.765	.774	.783		
	50.	.760	.769	.778	.785		
	0.	.765	.774	.782	.787		
	–50.	.772	.780	.786	.789		
	–100.	.780	.787	.791	.792		
80	100.	.759	.770	.779	.785		
	50.	.765	.774	.782	.786		
	0.	.770	.778	.785	.788		
	–50.	.776	.783	.788	.789		
	–100.	.783	.789	.791	.790		
85	100.	.765	.775	.783			
	50.	.770	.779	.785			
	0.	.774	.782	.787			
	–50.	.779	.786	.789			
	–100.	.786	.790	.790			
90	100.	.770	.780	.784			
	50.	.774	.783	.786			
	0.	.778	.785	.787			
	–50.	.783	.788	.788			
	–100.	.788	.790	.789			

COST INDEX 40 KG/MIN

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

COST INDEX = 40 kg/min

WEIGHT/WIND		FLIGHT LEVEL					
1000kg	kt	290	310	330	350	370	390
50	100	.727	.741	.756	.770	.780	.783
	50	.742	.754	.768	.778	.785	.787
	0	.758	.767	.777	.785	.789	.789
	–50	.768	.777	.784	.789	.792	.792
	–100	.777	.783	.790	.795	.795	.796
55	100	.733	.750	.764	.775	.781	.781
	50	.747	.762	.774	.782	.785	.784
	0	.762	.773	.782	.788	.788	.786
	–50	.773	.782	.787	.791	.791	.789
	–100	.781	.788	.793	.794	.794	.793
60	100	.741	.758	.770	.778	.781	.779
	50	.755	.768	.779	.783	.783	.780
	0	.768	.778	.785	.787	.785	.781
	–50	.778	.785	.790	.790	.789	.782
	–100	.785	.790	.793	.793	.792	.787
65	100	.750	.765	.775	.780	.779	
	50	.762	.774	.780	.782	.780	
	0	.774	.782	.785	.785	.781	
	–50	.782	.788	.789	.788	.782	
	–100	.788	.791	.792	.791	.786	
70	100	.758	.771	.779	.779	.751	
	50	.768	.777	.781	.780	.751	
	0	.778	.783	.784	.782	.751	
	–50	.785	.788	.787	.783	.751	
	–100	.790	.791	.790	.786	.751	
75	100	.765	.777	.779	.773		
	50	.773	.779	.780	.773		
	0	.780	.783	.782	.773		
	–50	.786	.787	.784	.773		
	–100	.790	.790	.787	.773		

COST INDEX 40 KG/MIN

Applicable to: B-HTG, B-HTH, B-HTI

COST INDEX = 40 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
55	100	.720	.735	.750	.761	.769	.778
	50	.735	.749	.757	.765	.774	.782
	0	.745	.754	.763	.772	.780	.787
	–50	.753	.762	.772	.781	.788	.792
	–100	.765	.775	.784	.791	.795	.797
60	100	.729	.743	.757	.767	.775	.783
	50	.742	.754	.762	.771	.780	.786
	0	.751	.759	.768	.777	.784	.789
	–50	.758	.767	.776	.784	.790	.792
	–100	.769	.779	.787	.792	.795	.795
65	100	.737	.751	.763	.772	.781	.786
	50	.749	.760	.768	.776	.784	.787
	0	.756	.764	.773	.781	.787	.789
	–50	.763	.772	.780	.787	.790	.790
	–100	.773	.782	.789	.793	.794	.793
70	100	.745	.758	.769	.778	.785	
	50	.755	.765	.773	.781	.787	
	0	.761	.769	.778	.785	.788	
	–50	.767	.776	.783	.789	.790	
	–100	.777	.785	.790	.793	.792	
75	100	.752	.765	.774	.783	.785	
	50	.760	.769	.778	.785	.786	
	0	.765	.774	.782	.787	.787	
	–50	.772	.780	.786	.789	.788	
	–100	.780	.787	.791	.792	.790	
80	100	.759	.770	.779	.785		
	50	.765	.774	.782	.786		
	0	.770	.778	.785	.788		
	–50	.776	.783	.788	.789		
	–100	.783	.789	.791	.790		
85	100	.765	.775	.783			
	50	.770	.779	.785			
	0	.774	.782	.787			
	–50	.779	.786	.789			
	–100	.786	.790	.790			
90	100	.770	.780				
	50	.774	.783				
	0	.778	.785				
	–50	.783	.788				
	–100	.788	.790				

COST INDEX 60 KG/MIN

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

COST INDEX = 60 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
50	100.	.757	.768	.779	.789	.795	.796
	50.	.770	.780	.788	.796	.799	.799
	0.	.783	.790	.796	.800	.800	.799
	– 50.	.794	.797	.800	.800	.800	.798
	– 100.	.799	.798	.800	.799	.797	.796
55	100.	.761	.772	.783	.791	.794	.791
	50.	.772	.783	.791	.797	.797	.792
	0.	.784	.792	.798	.800	.799	.793
	– 50.	.794	.799	.800	.800	.799	.793
	– 100.	.798	.800	.800	.799	.796	.795
60	100.	.766	.776	.786	.791	.790	.783
	50.	.776	.786	.793	.796	.792	.784
	0.	.787	.794	.799	.799	.793	.787
	– 50.	.796	.800	.800	.799	.794	.790
	– 100.	.800	.800	.800	.798	.794	.794
65	100.	.770	.780	.787	.789	.784	
	50.	.780	.789	.793	.792	.785	
	0.	.789	.796	.798	.794	.786	
	– 50.	.797	.800	.800	.795	.789	
	– 100.	.800	.800	.800	.795	.792	
70	100.	.774	.783	.787	.785	.776	
	50.	.783	.790	.791	.787	.777	
	0.	.792	.796	.794	.788	.781	
	– 50.	.799	.800	.796	.789	.783	
	– 100.	.800	.800	.796	.791	.783	
75	100.	.778	.784	.785	.778		
	50.	.785	.789	.787	.779		
	0.	.792	.794	.789	.780		
	– 50.	.798	.797	.790	.785		
	– 100.	.800	.797	.792	.790		

COST INDEX 60 KG/MIN

Applicable to: B-HTD, B-HTE, B-HTF

COST INDEX = 60 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
55	100.	.746	.755	.764	.774	.782	.788
	50.	.752	.761	.772	.781	.789	.793
	0.	.761	.772	.782	.790	.794	.796
	–50.	.775	.785	.791	.796	.800	.800
	–100.	.788	.793	.799	.800	.800	.800
60	100.	.751	.760	.769	.778	.785	.789
	50.	.757	.766	.776	.784	.790	.792
	0.	.766	.776	.784	.791	.794	.795
	–50.	.778	.787	.792	.796	.799	.798
	–100.	.789	.795	.800	.800	.800	.800
65	100.	.756	.765	.774	.782	.788	.789
	50.	.762	.771	.780	.787	.790	.790
	0.	.770	.779	.787	.792	.793	.792
	–50.	.781	.789	.793	.796	.797	.795
	–100.	.791	.796	.800	.800	.800	.797
70	100.	.761	.769	.778	.786	.788	
	50.	.766	.775	.783	.788	.790	
	0.	.774	.782	.788	.792	.792	
	–50.	.783	.790	.794	.795	.794	
	–100.	.793	.797	.799	.800	.798	
75	100.	.765	.774	.782	.787		
	50.	.770	.779	.786	.789		
	0.	.777	.785	.790	.791		
	–50.	.785	.791	.794	.794		
	–100.	.793	.797	.798	.797		
80	100.	.770	.778	.785	.788		
	50.	.774	.782	.787	.788		
	0.	.780	.787	.790	.790		
	–50.	.787	.792	.793	.792		
	–100.	.794	.797	.797	.794		
85	100.	.774	.782	.787			
	50.	.778	.785	.788			
	0.	.783	.788	.790			
	–50.	.789	.792	.792			
	–100.	.795	.796	.794			
90	100.	.778	.785	.787			
	50.	.781	.787	.788			
	0.	.785	.789	.788			
	–50.	.790	.791	.789			
	–100.	.794	.794	.789			

COST INDEX 60 KG/MIN

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

COST INDEX = 60 kg/min

WEIGHT/WIND		FLIGHT LEVEL					
1000kg	kt	290	310	330	350	370	390
50	100	.760	.769	.780	.787	.790	.790
	50	.769	.778	.784	.790	.793	.793
	0	.776	.782	.789	.794	.795	.796
	–50	.782	.787	.794	.797	.798	.799
	–100	.788	.792	.798	.800	.800	.800
55	100	.764	.775	.784	.789	.789	.787
	50	.773	.782	.788	.791	.791	.790
	0	.779	.786	.792	.794	.794	.793
	–50	.784	.792	.795	.796	.797	.797
	–100	.790	.796	.799	.800	.800	.800
60	100	.770	.779	.787	.788	.786	.781
	50	.777	.785	.790	.790	.789	.782
	0	.784	.789	.792	.793	.792	.786
	–50	.789	.794	.795	.795	.796	.791
	–100	.794	.797	.798	.799	.800	.796
65	100	.775	.783	.786	.785	.781	
	50	.781	.788	.789	.788	.782	
	0	.787	.791	.791	.791	.785	
	–50	.791	.794	.794	.794	.790	
	–100	.796	.797	.797	.798	.796	
70	100	.779	.783	.784	.782	.751	
	50	.784	.788	.787	.783	.751	
	0	.789	.790	.789	.785	.751	
	–50	.792	.793	.793	.789	.751	
	–100	.795	.796	.797	.794	.751	
75	100	.780	.783	.782	.773		
	50	.785	.786	.784	.773		
	0	.789	.789	.786	.773		
	–50	.792	.792	.789	.773		
	–100	.795	.795	.794	.773		

COST INDEX 60 KG/MIN

Applicable to: B-HTG, B-HTH, B-HTI

COST INDEX = 60 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
55	100	.746	.755	.764	.774	.782	.788
	50	.752	.761	.772	.781	.789	.793
	0	.761	.772	.782	.790	.794	.796
	–50	.775	.785	.791	.796	.800	.800
	–100	.788	.793	.799	.800	.800	.800
60	100	.751	.760	.769	.778	.785	.789
	50	.757	.766	.776	.784	.790	.792
	0	.766	.776	.784	.791	.794	.795
	–50	.778	.787	.792	.796	.799	.798
	–100	.789	.795	.800	.800	.800	.800
65	100	.756	.765	.774	.782	.788	.789
	50	.762	.771	.780	.787	.790	.790
	0	.770	.779	.787	.792	.793	.792
	–50	.781	.789	.793	.796	.797	.795
	–100	.791	.796	.800	.800	.800	.797
70	100	.761	.769	.778	.786	.788	
	50	.766	.775	.783	.788	.790	
	0	.774	.782	.788	.792	.792	
	–50	.783	.790	.794	.795	.794	
	–100	.793	.797	.799	.800	.798	
75	100	.765	.774	.782	.787	.787	
	50	.770	.779	.786	.789	.788	
	0	.777	.785	.790	.791	.789	
	–50	.785	.791	.794	.794	.791	
	–100	.793	.797	.798	.797	.792	
80	100	.770	.778	.785	.788		
	50	.774	.782	.787	.788		
	0	.780	.787	.790	.790		
	–50	.787	.792	.793	.792		
	–100	.794	.797	.797	.794		
85	100	.774	.782	.787			
	50	.778	.785	.788			
	0	.783	.788	.790			
	–50	.789	.792	.792			
	–100	.795	.796	.794			
90	100	.778	.785				
	50	.781	.787				
	0	.785	.789				
	–50	.790	.791				
	–100	.794	.794				

COST INDEX 80 KG/MIN

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

COST INDEX = 80 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
50	100.	.782	.788	.795	.800	.800	.799
	50.	.791	.795	.800	.800	.800	.798
	0.	.798	.798	.800	.800	.799	.796
	– 50.	.798	.798	.798	.796	.796	.798
	– 100.	.797	.794	.791	.797	.800	.800
55	100.	.782	.791	.797	.800	.799	.793
	50.	.791	.797	.800	.800	.799	.793
	0.	.797	.800	.800	.800	.797	.794
	– 50.	.798	.800	.799	.797	.796	.797
	– 100.	.797	.795	.794	.798	.800	.800
60	100.	.785	.793	.798	.799	.793	.786
	50.	.793	.798	.800	.799	.794	.789
	0.	.799	.800	.800	.799	.794	.792
	– 50.	.800	.800	.800	.797	.795	.796
	– 100.	.798	.797	.795	.798	.799	.800
65	100.	.788	.794	.797	.794	.786	
	50.	.795	.799	.800	.795	.788	
	0.	.800	.800	.800	.795	.791	
	– 50.	.800	.800	.799	.794	.794	
	– 100.	.800	.798	.796	.797	.798	
70	100.	.790	.794	.794	.787	.780	
	50.	.796	.798	.796	.788	.783	
	0.	.800	.800	.796	.790	.783	
	– 50.	.800	.800	.796	.792	.783	
	– 100.	.800	.797	.795	.796	.783	
75	100.	.791	.793	.789	.780		
	50.	.796	.796	.790	.783		
	0.	.800	.797	.791	.788		
	– 50.	.800	.797	.792	.790		
	– 100.	.800	.796	.794	.790		

COST INDEX 80 KG/MIN

Applicable to: B-HTD, B-HTE, B-HTF

COST INDEX = 80 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
55	100.	.759	.770	.780	.789	.794	.796
	50.	.769	.780	.789	.794	.798	.800
	0.	.782	.789	.795	.800	.800	.800
	–50.	.790	.796	.800	.800	.800	.800
	–100.	.800	.800	.800	.800	.800	.800
60	100.	.763	.773	.783	.790	.794	.794
	50.	.773	.783	.790	.795	.797	.797
	0.	.784	.791	.796	.800	.800	.800
	–50.	.792	.798	.800	.800	.800	.800
	–100.	.800	.800	.800	.800	.800	.800
65	100.	.767	.777	.785	.791	.793	.792
	50.	.776	.785	.791	.795	.796	.794
	0.	.786	.792	.796	.799	.799	.796
	–50.	.793	.798	.800	.800	.800	.798
	–100.	.800	.800	.800	.800	.800	.799
70	100.	.771	.780	.787	.791	.791	
	50.	.779	.787	.792	.794	.793	
	0.	.788	.793	.796	.797	.796	
	–50.	.795	.799	.800	.800	.798	
	–100.	.800	.800	.800	.800	.800	
75	100.	.775	.783	.788	.791		
	50.	.781	.788	.792	.793		
	0.	.789	.794	.796	.795		
	–50.	.795	.799	.800	.798		
	–100.	.800	.800	.800	.800		
80	100.	.778	.785	.789	.789		
	50.	.784	.789	.792	.791		
	0.	.791	.794	.794	.792		
	–50.	.796	.798	.798	.795		
	–100.	.800	.800	.800	.797		
85	100.	.781	.787	.789			
	50.	.786	.790	.791			
	0.	.791	.793	.793			
	–50.	.796	.797	.795			
	–100.	.800	.800	.798			
90	100.	.784	.788	.788			
	50.	.787	.790	.789			
	0.	.791	.792	.789			
	–50.	.795	.795	.789			
	–100.	.800	.799	.789			

COST INDEX 80 KG/MIN

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

COST INDEX = 80 kg/min

WEIGHT/WIND		FLIGHT LEVEL					
1000kg	kt	290	310	330	350	370	390
50	100	.775	.781	.789	.794	.795	.796
	50	.779	.785	.793	.796	.797	.798
	0	.785	.790	.796	.799	.800	.800
	–50	.790	.794	.799	.800	.800	.800
	–100	.795	.800	.800	.800	.800	.800
55	100	.779	.786	.791	.794	.794	.793
	50	.783	.790	.795	.796	.796	.796
	0	.787	.794	.797	.798	.799	.800
	–50	.792	.797	.800	.800	.800	.800
	–100	.797	.800	.800	.800	.800	.800
60	100	.783	.788	.792	.792	.791	.786
	50	.787	.792	.794	.795	.795	.790
	0	.792	.796	.796	.797	.798	.794
	–50	.795	.798	.799	.800	.800	.796
	–100	.799	.800	.800	.800	.800	.796
65	100	.786	.790	.791	.790	.785	
	50	.789	.793	.793	.793	.788	
	0	.794	.795	.796	.796	.793	
	–50	.797	.798	.799	.800	.797	
	–100	.800	.800	.800	.800	.797	
70	100	.788	.789	.789	.785	.751	
	50	.791	.792	.791	.787	.751	
	0	.794	.794	.794	.791	.751	
	–50	.796	.797	.798	.796	.751	
	–100	.799	.800	.800	.799	.751	
75	100	.788	.788	.785	.773		
	50	.790	.790	.787	.773		
	0	.793	.793	.791	.773		
	–50	.796	.796	.795	.773		
	–100	.799	.800	.800	.773		

COST INDEX 80 KG/MIN

Applicable to: B-HTG, B-HTH, B-HTI

COST INDEX = 80 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
55	100	.759	.770	.780	.789	.794	.796
	50	.769	.780	.789	.794	.798	.800
	0	.782	.789	.795	.800	.800	.800
	–50	.790	.796	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
60	100	.763	.773	.783	.790	.794	.794
	50	.773	.783	.790	.795	.797	.797
	0	.784	.791	.796	.800	.800	.800
	–50	.792	.798	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
65	100	.767	.777	.785	.791	.793	.792
	50	.776	.785	.791	.795	.796	.794
	0	.786	.792	.796	.799	.799	.796
	–50	.793	.798	.800	.800	.800	.798
	–100	.800	.800	.800	.800	.800	.799
70	100	.771	.780	.787	.791	.791	
	50	.779	.787	.792	.794	.793	
	0	.788	.793	.796	.797	.796	
	–50	.795	.799	.800	.800	.798	
	–100	.800	.800	.800	.800	.800	
75	100	.775	.783	.788	.791	.789	
	50	.781	.788	.792	.793	.790	
	0	.789	.794	.796	.795	.792	
	–50	.795	.799	.800	.798	.792	
	–100	.800	.800	.800	.800	.792	
80	100	.778	.785	.789	.789		
	50	.784	.789	.792	.791		
	0	.791	.794	.794	.792		
	–50	.796	.798	.798	.795		
	–100	.800	.800	.800	.796		
85	100	.781	.787	.789			
	50	.786	.790	.791			
	0	.791	.793	.793			
	–50	.796	.797	.795			
	–100	.800	.800	.798			
90	100	.784	.788				
	50	.787	.790				
	0	.791	.792				
	–50	.795	.795				
	–100	.800	.799				

COST INDEX 100 KG/MIN

Applicable to: B-HSD, B-HSE, B-HSG, B-HSI

COST INDEX = 100 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
50	100.	.795	.798	.800	.800	.800	.787
	50.	.799	.798	.800	.799	.797	.796
	0.	.798	.798	.796	.794	.798	.800
	– 50.	.795	.792	.793	.799	.800	.800
	– 100.	.788	.795	.800	.800	.800	.800
55	100.	.795	.800	.800	.800	.798	.794
	50.	.798	.800	.800	.800	.796	.795
	0.	.798	.800	.798	.795	.797	.798
	– 50.	.796	.794	.795	.799	.800	.800
	– 100.	.790	.796	.800	.800	.800	.800
60	100.	.796	.800	.800	.799	.794	.791
	50.	.800	.800	.800	.798	.794	.794
	0.	.800	.800	.798	.795	.796	.797
	– 50.	.797	.796	.796	.799	.800	.800
	– 100.	.792	.798	.800	.800	.800	.800
65	100.	.798	.800	.800	.795	.789	
	50.	.800	.800	.800	.795	.792	
	0.	.800	.800	.798	.794	.795	
	– 50.	.799	.797	.797	.797	.798	
	– 100.	.794	.798	.800	.800	.800	
70	100.	.799	.800	.796	.789	.783	
	50.	.800	.800	.796	.791	.783	
	0.	.800	.800	.795	.793	.783	
	– 50.	.800	.797	.795	.796	.783	
	– 100.	.795	.799	.800	.800	.783	
75	100.	.798	.797	.791	.785		
	50.	.800	.797	.791	.789		
	0.	.800	.797	.793	.790		
	– 50.	.799	.795	.794	.790		
	– 100.	.796	.798	.799	.790		

COST INDEX 100 KG/MIN

Applicable to: B-HTD, B-HTE, B-HTF

COST INDEX = 100 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
55	100.	.776	.786	.792	.797	.800	.800
	50.	.786	.792	.798	.800	.800	.800
	0.	.793	.799	.800	.800	.800	.800
	–50.	.800	.800	.800	.800	.800	.800
	–100.	.800	.800	.800	.800	.800	.800
60	100.	.778	.788	.793	.797	.800	.799
	50.	.788	.793	.798	.800	.800	.800
	0.	.794	.800	.800	.800	.800	.800
	–50.	.800	.800	.800	.800	.800	.800
	–100.	.800	.800	.800	.800	.800	.800
65	100.	.781	.789	.794	.797	.797	.795
	50.	.789	.794	.799	.800	.800	.797
	0.	.795	.800	.800	.800	.800	.798
	–50.	.800	.800	.800	.800	.800	.800
	–100.	.800	.800	.800	.800	.800	.800
70	100.	.783	.790	.794	.796	.795	
	50.	.791	.795	.798	.799	.797	
	0.	.796	.800	.800	.800	.799	
	–50.	.800	.800	.800	.800	.800	
	–100.	.800	.800	.800	.800	.800	
75	100.	.785	.791	.794	.794		
	50.	.791	.795	.797	.796		
	0.	.797	.800	.800	.799		
	–50.	.800	.800	.800	.800		
	–100.	.800	.800	.800	.800		
80	100.	.787	.792	.793	.791		
	50.	.792	.795	.795	.793		
	0.	.797	.799	.799	.795		
	–50.	.800	.800	.800	.797		
	–100.	.800	.800	.800	.799		
85	100.	.788	.792	.791			
	50.	.793	.794	.793			
	0.	.797	.798	.796			
	–50.	.800	.800	.798			
	–100.	.800	.800	.799			
90	100.	.789	.791	.789			
	50.	.793	.793	.789			
	0.	.796	.796	.789			
	–50.	.800	.799	.789			
	–100.	.800	.800	.789			

COST INDEX 100 KG/MIN

Applicable to: B-HSJ, B-HSK, B-HSL, B-HSM, B-HSN, B-HSO, B-HSP, B-HSQ, B-HSR, B-HST, B-HSU

COST INDEX = 100 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
50	100	.783	.788	.795	.798	.799	.800
	50	.787	.792	.798	.800	.800	.800
	0	.791	.796	.800	.800	.800	.800
	–50	.796	.800	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
55	100	.785	.793	.796	.797	.798	.799
	50	.789	.795	.798	.799	.800	.800
	0	.793	.798	.800	.800	.800	.800
	–50	.798	.800	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
60	100	.789	.795	.795	.796	.797	.792
	50	.793	.797	.798	.799	.800	.796
	0	.796	.799	.800	.800	.800	.796
	–50	.800	.800	.800	.800	.800	.796
	–100	.800	.800	.800	.800	.800	.796
65	100	.792	.794	.794	.795	.791	
	50	.795	.796	.797	.798	.795	
	0	.797	.798	.800	.800	.797	
	–50	.800	.800	.800	.800	.797	
	–100	.800	.800	.800	.800	.797	
70	100	.792	.793	.793	.790	.751	
	50	.795	.795	.796	.793	.751	
	0	.797	.798	.799	.798	.751	
	–50	.800	.800	.800	.800	.751	
	–100	.800	.800	.800	.800	.751	
75	100	.792	.792	.789	.773		
	50	.794	.794	.792	.773		
	0	.796	.797	.796	.773		
	–50	.799	.800	.800	.773		
	–100	.800	.800	.800	.773		

COST INDEX 100 KG/MIN

Applicable to: B-HTG, B-HTH, B-HTI

COST INDEX = 100 kg/min							
		FLIGHT LEVEL					
WEIGHT/WIND							
1000kg	kt	290	310	330	350	370	390
55	100	.776	.786	.792	.797	.800	.800
	50	.786	.792	.798	.800	.800	.800
	0	.793	.799	.800	.800	.800	.800
	–50	.800	.800	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
60	100	.778	.788	.793	.797	.800	.799
	50	.788	.793	.798	.800	.800	.800
	0	.794	.800	.800	.800	.800	.800
	–50	.800	.800	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
65	100	.781	.789	.794	.797	.797	.795
	50	.789	.794	.799	.800	.800	.797
	0	.795	.800	.800	.800	.800	.798
	–50	.800	.800	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
70	100	.783	.790	.794	.796	.795	
	50	.791	.795	.798	.799	.797	
	0	.796	.800	.800	.800	.799	
	–50	.800	.800	.800	.800	.800	
	–100	.800	.800	.800	.800	.800	
75	100	.785	.791	.794	.794	.791	
	50	.791	.795	.797	.796	.792	
	0	.797	.800	.800	.799	.792	
	–50	.800	.800	.800	.800	.792	
	–100	.800	.800	.800	.800	.792	
80	100	.787	.792	.793	.791		
	50	.792	.795	.795	.793		
	0	.797	.799	.799	.795		
	–50	.800	.800	.800	.796		
	–100	.800	.800	.800	.796		
85	100	.788	.792	.791			
	50	.793	.794	.793			
	0	.797	.798	.796			
	–50	.800	.800	.798			
	–100	.800	.800	.799			
90	100	.789	.791				
	50	.793	.793				
	0	.796	.796				
	–50	.800	.799				
	–100	.800	.800				

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DEFINITIONS

Applicable to: ALL

- Optimum altitude : the altitude at which the airplane covers the maximum distance per kilogram (pound) of fuel (best specific range). It depends on the actual weight and the deviation from ISA.
- Maximum altitude is defined as the lower of :
  - maximum altitude at maximum cruise thrust in level flight and
  - maximum altitude at maximum climb thrust with 300 ft/min vertical speed.

Note: *Definition of the maximum altitude in the FMGC is different (Refer to DSC-22_20-50-10 MCDU).*

CRUISE LEVEL CHARTS GENERAL

Applicable to: ALL

These charts have been established for a center of gravity at 33 % MAC.
Maximum and optimum altitudes are given for different temperatures at long range speed and M 0.78.

Note: *The n = 1.3 g (n = 1.4 g) curve indicates the buffet margin.*

OPTIMUM WEIGHT FOR 4000 FEET STEP CLIMB

Applicable to: ALL 320

STEP CLIMB FROM/TO	WEIGHT (1 000 kg/1 000 lb)					
	≤ISA + 10		ISA + 15		ISA + 20	
	LR	M.78	LR	M.78	LR	M.78
310/350	75/165	75/165	74/163	73/160	70/154	69/152
330/370	68/149	69/152	68/149	67/147	64/141	64/141
350/390	61/134	62/136	61/134	61/134	58/127	57/125

OPTIMUM WEIGHT FOR 4000 FEET STEP CLIMB

Applicable to: ALL 321

STEP CLIMB FROM/TO	WEIGHT (1 000 kg/1 000 lb)					
	≤ISA + 10		ISA + 15		ISA + 20	
	LR	M.78	LR	M.78	LR	M.78
310/350	82/180	82/180	80/176	80/176	77/169	76/167
330/370	74/163	75/165	73/160	73/160	69/152	69/152
350/390	67/147	68/149	66/145	66/145	63/138	63/138

CRUISE LEVEL CHARTS BLEED CORRECTIONS

Applicable to: ALL 320

BLEED CORRECTIONS

	ENGINE ANTI ICE	TOTAL ANTI ICE
≤ISA + 10	Max Alt. : - 900 ft Opt Alt. : No corr.	Max Alt. : -1 700 ft Opt Alt. : No corr.
ISA + 15	Max Alt. : -1 400 ft Opt Alt. : No corr.	Max Alt. : -2 800 ft Opt Alt. : -1 400 ft
ISA + 20	Max Alt. : -1 700 ft Opt Alt. : -1 500 ft	Max Alt. : -2 800 ft Opt Alt. : -2 000 ft

CRUISE LEVEL CHARTS BLEED CORRECTIONS

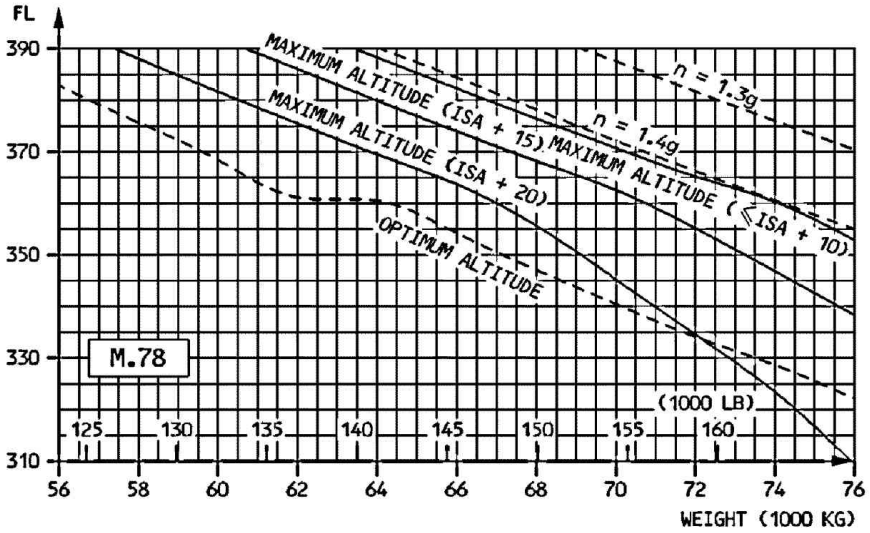
Applicable to: ALL 321

BLEED CORRECTIONS

	ENGINE ANTI ICE	TOTAL ANTI ICE
≤ISA + 10	Max Alt. : - 500 ft Opt Alt. : - 300 ft	Max Alt. : -1 100 ft Opt Alt. : - 300 ft
ISA + 15	Max Alt. : - 700 ft Opt Alt. : - 300 ft	Max Alt. : -1 500 ft Opt Alt. : - 600 ft
ISA + 20	Max Alt. : -1 000 ft Opt Alt. : -1 000 ft	Max Alt. : -2 300 ft Opt Alt. : -2 300 ft

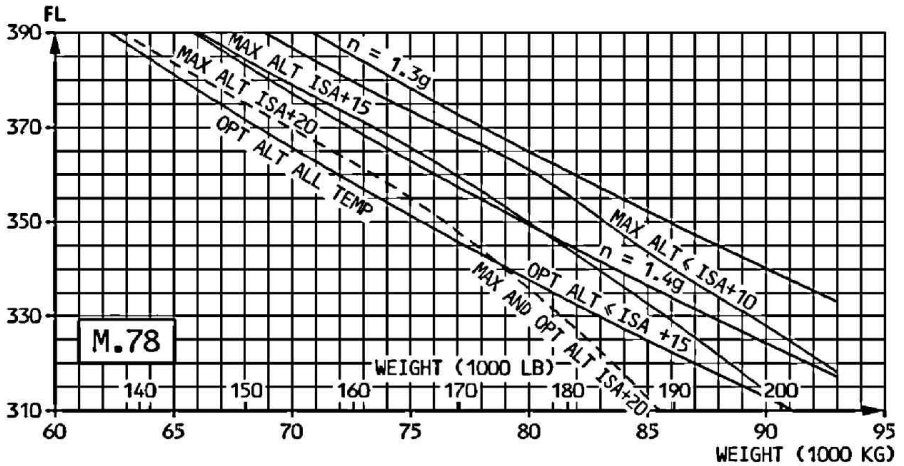
CRUISE LEVEL CHARTS M.78

Applicable to: ALL 320



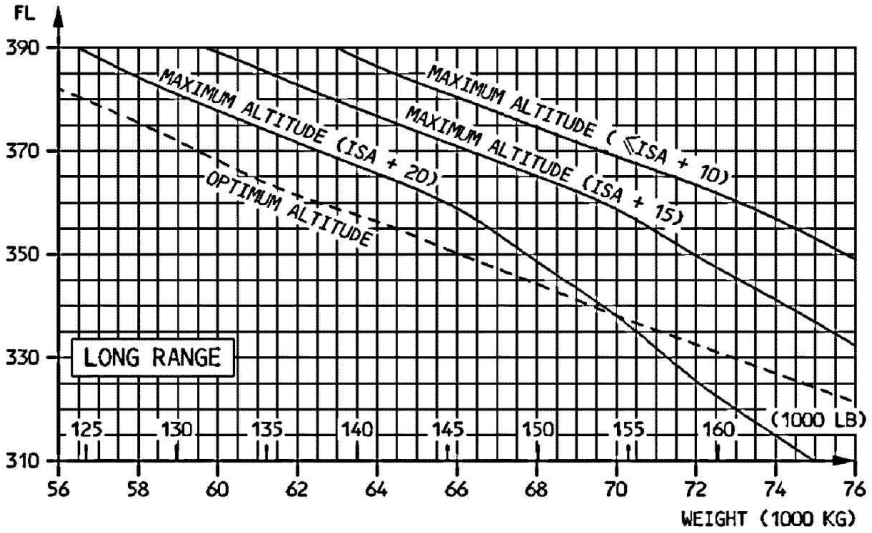
CRUISE LEVEL CHARTS M.78

Applicable to: ALL 321



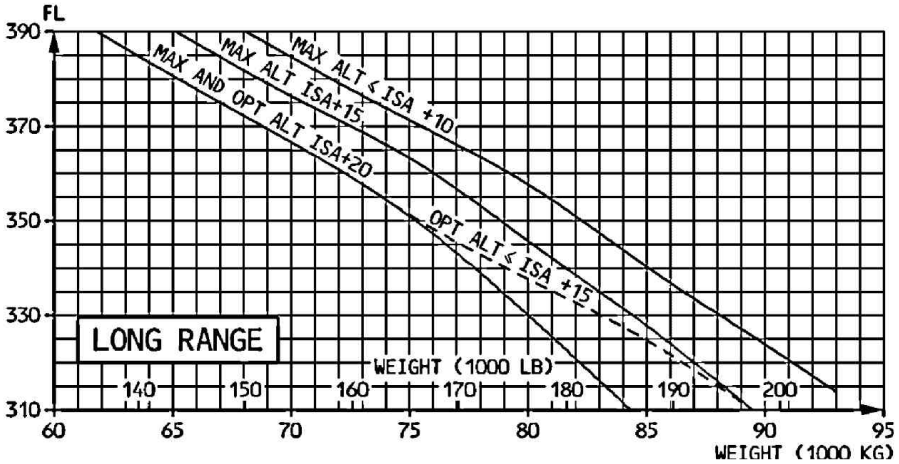
CRUISE LEVEL CHARTS LONG RANGE SPEED

Applicable to: ALL 320



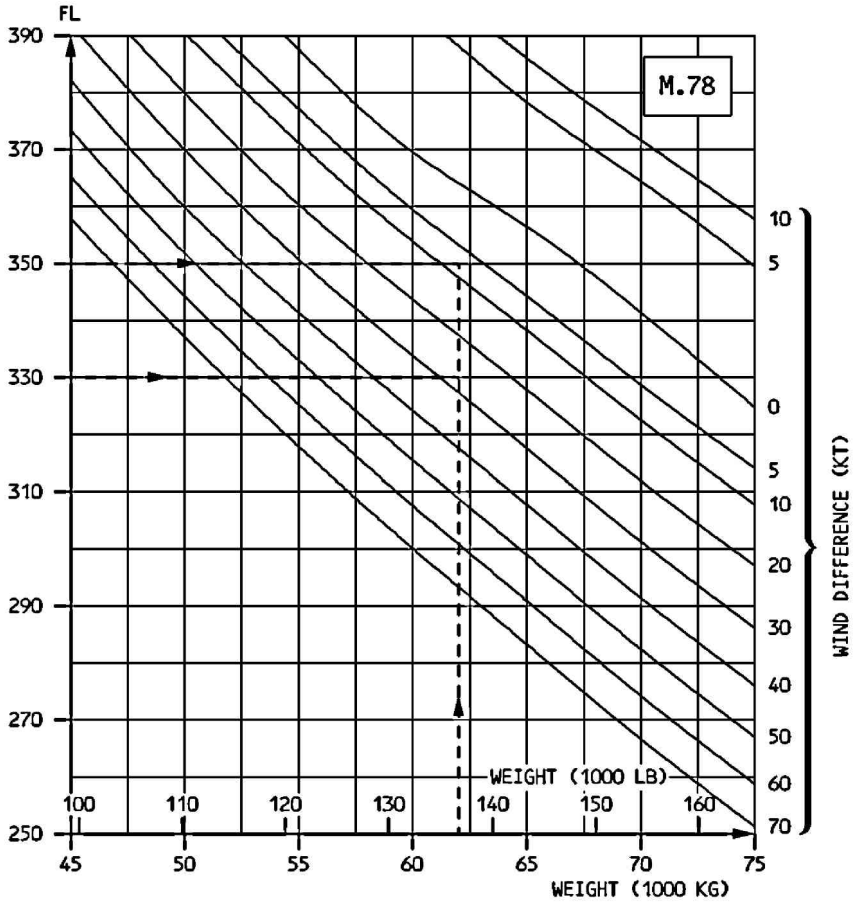
CRUISE LEVEL CHARTS LONG RANGE SPEED

Applicable to: ALL 321



WIND ALTITUDE TRADE FOR CONSTANT SPECIFIC RANGE

Applicable to: ALL 320



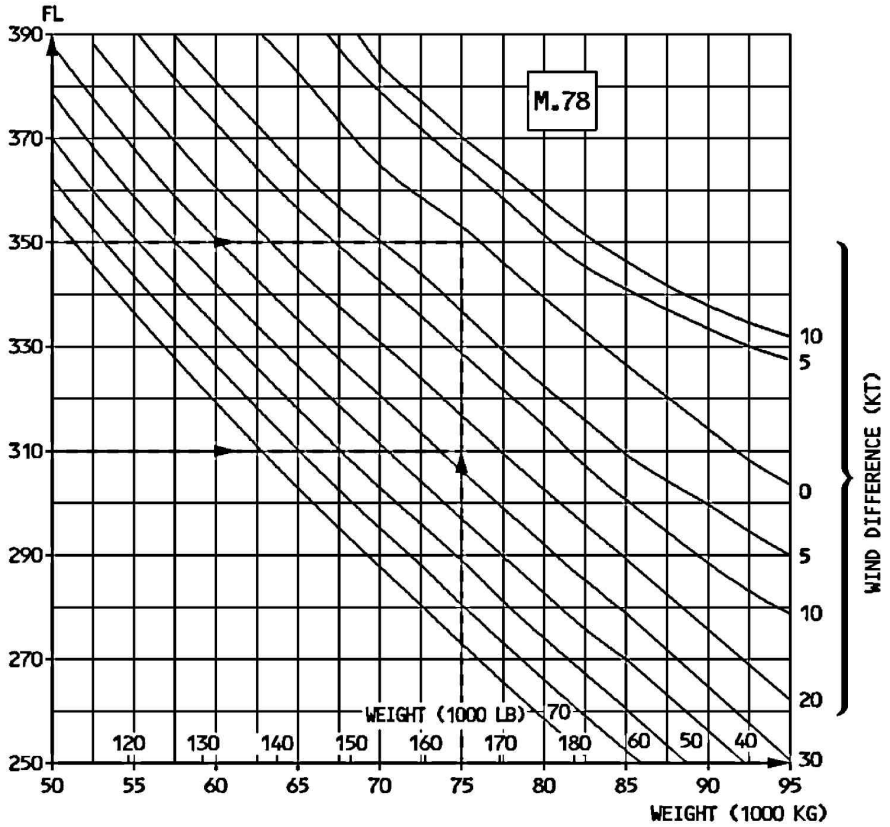
GIVEN : Weight : 62 000 kg (136 700 lb)
Wind at FL 350 : 10 kt head

FIND : Minimum wind difference to descend to FL 330 : (27 - 7) = 20 kt

RESULTS : Descent to FL 330 may be considered provided the tail wind at this altitude is more than (20 - 10) = 10 kt.

WIND ALTITUDE TRADE FOR CONSTANT SPECIFIC RANGE

Applicable to: ALL 321



GIVEN : Weight : 75 000 kg (165 300 lb)
Wind at FL 350 : 10 kt head

FIND : Minimum wind difference to descend to FL 310 : (27 - 2) = 25 kt

RESULTS : Descent to FL 310 may be considered provided the tail wind at this altitude is more than (25 - 10) = 15 kt.

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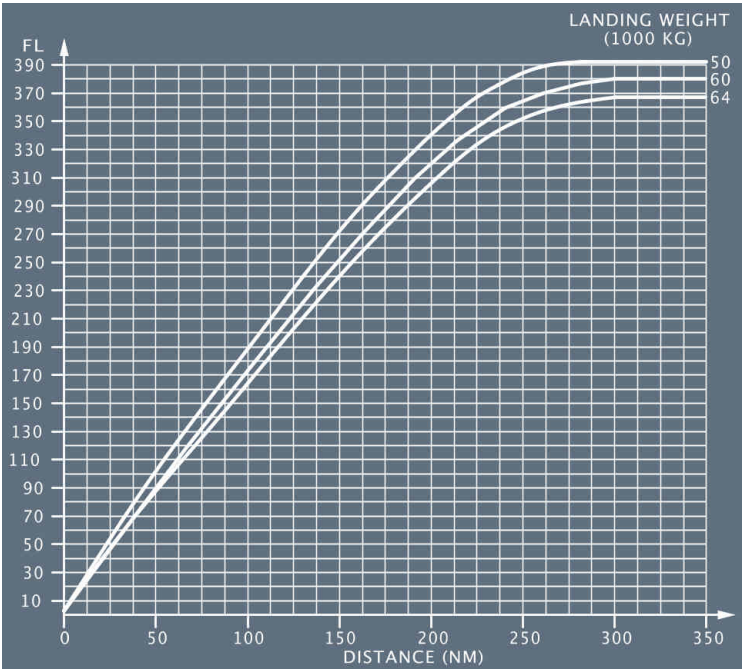
OPTIMUM ALTITUDE ON SHORT STAGE

Applicable to: ALL 320

According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.

It includes the following profiles:
- Takeoff
- Climb: 250 kt/300 kt/M .78
- Long range cruise (during at least 5 min)
- Descent: M .78/300 kt/250 kt
- Approach and landing

and it is established for:
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF


LANDING WEIGHT
(1000 KG)
FL
390
370
350
330
310
290
270
250
230
210
190
170
150
130
110
90
70
50
30
10
50
60
64
0
50
100
150
200
250
300
350
DISTANCE (NM)

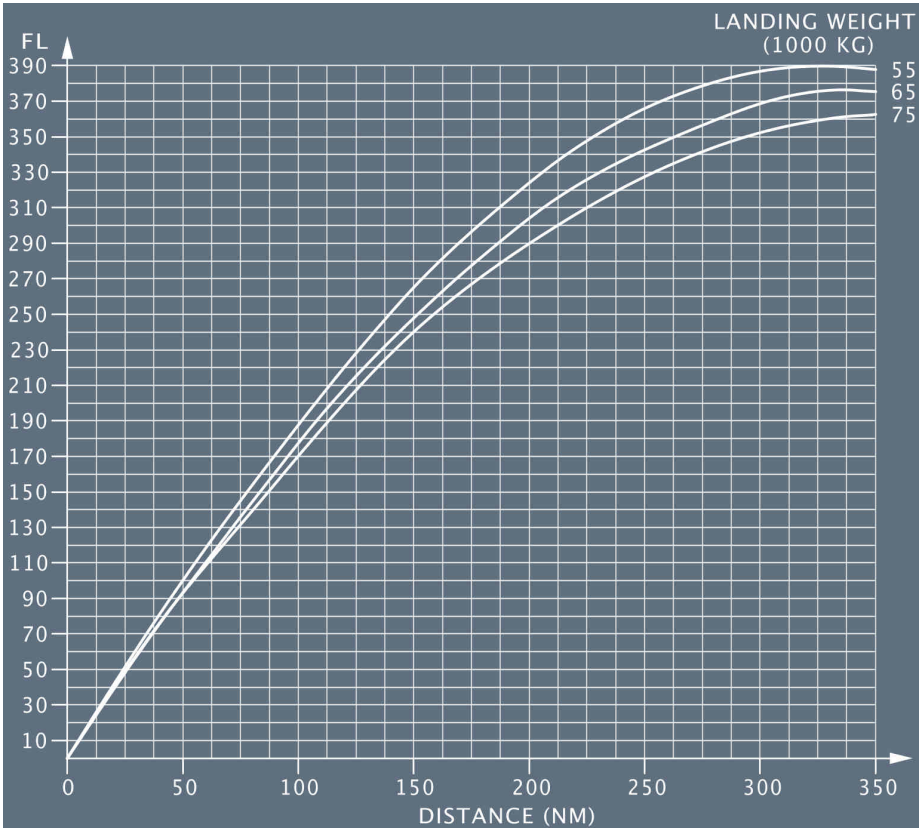
OPTIMUM ALTITUDE ON SHORT STAGE

Applicable to: ALL 321

According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.

It includes the following profiles:
- Takeoff
- Climb: 250 kt/300 kt/M .78
- Long range cruise (during at least 5 min)
- Descent: M .78/300 kt/250 kt
- Approach and landing

and it is established for:
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF


FL
390
370
350
330
310
290
270
250
230
210
190
170
150
130
110
90
70
50
30
10
0
50
100
150
200
250
300
350
DISTANCE (NM)
LANDING WEIGHT
(1000 KG)
55
65
75

GENERAL

Applicable to: ALL

Cruise tables are established:

- for ISA, ISA + 10, ISA + 15 and ISA + 20
- with normal air conditioning and anti ice OFF
- from FL 290 to FL 390 at M 0.78
- from FL 100 to FL 390 at long range speed
- with a 33 % center of gravity.

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CRUISE - M.78 - ISA

Applicable to: ALL 320

CRUISE - M.78

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0%

EPR
KG/H/ENG
NM/1000KG
MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	1.217	.780	1.223	.780	1.232	.780	1.246	.780	1.265	.780	1.293	.780
	1280	302	1177	289	1087	277	1019	264	969	252	930	241
	180.3	462	194.4	458	208.7	454	220.5	450	230.7	447	240.5	447
52	1.219	.780	1.226	.780	1.237	.780	1.253	.780	1.274	.780	1.305	.780
	1284	302	1183	289	1099	277	1036	264	987	252	949	241
	179.7	462	193.4	458	206.3	454	217.1	450	226.6	447	235.7	447
54	1.221	.780	1.229	.780	1.242	.780	1.259	.780	1.284	.780	1.320	.780
	1290	302	1190	289	1115	277	1053	264	1005	252	973	241
	178.9	462	192.2	458	203.5	454	213.4	450	222.6	447	229.8	447
56	1.223	.780	1.233	.780	1.248	.780	1.266	.780	1.295	.780	1.337	.780
	1296	302	1200	289	1131	277	1072	264	1023	252	1006	241
	178.1	462	190.6	458	200.6	454	209.7	450	218.6	447	222.3	447
58	1.225	.780	1.237	.780	1.253	.780	1.275	.780	1.307	.780	1.355	.780
	1302	302	1215	289	1148	277	1090	264	1044	252	1041	241
	177.2	462	188.4	458	197.6	454	206.3	450	214.3	447	214.9	447
60	1.228	.780	1.242	.780	1.260	.780	1.284	.780	1.321	.780	1.376	.780
	1311	302	1230	289	1166	277	1108	264	1070	252	1078	241
	176.1	462	186.0	458	194.6	454	202.9	450	209.1	447	207.4	447
62	1.232	.780	1.247	.780	1.266	.780	1.294	.780	1.337	.780	1.399	.780
	1321	302	1247	289	1185	277	1127	264	1103	252	1120	241
	174.7	462	183.5	458	191.5	454	199.5	450	202.9	447	199.8	447
64	1.236	.780	1.252	.780	1.274	.780	1.305	.780	1.354	.780		
	1336	302	1264	289	1203	277	1148	264	1138	252		
	172.8	462	181.0	458	188.5	454	195.9	450	196.6	447		
66	1.241	.780	1.258	.780	1.282	.780	1.318	.780	1.372	.780		
	1352	302	1283	289	1221	277	1173	264	1176	252		
	170.7	462	178.4	458	185.7	454	191.7	450	190.3	447		
68	1.245	.780	1.264	.780	1.291	.780	1.332	.780	1.393	.780		
	1369	302	1302	289	1240	277	1206	264	1216	252		
	168.7	462	175.8	458	182.9	454	186.5	450	183.9	447		
70	1.250	.780	1.270	.780	1.301	.780	1.347	.780	1.415	.780		
	1386	302	1321	289	1261	277	1240	264	1261	252		
	166.5	462	173.2	458	179.9	454	181.2	450	177.4	447		
72	1.256	.780	1.278	.780	1.312	.780	1.364	.780				
	1405	302	1339	289	1284	277	1278	264				
	164.3	462	170.9	458	176.6	454	175.8	450				
74	1.261	.780	1.286	.780	1.325	.780	1.382	.780				
	1424	302	1358	289	1316	277	1318	264				
	162.1	462	168.5	458	172.4	454	170.6	450				
76	1.267	.780	1.295	.780	1.339	.780	1.402	.780				
	1443	302	1378	289	1350	277	1360	264				
	159.9	462	166.1	458	168.0	454	165.3	450				

LOW AIR CONDITIONING
△FUEL = − 0.4 %

ENGINE ANTI ICE ON
△FUEL = + 3 %

TOTAL ANTI ICE ON
△FUEL = + 5.5 %

10F -08F0A320-232 IAE V2527-A5 12100000C5KG330 0 018590 0 0 1 1.0 .0 .0 0 01 .780 .000 .000 0 FCOM-NO-03-05-15-007-140

CRUISE - M.78 - ISA

Applicable to: ALL 321

CRUISE - M.78

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290	FL310	FL330	FL350	FL370	FL390
48	1.255 .780 1346 302 171.5 462	1.266 .780 1243 289 184.1 458	1.280 .780 1153 277 196.7 454	1.299 .780 1075 264 209.2 450	1.322 .780 1011 252 221.3 447	1.351 .780 962 241 232.4 447
52	1.262 .780 1361 302 169.5 462	1.275 .780 1264 289 181.1 458	1.294 .780 1179 277 192.4 454	1.315 .780 1103 264 203.8 450	1.343 .780 1043 252 214.5 447	1.376 .780 1000 241 223.8 447
56	1.271 .780 1382 302 167.1 462	1.288 .780 1289 289 177.5 458	1.308 .780 1207 277 187.9 454	1.334 .780 1135 264 198.1 450	1.365 .780 1079 252 207.4 447	1.404 .780 1041 241 214.9 447
60	1.281 .780 1406 302 164.1 462	1.301 .780 1317 289 173.7 458	1.325 .780 1238 277 183.2 454	1.354 .780 1169 264 192.3 450	1.389 .780 1118 252 200.1 447	1.435 .780 1091 241 205.0 447
64	1.293 .780 1434 302 161.0 462	1.315 .780 1347 289 169.9 458	1.342 .780 1271 277 178.4 454	1.375 .780 1207 264 186.2 450	1.416 .780 1164 252 192.2 447	1.475 .780 1157 241 193.3 447
68	1.306 .780 1463 302 157.7 462	1.331 .780 1380 289 165.9 458	1.361 .780 1308 277 173.4 454	1.398 .780 1249 264 180.1 450	1.448 .780 1219 252 183.5 447	1.526 .780 1246 241 179.5 447
72	1.319 .780 1495 302 154.4 462	1.347 .780 1414 289 161.8 458	1.381 .780 1348 277 168.3 454	1.424 .780 1298 264 173.2 450	1.488 .780 1293 252 173.0 447	
76	1.334 .780 1528 302 151.0 462	1.365 .780 1452 289 157.6 458	1.403 .780 1391 277 163.0 454	1.455 .780 1358 264 165.6 450	1.537 .780 1388 252 161.1 447	
80	1.349 .780 1564 302 147.6 462	1.383 .780 1493 289 153.3 458	1.427 .780 1443 277 157.2 454	1.493 .780 1436 264 156.6 450		
84	1.365 .780 1603 302 144.0 462	1.404 .780 1538 289 148.8 458	1.456 .780 1506 277 150.7 454			
88	1.383 .780 1644 302 140.4 462	1.426 .780 1591 289 143.8 458	1.491 .780 1585 277 143.1 454			
92	1.401 .780 1690 302 136.6 462	1.452 .780 1654 289 138.4 458				
96	1.422 .780 1743 302 132.5 462					

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10D -08F0A321--131 IAE V2530-A5 12100000C5KG330 0 018590 0 0 1 1.0 .0 .00 0 01 .780 .000 .000 0 FCOM-N0 03-05-15-009-XXX

CRUISE - M.78 - ISA+10

Applicable to: ALL 320

CRUISE - M.78

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

EPR
KG/H/ENG
NM/1000KG
MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	1.219	.780	1.225	.780	1.234	.780	1.248	.780	1.267	.780	1.295	.780
	1316	302	1211	289	1119	277	1051	264	999	252	958	241
	179.1	472	193.0	468	207.2	464	218.8	460	229.0	458	238.8	458
52	1.220	.780	1.228	.780	1.238	.780	1.254	.780	1.276	.780	1.308	.780
	1321	302	1218	289	1132	277	1067	264	1017	252	978	241
	178.5	472	192.0	468	204.8	464	215.4	460	225.0	458	234.0	458
54	1.222	.780	1.230	.780	1.244	.780	1.261	.780	1.286	.780	1.322	.780
	1327	302	1225	289	1148	277	1086	264	1035	252	1004	241
	177.7	472	190.9	468	202.0	464	211.8	460	221.0	458	228.0	458
56	1.224	.780	1.234	.780	1.249	.780	1.268	.780	1.297	.780	1.339	.780
	1333	302	1236	289	1164	277	1105	264	1054	252	1037	241
	176.9	472	189.2	468	199.1	464	208.1	460	217.1	458	220.6	458
58	1.227	.780	1.239	.780	1.255	.780	1.277	.780	1.309	.780	1.358	.780
	1339	302	1251	289	1182	277	1122	264	1075	252	1073	241
	176.1	472	187.0	468	196.2	464	204.8	460	212.8	458	213.2	458
60	1.230	.780	1.244	.780	1.261	.780	1.286	.780	1.323	.780	1.378	.780
	1348	302	1267	289	1201	277	1141	264	1103	252	1111	241
	174.9	472	184.6	468	193.1	464	201.5	460	207.5	458	205.9	458
62	1.233	.780	1.249	.780	1.268	.780	1.296	.780	1.339	.780	1.401	.780
	1359	302	1284	289	1220	277	1160	264	1137	252	1154	241
	173.5	472	182.2	468	190.1	464	198.1	460	201.3	458	198.3	458
64	1.238	.780	1.254	.780	1.276	.780	1.307	.780	1.356	.780		
	1375	302	1302	289	1238	277	1182	264	1173	252		
	171.5	472	179.7	468	187.2	464	194.5	460	195.1	458		
66	1.242	.780	1.260	.780	1.284	.780	1.320	.780	1.374	.780		
	1391	302	1320	289	1257	277	1209	264	1211	252		
	169.5	472	177.1	468	184.5	464	190.2	460	188.9	458		
68	1.247	.780	1.266	.780	1.293	.780	1.334	.780	1.395	.780		
	1408	302	1340	289	1276	277	1242	264	1253	252		
	167.5	472	174.5	468	181.7	464	185.0	460	182.5	458		
70	1.252	.780	1.272	.780	1.303	.780	1.349	.780	1.417	.780		
	1426	302	1359	289	1298	277	1278	264	1299	252		
	165.4	472	172.0	468	178.6	464	179.9	460	176.1	458		
72	1.257	.780	1.280	.780	1.314	.780	1.366	.780				
	1445	302	1378	289	1322	277	1317	264				
	163.2	472	169.7	468	175.4	464	174.6	460				
74	1.263	.780	1.288	.780	1.327	.780	1.384	.780				
	1465	302	1397	289	1355	277	1357	264				
	161.0	472	167.3	468	171.1	464	169.4	460				
76	1.268	.780	1.297	.780	1.341	.780	1.404	.780				
	1485	302	1418	289	1390	277	1401	264				
	158.8	472	164.9	468	166.8	464	164.1	460				

LOW AIR CONDITIONING
△FUEL = – 0.4 %

ENGINE ANTI ICE ON
△FUEL = + 3 %

TOTAL ANTI ICE ON
△FUEL = + 5.5 %

10F -08F0A1A320-232 IAE V2527--A5 12100000C5KG330 0 018590 0 0 1 1 0 0 0 0 0 01 .780 .000 .000 10 FCOM-N0-03-05-15-008-142

CRUISE - M.78 - ISA+10

Applicable to: ALL 321

CRUISE - M.78

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

EPR
KG/H/ENG
NM/1000KG
MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290	FL310	FL330	FL350	FL370	FL390
48	1.257 .780 1384 302 170.4 472	1.268 .780 1279 289 182.8 468	1.282 .780 1187 277 195.4 464	1.301 .780 1107 264 207.7 460	1.324 .780 1042 252 219.7 458	1.353 .780 992 241 230.7 458
52	1.264 .780 1400 302 168.4 472	1.278 .780 1300 289 179.8 468	1.296 .780 1214 277 191.1 464	1.318 .780 1136 264 202.3 460	1.345 .780 1074 252 212.9 458	1.378 .780 1030 241 222.1 458
56	1.273 .780 1421 302 165.9 472	1.290 .780 1327 289 176.3 468	1.311 .780 1243 277 186.6 464	1.336 .780 1169 264 196.7 460	1.367 .780 1112 252 205.8 458	1.406 .780 1073 241 213.3 458
60	1.283 .780 1446 302 163.0 472	1.303 .780 1355 289 172.5 468	1.327 .780 1274 277 181.9 464	1.356 .780 1204 264 190.9 460	1.392 .780 1152 252 198.6 458	1.438 .780 1125 241 203.4 458
64	1.295 .780 1475 302 159.9 472	1.317 .780 1386 289 168.7 468	1.344 .780 1309 277 177.2 464	1.377 .780 1243 264 184.9 460	1.419 .780 1200 252 190.7 458	1.478 .780 1193 241 191.8 458
68	1.308 .780 1505 302 156.7 472	1.333 .780 1420 289 164.7 468	1.363 .780 1346 277 172.2 464	1.400 .780 1286 264 178.7 460	1.450 .780 1257 252 182.1 458	1.529 .780 1285 241 178.1 458
72	1.321 .780 1537 302 153.4 472	1.349 .780 1455 289 160.7 468	1.383 .780 1387 277 167.1 464	1.426 .780 1338 264 171.9 460	1.491 .780 1333 252 171.6 458	
76	1.336 .780 1572 302 150.0 472	1.367 .780 1495 289 156.4 468	1.405 .780 1433 277 161.9 464	1.457 .780 1399 264 164.3 460	1.540 .780 1431 252 159.8 458	
80	1.351 .780 1608 302 146.6 472	1.385 .780 1537 289 152.2 468	1.429 .780 1486 277 156.1 464	1.495 .780 1480 264 155.4 460		
84	1.367 .780 1649 302 143.0 472	1.406 .780 1583 289 147.7 468	1.458 .780 1551 277 149.5 464			
88	1.385 .780 1691 302 139.4 472	1.428 .780 1638 289 142.8 468	1.493 .780 1632 277 142.0 464			
92	1.403 .780 1738 302 135.7 472	1.455 .780 1703 289 137.3 468				
96	1.423 .780 1793 302 131.5 472					

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10D-08F0A321-131-IAE V2530-A5 12100000C5KG330 0 018590 0 0 1 1.0 .0 .00 0 01 .780 .000 .000 10 FCOM-N0-03-05-15-010-XXX

CRUISE - M.78 - ISA+15

Applicable to: ALL 320

CRUISE - M.78

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	1.219	.780	1.226	.780	1.235	.780	1.249	.780	1.268	.780	1.296	.780
	1334	302	1228	289	1135	277	1066	264	1014	252	972	241
	178.6	476	192.4	473	206.4	469	218.0	465	228.1	463	238.0	463
52	1.221	.780	1.228	.780	1.239	.780	1.255	.780	1.277	.780	1.309	.780
	1339	302	1235	289	1148	277	1083	264	1032	252	992	241
	178.0	476	191.4	473	204.1	469	214.6	465	224.2	463	233.1	463
54	1.223	.780	1.231	.780	1.244	.780	1.262	.780	1.287	.780	1.323	.780
	1345	302	1242	289	1164	277	1102	264	1050	252	1019	241
	177.2	476	190.3	473	201.3	469	211.0	465	220.3	463	227.1	463
56	1.225	.780	1.235	.780	1.250	.780	1.269	.780	1.298	.780	1.340	.780
	1351	302	1254	289	1181	277	1121	264	1069	252	1053	241
	176.4	476	188.5	473	198.4	469	207.3	465	216.3	463	219.7	463
58	1.227	.780	1.239	.780	1.256	.780	1.278	.780	1.310	.780	1.359	.780
	1357	302	1268	289	1199	277	1139	264	1091	252	1089	241
	175.5	476	186.3	473	195.5	469	204.1	465	212.1	463	212.4	463
60	1.231	.780	1.244	.780	1.262	.780	1.287	.780	1.324	.780	1.379	.780
	1366	302	1285	289	1218	277	1157	264	1119	252	1128	241
	174.4	476	183.9	473	192.4	469	200.8	465	206.7	463	205.1	463
62	1.234	.780	1.249	.780	1.268	.780	1.297	.780	1.340	.780		
	1378	302	1302	289	1237	277	1177	264	1153	252		
	172.9	476	181.5	473	189.4	469	197.5	465	200.6	463		
64	1.239	.780	1.255	.780	1.276	.780	1.308	.780	1.357	.780		
	1394	302	1320	289	1256	277	1199	264	1190	252		
	170.9	476	179.0	473	186.6	469	193.8	465	194.4	463		
66	1.243	.780	1.261	.780	1.285	.780	1.321	.780	1.375	.780		
	1410	302	1339	289	1275	277	1226	264	1229	252		
	168.9	476	176.4	473	183.9	469	189.5	465	188.2	463		
68	1.248	.780	1.267	.780	1.294	.780	1.335	.780				
	1428	302	1359	289	1294	277	1261	264				
	166.9	476	173.9	473	181.1	469	184.3	465				
70	1.253	.780	1.273	.780	1.304	.780	1.350	.780				
	1446	302	1378	289	1316	277	1297	264				
	164.8	476	171.4	473	178.1	469	179.2	465				
72	1.258	.780	1.281	.780	1.315	.780	1.367	.780				
	1465	302	1397	289	1340	277	1336	264				
	162.6	476	169.1	473	174.8	469	173.9	465				
74	1.263	.780	1.289	.780	1.328	.780						
	1485	302	1417	289	1374	277						
	160.4	476	166.8	473	170.5	469						
76	1.269	.780	1.298	.780	1.341	.780						
	1505	302	1438	289	1410	277						
	158.3	476	164.4	473	166.2	469						

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.4 %	△FUEL = + 3 %	△FUEL = + 5.5 %

10F -08F0A320-232 IAE V2527--A5 12100000C5KG330 0 018590 0 0 1 1 0 0 0 0 0 01 .780 .000 .000 15 FCOM-N0-03-05-15-009-140

CRUISE - M.78 - ISA+15

Applicable to: ALL 321

CRUISE - M.78

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290	FL310	FL330	FL350	FL370	FL390
48	1.258 .780 1403 302 169.8 476	1.269 .780 1297 289 182.2 473	1.283 .780 1204 277 194.7 469	1.302 .780 1123 264 206.9 465	1.325 .780 1057 252 218.9 463	1.354 .780 1006 241 229.8 463
52	1.265 .780 1419 302 167.8 476	1.279 .780 1319 289 179.2 473	1.297 .780 1231 277 190.4 469	1.319 .780 1153 264 201.6 465	1.346 .780 1090 252 212.2 463	1.379 .780 1045 241 221.3 463
56	1.274 .780 1440 302 165.4 476	1.291 .780 1345 289 175.7 473	1.312 .780 1260 277 186.0 469	1.337 .780 1186 264 196.0 465	1.368 .780 1128 252 205.1 463	1.407 .780 1089 241 212.4 463
60	1.284 .780 1466 302 162.5 476	1.304 .780 1374 289 171.9 473	1.328 .780 1292 277 181.3 469	1.357 .780 1222 264 190.2 465	1.393 .780 1169 252 197.9 463	1.439 .780 1142 241 202.6 463
64	1.296 .780 1495 302 159.4 476	1.318 .780 1406 289 168.1 473	1.345 .780 1327 277 176.6 469	1.378 .780 1262 264 184.2 465	1.420 .780 1217 252 190.0 463	1.479 .780 1211 241 191.1 463
68	1.309 .780 1525 302 156.2 476	1.334 .780 1439 289 164.1 473	1.364 .780 1365 277 171.6 469	1.401 .780 1305 264 178.1 465	1.451 .780 1275 252 181.4 463	
72	1.322 .780 1558 302 152.9 476	1.350 .780 1476 289 160.1 473	1.384 .780 1407 277 166.6 469	1.427 .780 1357 264 171.2 465	1.492 .780 1353 252 171.0 463	
76	1.337 .780 1593 302 149.5 476	1.368 .780 1516 289 155.9 473	1.406 .780 1453 277 161.3 469	1.458 .780 1420 264 163.7 465		
80	1.352 .780 1630 302 146.1 476	1.386 .780 1558 289 151.6 473	1.430 .780 1507 277 155.5 469			
84	1.368 .780 1671 302 142.5 476	1.407 .780 1606 289 147.2 473	1.459 .780 1573 277 149.0 469			
88	1.386 .780 1715 302 138.9 476	1.429 .780 1661 289 142.3 473				
92	1.404 .780 1762 302 135.2 476					
96						

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10D -08F0A321--131 IAE V2530-A5 12100000C5KG330 0 018590 0 0 1 1.0 .0 .00 0 01 .780 .000 .000 15 FCOM-N0-03-05-15-011-XXX

CRUISE - M.78 - ISA+20

Applicable to: ALL 320

CRUISE - M.78

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H/ENG
NM/1000KG
MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	1.220	.780	1.227	.780	1.235	.780	1.250	.780	1.269	.780	1.297	.780
	1352	302	1245	289	1151	277	1081	264	1028	252	986	241
	178.0	481	191.8	477	205.7	474	217.2	470	227.3	468	237.1	468
52	1.222	.780	1.229	.780	1.240	.780	1.256	.780	1.278	.780	1.310	.780
	1357	302	1251	289	1165	277	1099	264	1046	252	1006	241
	177.4	481	190.8	477	203.3	474	213.8	470	223.5	468	232.3	468
54	1.224	.780	1.232	.780	1.245	.780	1.263	.780	1.288	.780	1.324	.780
	1363	302	1259	289	1181	277	1117	264	1065	252	1033	241
	176.6	481	189.7	477	200.5	474	210.2	470	219.6	468	226.2	468
56	1.226	.780	1.236	.780	1.251	.780	1.270	.780	1.299	.780	1.341	.780
	1369	302	1271	289	1198	277	1137	264	1084	252	1068	241
	175.8	481	187.8	477	197.7	474	206.6	470	215.6	468	218.9	468
58	1.228	.780	1.240	.780	1.256	.780	1.279	.780	1.311	.780		
	1375	302	1286	289	1216	277	1155	264	1106	252		
	174.9	481	185.6	477	194.8	474	203.4	470	211.4	468		
60	1.231	.780	1.245	.780	1.263	.780	1.288	.780	1.325	.780		
	1385	302	1303	289	1235	277	1174	264	1135	252		
	173.8	481	183.3	477	191.7	474	200.1	470	206.0	468		
62	1.235	.780	1.250	.780	1.269	.780	1.298	.780	1.341	.780		
	1397	302	1320	289	1255	277	1193	264	1170	252		
	172.3	481	180.9	477	188.7	474	196.8	470	199.8	468		
64	1.239	.780	1.256	.780	1.277	.780	1.309	.780				
	1413	302	1338	289	1273	277	1216	264				
	170.3	481	178.4	477	186.0	474	193.2	470				
66	1.244	.780	1.261	.780	1.286	.780	1.322	.780				
	1430	302	1358	289	1292	277	1244	264				
	168.3	481	175.8	477	183.2	474	188.8	470				
68	1.248	.780	1.267	.780	1.295	.780	1.336	.780				
	1447	302	1378	289	1312	277	1279	264				
	166.3	481	173.3	477	180.5	474	183.7	470				
70	1.253	.780	1.274	.780	1.305	.780						
	1466	302	1397	289	1334	277						
	164.2	481	170.9	477	177.5	474						
72	1.259	.780	1.282	.780	1.316	.780						
	1485	302	1416	289	1359	277						
	162.0	481	168.6	477	174.2	474						
74	1.264	.780	1.290	.780								
	1505	302	1436	289								
	159.9	481	166.2	477								
76	1.270	.780										
	1526	302										
	157.7	481										

LOW AIR CONDITIONING
△FUEL = − 0.4 %

ENGINE ANTI ICE ON
△FUEL = + 3 %

TOTAL ANTI ICE ON
△FUEL = + 5.5 %

10F -08F0A320-232 IAE V2527-A5 12100000C5KG330 0 018590 0 0 1 1.0 .0 .0 0 01 .780 .000 .000 20 FCOM-N0-03-05-15-010-140

CRUISE - M.78 - ISA+20

Applicable to: ALL 321

CRUISE - M.78

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290	FL310	FL330	FL350	FL370	FL390
48	1.259 .780 1422 302 169.2 481	1.270 .780 1315 289 181.6 477	1.284 .780 1220 277 194.0 474	1.303 .780 1139 264 206.2 470	1.326 .780 1072 252 218.2 468	1.355 .780 1021 241 229.0 468
52	1.266 .780 1439 302 167.3 481	1.280 .780 1337 289 178.6 477	1.298 .780 1248 277 189.8 474	1.320 .780 1169 264 200.9 470	1.347 .780 1105 252 211.5 468	1.381 .780 1060 241 220.5 468
56	1.275 .780 1460 302 164.8 481	1.292 .780 1363 289 175.1 477	1.313 .780 1278 277 185.3 474	1.338 .780 1202 264 195.3 470	1.369 .780 1144 252 204.4 468	1.408 .780 1105 241 211.6 468
60	1.285 .780 1486 302 161.9 481	1.305 .780 1393 289 171.4 477	1.329 .780 1310 277 180.7 474	1.358 .780 1239 264 189.5 470	1.394 .780 1185 252 197.2 468	1.440 .780 1158 241 201.9 468
64	1.297 .780 1515 302 158.8 481	1.319 .780 1425 289 167.6 477	1.346 .780 1346 277 176.0 474	1.379 .780 1279 264 183.6 470	1.421 .780 1235 252 189.4 468	
68	1.310 .780 1546 302 155.7 481	1.335 .780 1459 289 163.6 477	1.365 .780 1384 277 171.0 474	1.402 .780 1324 264 177.4 470	1.452 .780 1294 252 180.7 468	
72	1.323 .780 1579 302 152.4 481	1.351 .780 1496 289 159.6 477	1.385 .780 1426 277 166.0 474	1.428 .780 1377 264 170.6 470		
76	1.338 .780 1615 302 149.0 481	1.369 .780 1536 289 155.4 477	1.407 .780 1473 277 160.7 474	1.459 .780 1440 264 163.0 470		
80	1.353 .780 1653 302 145.6 481	1.387 .780 1580 289 151.1 477	1.431 .780 1528 277 154.9 474			
84	1.369 .780 1694 302 142.1 481	1.408 .780 1628 289 146.7 477				
88	1.387 .780 1738 302 138.5 481					
92						
96						

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10D -08F0A321--131 IAE V2530-A5 12100000C5KG330 0 018590 0 0 1 1.0 .0 .00 0 01 .780 .000 .000 20 FCOM-N0-03-05-15-012-XXX

LONG RANGE CRUISE - ISA

Applicable to: ALL 320

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
50	1.013	.439	1.027	.480	1.052	.573	1.079	.615	1.092	.619	1.105	.620
	1011	243	991	241	1073	262	1049	266	983	257	921	246
	138.7	280	151.6	300	164.0	352	177.9	373	189.5	373	200.8	370
52	1.015	.447	1.030	.489	1.063	.603	1.084	.616	1.098	.623	1.111	.622
	1048	247	1032	246	1147	277	1059	266	999	258	939	247
	136.2	286	148.4	306	161.4	370	176.6	374	187.6	375	197.7	371
54	1.017	.455	1.033	.497	1.070	.609	1.089	.618	1.102	.621	1.118	.627
	1087	252	1072	250	1172	280	1071	267	1007	258	964	249
	133.8	291	145.4	312	159.7	374	175.2	375	185.6	374	194.3	374
56	1.019	.463	1.037	.514	1.075	.614	1.094	.621	1.107	.621	1.126	.634
	1124	256	1131	259	1191	282	1087	269	1020	258	992	252
	131.5	296	142.5	322	158.3	377	173.5	377	183.2	374	190.7	378
58	1.022	.471	1.042	.536	1.079	.616	1.100	.623	1.114	.625	1.135	.641
	1162	260	1201	270	1202	283	1100	270	1044	259	1023	255
	129.3	300	139.8	336	157.3	378	171.9	378	180.3	376	187.0	383
60	1.024	.478	1.046	.558	1.083	.617	1.103	.621	1.120	.631	1.144	.650
	1200	264	1275	282	1213	283	1107	268	1071	262	1058	259
	127.1	305	137.1	350	156.2	379	170.1	377	177.4	380	183.4	388
62	1.026	.485	1.051	.575	1.088	.619	1.109	.623	1.128	.638	1.158	.669
	1237	268	1333	291	1227	285	1126	269	1101	265	1110	267
	125.0	309	135.1	360	155.0	380	167.9	378	174.3	384	179.9	399
64	1.029	.492	1.059	.600	1.093	.622	1.115	.627	1.136	.645	1.171	.682
	1279	273	1410	304	1243	286	1151	271	1133	268	1152	273
	122.9	314	133.4	376	153.7	382	165.4	381	171.2	388	176.8	407
66	1.032	.499	1.064	.607	1.098	.625	1.121	.633	1.145	.654	1.181	.692
	1318	276	1441	308	1259	287	1179	274	1170	272	1188	277
	120.9	319	132.0	380	152.4	384	162.9	384	168.2	394	173.9	413
68	1.035	.514	1.069	.612	1.102	.623	1.128	.639	1.159	.671	1.191	.700
	1381	285	1462	310	1267	286	1209	277	1222	280	1220	280
	118.9	328	131.0	383	151.1	383	160.3	388	165.3	404	171.2	418
70	1.038	.531	1.073	.615	1.106	.623	1.135	.646	1.170	.683	1.198	.703
	1448	294	1479	311	1279	286	1243	280	1264	285	1244	282
	117.0	339	130.1	385	149.5	383	157.7	392	162.6	411	168.6	419
72	1.042	.547	1.076	.616	1.111	.627	1.144	.654	1.179	.692	1.207	.714
	1515	303	1490	312	1304	288	1280	284	1300	289	1287	286
	115.2	349	129.4	386	147.6	385	155.1	397	160.2	417	165.5	426
74	1.046	.564	1.080	.617	1.116	.631	1.156	.671	1.188	.699	1.217	.726
	1586	313	1501	313	1332	290	1334	291	1333	292	1334	292
	113.6	360	128.7	386	145.6	388	152.6	407	157.9	421	162.4	433
76	1.049	.577	1.084	.619	1.122	.636	1.167	.682	1.195	.704	1.226	.737
	1641	321	1515	314	1361	293	1377	297	1361	294	1378	296
	112.3	369	127.9	388	143.6	391	150.3	414	155.7	424	159.6	440

LOW AIR CONDITIONING
△FUEL = – 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 12200000C5KG330 0 018590 0 0 1 1.0 .0 .0 0 01 .990 .000 .000 0 FCOM-NO-03-05-15-011-140

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	1.122	.629	1.147	.650	1.184	.689	1.215	.714	1.247	.743	1.291	.777
	887	240	877	237	889	242	885	240	897	239	925	240
	209.9	372	217.4	381	225.2	401	232.6	412	237.6	426	241.0	446
52	1.131	.636	1.163	.670	1.195	.696	1.229	.732	1.260	.755	1.310	.784
	916	243	925	245	917	244	931	246	939	244	960	242
	205.6	377	212.6	393	220.6	405	226.5	422	230.5	433	234.3	450
54	1.141	.645	1.177	.684	1.207	.707	1.239	.738	1.279	.771	1.326	.785
	948	246	964	251	954	249	964	249	988	249	989	243
	201.3	382	208.2	401	215.5	411	220.8	426	223.8	442	227.6	450
56	1.155	.662	1.189	.694	1.220	.723	1.250	.749	1.297	.782	1.344	.787
	993	253	997	255	1000	255	1005	253	1028	253	1026	243
	197.1	392	204.3	407	210.3	421	214.8	432	218.1	448	219.9	451
58	1.169	.677	1.198	.698	1.231	.735	1.263	.760	1.313	.785	1.363	.787
	1037	259	1021	256	1041	259	1047	257	1059	254	1063	243
	193.2	401	200.5	410	205.4	428	209.0	438	212.7	451	212.4	452
60	1.181	.689	1.210	.712	1.241	.742	1.281	.775	1.327	.786	1.384	.787
	1075	264	1066	262	1075	262	1097	262	1089	255	1101	244
	189.7	408	196.0	418	200.7	431	203.5	447	207.0	451	205.1	452
62	1.191	.698	1.221	.727	1.251	.751	1.297	.782	1.344	.787	1.407	.786
	1108	268	1112	268	1116	265	1134	265	1126	255	1140	243
	186.5	413	191.7	427	195.7	437	198.8	451	200.5	451	197.8	451
64	1.199	.701	1.232	.738	1.263	.761	1.311	.786	1.361	.787		
	1132	269	1153	272	1158	269	1165	267	1161	255		
	183.3	415	187.7	433	190.9	442	194.3	453	194.4	451		
66	1.210	.715	1.240	.743	1.279	.775	1.324	.786	1.381	.788		
	1179	275	1186	274	1210	275	1194	267	1201	255		
	179.5	423	183.8	436	186.3	451	189.7	453	188.1	452		
68	1.220	.728	1.250	.752	1.294	.782	1.340	.787	1.401	.787		
	1225	280	1228	278	1248	278	1230	267	1239	255		
	175.9	431	179.6	441	182.3	455	184.4	454	182.1	451		
70	1.230	.739	1.260	.760	1.307	.786	1.355	.787	1.422	.785		
	1268	285	1270	281	1280	279	1267	267	1279	254		
	172.6	438	175.6	446	178.5	457	179.1	454	176.0	450		
72	1.237	.742	1.273	.771	1.320	.786	1.372	.788				
	1296	286	1317	286	1309	279	1306	267				
	169.5	439	171.7	452	174.7	457	173.9	454				
74	1.245	.750	1.288	.781	1.332	.787	1.390	.787				
	1337	289	1363	290	1342	279	1344	267				
	165.9	444	168.1	458	170.5	458	168.8	454				
76	1.255	.758	1.300	.785	1.346	.788	1.410	.786				
	1379	293	1396	291	1379	280	1386	267				
	162.6	448	164.9	460	166.1	458	163.5	453				

LOW AIR CONDITIONING
△FUEL = − 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 12200000C5KG330 0 018590 0 0 1 1 0 0 0 0 01 990 000 000 0 FCOM-N0-03-05-15-01 2-140

LONG RANGE CRUISE - ISA

Applicable to: ALL 321

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
48	1.023	.434	1.036	.478	1.060	.549	1.105	.624	1.109	.608	1.123	.613
	1096	240	1065	240	1079	251	1130	270	1016	252	962	244
	126.4	277	140.5	299	156.3	337	167.6	379	180.2	366	190.2	366
52	1.028	.452	1.042	.497	1.072	.569	1.108	.610	1.121	.613	1.138	.621
	1178	250	1144	250	1153	261	1114	264	1051	254	1004	247
	122.5	288	136.0	311	151.6	350	166.3	370	175.6	369	184.5	370
56	1.032	.468	1.050	.532	1.106	.626	1.118	.613	1.134	.619	1.157	.635
	1257	259	1265	268	1300	288	1143	265	1090	257	1062	253
	118.9	299	131.8	333	147.8	384	162.7	372	170.9	373	178.4	379
60	1.036	.484	1.060	.555	1.108	.611	1.129	.618	1.150	.630	1.182	.660
	1338	268	1355	280	1278	281	1182	267	1145	262	1143	263
	115.6	309	128.2	347	147.0	376	158.7	375	165.7	379	172.2	394
64	1.041	.500	1.070	.572	1.117	.614	1.143	.626	1.172	.651	1.205	.679
	1418	277	1432	289	1308	282	1231	271	1221	271	1214	271
	112.5	319	125.1	358	144.1	377	154.4	380	160.4	392	166.9	405
68	1.048	.532	1.080	.588	1.127	.618	1.161	.641	1.194	.673	1.226	.694
	1548	295	1509	297	1348	284	1299	278	1300	280	1281	278
	109.7	340	122.1	368	141.0	380	149.9	389	155.7	405	161.6	414
72	1.056	.552	1.105	.620	1.139	.626	1.182	.663	1.212	.684	1.252	.716
	1643	306	1600	314	1396	288	1382	288	1358	285	1368	287
	107.2	352	121.3	388	137.7	384	145.7	403	151.5	412	156.1	427
76	1.063	.567	1.109	.612	1.153	.636	1.201	.681	1.235	.704	1.273	.728
	1723	315	1596	310	1456	293	1456	296	1444	294	1439	292
	105.0	362	120.2	384	134.2	391	141.8	413	146.7	424	150.9	434
80	1.072	.581	1.116	.615	1.171	.655	1.218	.690	1.256	.720	1.295	.741
	1800	323	1631	312	1539	302	1514	300	1524	302	1517	298
	103.0	371	118.2	385	130.7	402	138.3	419	142.3	434	145.9	443
84	1.101	.629	1.125	.619	1.190	.673	1.239	.709	1.276	.732	1.317	.756
	1983	350	1670	314	1621	311	1603	309	1596	307	1597	305
	101.2	402	116.1	388	127.6	414	134.2	430	137.9	440	141.3	451
88	1.106	.629	1.134	.625	1.205	.685	1.258	.722	1.296	.744	1.339	.766
	2005	350	1721	317	1687	316	1680	315	1674	312	1669	309
	100.1	402	113.8	392	124.7	421	130.5	438	133.7	448	137.0	457
92	1.106	.615	1.145	.634	1.220	.695	1.276	.733	1.317	.757	1.360	.774
	1963	342	1780	321	1751	321	1753	320	1754	318	1738	313
	100.0	393	111.5	397	121.9	427	126.9	445	129.9	455	133.0	462
96	1.111	.615	1.159	.646	1.239	.711	1.294	.744	1.337	.766	1.381	.781
	1988	342	1854	328	1840	329	1832	325	1826	322	1807	316
	98.8	393	109.1	405	118.7	437	123.3	452	126.2	461	129.0	466

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10D-08F0A321-131-IAE V2530-A5 12100000C5KG330 0 018590 0 0 1 1 0 0 00 0 01 990 000 000 0 FCOM-N0-03-05-15-013-XXX

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
48	1.142	.622	1.170	.644	1.205	.673	1.243	.701	1.285	.727	1.332	.754
	921	237	906	235	901	236	897	235	899	234	909	232
	199.9	368	208.4	378	217.2	391	225.3	404	232.0	417	237.8	432
52	1.164	.640	1.200	.672	1.235	.696	1.276	.724	1.321	.749	1.369	.770
	984	244	984	246	973	244	972	244	976	242	978	237
	192.5	379	200.3	394	208.0	405	214.5	417	220.2	430	225.6	441
56	1.192	.666	1.225	.689	1.265	.719	1.309	.744	1.356	.766	1.406	.782
	1063	255	1047	253	1050	253	1049	251	1047	248	1047	242
	185.5	394	192.8	404	199.0	418	204.3	429	209.8	439	214.2	449
60	1.214	.681	1.254	.713	1.295	.737	1.341	.762	1.390	.780	1.442	.787
	1124	261	1131	262	1126	260	1124	258	1119	253	1112	243
	179.4	403	185.1	419	190.2	428	195.4	439	200.0	447	203.0	451
64	1.241	.706	1.280	.729	1.324	.755	1.371	.774	1.422	.785	1.483	.791
	1210	271	1205	269	1203	267	1192	262	1180	254	1184	245
	172.6	418	177.6	428	182.4	439	187.1	446	190.7	450	191.4	453
68	1.266	.722	1.307	.746	1.353	.768	1.401	.783	1.455	.788	1.534	.790
	1284	278	1283	276	1274	272	1258	265	1244	255	1275	245
	166.4	427	170.7	438	175.2	446	179.3	451	181.7	452	177.7	453
72	1.290	.737	1.334	.762	1.380	.779	1.430	.786	1.496	.791		
	1361	284	1359	282	1345	276	1321	267	1324	256		
	160.3	436	164.4	447	168.4	453	171.6	453	171.3	453		
76	1.314	.752	1.359	.771	1.407	.784	1.462	.789	1.542	.787		
	1439	290	1427	286	1406	278	1387	268	1410	255		
	154.7	445	158.6	453	162.0	456	163.9	455	160.1	451		
80	1.338	.764	1.384	.781	1.434	.787	1.500	.791				
	1512	295	1497	290	1470	279	1470	268				
	149.6	452	153.0	458	155.6	458	155.0	456				
84	1.361	.773	1.408	.784	1.463	.790						
	1581	299	1557	291	1540	280						
	144.8	458	147.7	460	149.2	459						
88	1.384	.781	1.433	.787	1.499	.791						
	1651	303	1622	292	1623	281						
	140.1	462	142.4	462	141.7	460						
92	1.406	.784	1.459	.789								
	1711	304	1691	293								
	135.6	464	137.0	463								
96	1.428	.787	1.485	.773								
	1775	305	1721	286								
	131.2	466	131.7	453								

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10D -08F0A321--131 IAE V2530-A5 12100000C5KG330 0 018590 0 0 1 1.0 .0 .00 0.01 .990 .000 .000 0 FCOM-N0 03-05-15-014-XXX

LONG RANGE CRUISE - ISA+10

Applicable to: ALL 320

LONG RANGE CRUISE													
MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF							ISA+10 CG=33.0%		EPR KG/H/ENG NM/1000KG		MACH IAS (KT) TAS (KT)	
WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
50	1.013	.439	1.027	.479	1.054	.575	1.081	.615	1.093	.619	1.106	.619
	1035	242	1015	241	1105	263	1077	266	1009	257	946	246
	137.8	285	150.6	306	162.9	360	176.9	381	188.5	380	199.6	378
52	1.015	.447	1.030	.489	1.065	.603	1.085	.616	1.099	.622	1.112	.622
	1073	247	1058	246	1178	277	1087	266	1024	258	964	247
	135.4	290	147.4	312	160.5	378	175.6	382	186.6	382	196.5	379
54	1.017	.455	1.034	.497	1.071	.610	1.090	.618	1.103	.620	1.119	.627
	1111	251	1099	250	1202	280	1099	267	1031	257	989	249
	133.0	295	144.5	317	158.8	382	174.2	383	184.6	381	193.1	382
56	1.020	.463	1.038	.514	1.076	.614	1.096	.622	1.108	.621	1.127	.633
	1150	256	1158	259	1222	282	1115	269	1047	257	1018	252
	130.7	301	141.6	328	157.4	385	172.6	385	182.1	381	189.6	386
58	1.022	.470	1.042	.536	1.080	.616	1.101	.622	1.115	.625	1.136	.641
	1190	260	1231	270	1233	283	1128	269	1071	259	1050	255
	128.5	306	138.9	342	156.4	386	170.9	385	179.3	384	186.0	390
60	1.024	.478	1.047	.558	1.084	.617	1.104	.620	1.122	.630	1.145	.650
	1229	264	1309	282	1244	283	1136	268	1098	262	1086	259
	126.4	311	136.2	356	155.4	386	169.2	384	176.3	387	182.4	396
62	1.027	.485	1.051	.577	1.089	.619	1.110	.623	1.129	.637	1.160	.668
	1269	268	1372	292	1258	284	1155	269	1129	264	1138	267
	124.2	315	134.2	368	154.2	388	166.9	386	173.3	391	178.9	407
64	1.030	.492	1.060	.601	1.094	.622	1.116	.627	1.137	.644	1.172	.681
	1310	272	1449	304	1275	286	1181	271	1162	268	1181	272
	122.1	320	132.5	384	152.9	390	164.5	388	170.3	396	175.8	415
66	1.032	.499	1.066	.608	1.099	.624	1.122	.633	1.147	.654	1.183	.691
	1350	276	1478	308	1290	287	1210	274	1202	272	1219	277
	120.1	324	131.3	388	151.6	391	161.9	392	167.3	402	172.9	421
68	1.035	.513	1.071	.612	1.103	.622	1.129	.639	1.160	.671	1.192	.699
	1412	284	1500	310	1296	286	1241	277	1255	280	1251	280
	118.2	334	130.3	391	150.3	390	159.4	396	164.3	412	170.2	426
70	1.039	.531	1.074	.615	1.107	.622	1.137	.645	1.171	.683	1.199	.701
	1483	294	1517	312	1312	286	1275	280	1297	285	1275	281
	116.3	345	129.4	393	148.6	390	156.8	400	161.7	419	167.6	428
72	1.043	.547	1.078	.616	1.112	.626	1.145	.654	1.181	.692	1.209	.714
	1553	303	1528	312	1338	288	1313	284	1334	289	1323	286
	114.5	356	128.7	393	146.7	392	154.2	405	159.3	425	164.5	435
74	1.047	.565	1.081	.617	1.118	.631	1.158	.670	1.190	.699	1.218	.726
	1627	313	1538	313	1366	290	1368	291	1367	292	1371	292
	112.8	367	128.1	394	144.7	395	151.7	415	157.1	429	161.4	443
76	1.050	.577	1.085	.619	1.123	.636	1.168	.681	1.196	.702	1.228	.737
	1682	321	1553	314	1396	293	1411	296	1394	294	1416	296
	111.6	375	127.2	395	142.8	399	149.5	422	154.9	432	158.6	449
LOW AIR CONDITIONING △FUEL = – 0.3 %					ENGINE ANTI ICE ON △FUEL = + 2 %				TOTAL ANTI ICE ON △FUEL = + 5 %			

10F -08F0A320-232 IAE V2527--A5 12200000C5KG330 0 018590 0 0 1 1 0 0 0 0 01 .990 .000 .000 10 FCOM-N0-03-05-15-013-140

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	1.123	.629	1.148	.650	1.186	.688	1.216	.714	1.248	.744	1.293	.777
	911	239	902	237	913	241	910	240	925	239	953	240
	208.6	380	216.1	390	223.9	409	231.1	421	235.8	436	239.3	456
52	1.132	.636	1.165	.669	1.196	.694	1.230	.730	1.262	.755	1.312	.784
	941	243	950	245	941	244	956	246	967	243	989	242
	204.4	385	211.3	401	219.3	413	225.1	430	228.9	443	232.6	460
54	1.142	.645	1.179	.684	1.209	.706	1.240	.737	1.281	.771	1.328	.785
	974	246	991	251	980	248	991	249	1017	249	1019	243
	200.1	390	207.0	410	214.1	420	219.3	435	222.3	452	225.9	460
56	1.156	.663	1.191	.694	1.222	.723	1.252	.749	1.299	.781	1.346	.787
	1023	253	1025	255	1029	255	1035	253	1058	253	1058	243
	195.9	401	203.1	416	208.9	430	213.2	441	216.6	458	218.2	462
58	1.170	.677	1.199	.698	1.233	.734	1.265	.759	1.315	.785	1.366	.787
	1066	259	1050	256	1069	259	1078	257	1091	254	1096	244
	192.1	410	199.3	418	204.1	437	207.5	448	211.2	461	210.7	462
60	1.182	.689	1.211	.713	1.242	.742	1.283	.774	1.329	.786	1.387	.787
	1104	264	1097	262	1107	262	1129	262	1122	255	1134	244
	188.6	416	194.8	427	199.2	441	202.1	457	205.4	461	203.6	462
62	1.192	.696	1.223	.727	1.253	.752	1.299	.782	1.346	.787	1.409	.786
	1135	267	1144	268	1150	266	1168	265	1160	255	1175	243
	185.4	421	190.5	436	194.3	447	197.5	461	199.0	462	196.3	461
64	1.200	.700	1.233	.736	1.264	.761	1.313	.786	1.363	.787		
	1160	268	1183	272	1193	269	1200	267	1197	255		
	182.3	423	186.5	441	189.6	452	192.9	463	192.9	462		
66	1.211	.714	1.241	.743	1.281	.775	1.326	.786	1.383	.787		
	1210	275	1220	274	1245	275	1230	267	1236	255		
	178.5	432	182.5	445	185.0	461	188.3	463	186.8	462		
68	1.222	.728	1.251	.751	1.296	.782	1.342	.787	1.403	.787		
	1258	280	1263	278	1284	277	1268	267	1276	255		
	174.9	440	178.4	450	181.1	465	182.9	464	180.8	461		
70	1.231	.738	1.262	.760	1.309	.785	1.357	.787	1.422	.783		
	1300	284	1306	281	1317	279	1305	267	1313	254		
	171.5	446	174.4	456	177.3	467	177.8	464	175.0	460		
72	1.238	.742	1.275	.771	1.321	.786	1.375	.788				
	1333	286	1356	286	1346	279	1346	267				
	168.3	449	170.5	462	173.6	467	172.6	464				
74	1.247	.750	1.290	.781	1.334	.787	1.392	.787				
	1375	289	1402	290	1382	279	1384	267				
	164.8	453	167.0	468	169.2	468	167.6	464				
76	1.257	.758	1.302	.784	1.348	.788	1.410	.785				
	1419	293	1435	291	1420	280	1422	266				
	161.4	458	163.8	470	164.9	468	162.7	463				

LOW AIR CONDITIONING
△FUEL = − 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 12200000C5KG330 0 018590 0 0 1 1 0 0 0 0 01 990 000 000 10 FCOM-N0-03-05-15-014-140

LONG RANGE CRUISE - ISA+10

Applicable to: ALL 321

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
48	1.024	.434	1.037	.478	1.060	.548	1.105	.621	1.110	.607	1.125	.613
	1122	240	1091	240	1105	250	1151	268	1041	252	989	244
	125.7	282	139.7	305	155.4	343	167.1	384	179.3	373	189.1	374
52	1.028	.451	1.042	.497	1.073	.569	1.109	.610	1.122	.613	1.139	.621
	1205	249	1173	250	1183	260	1141	263	1078	254	1031	247
	121.8	293	135.2	317	150.7	356	165.4	377	174.7	376	183.5	378
56	1.032	.468	1.051	.531	1.105	.620	1.119	.613	1.135	.619	1.158	.635
	1287	259	1293	268	1315	285	1173	265	1118	257	1090	253
	118.2	304	131.1	339	147.6	388	161.7	379	170.0	380	177.4	387
60	1.037	.485	1.061	.554	1.109	.610	1.130	.618	1.151	.630	1.184	.659
	1371	268	1389	280	1308	280	1213	267	1174	262	1173	263
	114.9	315	127.4	354	146.2	382	157.8	383	164.8	387	171.3	402
64	1.041	.499	1.070	.571	1.118	.613	1.144	.627	1.173	.651	1.206	.677
	1451	277	1467	289	1341	282	1263	271	1253	271	1244	271
	111.9	325	124.3	365	143.3	384	153.6	388	159.6	400	166.0	413
68	1.049	.532	1.081	.587	1.128	.618	1.162	.642	1.196	.673	1.228	.694
	1584	295	1544	297	1381	284	1333	278	1335	280	1316	278
	109.1	346	121.4	375	140.2	387	149.1	397	154.9	413	160.7	423
72	1.056	.552	1.105	.617	1.140	.625	1.183	.663	1.214	.683	1.253	.715
	1683	306	1629	313	1431	287	1417	288	1393	285	1405	287
	106.6	359	120.9	394	136.9	392	144.9	411	150.7	420	155.2	436
76	1.064	.566	1.110	.612	1.154	.636	1.202	.679	1.236	.703	1.274	.728
	1763	314	1634	310	1494	293	1491	295	1481	294	1479	292
	104.4	368	119.6	391	133.4	399	141.1	421	145.9	432	150.0	444
80	1.072	.580	1.117	.615	1.173	.655	1.219	.690	1.258	.719	1.297	.741
	1842	322	1672	312	1579	302	1553	300	1562	301	1558	298
	102.4	377	117.5	393	130.0	410	137.5	427	141.4	442	145.0	452
84	1.102	.629	1.126	.619	1.191	.673	1.241	.709	1.277	.731	1.319	.755
	2032	350	1711	314	1662	311	1645	309	1638	306	1640	304
	100.6	409	115.4	395	126.9	422	133.5	439	137.1	449	140.4	460
88	1.107	.629	1.135	.625	1.206	.684	1.259	.722	1.298	.744	1.341	.765
	2054	350	1763	317	1726	316	1723	315	1719	312	1714	309
	99.5	409	113.2	399	124.1	428	129.8	447	132.9	457	136.1	467
92	1.107	.616	1.146	.634	1.221	.694	1.277	.732	1.318	.757	1.361	.773
	2014	342	1824	321	1794	321	1799	320	1801	318	1784	312
	99.4	400	110.9	404	121.2	435	126.1	454	129.0	465	132.1	471
96	1.112	.615	1.160	.646	1.240	.711	1.296	.744	1.338	.766	1.382	.781
	2035	342	1900	328	1887	329	1879	325	1875	322	1857	316
	98.2	400	108.5	412	118.1	446	122.6	461	125.4	471	128.2	476

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10D-08F0A321-131-IAE V2530-A5 12100000C5KG330 0 018590 0 0 1 1 0 0 00 0 01 990 000 000 10 FCOM-N0-03-05-15-015-XXX

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
48	1.143	.622	1.171	.643	1.206	.672	1.245	.701	1.287	.727	1.334	.753
	946	237	931	235	924	235	923	235	926	234	935	232
	198.7	376	207.3	386	216.0	399	223.9	413	230.3	427	236.2	442
52	1.166	.640	1.201	.671	1.237	.695	1.278	.723	1.323	.749	1.371	.769
	1011	244	1010	246	999	244	1000	243	1005	242	1008	237
	191.4	387	199.2	402	206.8	413	213.1	426	218.7	440	224.0	451
56	1.193	.667	1.227	.689	1.267	.718	1.310	.743	1.358	.765	1.408	.782
	1093	255	1077	253	1080	253	1079	251	1077	247	1079	242
	184.4	403	191.7	413	197.7	427	203.0	438	208.4	449	212.6	459
60	1.216	.681	1.256	.713	1.297	.737	1.343	.762	1.391	.780	1.445	.787
	1154	261	1162	262	1159	260	1157	258	1151	252	1146	243
	178.3	412	183.9	428	188.9	438	194.1	449	198.6	457	201.4	462
64	1.243	.705	1.282	.729	1.326	.755	1.373	.773	1.424	.785	1.485	.791
	1242	271	1238	269	1239	267	1227	262	1216	254	1221	245
	171.6	426	176.5	437	181.1	449	185.8	456	189.3	460	189.9	464
68	1.267	.721	1.309	.746	1.355	.767	1.403	.783	1.457	.788	1.536	.790
	1318	277	1318	275	1311	272	1296	265	1282	255	1315	245
	165.4	436	169.6	447	174.0	456	178.0	461	180.3	462	176.3	464
72	1.292	.737	1.336	.761	1.382	.779	1.433	.786	1.498	.790		
	1398	284	1397	282	1383	276	1361	267	1365	256		
	159.3	445	163.4	456	167.3	463	170.3	463	169.9	464		
76	1.316	.752	1.361	.771	1.409	.783	1.464	.789	1.543	.785		
	1479	290	1466	285	1447	278	1430	268	1446	254		
	153.7	455	157.6	462	160.9	466	162.6	465	159.2	460		
80	1.340	.764	1.386	.781	1.436	.787	1.503	.791				
	1555	295	1540	290	1514	279	1515	268				
	148.6	462	152.0	468	154.5	468	153.8	466				
84	1.363	.773	1.410	.784	1.465	.790						
	1625	299	1602	291	1586	280						
	143.8	467	146.7	470	148.0	469						
88	1.386	.781	1.435	.787	1.501	.791						
	1697	303	1669	292	1671	281						
	139.1	472	141.3	472	140.6	470						
92	1.408	.784	1.462	.789								
	1759	304	1741	293								
	134.7	474	136.0	473								
96	1.430	.787	1.487	.767								
	1826	305	1762	284								
	130.2	476	130.5	460								

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10D -08F0A321--131 IAE V2530-A5 12100000C5KG330 0 018590 0 0 1 1.0 .0 .00 0.01 .990 .000 .000 10 FCOM-N0-03-05--15--016-XXX

LONG RANGE CRUISE - ISA+15

Applicable to: ALL 320

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
50	1.013	.439	1.027	.478	1.054	.575	1.081	.615	1.094	.619	1.106	.619
	1047	242	1027	241	1120	263	1090	266	1022	257	958	246
	137.4	288	150.1	308	162.4	364	176.4	385	188.0	384	199.0	381
52	1.015	.447	1.031	.488	1.066	.604	1.086	.616	1.100	.621	1.113	.622
	1085	247	1070	246	1193	277	1100	266	1036	258	977	247
	134.9	293	147.0	315	160.0	382	175.1	385	186.1	386	195.9	383
54	1.018	.454	1.034	.497	1.072	.610	1.091	.618	1.104	.619	1.120	.627
	1124	251	1111	250	1218	280	1113	267	1044	257	1003	249
	132.6	298	144.0	320	158.3	386	173.7	387	184.1	384	192.5	386
56	1.020	.462	1.038	.514	1.077	.614	1.097	.622	1.109	.620	1.128	.633
	1163	256	1172	259	1237	282	1129	269	1060	257	1032	252
	130.3	303	141.1	331	157.0	389	172.1	389	181.6	385	189.0	390
58	1.022	.470	1.042	.536	1.081	.616	1.101	.622	1.115	.625	1.136	.641
	1203	260	1246	270	1248	283	1141	269	1084	259	1064	255
	128.1	308	138.4	345	156.0	389	170.4	389	178.8	388	185.4	395
60	1.025	.477	1.047	.558	1.085	.617	1.105	.620	1.122	.630	1.146	.650
	1243	264	1324	282	1259	283	1150	268	1112	261	1101	259
	126.0	313	135.8	360	155.0	390	168.7	388	175.8	391	181.8	401
62	1.027	.485	1.052	.578	1.090	.619	1.110	.622	1.129	.636	1.160	.668
	1285	268	1392	292	1274	285	1170	269	1142	264	1153	267
	123.8	318	133.8	373	153.8	392	166.4	389	172.8	395	178.4	411
64	1.030	.492	1.061	.602	1.095	.622	1.116	.627	1.138	.643	1.172	.681
	1326	272	1468	305	1290	286	1196	271	1176	267	1195	272
	121.7	323	132.1	388	152.5	394	164.0	392	169.8	399	175.3	419
66	1.032	.499	1.067	.608	1.100	.624	1.123	.632	1.148	.654	1.183	.691
	1366	276	1496	308	1304	287	1225	274	1217	272	1234	277
	119.7	327	130.9	392	151.2	394	161.4	396	166.8	406	172.4	425
68	1.036	.513	1.071	.612	1.103	.621	1.130	.639	1.161	.671	1.192	.698
	1429	284	1518	310	1311	286	1257	277	1270	279	1265	279
	117.8	337	129.9	394	149.9	393	158.9	399	163.9	416	169.8	430
70	1.039	.531	1.075	.615	1.107	.622	1.137	.645	1.172	.683	1.199	.701
	1501	294	1535	312	1328	286	1291	280	1313	285	1291	281
	116.0	348	129.1	396	148.2	394	156.3	404	161.3	424	167.2	432
72	1.043	.547	1.078	.616	1.112	.626	1.146	.655	1.181	.692	1.209	.714
	1571	303	1546	312	1354	288	1331	284	1351	289	1340	286
	114.1	359	128.4	397	146.3	396	153.8	409	158.9	429	164.0	439
74	1.047	.565	1.082	.617	1.118	.631	1.158	.671	1.190	.699	1.219	.726
	1648	314	1557	313	1382	290	1386	291	1384	292	1388	292
	112.5	371	127.7	398	144.3	399	151.3	419	156.6	434	161.0	447
76	1.050	.578	1.085	.619	1.124	.636	1.168	.681	1.197	.702	1.228	.737
	1704	321	1572	314	1413	292	1429	296	1411	293	1435	296
	111.2	379	126.9	399	142.4	402	149.1	426	154.4	436	158.1	454

LOW AIR CONDITIONING
△FUEL = – 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 12200000C5KG330 0 018590 0 0 1 1.0 .0 .0 0 01 .990 .000 .000 15 FCOM-NO-03-05-15-015-140

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	1.124	.628	1.149	.650	1.186	.687	1.217	.714	1.249	.744	1.294	.777
	923	239	913	237	925	241	924	240	938	240	966	240
	208.0	384	215.5	394	223.3	413	230.3	426	235.0	441	238.5	461
52	1.133	.636	1.165	.669	1.197	.693	1.231	.729	1.262	.755	1.313	.784
	953	242	962	245	952	243	969	246	982	244	1003	242
	203.8	388	210.7	405	218.8	417	224.3	435	228.0	448	231.8	465
54	1.142	.644	1.179	.683	1.209	.706	1.241	.737	1.282	.771	1.329	.785
	986	246	1003	251	993	248	1005	248	1031	249	1034	243
	199.5	394	206.4	414	213.5	424	218.6	439	221.6	457	225.0	466
56	1.157	.663	1.191	.694	1.222	.723	1.253	.748	1.299	.781	1.348	.787
	1036	253	1038	255	1042	255	1049	253	1073	253	1073	243
	195.3	405	202.5	420	208.3	434	212.5	446	215.9	463	217.3	467
58	1.171	.678	1.200	.697	1.233	.733	1.265	.759	1.316	.785	1.367	.787
	1080	259	1063	256	1083	259	1094	257	1106	254	1112	244
	191.6	414	198.7	422	203.5	441	206.8	452	210.5	466	210.0	467
60	1.183	.689	1.212	.713	1.243	.742	1.284	.774	1.330	.785	1.385	.785
	1119	264	1112	262	1123	262	1145	262	1138	254	1145	243
	188.1	421	194.1	432	198.5	446	201.5	461	204.7	466	203.4	466
62	1.193	.696	1.224	.727	1.253	.751	1.300	.782	1.347	.787		
	1150	267	1160	268	1166	265	1184	265	1177	255		
	184.9	425	189.9	441	193.6	451	196.8	466	198.3	467		
64	1.201	.700	1.233	.736	1.265	.761	1.314	.786	1.364	.787		
	1177	269	1199	271	1210	269	1217	267	1215	255		
	181.7	428	185.9	446	188.9	457	192.3	468	192.2	467		
66	1.212	.714	1.242	.743	1.282	.775	1.327	.786	1.384	.787		
	1226	275	1237	274	1263	275	1248	267	1254	255		
	177.9	436	181.9	450	184.4	466	187.6	468	186.1	467		
68	1.222	.727	1.251	.751	1.296	.782	1.343	.787	1.394	.770		
	1274	280	1279	277	1302	277	1286	267	1255	249		
	174.4	444	177.8	455	180.5	470	182.3	469	181.9	456		
70	1.232	.737	1.262	.760	1.310	.785	1.358	.787				
	1316	284	1324	281	1335	279	1324	267				
	171.0	450	173.8	460	176.7	472	177.1	469				
72	1.239	.742	1.276	.771	1.322	.786	1.375	.788				
	1350	286	1375	286	1364	279	1364	267				
	167.7	453	170.0	467	173.0	472	172.0	469				
74	1.248	.750	1.290	.781	1.335	.787	1.383	.768				
	1394	289	1421	290	1401	279	1358	260				
	164.2	458	166.5	473	168.6	473	168.6	458				
76	1.257	.757	1.303	.784	1.349	.788						
	1438	292	1455	291	1440	280						
	160.9	463	163.3	475	164.3	473						

LOW AIR CONDITIONING
△FUEL = − 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 12200000C5KG330 0 018590 0 0 1 1 0 0 0 0 01 990 000 000 15 FCOM-N0-03-05-15-016-140

LONG RANGE CRUISE - ISA+15

Applicable to: ALL 321

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
48	1.024	.434	1.037	.477	1.061	.547	1.105	.620	1.111	.608	1.125	.613
	1136	240	1104	240	1117	250	1164	268	1055	252	1001	244
	125.4	285	139.3	308	154.9	346	166.7	388	178.8	377	188.6	378
52	1.028	.451	1.042	.497	1.073	.568	1.109	.609	1.122	.613	1.140	.621
	1219	249	1187	250	1196	260	1154	263	1091	254	1044	247
	121.4	296	134.8	320	150.3	359	165.0	381	174.2	380	183.0	382
56	1.033	.468	1.051	.531	1.105	.619	1.119	.612	1.135	.619	1.159	.635
	1301	259	1308	268	1330	285	1187	265	1132	256	1105	253
	117.9	307	130.7	342	147.3	392	161.3	383	169.5	384	176.9	391
60	1.037	.485	1.061	.554	1.109	.610	1.131	.618	1.152	.630	1.185	.659
	1387	268	1404	280	1322	280	1228	267	1189	261	1188	263
	114.6	318	127.1	357	145.9	386	157.3	386	164.4	391	170.8	406
64	1.042	.499	1.071	.571	1.118	.613	1.145	.626	1.174	.650	1.207	.677
	1468	277	1485	289	1357	282	1279	271	1268	270	1259	270
	111.6	328	124.0	368	142.9	388	153.1	392	159.1	404	165.5	417
68	1.049	.531	1.082	.587	1.128	.618	1.163	.642	1.197	.673	1.229	.693
	1601	294	1563	297	1398	284	1350	278	1352	280	1332	278
	108.8	348	121.0	378	139.8	391	148.7	401	154.4	417	160.2	427
72	1.057	.552	1.105	.615	1.140	.625	1.184	.663	1.214	.683	1.254	.715
	1702	306	1643	312	1448	287	1435	288	1410	285	1422	287
	106.3	362	120.7	397	136.5	395	144.5	415	150.2	424	154.7	440
76	1.064	.566	1.110	.611	1.155	.636	1.203	.679	1.237	.704	1.275	.728
	1783	314	1652	310	1512	293	1509	295	1501	294	1498	292
	104.1	371	119.3	394	133.1	402	140.7	425	145.5	437	149.5	448
80	1.073	.580	1.118	.615	1.173	.655	1.220	.689	1.258	.719	1.297	.741
	1863	322	1691	312	1598	302	1572	300	1582	301	1579	298
	102.1	380	117.2	396	129.6	414	137.1	431	141.0	446	144.5	456
84	1.102	.629	1.126	.619	1.192	.673	1.241	.709	1.278	.731	1.320	.755
	2056	350	1731	313	1683	311	1665	309	1659	306	1661	304
	100.4	413	115.1	399	126.5	426	133.1	443	136.7	453	140.0	465
88	1.107	.629	1.136	.625	1.207	.683	1.260	.722	1.298	.743	1.342	.765
	2078	350	1784	317	1747	316	1745	315	1740	312	1736	309
	99.3	413	112.9	403	123.7	432	129.4	451	132.5	461	135.7	471
92	1.107	.614	1.147	.633	1.222	.694	1.278	.733	1.319	.756	1.362	.773
	2030	341	1845	321	1816	321	1822	320	1824	318	1807	312
	99.2	403	110.6	408	120.9	439	125.7	458	128.6	469	131.7	476
96	1.113	.615	1.161	.646	1.241	.711	1.297	.744	1.339	.766	1.383	.781
	2059	342	1924	328	1910	329	1904	325	1899	322	1882	316
	97.9	403	108.2	416	117.7	450	122.2	465	125.1	475	127.8	481

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10D -08F0A321-131-IAE V2530-A5 12100000C5KG330 0 018590 0 0 1 1.0 .0 .00 0 01 .990 .000 .000 15 FCOM-N0 03-05-15-017-XXX

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
48	1.143	.621	1.172	.643	1.207	.671	1.246	.701	1.288	.727	1.335	.753
	958	237	943	235	936	235	936	235	939	234	948	232
	198.1	380	206.7	390	215.4	403	223.2	418	229.6	431	235.4	446
52	1.166	.640	1.202	.670	1.237	.695	1.278	.723	1.324	.749	1.372	.769
	1024	244	1022	245	1012	244	1014	243	1020	242	1022	237
	190.8	391	198.7	406	206.2	417	212.4	431	217.9	444	223.2	456
56	1.194	.667	1.227	.688	1.268	.717	1.311	.743	1.359	.766	1.409	.782
	1107	255	1091	252	1094	253	1094	251	1093	247	1094	242
	183.9	407	191.1	417	197.0	431	202.3	443	207.6	454	211.8	464
60	1.216	.681	1.257	.713	1.298	.736	1.343	.761	1.393	.780	1.446	.787
	1170	261	1178	262	1175	260	1173	257	1168	252	1163	243
	177.8	416	183.3	432	188.3	442	193.4	454	197.9	462	200.6	467
64	1.244	.705	1.283	.729	1.327	.755	1.374	.773	1.425	.785	1.486	.791
	1258	271	1256	269	1256	267	1244	262	1233	254	1239	245
	171.1	431	175.9	442	180.5	453	185.2	461	188.6	465	189.1	469
68	1.268	.721	1.310	.746	1.356	.767	1.404	.782	1.458	.788		
	1335	277	1336	275	1329	272	1314	265	1300	255		
	164.9	440	169.1	452	173.5	461	177.4	466	179.6	467		
72	1.292	.736	1.337	.761	1.383	.779	1.434	.786	1.499	.790		
	1416	284	1415	281	1403	276	1381	267	1385	256		
	158.8	450	162.9	461	166.7	468	169.6	468	169.3	469		
76	1.317	.752	1.362	.770	1.410	.783	1.465	.789				
	1499	290	1486	285	1468	278	1451	268				
	153.2	459	157.1	467	160.4	471	162.0	470				
80	1.341	.764	1.387	.781	1.437	.787	1.497	.778				
	1575	295	1561	289	1535	279	1499	264				
	148.1	467	151.5	473	154.0	473	154.6	463				
84	1.364	.773	1.411	.784	1.466	.790						
	1647	299	1624	291	1608	280						
	143.3	472	146.2	475	147.5	474						
88	1.387	.781	1.436	.787								
	1720	303	1693	292								
	138.7	477	140.8	477								
92	1.409	.784	1.456	.763								
	1784	304	1697	282								
	134.3	479	136.2	462								
96	1.424	.778										
	1814	301										
	131.1	475										

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10D -08F0A321--131 IAE V2530-A5 12100000C5KG330 0 018590 0 0 1 1.0 .0 .00 0 01 .990 .000 .000 15 FCOM-N0--03--05--15--018--XXX

LONG RANGE CRUISE - ISA+20

Applicable to: ALL 320

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
50	1.013	.438	1.028	.478	1.055	.576	1.082	.615	1.095	.619	1.107	.619
	1059	242	1038	240	1135	264	1104	266	1034	257	971	246
	137.0	290	149.7	311	161.9	368	175.9	388	187.5	388	198.4	385
52	1.016	.446	1.031	.488	1.067	.604	1.086	.616	1.100	.621	1.113	.622
	1098	247	1083	245	1209	277	1114	266	1049	258	989	247
	134.6	295	146.5	317	159.5	386	174.7	389	185.6	389	195.4	387
54	1.018	.454	1.034	.496	1.073	.610	1.091	.618	1.104	.619	1.120	.627
	1137	251	1124	250	1234	280	1126	267	1057	257	1015	249
	132.2	301	143.6	323	157.9	390	173.3	390	183.6	388	192.0	390
56	1.020	.462	1.038	.514	1.078	.614	1.097	.622	1.109	.620	1.128	.633
	1176	255	1187	259	1253	282	1143	269	1073	257	1044	252
	129.9	306	140.7	334	156.6	392	171.6	392	181.1	389	188.5	394
58	1.022	.470	1.043	.536	1.082	.616	1.101	.621	1.116	.624	1.137	.641
	1216	260	1262	270	1263	283	1153	269	1098	259	1077	255
	127.7	311	138.0	348	155.6	393	170.0	392	178.3	391	184.9	398
60	1.025	.477	1.048	.558	1.086	.617	1.105	.620	1.123	.630	1.147	.651
	1257	264	1341	282	1274	283	1164	268	1125	261	1116	259
	125.6	316	135.4	363	154.6	394	168.2	392	175.3	395	181.3	405
62	1.027	.485	1.053	.578	1.090	.619	1.111	.622	1.130	.636	1.161	.668
	1299	268	1410	292	1289	284	1184	269	1156	264	1168	267
	123.4	321	133.4	376	153.4	395	165.9	393	172.4	399	177.9	416
64	1.030	.492	1.062	.602	1.096	.622	1.117	.627	1.138	.643	1.173	.681
	1341	272	1487	305	1305	286	1210	271	1190	267	1211	272
	121.4	325	131.7	392	152.1	397	163.5	396	169.3	403	174.8	423
66	1.033	.499	1.067	.608	1.100	.623	1.123	.632	1.148	.654	1.184	.691
	1382	276	1515	308	1319	286	1239	274	1232	272	1249	276
	119.4	330	130.5	395	150.8	398	161.0	399	166.3	410	172.0	429
68	1.036	.513	1.072	.612	1.103	.621	1.130	.638	1.161	.670	1.193	.697
	1446	284	1537	310	1326	285	1272	276	1285	279	1280	279
	117.4	340	129.6	398	149.5	396	158.4	403	163.4	420	169.3	434
70	1.040	.531	1.076	.615	1.108	.622	1.138	.645	1.172	.682	1.200	.700
	1519	294	1553	312	1344	286	1306	279	1329	285	1305	280
	115.6	351	128.7	400	147.8	397	155.9	407	160.9	427	166.7	435
72	1.043	.547	1.079	.616	1.113	.626	1.147	.655	1.182	.692	1.210	.713
	1590	303	1564	312	1370	288	1348	284	1368	289	1357	286
	113.8	362	128.1	401	145.9	400	153.4	414	158.4	433	163.5	444
74	1.047	.565	1.082	.617	1.118	.630	1.159	.671	1.191	.699	1.220	.725
	1668	314	1575	313	1398	290	1403	291	1402	292	1405	291
	112.1	374	127.4	401	143.9	403	150.9	423	156.2	438	160.5	451
76	1.050	.578	1.086	.619	1.124	.635	1.169	.681	1.197	.701	1.229	.736
	1725	321	1590	314	1429	292	1447	296	1427	293	1453	296
	110.9	383	126.6	402	142.0	406	148.7	430	154.0	440	157.6	458

LOW AIR CONDITIONING
△FUEL = – 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 12200000C5KG330 0 018590 0 0 1 1.0 .0 .0 0 01 .990 .000 .000 15 FCOM-NO-03-05-15-017-140

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	1.124	.628	1.150	.650	1.187	.687	1.218	.714	1.250	.743	1.295	.776
	934	239	926	237	937	241	937	240	952	239	979	240
	207.4	388	214.8	398	222.6	417	229.6	430	234.1	446	237.7	465
52	1.133	.635	1.166	.669	1.197	.693	1.231	.729	1.263	.755	1.314	.784
	965	242	974	245	964	243	982	246	996	243	1017	242
	203.2	392	210.2	409	218.1	421	223.6	439	227.2	452	231.0	470
54	1.143	.644	1.180	.683	1.210	.706	1.242	.737	1.283	.771	1.330	.785
	999	246	1016	250	1006	248	1020	249	1047	249	1049	243
	198.9	397	205.8	418	212.9	428	217.8	444	220.8	462	224.2	470
56	1.158	.662	1.192	.693	1.223	.722	1.253	.748	1.300	.781	1.348	.787
	1049	253	1050	254	1056	254	1064	253	1088	253	1089	243
	194.8	409	201.9	424	207.7	439	211.8	451	215.2	468	216.5	471
58	1.171	.677	1.200	.697	1.234	.733	1.266	.759	1.316	.785		
	1094	259	1076	256	1096	258	1109	257	1122	254		
	191.0	418	198.1	427	202.8	445	206.1	457	209.8	471		
60	1.184	.689	1.213	.712	1.244	.741	1.285	.774	1.331	.786		
	1133	264	1126	262	1138	262	1160	262	1154	254		
	187.6	425	193.6	436	197.8	450	200.8	466	204.0	471		
62	1.193	.696	1.224	.727	1.254	.751	1.300	.782	1.348	.787		
	1165	267	1175	268	1182	265	1200	265	1194	255		
	184.4	429	189.3	445	192.9	456	196.2	471	197.6	472		
64	1.202	.701	1.234	.736	1.266	.761	1.315	.785				
	1193	269	1215	271	1227	269	1234	266				
	181.1	432	185.3	450	188.2	462	191.6	473				
66	1.213	.715	1.243	.743	1.283	.775	1.328	.786				
	1243	275	1254	274	1280	275	1265	266				
	177.4	441	181.3	455	183.8	470	186.9	473				
68	1.223	.727	1.252	.751	1.297	.782	1.342	.785				
	1291	280	1297	278	1320	278	1299	266				
	173.8	449	177.2	460	179.9	475	182.0	473				
70	1.232	.736	1.263	.760	1.311	.785						
	1332	284	1342	281	1354	279						
	170.5	454	173.3	465	176.1	477						
72	1.240	.741	1.277	.772	1.320	.783						
	1368	286	1394	286	1374	278						
	167.2	457	169.4	472	173.1	476						
74	1.248	.749	1.291	.781								
	1412	289	1439	290								
	163.7	462	166.0	478								
76	1.258	.757	1.299	.780								
	1457	292	1456	289								
	160.3	467	163.9	477								

LOW AIR CONDITIONING
△FUEL = − 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10F -08F0A320-232 IAE V2527-A5 12200000C5KG330 0 018590 0 0 1 1 0 0 0 0 01 990 000 000 20 FCOM-N0-03-05-15-020-140

LONG RANGE CRUISE - ISA+20

Applicable to: ALL 321

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
48	1.024	.434	1.037	.477	1.061	.547	1.105	.619	1.111	.607	1.126	.613
	1148	240	1116	240	1130	250	1174	267	1067	252	1014	244
	125.0	287	139.0	310	154.5	349	166.4	391	178.3	381	188.0	381
52	1.028	.451	1.043	.496	1.073	.568	1.109	.608	1.123	.613	1.141	.620
	1233	249	1200	250	1209	260	1167	263	1106	254	1057	247
	121.1	299	134.4	323	149.9	362	164.6	384	173.7	384	182.4	386
56	1.033	.468	1.051	.531	1.105	.618	1.120	.612	1.136	.618	1.160	.635
	1316	259	1323	268	1341	284	1201	264	1146	256	1119	253
	117.6	309	130.4	345	147.1	394	160.8	386	169.1	388	176.4	395
60	1.037	.484	1.061	.553	1.109	.609	1.131	.618	1.152	.630	1.185	.660
	1402	268	1419	279	1337	280	1243	267	1204	261	1204	263
	114.3	320	126.7	360	145.5	389	156.9	390	163.9	395	170.4	410
64	1.042	.499	1.071	.571	1.119	.613	1.145	.626	1.174	.650	1.207	.676
	1485	277	1501	288	1374	282	1294	271	1284	270	1274	270
	111.3	330	123.6	371	142.5	392	152.7	395	158.7	407	165.1	421
68	1.049	.531	1.082	.587	1.129	.618	1.163	.642	1.197	.672	1.229	.693
	1619	294	1581	297	1415	284	1366	278	1368	280	1349	277
	108.5	351	120.7	382	139.4	395	148.3	405	154.0	421	159.8	431
72	1.057	.551	1.105	.614	1.141	.625	1.185	.663	1.215	.682	1.254	.714
	1721	306	1659	311	1465	287	1453	288	1427	285	1439	286
	106.0	365	120.4	399	136.2	399	144.1	419	149.8	428	154.3	444
76	1.065	.566	1.110	.611	1.155	.636	1.204	.679	1.238	.704	1.276	.727
	1804	314	1670	310	1530	293	1527	295	1520	294	1517	292
	103.8	375	119.0	397	132.7	406	140.3	429	145.1	441	149.1	452
80	1.073	.580	1.118	.615	1.174	.655	1.221	.689	1.259	.719	1.298	.741
	1885	322	1711	312	1617	302	1592	300	1602	301	1599	298
	101.8	384	116.9	400	129.3	418	136.7	435	140.6	450	144.1	461
84	1.103	.629	1.127	.619	1.192	.673	1.242	.708	1.279	.731	1.321	.755
	2080	350	1753	314	1703	311	1685	309	1680	306	1683	304
	100.1	416	114.8	402	126.2	430	132.7	447	136.3	458	139.5	470
88	1.108	.629	1.136	.625	1.207	.683	1.261	.721	1.299	.743	1.343	.765
	2103	350	1805	317	1768	316	1765	315	1762	312	1759	309
	99.0	416	112.6	406	123.4	436	129.0	455	132.1	466	135.3	476
92	1.107	.613	1.147	.633	1.223	.694	1.279	.732	1.320	.756	1.363	.773
	2050	341	1866	321	1839	321	1844	320	1847	318	1831	312
	99.0	406	110.3	412	120.5	443	125.3	462	128.3	474	131.3	481
96	1.113	.615	1.161	.646	1.242	.711	1.297	.744	1.340	.765	1.374	.756
	2082	342	1947	328	1933	329	1927	325	1923	322	1827	305
	97.7	407	107.9	420	117.4	454	121.8	470	124.7	480	128.6	470

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

10D -08F0A321--131-IAE V2530-A5 12100000C5KG330 0 018590 0 0 1 1 0 0 00 0 01 990 000 000 20 FCOM-N0 03-05-15-019-XXX

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H/ENG
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
48	1.144 970 197.6	.621 236 383	1.173 955 206.1	.643 235 394	1.208 949 214.8	.671 235 408	1.247 949 222.5	.701 235 422	1.289 952 228.8	.726 233 435	1.336 961 234.6	.752 232 451
52	1.167 1037 190.3	.640 244 395	1.202 1035 198.1	.670 245 410	1.238 1026 205.5	.695 244 422	1.279 1028 211.7	.723 243 435	1.325 1034 217.2	.749 241 449	1.373 1036 222.4	.769 237 461
56	1.195 1121 183.4	.666 255 411	1.228 1105 190.5	.688 252 421	1.268 1108 196.4	.717 252 435	1.312 1109 201.7	.743 251 447	1.360 1109 206.9	.765 247 459	1.410 1110 211.1	.782 242 468
60	1.217 1185 177.3	.681 261 420	1.257 1192 182.8	.712 262 436	1.298 1190 187.7	.736 260 447	1.344 1188 192.8	.761 257 458	1.394 1185 197.2	.780 252 467	1.447 1179 199.9	.787 243 472
64	1.245 1275 170.6	.705 271 435	1.284 1272 175.4	.729 269 446	1.328 1272 180.0	.754 267 458	1.375 1261 184.5	.773 262 465	1.426 1251 188.0	.785 254 470		
68	1.269 1353 164.4	.721 277 445	1.311 1355 168.5	.746 275 457	1.356 1347 172.9	.767 272 466	1.405 1333 176.8	.782 265 471	1.459 1319 178.9	.788 255 472		
72	1.293 1434 158.3	.736 284 454	1.337 1435 162.3	.761 282 466	1.384 1423 166.2	.779 276 473	1.435 1400 169.0	.786 267 473				
76	1.318 1518 152.8	.752 290 464	1.362 1505 156.6	.770 285 471	1.411 1488 159.8	.783 278 476	1.462 1452 162.5	.784 266 472				
80	1.342 1596 147.7	.764 295 471	1.388 1582 151.0	.781 289 478	1.438 1557 153.4	.787 279 478						
84	1.365 1668 142.9	.773 299 477	1.412 1647 145.7	.784 291 480								
88	1.388 1743 138.2	.781 303 482	1.428 1630 141.3	.752 278 460								
92	1.400 1730 135.1	.758 293 468										
96												

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.6 %	△FUEL = + 2 %	△FUEL = + 5 %

10D -08F0A321--131 IAE V2530-A5 12100000C5KG330 0 018590 0 0 1 1.0 .0 .00 0 01 .990 .000 .000 20 FCOM-N0--03--05--15--020--XXX

GENERAL

Applicable to: ALL 320

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and the time required to cover a given air distance from any moment in cruise to land.

These tables are established for:

- Cruise Mach number: M 0.78/LR
- Descent profile: M 0.78/300 kt/250 kt
- Approach and landing: 120 kg or 270 lb -6 min IMC
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

Note:
1. *In the tables, the asterisk "*" means that a step climb of 4 000 ft has been made to reach the corresponding flight level.*
2. *The flight level shown on the top of each column is the final flight level.*
3. *For each degree celsius above ISA apply a fuel correction of*
   0.005 (kg/°C/NM) x ΔISA (°C) x Air Distance (NM)
   or 0.011 (lb/°C/NM) x ΔISA (°C) x Air Distance (NM)

GENERAL

Applicable to: ALL 321

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and the time required to cover a given air distance from any moment in cruise to land.

These tables are established for:
- Cruise Mach number: M 0.78/LR
- Descent profile: M 0.78/300 kt/250 kt
- Approach and landing: 140 kg or 310 lb -6 min IMC
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

Note: *1. In the tables, the asterisk "*" means that a step climb of 4 000 ft has been made to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree celsius above ISA apply a fuel correction of
0.005 (kg/°C/NM) x ΔISA (°C) x Air Distance (NM)
or 0.011 (lb/°C/NM) x ΔISA (°C) x Air Distance (NM)

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

Applicable to: ALL

The in cruise quick check tables are based on a reference initial weight.
The fuel consumption must be corrected when the actual weight is different from the reference initial weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1 000 kg or 1 000 lb below (or above) the reference weight.

Intentionally left blank

EXAMPLE

Applicable to: ALL 320

In-cruise quick check with cruise at M .78
FL 370

Actual cruise weight : 55 000 kg

Remaining ground distance : 800 nm
ISA +10

Average wind during flight : -40 kt (head wind)

- Evaluation of air distance to be covered
  - Using the "Ground Distance/Air Distance" conversion table (*Refer to PER-OPD-CON-AEO M.78*), the corresponding air distance is : 880 nm
- Determination of the fuel consumption and time for the reference initial weight in cruise.
  - Enter table (*Refer to PER-CRZ-ICQ-40 IN CRUISE QUICK CHECK M.78*) with an air distance of 880 nm and FL 370 for ISA.
    Fuel consumption : 3 941 kg
    Time needed : 2 h 08 min
- Correction due to real in cruise weight of 55 000 kg
  - Δfuel consumption : -50 kg per 1 000 kg below reference
  - Δfuel : -50 ×(60 - 55) = - 250 kg
- Temperature correction :
  - Δfuel consumption : +0.005 kg per 1 °above ISA and per 1 nm Air distance
  - Δfuel : +0.005 ×10 ×880 = 44 kg

RESULT

Fuel : 3 941 - 250 + 44 = 3 735 kg

Time : 2 h 08 min

EXAMPLE

Applicable to: ALL 321

In-cruise quick check with cruise at M .78
FL 370

Actual cruise weight : 60 000 kg

Remaining ground distance : 800 nm
ISA +10

Average wind during flight : -40 kt (head wind)

- Evaluation of air distance to be covered
  - Using the "Ground Distance/Air Distance" conversion table (*Refer to PER-OPD-CON-AEO M.78*), the corresponding air distance is : 880 nm
- Determination of the fuel consumption and time for the reference initial weight in cruise.
  - Enter table (*Refer to PER-CRZ-ICQ-40 IN CRUISE QUICK CHECK M.78*) with an air distance of 880 nm and FL 370 for ISA.
    Fuel consumption : 4 344 kg
    Time needed : 2 h 07 min
- Correction due to real in cruise weight of 60 000 kg
  - Δfuel consumption : -50 kg per 1 000 kg below reference
  - Δfuel : -50 ×(65 - 60) = - 250 kg
- Temperature correction :
  - Δfuel consumption : +0.005 kg per 1 °above ISA and per 1 nm Air distance
  - Δfuel : +0.005 ×10 ×880 = 44 kg

RESULT

Fuel : 4 344 - 250 + 44 = 4 138 kg

Time : 2 h 07 min

IN CRUISE QUICK CHECK M.78

Applicable to: ALL 320

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
100	364 0.23	340 0.23	319 0.23	299 0.23			0	0	
125	506 0.26	475 0.26	448 0.26	422 0.26	398 0.26	377 0.26	0	0	0
150	649 0.29	610 0.29	577 0.30	546 0.30	518 0.30	498 0.30	0	0	0
175	791 0.33	745 0.33	705 0.33	669 0.33	638 0.33	619 0.33	0	0	1
200	933 0.36	879 0.36	834 0.36	792 0.36	757 0.36	739 0.36	1	1	3
225	1075 0.39	1014 0.39	962 0.39	916 0.40	876 0.40	859 0.40	2	2	5
250	1218 0.42	1148 0.43	1091 0.43	1039 0.43	995 0.43	979 0.43	1	3	7
275	1360 0.46	1282 0.46	1219 0.46	1162 0.46	1114 0.46	1098 0.46	1	4	8
300	1502 0.49	1416 0.49	1347 0.49	1284 0.50	1232 0.50	1217 0.50	2	5	10
325	1644 0.52	1550 0.52	1475 0.53	1407 0.53	1351 0.53	1336 0.53	3	6	12
350	1785 0.55	1684 0.56	1603 0.56	1529 0.56	1469 0.56	1455 0.56	3	7	16
375	1927 0.59	1818 0.59	1730 0.59	1652 1.00	1587 1.00	1573 1.00	4	8	18
400	2069 1.02	1951 1.02	1858 1.03	1774 1.03	1704 1.03	1692 1.03	5	9	20
425	2211 1.05	2085 1.05	1985 1.06	1896 1.06	1822 1.06	1809 1.06	5	10	21
450	2353 1.08	2218 1.09	2112 1.09	2018 1.10	1940 1.10	1927 1.10	6	11	23
475	2494 1.12	2351 1.12	2240 1.12	2140 1.13	2057 1.13	2045 1.13	6	12	25
500	2636 1.15	2485 1.15	2367 1.16	2262 1.16	2174 1.16	2162 1.16	7	13	26
525	2777 1.18	2618 1.19	2493 1.19	2384 1.20	2292 1.20	2279 1.20	7	14	28
550	2919 1.21	2751 1.22	2620 1.22	2505 1.23	2409 1.23	2396 1.23	8	15	30
575	3060 1.24	2883 1.25	2747 1.26	2627 1.26	2526 1.27	2512 1.27	9	16	31
600	3202 1.28	3016 1.28	2873 1.29	2748 1.30	2642 1.30	2628 1.30	9	17	33
625	3343 1.31	3149 1.32	3000 1.32	2869 1.33	2759 1.33	2744 1.33	10	18	35
650	3484 1.34	3281 1.35	3126 1.36	2990 1.36	2876 1.37	2860 1.37	10	19	36
675	3625 1.37	3413 1.38	3252 1.39	3111 1.40	2992 1.40	2976 1.40	11	20	38
700	3767 1.41	3546 1.41	3378 1.42	3232 1.43	3108 1.43	3091 1.43	11	20	39
725	3908 1.44	3678 1.45	3504 1.45	3353 1.46	3224 1.47	3206 1.47	12	21	41

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
ΔFUEL = – 0.4 %	ΔFUEL = + 3 %	ΔFUEL = + 5.5 %

FLIP23C A320-232 IAE V2527-A5 3610 03301.000011 0250300 .7800 .000200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-003-140

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
725	3908 1.44	3678 1.45	3504 1.45	3353 1.46	3224 1.47	3206 1.47	12	21	41
750	4049 1.47	3810 1.48	3630 1.49	3473 1.50	3340 1.50	3321 1.50	12	22	42
775	4190 1.50	3942 1.51	3756 1.52	3594 1.53	3456 1.53	3436 1.53	13	23	44
800	4331 1.54	4074 1.55	3881 1.55	3714 1.56	3572 1.57	3550 1.57	13	24	45
825	4472 1.57	4205 1.58	4007 1.59	3834 2.00	3687 2.00	3664 2.00	14	25	47
850	4612 2.00	4337 2.01	4132 2.02	3955 2.03	3803 2.03	3778 2.03	14	26	48
875	4753 2.03	4468 2.04	4257 2.05	4075 2.06	3918 2.07	3892 2.07	14	27	50
900	4894 2.07	4600 2.08	4382 2.09	4194 2.10	4033 2.10	4006 2.10	15	28	51
925	5035 2.10	4731 2.11	4507 2.12	4314 2.13	4148 2.13	4119 2.13	15	29	53
950	5175 2.13	4862 2.14	4632 2.15	4434 2.16	4263 2.17	4232 2.17	16	30	54
975	5316 2.16	4993 2.17	4757 2.18	4553 2.20	4377 2.20	4345 2.20	16	31	55
1000	5456 2.20	5124 2.21	4881 2.22	4673 2.23	4492 2.23	4458 2.23	17	32	57
1025	5597 2.23	5255 2.24	5006 2.25	4792 2.26	4606 2.27	4570 2.27	17	33	58
1050	5737 2.26	5386 2.27	5130 2.28	4911 2.30	4721 2.30	4682 2.30	18	33	59
1075	5878 2.29	5516 2.31	5254 2.32	5031 2.33	4835 2.34	4795 2.34	18	34	61
1100	6018 2.33	5647 2.34	5378 2.35	5150 2.36	4949 2.37	4906 2.37	18	35	62
1125	6158 2.36	5777 2.37	5502 2.38	5268 2.40	5063 2.40	5018 2.40	19	36	63
1150	6298 2.39	5907 2.40	5626 2.42	5387 2.43	5176 2.44	5129 2.44	19	37	65
1175	6438 2.42	6038 2.44	5750 2.45	5506 2.46	5290 2.47	5241 2.47	19	38	66
1200	6579 2.46	6168 2.47	5874 2.48	5624 2.50	5403 2.50	5352 2.50	20	39	67
1225	6719 2.49	6298 2.50	5997 2.51	5743 2.53	5517 2.54	5462 2.54	20	40	69
1250	6859 2.52	6427 2.53	6121 2.55	5861 2.56	5630 2.57	5573 2.57	21	41	70
1275	6999 2.55	6557 2.57	6244 2.58	5979 3.00	5743 3.00	5683 3.00	21	42	71
1300	7139 2.59	6687 3.00	6367 3.01	6097 3.03	5856 3.04	5794 3.04	21	42	72
1325	7279 3.02	6816 3.03	6490 3.05	6215 3.06	5969 3.07	5904 3.07	22	43	74
1350	7419 3.05	6946 3.07	6613 3.08	6333 3.10	6081 3.10	6013 3.10	22	44	75

LOW AIR CONDITIONING
△FUEL = – 0.4 %

ENGINE ANTI ICE ON
△FUEL = + 3 %

TOTAL ANTI ICE ON
△FUEL = + 5.5 %

FLIP23C A320-232 IAE V2527-A5 3610 03301.000011 0250300 .7800 .000200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0–03–05–20–004–140

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1350	7419 3.05	6946 3.07	6613 3.08	6333 3.10	6081 3.10	6013 3.10	22	44	75
1375	7559 3.08	7076 3.10	6736 3.11	6451 3.13	6194 3.14	6123 3.14	23	45	76
1400	7699 3.12	7206 3.13	6859 3.15	6569 3.16	6306 3.17	6232 3.17	23	46	77
1425	7839 3.15	7336 3.16	6982 3.18	6686 3.20	6418 3.20	6342 3.20	23	47	79
1450	7979 3.18	7466 3.20	7104 3.21	6804 3.23	6531 3.24	6451 3.24	24	48	80
1475	8118 3.21	7596 3.23	7227 3.25	6921 3.26	6643 3.27	6559 3.27	24	49	81
1500	8258 3.25	7726 3.26	7349 3.28	7038 3.30	6755 3.30	6668 3.30	24	49	82
1525	8398 3.28	7856 3.29	7472 3.31	7155 3.33	6866 3.34	6776 3.34	25	50	83
1550	8538 3.31	7986 3.33	7594 3.34	7271 3.36	6978 3.37	6885 3.37	25	51	84
1575	8677 3.34	8115 3.36	7716 3.38	7388 3.39	7090 3.40	6993 3.40	25	52	86
1600	8817 3.37	8245 3.39	7838 3.41	7505 3.43	7202 3.44	7101 3.44	26	53	87
1625	8956 3.41	8374 3.42	7960 3.44	7621 3.46	7314 3.47	7208 3.47	26	54	88
1650	9096 3.44	8504 3.46	8082 3.48	7737 3.49	7425 3.51	7316 3.51	26	54	89
1675	9235 3.47	8633 3.49	8204 3.51	7853 3.53	7537 3.54	7423 3.54	26	55	90
1700	9375 3.50	8762 3.52	8326 3.54	7969 3.56	7649 3.57	7530 3.57	27	56	91
1725	9514 3.54	8892 3.56	8447 3.58	8085 3.59	7760 4.01	7637 4.01	27	57	92
1750	9653 3.57	9021 3.59	8569 4.01	8201 4.03	7871 4.04	7744 4.04	27	58	93
1775	9793 4.00	9150 4.02	8690 4.04	8317 4.06	7982 4.07	7851 4.07	28	58	94
1800	9932 4.03	9279 4.05	8812 4.07	8432 4.09	8093 4.11	7957 4.11	28	59	95
1825	10071 4.07	9408 4.09	8933 4.11	8548 4.13	8204 4.14	8064 4.14	28	60	96
1850	10210 4.10	9536 4.12	9054 4.14	8663 4.16	8315 4.17	8170 4.17	28	61	97
1875	10349 4.13	9665 4.15	9175 4.17	8778 4.19	8426 4.21	8276 4.21	29	62	98
1900	10489 4.16	9794 4.18	9296 4.21	8894 4.23	8536 4.24	8381 4.24	29	62	99
1925	10628 4.20	9922 4.22	9416 4.24	9009 4.26	8647 4.27	8487 4.27	29	63	100
1950	10767 4.23	10051 4.25	9537 4.27	9123 4.29	8757 4.31	8592 4.31	29	64	101
1975	10905 4.26	10179 4.28	9658 4.31	9238 4.33	8867 4.34	8697 4.34	29	65	102

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
ΔFUEL = – 0.4 %	ΔFUEL = + 3 %	ΔFUEL = + 5.5 %

FLIP23C A320-232 IAE V2527-A5 3610 03301.000011 0250300 .7800 .000200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0–03–05–20–005–140

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1975	10905 4.26	10179 4.28	9658 4.31	9238 4.33	8867 4.34	8697 4.34	29	65	102
2000	11044 4.29	10308 4.32	9778 4.34	9353 4.36	8978 4.37	8803 4.37	30	65	103
2025	11183 4.33	10436 4.35	9898 4.37	9467 4.39	9088 4.41	8907 4.41	30	66	104
2050	11322 4.36	10564 4.38	10019 4.40	9582 4.43	9198 4.44	9012 4.44	30	67	105
2075	11461 4.39	10693 4.41	10139 4.44	9696 4.46	9307 4.47	9117 4.47	30	68	106
2100	11599 4.42	10821 4.45	10259 4.47	9810 4.49	9417 4.51	9221 4.51	30	68	107
2125	11738 4.46	10949 4.48	10379 4.50	9925 4.53	9527 4.54	9325 4.54	31	69	107
2150	11877 4.49	11077 4.51	10499 4.54	10039 4.56	9636 4.57	9429 4.58	31	70	108
2175	12015 4.52	11205 4.54	10618 4.57	10152 4.59	9746 5.01	9533 5.01	31	71	109
2200	12154 4.55	11332 4.58	10738 5.00	10266 5.03	9855 5.04	9637 5.04	31	71	110
2225	12292 4.59	11460 5.01	10858 5.04	10380 5.06	9964 5.08	9740 5.08	31	72	111
2250	12431 5.02	11588 5.04	10977 5.07	10493 5.09	10073 5.11	9844 5.11	32	73	112
2275	12570 5.05	11715 5.08	11096 5.10	10607 5.13	10182 5.14	9947 5.14	32	73	113
2300	12708 5.08	11843 5.11	11216 5.13	10720 5.16	10291 5.18	10050 5.18	32	74	113
2325	12846 5.11	11970 5.14	11335 5.17	10834 5.19	10400 5.21	10153 5.21	32	75	114
2350	12985 5.15	12098 5.17	11454 5.20	10947 5.23	10509 5.24	10256 5.24	32	76	115
2375	13123 5.18	12227 5.21	11573 5.23	11060 5.26	10617 5.28	10358 5.28	33	76	116
2400	13262 5.21	12355 5.24	11692 5.27	11173 5.29	10726 5.31	10460 5.31	33	77	117
2425	13400 5.24	12483 5.27	11810 5.30	11285 5.33	10834 5.34	10563 5.34	33	78	117
2450	13538 5.28	12612 5.30	11929 5.33	11398 5.36	10942 5.38	10665 5.38	33	78	118
2475	13676 5.31	12740 5.34	12048 5.37	11511 5.39	11050 5.41	10767 5.41	33	79	119
2500	13814 5.34	12868 5.37	12166 5.40	11623 5.43	11159 5.44	10868 5.44	33	80	120
2525	13952 5.37	12996 5.40	12285 5.43	11736 5.46	11266 5.48	10970 5.48	34	80	120
2550	14090 5.41	13124 5.44	12403 5.46	11848 5.49	11374 5.51	11071 5.51	34	81	121
2575	14228 5.44	13252 5.47	12521 5.50	11960 5.53	11482 5.54	11173 5.54	34	82	122
2600	14367 5.47	13380 5.50	12640 5.53	12072 5.56	11590 5.58	11274 5.58	34	83	123

LOW AIR CONDITIONING
△FUEL = − 0.4 %

ENGINE ANTI ICE ON
△FUEL = + 3 %

TOTAL ANTI ICE ON
△FUEL = + 5.5 %

FLIP23C A320-232 IAE V2527-A5 3610 03301.000011 0250300 .7800 .000200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0–03–05–20–006–140

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2600	14367 5.47	13380 5.50	12640 5.53	12072 5.56	11590 5.58	11274 5.58	34	83	123
2625	14505 5.50	13508 5.53	12758 5.56	12184 5.59	11697 6.01	11375 6.01	34	83	124
2650	14642 5.54	13636 5.57	12876 6.00	12296 6.03	11805 6.04	11476 6.04	34	84	125
2675	14780 5.57	13764 6.00	12994 6.03	12408 6.06	11912 6.08	11576 6.08	34	84	125
2700	14918 6.00	13892 6.03	13112 6.06	12520 6.09	12019 6.11	11677 6.11	35	85	126
2725	15056 6.03	14020 6.06	13229 6.10	12632 6.13	12127 6.15	11777 6.15	35	86	127
2750	15194 6.07	14147 6.10	13347 6.13	12743 6.16	12234 6.18	11878 6.18	35	86	128
2775	15332 6.10	14275 6.13	13465 6.16	12855 6.19	12341 6.21	11978 6.21	35	87	129
2800	15469 6.13	14403 6.16	13582 6.19	12966 6.23	12448 6.25	12078 6.25	35	87	130
2825	15607 6.16	14530 6.20	13699 6.23	13077 6.26	12555 6.28	12179 6.28	35	88	130
2850	15745 6.20	14658 6.23	13817 6.26	13188 6.29	12661 6.31	12281 6.31	35	88	131
2875	15882 6.23	14785 6.26	13934 6.29	13299 6.33	12768 6.35	12382 6.35	35	89	132
2900	16020 6.26	14913 6.29	14051 6.33	13410 6.36	12875 6.38	12484 6.38	35	90	133
2925	16157 6.29	15040 6.33	14168 6.36	13521 6.39	12981 6.41	12585 6.41	35	90	133
2950	16295 6.33	15168 6.36	14285 6.39	13632 6.43	13087 6.45	12686 6.45	35	91	134
2975	16432 6.36	15295 6.39	14402 6.43	13743 6.46	13194 6.48	12787 6.48	36	91	135
3000	16570 6.39	15422 6.42	14519 6.46	13853 6.49	13300 6.51	12888 6.51	36	92	136
3025	16707 6.42	15550 6.46	14635 6.49	13964 6.53	13406 6.55	12989 6.55	36	92	136
3050	16844 6.45	15677 6.49	14752 6.52	14074 6.56	13512 6.58	13090 6.58	36	93	137
3075	16981 6.49	15804 6.52	14869 6.56	14184 6.59	13618 7.01	13190 7.01	36	93	138
3100	17119 6.52	15931 6.55	14985 6.59	14294 7.03	13724 7.05	13291 7.05	36	94	139

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.4 %	△FUEL = + 3 %	△FUEL = + 5.5 %

FLIP23C A320-232 IAE V2527-A5 3610 03301 000011 0250300 .7800 .000200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0--03--05--20--007--140

IN CRUISE QUICK CHECK M.78

Applicable to: ALL 321

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
100	412 0.23	386 0.23	361 0.23	338 0.23	316 0.23		0	0	0
125	568 0.26	534 0.26	502 0.26	474 0.26	447 0.26	424 0.26	0	0	0
150	725 0.29	682 0.29	644 0.29	609 0.29	579 0.29	556 0.29	0	0	0
175	881 0.32	830 0.32	785 0.33	745 0.33	711 0.33	687 0.33	1	1	2
200	1037 0.36	978 0.36	926 0.36	880 0.36	842 0.36	818 0.36	1	2	4
225	1193 0.39	1126 0.39	1067 0.39	1015 0.39	973 0.39	949 0.39	2	3	5
250	1349 0.42	1274 0.42	1208 0.42	1150 0.43	1104 0.43	1079 0.43	2	4	7
275	1504 0.45	1422 0.46	1348 0.46	1285 0.46	1235 0.46	1209 0.46	3	5	9
300	1660 0.49	1569 0.49	1489 0.49	1419 0.49	1365 0.49	1339 0.49	4	6	14
325	1815 0.52	1716 0.52	1629 0.52	1554 0.53	1496 0.53	1469 0.53	5	7	16
350	1971 0.55	1864 0.55	1769 0.56	1688 0.56	1626 0.56	1598 0.56	6	8	17
375	2126 0.58	2011 0.59	1909 0.59	1822 0.59	1756 0.59	1727 0.59	6	9	19
400	2281 1.02	2158 1.02	2049 1.02	1957 1.03	1886 1.03	1856 1.03	7	10	21
425	2436 1.05	2305 1.05	2189 1.06	2090 1.06	2015 1.06	1985 1.06	8	11	22
450	2591 1.08	2452 1.08	2329 1.09	2224 1.09	2145 1.10	2113 1.10	9	12	24
475	2746 1.11	2598 1.12	2469 1.12	2358 1.13	2274 1.13	2241 1.13	10	13	26
500	2901 1.15	2745 1.15	2608 1.15	2491 1.16	2403 1.16	2368 1.16	10	14	27
525	3055 1.18	2891 1.18	2747 1.19	2625 1.19	2532 1.20	2496 1.20	11	15	29
550	3210 1.21	3037 1.22	2886 1.22	2758 1.23	2661 1.23	2623 1.23	12	16	31
575	3364 1.24	3184 1.25	3026 1.25	2891 1.26	2789 1.26	2750 1.26	13	17	32
600	3518 1.27	3330 1.28	3164 1.29	3024 1.29	2918 1.30	2876 1.30	13	18	34
625	3672 1.31	3476 1.31	3303 1.32	3157 1.33	3046 1.33	3003 1.33	14	19	35
650	3826 1.34	3621 1.35	3442 1.35	3289 1.36	3174 1.36	3129 1.36	15	20	37
675	3980 1.37	3767 1.38	3580 1.39	3422 1.39	3302 1.40	3255 1.40	16	21	38
700	4134 1.40	3913 1.41	3719 1.42	3554 1.43	3430 1.43	3380 1.43	16	22	40
725	4288 1.44	4058 1.44	3857 1.45	3686 1.46	3557 1.46	3506 1.46	17	23	42

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23A A321–131 IAE V2530–A5 3610 03301.000011 0250300 .7800 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM-N0–03–05–20–003–150

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
725	4288 1.44	4058 1.44	3857 1.45	3686 1.46	3557 1.46	3506 1.46	17	23	42
750	4441 1.47	4203 1.48	3995 1.49	3818 1.49	3685 1.50	3631 1.50	18	24	43
775	4594 1.50	4349 1.51	4133 1.52	3950 1.53	3812 1.53	3756 1.53	19	25	44
800	4748 1.53	4494 1.54	4271 1.55	4082 1.56	3939 1.56	3881 1.56	19	25	46
825	4901 1.57	4639 1.58	4409 1.58	4214 1.59	4066 2.00	4006 2.00	20	26	47
850	5054 2.00	4784 2.01	4547 2.02	4345 2.03	4193 2.03	4131 2.03	21	27	49
875	5207 2.03	4928 2.04	4684 2.05	4476 2.06	4320 2.06	4255 2.06	22	28	50
900	5360 2.06	5073 2.07	4822 2.08	4608 2.09	4446 2.10	4379 2.10	22	29	52
925	5513 2.10	5218 2.11	4959 2.12	4739 2.13	4572 2.13	4503 2.13	23	30	53
950	5665 2.13	5362 2.14	5096 2.15	4870 2.16	4699 2.17	4626 2.17	24	31	54
975	5818 2.16	5506 2.17	5233 2.18	5001 2.19	4825 2.20	4750 2.20	24	32	56
1000	5970 2.19	5650 2.20	5370 2.22	5131 2.23	4950 2.23	4873 2.23	25	33	57
1025	6122 2.23	5794 2.24	5507 2.25	5262 2.26	5076 2.27	4996 2.27	26	34	58
1050	6274 2.26	5938 2.27	5644 2.28	5392 2.29	5202 2.30	5119 2.30	27	35	60
1075	6427 2.29	6082 2.30	5780 2.31	5522 2.33	5327 2.33	5241 2.33	27	35	61
1100	6578 2.32	6226 2.34	5917 2.35	5653 2.36	5452 2.37	5363 2.37	28	36	62
1125	6730 2.36	6369 2.37	6053 2.38	5783 2.39	5577 2.40	5485 2.40	29	37	64
1150	6882 2.39	6513 2.40	6189 2.41	5913 2.43	5702 2.43	5607 2.43	29	38	65
1175	7034 2.42	6656 2.43	6325 2.45	6042 2.46	5827 2.47	5729 2.47	30	39	66
1200	7185 2.45	6800 2.47	6461 2.48	6172 2.49	5952 2.50	5850 2.50	31	40	67
1225	7337 2.49	6943 2.50	6597 2.51	6301 2.53	6076 2.53	5972 2.53	32	41	69
1250	7488 2.52	7086 2.53	6733 2.55	6431 2.56	6200 2.57	6093 2.57	32	42	70
1275	7639 2.55	7229 2.56	6868 2.58	6560 2.59	6325 3.00	6213 3.00	33	43	71
1300	7790 2.58	7371 3.00	7004 3.01	6689 3.03	6449 3.03	6334 3.03	34	43	72
1325	7941 3.02	7514 3.03	7139 3.04	6818 3.06	6572 3.07	6454 3.07	34	44	73
1350	8092 3.05	7657 3.06	7274 3.08	6947 3.09	6696 3.10	6575 3.10	35	45	75

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23A A321–131 IAE V2530–A5 3610 03301.000011 0250300 .7800 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM-N0–03–05–20–004–150

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1350	8092 3.05	7657 3.06	7274 3.08	6947 3.09	6696 3.10	6575 3.10	35	45	75
1375	8243 3.08	7799 3.10	7409 3.11	7075 3.13	6820 3.13	6695 3.13	36	46	76
1400	8393 3.11	7941 3.13	7544 3.14	7204 3.16	6943 3.17	6814 3.17	36	47	77
1425	8544 3.15	8084 3.16	7679 3.18	7332 3.19	7066 3.20	6934 3.20	37	48	78
1450	8694 3.18	8226 3.19	7814 3.21	7461 3.23	7189 3.24	7053 3.24	38	49	79
1475	8845 3.21	8368 3.23	7949 3.24	7589 3.26	7312 3.27	7173 3.27	38	49	80
1500	8995 3.24	8510 3.26	8083 3.28	7717 3.29	7435 3.30	7292 3.30	39	50	82
1525	9145 3.28	8651 3.29	8217 3.31	7845 3.33	7558 3.34	7410 3.34	40	51	83
1550	9295 3.31	8793 3.32	8352 3.34	7973 3.36	7680 3.37	7529 3.37	40	52	84
1575	9445 3.34	8935 3.36	8486 3.37	8100 3.39	7803 3.40	7647 3.40	41	53	85
1600	9595 3.37	9076 3.39	8620 3.41	8228 3.43	7925 3.44	7766 3.44	42	54	86
1625	9745 3.41	9218 3.42	8754 3.44	8355 3.46	8047 3.47	7884 3.47	42	54	87
1650	9895 3.44	9359 3.46	8888 3.47	8483 3.49	8169 3.50	8001 3.50	43	55	88
1675	10045 3.47	9501 3.49	9022 3.51	8610 3.53	8291 3.54	8119 3.54	44	56	90
1700	10195 3.50	9642 3.52	9155 3.54	8737 3.56	8412 3.57	8236 3.57	44	57	91
1725	10344 3.53	9783 3.55	9289 3.57	8864 3.59	8534 4.00	8354 4.00	45	58	92
1750	10493 3.57	9924 3.59	9422 4.01	8991 4.03	8655 4.04	8471 4.04	46	59	93
1775	10643 4.00	10065 4.02	9556 4.04	9117 4.06	8777 4.07	8588 4.07	46	59	94
1800	10792 4.03	10205 4.05	9689 4.07	9244 4.09	8898 4.10	8704 4.10	47	60	95
1825	10941 4.06	10346 4.08	9822 4.11	9371 4.13	9019 4.14	8821 4.14	47	61	96
1850	11090 4.10	10486 4.12	9955 4.14	9497 4.16	9140 4.17	8937 4.17	48	62	97
1875	11239 4.13	10627 4.15	10088 4.17	9624 4.19	9261 4.20	9054 4.20	49	63	98
1900	11388 4.16	10767 4.18	10221 4.20	9750 4.23	9382 4.24	9170 4.24	49	63	99
1925	11536 4.19	10907 4.22	10354 4.24	9876 4.26	9503 4.27	9287 4.27	50	64	100
1950	11685 4.23	11047 4.25	10486 4.27	10002 4.29	9624 4.31	9404 4.31	50	65	101
1975	11834 4.26	11187 4.28	10619 4.30	10128 4.33	9744 4.34	9520 4.34	51	66	102

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.6 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23A A321-131 IAE V2530-A5 3610 03301.000011 0250300 .7800 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM-N0-03-05-20-005-150

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1975	11834 4.26	11187 4.28	10619 4.30	10128 4.33	9744 4.34	9520 4.34	51	66	102
2000	11982 4.29	11327 4.31	10751 4.34	10254 4.36	9865 4.37	9637 4.37	52	67	103
2025	12130 4.32	11467 4.35	10884 4.37	10380 4.39	9985 4.41	9753 4.41	52	67	104
2050	12278 4.36	11607 4.38	11016 4.40	10505 4.43	10105 4.44	9869 4.44	53	68	105
2075	12427 4.39	11746 4.41	11148 4.44	10630 4.46	10225 4.47	9985 4.47	53	69	106
2100	12575 4.42	11886 4.44	11280 4.47	10756 4.49	10345 4.51	10100 4.51	54	70	107
2125	12722 4.45	12025 4.48	11412 4.50	10881 4.53	10465 4.54	10216 4.54	54	70	108
2150	12870 4.49	12164 4.51	11543 4.53	11006 4.56	10585 4.57	10331 4.57	55	71	109
2175	13018 4.52	12304 4.54	11675 4.57	11131 4.59	10704 5.01	10446 5.01	55	72	110
2200	13166 4.55	12443 4.58	11807 5.00	11256 5.03	10824 5.04	10561 5.04	56	73	111
2225	13313 4.58	12582 5.01	11938 5.03	11381 5.06	10943 5.07	10676 5.07	57	74	112
2250	13461 5.02	12721 5.04	12069 5.07	11505 5.09	11062 5.11	10791 5.11	57	74	113
2275	13608 5.05	12859 5.07	12201 5.10	11630 5.13	11181 5.14	10906 5.14	58	75	114
2300	13755 5.08	12998 5.11	12332 5.13	11754 5.16	11300 5.17	11020 5.17	58	76	114
2325	13902 5.11	13136 5.14	12463 5.17	11878 5.19	11419 5.21	11134 5.21	59	76	115
2350	14049 5.15	13275 5.17	12593 5.20	12003 5.23	11538 5.24	11248 5.24	59	77	116
2375	14196 5.18	13413 5.20	12724 5.23	12127 5.26	11656 5.27	11362 5.27	60	78	117
2400	14343 5.21	13551 5.24	12855 5.26	12251 5.29	11775 5.31	11476 5.31	60	79	118
2425	14490 5.24	13690 5.27	12985 5.30	12374 5.33	11893 5.34	11590 5.34	61	79	119
2450	14636 5.28	13828 5.30	13116 5.33	12498 5.36	12011 5.37	11703 5.38	61	80	120
2475	14783 5.31	13966 5.34	13246 5.36	12622 5.39	12130 5.41	11817 5.41	62	81	120
2500	14930 5.34	14103 5.37	13376 5.40	12745 5.43	12248 5.44	11930 5.44	63	82	121
2525	15077 5.37	14241 5.40	13507 5.43	12869 5.46	12365 5.48	12043 5.48	63	82	122
2550	15223 5.41	14379 5.43	13637 5.46	12992 5.49	12483 5.51	12156 5.51	64	83	123
2575	15370 5.44	14516 5.47	13767 5.50	13115 5.53	12601 5.54	12269 5.54	64	84	124
2600	15517 5.47	14654 5.50	13896 5.53	13238 5.56	12718 5.58	12382 5.58	65	85	125

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23A A321–131 IAE V2530–A5 3610 03301.000011 0250300 .7800 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM-N0–03–05–20–006–150

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2600	15517 5.47	14654 5.50	13896 5.53	13238 5.56	12718 5.58	12382 5.58	65	85	125
2625	15663 5.50	14791 5.53	14026 5.56	13361 5.59	12836 6.01	12494 6.01	65	85	126
2650	15809 5.53	14929 5.56	14156 5.59	13484 6.03	12953 6.04	12607 6.04	66	86	126
2675	15955 5.57	15066 6.00	14285 6.03	13607 6.06	13070 6.08	12719 6.08	66	87	127
2700	16102 6.00	15203 6.03	14415 6.06	13729 6.09	13187 6.11	12831 6.11	67	87	128
2725	16248 6.03	15340 6.06	14544 6.09	13852 6.13	13304 6.14	12943 6.14	67	88	129
2750	16394 6.06	15477 6.10	14673 6.13	13974 6.16	13421 6.18	13055 6.18	68	89	130
2775	16540 6.10	15614 6.13	14802 6.16	14096 6.19	13537 6.21	13166 6.21	68	90	131
2800	16685 6.13	15751 6.16	14932 6.19	14219 6.23	13654 6.24	13278 6.24	69	90	131
2825	16831 6.16	15887 6.19	15061 6.23	14341 6.26	13770 6.28	13389 6.28	69	91	132
2850	16977 6.19	16024 6.23	15190 6.26	14463 6.29	13887 6.31	13500 6.31	70	92	133
2875	17123 6.23	16160 6.26	15319 6.29	14584 6.33	14003 6.34	13612 6.34	70	92	134
2900	17268 6.26	16297 6.29	15447 6.32	14706 6.36	14119 6.38	13723 6.38	71	93	135
2925	17414 6.29	16433 6.32	15576 6.36	14828 6.39	14235 6.41	13833 6.41	71	94	135
2950	17559 6.32	16569 6.36	15705 6.39	14950 6.43	14351 6.44	13944 6.44	71	94	136
2975	17704 6.36	16706 6.39	15833 6.42	15071 6.46	14467 6.48	14055 6.48	72	95	137
3000	17849 6.39	16842 6.42	15961 6.46	15193 6.49	14582 6.51	14165 6.51	72	96	138
3025	17994 6.42	16978 6.46	16090 6.49	15314 6.53	14698 6.55	14275 6.55	73	97	139
3050	18139 6.45	17113 6.49	16218 6.52	15436 6.56	14813 6.58	14385 6.58	73	97	139
3075	18284 6.49	17249 6.52	16346 6.56	15557 6.59	14929 7.01	14496 7.01	74	98	140
3100	18429 6.52	17385 6.55	16474 6.59	15678 7.03	15044 7.05	14605 7.05	74	99	141

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23A A321−131 IAE V2530−A5 3610 03301 000011 0250300 .7800 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM-N0−03−05−20−007−150

IN CRUISE QUICK CHECK LONG RANGE

Applicable to: ALL 320

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
100	779 0.25	620 0.25	507 0.24	448 0.24	415 0.24	386 0.23	2	0	0
125	975 0.30	802 0.29	667 0.28	595 0.28	556 0.28	523 0.27	4	0	0
150	1170 0.35	984 0.33	827 0.32	742 0.32	697 0.32	659 0.31	5	0	1
175	1366 0.40	1165 0.38	987 0.36	889 0.36	838 0.35	795 0.35	7	1	2
200	1560 0.45	1346 0.42	1147 0.40	1036 0.40	979 0.39	931 0.39	9	1	3
225	1755 0.50	1527 0.47	1307 0.44	1182 0.44	1119 0.43	1067 0.43	10	2	4
250	1949 0.55	1707 0.51	1467 0.48	1329 0.48	1259 0.47	1203 0.47	12	3	5
275	2143 1.00	1887 0.55	1627 0.52	1475 0.52	1399 0.51	1338 0.50	13	3	7
300	2337 1.05	2067 1.00	1787 0.55	1621 0.56	1539 0.55	1474 0.54	15	4	8
325	2530 1.10	2246 1.04	1947 0.59	1768 1.00	1679 0.59	1609 0.58	17	5	9
350	2723 1.15	2425 1.09	2106 1.03	1914 1.04	1819 1.03	1744 1.02	18	6	10
375	2916 1.20	2604 1.13	2266 1.07	2060 1.08	1958 1.07	1879 1.06	20	6	11
400	3108 1.25	2782 1.18	2425 1.11	2206 1.11	2097 1.11	2014 1.10	21	7	13
425	3300 1.30	2960 1.22	2584 1.15	2352 1.15	2237 1.15	2148 1.14	23	8	14
450	3492 1.35	3138 1.27	2744 1.19	2497 1.19	2376 1.19	2282 1.18	25	8	15
475	3683 1.41	3316 1.31	2903 1.23	2643 1.23	2514 1.23	2416 1.22	26	9	16
500	3874 1.46	3493 1.36	3062 1.27	2789 1.27	2653 1.27	2550 1.26	28	10	17
525	4065 1.51	3670 1.41	3221 1.31	2934 1.31	2792 1.31	2684 1.30	29	10	18
550	4255 1.56	3846 1.45	3380 1.35	3079 1.35	2930 1.35	2817 1.33	31	11	19
575	4445 2.01	4022 1.50	3539 1.39	3225 1.39	3068 1.39	2951 1.37	33	12	21
600	4635 2.06	4198 1.54	3697 1.43	3370 1.43	3206 1.43	3084 1.41	34	12	22
625	4825 2.11	4374 1.59	3856 1.47	3515 1.47	3344 1.47	3217 1.45	36	13	23
650	5014 2.16	4549 2.04	4015 1.51	3660 1.51	3482 1.51	3349 1.49	37	14	24
675	5203 2.21	4724 2.08	4173 1.55	3805 1.55	3619 1.55	3482 1.53	39	14	25
700	5392 2.26	4899 2.13	4332 1.59	3949 1.59	3757 1.59	3615 1.57	41	15	26
725	5580 2.32	5074 2.18	4490 2.03	4094 2.03	3894 2.03	3747 2.01	42	16	27

LOW AIR CONDITIONING
△FUEL = − 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23C A320-232 IAE V2527-A5 3610 03301.000011 0250300 .7801 .000200 120 0300350 60 0 *100 20 20 20 18590 FCOM-N0-03-05-20-008-140

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
725	5580 2.32	5074 2.18	4490 2.03	4094 2.03	3894 2.03	3747 2.01	42	16	27
750	5768 2.37	5248 2.23	4648 2.07	4239 2.07	4031 2.07	3879 2.05	44	16	28
775	5956 2.42	5422 2.27	4806 2.11	4383 2.11	4168 2.11	4011 2.09	46	17	29
800	6144 2.47	5595 2.32	4964 2.15	4527 2.15	4305 2.15	4143 2.13	47	18	30
825	6331 2.52	5769 2.37	5123 2.19	4672 2.19	4442 2.19	4274 2.17	49	18	31
850	6518 2.57	5942 2.42	5280 2.23	4816 2.23	4578 2.23	4405 2.21	50	19	32
875	6705 3.03	6114 2.46	5438 2.27	4960 2.27	4715 2.27	4537 2.25	52	20	33
900	6891 3.08	6287 2.51	5596 2.31	5104 2.31	4851 2.31	4668 2.29	54	20	34
925	7077 3.13	6459 2.56	5754 2.35	5248 2.35	4987 2.35	4799 2.33	55	21	35
950	7262 3.18	6631 3.01	5911 2.39	5391 2.39	5123 2.39	4929 2.37	57	21	36
975	7447 3.23	6803 3.06	6069 2.43	5535 2.43	5259 2.43	5060 2.41	59	22	37
1000	7632 3.29	6974 3.11	6226 2.47	5679 2.47	5394 2.47	5190 2.45	60	23	39
1025	7817 3.34	7145 3.16	6384 2.51	5822 2.51	5530 2.52	5320 2.49	62	23	40
1050	8001 3.39	7316 3.20	6541 2.55	5965 2.55	5665 2.56	5451 2.53	63	24	41
1075	8185 3.44	7486 3.25	6698 2.59	6109 2.59	5800 3.00	5580 2.57	65	25	42
1100	8369 3.50	7657 3.30	6856 3.03	6252 3.03	5936 3.04	5710 3.01	67	25	43
1125	8553 3.55	7827 3.35	7012 3.07	6395 3.07	6070 3.08	5840 3.05	68	26	44
1150	8736 4.00	7997 3.40	7169 3.11	6538 3.11	6205 3.12	5969 3.09	70	27	45
1175	8919 4.05	8166 3.45	7325 3.15	6681 3.14	6340 3.16	6098 3.13	72	27	46
1200	9101 4.11	8335 3.50	7481 3.19	6824 3.18	6474 3.20	6227 3.17	73	28	46
1225	9284 4.16	8504 3.55	7637 3.23	6966 3.22	6609 3.24	6356 3.21	75	29	47
1250	9466 4.21	8673 4.00	7794 3.27	7109 3.26	6743 3.28	6485 3.25	76	29	48
1275	9648 4.27	8841 4.05	7950 3.31	7251 3.30	6877 3.32	6614 3.29	78	30	49
1300	9829 4.32	9010 4.10	8105 3.35	7394 3.34	7011 3.36	6742 3.33	80	31	50
1325	10010 4.37	9177 4.15	8261 3.39	7536 3.38	7146 3.40	6870 3.37	81	32	51
1350	10191 4.43	9345 4.20	8417 3.43	7678 3.42	7280 3.44	6998 3.41	83	32	52

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.3 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23C A320-232 IAE V2527-A5 3610 03301.000011 0250300 .7801 .000200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0–03–05–20–009–140

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
1350	10191 4.43	9345 4.20	8417 3.43	7678 3.42	7280 3.44	6998 3.41	83	32	52
1375	10372 4.48	9512 4.25	8573 3.47	7820 3.47	7414 3.48	7127 3.45	85	33	53
1400	10553 4.53	9680 4.30	8728 3.51	7962 3.51	7548 3.52	7255 3.49	86	34	54
1425	10733 4.59	9846 4.36	8884 3.55	8104 3.55	7682 3.56	7382 3.53	88	35	55
1450	10913 5.04	10013 4.41	9039 3.59	8246 3.59	7815 4.00	7510 3.57	89	35	56
1475	11092 5.10	10179 4.46	9194 4.03	8388 4.03	7949 4.04	7638 4.01	91	36	57
1500	11272 5.15	10346 4.51	9349 4.07	8529 4.07	8082 4.08	7765 4.05	93	37	58
1525	11451 5.20	10511 4.56	9504 4.11	8671 4.11	8216 4.12	7892 4.09	94	38	59
1550	11630 5.26	10677 5.01	9659 4.15	8812 4.15	8349 4.16	8019 4.13	96	38	59
1575	11808 5.31	10842 5.07	9814 4.19	8953 4.19	8482 4.20	8146 4.17	97	39	60
1600	11986 5.37	11007 5.12	9969 4.23	9095 4.23	8615 4.24	8273 4.21	99	40	61
1625	12164 5.42	11172 5.17	10123 4.27	9236 4.27	8748 4.28	8400 4.25	101	41	62
1650	12341 5.48	11337 5.22	10278 4.31	9377 4.31	8881 4.32	8526 4.29	102	41	63
1675	12518 5.53	11501 5.27	10432 4.35	9518 4.35	9013 4.37	8653 4.34	104	42	64
1700	12695 5.59	11665 5.33	10586 4.39	9659 4.39	9146 4.41	8779 4.38	105	43	65
1725	12872 6.04	11829 5.38	10741 4.43	9799 4.43	9278 4.45	8905 4.42	107	44	65
1750	13048 6.09	11993 5.43	10895 4.48	9940 4.47	9410 4.49	9031 4.46	108	44	66
1775	13224 6.15	12155 5.48	11049 4.52	10081 4.51	9543 4.53	9157 4.50	110	45	67
1800	13400 6.20	12317 5.54	11203 4.56	10221 4.55	9675 4.57	9282 4.54	111	46	68
1825	13575 6.26	12479 5.59	11356 5.00	10361 4.59	9806 5.01	9408 4.58	113	47	69
1850	13751 6.32	12640 6.04	11510 5.04	10502 5.03	9938 5.05	9533 5.02	114	47	69
1875	13926 6.37	12802 6.09	11664 5.08	10642 5.07	10070 5.09	9658 5.06	115	48	70
1900	14100 6.43	12962 6.14	11817 5.12	10782 5.11	10201 5.13	9783 5.10	117	49	71
1925	14275 6.48	13123 6.19	11971 5.16	10922 5.15	10333 5.17	9908 5.14	118	50	72
1950	14449 6.54	13284 6.24	12123 5.20	11062 5.19	10464 5.21	10033 5.18	120	51	73
1975	14623 6.59	13444 6.29	12275 5.24	11202 5.23	10595 5.25	10158 5.22	121	51	73

LOW AIR CONDITIONING
△FUEL = – 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23C A320-232 IAE V25217–A5 3610 03301.000011 0250300 .7801 .000200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0–03–05–20–010–120

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
1975	14623 6.59	13444 6.29	12275 5.24	11202 5.23	10595 5.25	10158 5.22	121	51	73
2000	14797 7.05	13604 6.34	12427 5.28	11342 5.28	10727 5.29	10282 5.27	123	52	74
2025	14970 7.10	13763 6.40	12578 5.33	11481 5.32	10858 5.33	10407 5.31	124	53	75
2050	15144 7.16	13923 6.45	12730 5.37	11621 5.36	10988 5.37	10531 5.35	126	54	76
2075	15317 7.22	14082 6.50	12881 5.41	11760 5.40	11119 5.41	10655 5.39	127	55	76
2100	15489 7.27	14241 6.55	13033 5.45	11899 5.44	11250 5.45	10779 5.43	129	56	77
2125	15662 7.33	14399 7.00	13184 5.49	12039 5.48	11380 5.49	10903 5.47	130	57	78
2150	15834 7.38	14558 7.06	13335 5.53	12179 5.52	11511 5.53	11026 5.51	132	58	79
2175	16006 7.44	14716 7.11	13486 5.58	12319 5.56	11641 5.57	11150 5.55	133	59	79
2200	16178 7.50	14874 7.16	13637 6.02	12458 6.00	11771 6.01	11273 5.59	135	60	80
2225	16349 7.55	15032 7.21	13787 6.06	12598 6.04	11901 6.05	11397 6.04	136	61	81
2250	16520 8.01	15189 7.26	13938 6.10	12738 6.08	12031 6.09	11520 6.08	137	62	81
2275	16691 8.07	15346 7.32	14088 6.14	12877 6.12	12162 6.13	11643 6.12	139	63	82
2300	16862 8.12	15503 7.37	14238 6.18	13017 6.16	12293 6.17	11765 6.16	140	65	83
2325	17033 8.18	15660 7.42	14389 6.23	13156 6.20	12424 6.21	11888 6.20	142	66	83
2350	17202 8.24	15817 7.47	14539 6.27	13296 6.24	12555 6.25	12011 6.24	143	67	84
2375	17372 8.29	15973 7.53	14689 6.31	13435 6.28	12686 6.29	12133 6.28	144	68	85
2400	17541 8.35	16129 7.58	14839 6.35	13574 6.32	12817 6.33	12256 6.32	146	69	85
2425	17710 8.41	16285 8.03	14988 6.40	13713 6.36	12947 6.37	12379 6.36	147	70	86
2450	17878 8.47	16440 8.08	15138 6.44	13852 6.40	13078 6.41	12501 6.41	149	72	87
2475	18047 8.52	16596 8.14	15288 6.48	13991 6.44	13208 6.45	12623 6.45	150	73	87
2500	18215 8.58	16751 8.19	15437 6.52	14130 6.48	13338 6.49	12745 6.49	151	74	88
2525	18383 9.04	16905 8.24	15586 6.56	14269 6.52	13469 6.53	12867 6.53	153	75	88
2550	18550 9.09	17060 8.30	15735 7.01	14408 6.56	13599 6.57	12989 6.57	154	76	89
2575	18718 9.15	17214 8.35	15884 7.05	14547 7.00	13729 7.01	13111 7.01	155	78	89
2600	18885 9.21	17369 8.40	16033 7.09	14685 7.05	13859 7.05	13232 7.05	157	79	90

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.3 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23C A320-232 IAE V2527-A5 3610 03301.000011 025300 .7801 .000200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-011-140

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
2600	18885 9.21	17369 8.40	16033 7.09	14685 7.05	13859 7.05	13232 7.05	157	79	90
2625	19052 9.27	17522 8.46	16182 7.13	14824 7.09	13989 7.09	13354 7.09	158	80	90
2650	19219 9.33	17676 8.51	16331 7.18	14962 7.13	14118 7.13	13475 7.14	159	81	91
2675	19385 9.38	17829 8.56	16479 7.22	15101 7.17	14248 7.17	13596 7.18	161	83	91
2700	19551 9.44	17983 9.01	16628 7.26	15239 7.21	14378 7.21	13718 7.22	162	84	92
2725	19717 9.50	18135 9.07	16776 7.30	15378 7.25	14507 7.25	13839 7.26	163	85	92
2750	19883 9.56	18288 9.12	16924 7.35	15516 7.29	14637 7.29	13959 7.30	164	86	93
2775	20048 10.02	18441 9.17	17072 7.39	15654 7.33	14766 7.33	14080 7.34	166	87	93
2800	20214 10.07	18593 9.23	17219 7.43	15792 7.37	14896 7.37	14201 7.38	167	89	93
2825	20379 10.13	18745 9.28	17363 7.48	15930 7.41	15025 7.41	14321 7.42	168	90	94
2850	20544 10.19	18897 9.33	17507 7.53	16068 7.45	15154 7.45	14442 7.47	170	91	94
2875	20708 10.25	19048 9.39	17652 7.58	16206 7.49	15283 7.49	14562 7.51	171	92	95
2900	20873 10.31	19200 9.44	17795 8.03	16344 7.53	15412 7.53	14682 7.55	172	94	95
2925	21037 10.37	19351 9.49	17939 8.08	16482 7.57	15541 7.57	14802 7.59	174	95	95
2950	21201 10.43	19502 9.55	18083 8.13	16619 8.01	15670 8.01	14922 8.03	175	96	96
2975	21364 10.48	19653 10.00	18226 8.18	16757 8.05	15799 8.05	15042 8.07	176	97	96
3000	21528 10.54	19803 10.05	18369 8.23	16894 8.09	15927 8.09	15162 8.11	178	99	97
3025	21691 11.00	19953 10.11	18512 8.28	17032 8.13	16056 8.13	15281 8.16	179	100	97
3050	21854 11.06	20104 10.16	18655 8.33	17169 8.17	16185 8.17	15401 8.20	180	101	97
3075	22017 11.12	20253 10.22	18798 8.38	17307 8.21	16313 8.21	15520 8.24	181	102	98
3100	22179 11.18	20403 10.27	18941 8.43	17444 8.25	16441 8.25	15639 8.28	183	104	98

LOW AIR CONDITIONING
△FUEL = − 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23C A320-232 IAE V2527-A5 3610 03301 000011 025300 7801 000200 120 0300350 60 0 100 20 20 20 18590 FCOM-NO-03-05-20-012-140

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
100	358 0.23	337 0.23	318 0.23	299 0.23			0	0	
125	490 0.27	465 0.27	443 0.26	422 0.26	399 0.26	378 0.26	0	0	0
150	622 0.31	593 0.30	567 0.30	545 0.30	520 0.30	500 0.30	0	0	0
175	754 0.34	720 0.34	692 0.33	667 0.33	641 0.33	622 0.33	1	2	2
200	885 0.38	847 0.37	816 0.37	790 0.36	762 0.36	744 0.36	3	3	4
225	1017 0.42	974 0.41	940 0.40	912 0.40	882 0.40	865 0.40	4	5	6
250	1148 0.45	1101 0.45	1064 0.44	1034 0.43	1002 0.43	986 0.43	5	6	7
275	1279 0.49	1228 0.48	1188 0.47	1157 0.47	1122 0.46	1107 0.46	6	8	9
300	1410 0.53	1354 0.52	1311 0.51	1278 0.50	1242 0.50	1228 0.49	8	9	11
325	1541 0.56	1481 0.56	1434 0.54	1400 0.53	1361 0.53	1348 0.53	9	11	13
350	1671 1.00	1607 0.59	1558 0.58	1522 0.57	1480 0.56	1468 0.56	10	12	15
375	1802 1.04	1733 1.03	1680 1.01	1643 1.00	1600 0.59	1588 0.59	11	14	17
400	1932 1.08	1859 1.07	1803 1.05	1764 1.03	1718 1.03	1707 1.03	13	15	18
425	2062 1.11	1984 1.10	1926 1.08	1885 1.07	1837 1.06	1827 1.06	14	17	22
450	2192 1.15	2110 1.14	2048 1.12	2005 1.10	1956 1.09	1946 1.09	15	18	24
475	2322 1.19	2235 1.17	2171 1.15	2126 1.14	2074 1.13	2065 1.13	16	20	26
500	2451 1.23	2360 1.21	2293 1.19	2246 1.17	2192 1.16	2183 1.16	17	21	28
525	2581 1.26	2486 1.25	2415 1.22	2366 1.21	2310 1.19	2301 1.19	19	23	29
550	2710 1.30	2610 1.28	2537 1.26	2486 1.24	2428 1.23	2419 1.23	20	24	31
575	2839 1.34	2735 1.32	2658 1.30	2606 1.27	2546 1.26	2537 1.26	21	26	33
600	2968 1.38	2860 1.36	2780 1.33	2725 1.31	2663 1.29	2655 1.29	22	27	35
625	3097 1.41	2984 1.39	2901 1.37	2844 1.34	2781 1.33	2772 1.33	24	28	36
650	3225 1.45	3109 1.43	3022 1.40	2963 1.38	2898 1.36	2889 1.36	25	30	38
675	3354 1.49	3233 1.47	3143 1.44	3082 1.41	3015 1.39	3006 1.39	26	31	40
700	3482 1.53	3357 1.50	3264 1.47	3201 1.45	3132 1.43	3123 1.42	27	33	42
725	3610 1.57	3480 1.54	3384 1.51	3319 1.48	3248 1.46	3239 1.46	29	34	43

LOW AIR CONDITIONING
△FUEL = − 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23C A320-232 V2527-A5 3610 03301.000011 025300 .7801 .000200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-013-140

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
725	3610 1.57	3480 1.54	3384 1.51	3319 1.48	3248 1.46	3239 1.46	29	34	43
750	3738 2.00	3604 1.58	3505 1.54	3438 1.51	3365 1.49	3355 1.49	30	36	45
775	3866 2.04	3728 2.01	3625 1.58	3556 1.55	3481 1.53	3471 1.52	31	37	47
800	3994 2.08	3851 2.05	3745 2.01	3674 1.58	3597 1.56	3587 1.56	32	38	48
825	4121 2.12	3974 2.09	3865 2.05	3791 2.02	3713 1.59	3702 1.59	33	40	50
850	4249 2.16	4097 2.12	3985 2.08	3909 2.05	3829 2.03	3817 2.02	35	41	52
875	4376 2.20	4220 2.16	4105 2.12	4026 2.09	3944 2.06	3932 2.06	36	43	53
900	4503 2.23	4343 2.20	4224 2.16	4144 2.12	4060 2.10	4047 2.09	37	44	55
925	4630 2.27	4466 2.23	4344 2.19	4261 2.16	4175 2.13	4162 2.12	38	46	57
950	4757 2.31	4588 2.27	4463 2.23	4377 2.19	4290 2.16	4276 2.16	40	47	58
975	4883 2.35	4710 2.31	4582 2.26	4494 2.23	4405 2.20	4390 2.19	41	48	60
1000	5010 2.39	4833 2.34	4701 2.30	4610 2.26	4520 2.23	4504 2.22	42	50	62
1025	5136 2.43	4955 2.38	4820 2.33	4727 2.30	4634 2.26	4617 2.26	43	51	63
1050	5262 2.47	5077 2.42	4938 2.37	4843 2.33	4749 2.30	4731 2.29	44	52	65
1075	5388 2.50	5198 2.46	5057 2.40	4959 2.37	4863 2.33	4844 2.32	46	54	67
1100	5514 2.54	5320 2.49	5175 2.44	5075 2.40	4977 2.36	4957 2.36	47	55	68
1125	5640 2.58	5441 2.53	5293 2.48	5190 2.44	5091 2.40	5070 2.39	48	57	70
1150	5765 3.02	5563 2.57	5411 2.51	5306 2.47	5204 2.43	5182 2.42	49	58	71
1175	5891 3.06	5684 3.00	5529 2.55	5421 2.51	5318 2.46	5295 2.46	50	59	73
1200	6016 3.10	5805 3.04	5647 2.58	5536 2.54	5431 2.50	5407 2.49	52	61	74
1225	6141 3.14	5926 3.08	5764 3.02	5651 2.58	5545 2.53	5519 2.52	53	62	76
1250	6266 3.18	6046 3.12	5881 3.05	5766 3.01	5658 2.56	5630 2.56	54	64	78
1275	6391 3.22	6167 3.15	5999 3.09	5880 3.05	5771 3.00	5742 2.59	55	65	79
1300	6516 3.25	6287 3.19	6116 3.13	5995 3.08	5883 3.03	5853 3.02	56	66	81
1325	6640 3.29	6408 3.23	6233 3.16	6109 3.12	5996 3.06	5964 3.05	58	68	82
1350	6764 3.33	6528 3.26	6349 3.20	6223 3.15	6109 3.10	6075 3.09	59	69	84

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.3 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23C A320-232 IAE V2527-A5 3610 03301.000011 0250300 .7801 .000200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03–05–20–014–120

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1350	6764 3.33	6528 3.26	6349 3.20	6223 3.15	6109 3.10	6075 3.09	59	69	84
1375	6889 3.37	6648 3.30	6466 3.23	6337 3.19	6221 3.13	6186 3.12	60	70	85
1400	7013 3.41	6768 3.34	6582 3.27	6451 3.22	6333 3.16	6296 3.15	61	72	87
1425	7136 3.45	6888 3.38	6699 3.31	6564 3.26	6445 3.20	6407 3.19	62	73	88
1450	7260 3.49	7007 3.41	6815 3.34	6677 3.29	6557 3.23	6517 3.22	64	74	90
1475	7383 3.53	7127 3.45	6931 3.38	6791 3.33	6668 3.26	6627 3.25	65	76	91
1500	7507 3.57	7246 3.49	7046 3.41	6904 3.36	6780 3.30	6736 3.29	66	77	93
1525	7630 4.01	7365 3.53	7161 3.45	7016 3.40	6891 3.33	6846 3.32	67	78	94
1550	7753 4.05	7485 3.56	7277 3.49	7129 3.43	7002 3.37	6955 3.35	68	79	96
1575	7876 4.09	7604 4.00	7391 3.52	7241 3.47	7114 3.40	7064 3.39	69	81	97
1600	7998 4.13	7723 4.04	7506 3.56	7353 3.51	7224 3.43	7173 3.42	71	82	98
1625	8121 4.17	7841 4.08	7621 4.00	7465 3.54	7335 3.47	7281 3.45	72	83	100
1650	8244 4.21	7960 4.11	7735 4.04	7577 3.58	7446 3.50	7390 3.49	73	85	101
1675	8366 4.25	8079 4.15	7850 4.07	7688 4.01	7556 3.54	7498 3.52	74	86	103
1700	8488 4.29	8197 4.19	7964 4.11	7799 4.05	7667 3.57	7606 3.55	75	87	104
1725	8610 4.33	8315 4.23	8078 4.15	7911 4.08	7777 4.00	7714 3.59	76	88	106
1750	8732 4.37	8433 4.27	8192 4.18	8022 4.12	7887 4.04	7821 4.02	77	90	107
1775	8854 4.41	8551 4.30	8306 4.22	8133 4.15	7997 4.07	7929 4.05	79	91	108
1800	8975 4.45	8669 4.34	8419 4.26	8243 4.19	8107 4.11	8036 4.09	80	92	110
1825	9097 4.49	8787 4.38	8532 4.30	8354 4.23	8216 4.14	8143 4.12	81	93	111
1850	9218 4.53	8904 4.42	8646 4.33	8464 4.26	8326 4.17	8250 4.15	82	95	113
1875	9339 4.57	9022 4.46	8759 4.37	8575 4.30	8435 4.21	8357 4.19	83	96	114
1900	9460 5.01	9139 4.49	8872 4.41	8685 4.33	8544 4.24	8463 4.22	84	97	115
1925	9581 5.05	9256 4.53	8985 4.45	8795 4.37	8653 4.28	8569 4.25	86	99	117
1950	9702 5.09	9373 4.57	9097 4.48	8904 4.40	8762 4.31	8676 4.29	87	100	118
1975	9822 5.13	9490 5.01	9210 4.52	9014 4.44	8871 4.35	8782 4.32	88	101	119

LOW AIR CONDITIONING
△FUEL = − 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23C A320-232 IAE V2527-A5 3610 03301.000011 0250300 .7801 .000200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03–05–20–015–140

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1975	9822 5.13	9490 5.01	9210 4.52	9014 4.44	8871 4.35	8782 4.32	88	101	119
2000	9943 5.18	9607 5.05	9322 4.56	9123 4.48	8979 4.38	8887 4.35	89	102	121
2025	10063 5.22	9724 5.08	9434 5.00	9233 4.51	9088 4.41	8993 4.39	90	104	122
2050	10183 5.26	9840 5.12	9546 5.03	9342 4.55	9196 4.45	9098 4.42	91	105	123
2075	10303 5.30	9957 5.16	9658 5.07	9451 4.58	9304 4.48	9204 4.45	92	106	125
2100	10423 5.34	10073 5.20	9770 5.11	9559 5.02	9412 4.52	9309 4.49	93	107	126
2125	10543 5.38	10189 5.24	9882 5.15	9668 5.06	9520 4.55	9413 4.52	95	108	128
2150	10663 5.42	10305 5.28	9993 5.18	9777 5.09	9628 4.59	9518 4.55	96	110	129
2175	10782 5.46	10421 5.31	10105 5.22	9885 5.13	9736 5.02	9623 4.59	97	111	130
2200	10901 5.50	10537 5.35	10216 5.26	9993 5.16	9843 5.06	9727 5.02	98	112	131
2225	11021 5.54	10653 5.39	10327 5.30	10101 5.20	9950 5.09	9831 5.05	99	113	133
2250	11140 5.59	10768 5.43	10438 5.34	10209 5.24	10058 5.12	9935 5.09	100	115	134
2275	11259 6.03	10884 5.47	10548 5.37	10317 5.27	10165 5.16	10039 5.12	101	116	135
2300	11378 6.07	10999 5.51	10659 5.41	10424 5.31	10271 5.19	10143 5.15	102	117	137
2325	11496 6.11	11114 5.55	10770 5.45	10532 5.35	10378 5.23	10246 5.19	103	118	138
2350	11615 6.15	11229 5.58	10880 5.49	10639 5.38	10485 5.26	10350 5.22	105	119	139
2375	11733 6.19	11344 6.02	10990 5.53	10746 5.42	10591 5.30	10453 5.25	106	121	140
2400	11852 6.23	11459 6.06	11100 5.57	10853 5.45	10698 5.33	10556 5.29	107	122	142
2425	11970 6.28	11574 6.10	11210 6.00	10960 5.49	10804 5.37	10659 5.32	108	123	143
2450	12087 6.32	11689 6.14	11320 6.04	11066 5.53	10910 5.40	10761 5.35	109	124	144
2475	12205 6.36	11803 6.18	11430 6.08	11173 5.56	11016 5.44	10864 5.39	110	125	145
2500	12322 6.40	11917 6.22	11539 6.12	11279 6.00	11122 5.47	10966 5.42	111	127	146
2525	12438 6.44	12032 6.26	11648 6.16	11385 6.04	11228 5.51	11068 5.45	112	128	148
2550	12555 6.48	12145 6.29	11758 6.20	11492 6.07	11333 5.54	11170 5.49	113	129	149
2575	12672 6.52	12258 6.33	11867 6.24	11598 6.11	11439 5.58	11272 5.52	114	130	150
2600	12788 6.56	12371 6.37	11976 6.27	11703 6.15	11544 6.01	11374 5.55	116	131	152

LOW AIR CONDITIONING
△FUEL = – 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23C A320-232 IAEV2527-A5 3610 03301.000011 0250300 .7801 .000200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03–05–20–016–140

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST.	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
(NM)	290	310	330	350	370	390	FL290 FL310	FL330 FL350	FL370 FL390
2600	12788 6.56	12371 6.37	11976 6.27	11703 6.15	11544 6.01	11374 5.55	116	131	152
2625	12904 7.00	12484 6.41	12085 6.31	11809 6.18	11649 6.04	11475 5.59	117	132	153
2650	13020 7.04	12597 6.45	12194 6.35	11914 6.22	11754 6.08	11577 6.02	118	133	154
2675	13136 7.09	12710 6.49	12303 6.39	12020 6.26	11859 6.11	11678 6.05	119	135	155
2700	13252 7.13	12823 6.53	12411 6.43	12125 6.29	11964 6.15	11779 6.09	120	136	157
2725	13368 7.17	12935 6.57	12520 6.46	12231 6.33	12069 6.18	11880 6.12	121	137	158
2750	13483 7.21	13048 7.01	12629 6.50	12336 6.37	12172 6.22	11981 6.16	122	138	159
2775	13599 7.25	13160 7.05	12737 6.54	12441 6.40	12275 6.26	12081 6.19	123	139	160
2800	13714 7.29	13272 7.09	12845 6.58	12546 6.44	12377 6.29	12183 6.22	124	140	161
2825	13829 7.33	13384 7.14	12954 7.02	12651 6.48	12480 6.33	12284 6.26	125	141	163
2850	13944 7.37	13496 7.18	13062 7.05	12756 6.51	12583 6.36	12385 6.29	126	142	164
2875	14059 7.41	13607 7.22	13170 7.09	12861 6.55	12685 6.40	12486 6.32	127	144	165
2900	14174 7.46	13719 7.26	13277 7.13	12965 6.58	12787 6.43	12587 6.36	128	145	166
2925	14289 7.50	13831 7.30	13385 7.17	13070 7.02	12889 6.47	12688 6.39	130	146	168
2950	14403 7.54	13942 7.34	13493 7.21	13174 7.06	12991 6.51	12788 6.42	131	147	169
2975	14518 7.58	14053 7.38	13600 7.24	13278 7.09	13093 6.54	12889 6.46	132	148	170
3000	14632 8.02	14164 7.42	13707 7.28	13382 7.13	13194 6.58	12989 6.49	133	149	171
3025	14746 8.06	14275 7.46	13814 7.32	13486 7.17	13296 7.01	13089 6.52	134	150	172
3050	14860 8.10	14386 7.50	13922 7.36	13590 7.20	13397 7.05	13189 6.56	135	152	174
3075	14974 8.15	14497 7.54	14028 7.40	13694 7.24	13498 7.09	13289 6.59	136	153	175
3100	15088 8.19	14608 7.58	14135 7.44	13797 7.28	13600 7.12	13389 7.02	137	154	176

LOW AIR CONDITIONING
△FUEL = − 0.3 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23C A320-232 IAE V2527-A5 3610 03301 000011 0250300 7801 000200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-017-140

IN CRUISE QUICK CHECK LONG RANGE

Applicable to: ALL 321

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
100	871 0.25	702 0.24	569 0.24	507 0.23	471 0.23	437 0.23	2	0	0
125	1093 0.30	903 0.28	743 0.28	670 0.27	628 0.27	588 0.27	4	0	0
150	1315 0.35	1103 0.33	918 0.32	833 0.31	785 0.31	738 0.30	5	1	1
175	1537 0.40	1304 0.37	1092 0.36	995 0.35	941 0.35	889 0.34	6	2	2
200	1759 0.44	1504 0.41	1266 0.40	1158 0.39	1098 0.38	1040 0.38	8	3	4
225	1980 0.49	1703 0.45	1440 0.44	1320 0.43	1254 0.42	1190 0.41	9	4	5
250	2201 0.54	1903 0.49	1613 0.48	1482 0.47	1410 0.46	1341 0.45	10	5	6
275	2422 0.59	2102 0.54	1787 0.51	1644 0.51	1566 0.50	1491 0.49	12	6	7
300	2642 1.03	2301 0.58	1960 0.55	1806 0.55	1722 0.54	1641 0.53	13	7	8
325	2862 1.08	2500 1.02	2133 0.59	1968 0.59	1877 0.58	1790 0.56	14	8	10
350	3082 1.13	2699 1.06	2306 1.03	2129 1.03	2033 1.02	1940 1.00	16	8	11
375	3302 1.18	2897 1.11	2479 1.07	2290 1.07	2188 1.05	2089 1.04	17	9	12
400	3521 1.23	3095 1.15	2652 1.11	2451 1.11	2343 1.09	2239 1.07	18	10	13
425	3740 1.27	3293 1.19	2824 1.15	2612 1.15	2497 1.13	2388 1.11	19	11	14
450	3958 1.32	3490 1.23	2997 1.19	2773 1.19	2652 1.17	2537 1.15	21	11	16
475	4176 1.37	3688 1.28	3169 1.23	2933 1.23	2806 1.21	2686 1.19	22	12	17
500	4394 1.42	3885 1.32	3341 1.27	3093 1.27	2961 1.25	2834 1.22	23	13	18
525	4612 1.47	4082 1.36	3513 1.31	3254 1.31	3115 1.29	2983 1.26	25	14	19
550	4829 1.51	4278 1.40	3685 1.35	3413 1.35	3268 1.33	3131 1.30	26	14	20
575	5046 1.56	4475 1.45	3856 1.39	3573 1.39	3422 1.37	3279 1.33	27	15	22
600	5263 2.01	4671 1.49	4028 1.43	3733 1.43	3575 1.40	3427 1.37	29	16	23
625	5480 2.06	4867 1.53	4199 1.47	3892 1.47	3729 1.44	3575 1.41	30	16	24
650	5696 2.11	5063 1.58	4370 1.51	4052 1.51	3882 1.48	3722 1.45	31	17	25
675	5912 2.16	5258 2.02	4541 1.55	4211 1.55	4034 1.52	3869 1.48	33	18	26
700	6127 2.20	5453 2.06	4712 1.59	4370 1.59	4187 1.56	4017 1.52	34	18	27
725	6343 2.25	5648 2.11	4882 2.03	4528 2.03	4339 2.00	4164 1.56	35	19	29

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23A A321–131 IAE V2530–A5 3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM-N0–03–05–20–008–150

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
725	6343 2.25	5648 2.11	4882 2.03	4528 2.03	4339 2.00	4164 1.56	35	19	29
750	6558 2.30	5843 2.15	5053 2.07	4687 2.07	4492 2.04	4310 2.00	37	20	30
775	6773 2.35	6038 2.19	5223 2.11	4845 2.11	4644 2.08	4457 2.04	38	21	31
800	6987 2.40	6232 2.24	5393 2.15	5003 2.15	4795 2.12	4604 2.07	39	21	32
825	7201 2.45	6426 2.28	5563 2.19	5161 2.19	4947 2.16	4750 2.11	41	22	33
850	7415 2.50	6620 2.32	5733 2.23	5319 2.23	5099 2.20	4896 2.15	42	23	34
875	7629 2.55	6814 2.37	5902 2.27	5477 2.27	5250 2.24	5042 2.19	43	24	35
900	7842 3.00	7007 2.41	6072 2.31	5635 2.31	5401 2.28	5188 2.23	45	24	37
925	8055 3.05	7201 2.46	6241 2.35	5792 2.35	5552 2.32	5333 2.26	46	25	38
950	8268 3.09	7394 2.50	6410 2.40	5949 2.39	5703 2.36	5479 2.30	47	26	39
975	8481 3.14	7586 2.54	6579 2.44	6106 2.43	5853 2.40	5624 2.34	49	27	40
1000	8693 3.19	7779 2.59	6748 2.48	6263 2.47	6003 2.44	5769 2.38	50	28	41
1025	8905 3.24	7971 3.03	6917 2.52	6420 2.51	6154 2.48	5914 2.42	51	28	42
1050	9116 3.29	8163 3.08	7085 2.56	6576 2.55	6304 2.52	6059 2.45	53	29	43
1075	9327 3.34	8355 3.12	7254 3.00	6733 2.59	6453 2.56	6204 2.49	54	30	45
1100	9537 3.39	8547 3.16	7422 3.04	6889 3.03	6603 3.00	6348 2.53	55	31	46
1125	9747 3.44	8738 3.21	7590 3.08	7045 3.07	6753 3.04	6493 2.57	57	31	47
1150	9957 3.49	8930 3.25	7758 3.12	7201 3.11	6902 3.08	6637 3.01	58	32	48
1175	10167 3.54	9121 3.30	7926 3.16	7356 3.15	7051 3.12	6781 3.05	59	33	49
1200	10376 3.59	9311 3.34	8094 3.20	7512 3.19	7200 3.16	6925 3.08	61	34	50
1225	10585 4.05	9501 3.39	8261 3.24	7667 3.23	7349 3.20	7068 3.12	62	34	51
1250	10793 4.10	9691 3.43	8428 3.28	7823 3.27	7497 3.24	7212 3.16	63	35	52
1275	11001 4.15	9880 3.48	8596 3.32	7978 3.31	7646 3.28	7355 3.20	65	36	53
1300	11209 4.20	10070 3.52	8763 3.36	8133 3.35	7794 3.32	7499 3.24	66	37	55
1325	11417 4.25	10259 3.57	8930 3.40	8287 3.39	7942 3.36	7642 3.28	67	38	56
1350	11624 4.30	10448 4.01	9101 3.44	8442 3.43	8090 3.40	7784 3.31	69	38	57

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23A A321–131 IAE V2530–A5 3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM-N0–03–05–20–009–150

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
1350	11624 4.30	10448 4.01	9101 3.44	8442 3.43	8090 3.40	7784 3.31	69	38	57
1375	11831 4.35	10636 4.06	9274 3.48	8596 3.47	8237 3.44	7927 3.35	70	39	58
1400	12038 4.40	10825 4.10	9448 3.51	8751 3.51	8385 3.48	8070 3.39	72	40	59
1425	12245 4.45	11013 4.15	9622 3.55	8905 3.55	8532 3.52	8212 3.43	73	41	60
1450	12451 4.51	11201 4.19	9795 3.59	9059 3.59	8680 3.56	8355 3.47	74	41	61
1475	12657 4.56	11389 4.24	9969 4.02	9213 4.03	8827 4.00	8497 3.51	76	42	62
1500	12862 5.01	11576 4.29	10143 4.06	9367 4.08	8974 4.04	8639 3.55	77	43	63
1525	13068 5.06	11763 4.33	10317 4.10	9521 4.12	9121 4.08	8781 3.59	78	44	64
1550	13273 5.11	11950 4.38	10492 4.13	9675 4.16	9267 4.12	8922 4.03	80	44	66
1575	13477 5.16	12137 4.42	10666 4.17	9828 4.20	9414 4.16	9064 4.06	81	45	67
1600	13682 5.22	12324 4.47	10840 4.21	9982 4.24	9560 4.20	9204 4.10	83	46	68
1625	13886 5.27	12510 4.52	11015 4.24	10135 4.28	9707 4.24	9345 4.14	84	47	69
1650	14090 5.32	12696 4.56	11189 4.28	10288 4.32	9853 4.28	9486 4.18	85	48	70
1675	14293 5.37	12882 5.01	11364 4.31	10441 4.36	9999 4.32	9626 4.22	87	48	71
1700	14497 5.43	13068 5.05	11539 4.35	10594 4.40	10144 4.37	9766 4.26	88	49	72
1725	14700 5.48	13253 5.10	11714 4.38	10747 4.44	10290 4.41	9906 4.30	90	50	73
1750	14902 5.53	13438 5.15	11889 4.42	10899 4.48	10436 4.45	10046 4.34	91	51	74
1775	15104 5.58	13624 5.19	12064 4.46	11052 4.52	10581 4.49	10186 4.38	92	52	75
1800	15305 6.04	13808 5.24	12239 4.49	11204 4.56	10726 4.53	10325 4.42	94	52	76
1825	15507 6.09	13993 5.29	12414 4.53	11356 5.00	10871 4.57	10464 4.46	95	53	77
1850	15708 6.14	14177 5.33	12590 4.56	11508 5.04	11016 5.01	10604 4.50	96	54	78
1875	15908 6.20	14361 5.38	12765 5.00	11660 5.08	11161 5.05	10743 4.54	98	55	79
1900	16109 6.25	14545 5.43	12941 5.03	11812 5.12	11305 5.09	10882 4.58	99	55	81
1925	16309 6.30	14729 5.48	13117 5.07	11963 5.16	11449 5.13	11020 5.02	101	56	82
1950	16509 6.36	14911 5.52	13293 5.10	12115 5.20	11594 5.17	11159 5.06	102	57	83
1975	16709 6.41	15094 5.57	13469 5.14	12266 5.25	11738 5.21	11297 5.10	104	58	84

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23A A321–131 IAE V2530–A5 3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM-N0–03–05–20–010–150

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
1975	16709 6.41	15094 5.57	13469 5.14	12266 5.25	11738 5.21	11297 5.10	104	58	84
2000	16908 6.46	15276 6.02	13645 5.17	12417 5.29	11882 5.25	11435 5.15	105	58	85
2025	17107 6.52	15458 6.07	13821 5.21	12568 5.33	12025 5.29	11573 5.19	106	59	86
2050	17306 6.57	15640 6.12	13997 5.24	12719 5.37	12169 5.33	11711 5.23	108	60	87
2075	17505 7.02	15821 6.17	14173 5.27	12870 5.41	12312 5.37	11849 5.27	109	61	88
2100	17703 7.08	16003 6.21	14350 5.31	13021 5.45	12456 5.42	11986 5.31	111	62	89
2125	17901 7.13	16184 6.26	14527 5.34	13171 5.49	12599 5.46	12124 5.35	112	62	90
2150	18099 7.19	16364 6.31	14700 5.38	13321 5.53	12742 5.50	12261 5.39	113	63	91
2175	18296 7.24	16545 6.36	14864 5.43	13471 5.57	12885 5.54	12398 5.43	115	64	92
2200	18493 7.30	16726 6.41	15028 5.47	13622 6.01	13027 5.58	12535 5.47	116	65	93
2225	18690 7.35	16906 6.46	15191 5.52	13771 6.05	13170 6.02	12672 5.51	118	65	94
2250	18887 7.41	17086 6.51	15355 5.57	13921 6.09	13312 6.06	12809 5.55	119	66	95
2275	19084 7.46	17266 6.56	15518 6.01	14071 6.13	13455 6.10	12945 5.59	121	67	96
2300	19280 7.51	17445 7.01	15681 6.06	14220 6.17	13597 6.14	13081 6.04	122	68	97
2325	19476 7.57	17625 7.06	15844 6.11	14370 6.22	13739 6.18	13218 6.08	123	68	98
2350	19671 8.02	17804 7.11	16006 6.16	14519 6.26	13880 6.23	13354 6.12	125	69	99
2375	19867 8.08	17983 7.16	16169 6.20	14668 6.30	14022 6.27	13489 6.16	126	70	99
2400	20062 8.13	18161 7.20	16331 6.25	14817 6.34	14163 6.31	13625 6.20	128	71	100
2425	20256 8.19	18340 7.25	16493 6.30	14966 6.38	14305 6.35	13761 6.24	129	72	101
2450	20451 8.25	18518 7.30	16655 6.35	15115 6.42	14446 6.39	13896 6.28	130	72	102
2475	20644 8.30	18696 7.35	16817 6.40	15264 6.46	14587 6.43	14031 6.32	132	73	103
2500	20838 8.36	18874 7.41	16978 6.45	15412 6.50	14728 6.47	14166 6.37	133	74	104
2525	21031 8.41	19052 7.46	17140 6.50	15561 6.54	14869 6.51	14301 6.41	134	75	105
2550	21224 8.47	19229 7.51	17301 6.55	15709 6.58	15010 6.55	14436 6.45	136	75	106
2575	21416 8.52	19406 7.56	17462 7.00	15858 7.02	15151 7.00	14571 6.49	137	76	107
2600	21608 8.58	19583 8.01	17623 7.05	16006 7.06	15291 7.04	14705 6.53	139	77	108

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23A A321–131 IAE V2530–A5 3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM-N0–03–05–20–011–150

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
2600	21608 8.58	19583 8.01	17623 7.05	16006 7.06	15291 7.04	14705 6.53	139	77	108
2625	21800 9.04	19760 8.06	17784 7.10	16154 7.11	15432 7.08	14840 6.57	140	78	109
2650	21992 9.09	19937 8.11	17944 7.15	16302 7.15	15572 7.12	14974 7.02	141	78	110
2675	22184 9.15	20113 8.16	18105 7.20	16449 7.19	15712 7.16	15107 7.06	143	79	111
2700	22375 9.20	20289 8.21	18265 7.25	16597 7.23	15852 7.20	15241 7.10	144	80	112
2725	22566 9.26	20465 8.26	18425 7.30	16745 7.27	15992 7.24	15375 7.14	145	80	112
2750	22757 9.32	20640 8.32	18585 7.35	16892 7.31	16132 7.28	15508 7.18	147	81	113
2775	22947 9.37	20815 8.37	18744 7.40	17039 7.35	16272 7.32	15641 7.22	148	82	114
2800	23138 9.43	20989 8.42	18904 7.46	17186 7.39	16411 7.37	15775 7.26	150	82	115
2825	23328 9.49	21164 8.48	19063 7.51	17334 7.43	16551 7.41	15907 7.31	151	83	116
2850	23517 9.54	21338 8.53	19223 7.56	17480 7.47	16690 7.45	16040 7.35	153	85	117
2875	23707 10.00	21512 8.58	19382 8.01	17627 7.51	16829 7.49	16173 7.39	154	86	118
2900	23896 10.06	21686 9.04	19540 8.07	17774 7.56	16968 7.53	16306 7.43	155	87	119
2925	24085 10.12	21860 9.09	19699 8.12	17920 8.00	17107 7.57	16438 7.47	157	88	120
2950	24274 10.17	22033 9.14	19858 8.17	18067 8.04	17246 8.01	16570 7.51	158	90	121
2975	24463 10.23	22206 9.20	20016 8.23	18213 8.08	17385 8.05	16702 7.56	160	91	122
3000	24651 10.29	22379 9.25	20174 8.28	18359 8.12	17523 8.09	16834 8.00	161	92	123
3025	24839 10.35	22552 9.31	20332 8.34	18505 8.16	17662 8.14	16966 8.04	162	94	123
3050	25027 10.40	22725 9.36	20489 8.38	18651 8.20	17800 8.18	17098 8.08	164	95	124
3075	25214 10.46	22897 9.42	20646 8.43	18797 8.24	17938 8.22	17230 8.12	165	96	125
3100	25402 10.52	23069 9.47	20803 8.47	18943 8.28	18076 8.26	17361 8.16	167	98	126

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23A A321--131 IAE V2530--A5 3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM:N0--03--05--20--012--150

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
100	405 0.23	382 0.23	360 0.23	338 0.23	316 0.23		0	0	0
125	551 0.26	524 0.26	499 0.26	473 0.26	449 0.26	425 0.26	0	0	0
150	697 0.30	666 0.30	637 0.29	608 0.29	581 0.29	558 0.29	1	0	0
175	843 0.34	808 0.33	775 0.33	743 0.33	714 0.33	691 0.33	2	2	2
200	989 0.37	950 0.37	913 0.36	878 0.36	846 0.36	823 0.36	4	3	4
225	1134 0.41	1091 0.40	1051 0.40	1012 0.39	978 0.39	955 0.39	5	5	6
250	1280 0.44	1232 0.44	1189 0.43	1147 0.43	1110 0.43	1086 0.42	6	6	11
275	1425 0.48	1373 0.47	1327 0.47	1281 0.46	1241 0.46	1218 0.46	8	8	12
300	1570 0.52	1514 0.51	1464 0.50	1415 0.49	1373 0.49	1349 0.49	9	9	14
325	1715 0.55	1655 0.54	1601 0.53	1549 0.53	1504 0.53	1480 0.52	11	10	16
350	1859 0.59	1795 0.58	1738 0.57	1682 0.56	1635 0.56	1610 0.56	12	12	18
375	2003 1.02	1936 1.01	1875 1.00	1816 1.00	1766 0.59	1741 0.59	13	13	20
400	2148 1.06	2076 1.05	2012 1.04	1949 1.03	1896 1.03	1871 1.02	15	15	21
425	2292 1.10	2216 1.08	2148 1.07	2082 1.06	2027 1.06	2000 1.06	16	16	23
450	2436 1.13	2355 1.12	2285 1.10	2215 1.10	2157 1.09	2130 1.09	17	17	25
475	2579 1.17	2495 1.15	2421 1.14	2347 1.13	2287 1.13	2259 1.12	19	19	27
500	2723 1.20	2634 1.19	2557 1.17	2480 1.16	2417 1.16	2388 1.16	20	20	28
525	2866 1.24	2773 1.22	2693 1.21	2612 1.20	2546 1.19	2516 1.19	21	22	30
550	3009 1.28	2912 1.26	2828 1.24	2744 1.23	2675 1.23	2644 1.22	23	23	32
575	3152 1.31	3051 1.30	2964 1.28	2876 1.27	2805 1.26	2773 1.25	24	24	34
600	3295 1.35	3189 1.33	3099 1.31	3007 1.30	2934 1.29	2900 1.29	25	26	35
625	3437 1.39	3328 1.37	3234 1.35	3139 1.33	3062 1.33	3028 1.32	27	27	37
650	3579 1.42	3466 1.40	3369 1.38	3270 1.37	3191 1.36	3155 1.35	28	29	39
675	3721 1.46	3603 1.44	3504 1.41	3401 1.40	3319 1.39	3282 1.39	29	30	40
700	3863 1.50	3741 1.47	3638 1.45	3532 1.44	3447 1.43	3409 1.42	30	31	42
725	4005 1.53	3879 1.51	3772 1.48	3663 1.47	3575 1.46	3535 1.45	32	33	44

ECON AIR CONDITIONING
△FUEL = − 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23A A321–131 IAE V2530–A5 3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM-N0–03–05–20–013–150

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
725	4005 1.53	3879 1.51	3772 1.48	3663 1.47	3575 1.46	3535 1.45	32	33	44
750	4146 1.57	4016 1.54	3906 1.52	3793 1.50	3703 1.49	3662 1.49	33	34	45
775	4287 2.01	4153 1.58	4040 1.55	3924 1.54	3831 1.53	3788 1.52	34	35	47
800	4428 2.04	4290 2.02	4173 1.59	4054 1.57	3958 1.56	3914 1.55	35	37	48
825	4569 2.08	4426 2.05	4307 2.02	4184 2.01	4085 1.59	4040 1.59	37	38	50
850	4710 2.12	4563 2.09	4440 2.06	4313 2.04	4212 2.03	4166 2.02	38	39	52
875	4850 2.15	4699 2.12	4573 2.09	4443 2.07	4339 2.06	4291 2.05	39	41	53
900	4991 2.19	4835 2.16	4706 2.13	4572 2.11	4466 2.09	4416 2.09	41	42	55
925	5131 2.23	4971 2.19	4838 2.16	4701 2.14	4592 2.13	4541 2.12	42	43	56
950	5271 2.27	5107 2.23	4970 2.20	4830 2.18	4719 2.16	4666 2.15	43	45	58
975	5411 2.30	5243 2.27	5103 2.23	4959 2.21	4845 2.19	4791 2.19	44	46	60
1000	5550 2.34	5378 2.30	5235 2.27	5088 2.24	4971 2.23	4915 2.22	46	47	61
1025	5689 2.38	5513 2.34	5367 2.30	5216 2.28	5096 2.26	5039 2.25	47	49	63
1050	5829 2.41	5648 2.37	5498 2.34	5345 2.31	5222 2.30	5163 2.28	48	50	64
1075	5968 2.45	5783 2.41	5630 2.37	5473 2.35	5347 2.33	5286 2.32	49	51	66
1100	6106 2.49	5917 2.45	5761 2.41	5601 2.38	5472 2.36	5410 2.35	51	53	67
1125	6245 2.53	6052 2.48	5892 2.44	5729 2.41	5597 2.40	5533 2.38	52	54	69
1150	6384 2.56	6186 2.52	6023 2.48	5856 2.45	5722 2.43	5656 2.42	53	56	70
1175	6522 3.00	6320 2.55	6154 2.51	5984 2.48	5847 2.46	5779 2.45	54	57	72
1200	6660 3.04	6454 2.59	6284 2.55	6111 2.52	5971 2.50	5901 2.48	55	58	73
1225	6798 3.08	6588 3.03	6415 2.58	6238 2.55	6096 2.53	6024 2.52	57	60	75
1250	6936 3.12	6721 3.06	6545 3.02	6365 2.59	6220 2.56	6146 2.55	58	61	76
1275	7073 3.15	6855 3.10	6675 3.05	6491 3.02	6344 3.00	6268 2.58	59	62	78
1300	7211 3.19	6988 3.13	6805 3.09	6618 3.05	6467 3.03	6389 3.02	60	64	79
1325	7348 3.23	7121 3.17	6935 3.12	6744 3.09	6591 3.06	6511 3.05	62	65	80
1350	7485 3.27	7254 3.21	7064 3.16	6871 3.12	6714 3.10	6632 3.08	63	66	82

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23A A321–131 IAE V2530–A5 3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM-N0–03–05–20–014–150

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1350	7485 3.27	7254 3.21	7064 3.16	6871 3.12	6714 3.10	6632 3.08	63	66	82
1375	7622 3.30	7386 3.24	7193 3.19	6997 3.16	6838 3.13	6753 3.12	64	68	83
1400	7759 3.34	7519 3.28	7323 3.23	7123 3.19	6961 3.16	6874 3.15	65	69	85
1425	7895 3.38	7651 3.32	7452 3.27	7248 3.23	7084 3.20	6995 3.18	66	70	86
1450	8031 3.42	7783 3.35	7580 3.30	7374 3.26	7206 3.23	7115 3.22	68	72	87
1475	8168 3.46	7915 3.39	7709 3.34	7499 3.30	7329 3.27	7235 3.25	69	73	89
1500	8304 3.50	8047 3.43	7838 3.37	7624 3.33	7451 3.30	7355 3.28	70	74	90
1525	8440 3.53	8178 3.46	7966 3.41	7749 3.36	7573 3.33	7475 3.32	71	76	92
1550	8575 3.57	8310 3.50	8094 3.44	7874 3.40	7695 3.37	7595 3.35	72	77	93
1575	8711 4.01	8441 3.54	8222 3.48	7999 3.43	7817 3.40	7714 3.38	74	78	94
1600	8846 4.05	8572 3.57	8350 3.52	8124 3.47	7939 3.43	7834 3.42	75	80	96
1625	8981 4.09	8703 4.01	8478 3.55	8248 3.50	8061 3.47	7953 3.45	76	81	97
1650	9117 4.13	8834 4.04	8605 3.59	8372 3.54	8182 3.50	8072 3.48	77	82	98
1675	9252 4.16	8965 4.08	8732 4.02	8496 3.57	8303 3.53	8190 3.52	78	84	100
1700	9388 4.20	9095 4.12	8860 4.06	8620 4.01	8424 3.57	8309 3.55	79	85	101
1725	9523 4.24	9226 4.16	8987 4.09	8744 4.04	8545 4.00	8427 3.58	81	86	102
1750	9658 4.28	9356 4.19	9113 4.13	8868 4.08	8666 4.03	8545 4.02	82	87	103
1775	9793 4.31	9486 4.23	9240 4.17	8991 4.11	8786 4.07	8663 4.05	83	89	105
1800	9927 4.35	9616 4.27	9366 4.20	9114 4.15	8907 4.10	8781 4.08	84	90	106
1825	10062 4.39	9746 4.30	9492 4.24	9238 4.18	9027 4.14	8898 4.12	85	91	107
1850	10196 4.43	9875 4.34	9617 4.27	9361 4.21	9147 4.17	9016 4.15	86	93	109
1875	10331 4.47	10005 4.38	9743 4.31	9484 4.25	9267 4.20	9133 4.18	87	94	110
1900	10465 4.50	10134 4.41	9869 4.35	9606 4.28	9387 4.24	9251 4.22	89	95	111
1925	10599 4.54	10263 4.45	9994 4.38	9729 4.32	9506 4.27	9368 4.25	90	96	112
1950	10733 4.58	10392 4.49	10119 4.42	9851 4.35	9625 4.31	9485 4.28	91	98	114
1975	10866 5.02	10521 4.52	10244 4.45	9974 4.39	9744 4.34	9602 4.32	92	99	115

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.6 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23A A321–131 IAE V2530–A5 3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM-N0–03–05–20–015–150

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1975	10866 5.02	10521 4.52	10244 4.45	9974 4.39	9744 4.34	9602 4.32	92	99	115
2000	11000 5.06	10650 4.56	10369 4.49	10096 4.42	9863 4.37	9718 4.35	93	100	116
2025	11133 5.09	10778 5.00	10493 4.53	10218 4.46	9982 4.41	9835 4.38	94	102	117
2050	11266 5.13	10906 5.04	10618 4.56	10340 4.49	10101 4.44	9951 4.42	95	103	118
2075	11399 5.17	11035 5.07	10742 5.00	10461 4.53	10219 4.48	10067 4.45	97	104	120
2100	11532 5.21	11163 5.11	10866 5.03	10583 4.56	10338 4.51	10183 4.48	98	105	121
2125	11665 5.25	11290 5.15	10990 5.07	10704 5.00	10456 4.55	10299 4.52	99	107	122
2150	11798 5.29	11418 5.18	11114 5.11	10825 5.03	10574 4.58	10414 4.55	100	108	123
2175	11930 5.32	11546 5.22	11237 5.14	10946 5.07	10692 5.01	10530 4.58	101	109	124
2200	12063 5.36	11673 5.26	11361 5.18	11067 5.10	10810 5.05	10645 5.02	102	111	126
2225	12195 5.40	11800 5.30	11484 5.22	11188 5.14	10927 5.08	10760 5.05	103	112	127
2250	12327 5.44	11928 5.33	11607 5.25	11309 5.17	11045 5.12	10875 5.09	104	113	128
2275	12459 5.48	12054 5.37	11730 5.29	11429 5.21	11162 5.15	10990 5.12	105	115	129
2300	12591 5.51	12181 5.41	11853 5.32	11549 5.24	11279 5.19	11104 5.15	107	116	130
2325	12722 5.55	12308 5.45	11976 5.36	11670 5.28	11396 5.22	11219 5.19	108	117	131
2350	12854 5.59	12434 5.48	12098 5.40	11790 5.31	11513 5.25	11333 5.22	109	118	133
2375	12985 6.03	12561 5.52	12221 5.43	11910 5.35	11629 5.29	11447 5.25	110	120	134
2400	13117 6.07	12687 5.56	12343 5.47	12029 5.38	11746 5.32	11561 5.29	111	121	135
2425	13248 6.11	12813 6.00	12465 5.51	12149 5.42	11862 5.36	11675 5.32	112	122	136
2450	13379 6.15	12939 6.03	12587 5.54	12268 5.45	11979 5.39	11788 5.35	113	124	137
2475	13510 6.18	13065 6.07	12708 5.58	12388 5.49	12095 5.43	11902 5.39	114	125	138
2500	13640 6.22	13190 6.11	12830 6.02	12507 5.52	12211 5.46	12015 5.42	115	126	140
2525	13771 6.26	13316 6.15	12951 6.05	12626 5.56	12326 5.50	12128 5.45	116	127	141
2550	13901 6.30	13441 6.19	13073 6.09	12745 6.00	12442 5.53	12241 5.49	117	128	142
2575	14032 6.34	13566 6.22	13194 6.13	12863 6.03	12557 5.56	12354 5.52	118	130	143
2600	14162 6.38	13691 6.26	13315 6.16	12982 6.07	12673 6.00	12467 5.55	119	131	144

ECON AIR CONDITIONING
△FUEL = – 0.6 %

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

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IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2600	14162 6.38	13691 6.26	13315 6.16	12982 6.07	12673 6.00	12467 5.55	119	131	144
2625	14292 6.42	13816 6.30	13436 6.20	13101 6.10	12788 6.03	12579 5.59	120	132	145
2650	14422 6.45	13941 6.34	13556 6.24	13219 6.14	12903 6.07	12691 6.02	121	133	147
2675	14551 6.49	14065 6.37	13677 6.27	13337 6.17	13018 6.10	12804 6.05	122	135	148
2700	14681 6.53	14190 6.41	13797 6.31	13455 6.21	13133 6.14	12916 6.09	123	136	149
2725	14810 6.57	14314 6.45	13917 6.35	13573 6.24	13247 6.17	13027 6.12	124	137	150
2750	14939 7.01	14438 6.49	14037 6.38	13691 6.28	13362 6.21	13139 6.16	125	138	151
2775	15068 7.05	14562 6.53	14157 6.42	13808 6.31	13476 6.24	13251 6.19	126	139	153
2800	15196 7.09	14686 6.56	14277 6.46	13926 6.35	13590 6.28	13362 6.22	127	141	154
2825	15325 7.13	14809 7.00	14397 6.49	14043 6.38	13704 6.31	13473 6.26	128	142	155
2850	15453 7.17	14932 7.04	14516 6.53	14161 6.42	13818 6.35	13584 6.29	129	143	156
2875	15581 7.21	15055 7.08	14635 6.57	14278 6.46	13932 6.38	13695 6.32	130	144	157
2900	15710 7.25	15178 7.12	14754 7.01	14395 6.49	14045 6.42	13806 6.36	131	145	158
2925	15837 7.29	15300 7.16	14873 7.04	14511 6.53	14159 6.45	13917 6.39	132	146	159
2950	15965 7.33	15423 7.20	14991 7.08	14628 6.56	14272 6.48	14027 6.42	133	148	161
2975	16093 7.37	15545 7.24	15110 7.12	14744 7.00	14385 6.52	14138 6.46	134	149	162
3000	16221 7.41	15667 7.28	15228 7.15	14860 7.03	14499 6.55	14248 6.49	135	150	163
3025	16348 7.45	15789 7.32	15346 7.19	14975 7.07	14611 6.59	14358 6.53	136	151	164
3050	16475 7.49	15911 7.35	15464 7.23	15090 7.11	14724 7.02	14468 6.56	137	152	165
3075	16602 7.53	16032 7.39	15581 7.27	15205 7.14	14837 7.06	14578 6.59	138	154	166
3100	16729 7.57	16154 7.43	15699 7.30	15319 7.18	14949 7.09	14687 7.03	139	155	167

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.6 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23A A321-131 IAE V2530-A5 3610.03301.000011 0250300 .7801 .00200 140 0300350 65 0 100 20 20 20 18590 FCOM-N0-03-05-20-017-150

PERFORMANCE

HOLDING

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GENERAL

Applicable to: ALL 321

Holding tables contain information about the total fuel flow that allows the flight crew to plan holding and reserve fuel requirements.

They are established for flight in a race track holding pattern for two different configurations:
- Clean configuration at 210 kt and green dot speed
- Configuration 1 at 170 kt and S speed.

Green dot speed in clean configuration and S in CONF 1 are speeds between the minimum fuel speed and the minimum drag speed.
These charts are established with air conditioning in normal mode and the center of gravity at 33 %.

GENERAL

Applicable to: ALL 320

Holding tables contain information about the total fuel flow that allows the flight crew to plan holding and reserve fuel requirements.

They are established for flight in a race track holding pattern for two different configurations:
- Clean configuration at 210 kt and green dot speed + 20 kt
- Configuration 1 at 170 kt and S speed.

Green dot speed in clean configuration and S in CONF 1 are speeds between the minimum fuel speed and the minimum drag speed.
These charts are established with air conditioning in normal mode and the center of gravity at 33 %.

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CONF 0 - GREEN DOT SPEED

Applicable to: ALL 320

RACE TRACK HOLDING PATTERN - GREEN DOT SPEED + 20 KNOTS								
MAX. CRUISE THRUST LIMITS CLEAN CONFIGURATION NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=33.0%		EPR FF (KG/H/ENG)	
WEIGHT (1000KG)	FL 15	FL 50	FL100	FL140	FL180	FL200	FL220	FL250
46	1.011 919	1.015 885	1.022 844	1.031 827	1.046 822	1.055 821	1.065 826	1.083 835
48	1.012 949	1.016 914	1.024 876	1.034 861	1.050 858	1.060 858	1.071 863	1.091 868
50	1.013 979	1.017 944	1.026 909	1.038 897	1.054 895	1.065 896	1.077 901	1.098 899
52	1.014 1009	1.018 973	1.028 942	1.041 933	1.059 932	1.070 933	1.083 940	1.106 923
54	1.015 1038	1.020 1003	1.031 976	1.044 970	1.063 970	1.075 971	1.089 975	1.114 948
56	1.016 1068	1.021 1035	1.033 1011	1.048 1008	1.068 1008	1.081 1010	1.095 1007	1.123 973
58	1.017 1098	1.023 1068	1.036 1047	1.052 1045	1.073 1047	1.086 1048	1.101 1039	1.131 1000
60	1.018 1129	1.024 1102	1.038 1084	1.055 1084	1.078 1086	1.092 1081	1.108 1065	1.140 1030
62	1.019 1160	1.026 1136	1.041 1122	1.059 1122	1.083 1126	1.098 1114	1.115 1090	1.148 1059
64	1.020 1192	1.028 1170	1.044 1161	1.062 1161	1.088 1163	1.104 1146	1.123 1115	1.157 1089
66	1.022 1226	1.030 1206	1.047 1199	1.066 1201	1.093 1196	1.110 1171	1.130 1143	1.166 1119
68	1.023 1260	1.031 1242	1.050 1238	1.070 1241	1.098 1229	1.117 1197	1.138 1173	1.175 1151
70	1.024 1294	1.033 1278	1.053 1277	1.074 1281	1.103 1257	1.123 1222	1.145 1203	1.184 1185
72	1.026 1330	1.035 1317	1.056 1317	1.078 1322	1.109 1282	1.130 1250	1.153 1233	1.194 1220
74	1.027 1365	1.038 1357	1.059 1357	1.082 1363	1.115 1308	1.137 1280	1.160 1263	1.203 1261
76	1.029 1402	1.040 1397	1.062 1398	1.086 1403	1.121 1335	1.143 1311	1.168 1294	1.213 1302
78	1.030 1439	1.042 1437	1.065 1440	1.090 1438	1.127 1361	1.150 1340	1.176 1326	1.223 1343
LOW AIR CONDITIONING ΔFF = –0.2 %	ENGINE ANTI ICE ON ΔFF = +3.5 %		TOTAL ANTI ICE ON ΔFF = +5.5 %		PER 1° ABOVE ISA ΔFF = +0.3 %		STRAIGHT LINE ΔFF = –5 %	

CONF 0 - GREEN DOT SPEED

Applicable to: ALL 321

RACE TRACK HOLDING PATTERN - GREEN DOT SPEED								
MAX. CRUISE THRUST LIMITS CLEAN CONFIGURATION NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=33.0%		EPR FF (KG/H/ENG)	
WEIGHT (1000KG)	FL 15	FL 50	FL100	FL140	FL180	FL200	FL220	FL250
58	1.031 1186	1.037 1156	1.049 1123	1.064 1107	1.084 1070	1.096 1065	1.112 1040	1.137 1033
60	1.032 1220	1.038 1190	1.051 1159	1.068 1143	1.089 1106	1.104 1080	1.119 1075	1.145 1068
62	1.034 1254	1.040 1225	1.054 1195	1.072 1151	1.094 1142	1.110 1115	1.126 1109	1.153 1099
64	1.035 1288	1.042 1260	1.057 1232	1.075 1188	1.098 1178	1.116 1150	1.133 1145	1.163 1131
66	1.037 1322	1.044 1295	1.061 1268	1.079 1225	1.106 1192	1.123 1185	1.139 1180	1.173 1163
68	1.038 1357	1.046 1331	1.064 1305	1.083 1262	1.112 1227	1.129 1220	1.146 1215	1.183 1197
70	1.040 1392	1.048 1366	1.067 1342	1.087 1299	1.117 1262	1.135 1256	1.153 1249	1.193 1231
72	1.041 1427	1.050 1402	1.070 1379	1.091 1336	1.123 1297	1.141 1291	1.161 1283	1.202 1265
74	1.043 1463	1.053 1439	1.073 1382	1.095 1372	1.128 1332	1.147 1327	1.170 1316	1.213 1300
76	1.044 1498	1.055 1476	1.076 1419	1.099 1409	1.134 1368	1.154 1362	1.178 1349	1.224 1336
78	1.046 1534	1.057 1513	1.079 1457	1.105 1418	1.139 1404	1.160 1396	1.187 1383	1.236 1374
80	1.048 1570	1.060 1549	1.083 1494	1.110 1453	1.145 1440	1.168 1430	1.195 1418	1.247 1412
82	1.049 1606	1.062 1587	1.086 1531	1.115 1489	1.150 1474	1.176 1463	1.204 1452	1.259 1452
84	1.051 1643	1.065 1624	1.089 1568	1.119 1524	1.156 1509	1.184 1497	1.213 1487	1.270 1492
86	1.053 1680	1.067 1662	1.092 1605	1.124 1560	1.163 1543	1.191 1532	1.222 1522	1.281 1532
88	1.055 1717	1.069 1699	1.095 1642	1.128 1595	1.170 1575	1.199 1566	1.232 1560	1.292 1573
90	1.057 1754	1.072 1695	1.099 1679	1.132 1631	1.177 1609	1.207 1601	1.242 1598	1.304 1616
92	1.059 1792	1.074 1733	1.104 1684	1.137 1667	1.184 1643	1.215 1636	1.252 1637	1.315 1661
94	1.061 1830	1.077 1771	1.108 1720	1.141 1704	1.191 1678	1.223 1671	1.262 1676	1.327 1707
ECON AIR CONDITIONING △FF = – 0.3 %	ENGINE ANTI ICE ON △FF = + 3 %		TOTAL ANTI ICE ON △FF = + 6 %		PER 1° ABOVE ISA △FF = + 0.3 %		STRAIGHT LINE △FF = – 5 %	

CONF 0 - 210KT

Applicable to: ALL 320

RACE TRACK HOLDING PATTERN - 210KT								
MAX. CRUISE THRUST LIMITS CLEAN CONFIGURATION NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=33.0%		EPR FF (KG/H/ENG)	
WEIGHT (1000KG)	FL 15	FL 50	FL100	FL140	FL180	FL200	FL220	FL250
46	1.004 968	1.006 927	1.011 883	1.019 866	1.031 864	1.039 865	1.048 865	1.065 858
48	1.006 986	1.008 946	1.014 904	1.022 891	1.036 891	1.044 891	1.054 893	1.072 884
50	1.007 1004	1.010 966	1.017 928	1.026 918	1.040 917	1.050 919	1.060 921	1.080 904
52	1.009 1023	1.012 986	1.019 954	1.030 946	1.045 945	1.055 947	1.067 949	1.087 924
54	1.011 1043	1.014 1008	1.022 980	1.034 974	1.051 975	1.061 976	1.073 975	1.096 946
56	1.012 1063	1.016 1032	1.026 1007	1.038 1004	1.056 1004	1.067 1006	1.080 997	1.105 966
58	1.014 1085	1.019 1057	1.029 1037	1.043 1034	1.062 1034	1.074 1032	1.088 1020	1.114 993
60	1.016 1108	1.021 1084	1.033 1068	1.047 1065	1.068 1065	1.080 1056	1.095 1043	1.123 1021
62	1.018 1134	1.024 1111	1.037 1099	1.052 1098	1.074 1093	1.087 1080	1.103 1065	1.133 1049
64	1.020 1161	1.026 1141	1.041 1132	1.057 1130	1.080 1119	1.094 1106	1.111 1094	1.143 1076
66	1.022 1189	1.030 1172	1.045 1165	1.063 1164	1.086 1145	1.101 1131	1.119 1125	1.153 1108
68	1.025 1217	1.033 1205	1.049 1200	1.068 1198	1.093 1173	1.109 1163	1.128 1158	1.164 1145
70	1.027 1249	1.036 1240	1.054 1236	1.074 1228	1.100 1201	1.117 1198	1.137 1190	1.176 1190
72	1.030 1283	1.040 1276	1.059 1273	1.080 1259	1.107 1237	1.125 1234	1.146 1216	1.188 1238
74	1.033 1318	1.043 1313	1.063 1311	1.086 1291	1.115 1276	1.134 1271	1.156 1254	1.200 1279
76	1.036 1355	1.047 1351	1.069 1347	1.092 1324	1.123 1316	1.143 1299	1.166 1298	1.214 1320
78	1.039 1393	1.051 1390	1.074 1382	1.098 1358	1.131 1358	1.152 1337	1.177 1349	1.223 1361
LOW AIR CONDITIONING △FF = – 0.2 %	ENGINE ANTI ICE ON △FF = + 3 %		TOTAL ANTI ICE ON △FF = + 5 %		PER 1° ABOVE ISA △FF = + 0.3 %		STRAIGHT LINE △FF = – 5 %	

CONF 0 - 210KT

Applicable to: ALL 321

RACE TRACK HOLDING PATTERN - 210KT								
MAX. CRUISE THRUST LIMITS CLEAN CONFIGURATION NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=33.0%		EPR FF (KG/H/ENG)	
WEIGHT (1000KG)	FL 15	FL 50	FL100	FL140	FL180	FL200	FL220	FL250
58	1.026 1213	1.032 1176	1.043 1139	1.057 1121	1.077 1083	1.088 1076	1.105 1050	1.132 1036
60	1.029 1239	1.035 1203	1.047 1170	1.062 1153	1.083 1115	1.095 1108	1.113 1081	1.142 1068
62	1.031 1266	1.038 1233	1.051 1201	1.068 1185	1.089 1147	1.105 1120	1.122 1112	1.152 1098
64	1.034 1294	1.041 1264	1.055 1234	1.073 1191	1.096 1180	1.113 1152	1.131 1145	1.164 1131
66	1.036 1323	1.044 1296	1.060 1269	1.079 1226	1.105 1192	1.122 1185	1.140 1180	1.177 1167
68	1.039 1355	1.047 1329	1.065 1304	1.084 1262	1.113 1226	1.131 1220	1.150 1215	1.190 1205
70	1.042 1389	1.050 1363	1.070 1341	1.090 1299	1.121 1261	1.140 1255	1.161 1250	1.204 1244
72	1.044 1423	1.054 1401	1.075 1346	1.096 1337	1.130 1296	1.149 1292	1.172 1287	1.219 1284
74	1.047 1459	1.058 1439	1.080 1385	1.104 1348	1.138 1333	1.159 1329	1.184 1326	1.234 1326
76	1.050 1496	1.062 1478	1.085 1424	1.111 1386	1.147 1371	1.169 1367	1.195 1366	1.250 1369
78	1.054 1536	1.067 1519	1.091 1465	1.119 1424	1.156 1410	1.179 1406	1.208 1406	1.259 1404
80	1.058 1577	1.071 1522	1.096 1507	1.127 1463	1.165 1450	1.190 1446	1.217 1445	1.270 1442
82	1.062 1619	1.076 1564	1.102 1517	1.135 1503	1.175 1491	1.196 1482	1.226 1483	1.280 1479
84	1.066 1662	1.080 1606	1.109 1559	1.143 1544	1.179 1524	1.204 1520	1.235 1520	1.291 1518
86	1.070 1702	1.085 1650	1.116 1600	1.152 1589	1.185 1560	1.212 1558	1.245 1556	1.302 1558
88	1.074 1709	1.090 1695	1.123 1643	1.154 1619	1.192 1596	1.220 1597	1.254 1593	1.314 1600
90	1.078 1754	1.095 1741	1.130 1687	1.158 1654	1.198 1634	1.229 1635	1.263 1631	1.326 1643
92	1.082 1800	1.100 1749	1.132 1716	1.162 1688	1.206 1671	1.237 1671	1.273 1669	1.338 1687
94	1.087 1847	1.106 1796	1.136 1751	1.167 1722	1.213 1710	1.246 1707	1.282 1707	1.349 1731
ECON AIR CONDITIONING △FF = – 0.3 %	ENGINE ANTI ICE ON △FF = + 3 %		TOTAL ANTI ICE ON △FF = + 6 %		PER 1° ABOVE ISA △FF = + 0.3 %		STRAIGHT LINE △FF = – 5 %	

CONF 1 - S SPEED

Applicable to: ALL 320

RACE TRACK HOLDING PATTERN - S SPEED								
MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=33.0%		EPR FF (KG/H/ENG)	
WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
46	1.022 896	1.026 880	1.036 868	1.041 869	1.048 870	1.056 874	1.065 876	1.076 871
48	1.023 932	1.028 918	1.039 909	1.045 910	1.052 913	1.060 917	1.070 914	1.081 907
50	1.025 968	1.030 956	1.042 951	1.048 952	1.056 956	1.065 957	1.075 951	1.087 943
52	1.026 1005	1.032 994	1.045 993	1.052 995	1.060 998	1.070 996	1.081 988	1.093 979
54	1.028 1043	1.034 1033	1.048 1035	1.055 1039	1.064 1039	1.075 1033	1.086 1025	1.099 1014
56	1.029 1081	1.036 1073	1.051 1078	1.059 1080	1.069 1078	1.080 1070	1.092 1061	1.106 1054
58	1.031 1120	1.038 1115	1.055 1121	1.063 1121	1.073 1116	1.085 1107	1.097 1096	1.113 1096
60	1.033 1159	1.041 1157	1.058 1162	1.067 1161	1.078 1153	1.090 1143	1.103 1133	1.119 1137
62	1.035 1198	1.043 1200	1.062 1203	1.072 1199	1.083 1190	1.095 1179	1.109 1176	1.126 1177
64	1.036 1239	1.046 1242	1.066 1244	1.076 1237	1.087 1227	1.100 1214	1.116 1218	1.133 1216
66	1.038 1281	1.048 1286	1.070 1283	1.080 1274	1.092 1263	1.106 1255	1.122 1258	1.140 1248
68	1.040 1324	1.051 1328	1.073 1321	1.084 1311	1.097 1299	1.111 1298	1.128 1298	1.147 1279
70	1.043 1367	1.054 1369	1.077 1359	1.089 1347	1.101 1334	1.117 1339	1.134 1337	1.154 1315
72	1.045 1411	1.057 1411	1.081 1396	1.093 1384	1.107 1377	1.123 1380	1.140 1367	1.161 1351
74	1.047 1454	1.060 1452	1.085 1433	1.097 1420	1.112 1419	1.128 1419	1.147 1399	1.168 1390
76	1.049 1495	1.063 1494	1.089 1470	1.102 1456	1.117 1461	1.134 1459	1.153 1435	1.175 1432
78	1.052 1536	1.066 1535	1.093 1506	1.107 1499	1.122 1502	1.140 1490	1.160 1472	1.183 1474
LOW AIR CONDITIONING △FF = – 0.2 %	ENGINE ANTI ICE ON △FF = + 3 %		TOTAL ANTI ICE ON △FF = + 5 %		PER 1° ABOVE ISA △FF = + 0.3 %		STRAIGHT LINE △FF = – 5 %	

CONF 1 - S SPEED

Applicable to: ALL 321

RACE TRACK HOLDING PATTERN - S SPEED

MAX. CRUISE THRUST LIMITS
CONFIGURATION 1
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

EPR
FF (KG/H/ENG)

WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
58	1.047 1235	1.055 1224	1.073 1215	1.082 1182	1.093 1176	1.105 1145	1.120 1139	1.138 1132
60	1.048 1277	1.058 1268	1.077 1229	1.086 1222	1.097 1216	1.111 1185	1.127 1177	1.146 1171
62	1.050 1318	1.061 1312	1.081 1270	1.091 1263	1.102 1230	1.117 1224	1.134 1216	1.154 1210
64	1.053 1362	1.064 1356	1.085 1311	1.095 1304	1.108 1271	1.123 1263	1.142 1256	1.161 1249
66	1.055 1407	1.067 1400	1.089 1351	1.100 1328	1.113 1310	1.130 1302	1.149 1295	1.168 1288
68	1.057 1451	1.070 1444	1.093 1392	1.104 1356	1.119 1349	1.137 1341	1.156 1334	1.175 1327
70	1.060 1496	1.073 1479	1.097 1433	1.109 1396	1.125 1388	1.143 1380	1.162 1373	1.183 1366
72	1.062 1540	1.076 1494	1.101 1442	1.115 1436	1.131 1427	1.150 1420	1.169 1413	1.191 1402
74	1.065 1584	1.079 1535	1.105 1483	1.120 1475	1.137 1467	1.156 1459	1.176 1452	1.199 1440
76	1.068 1629	1.082 1575	1.110 1524	1.126 1514	1.144 1507	1.162 1499	1.183 1491	1.209 1478
78	1.070 1674	1.085 1616	1.115 1563	1.131 1554	1.150 1546	1.168 1538	1.190 1528	1.219 1518
80	1.073 1680	1.089 1657	1.120 1602	1.137 1593	1.155 1585	1.174 1578	1.197 1565	1.229 1560
82	1.076 1716	1.092 1698	1.125 1642	1.143 1633	1.161 1625	1.181 1617	1.206 1603	1.239 1602
84	1.079 1757	1.095 1740	1.130 1681	1.149 1673	1.166 1665	1.187 1654	1.215 1642	1.249 1643
86	1.081 1797	1.099 1781	1.135 1721	1.154 1712	1.172 1704	1.194 1692	1.224 1684	1.260 1685
88	1.084 1838	1.102 1784	1.141 1761	1.159 1752	1.178 1744	1.201 1730	1.234 1726	1.270 1727
90	1.087 1879	1.106 1825	1.146 1801	1.164 1792	1.184 1782	1.210 1769	1.243 1768	1.281 1769
92	1.090 1920	1.110 1866	1.151 1840	1.169 1832	1.190 1820	1.218 1808	1.252 1810	1.291 1811
94	1.093 1962	1.114 1905	1.156 1880	1.174 1872	1.196 1857	1.227 1851	1.262 1852	1.302 1855

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA	STRAIGHT LINE
△FF = – 0.3 %	△FF = + 3 %	△FF = + 6 %	△FF = + 0.3 %	△FF = – 5 %

CONF 1 - 170KT

Applicable to: ALL 320

RACE TRACK HOLDING PATTERN - 170KT								
MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=33.0%		EPR FF (KG/H/ENG)	
WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
46	1.020 909	1.023 891	1.032 876	1.037 874	1.044 876	1.051 874	1.060 873	1.070 870
48	1.022 939	1.026 922	1.037 912	1.042 913	1.049 915	1.057 914	1.067 913	1.078 906
50	1.024 969	1.030 957	1.041 951	1.047 953	1.055 956	1.064 956	1.075 951	1.087 943
52	1.027 1003	1.033 993	1.046 992	1.053 996	1.062 1001	1.072 998	1.083 991	1.095 982
54	1.031 1040	1.037 1032	1.051 1037	1.059 1042	1.069 1047	1.079 1040	1.091 1032	1.105 1027
56	1.034 1079	1.041 1075	1.057 1084	1.066 1091	1.076 1091	1.087 1084	1.100 1076	1.115 1079
58	1.038 1119	1.046 1121	1.063 1135	1.073 1138	1.083 1138	1.095 1130	1.109 1129	1.126 1134
60	1.041 1166	1.050 1169	1.070 1187	1.080 1187	1.091 1187	1.104 1183	1.120 1185	1.137 1183
62	1.045 1215	1.056 1223	1.077 1238	1.087 1239	1.099 1239	1.114 1239	1.130 1242	1.149 1234
64	1.049 1265	1.061 1278	1.084 1291	1.095 1292	1.109 1295	1.124 1297	1.141 1292	1.161 1298
66	1.054 1321	1.067 1335	1.091 1347	1.104 1348	1.118 1355	1.135 1354	1.153 1353	1.174 1364
68	1.060 1379	1.073 1393	1.099 1404	1.113 1407	1.128 1416	1.146 1413	1.166 1421	1.188 1430
70	1.065 1440	1.080 1451	1.108 1462	1.122 1467	1.139 1475	1.157 1480	1.178 1486	1.202 1485
72	1.071 1502	1.086 1509	1.117 1522	1.132 1528	1.150 1540	1.169 1546	1.191 1549	1.217 1544
74	1.077 1561	1.093 1569	1.126 1583	1.142 1593	1.161 1615	1.181 1613	1.205 1611	1.232 1613
76	1.083 1621	1.100 1629	1.136 1648	1.153 1667	1.172 1680	1.194 1679	1.219 1677	1.248 1681
78	1.089 1684	1.108 1691	1.146 1721	1.164 1744	1.184 1746	1.208 1744	1.234 1748	1.265 1748
LOW AIR CONDITIONING △FF = – 0.2 %	ENGINE ANTI ICE ON △FF = + 3 %		TOTAL ANTI ICE ON △FF = + 5 %		PER 1° ABOVE ISA △FF = + 0.3 %		STRAIGHT LINE △FF = – 5 %	

CONF 1 - 170KT

Applicable to: ALL 321

RACE TRACK HOLDING PATTERN - 170KT								
MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=33.0%		EPR FF (KG/H/ENG)	
WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
58	1.049 1231	1.059 1224	1.078 1190	1.087 1187	1.098 1187	1.111 1156	1.126 1148	1.144 1142
60	1.053 1276	1.064 1271	1.084 1237	1.094 1235	1.105 1208	1.120 1201	1.136 1194	1.155 1188
62	1.058 1324	1.069 1320	1.090 1285	1.101 1257	1.114 1256	1.129 1249	1.147 1242	1.167 1237
64	1.063 1374	1.075 1371	1.097 1336	1.109 1307	1.123 1306	1.140 1300	1.158 1294	1.178 1289
66	1.067 1425	1.080 1389	1.105 1361	1.118 1361	1.133 1361	1.150 1356	1.169 1350	1.190 1340
68	1.072 1481	1.086 1445	1.112 1417	1.126 1417	1.142 1418	1.160 1412	1.180 1405	1.203 1392
70	1.077 1531	1.092 1502	1.120 1474	1.135 1474	1.152 1477	1.171 1471	1.192 1460	1.218 1458
72	1.083 1560	1.098 1561	1.128 1533	1.144 1535	1.162 1538	1.182 1530	1.204 1520	1.234 1526
74	1.088 1620	1.105 1589	1.137 1596	1.154 1598	1.173 1602	1.194 1592	1.220 1592	1.252 1599
76	1.094 1687	1.112 1655	1.147 1664	1.165 1666	1.185 1668	1.208 1663	1.237 1667	1.272 1669
78	1.101 1719	1.120 1723	1.157 1732	1.176 1735	1.197 1736	1.223 1738	1.254 1743	1.293 1740
80	1.108 1787	1.129 1792	1.168 1802	1.188 1805	1.211 1812	1.239 1816	1.274 1818	1.314 1823
82	1.115 1858	1.137 1864	1.180 1875	1.201 1878	1.226 1892	1.257 1897	1.295 1895	1.338 1913
84	1.123 1931	1.146 1939	1.192 1950	1.215 1957	1.242 1974	1.277 1977	1.317 1983	1.362 2010
86	1.131 2006	1.156 2014	1.205 2027	1.230 2039	1.260 2058	1.297 2058	1.339 2078	1.387 2113
88	1.139 2083	1.167 2090	1.218 2109	1.244 2124	1.279 2142	1.318 2151	1.362 2178	1.414 2225
90	1.148 2161	1.177 2168	1.232 2193	1.261 2210	1.298 2228	1.339 2249	1.386 2285	1.442 2347
92	1.157 2240	1.188 2248	1.246 2279	1.279 2298	1.317 2324	1.361 2352	1.407 2383	1.455 2413
94	1.166 2321	1.199 2332	1.262 2368	1.298 2387	1.338 2424	1.376 2428	1.419 2446	1.469 2482
ECON AIR CONDITIONING △FF = – 0.3 %	ENGINE ANTI ICE ON △FF = + 3 %		TOTAL ANTI ICE ON △FF = + 6 %		PER 1° ABOVE ISA △FF = + 0.3 %		STRAIGHT LINE △FF = – 5 %	

PERFORMANCE

DESCENT

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PER-DES-EMG EMERGENCY

EMERGENCY DESCENT - M.82/350KT ..... A

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GENERAL

Applicable to: ALL

Descent tables are established for normal descent speed M .78 / 300 kt /250 kt and emergency descent at MMO/VMO with airbrakes extended, down to 1 500 ft with :

- Normal air conditioning
- CG = 33 %
- Anti ice OFF

For normal descent, cabin vertical speed is limited to 350 ft/min

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DESCENT- M.78/300KT/250KT

Applicable to: ALL 320

DESCENT - M.78/300KT/250KT									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%		MAXIMUM CABIN RATE OF DESCENT 350FT/MIN				
WEIGHT (1000KG)	45				65				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	IAS (KT)
390	16.1	188	98	1.047	19.0	192	114	IDLE	241
370	14.6	158	87	1.066	18.2	185	108	IDLE	252
350	13.5	139	78	IDLE	17.5	178	102	IDLE	264
330	12.9	134	74	IDLE	16.8	171	97	IDLE	277
310	12.4	129	71	IDLE	16.1	166	93	IDLE	289
290	12.0	125	67	IDLE	15.5	160	88	IDLE	300
270	11.4	120	63	IDLE	14.7	153	82	IDLE	300
250	10.8	115	58	IDLE	13.9	146	76	IDLE	300
240	10.5	112	56	IDLE	13.5	143	73	IDLE	300
220	9.9	107	52	IDLE	12.7	136	67	IDLE	300
200	9.3	102	48	IDLE	11.8	129	62	IDLE	300
180	8.7	97	44	IDLE	11.0	122	56	IDLE	300
160	8.0	91	40	IDLE	10.1	114	50	IDLE	300
140	7.4	85	36	IDLE	9.2	106	45	IDLE	300
120	6.7	79	32	IDLE	8.3	97	39	IDLE	300
100	6.0	72	28	IDLE	7.4	88	34	IDLE	300
50	2.2	28	10	IDLE	2.7	34	12	IDLE	250
15	.0	0	0	IDLE	.0	0	0	IDLE	250

CORRECTIONS	LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	–	+ 4 %	+ 18 %	+ 0.3 %
FUEL	– 1 %	+ 17 %	+ 85 %	+ 0.4 %
DISTANCE	–	+ 4 %	+ 18 %	+ 0.4 %

10F –08F0A320–232 IAE V2527–A5 23100000C5KG330 0 018590 0 0–1–350.0 15.0 .00 0 03 .780300.000250.000 0 FCOM-N0-03-05-30-002-140

DESCENT- M.78/300KT/250KT

Applicable to: ALL 321

DESCENT - M.78/300KT/250KT									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%		MAXIMUM CABIN RATE OF DESCENT 350FT/MIN				
WEIGHT (1000KG)	60				80				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	IAS (KT)
390	16.7	173	100	IDLE					241
370	15.9	166	95	IDLE	18.0	186	108	IDLE	252
350	15.2	159	90	IDLE	17.3	179	103	IDLE	264
330	14.6	153	85	IDLE	16.6	173	98	IDLE	277
310	14.0	148	81	IDLE	16.0	167	93	IDLE	289
290	13.5	143	76	IDLE	15.3	161	88	IDLE	300
270	12.8	137	71	IDLE	14.5	154	81	IDLE	300
250	12.1	131	66	IDLE	13.6	146	75	IDLE	300
240	11.7	127	63	IDLE	13.2	143	72	IDLE	300
220	11.0	121	58	IDLE	12.3	135	66	IDLE	300
200	10.2	114	53	IDLE	11.5	127	60	IDLE	300
180	9.5	108	48	IDLE	10.5	119	54	IDLE	300
160	8.7	100	43	IDLE	9.6	110	48	IDLE	300
140	7.9	93	39	IDLE	8.7	101	42	IDLE	300
120	7.1	85	34	IDLE	7.7	92	37	IDLE	300
100	6.3	76	29	IDLE	6.7	81	31	IDLE	300
50	2.4	30	10	IDLE	2.5	32	11	IDLE	250
15	.0	0	0	IDLE	.0	0	0	IDLE	250

CORRECTIONS	ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	–	+ 1 min	+ 3 min	–
FUEL	– 2 %	+ 17 %	+ 90 %	+ 0.7 %
DISTANCE	–	+ 4 %	+ 20 %	+ 0.4 %

10B -08FA321-131 IAE V2530-A5 23100000C5KG330 0 018590 0 0-1-350.0 15.0 .00 0 03 .780300.000250.000 0 FCOM-N0-03-05-30-002-150

EMERGENCY DESCENT - M.82/350KT

Applicable to: ALL 320

EMERGENCY DESCENT - M.82/350KT									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%		AIRBRAKES EXTENDED				
WEIGHT (1000KG)	45				65				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	IAS (KT)
390	4.8	42	34	IDLE	6.5	57	47	IDLE	255
370	4.5	39	32	IDLE	6.2	54	44	IDLE	267
350	4.2	37	30	IDLE	5.9	51	42	IDLE	279
330	4.0	35	28	IDLE	5.6	48	39	IDLE	292
310	3.8	33	26	IDLE	5.3	46	37	IDLE	306
290	3.6	31	25	IDLE	5.1	44	35	IDLE	319
270	3.4	29	23	IDLE	4.8	41	33	IDLE	333
250	3.2	28	22	IDLE	4.6	39	31	IDLE	347
240	3.1	27	21	IDLE	4.4	38	30	IDLE	350
220	2.9	25	19	IDLE	4.1	35	28	IDLE	350
200	2.6	23	17	IDLE	3.8	33	25	IDLE	350
180	2.4	21	16	IDLE	3.4	30	22	IDLE	350
160	2.2	19	14	IDLE	3.1	27	20	IDLE	350
140	1.9	17	12	IDLE	2.7	25	17	IDLE	350
120	1.7	15	10	IDLE	2.4	22	15	IDLE	350
100	1.4	13	9	IDLE	2.0	19	12	IDLE	350
50	.7	7	4	IDLE	1.0	10	6	IDLE	350
0	.0	0	0	IDLE	.0	0	0	IDLE	350

10F -08F0A320-232 IAE V2527-A5 23310000C5KG330 0 018590 0 0-1 .0 .0 .00 0 02 .820350.000 .000 0 FCOM-N0-03-05-30-003-140

EMERGENCY DESCENT - M.82/350KT

Applicable to: ALL 321

EMERGENCY DESCENT - M.82/350KT									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%		AIRBRAKES EXTENDED				
WEIGHT (1000KG)	55				75				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	IAS (KT)
390	6.2	57	44	IDLE					255
370	5.8	54	41	IDLE	7.3	68	53	IDLE	267
350	5.4	50	39	IDLE	7.0	65	50	IDLE	279
330	5.1	47	36	IDLE	6.6	61	47	IDLE	292
310	4.8	45	34	IDLE	6.3	58	44	IDLE	306
290	4.5	42	32	IDLE	6.0	55	42	IDLE	319
270	4.3	40	30	IDLE	5.7	53	39	IDLE	333
250	4.1	38	28	IDLE	5.4	50	37	IDLE	347
240	4.0	37	27	IDLE	5.2	49	36	IDLE	350
220	3.7	35	25	IDLE	4.8	46	33	IDLE	350
200	3.4	32	22	IDLE	4.4	42	29	IDLE	350
180	3.0	30	20	IDLE	4.0	39	26	IDLE	350
160	2.7	27	18	IDLE	3.6	36	23	IDLE	350
140	2.4	24	15	IDLE	3.2	32	20	IDLE	350
120	2.1	22	13	IDLE	2.8	28	17	IDLE	350
100	1.8	19	11	IDLE	2.3	24	14	IDLE	350
50	.9	10	5	IDLE	1.2	13	7	IDLE	350
0	.0	0	0	IDLE	.0	0	0	IDLE	350

H09C -08B1A321-131 IAE V2530-A5 23310000C5KG330 0 018590 0 0-1 .0 .0 .00 0 02 .820350.000 .000 0 FCOM-N0-03-05-30-003-150

PERFORMANCE

GO AROUND

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PER-GOA-PLP PRELIMINARY PAGES

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Localization Title	Toc Index	ID	Reason
PER-GOA-GEN GENERAL	A	1	**Update of the technical wording**
PER-GOA-GEN PROCEDURE	B	2	Following introduction of In Flight Landing Distance, new reference added for landing performance assessment.
PER-GOA-GEN PROCEDURE	B	3	Following introduction of In Flight Landing Distance, new reference added for landing performance assessment.

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GENERAL

Applicable to: ALL 320

1 In the go around configuration corresponding to the all engine procedure, the minimum steady gradient one engine inoperative required by the regulations is 2.1 % at a speed not exceeding 1.4 Vs. This requirement is also called approach climb performance by regulations.
The following tables allow to determine the go around limiting weight which satisfies the required gradient with the certified go around configurations 3 and 2.
The required gradient of 2.1 % is considered at the airport reference altitude. The power setting is “GO AROUND” thrust with the air conditioning ON. The speed is 1.23 Vs of the specified configuration. For the occasional cases where approach climb performance is found restrictive, a correction is given for an increased speed, up to 1.4 Vs.

Note: The minimum landing climb gradient up to the acceleration altitude with All Engines Operating is 20.2% (ISA+15?C)

GENERAL

Applicable to: ALL 321

In the go around configuration corresponding to the all engine procedure, the minimum steady gradient one engine inoperative required by the regulations is 2.1 % at a speed not exceeding 1.4 Vs. This requirement is also called approach climb performance by regulations.
The following graph allow to determine the go around limiting weight which satisfies the required gradient with the certified go around configurations 3 and 2.
The required gradient of 2.1 % is considered at the airport reference altitude. The power setting is “GO AROUND” thrust with the air conditioning ON. The speed is 1.23 Vs of the specified configuration. For the occasional cases where approach climb performance is found restrictive, a correction is given for an increased speed, up to 1.4 Vs.

Note: Landing climb performance (2 engines running) is never limiting.

PROCEDURE

Applicable to: ALL 320

2 According to airport pressure altitude and temperature determine if the slats/flaps setting must be restricted as a function of the landing weight, in order to meet the go around gradient requirement of 2.1 %.
Establish the final approach configuration with one more step of flaps. If the approach is interrupted, retract the flaps by one step during the go-around.
In case of category II approach, JAR-OPS requires a regulatory approach climb gradient of 2.5 % to be maintained.
Use the tables for CAT II approach to determine the maximum approach climb limiting weight according to airport pressure altitude and temperature.

Note:
1. *If circumstances dictate, landing may be made at a weight corresponding to the maximum structural takeoff weight. (Refer to PRO-ABN-80 OVERWEIGHT LANDING).*
2. *When icing conditions are predicted during the flight and TAT is 10 °C or below and there is an evidence of significant ice accretion, to take into account ice formation on the non heated structure :*
   - *decrease the approach climb limiting weight by 4.5 %.*
   - *in CONF FULL, the approach speed must not be lower than VREF +5 kt.*
     or
     in CONF 3, the approach speed must not be lower than VLS +10 kt.

   For Landing Performance assessment, refer to QRH FPE-IFL.
3. *In the following tables corrections for anti ice are only valid for OAT lower than 10 °C.*

PROCEDURE

Applicable to: ALL 321

3 According to airport pressure altitude and temperature determine if the slats/flaps setting must be restricted as a function of the landing weight, in order to meet the go around gradient requirement of 2.1 %.
Establish the final approach configuration with one more step of flaps. If the approach is interrupted, retract the flaps by one step during the go-around.
In case of category II approach, JAR-OPS requires a regulatory approach climb gradient of 2.5 % to be maintained.
Use the tables for CAT II approach to determine the maximum approach climb limiting weight according to airport pressure altitude and temperature.

Note:
1. *If circumstances dictate, landing may be made at a weight corresponding to the maximum structural takeoff weight. (Refer to PRO-ABN-80 OVERWEIGHT LANDING).*
2. *When icing conditions are predicted during the flight and TAT is 10 °C or below and there is an evidence of significant ice accretion, to take into account ice formation on the non heated structure :*
   - *decrease the approach climb limiting weight by 7.2 %.*
   - *in CONF FULL, the approach speed must not be lower than VREF +5 kt.*
     or
     in CONF 3, the approach speed must not be lower than VLS +10 kt.

   For Landing Performance assessment, refer to QRH FPE-IFL.
3. *In the following tables corrections for anti ice are only valid for OAT lower than 10 °C.*

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CONF 2

Applicable to: ALL 321

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 2

ONE ENGINE OUT
ONE ENGINE AT GO AROUND THRUST
Normal Air Conditioning
Anti Ice OFF
Gradient : 2.1 %
V = 1.23 Vs

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	0	200	400	600	800	1000	2000	5000	9200	12000	14100
≤10	95.7	95.3	95.1	94.8	94.4	94.0	93.5	91.2	82.5	70.0	62.6	57.6
20	95.7	95.3	95.1	94.8	94.4	94.0	93.5	91.2	82.5	69.7	62.0	57.5
22	95.7	95.3	95.1	94.8	94.4	94.0	93.5	91.2	82.2	69.5	61.7	57.4
24	95.7	95.3	95.1	94.8	94.4	94.0	93.5	91.2	81.8	69.0	61.4	
26	95.7	95.3	95.1	94.8	94.4	94.0	93.5	91.2	81.2	68.3	61.0	
28	95.7	95.3	95.0	94.8	94.4	94.0	93.5	90.0	80.2	67.5		
30	95.7	95.3	94.8	94.2	93.6	92.9	92.2	88.6	79.3	66.7		
32	95.7	94.0	93.4	92.9	92.3	91.6	90.8	87.3	78.1	65.8		
34	95.7	92.6	92.1	91.5	90.9	90.2	89.5	86.0	76.9	64.9		
36	94.2	91.3	90.7	90.2	89.5	88.8	88.1	84.7	75.6	64.0		
38	92.7	89.8	89.3	88.7	88.1	87.4	86.7	83.3	74.3			
40	91.3	88.4	87.8	87.3	86.7	86.0	85.3	81.9	73.1			
42	89.9	87.0	86.4	85.9	85.3	84.6	83.9	80.6	71.7			
44	88.4	85.5	85.0	84.4	83.8	83.1	82.5	79.1	70.4			
46	87.0	83.9	83.4	82.9	82.3	81.6	80.9	77.7				
48	85.3	82.3	81.8	81.3	80.7	80.0	79.4	76.3				
50	83.5	80.7	80.2	79.7	79.2	78.5	77.9	74.9				
52	81.6	79.2	78.7	78.2	77.6	77.0	76.4					
54	79.9	77.6	77.1	76.6								
55	79.1	76.9										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON SUBTRACT	SPEED INCREASE PER 0.01 Vs ADD
940 kg	No correction	1700 kg	300 kg

CONF 2

Applicable to: ALL 320

APPROACH CLIMB LIMITING WEIGHT (1000 KG) ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST	Gradient : 2.1 % High Air Conditioning Anti ice OFF V = 1.23 Vs	CONF 2

	PRESSURE ALTITUDE (FT)											
OAT (°C)	–1000	0	200	400	600	800	1000	1500	2000	5000	10000	14500
≤10	81.3	81.2	81.1	80.9	80.8	80.7	80.5	80.2	79.9	74.8	65.6	56.5
20	81.3	81.2	81.1	80.9	80.8	80.7	80.5	80.2	79.9	74.8	65.5	54.2
22	81.3	81.2	81.1	80.9	80.8	80.7	80.5	80.2	79.9	74.8	64.9	
24	81.3	81.2	81.1	80.9	80.8	80.7	80.5	80.2	79.9	74.8	64.2	
26	81.3	81.2	81.1	80.9	80.8	80.7	80.5	80.2	79.9	74.8	63.3	
28	81.3	81.2	81.1	80.9	80.8	80.7	80.5	80.2	79.9	74.8	62.4	
30	81.3	81.2	81.1	80.9	80.8	80.7	80.5	80.2	79.9	74.8	61.4	
32	81.3	81.2	81.1	80.9	80.8	80.7	80.5	80.2	79.9	73.9	60.4	
34	81.3	81.2	81.1	80.9	80.8	80.7	80.5	80.2	79.9	72.9	59.4	
36	81.3	81.2	81.1	80.9	80.8	80.7	80.5	80.2	79.9	71.9		
38	81.3	81.2	81.1	80.9	80.8	80.7	80.5	80.2	79.9	70.7		
40	81.3	81.2	81.0	80.9	80.8	80.7	80.5	80.2	79.6	69.5		
42	81.3	81.2	81.0	80.9	80.8	80.7	80.5	79.7	78.2	68.3		
44	81.3	81.2	81.0	80.9	80.8	80.3	79.7	78.2	76.8	67.0		
46	81.3	81.2	80.6	80.0	79.5	78.9	78.3	76.8	75.5			
48	81.3	79.7	79.1	78.5	77.9	77.3	76.8	75.6	74.2			
50	81.3	78.2	77.7	77.1	76.6	76.2	75.7	74.2	72.8			
52	79.7	76.9	76.4	76.0	75.4	74.9	74.3	72.9				
54	78.3	75.8	75.2	74.6								
55	77.6	75.1										

AIR CONDITIONING OFF ADD 1000 kg	ENGINE ANTI ICE ON SUBTRACT 500 kg	TOTAL ANTI ICE ON SUBTRACT 2400 kg	SPEED INCREASE PER 0.01 VS ADD 270 kg

CONF 3

Applicable to: ALL 321

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 3

ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST		Normal Air Conditioning Anti Ice OFF	Gradient : 2.1 % V = 1.23 Vs

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	0	200	400	600	800	1000	2000	5000	9200	12000	14100
≤10	91.5	91.2	90.9	90.6	90.2	89.8	89.4	87.2	78.7	66.7	59.7	54.9
20	91.5	91.2	90.9	90.6	90.2	89.8	89.4	87.1	78.7	66.4	59.1	54.8
22	91.5	91.2	90.9	90.6	90.2	89.8	89.3	87.1	78.3	66.2	58.8	54.7
24	91.5	91.2	90.9	90.6	90.2	89.8	89.3	87.1	77.9	65.8	58.5	
26	91.5	91.2	90.9	90.6	90.2	89.8	89.3	87.1	77.3	65.1	58.2	
28	91.5	91.2	90.9	90.6	90.2	89.8	89.3	86.0	76.5	64.4		
30	91.5	91.2	90.6	90.1	89.5	88.8	88.1	84.7	75.6	63.6		
32	91.5	89.9	89.3	88.8	88.2	87.5	86.8	83.4	74.6	62.8		
34	91.5	88.5	88.0	87.4	86.9	86.2	85.5	82.1	73.3	61.9		
36	90.0	87.2	86.7	86.1	85.6	84.9	84.2	80.9	72.1	61.1		
38	88.6	85.9	85.3	84.8	84.2	83.6	82.9	79.6	70.9			
40	87.2	84.5	84.0	83.5	82.9	82.2	81.6	78.3	69.7			
42	85.9	83.2	82.6	82.1	81.5	80.9	80.2	77.0	68.5			
44	84.6	81.8	81.3	80.8	80.2	79.5	78.9	75.6	67.3			
46	83.2	80.3	79.8	79.3	78.7	78.0	77.4	74.3				
48	81.6	78.7	78.2	77.7	77.2	76.5	75.9	72.9				
50	79.8	77.2	76.7	76.2	75.7	75.1	74.5	71.5				
52	78.0	75.7	75.2	74.8	74.2	73.6	73.0					
54	76.4	74.3	73.8	73.3								
55	75.7	73.5										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON SUBTRACT	SPEED INCREASE PER 0.01 Vs ADD
760 kg	No correction	1600 kg	150 kg

CONF 3

Applicable to: ALL 320

APPROACH CLIMB LIMITING WEIGHT (1000 KG) ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST	Gradient : 2.1% High Air Conditioning Anti ice OFF V = 1.23 Vs	CONF 3

	PRESSURE ALTITUDE (FT)											
OAT (°C)	–1000	0	200	400	600	800	1000	1500	2000	5000	10000	14500
≤ 10	82.0	81.9	81.7	81.6	81.5	81.3	81.2	80.9	80.5	75.3	65.9	56.8
20	82.0	81.9	81.7	81.6	81.5	81.3	81.2	80.9	80.5	75.3	65.9	54.5
22	82.0	81.9	81.7	81.6	81.5	81.3	81.2	80.9	80.5	75.3	65.2	
24	82.0	81.9	81.7	81.6	81.5	81.3	81.2	80.9	80.5	75.3	64.5	
26	82.0	81.9	81.7	81.6	81.5	81.3	81.2	80.9	80.5	75.2	63.7	
28	82.0	81.9	81.7	81.6	81.5	81.3	81.2	80.9	80.5	75.2	62.7	
30	82.0	81.9	81.7	81.6	81.5	81.3	81.2	80.9	80.5	75.2	61.8	
32	82.0	81.9	81.7	81.6	81.5	81.3	81.2	80.9	80.5	74.4	60.8	
34	82.0	81.9	81.7	81.6	81.5	81.3	81.2	80.9	80.5	73.4	59.8	
36	82.0	81.9	81.7	81.6	81.5	81.3	81.2	80.9	80.5	72.3		
38	82.0	81.9	81.7	81.6	81.5	81.3	81.2	80.9	80.5	71.1		
40	82.0	81.9	81.7	81.6	81.5	81.3	81.2	80.9	80.3	69.9		
42	82.0	81.9	81.7	81.6	81.5	81.3	81.2	80.3	78.8	68.7		
44	82.0	81.9	81.7	81.6	81.5	81.0	80.4	78.9	77.3	67.5		
46	82.0	81.9	81.3	80.7	80.1	79.5	78.9	77.4	76.0			
48	82.0	80.4	79.8	79.2	78.6	78.0	77.4	76.1	74.6			
50	82.0	78.9	78.3	77.8	77.2	76.6	76.1	74.7	73.3			
52	80.4	77.5	77.0	76.4	75.9	75.4	74.8	73.4				
54	79.0	76.2	75.7	75.1								
55	78.3	75.6										

AIR CONDITIONING OFF ADD 1200 kg	ENGINE ANTI ICE ON SUBTRACT 500 kg	TOTAL ANTI ICE ON SUBTRACT 2400 kg	SPEED INCREASE PER 0.01 VS ADD 210 kg

CAT II - CONF 2

Applicable to: ALL 321

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 2

ONE ENGINE OUT
ONE ENGINE AT GO AROUND THRUST
Normal Air Conditioning
Anti Ice OFF
Gradient : 2.5 %
CAT II

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	0	200	400	600	800	1000	2000	5000	9200	12000	14100
≤10	93.6	93.2	93.0	92.7	92.3	91.9	91.5	89.3	80.8	68.7	61.5	56.7
20	93.6	93.2	92.9	92.7	92.3	91.9	91.5	89.2	80.8	68.4	60.9	56.5
22	93.6	93.2	92.9	92.7	92.3	91.9	91.5	89.2	80.5	68.2	60.6	56.5
24	93.6	93.2	92.9	92.7	92.3	91.9	91.5	89.2	80.1	67.7	60.3	
26	93.6	93.2	92.9	92.7	92.3	91.9	91.5	89.2	79.5	67.0	60.0	
28	93.6	93.2	92.9	92.7	92.3	91.9	91.5	88.0	78.6	66.3		
30	93.6	93.2	92.7	92.2	91.6	90.9	90.2	86.7	77.7	65.5		
32	93.6	91.9	91.4	90.9	90.3	89.6	88.9	85.4	76.6	64.6		
34	93.6	90.6	90.1	89.5	88.9	88.2	87.6	84.2	75.3	63.8		
36	92.1	89.3	88.8	88.2	87.6	86.9	86.3	82.9	74.1	62.9		
38	90.6	87.9	87.3	86.8	86.2	85.5	84.9	81.5	72.8			
40	89.2	86.4	85.9	85.4	84.8	84.1	83.5	80.2	71.6			
42	87.9	85.1	84.5	84.0	83.4	82.8	82.1	78.9	70.3			
44	86.5	83.7	83.1	82.6	82.0	81.4	80.7	77.5	69.0			
46	85.1	82.1	81.6	81.1	80.5	79.9	79.2	76.1				
48	83.5	80.6	80.1	79.6	79.0	78.4	77.7	74.7				
50	81.7	79.0	78.5	78.0	77.5	76.9	76.3	73.4				
52	79.9	77.5	77.0	76.5	76.0	75.4	74.8					
54	78.3	76.0	75.5	75.0								
55	77.5	75.3										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON SUBTRACT
920 kg	No correction	1600 kg

CAT II - CONF 2

Applicable to: ALL 320

APPROACH CLIMB LIMITING WEIGHT (1000 KG)	Gradient : 2.5%	CAT II
ONE ENGINE OUT	High Air Conditioning	
ONE ENGINE AT GO AROUND THRUST	Anti ice OFF	CONF 2

	PRESSURE ALTITUDE (FT)											
OAT (°C)	–1000	0	200	400	600	800	1000	1500	2000	5000	10000	14500
≤ 10	80.7	80.6	80.5	80.4	80.2	80.1	80.0	79.6	79.3	74.3	65.1	56.3
20	80.7	80.6	80.5	80.3	80.2	80.1	80.0	79.6	79.3	74.3	65.1	54.1
22	80.7	80.6	80.5	80.3	80.2	80.1	80.0	79.6	79.3	74.3	64.5	
24	80.7	80.6	80.5	80.3	80.2	80.1	80.0	79.6	79.3	74.3	63.8	
26	80.7	80.6	80.5	80.3	80.2	80.1	80.0	79.6	79.3	74.3	63.0	
28	80.7	80.6	80.5	80.3	80.2	80.1	80.0	79.6	79.3	74.3	62.0	
30	80.7	80.6	80.5	80.3	80.2	80.1	80.0	79.6	79.3	74.3	61.1	
32	80.7	80.6	80.5	80.3	80.2	80.1	80.0	79.6	79.3	73.4	60.2	
34	80.7	80.6	80.5	80.3	80.2	80.1	80.0	79.6	79.3	72.4	59.2	
36	80.7	80.6	80.5	80.3	80.2	80.1	80.0	79.6	79.3	71.3		
38	80.7	80.6	80.5	80.3	80.2	80.1	80.0	79.6	79.3	70.2		
40	80.7	80.6	80.5	80.3	80.2	80.1	79.9	79.6	79.1	69.0		
42	80.7	80.6	80.5	80.3	80.2	80.1	79.9	79.1	77.7	67.9		
44	80.7	80.6	80.5	80.3	80.2	79.7	79.1	77.7	76.3	66.6		
46	80.7	80.6	80.1	79.5	78.9	78.3	77.7	76.4	75.0			
48	80.7	79.2	78.6	78.0	77.4	76.9	76.4	75.1	73.6			
50	80.7	77.7	77.2	76.7	76.2	75.7	75.1	73.7	72.3			
52	79.2	76.5	76.0	75.5	74.9	74.3	73.8	72.4				
54	77.8	75.2	74.7	74.1								
55	77.2	74.5										

AIR CONDITIONING OFF ADD 1100 kg	ENGINE ANTI ICE ON SUBTRACT 500 kg	TOTAL ANTI ICE ON SUBTRACT 2400 kg

CAT II - CONF 3

Applicable to: ALL 321

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 3

ONE ENGINE OUT — Normal Air Conditioning — Gradient : 2.5 %
ONE ENGINE AT GO AROUND THRUST — Anti Ice OFF — CAT II

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	0	200	400	600	800	1000	2000	5000	9200	12000	14100
≤10	89.3	88.9	88.7	88.4	88.0	87.6	87.2	85.0	76.8	65.2	58.4	53.8
20	89.2	88.9	88.7	88.4	88.0	87.6	87.2	85.0	76.8	64.9	57.9	53.6
22	89.2	88.9	88.7	88.4	88.0	87.6	87.2	85.0	76.5	64.8	57.6	53.6
24	89.2	88.9	88.7	88.4	88.0	87.6	87.2	85.0	76.1	64.3	57.3	
26	89.2	88.9	88.7	88.4	88.0	87.6	87.2	85.0	75.5	63.7	56.9	
28	89.2	88.9	88.7	88.4	88.0	87.6	87.2	83.9	74.7	63.0		
30	89.2	88.9	88.4	87.9	87.3	86.7	86.0	82.7	73.8	62.2		
32	89.2	87.7	87.2	86.6	86.1	85.4	84.7	81.4	72.8	61.4		
34	89.2	86.4	85.9	85.4	84.8	84.1	83.5	80.2	71.6	60.6		
36	87.9	85.1	84.6	84.1	83.5	82.9	82.2	79.0	70.5	59.8		
38	86.4	83.8	83.3	82.8	82.2	81.6	80.9	77.7	69.3			
40	85.1	82.5	82.0	81.5	80.9	80.3	79.6	76.4	68.2			
42	83.9	81.2	80.7	80.2	79.6	79.0	78.3	75.1	67.0			
44	82.6	79.8	79.4	78.9	78.3	77.6	77.0	73.9	65.8			
46	81.2	78.4	77.9	77.4	76.8	76.2	75.5	72.5				
48	79.7	76.9	76.4	75.9	75.3	74.7	74.1	71.2				
50	78.0	75.3	74.9	74.4	73.9	73.3	72.7	69.9				
52	76.2	73.9	73.5	73.0	72.5	71.9	71.3					
54	74.6	72.5	72.0	71.6								
55	73.9	71.8										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON SUBTRACT
740 kg	No correction	1600 kg

CAT II - CONF 3

Applicable to: ALL 320

APPROACH CLIMB LIMITING WEIGHT (1000 KG) ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST	Gradient : 2.5% High Air Conditioning Anti ice OFF	CAT II CONF 3

	PRESSURE ALTITUDE (FT)											
OAT (°C)	–1000	0	200	400	600	800	1000	1500	2000	5000	10000	14500
≤ 10	79.5	79.4	79.3	79.1	79.0	78.9	78.7	78.4	78.1	73.0	64.0	55.3
20	79.5	79.4	79.3	79.1	79.0	78.9	78.7	78.4	78.1	73.0	64.0	53.1
22	79.5	79.4	79.3	79.1	79.0	78.9	78.7	78.4	78.1	73.0	63.4	
24	79.5	79.4	79.3	79.1	79.0	78.9	78.7	78.4	78.1	73.0	62.7	
26	79.5	79.4	79.3	79.1	79.0	78.9	78.7	78.4	78.1	73.0	61.9	
28	79.5	79.4	79.3	79.1	79.0	78.9	78.7	78.4	78.1	73.0	61.0	
30	79.5	79.4	79.3	79.1	79.0	78.9	78.7	78.4	78.1	73.0	60.1	
32	79.5	79.4	79.3	79.1	79.0	78.9	78.7	78.4	78.1	72.2	59.1	
34	79.5	79.4	79.3	79.1	79.0	78.9	78.7	78.4	78.1	71.2	58.2	
36	79.5	79.4	79.3	79.1	79.0	78.9	78.7	78.4	78.1	70.2		
38	79.5	79.4	79.3	79.1	79.0	78.9	78.7	78.4	78.1	69.0		
40	79.5	79.4	79.3	79.1	79.0	78.9	78.7	78.4	77.8	67.9		
42	79.5	79.4	79.3	79.1	79.0	78.9	78.7	77.9	76.5	66.8		
44	79.5	79.4	79.3	79.1	79.0	78.5	77.9	76.6	75.2	65.6		
46	79.5	79.4	78.9	78.3	77.7	77.2	76.6	75.3	73.8			
48	79.5	78.0	77.4	76.9	76.4	75.8	75.3	73.9	72.5			
50	79.5	76.6	76.1	75.6	75.1	74.5	73.9	72.6	71.2			
52	78.0	75.4	74.8	74.3	73.7	73.2	72.6	71.2				
54	76.7	74.1	73.5	73.0								
55	76.2	73.4										

AIR CONDITIONING OFF ADD 1100 kg	ENGINE ANTI ICE ON SUBTRACT 500 kg	TOTAL ANTI ICE ON SUBTRACT 2300 kg

CONF2 - GRADIENT 3%

Applicable to: ALL 321

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 2

ONE ENGINE OUT	Normal Air Conditioning	Gradient : 3 %
ONE ENGINE OUT AT GO AROUND THRUST	Anti Ice OFF	CAT II

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	0	200	400	600	800	1000	2000	5000	9200	12000	14100
≤10	90.0	89.6	89.4	89.1	88.8	88.4	87.9	85.8	77.6	66.0	59.1	54.5
20	90.0	89.6	89.4	89.1	88.8	88.4	87.9	85.8	77.6	65.7	58.6	54.3
22	90.0	89.6	89.4	89.1	88.8	88.4	87.9	85.8	77.3	65.5	58.3	54.3
24	90.0	89.6	89.4	89.1	88.8	88.4	87.9	85.8	77.0	65.0	58.0	
26	90.0	89.6	89.4	89.1	88.8	88.3	87.9	85.8	76.4	64.4	57.6	
28	90.0	89.6	89.4	89.1	88.8	88.3	87.9	84.6	75.5	63.7		
30	90.0	89.6	89.1	88.6	88.0	87.4	86.7	83.4	74.6	62.9		
32	90.0	88.4	87.9	87.4	86.8	86.1	85.4	82.1	73.6	62.1		
34	90.0	87.1	86.6	86.1	85.5	84.8	84.2	80.9	72.4	61.3		
36	88.6	85.9	85.3	84.8	84.2	83.6	82.9	79.7	71.2	60.5		
38	87.2	84.5	84.0	83.5	82.9	82.3	81.6	78.4	70.0			
40	85.9	83.2	82.7	82.2	81.6	81.0	80.3	77.2	68.9			
42	84.6	81.9	81.4	80.9	80.3	79.7	79.0	75.9	67.7			
44	83.2	80.5	80.0	79.5	79.0	78.3	77.7	74.6	66.4			
46	81.9	79.1	78.6	78.1	77.5	76.9	76.2	73.2				
48	80.3	77.6	77.1	76.6	76.0	75.4	74.8	71.9				
50	78.7	76.0	75.6	75.1	74.6	74.0	73.4	70.6				
52	76.9	74.6	74.1	73.7	73.1	72.6	72.0					
54	75.3	73.2	72.7	72.2								
55	74.5	72.4										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON SUBTRACT
1100 kg	No correction	1600 kg

Note: For aircraft operated under UK regulation, for single engine CAT II approach a minimum gradient of 3 % is required.

CONF2 - GRADIENT 3%

Applicable to: ALL 320

APPROACH CLIMB LIMITING WEIGHT (1000 KG) ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST	Gradient : 3% High Air Conditioning Anti ice OFF	CAT II CONF 2

	PRESSURE ALTITUDE (FT)											
OAT (°C)	–1000	0	200	400	600	800	1000	1500	2000	5000	10000	14500
≤ 10	77.3	77.2	77.0	76.9	76.8	76.7	76.6	76.3	76.1	71.1	62.3	53.8
20	77.3	77.2	77.0	76.9	76.8	76.7	76.6	76.3	76.1	71.1	62.3	51.7
22	77.3	77.2	77.0	76.9	76.8	76.7	76.6	76.3	76.1	71.1	61.7	
24	77.3	77.2	77.0	76.9	76.8	76.7	76.6	76.3	76.1	71.1	61.0	
26	77.3	77.2	77.0	76.9	76.8	76.7	76.6	76.3	76.1	71.0	60.3	
28	77.3	77.2	77.0	76.9	76.8	76.7	76.6	76.3	76.1	71.0	59.4	
30	77.3	77.2	77.0	76.9	76.8	76.7	76.6	76.3	76.1	71.0	58.5	
32	77.3	77.2	77.0	76.9	76.8	76.7	76.6	76.3	76.1	70.2	57.6	
34	77.3	77.2	77.0	76.9	76.8	76.7	76.6	76.3	76.1	69.3	56.6	
36	77.0	77.2	77.0	76.9	76.8	76.7	76.6	76.3	76.1	68.3		
38	77.3	77.2	77.0	76.9	76.8	76.7	76.6	76.3	76.1	67.2		
40	77.3	77.2	77.0	76.9	76.8	76.7	76.6	76.3	75.9	66.1		
42	77.3	77.2	77.0	76.9	76.8	76.7	76.6	75.9	74.6	65.0		
44	77.3	77.2	77.0	76.9	76.8	76.4	76.0	74.6	73.2	63.8		
46	77.3	77.2	76.7	76.2	75.8	75.2	74.7	73.2	71.8			
48	77.3	76.0	75.5	74.9	74.4	73.8	73.2	71.9	70.5			
50	77.3	74.7	74.1	73.6	73.0	72.5	71.9	70.6	69.2			
52	76.0	73.3	72.8	72.3	71.7	71.2	70.6	69.3				
54	74.8	72.0	71.5	71.0								
55	74.1	71.4										

AIR CONDITIONING OFF ADD 1000 kg	ENGINE ANTI ICE ON SUBTRACT 500 kg	TOTAL ANTI ICE ON SUBTRACT 2300 kg

Note: For aircraft operated under UK regulation, for single engine CAT II approach a minimum gradient of 3% is required.

CONF3 - GRADIENT 3%

Applicable to: ALL 321

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 3												
ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST							Normal Air Conditioning Anti Ice OFF			Gradient : 3 % CAT II		
OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	0	200	400	600	800	1000	2000	5000	9200	12000	14100
≤10	86.0	85.7	85.4	85.1	84.8	84.4	84.0	81.9	73.9	62.7	56.2	51.8
20	86.0	85.7	85.4	85.1	84.8	84.4	84.0	81.9	73.9	62.5	55.7	51.6
22	86.0	85.7	85.4	85.1	84.8	84.4	84.0	81.9	73.5	62.4	55.4	51.6
24	86.0	85.7	85.4	85.1	84.8	84.4	84.0	81.9	73.2	61.9	55.1	
26	86.0	85.7	85.4	85.1	84.8	84.4	84.0	81.9	72.6	61.3	54.8	
28	86.0	85.7	85.4	85.1	84.8	84.4	84.0	80.8	71.9	60.7		
30	86.0	85.7	85.2	84.7	84.1	83.5	82.8	79.6	71.1	59.9		
32	86.0	84.5	84.0	83.5	82.9	82.3	81.6	78.4	70.1	59.1		
34	86.0	83.2	82.7	82.2	81.7	81.0	80.4	77.2	69.0	58.4		
36	84.6	82.0	81.5	81.0	80.5	79.8	79.2	76.0	67.9	57.6		
38	83.3	80.8	80.3	79.8	79.2	78.6	78.0	74.8	66.8			
40	82.0	79.5	79.0	78.5	78.0	77.3	76.7	73.6	65.7			
42	80.8	78.2	77.7	77.3	76.7	76.1	75.4	72.4	64.6			
44	79.6	77.0	76.5	76.0	75.4	74.8	74.2	71.1	63.4			
46	78.2	75.5	75.0	74.5	74.0	73.4	72.8	69.9				
48	76.8	74.1	73.6	73.1	72.6	72.0	71.4	68.6				
50	75.1	72.6	72.1	71.7	71.2	70.6	70.1	67.4				
52	73.4	71.2	70.8	70.4	69.9	69.3	68.8					
54	71.9	69.9	69.5	69.0								
55	71.2	69.3										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON SUBTRACT
1000 kg	No correction	1500 kg

Note: *For aircraft operated under UK regulation, for single engine CAT II approach a minimum gradient of 3 % is required.*

CONF3 - GRADIENT 3%

Applicable to: ALL 320

APPROACH CLIMB LIMITING WEIGHT (1000 KG) ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST	Gradient : 3% High Air Conditioning Anti ice OFF	CAT II CONF 3

	PRESSURE ALTITUDE (FT)											
OAT (°C)	–1000	0	200	400	600	800	1000	1500	2000	5000	10000	14500
≤ 10	76.3	76.2	76.1	76.0	75.8	75.7	75.6	75.3	74.9	69.9	61.3	53.0
20	76.3	76.2	76.1	76.0	75.8	75.7	75.6	75.3	74.9	69.9	61.3	50.9
22	76.3	76.2	76.1	76.0	75.8	75.7	75.6	75.3	74.9	69.9	60.7	
24	76.3	76.2	76.1	75.9	75.8	75.7	75.6	75.3	74.9	69.9	60.0	
26	76.3	76.2	76.1	75.9	75.8	75.7	75.6	75.3	74.9	69.9	59.3	
28	76.3	76.2	76.1	75.9	75.8	75.7	75.6	75.3	74.9	69.9	58.4	
30	76.3	76.2	76.1	75.9	75.8	75.7	75.6	75.3	74.9	69.9	57.5	
32	76.3	76.2	76.1	75.9	75.8	75.7	75.6	75.3	74.9	69.1	56.7	
34	76.3	76.2	76.1	75.9	75.8	75.7	75.6	75.3	74.9	68.2	55.7	
36	76.3	76.2	76.1	75.9	75.8	75.7	75.6	75.3	74.9	67.2		
38	76.3	76.2	76.1	75.9	75.8	75.7	75.6	75.3	74.9	66.2		
40	76.3	76.2	76.1	75.9	75.8	75.7	75.6	75.3	74.7	65.1		
42	76.3	76.2	76.1	75.9	75.8	75.7	75.6	74.8	73.4	64.0		
44	76.3	76.2	76.1	75.9	75.8	75.4	74.8	73.5	72.1	62.9		
46	76.3	76.2	75.7	75.2	74.6	74.1	73.5	72.1	70.7			
48	76.3	74.9	74.4	73.8	73.3	72.7	72.1	70.8	69.5			
50	76.3	73.5	73.0	72.5	71.9	71.4	70.9	69.5	68.2			
52	75.0	72.3	71.7	71.2	70.7	70.1	69.6	68.3				
54	73.7	71.0	70.5	69.9								
55	73.1	70.4										

AIR CONDITIONING OFF ADD 1000 kg	ENGINE ANTI ICE ON SUBTRACT 500 kg	TOTAL ANTI ICE ON SUBTRACT 2200 kg

PERFORMANCE

LANDING

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Localization Title	Toc Index	ID	Reason
PER-LDG-GEN GENERAL	A	1	Update of the technical wording
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PER-LDG-DIS-MAT Runway Condition Assessment Matrix	A	1	Documentation update: Addition of "Runway Condition Assessment Matrix" documentary unit
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GENERAL

Applicable to: ALL

1 **REQUIRED LANDING DISTANCE (RLD) AT DISPATCH**

The RLD is the regulatory reference to be used for dispatch landing performance computation.

The RLD is the factored certified landing distance based on:
- Maximum manual braking initiated immediately after main gear touchdown
- Prompt selection of max reverse thrust, maintained to 70kt, and idle thrust to full stop (when credit is used)
- Antiskid and all spoilers operative
- Dry Runway State: The certification Landing Distance divided by 0.6.
- Wet Runway State: The certification Landing Distance (Dry) divided by 0.6 and then increased by 15 % (ie multiplied by 1.92)

MANUAL LANDING

CONTAMINATED RUNWAY

If the surface is contaminated, the longer of the published RLD for wet runway and the published RLD for the applicable contaminant must be used.

AUTOMATIC LANDING

The RLD for automatic landing is defined as the RLD in manual landing corrected with the increment given in AFM. These increments assume maximum manual braking from main gear touchdown.

IN-FLIGHT LANDING DISTANCE

The flight crew should use the Landing Distances published in the QRH as the reference for In-Flight landing performance computation. The In-Flight Landing Distances reflect the performance achievable in a typical operational landing without margin, assuming realistic airborne phase from threshold to touchdown and deceleration on ground to full stop.

The In-Flight Landing Distances consider:
- Touchdown within the touchdown zone
- Maximum manual braking initiated immediately after main gear touchdown
- Normal system delays in braking activation in case of autobrake
- Prompt selection of max reverse thrust, maintained to 70kt, and idle thrust to full stop (when credit is used)
- Antiskid and all spoilers operative.

2 **FACTORED IN-FLIGHT LANDING DISTANCE**

The flight crew should apply a 15 % margin to the In-Flight Landing Distances published in the QRH to account for operational variability (e.g. in wind and runway condition reporting) and flying technique (e.g. speed and height above threshold, flare).
The Factored In-Flight Landing Distance may in some cases, and in particular on contaminated runway, exceed the RLD considered at dispatch.
The requirements for dispatch remain unchanged and are based on the RLD. However, when arrival conditions are expected to be marginal it is recommended to make a preliminary calculation of In-Flight Landing Distance or Factored In-Flight Landing Distance at dispatch in order to nominate suitable destination alternates.

3 **LANDING DISTANCE AVAILABLE (LDA)**

LDA is the length of runway declared to be available and suitable for landing. LDA starts at the threshold and, in most cases, corresponds to the physical length of the runway. However if the threshold is displaced, the LDA is reduced and will normally be the distance between the displaced threshold and the far end of the runway.

DISPATCH

Applicable to: ALL

4 The pilot must check before departure that the Landing Distance Available at both destination and alternate is at least equal to the required landing distance for the forecasted landing weight.
In case of aircraft system failure affecting landing distance known before the dispatch, the available runway length must be at least equal to the required landing distance with failure, i.e. the required landing distance without failure multiplied by the coefficient given in the MEL.

When calculating the most limiting RLD for each airport, the following shall be considered:
- the most suitable runway for landing in still air conditions, and
- the runway that may be required for landing due to the forecast wind conditions.

Dispatch Landing Performance shall be checked in the following cases:
- when dispatching to an unplanned destination
- where LDA is affected by WIP, or
- where landing performance is affected by system degradation (refer MEL).

The following may be used to check dispatch landing performance:
- ACARS LANDING (data is appended to the bottom of the printout), or
- REQUIRED LANDING DISTANCE tables. *Refer to PER-LDG-DIS REQUIRED LANDING DISTANCES*

USE OF THE AUTOBRAKE SYSTEM

Applicable to: ALL

The autobrake system is designed to help the pilot in case of :

- aborted takeoff or
- landing on short runways or
- operation with low visibility weather conditions

Furthermore, it ensures a straight roll-out and optimizes the landing distance on contaminated runways provided the contamination is evenly distributed.

At landing, select the braking mode according to :

- runway length
- configuration
- runway condition

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GENERAL

Applicable to: ALL

This section presents the recommendations of Airbus Industrie for operations from wet runways or from runways which are covered with contaminants such as standing water, slush or snow.

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DEFINITIONS

Applicable to: ALL

DAMP : A runway is damp when the surface is not dry, but when the water on it does not give it a shiny appearance.

WET : A runway is considered as wet when the surface has a shiny appearance due to a thin layer of water. When this layer does not exceed 3 mm depth, there is no substantial risk of hydroplaning.

STANDING WATER is caused by heavy rainfall and/or insufficient runway drainage with a depth of more than 3 mm.

SLUSH : is water saturated with snow which spatters when stepping firmly on it. It is encountered at temperatures around 5 °C and its density is approximately 0.85 kg/l (7.1 lb/US Gal).

WET SNOW : is a condition where, if compacted by hand, snow will stick together and tend to form a snowball. Its density is approximately 0.4 kg/l (3.35 lb/US Gal).

DRY SNOW : is a condition where snow can be blown if loose, or if compacted by hand, will fall apart again upon release. Its density is approximately 0.2 kg/l (1.7 lb/US Gal).

COMPACTED SNOW is a condition where snow has been compressed (a typical friction coefficient is 0.2).

ICY : is a condition where the friction coefficient is 0.05 or below.

The performance given in this chapter has been divided into two categories which are determined by the depth of the contaminant. For each of these categories an equivalent depth of contaminant has been defined for which the landing performance deterioration is the same.

1. WET RUNWAY and EQUIVALENT

Equivalent of a wet runway is a runway covered with or less than:
- 3 mm (0.12 in) slush
- 3 mm (0.12 in) water
- 3 mm (0.12 in) wet snow
- 3 mm (0.12 in) dry snow

2. CONTAMINATED RUNWAY

An equivalence between depth of slush and snow has been defined:
- up to 30 mm (1.18 in) wet snow is equivalent to slush
- up to 130 mm (5.12 in) dry snow is equivalent to slush

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RUNWAY CONDITION ASSESSMENT MATRIX

Applicable to: ALL

1

Code	Runway Condition	Deceleration And Directional Control Observation	Reported Braking Action
6	Dry	-	**Dry**
5	Damp Wet 3 mm (1/8") or less of • Slush • Dry Snow • Wet Snow Frost	Braking deceleration is normal for the wheel braking effort applied. Directional control is normal.	**Good**
4	Compacted Snow (OAT at or below -15°C)	Braking deceleration and controllability is between Good and Medium.	**Good to Medium**
3	Slippery when wet Compacted Snow (OAT at or above -15°C) More than 3 mm (1/8") depth of: • Dry Snow - max 130 mm (5") • Wet Snow - max 30 mm (1 1/8")	Braking deceleration is noticeably reduced for the wheel braking effort applied. Directional control may be noticeably reduced.	**Medium**
2	Between 3 mm (1/8") depth of: • Water - max 12.7 mm (1/2") • Slush - max 12.7 mm (1/2")	Braking deceleration and controllability is between Medium and Poor. Potential for Hydroplaning exists.	**Medium to Poor**
1	Ice (cold & dry)	Braking deceleration is significantly reduced for the wheel braking effort applied. Directional control may be significantly reduced.	**Poor**
0	Wet ice Water on top of Compacted Snow Dry Snow or Wet Snow over Ice	Braking deceleration is minimal to non-existent for the wheel braking effort applied. Directional control may be uncertain.	**Nil**

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RLD CONF FULL

Applicable to: ALL 320

1 The RLD in the first table considers: Sea Level (SL), ISA, no wind, no slope, no engine reverse thrust, manual landing, and VAPP=VLS.

Required Landing Distances (m)					
Runway State / Weight (1000 kg)	Dry	Wet	Compacted snow	Slush	Standing Water
46	1 150	1 320	1 310	1 300	1 350
50	1 210	1 390	1 400	1 390	1 440
54	1 260	1 450	1 480	1 480	1 530
58	1 320	1 510	1 560	1 570	1 630
62	1 380	1 580	1 640	1 670	1 750
66	1 480	1 710	1 730	1 760	1 880

Corrections on Landing Distances (m)						
Runway State		Dry	Wet	Compacted snow	Slush	Standing Water
Altitude	Per 1 000 ft ABOVE SL	+ 60	+ 70	+ 90	+ 130	+ 140
Speed	Per 5 kt	+ 100	+ 100	+ 80	+ 110	+ 160
Wind	Per 5 kt TW	+ 140	+ 170	+ 150	+ 220	+ 300
Reverse	Per Thrust Reverser Operative	-	-	- 90	- 90	- 110
CG	Extended Forward CG	+ 30	+ 30	+ 40	+ 40	+ 50

RLD CONF FULL

Applicable to: ALL 321

2

The RLD in the first table considers: Sea Level (SL), ISA, no wind, no slope, no engine reverse thrust, manual landing, and VAPP=VLS.

Required Landing Distances (m)					
Runway State / Weight (1000 kg)	Dry	Wet	Compacted snow	Slush	Standing Water
58	1 360	1 570	1 510	1 600	1 650
62	1 420	1 630	1 580	1 690	1 760
66	1 480	1 710	1 660	1 790	1 880
70	1 550	1 780	1 740	1 890	2 000
74	1 610	1 850	1 800	1 990	2 100
78	1 690	1 940	1 870	2 090	2 210

Corrections on Landing Distances (m)						
Runway State		Dry	Wet	Compacted snow	Slush	Standing Water
Altitude	Per 1 000 ft ABOVE SL	+ 80	+ 90	+ 90	+ 160	+ 150
Speed	Per 5 kt	+ 90	+ 100	+ 90	+ 150	+ 190
Wind	Per 5 kt TW	+ 160	+ 190	+ 160	+ 270	+ 360
Reverse	Per Thrust Reverser Operative	-	-	- 110	- 140	- 150

RLD CONF 3

Applicable to: ALL 320

3

The RLD in the first table considers: Sea Level (SL), ISA, no wind, no slope, no engine reverse thrust, manual landing, and VAPP=VLS.

Required Landing Distances (m)					
Runway State / Weight (1000 kg)	Dry	Wet	Compacted snow	Slush	Standing Water
46	1 210	1 390	1 410	1 410	1 460
50	1 270	1 460	1 500	1 510	1 560
54	1 330	1 520	1 590	1 610	1 660
58	1 390	1 600	1 680	1 700	1 800
62	1 470	1 690	1 770	1 810	1 940
66	1 610	1 850	1 860	1 910	2 080

Corrections on Landing Distances (m)						
Runway State		Dry	Wet	Compacted snow	Slush	Standing Water
Altitude	Per 1 000 ft ABOVE SL	+ 70	+ 80	+ 100	+ 160	+ 160
Speed	Per 5 kt	+ 100	+ 120	+ 90	+ 150	+ 190
Wind	Per 5 kt TW	+ 150	+ 170	+ 160	+ 260	+ 350
Reverse	Per Thrust Reverser Operative	-	-	- 110	- 120	- 130
CG	Extended Forward CG	+ 30	+ 30	+ 40	+ 60	+ 60

RLD CONF 3

Applicable to: ALL 321

4

The RLD in the first table considers: Sea Level (SL), ISA, no wind, no slope, no engine reverse thrust, manual landing, and VAPP=VLS.

Required Landing Distances (m)					
Runway State / Weight (1000 kg)	Dry	Wet	Compacted snow	Slush	Standing Water
58	1 430	1 640	1 600	1 710	1 780
62	1 490	1 720	1 680	1 810	1 900
66	1 560	1 790	1 760	1 920	2 020
70	1 630	1 870	1 840	2 040	2 160
74	1 700	1 950	1 910	2 150	2 290
78	1 780	2 050	1 980	2 270	2 390

Corrections on Landing Distances (m)						
Runway State		Dry	Wet	Compacted snow	Slush	Standing Water
Altitude	Per 1 000 ft ABOVE SL	+ 80	+ 100	+ 100	+ 170	+ 170
Speed	Per 5 kt	+ 100	+ 110	+ 100	+ 140	+ 190
Wind	Per 5 kt TW	+ 170	+ 190	+ 160	+ 280	+ 380
Reverse	Per Thrust Reverser Operative	-	-	- 120	- 160	- 170

EXAMPLE

Applicable to: ALL 320

5

EXAMPLE 1

Required Landing Distance (RLD) determination with multiple corrections

Data: Landing CONF = CONF FULL
LW = 58 T
DRY runway
Airport altitude = 2 000 ft
Approach speed = VLS
5 ktTW
ISAconditions
No slope

Read the reference distance for 58 T from RLDtable:
RLD(DRY, 0 ft, VLS, no wind) = 1 320 m

Read the different corrections:
Altitude correction: 60 x 2 = + 120 m
Wind correction: 140 x 1 = + 140 m

RLD(DRY, 2 000 ft, VLS, 5 kt TW) = 1 320 + 120 + 140 = 1 580 m

EXAMPLE 2

Required Landing Distance (RLD) calculation with WET CHECK (Mandatory for EASA operators)

Data: Landing CONF = CONF FULL
LW = 58 T
Runway covered with STANDING WATER
Airport altitude = 2 000 ft
Approach speed = VLS
Credit for all thrust reversers
ISAconditions
No slope

RLD(WATER, 2 000 ft, VLS, no wind, all reversers) = 1 630 + 140 x 2 - 110 x 2 = 1 690 m

Compare this distance to the landing distance in the same conditions on WET runway:
RLD(WET, 2 000 ft, VLS, no wind) = 1 510 + 70 x 2 = 1 650 m

RLD(WET) < RLD(WATER), therefore RLD= 1 690 m

EXAMPLE

Applicable to: ALL 321

6

EXAMPLE 1

Required Landing Distance (RLD) determination with multiple corrections

Data: Landing CONF = CONF FULL
LW = 70 T
DRY runway
Airport altitude = 2 000 ft
Approach speed = VLS
5 ktTW
ISAconditions
No slope

Read the reference distance for 70 T from RLDtable:
RLD(DRY, 0 ft, VLS, no wind) = 1 550 m

Read the different corrections:
Altitude correction: 80 x 2 = + 160 m
Wind correction: 160 x 1 = + 160 m

RLD(DRY, 2 000 ft, VLS, 5 kt TW) = 1 550 + 160 + 160 = 1 870 m

EXAMPLE 2

Required Landing Distance (RLD) calculation with WET CHECK (Mandatory for EASA operators)

Data: Landing CONF = CONF FULL
LW = 70 T
Runway covered with STANDING WATER
Airport altitude = 2 000 ft
Approach speed = VLS
Credit for all thrust reversers
ISAconditions
No slope

RLD(WATER, 2 000 ft, VLS, no wind, all reversers) = 2 000 + 150 x 2 - 150 x 2 = 2 000 m

Compare this distance to the landing distance in the same conditions on WET runway:
RLD(WET, 2 000 ft, VLS, no wind) = 1 780 + 90 x 2 = 1 960 m

RLD(WET) < RLD(WATER), therefore RLD= 2 000 m

INTRODUCTION

Applicable to: ALL

1

ACARS LANDING operates in a similar way to ACARS RTOW. After the required data has been entered and sent, the computed data is returned to the flight deck as a printable, on-screen display, via the "Received Messages" prompt. All entered data will remain on the screen to facilitate multiple requests. All fields are reset to their default values after landing.

There are two distinct sets of landing performance data with distinct requirements:
- REQUIRED LANDING DISTANCE (RLD) data, and
- INFLIGHT LANDING DISTANCE data.

REQUIRED LANDING DISTANCE (RLD) data is manufacturer provided and certified data which is used to check compliance with legal Dispatch Landing Performance requirements. A Maximum Landing Weight and flap setting are provided.
INFLIGHT LANDING DISTANCE data is manufacturer supplied operational data used to conduct an inflight assessment of Landing Performance. The default data provided by ACARS LANDING includes the 15 % safety margin for both failure and without failure cases.

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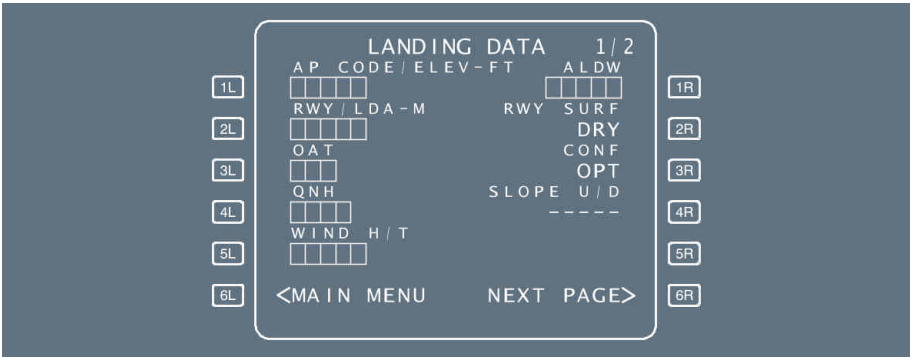
ACARS DESCRIPTION

MCDU

Applicable to: ALL

1

ACARS LANDING DATA 1/2



Keys [1L], [2L], [3L], [4L], [5L] and [1R] are compulsory inputs.

[1L] AP CODE/ELEV-FT : Enter ICAO or IATA landing airport code (e.g. VHHH or HKG) or airport elevation in feet. Data is only available for online ports and corresponding alternate airports. Enter airport elevation and landing distance if it is not available in the database.

[2L] RWY/LDA-M : Enter RWY Code or landing distance available in metres (e.g. 07L or 3000), or enter "ALL" for a list of runway codes.

Note: Runways in the ACARS LANDING database assume FULL length for landing-performance calculations. The runway code is the same as the runway designator, e.g. 07R. If less than full length is desired, enter a LDA value instead.

WARNING	NOTAMs for landing distance WIP will not be monitored by OPS ENG section. WIP landing data is not available in the database.

[3L] OAT : Enter airport OAT in degrees Celsius e.g. +10 or -5.

[4L] QNH : Enter airport QNH in hPa e.g. 950, 1040 etc.

[5L] WIND H/T : Enter surface wind in Head or Tail component in KT e.g. 10H or 5T.

[1R] ALDW : Enter expected landing weight in tonnes e.g. 182.5.

[2R] RWY SURF : RCAM Runway Condition.

Default is DRY, available options are:

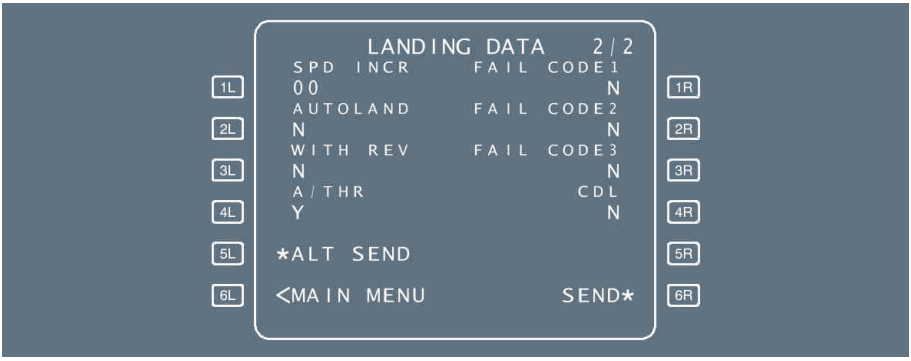
- DRY
- GOOD
- GOOD/MED
- MED
- MED/POOR
- POOR
- NIL

[3R] CONF : Default is OPT. Other options are 1, 2, 3 and FULL.

[4R] SLOPE U/D : When airport elevation is entered instead of the ICAO or IATA airport code, input the runway slope in percentage, e.g. “0.02U” represents 0.02 % uphill; “0.15D” represents 0.15 % downhill etc.

Note: *If ICAO or IATA airport code is entered, the slope input will be ignored. If a distance is entered instead of a runway code (e.g. as with WIP), then the system will assume the most penalising slope at the airport.*

ACARS LANDING DATA PAGE 2/2



[1L] SPD INCR : Speed increment. Default is zero; discretionary increases to VAPP/VLS should be entered here, e.g. windshear/local conditions.

[2L] AUTOLAND : Default is “N” for manual land. Other option is “Y” for Autoland.

[3L] WITH REV : Displays “N” as the default, i.e. no reverse thrust credit. Enter “Y” to enable the reverse thrust credit.

Note: Under some conditions the returned parameters will be identical regardless of the selection of "Y" or "N".

[4L] A/THR : Displays "Y" as the default with 5 kt VAPP correction, i.e. Auto Thrust active. Enter "N" if manual thrust is planned.

Note: N" assumes the approach will be flown at Vls, unless a value is entered in "SPD INCR" or there is a system failure that requires a ∆Vref.

[5L] ALT SEND : When available, provides an alternative communication path in the event of ground mainframe failure. Expect a slow response.

[1R] FAIL CODE 1 : Default "N" for no failure. Enter the failure code as per MEL for dispatch or QRH for inflight failure, e.g. enter "ELEC1".

[2R] FAIL CODE 2 : As per FAIL CODE 1

[3R]FAIL CODE 3 : As per FAIL CODE 1

[4R] CDL : Displays "N" as the default for no CDL item. Enter a CDL code or weight reduction (e.g. 2000 for a 2 tonne penalty) in accordance with the MEL.

ACARS LANDING OUTPUT

Applicable to: ALL

2

The computed landing data is returned to the MCDU screen. The message is divided into three parts. The first part is a summary of the input parameters (and warning message if any) for verification purposes.
The second part is the inflight landing data, which includes the CONF setting, threshold crossing speed, and landing distances for different brake settings.
The third part is the dispatch landing data (regulatory requirement), which contains the maximum allowable landing weight for the given conditions and the associated configuration setting. Dispatch landing data is only available for normal and failure(s) as listed in MEL (i.e. not available for inflight failure).

ACARS LANDING PRINTOUT - EXAMPLES

Applicable to: ALL

3

TBA

ACARS BACKUP PROCEDURES

BACKUP PROCEDURES

Applicable to: ALL

1

ALTERNATE SEND ⏪

An “ALT SEND” button is available in some aircraft, on page 2 of the ACARS LANDING input screen. When a communication failure is caused by the ground mainframe system, e.g. during routine system maintenance, using “ALT SEND” may allow the system to bypass the failure by using a different communication path.

“ALT SEND” will not be effective when the communication failure is caused by:

- Aircraft system failure, or
- ACARS signal blackout, or
- Ground system ACARS LANDING calculator malfunction

Note: “ALT SEND” response times can be slow. Avoid multiple “ALT SEND” requests

FCOM &QRH TABLES

Refer to FCOM PER-LDG LANDING
Refer to QRH/QRH FPE-IFL IN-FLIGHT LANDING

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PERFORMANCE

ONE ENGINE INOPERATIVE

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Localization Title	Toc Index	ID	Reason
PER-OEI-GEN-05 TAKEOFF PROCEDURE	C	1	Documentation update: Addition of "TAKEOFF PROCEDURE" documentary unit
PER-OEI-GEN-05 ENGINE INOPERATIVE CONTINUED TAKEOFF	D	2	Documentation update: Addition of "ENGINE INOPERATIVE CONTINUED TAKEOFF" documentary unit
PER-OEI-GEN-05 ENGINE INOPERATIVE MISSED APPROACH	E	3	Documentation update: Addition of "ENGINE INOPERATIVE MISSED APPROACH" documentary unit
PER-OEI-GEN-05 STANDARD ENGINE INOPERATIVE OPERATING PROCEDURES	F	4	Documentation update: Addition of "STANDARD ENGINE INOPERATIVE OPERATING PROCEDURES" documentary unit
PER-OEI-GEN-05 ENGINE INOPERATIVE PROCEDURES - EXAMPLES	G	5	Documentation update: Addition of "ENGINE INOPERATIVE PROCEDURES - EXAMPLES" documentary unit

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INTRODUCTION

Applicable to: ALL

This chapter provides the single engine performance data to be used for the conduct and monitoring of the flight following an engine failure.
The diversion strategy (descent and cruise speed schedules) shall be selected, and specified in the operator's routes specifications, as a function of the prevailing operational factors (e.g. obstacles clearance requirements and/or ETOPS operation).

FLIGHT PREPARATION

Applicable to: ALL

In readiness for a possible engine failure occurring during the flight, any flight shall be planned so as to comply with any of the following requirements, as applicable :

- obstacle clearance,
- oxygen,
- maximum diversion distance (ETOPS operation).

The following FCOM sections provide flight preparation and fuel planning information :

- *Refer to PER-FPL-GEN-INT GENERAL*, for Standard Fuel Planning,
- *Refer to PRO-SPO-40-10 General*, for Extended Range Operation (ETOPS) and associated fuel requirements.

TAKEOFF PROCEDURE

Applicable to: ALL

1

Normal takeoff procedure for Dragonair aircraft is to follow published SIDs. SIDs are published by the airport authority and are intended for all engine operations. When there is an engine failure, there is no requirement to adhere to or meet the SID altitude or gradient requirements. However, from an operational perspective it is desirable to maintain the SID lateral track if possible during an engine failure.

Occasionally, an alternative procedure will be necessary to avoid critical terrain in order to be able to uplift typical weights from some airfields. This procedure is called an Engine Inoperative Procedure.

Takeoff procedures for all engine and engine inoperative operations are provided on the “Departures” section of the Port Page. If no specific guidance is provided, any published SID procedure is acceptable for use. Alternatively, where obstacles are too limiting, an engine inoperative procedure will be published on the port page and must be followed to avoid the obstacles during an engine failure.

If visual, or above MSA, or under RADAR CONTROL, then it is permissible to depart from these procedures provided that obstacle clearance can be assured. This applies to all Engine Inoperative Procedures.

For all departures, ACARS RTOW performance data is only valid if the relevant SID or Engine Inoperative procedure is flown.

ENGINE INOPERATIVE CONTINUED TAKEOFF

Applicable to: ALL

2

During a continued takeoff with an engine inoperative, the standard procedure is to follow the published SID based on the lateral profile requirement only. Where there is insufficient information provided for lateral profile navigation, then the SID vertical profile information will then be used (e.g. climb gradients, turn at a certain altitude, etc.). RTOW performance data will be based on the most critical obstacles. Where obstacles are too limiting, an engine inoperative procedure will be published in the port page to avoid the obstacle after an engine failure.

In the event of an engine inoperative takeoff, crews will fly the SID or Engine Inoperative procedure as published on the Port Page. In the case where an engine inoperative procedure is to fly a SID, provided the SID is programmed in the FMS, use of managed lateral NAV modes is recommended.

Standard terminology on the Port Page refers to Engine Inoperative Flap Retraction Altitude expressed in feet AAL and AMSL.

Engine Inoperative Flap Retraction Altitudes will only be published on the Port Page if they are higher than the standard figures. For cold weather operations, ISA –15 °C and below, ACARS RTOW will automatically increase the Engine Inoperative Flap Retraction Altitude.

For Dragonair operations, standard minimum Engine Inoperative Flap Retraction Altitude is 1 500 ft AAL.

Obstacle analysis is separated into two categories: close-in obstacles and distant obstacles.

Close-in obstacles consider the SID track within the 25 nm MSA radius with:

- Track width +/-900 m of centerline
- 35 ft minimum obstacle clearance with net performance (50 ft in a turn)
- 15 °angle of bank

Distant obstacles consider the SID track beyond the 25 nm MSA radius (if required) with:

- Track width +/-5 nm of centerline
- 2 000 ft minimum obstacle clearance with net performance

If an engine failure occurs during a FLEX takeoff, consider increasing to TOGA thrust once airborne. EGPWS warnings may occur due to close proximity to terrain. Additionally, GPWS warnings may be triggered by Rad Alt rate of closure at heavy weights. If this occurs, follow the GPWS procedure as per the QRH, being careful to respect Vmca.

ENGINE INOPERATIVE MISSED APPROACH

Applicable to: ALL

3

The standard procedure for an engine inoperative missed approach is to follow the published missed approach procedure. If obstacles under the track are considered to be critical, then an engine inoperative missed approach procedure will be published in the “Arrivals” section of the Port Page. Engine inoperative missed approach performance is only considered up to the Maximum Landing Weight. However, landings at weights up to the RTOW can safely follow the engine inoperative departure procedure.
Missed Approach performance is based on the average minimum and maximum temperatures for each port. Temperature correction to the acceleration altitude is not required.

STANDARD ENGINE INOPERATIVE OPERATING PROCEDURES

Applicable to: ALL

4

ENGINE INOPERATIVE TAKEOFF (DEPARTURES SECTION OF PORT PAGE)

1. Follow the Engine Inoperative Departure procedure.
2. If no Engine Inoperative Departure procedure is published, follow any permissible SID.

ENGINE INOPERATIVE MISSED APPROACH (ARRIVALS SECTION OF PORT PAGE)

•LESS THAN MLW

1. If no Engine Inoperative Missed Approach procedure is published, follow the standard missed approach.

•GREATER THAN MLW

1. Follow the Engine Inoperative Departure procedure.
2. If no Engine Inoperative Departure procedure is published, follow any permissible SID.

ENGINE INOPERATIVE PROCEDURES - EXAMPLES

Applicable to: ALL

5

There are six basic types of engine inoperative scenario for both take-off and missed approach. Some of them are no more than a non-standard flap retraction altitude or give an additional instruction while following a SID.

1. NON-STANDARD MINIMUM FLAP RETRACTION ALTITUDE

Flap Retraction Altitude 2,100FT AAL (2,300FT AMSL)

Decode : Follow the normal SID, but commence the acceleration segment at a non-standard altitude 2,300 ft AMSL.

2. TURN TO A SPECIFIC POINT (NAVAID, AIRPORT) BEFORE REACHING A DESIGNATED POINT (DME DISTANCE, INITIAL TURN)

Engine inoperative before D17 PEK VOR:
Turn back to PEK VOR and hold at or above MSA

Decode : In this case, the turn direction is at the pilot's discretion, although it may be specified. No turns below 500 ft AAL (KA policy). If an engine failure occurs at or anytime after V1 it is safe to continue as far as D17 PEK on the SID. Think of D17 PEK VOR as the limit.

Note: Airmanship will dictate when and in which direction to turn back toward the airport within the D17 PEK. It should not be necessary to turn back at 500 ft. Normally the turn would be initiated after the aircraft is clean and climbing toward MSA (4th segment).

3. TURN ONTO A SPECIFIED TRACK AT A DESIGNATED POINT

Engine inoperative before PORPA:
Continue to D8.0 ISR, then turn RIGHT onto track 190º. Max 220 knots until established on track 190º or above 2,500ft AAL (2,500ft AMSL).

Decode : D8.0 ISR must be overflown before the turn is commenced. The turn is onto a specific track (with a speed limit).

Note: With Green Dot above 220 kt, Flap 1 must be kept until final acceleration, i.e. tracking 190 ° or above 2,500 ft.

4. CONTINUE ON SID TO A DESIGNATED POINT THEN TURN OR HOLD

Follow SID until D20 DGC VOR then turn RIGHT and track 240°, climbing to 5,000FT AAL (5,100FT AMSL)

Decode : D20 DGC VOR must be over flown before turn is commenced.

5. MAINTAIN RUNWAY TRACK TO A SPECIFIED DISTANCE THEN TURN

Engine inoperative before Initial Turn:

Continue on runway track until D6.0 TAJ VOR, then turn EAST to TAJ VOR.

Decode : After over flying D6.0 TAJ VOR, turn in the specified direction to the designated point.

Note: *In this case track must be maintained until the D6.0 point.*

6. CONTINUE ON SID TO REACH SPECIFIED ALTITUDE BY A SPECIFIED DISTANCE

Continue on SID and climb to 6,200FT AAL (6,300FT AMSL) by D48 SK NDB. If unable to comply, advise ATC and return to SK NDB and hold at or above MSA.

Decode : Monitor climb performance whilst continuing on the SID. If at any point before the specified distance it appears that the required altitude will not be met, advise ATC and turn back to the specified point.

Note: *ACARS RTOW performance is based on ambient conditions to the end of the 2nd segment, thereafter performance analysis uses standard data. Therefore, at heavy weight and hot temperatures the required altitude may not be achievable, hence the 'if unable to comply'. There are a number of airports where this instruction forms part of the procedure and usually refers to maintaining 2,000 ft obstacle clearance within 5 nm of the SID track once outside the 25 nm MSA. The preferred action would usually be a return to the departure airfield, however if routing to a takeoff alternate it would be necessary to achieve the required altitude unless under radar control and terrain separation is assured.*

STRATEGY

Applicable to: ALL

Depending on the prevailing operational constraints, the most appropriate diversion strategy shall be selected, out of the following options:

	STANDARD STRATEGY	OBSTACLE STRATEGY	FIXED SPEED STRATEGIES	
			320 kt	VMO
DESCENT TO CEILING	• M .78/300 kt • MCT	• Green Dot Speed • MCT	• M .78/320 kt • MCT	• M .80/350 kt • MCT
CRUISE	LR ceiling LR speed	- Obstacle not cleared: Maintain Green Dot Speed at MCT - Obstacle cleared : Revert to standard strategy	FL per *Refer to PRO-SPO-40-60 ETOPS Fuel from Critical Point to Landing - One Engine Out - Cruise at 320kt* MCT/320 kt	FL per *Refer to PRO-SPO-40-60 ETOPS Fuel from Critical Point to Landing - One Engine Out - Cruise at 350kt* MCT/350 kt
DESCENT TO LANDING	IDLE/M .78/300 kt/250 kt			
Approx increase in fuel consumption compared with both engines operative	+33 %			

For ETOPS operations, any of the above diversion strategies can be used provided that the selected strategy and speed schedule is used in:

- establishing the area of operation (maximum diversion distance), *Refer to PRO-SPO-40-60 General*,
- calculating the diversion fuel requirements for the single engine ETOPS critical scenario, *Refer to PRO-SPO-40-30 ETOPS Fuel Scenarios*,
- demonstrating the applicable obstacle clearance requirements (net flight path and net ceiling).

During the diversion, the flight crew is expected to use the planned speed schedule.
However, based on the evaluation of the actual situation, the pilot in command has the authority to deviate from this planned one engine inoperative speed.

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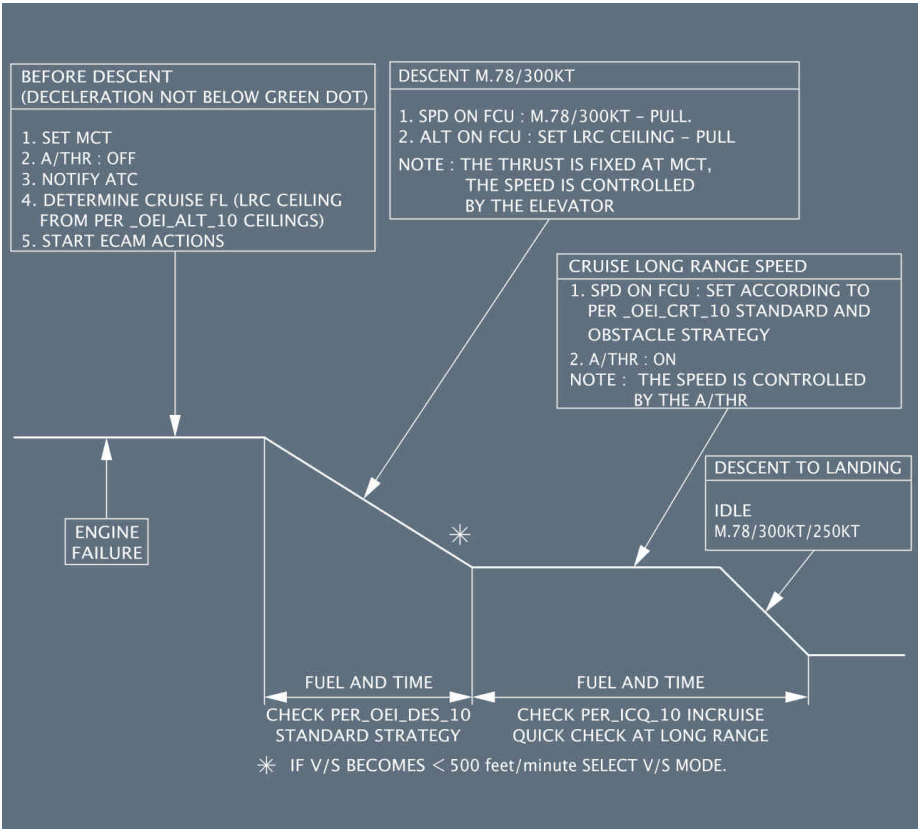
PROCEDURE

Applicable to: ALL

Unless a specific procedure has been established before dispatch (ETOPS, mountainous areas) the recommended procedure is as follows :



EXAMPLE

Applicable to: ALL 320

GIVEN:

GW at engine failure	=	70 000 kg
FL at engine failure	=	310
Temperature	=	ISA
Distance to diversion airport	=	560 nm

No wind

FIND:

LRC ceiling : (*Refer to PER-OEI-ALT-10 GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS*) FL 182

Descent to cruise level: (FL 180) *Refer to PER-OEI-DES-10 DESCENT - M.78/300KT*
Distance = 235 - 98 = 137 nm
Fuel = 1 248 - 567 = 681 kg
Time = 35.6 - 16.0 = 19.6 min

Cruise at long range speed (FL 180) to landing.
(Weight = 70 000 - 681 = 69 319 kg: Distance = 560 - 137 = 423 nm)
Determine on (*Refer to PER-OEI-ICQ-10 IN CRUISE QUICK CHECK LONG RANGE*) time and fuel consumption at ISA conditions and for a reference weight of 55 000 kg. Interpolate the remaining air distance of 423 nm at FL 180.

Fuel : 2 435 kg

Time : 1 h 24 min

Correction due to actual in-cruise weight

ΔFuel = +19 kg per 1 000 kg above reference weight

ΔFuel = +19 kg $\times$(69.3 – 55) ~ 280 kg

RESULT:

Total Fuel = 681 + 2 435 + 280 = 3 396 kg

Time = 1 h 24 min + 20 min = 1 h 44 min

EXAMPLE

Applicable to: ALL 321

GIVEN

GW at engine failure	=	80 000 kg
FL at engine failure	=	310
Temperature	=	ISA
Distance to diversion airport No wind	=	550 nm

FIND

LRC ceiling : (*Refer to PER-OEI-ALT-10 GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS*) FL 162

Descent to cruise level : (FL 160) *Refer to PER-OEI-DES-10 DESCENT - M.78/300KT*
Distance = 226 - 72 = 154 nm
Fuel = 1 354 - 482 = 872 kg
Time = 34.2 - 12 = 22.2 min

Cruise at long range speed (FL 160) to landing :
(Weight = 80 000 - 872 = 79 128 kg : Distance = 550 - 154 = 396 nm)
Determine on (*Refer to PER-OEI-ICQ-10 IN CRUISE QUICK CHECK LONG RANGE*) time and fuel consumption at ISA conditions for a reference weight of 60 000 kg. Interpolate the remaining air distance of 396 nm at FL 160.

Fuel : 2 622 kg

Time : 1 h 20 min

Correction due to actual in-cruise weight

ΔFuel = +22 kg per 1 000 kg above reference weight

ΔFuel = +22 kg $\times$(79.1 – 60) ~ 420 kg

RESULT

Total Fuel = 872 + 2 622 + 420 = 3 914 kg

Time = 1 h 20 min + 22 min = 1 h 42 min

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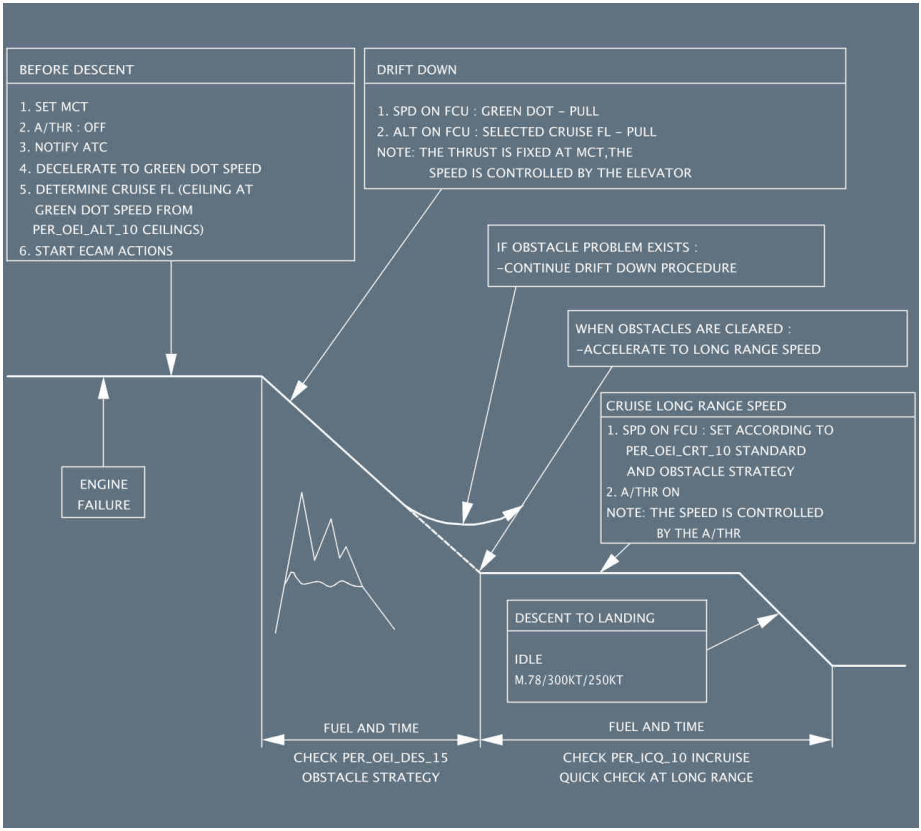
PROCEDURE

Applicable to: ALL

In order to maintain the highest possible level, the drift down procedure must be adopted.
This requires maximum continuous thrust on the remaining engine at green dot speed.

- **If, having reached drift down ceiling altitude, an obstacle problem remains, the drift down procedure must be maintained so as to fly an ascending cruise profile.**
- **If, after drift down, no obstacle problem remains, the speed should be allowed to increase to long range speed and maintained. The subsequent cruise should be made using either the long range speed by adjusting it as a function of aircraft weight or by maintaining the initial cruise speed.**

Note: *Due to the fact that the long range speed is higher than the green dot speed, the cruise will be made at an altitude lower than the drift down ceiling.*


BEFORE DESCENT
1. SET MCT
2. A/THR : OFF
3. NOTIFY ATC
4. DECELERATE TO GREEN DOT SPEED
5. DETERMINE CRUISE FL (CEILING AT GREEN DOT SPEED FROM PER_OEI_ALT_10 CEILINGS)
6. START ECAM ACTIONS
DRIFT DOWN
1. SPD ON FCU : GREEN DOT – PULL
2. ALT ON FCU : SELECTED CRUISE FL – PULL
NOTE: THE THRUST IS FIXED AT MCT,THE SPEED IS CONTROLLED BY THE ELEVATOR
IF OBSTACLE PROBLEM EXISTS :
–CONTINUE DRIFT DOWN PROCEDURE
WHEN OBSTACLES ARE CLEARED :
–ACCELERATE TO LONG RANGE SPEED
CRUISE LONG RANGE SPEED
1. SPD ON FCU : SET ACCORDING TO PER_OEI_CRT_10 STANDARD AND OBSTACLE STRATEGY
2. A/THR ON
NOTE: THE SPEED IS CONTROLLED BY THE A/THR
ENGINE FAILURE
DESCENT TO LANDING
IDLE
M.78/300KT/250KT
FUEL AND TIME
CHECK PER_OEI_DES_15 OBSTACLE STRATEGY
FUEL AND TIME
CHECK PER_ICQ_10 INCRUISE QUICK CHECK AT LONG RANGE

EXAMPLE

Applicable to: ALL 320

GIVEN

GW at engine failure	=	62 000 kg
FL at engine failure	=	350
Temperature	=	ISA
Distance to destination airport No wind	=	1 500 nm

FIND

Level off (drift down ceiling) (*Refer to PER-OEI-DES-15 GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - ISA*)	:	24 300 ft
Distance	:	338 nm
Fuel	:	1 800 kg
Time	:	1 h 04 min
LRC ceiling : (*Refer to PER-OEI-ALT-10 GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS*)	:	FL 202

Cruise at long range speed (FL 200) to landing
(weight = 62 000 - 1 800 = 60 200 kg : Distance = 1 500 - 338 = 1 162 nm)
Determine on (*Refer to PER-OEI-ICQ-10 IN CRUISE QUICK CHECK LONG RANGE*) time and fuel consumption at ISA conditions for a reference weight of 55 000 kg. Interpolate the remaining air distance of 1 162 nm at FL 200.

Fuel : 6 503 kg

Time : 3 h 34 min

Correction due to actual in-cruise weight

ΔFuel = +58 kg per 1 000 kg above reference weight

ΔFuel = +58 kg $\times$(60.2 – 55) ~ 302 kg

RESULT

Total Fuel = 6 503 + 302 + 1 800 = 8 605 kg

Time = 3 h 34 min + 1 h 04 min = 4 h 38 min

EXAMPLE

Applicable to: ALL 321

GIVEN:

GW at engine failure = 70 000 kg
FL at engine failure = 350
Temperature = ISA
Distance to destination airport = 1 500 nm
No wind

FIND:

Level off (drift down ceiling) (*Refer to PER-OEI-DES-15 GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - ISA*) : 22 900 ft
Distance : 376 nm
Fuel : 2 400 kg
Time : 1 h 10 min
LRC ceiling: (*Refer to PER-OEI-ALT-10 GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS*) : FL 203
Cruise at long range speed (FL 200) to landing
(weight = 70 000 - 2 400 = 67 600 kg: Distance = 1 500 - 376 = 1 124 nm)
Determine on (*Refer to PER-OEI-ICQ-10 IN CRUISE QUICK CHECK LONG RANGE*) time and fuel consumption at ISA conditions for a reference weight of 60 000 kg. Interpolate the remaining air distance of 1 124 nm at FL 200.

Fuel : 6 992 kg
Time : 3 h 27 min
Correction due to actual in-cruise weight

ΔFuel = +68 kg per 1 000 kg above reference weight
ΔFuel = +68 kg $\times$(67.6 – 60) ~ 517 kg

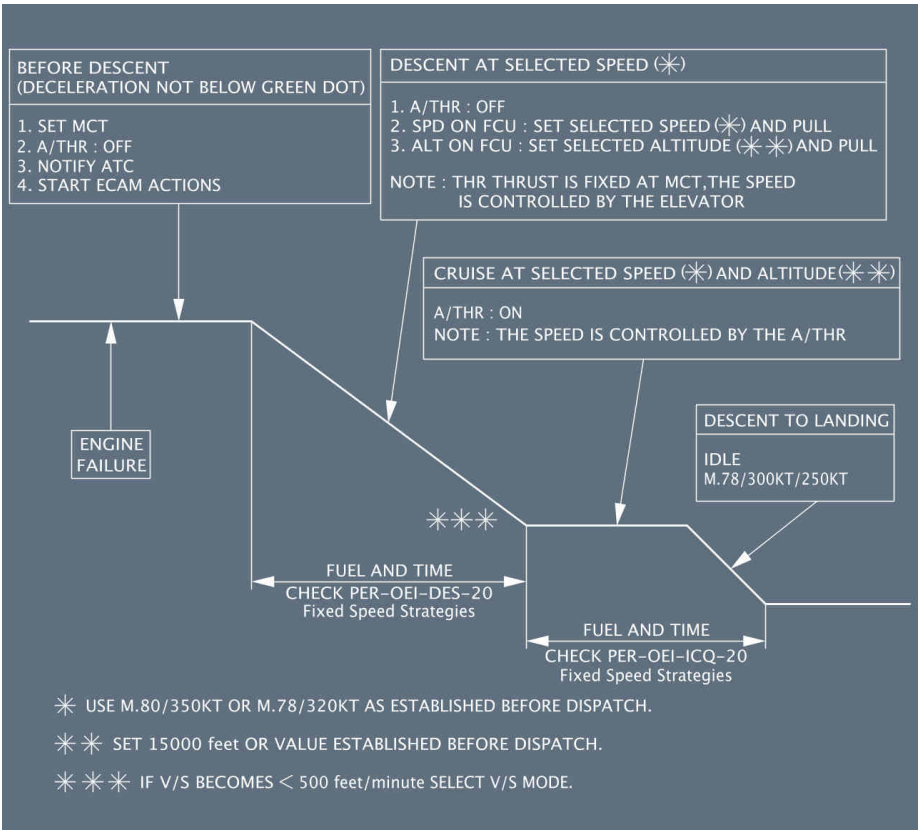
RESULT:

Total Fuel = 6 992 + 517 + 2 400 = 9 909 kg
Time = 3 h 27 min + 1 h 10 min = 4 h 37 min

PROCEDURE

Applicable to: ALL

This section provides single engine performance data for two fixed speed diversion strategies (fixed descent and cruise speed schedules) recommended for ETOPS operation, provided that the requirements set forth, *Refer to PER-OEI-GEN-05 INTRODUCTION*, are complied with.



EXAMPLE

Applicable to: ALL 320

GIVEN :

GW at engine failure	=	70 000 kg
FL at engine failure	=	350
Temperature	=	ISA
Distance to diversion airport	=	500 nm
Speed selected before dispatch	=	350 kt
Cruise level for diversion Selected before dispatch	=	FL 180

FIND :

Descent to cruise level (*Refer to PER-OEI-DES-20 DESCENT - M.80/350KT*) : Distance = 199 - 106 = 93 nm
Fuel = 1 186 - 760 = 426 kg
Time = 26.9 - 15.1 = 11.8 min

Cruise

Weight = 70 000 - 426 = 69 574 kg

Distance = 500 - 93 = 407 nm

Determine (*Refer to PER-OEI-ICQ-20 IN CRUISE QUICK CHECK VMO*) time and fuel consumption at ISA conditions for a reference weight of 55 000 kg

Interpolate the remaining distance of 407 nm at FL 180

Fuel = 2 595 kg

Time = 1 h 12 min

Correction due to actual in-cruise weight : no correction here

RESULT :

Total Fuel = 2 595 + 426 = 3 021 kg

Time = 1 h 12 min + 12 min = 1 h 24 min

EXAMPLE

Applicable to: ALL 321

GIVEN :

GW at engine failure	=	75 000 kg
FL at engine failure	=	350
Temperature	=	ISA
Distance to diversion airport	=	500 nm
Speed selected before dispatch	=	350 kt
Cruise level for diversion Selected before dispatch	=	FL 180

FIND :

Descent to cruise level (*Refer to PER-OEI-DES-20 DESCENT - M.80/350KT*) : Distance = 194 - 102 = 92 nm
Fuel = 1 250 - 780 = 470 kg
Time = 26.2 - 14.5 = 11.7 min

Cruise

Weight = 75 000 - 470 = 74 530 kg

Distance = 500 - 92 = 408 nm

Determine (*Refer to PER-OEI-ICQ-20 IN CRUISE QUICK CHECK VMO*) time and fuel consumption at ISA conditions for a reference weight of 60 000 kg

Interpolate the remaining distance of 408 nm at FL 180

Fuel = 2 839 kg

Time = 1 h 11 min

Correction due to actual in-cruise weight

△Fuel = +3 kg per 1 000 kg above reference weight

△Fuel = +3 kg ×(74.5 – 60) ~ 44 kg

RESULT :

Total Fuel = 2 839 + 44 + 470 = 3 353 kg

Time = 1 h 11 min + 12 min = 1 h 23 min

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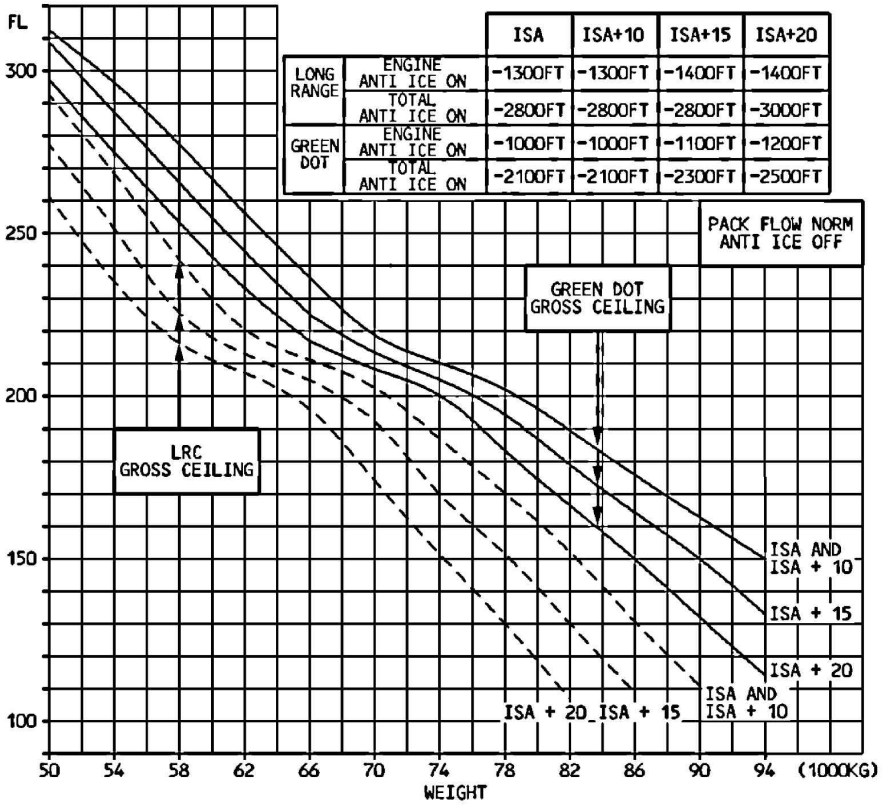
GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS

Applicable to: ALL 321



		ISA	ISA+10	ISA+15	ISA+20
LONG RANGE	ENGINE ANTI ICE ON	-1300FT	-1300FT	-1400FT	-1400FT
	TOTAL ANTI ICE ON	-2800FT	-2800FT	-2800FT	-3000FT
GREEN DOT	ENGINE ANTI ICE ON	-1000FT	-1000FT	-1100FT	-1200FT
	TOTAL ANTI ICE ON	-2100FT	-2100FT	-2300FT	-2500FT

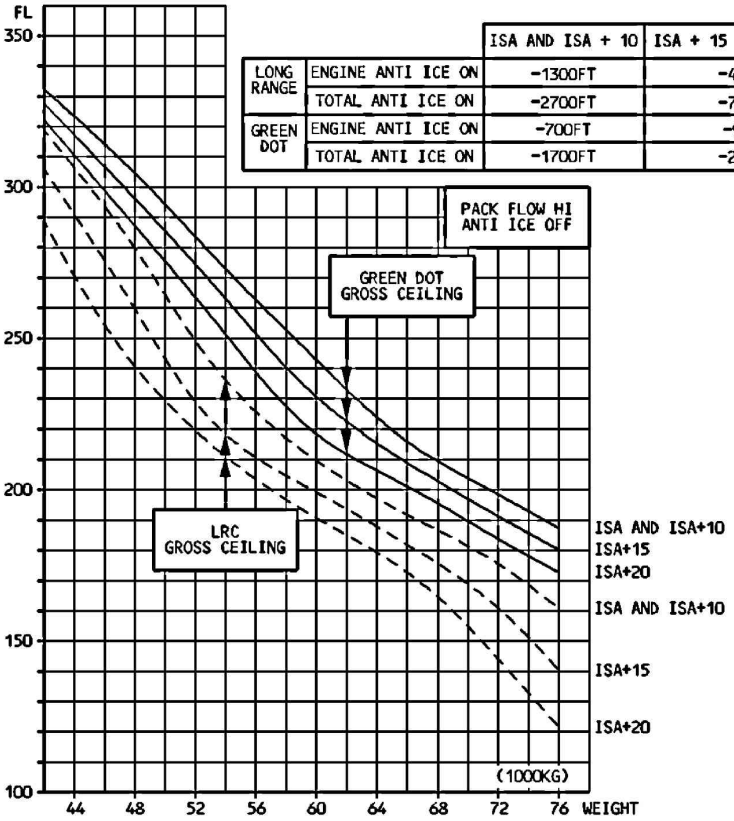
Note: *1. For weights above 85 000 kg, one engine ceilings at Long Range speed may be overestimated by FMS Legacy. In this case, ceiling values provided in the above graph should be retained.*

2. If severe icing conditions are encountered, ice formation may build up on non heated structure and therefore the ceiling will be reduced by 2 400 ft.

GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS

Applicable to: ALL 320

		ISA AND ISA + 10	ISA + 15 AND ISA + 20
LONG RANGE	ENGINE ANTI ICE ON	-1300FT	-4000FT
	TOTAL ANTI ICE ON	-2700FT	-7400FT
GREEN DOT	ENGINE ANTI ICE ON	-700FT	-900FT
	TOTAL ANTI ICE ON	-1700FT	-2100FT



Note: If severe icing conditions are encountered, ice formation may build up on non heated structure and therefore the ceiling will be reduced by 2 000 ft.

NET CEILING AT GREEN DOT SPEED

Applicable to: ALL 321

To obtain the net ceiling at green dot speed, apply the following corrections to the gross ceiling at green dot speed:

	WEIGHT (1 000 kg)					
	52	**60**	**68**	**76**	**84**	**92**
≤ISA +10	-5 200 ft	-5 200 ft	-3 500 ft	-4 600 ft	-6 000 ft	-7 100 ft
ISA +20	-5 500 ft	-3 800 ft	-4 300 ft	-6 400 ft	-7 200 ft	-8 300 ft

NET CEILING AT GREEN DOT SPEED

Applicable to: ALL 320

To obtain the net ceiling at green dot speed, apply the following corrections to the gross ceiling at green dot speed:

	WEIGHT (1 000 kg)							
	48	**52**	**56**	**60**	**64**	**68**	**72**	**76**
≤ISA +10	-4 500 ft	-4 700 ft	-4 700 ft	-4 000 ft	-3 300 ft	-3 300 ft	-3 700 ft	-4 600 ft
ISA +20	-5 200 ft	-4 800 ft	-3 800 ft	-3 100 ft	-3 300 ft	-4 000 ft	-5 200 ft	-6 800 ft

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LONG RANGE CRUISE - 1 ENGINE OUT - ISA

Applicable to: ALL 320

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL120		FL140		FL160		FL180		FL200	
50	1.151	.430	1.171	.447	1.232	.512	1.240	.510	1.255	.511	1.295	.538
	1811	237	1834	238	2034	263	1904	252	1812	243	1840	246
	151.4	274	154.4	283	158.3	322	167.1	318	174.5	316	179.6	330
52	1.158	.435	1.185	.463	1.236	.512	1.245	.510	1.266	.515	1.315	.550
	1879	240	1950	246	2053	263	1928	252	1868	245	1920	252
	147.8	278	150.4	293	156.8	322	165.0	318	170.8	319	176.0	338
54	1.170	.447	1.230	.512	1.239	.511	1.252	.510	1.287	.532	1.325	.553
	1983	247	2206	273	2072	263	1963	252	1970	253	1962	253
	143.9	285	147.2	325	155.2	322	162.3	319	167.1	329	173.2	340
56	1.183	.461	1.234	.513	1.244	.511	1.262	.514	1.310	.549	1.336	.555
	2098	255	2229	274	2095	262	2018	254	2079	261	2005	254
	140.4	295	145.8	325	153.4	321	159.1	321	163.6	340	170.2	341
58	1.226	.510	1.238	.513	1.249	.510	1.275	.522	1.321	.554	1.351	.563
	2373	283	2248	273	2121	262	2090	258	2129	264	2073	258
	137.2	326	144.4	325	151.3	321	155.9	326	161.1	343	166.8	346
60	1.233	.514	1.241	.512	1.258	.514	1.302	.546	1.330	.556	1.368	.572
	2415	285	2267	273	2173	264	2232	270	2169	265	2152	262
	135.8	328	143.0	324	148.6	323	152.6	341	158.6	344	163.3	352
62	1.236	.514	1.246	.511	1.267	.518	1.316	.554	1.341	.559	1.388	.585
	2434	285	2291	273	2230	266	2299	274	2219	266	2248	268
	134.7	328	141.4	324	146.0	326	150.3	346	156.0	346	160.0	360
64	1.239	.513	1.252	.512	1.286	.533	1.325	.556	1.357	.568	1.404	.594
	2454	284	2329	273	2341	274	2343	275	2298	270	2323	272
	133.5	328	139.3	325	143.2	335	148.1	347	153.0	352	157.0	365
66	1.243	.513	1.261	.516	1.307	.551	1.333	.558	1.373	.578	1.419	.601
	2476	284	2387	275	2465	283	2385	276	2384	275	2395	276
	132.2	327	136.9	327	140.5	346	146.0	348	150.1	358	154.2	369
68	1.247	.512	1.270	.520	1.318	.556	1.344	.562	1.391	.589	1.423	.595
	2499	283	2447	278	2523	286	2441	278	2475	281	2394	273
	130.7	327	134.6	329	138.7	350	143.7	351	147.3	364	152.6	365
70	1.254	.514	1.290	.538	1.326	.558	1.358	.570	1.405	.596	1.426	.584
	2550	285	2579	288	2563	287	2520	282	2547	284	2385	268
	128.8	328	132.3	341	136.9	351	141.1	356	144.8	369	150.4	359
72	1.262	.517	1.309	.553	1.334	.560	1.374	.579	1.419	.602	1.432	.568
	2604	287	2694	296	2607	288	2607	287	2617	287	2371	260
	126.8	330	130.1	350	135.0	352	138.7	361	142.4	373	147.1	349
74	1.270	.521	1.319	.558	1.344	.564	1.390	.589	1.432	.607	1.445	.529
	2666	289	2751	298	2665	290	2699	292	2682	290	2337	242
	124.8	333	128.5	353	133.0	355	136.3	368	140.1	376	139.1	325
76	1.290	.539	1.326	.559	1.357	.571	1.403	.596	1.434	.601		
	2805	299	2791	299	2745	294	2774	296	2678	287		
	122.8	344	126.9	354	130.8	359	134.2	372	138.9	372		
78	1.308	.554	1.334	.561	1.371	.580	1.416	.602	1.438	.590		
	2927	307	2836	300	2831	299	2844	299	2668	282		
	120.8	354	125.4	355	128.7	364	132.1	376	137.0	366		

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 6 %

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL210		FL220		FL230		FL240		FL250		FL260	
50	1.316 1841 182.9	.550 247 337	1.328 1802 186.7	.552 242 336	1.344 1777 190.1	.556 239 338	1.366 1782 192.7	.568 239 343	1.393 1801 195.2	.584 241 352	1.416 1798 198.3	.595 241 357
52	1.327 1881 179.7	.553 248 338	1.341 1850 183.1	.556 244 339	1.363 1855 185.5	.567 244 344	1.389 1875 188.0	.583 246 352	1.412 1874 190.9	.594 246 358	1.435 1865 193.7	.603 244 361
54	1.338 1925 176.5	.555 249 340	1.359 1928 178.9	.566 249 345	1.385 1947 181.2	.581 251 353	1.408 1949 183.9	.593 251 358	1.431 1942 186.6	.602 249 362	1.449 1908 190.0	.605 245 363
56	1.355 2001 172.7	.565 253 345	1.380 2017 174.9	.579 255 353	1.404 2024 177.4	.592 255 359	1.426 2019 180.0	.601 254 363	1.440 1963 183.8	.600 248 361	1.453 1899 186.9	.592 240 355
58	1.374 2086 168.9	.576 259 352	1.399 2100 171.2	.590 260 360	1.417 2071 174.3	.595 257 361	1.430 2014 177.8	.592 250 358	1.444 1952 180.5	.585 242 352	1.461 1881 181.3	.569 230 341
60	1.394 2174 165.4	.588 264 360	1.407 2123 168.8	.588 259 358	1.420 2065 172.0	.585 252 355	1.435 2003 174.3	.578 244 349	1.452 1935 174.7	.562 232 338		
62	1.410 2248 162.3	.596 268 365	1.411 2117 166.5	.578 254 353	1.426 2055 168.4	.570 246 346	1.444 1986 168.1	.552 233 334				
64	1.418 2272 160.1	.595 267 364	1.416 2108 162.8	.563 247 343	1.435 2037 161.9	.544 234 330						
66	1.421 2264 158.0	.585 263 358	1.427 2090 156.2	.536 235 326								
68	1.426 2253 154.8	.570 256 349										
70	1.436 2232 148.9	.543 243 332										
72												
74												
76												
78												

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 6 %

LONG RANGE CRUISE - 1 ENGINE OUT - ISA

Applicable to: ALL 321

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL120		FL140		FL160		FL180		FL200	
50	1.181	.442	1.201	.453	1.230	.469	1.267	.488	1.301	.501	1.343	.518
	1972	244	1931	241	1911	240	1906	241	1873	238	1862	236
	143.0	282	148.8	287	154.2	295	159.7	304	165.6	310	170.8	318
54	1.199	.454	1.228	.468	1.264	.487	1.297	.500	1.337	.516	1.387	.539
	2093	251	2068	249	2064	250	2030	247	2014	245	2032	246
	138.4	290	143.4	297	148.4	306	153.8	312	158.7	320	163.0	331
58	1.223	.466	1.260	.486	1.292	.499	1.329	.513	1.379	.536	1.427	.555
	2224	258	2226	259	2191	256	2162	253	2186	255	2182	254
	133.8	298	138.4	308	143.3	314	148.0	320	151.9	332	156.3	341
62	1.253	.484	1.286	.497	1.321	.511	1.369	.533	1.415	.551	1.468	.572
	2387	268	2354	265	2321	262	2344	264	2338	262	2346	262
	129.4	309	133.9	315	138.4	321	142.0	333	146.0	341	149.9	352
66	1.278	.495	1.312	.508	1.356	.528	1.403	.548	1.454	.568	1.508	.588
	2519	274	2483	271	2495	272	2498	271	2505	271	2512	270
	125.5	316	129.7	322	133.2	332	136.8	342	140.5	352	143.8	361
70	1.303	.506	1.342	.522	1.389	.543	1.437	.562	1.491	.583	1.545	.601
	2651	280	2641	279	2654	279	2656	278	2668	278	2673	276
	121.8	323	125.3	331	128.6	341	132.1	351	135.3	361	138.0	369
74	1.327	.515	1.374	.538	1.420	.556	1.471	.576	1.524	.594	1.562	.590
	2785	286	2813	287	2809	286	2820	286	2820	283	2720	271
	118.2	329	121.1	341	124.4	349	127.5	360	130.4	368	133.3	363
78	1.359	.531	1.403	.550	1.453	.570	1.505	.589	1.543	.590	1.573	.553
	2968	295	2968	294	2979	294	2987	292	2891	281	2693	253
	114.3	339	117.3	348	120.4	359	123.1	368	126.3	365	126.2	340
82	1.385	.543	1.432	.562	1.483	.582	1.525	.589	1.553	.563		
	3124	301	3128	301	3140	300	3073	292	2874	268		
	111.0	347	113.9	356	116.6	366	119.6	367	121.3	349		
86	1.412	.554	1.462	.575	1.504	.585	1.533	.569				
	3282	308	3295	307	3239	301	3064	282				
	107.8	354	110.5	364	113.5	368	115.8	355				
90	1.440	.567	1.480	.577	1.511	.568	1.548	.533				
	3449	315	3390	309	3234	293	3047	264				
	104.9	362	107.8	365	110.4	357	109.2	333				
94	1.456	.569	1.486	.562	1.522	.542						
	3540	316	3385	301	3227	279						
	102.6	363	105.2	356	105.7	341						

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

10D --08F0A321--131 IAE V2530-A5 23200010C6KG330 0 018590 0 0 3 1 0 0 00 0 01 990 000 000 0 FCOM-N0-03-06-30-004-XXX

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL210	FL220	FL230	FL240	FL250	FL260
50	1.369 .530 1874 237 173.1 324	1.393 .540 1875 237 175.6 329	1.417 .549 1870 236 178.2 333	1.445 .560 1874 236 180.8 339	1.472 .571 1875 236 183.2 344	1.503 .582 1883 236 185.4 349
54	1.411 .548 2028 246 165.4 335	1.437 .558 2029 245 167.7 340	1.464 .569 2032 245 170.0 345	1.493 .580 2037 245 172.1 351	1.520 .588 2034 243 174.1 354	1.551 .598 2041 242 175.7 359
58	1.454 .567 2190 254 158.3 347	1.481 .576 2190 253 160.4 351	1.510 .587 2196 253 162.2 356	1.537 .594 2192 251 163.9 359	1.554 .591 2138 244 166.2 356	1.571 .580 2074 235 167.5 347
62	1.497 .583 2354 262 151.6 357	1.523 .591 2348 260 153.4 360	1.536 .585 2277 252 155.8 355	1.550 .572 2196 241 157.4 346	1.568 .551 2121 227 156.4 332	
66	1.534 .595 2503 267 145.4 364	1.531 .567 2338 249 147.9 346	1.548 .548 2252 235 147.6 332			
70	1.547 .578 2519 260 140.4 354					
74	1.562 .528 2482 236 130.1 323					
78						
82						
86						
90						
94						

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

10D —08F0A321–131 IAE V2530–A5 23200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 0 FCOM-N0–03–06–30–005–XXX

LONG RANGE CRUISE - 1 ENGINE OUT - ISA +10

Applicable to: ALL 320

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA+10
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL120		FL140		FL160		FL180		FL200	
50	1.151	.428	1.172	.448	1.232	.511	1.241	.509	1.256	.510	1.298	.539
	1850	237	1884	238	2080	262	1950	252	1858	242	1892	246
	150.5	278	153.3	289	157.5	327	166.2	324	173.3	322	178.4	337
52	1.159	.435	1.187	.463	1.236	.511	1.246	.509	1.267	.514	1.315	.549
	1926	240	2002	247	2100	262	1974	251	1914	244	1966	251
	146.8	283	149.4	299	155.9	327	164.0	324	169.7	325	175.0	344
54	1.170	.447	1.231	.512	1.240	.510	1.253	.510	1.290	.534	1.326	.552
	2032	247	2259	273	2120	262	2013	252	2031	254	2009	252
	142.9	290	146.3	331	154.3	327	161.2	325	165.9	337	172.0	346
56	1.184	.461	1.235	.512	1.244	.510	1.263	.514	1.311	.549	1.337	.554
	2151	255	2280	273	2144	262	2069	254	2131	261	2054	253
	139.4	300	145.0	331	152.5	327	158.0	327	162.5	346	169.1	347
58	1.228	.511	1.238	.512	1.249	.509	1.278	.524	1.322	.553	1.353	.563
	2437	283	2300	273	2170	262	2151	259	2179	263	2128	257
	136.3	332	143.6	330	150.4	326	154.9	333	160.1	349	165.6	352
60	1.233	.513	1.242	.511	1.259	.513	1.304	.546	1.331	.554	1.370	.573
	2469	284	2320	273	2227	264	2291	270	2221	264	2214	262
	135.1	334	142.2	330	147.6	329	151.6	347	157.6	350	162.2	359
62	1.237	.513	1.246	.510	1.268	.517	1.316	.553	1.342	.558	1.390	.585
	2489	284	2345	272	2285	266	2354	274	2274	266	2309	268
	133.9	333	140.5	329	145.0	331	149.3	351	154.9	352	158.8	367
64	1.240	.512	1.253	.512	1.288	.535	1.325	.555	1.358	.567	1.405	.593
	2509	284	2389	273	2409	275	2397	275	2355	270	2383	272
	132.7	333	138.4	331	142.2	343	147.2	353	151.9	358	155.9	372
66	1.243	.512	1.262	.516	1.308	.550	1.334	.557	1.375	.577	1.421	.600
	2531	283	2447	275	2525	283	2441	276	2445	275	2456	276
	131.5	333	136.0	333	139.6	353	145.1	354	149.0	364	153.1	376
68	1.248	.511	1.271	.520	1.319	.555	1.346	.562	1.392	.588	1.423	.593
	2557	283	2509	277	2581	286	2504	278	2539	281	2450	272
	129.9	332	133.7	335	137.8	356	142.7	357	146.2	371	151.6	372
70	1.255	.514	1.292	.539	1.327	.556	1.360	.570	1.407	.595	1.427	.582
	2610	285	2648	288	2622	286	2586	282	2614	284	2440	267
	128.0	334	131.4	348	136.0	357	140.2	362	143.8	376	149.3	364
72	1.263	.517	1.310	.552	1.335	.558	1.376	.579	1.420	.602	1.433	.565
	2668	286	2758	295	2666	287	2677	287	2686	287	2426	259
	126.0	336	129.3	356	134.2	358	137.7	369	141.4	380	145.9	354
74	1.271	.521	1.319	.557	1.346	.563	1.391	.589	1.432	.605	1.449	.518
	2733	289	2815	298	2730	290	2769	292	2745	289	2383	236
	124.0	339	127.7	359	132.2	361	135.3	375	139.2	382	136.3	325
76	1.293	.541	1.327	.558	1.359	.570	1.404	.596	1.435	.599		
	2885	300	2855	298	2811	294	2843	296	2740	286		
	121.9	352	126.1	360	130.0	365	133.3	379	138.0	378		
78	1.309	.553	1.334	.560	1.373	.579	1.417	.602	1.439	.588		
	2995	307	2900	299	2902	298	2916	299	2730	281		
	120.1	360	124.6	361	127.8	371	131.2	383	136.0	371		

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 6 %

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA+10
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL210		FL220		FL230		FL240		FL250		FL260	
50	1.317	.549	1.329	.550	1.345	.556	1.368	.568	1.395	.584	1.418	.595
	1884	246	1844	242	1823	239	1831	239	1851	241	1849	241
	181.8	342	185.5	342	188.8	344	191.3	350	193.8	359	196.8	364
52	1.327	.551	1.342	.555	1.364	.566	1.391	.583	1.414	.593	1.437	.603
	1926	247	1897	244	1903	244	1925	246	1924	246	1918	244
	178.6	344	181.8	345	184.3	351	186.7	359	189.5	365	192.3	369
54	1.339	.554	1.361	.565	1.386	.581	1.410	.592	1.433	.602	1.450	.603
	1973	248	1978	248	1998	250	2000	250	1994	249	1956	245
	175.3	346	177.7	351	180.0	360	182.6	365	185.3	370	188.8	369
56	1.357	.564	1.382	.578	1.406	.591	1.427	.600	1.440	.597	1.454	.590
	2053	253	2071	254	2077	255	2069	254	2010	247	1945	239
	171.5	352	173.7	360	176.1	366	178.9	370	182.6	367	185.5	361
58	1.376	.576	1.401	.589	1.418	.593	1.431	.590	1.445	.583	1.462	.565
	2143	258	2155	259	2121	256	2062	249	1999	241	1925	228
	167.7	359	170.0	366	173.2	367	176.5	364	179.1	358	179.4	346
60	1.396	.588	1.408	.586	1.421	.583	1.436	.575	1.454	.557		
	2233	264	2174	258	2114	251	2051	243	1980	230		
	164.3	367	167.8	365	170.8	361	173.0	355	172.9	342		
62	1.412	.596	1.412	.576	1.427	.568	1.445	.548				
	2308	268	2167	253	2104	244	2032	231				
	161.2	372	165.3	358	167.1	352	166.4	338				
64	1.419	.593	1.417	.560	1.437	.540						
	2326	266	2158	246	2084	232						
	159.1	370	161.5	348	160.3	334						
66	1.422	.583	1.429	.530								
	2317	262	2137	232								
	156.9	364	154.3	330								
68	1.427	.567										
	2305	254										
	153.6	354										
70	1.437	.539										
	2282	241										
	147.3	336										
72												
74												
76												
78												

ENGINE ANTI ICE ON△
FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 6 %

LONG RANGE CRUISE - 1 ENGINE OUT - ISA +10

Applicable to: ALL 321

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL120		FL140		FL160		FL180		FL200	
50	1.182	.441	1.202	.453	1.232	.469	1.268	.487	1.302	.500	1.344	.517
	2018	244	1978	241	1959	240	1953	241	1918	237	1909	236
	142.2	287	147.9	293	153.3	300	158.8	310	164.6	316	169.8	324
54	1.200	.453	1.229	.468	1.265	.487	1.299	.500	1.338	.516	1.388	.538
	2142	251	2118	249	2115	250	2080	247	2064	245	2083	246
	137.6	295	142.6	302	147.6	312	152.9	318	157.7	326	161.9	337
58	1.224	.466	1.261	.486	1.293	.499	1.330	.513	1.380	.536	1.428	.554
	2278	258	2279	259	2243	256	2217	253	2244	255	2238	254
	133.0	303	137.6	313	142.5	320	147.1	326	150.9	339	155.2	347
62	1.254	.484	1.287	.497	1.321	.510	1.370	.533	1.416	.551	1.470	.572
	2445	268	2411	265	2374	262	2401	263	2397	262	2409	262
	128.6	314	133.1	321	137.6	327	141.1	339	145.0	348	148.8	358
66	1.279	.495	1.313	.508	1.358	.528	1.404	.547	1.455	.567	1.510	.587
	2579	274	2543	271	2557	271	2559	271	2567	270	2578	269
	124.7	322	128.9	328	132.3	338	135.9	348	139.5	358	142.8	368
70	1.303	.505	1.344	.522	1.390	.543	1.439	.562	1.492	.582	1.547	.600
	2712	280	2706	279	2722	279	2724	278	2736	278	2743	275
	121.1	328	124.5	337	127.7	348	131.2	357	134.3	368	137.0	376
74	1.328	.515	1.375	.537	1.421	.555	1.473	.576	1.525	.593	1.563	.588
	2850	285	2881	287	2878	286	2893	285	2893	283	2786	270
	117.4	335	120.3	347	123.6	356	126.6	366	129.4	374	132.3	368
78	1.360	.531	1.404	.549	1.454	.569	1.507	.589	1.544	.588	1.574	.550
	3041	294	3040	293	3052	293	3064	292	2960	281	2757	251
	113.6	345	116.6	354	119.6	365	122.3	375	125.4	371	124.9	344
82	1.387	.543	1.433	.562	1.484	.581	1.526	.587	1.554	.561		
	3203	301	3206	300	3217	300	3145	291	2943	267		
	110.2	353	113.1	363	115.8	373	118.7	373	120.3	354		
86	1.413	.554	1.463	.574	1.505	.583	1.534	.567				
	3362	307	3379	307	3315	301	3137	281				
	107.1	360	109.7	371	112.7	374	114.9	361				
90	1.441	.566	1.481	.576	1.512	.566	1.549	.530				
	3532	314	3469	308	3310	292	3118	262				
	104.2	368	107.1	371	109.6	363	108.0	337				
94	1.457	.567	1.487	.561	1.523	.540						
	3621	315	3463	300	3302	278						
	101.9	369	104.5	362	104.8	346						

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

10D —08F0A321–131 IAE V2530–A5 23200010C6KG330 0 018590 0 0 3 1 0 0 00 0 01 990 000 000 10 FCOM-N0–03–06–30–006–XXX

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL210	FL220	FL230	FL240	FL250	FL260
50	1.370 .530 1922 237 172.0 331	1.395 .540 1924 237 174.5 336	1.419 .549 1920 236 177.0 340	1.447 .560 1926 236 179.5 346	1.474 .571 1927 236 181.9 351	1.504 .582 1934 235 184.1 356
54	1.412 .547 2080 245 164.3 342	1.438 .558 2081 245 166.6 347	1.466 .568 2085 245 168.8 352	1.495 .579 2092 245 170.9 357	1.522 .587 2089 243 172.8 361	1.553 .598 2098 242 174.3 366
58	1.456 .566 2246 254 157.2 353	1.482 .575 2246 253 159.3 358	1.511 .586 2254 253 161.0 363	1.539 .593 2250 251 162.7 366	1.555 .589 2192 243 165.0 362	1.571 .577 2127 234 166.1 353
62	1.498 .583 2417 262 150.6 364	1.524 .590 2409 260 152.3 367	1.537 .583 2332 251 154.7 361	1.551 .570 2251 240 156.1 351	1.569 .548 2173 226 154.8 336	
66	1.536 .595 2574 267 144.3 371	1.532 .565 2394 248 146.7 351	1.549 .545 2306 234 146.3 337			
70	1.548 .576 2580 259 139.3 359					
74	1.563 .521 2538 233 128.1 325					
78						
82						
86						
90						
94						

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

10D —08F0A321–131 IAE V2530–A5 23200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 10 FCOM-N0–03–06–30–007–XXX

LONG RANGE CRUISE - 1 ENGINE OUT - ISA +15

Applicable to: ALL 320

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL120		FL140		FL160		FL180		FL200	
50	1.151	.428	1.173	.448	1.233	.511	1.241	.509	1.256	.510	1.299	.539
	1870	236	1908	238	2103	262	1972	251	1880	242	1916	246
	150.1	281	152.8	292	157.0	330	165.7	327	172.8	325	177.8	341
52	1.159	.435	1.187	.463	1.236	.510	1.246	.509	1.267	.514	1.316	.548
	1950	240	2028	247	2123	262	1998	251	1937	244	1989	251
	146.3	285	148.9	302	155.5	330	163.5	327	169.1	328	174.4	347
54	1.171	.447	1.232	.512	1.240	.510	1.254	.510	1.291	.534	1.326	.551
	2058	247	2285	273	2143	262	2038	252	2058	254	2032	252
	142.4	293	145.9	333	153.9	330	160.7	327	165.3	340	171.5	348
56	1.184	.461	1.235	.512	1.244	.510	1.264	.514	1.311	.548	1.337	.553
	2175	255	2305	273	2167	262	2095	254	2156	261	2076	253
	139.0	302	144.6	333	152.1	330	157.5	330	162.1	349	168.6	350
58	1.229	.511	1.239	.511	1.250	.509	1.280	.525	1.322	.552	1.353	.562
	2469	283	2325	273	2195	261	2185	260	2205	263	2154	257
	135.9	335	143.2	333	149.9	329	154.3	337	159.6	352	165.1	356
60	1.234	.513	1.242	.511	1.259	.513	1.305	.546	1.332	.554	1.371	.572
	2496	284	2347	273	2253	263	2322	270	2248	264	2241	262
	134.7	336	141.7	333	147.2	332	151.0	351	157.1	353	161.6	362
62	1.237	.512	1.247	.510	1.268	.517	1.316	.552	1.343	.558	1.391	.585
	2516	284	2372	272	2312	265	2379	273	2304	266	2340	268
	133.6	336	140.1	332	144.5	334	148.9	354	154.4	356	158.3	370
64	1.240	.512	1.254	.512	1.290	.535	1.325	.554	1.359	.567	1.396	.581
	2536	283	2417	273	2441	275	2423	274	2385	270	2349	266
	132.4	336	137.9	333	141.7	346	146.8	356	151.4	361	156.4	367
66	1.244	.511	1.262	.516	1.309	.550	1.334	.556	1.376	.577	1.399	.572
	2559	283	2477	275	2554	283	2467	275	2476	275	2342	262
	131.1	335	135.6	336	139.2	356	144.6	357	148.5	368	154.4	362
68	1.248	.511	1.272	.520	1.319	.555	1.346	.561	1.393	.587	1.404	.557
	2586	283	2541	277	2611	285	2534	278	2569	280	2333	255
	129.5	335	133.3	339	137.4	359	142.2	360	145.8	374	151.2	353
70	1.255	.513	1.294	.540	1.327	.556	1.361	.569	1.406	.593	1.412	.533
	2640	284	2687	288	2651	286	2617	282	2635	283	2313	244
	127.6	337	130.9	352	135.6	359	139.7	366	143.5	378	145.8	337
72	1.263	.516	1.310	.552	1.335	.558	1.376	.579	1.408	.586		
	2698	286	2788	295	2698	287	2711	287	2630	280		
	125.6	339	128.9	359	133.7	361	137.2	372	142.1	374		
74	1.272	.521	1.320	.556	1.346	.563	1.392	.589	1.412	.577		
	2766	289	2844	297	2765	290	2803	292	2622	275		
	123.6	342	127.3	362	131.7	364	134.9	378	140.2	368		
76	1.294	.541	1.327	.557	1.359	.570	1.403	.593	1.417	.563		
	2922	300	2885	298	2847	294	2859	294	2612	268		
	121.5	355	125.8	363	129.5	369	133.0	380	137.4	359		
78	1.309	.553	1.335	.559	1.374	.579	1.405	.586	1.425	.540		
	3029	307	2934	299	2938	298	2854	291	2593	257		
	119.7	363	124.2	364	127.4	374	131.9	376	132.8	344		

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 6 %

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H
NM/1000KG
MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL210		FL220		FL230		FL240		FL250		FL260	
50	1.317	.548	1.329	.550	1.346	.556	1.369	.568	1.396	.584	1.418	.594
	1907	246	1868	241	1848	239	1857	240	1876	241	1872	241
	181.2	346	184.9	345	188.1	348	190.6	354	193.2	362	196.1	367
52	1.328	.550	1.343	.555	1.365	.566	1.392	.583	1.410	.588	1.423	.585
	1947	246	1922	244	1928	244	1952	246	1926	243	1869	237
	178.0	347	181.2	348	183.6	354	186.0	363	189.5	365	193.4	361
54	1.340	.554	1.361	.565	1.387	.580	1.401	.581	1.414	.577	1.428	.568
	1997	248	2002	248	2024	250	1976	245	1919	239	1858	230
	174.7	349	177.1	355	179.3	363	183.1	362	186.7	358	189.0	351
56	1.357	.564	1.380	.575	1.392	.574	1.405	.570	1.420	.560	1.439	.535
	2079	253	2084	253	2027	247	1969	240	1908	231	1834	215
	170.9	355	173.3	361	177.0	359	180.2	355	182.0	347	180.1	330
58	1.377	.575	1.383	.567	1.396	.562	1.412	.551	1.435	.516		
	2169	258	2079	249	2021	242	1958	232	1878	212		
	167.2	363	171.1	356	173.9	351	175.2	343	170.5	320		
60	1.391	.581	1.387	.554	1.403	.542	1.428	.504				
	2229	261	2072	243	2008	233	1926	211				
	164.2	366	167.8	348	168.8	339	162.9	314				
62	1.394	.573	1.395	.533	1.420	.495						
	2224	257	2059	234	1980	212						
	162.2	361	162.6	335	156.2	309						
64	1.398	.560	1.411	.486								
	2216	251	2038	212								
	159.3	353	149.6	305								
66	1.405	.540										
	2201	242										
	154.5	340										
68	1.422	.490										
	2171	219										
	142.2	309										
70												
72												
74												
76												
78												

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 6 %

LONG RANGE CRUISE - 1 ENGINE OUT - ISA +15

Applicable to: ALL 321

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL120		FL140		FL160		FL180		FL200	
50	1.182	.441	1.202	.453	1.232	.469	1.269	.487	1.302	.500	1.344	.517
	2042	244	2002	241	1982	240	1976	240	1940	237	1933	236
	141.8	290	147.5	295	152.9	303	158.3	313	164.2	318	169.2	327
54	1.201	.453	1.230	.468	1.266	.487	1.299	.500	1.339	.515	1.389	.538
	2166	251	2144	249	2141	250	2105	247	2088	245	2109	246
	137.2	297	142.2	305	147.1	315	152.4	321	157.2	328	161.4	340
58	1.225	.466	1.261	.485	1.294	.499	1.331	.513	1.381	.536	1.429	.554
	2304	258	2304	259	2270	256	2244	253	2271	255	2266	253
	132.7	306	137.2	316	142.0	322	146.7	329	150.4	342	154.7	351
62	1.255	.484	1.287	.497	1.322	.509	1.371	.533	1.417	.551	1.470	.572
	2473	268	2438	265	2401	261	2432	263	2428	262	2438	262
	128.2	317	132.7	324	137.2	329	140.6	342	144.6	351	148.3	362
66	1.280	.495	1.313	.507	1.358	.528	1.405	.547	1.456	.567	1.510	.587
	2609	274	2571	271	2586	271	2590	271	2600	270	2611	269
	124.4	324	128.5	330	131.9	341	135.5	351	139.1	362	142.3	371
70	1.304	.505	1.344	.522	1.391	.542	1.439	.561	1.493	.582	1.534	.586
	2743	280	2739	279	2754	279	2758	278	2771	278	2699	269
	120.7	331	124.1	340	127.3	351	130.7	360	133.9	371	137.3	371
74	1.329	.515	1.376	.537	1.422	.555	1.473	.575	1.514	.581	1.543	.557
	2884	285	2916	287	2915	286	2927	285	2856	277	2678	255
	117.1	338	119.9	350	123.1	359	126.2	369	129.6	370	131.6	352
78	1.360	.531	1.404	.549	1.454	.569	1.494	.576	1.523	.558		
	3075	294	3075	293	3089	293	3019	286	2843	265		
	113.2	348	116.2	357	119.2	368	122.6	370	125.0	355		
82	1.387	.543	1.434	.561	1.473	.570	1.502	.557				
	3241	301	3243	300	3178	294	3011	276				
	109.9	356	112.7	366	116.0	369	118.8	358				
86	1.414	.554	1.451	.562	1.480	.554	1.516	.523				
	3403	307	3325	300	3173	285	2996	259				
	106.8	363	110.1	366	112.8	358	112.1	336				
90	1.428	.553	1.457	.546	1.492	.527						
	3473	307	3320	292	3161	271						
	104.4	363	107.2	356	107.8	341						
94	1.434	.539	1.467	.523								
	3467	299	3310	279								
	102.0	353	102.9	341								

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

10D --08F0A321--131 IAE V2530-A5 23200010C6KG330 0 018590 0 0 3 1.0 0 .00 0 01 .990 .000 .000 15 FCOM-N0--03--06--30--008--XXX

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL210	FL220	FL230	FL240	FL250	FL260
50	1.371 .530 1948 237 171.4 334	1.396 .540 1950 237 173.9 339	1.420 .549 1945 236 176.4 343	1.447 .560 1951 236 178.9 349	1.475 .570 1951 235 181.3 354	1.505 .581 1959 235 183.4 359
54	1.413 .547 2105 245 163.8 345	1.439 .557 2108 245 166.0 350	1.467 .568 2112 245 168.2 355	1.496 .579 2120 245 170.2 361	1.523 .587 2117 243 172.2 365	1.538 .582 2057 235 174.9 360
58	1.456 .565 2274 254 156.7 356	1.483 .575 2275 253 158.7 361	1.506 .580 2252 250 161.0 362	1.519 .572 2180 241 163.5 356	1.534 .559 2107 231 164.7 347	1.553 .539 2035 217 163.8 333
62	1.499 .583 2448 262 150.0 367	1.500 .564 2312 248 153.2 354	1.515 .552 2238 237 154.3 345	1.533 .529 2155 222 152.9 329		
66	1.517 .574 2498 258 144.9 362	1.513 .524 2288 230 143.8 329				
70	1.528 .540 2475 242 137.5 340					
74						
78						
82						
86						
90						
94						

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

10D —08F0A321–131 IAE V2530–A5 23200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 15 FCOM-N0–03–06–30–009–XXX

LONG RANGE CRUISE - 1 ENGINE OUT - ISA +20

Applicable to: ALL 320

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL120		FL140		FL160		FL180		FL200	
50	1.151	.427	1.173	.447	1.233	.510	1.242	.508	1.257	.509	1.300	.539
	1888	236	1931	238	2127	262	1994	251	1902	242	1944	246
	149.7	283	152.3	294	156.6	333	165.2	329	172.2	328	177.2	344
52	1.160	.435	1.188	.464	1.237	.510	1.247	.508	1.268	.514	1.316	.548
	1975	240	2054	247	2147	262	2020	251	1960	244	2010	250
	145.8	288	148.4	305	155.0	333	163.0	329	168.6	330	173.9	350
54	1.171	.447	1.232	.511	1.240	.509	1.254	.510	1.292	.534	1.326	.550
	2084	247	2309	273	2167	262	2062	252	2085	254	2053	251
	141.9	296	145.5	336	153.4	332	160.1	330	164.8	344	171.0	351
56	1.185	.461	1.235	.511	1.245	.509	1.264	.514	1.312	.548	1.337	.553
	2203	255	2330	273	2192	261	2120	254	2180	261	2100	253
	138.5	305	144.2	336	151.6	332	157.0	333	161.6	352	168.0	353
58	1.230	.511	1.239	.511	1.250	.509	1.281	.526	1.322	.551	1.354	.562
	2497	283	2350	272	2223	261	2217	260	2229	262	2180	257
	135.5	338	142.8	336	149.4	332	153.8	341	159.1	355	164.5	359
60	1.234	.512	1.243	.510	1.260	.513	1.305	.546	1.332	.553	1.368	.568
	2524	284	2373	272	2281	263	2350	270	2274	263	2249	260
	134.3	339	141.3	335	146.7	335	150.6	354	156.6	356	161.4	363
62	1.237	.512	1.247	.510	1.269	.516	1.317	.551	1.344	.558	1.371	.560
	2544	284	2398	272	2340	265	2407	273	2333	266	2245	256
	133.2	339	139.6	335	144.1	337	148.4	357	153.9	359	159.4	358
64	1.240	.511	1.254	.512	1.290	.535	1.325	.553	1.359	.567	1.375	.548
	2563	283	2445	273	2472	275	2449	274	2415	270	2239	251
	132.0	338	137.5	336	141.3	349	146.3	358	150.9	364	156.4	350
66	1.244	.511	1.263	.515	1.309	.549	1.335	.555	1.377	.577	1.382	.530
	2587	283	2504	275	2583	283	2495	275	2508	275	2226	242
	130.7	338	135.2	338	138.8	358	144.2	360	148.0	371	152.0	338
68	1.248	.510	1.272	.520	1.320	.554	1.347	.561	1.382	.574	1.396	.490
	2617	283	2573	278	2638	285	2564	278	2522	273	2207	223
	129.1	338	132.8	342	137.0	361	141.8	364	146.3	369	141.9	313
70	1.256	.513	1.295	.541	1.327	.555	1.361	.569	1.385	.565		
	2670	284	2723	289	2681	286	2647	282	2516	269		
	127.1	340	130.5	355	135.2	362	139.2	369	144.5	364		
72	1.264	.516	1.310	.551	1.336	.557	1.377	.579	1.389	.553		
	2730	286	2819	295	2727	287	2741	287	2509	263		
	125.2	342	128.5	362	133.3	364	136.8	375	141.7	356		
74	1.273	.522	1.320	.555	1.347	.563	1.379	.572	1.396	.533		
	2802	289	2875	297	2798	290	2737	284	2494	254		
	123.2	345	126.9	365	131.3	367	135.5	371	137.6	343		
76	1.295	.541	1.327	.557	1.360	.569	1.382	.564				
	2958	300	2917	298	2877	293	2731	280				
	121.1	358	125.4	366	129.1	372	133.9	366				
78	1.310	.552	1.335	.559	1.362	.564	1.386	.553				
	3062	306	2965	299	2874	290	2724	274				
	119.4	365	123.8	367	127.9	368	131.5	358				

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 6 %

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H
NM/1000KG
MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL210	FL220	FL230	FL240	FL250	FL260
50	1.318 .548 1930 246 180.6 349	1.330 .550 1890 241 184.3 348	1.347 .556 1872 239 187.4 351	1.370 .568 1880 239 190.0 357	1.383 .569 1838 235 193.9 356	1.396 .565 1785 228 197.7 353
52	1.328 .550 1971 246 177.5 350	1.344 .555 1947 244 180.6 352	1.363 .563 1939 242 183.3 356	1.375 .561 1886 236 187.1 353	1.388 .556 1831 229 190.3 349	1.403 .546 1775 220 192.1 341
54	1.340 .553 2021 248 174.2 352	1.354 .556 1986 244 177.4 352	1.366 .554 1935 238 180.6 350	1.380 .547 1879 230 183.2 344	1.395 .535 1819 220 184.2 335	1.419 .499 1747 201 178.5 312
56	1.358 .563 2103 253 170.3 358	1.358 .546 1982 239 174.5 346	1.372 .538 1926 231 176.3 340	1.388 .523 1864 220 176.5 329	1.412 .484 1798 199 168.8 303	
58	1.366 .561 2130 252 167.7 357	1.364 .528 1973 232 169.7 335	1.381 .511 1910 219 168.8 322	1.406 .467 1853 195 158.5 294		
60	1.370 .551 2125 247 165.0 351	1.375 .495 1958 217 160.3 314				
62	1.375 .534 2114 239 160.8 340					
64						
66						
68						
70						
72						
74						
76						
78						

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 6 %

LONG RANGE CRUISE - 1 ENGINE OUT - ISA +20

Applicable to: ALL 321

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL120		FL140		FL160		FL180		FL200	
50	1.182	.441	1.203	.453	1.233	.468	1.269	.487	1.303	.500	1.345	.517
	2066	244	2023	241	2005	240	1998	240	1963	237	1958	236
	141.4	292	147.1	298	152.4	306	157.9	316	163.7	321	168.7	330
54	1.201	.453	1.230	.468	1.267	.487	1.300	.500	1.339	.515	1.390	.538
	2189	250	2170	249	2165	250	2129	247	2113	245	2135	246
	136.9	300	141.8	308	146.7	318	152.0	324	156.8	331	160.9	344
58	1.225	.466	1.261	.485	1.295	.499	1.331	.512	1.382	.536	1.429	.554
	2330	258	2331	259	2297	256	2270	253	2298	255	2293	253
	132.3	308	136.8	319	141.6	325	146.2	332	149.9	345	154.2	354
62	1.255	.483	1.288	.497	1.322	.509	1.371	.533	1.418	.550	1.471	.571
	2500	267	2465	265	2429	261	2462	263	2457	262	2467	262
	127.9	320	132.4	326	136.7	332	140.1	345	144.1	354	147.8	365
66	1.280	.495	1.314	.507	1.359	.527	1.405	.547	1.456	.567	1.506	.582
	2639	274	2600	270	2617	271	2622	271	2632	270	2616	267
	124.0	327	128.1	333	131.5	344	135.1	354	138.6	365	142.2	372
70	1.305	.505	1.345	.522	1.391	.542	1.440	.561	1.485	.574	1.514	.559
	2775	279	2770	278	2787	279	2789	278	2754	273	2602	256
	120.3	334	123.7	343	126.9	354	130.3	363	134.0	369	137.3	357
74	1.329	.515	1.377	.537	1.422	.555	1.463	.565	1.492	.553	1.532	.504
	2918	285	2950	287	2948	285	2897	280	2743	263	2564	230
	116.7	341	119.5	353	122.8	362	126.4	366	129.7	356	125.6	322
78	1.361	.530	1.405	.549	1.442	.557	1.471	.547	1.507	.513		
	3110	294	3113	293	3041	287	2891	271	2719	244		
	112.9	351	115.8	361	119.5	363	122.6	354	121.4	330		
82	1.388	.543	1.420	.548	1.449	.540	1.484	.515				
	3278	301	3183	293	3035	278	2875	254				
	109.5	359	113.1	360	116.1	352	116.0	334				
86	1.399	.538	1.427	.532	1.461	.512						
	3322	299	3177	284	3025	263						
	107.3	356	110.1	350	110.5	334						
90	1.405	.524	1.438	.506								
	3317	290	3168	270								
	104.4	346	105.1	333								
94	1.415	.500										
	3312	277										
	99.9	331										

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

10D —08F0A321–131 IAE V2530–A5 23200010C6KG330 0 018590 0 0 3 1 0 0 00 0 01 990 000 000 20 FCOM-N0–03–06–30–010–XXX

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL210	FL220	FL230	FL240	FL250	FL260
50	1.372 .530 1972 237 170.9 337	1.397 .540 1975 237 173.3 342	1.420 .548 1970 236 175.8 346	1.448 .560 1975 236 178.2 352	1.475 .570 1976 235 180.6 357	1.505 .581 1984 235 182.7 363
54	1.413 .547 2131 245 163.2 348	1.440 .557 2135 245 165.5 353	1.467 .568 2140 245 167.6 359	1.488 .571 2108 241 170.3 359	1.501 .564 2041 233 173.2 353	1.516 .553 1976 223 174.6 345
58	1.457 .565 2301 253 156.2 359	1.469 .560 2232 246 159.1 355	1.482 .553 2164 238 161.4 349	1.497 .541 2092 228 162.8 341	1.516 .517 2015 212 160.7 324	
62	1.487 .571 2415 256 150.3 363	1.479 .532 2218 233 152.0 337	1.498 .508 2139 218 149.9 321			
66	1.496 .545 2400 244 144.4 347					
70						
74						
78						
82						
86						
90						
94						

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

10D —08F0A321–131 IAE V2530–A5 23200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 20 FCOM-N0–03–06–30–011–XXX

CRUISE - MCT/VMO - 1 ENGINE OUT - ISA

Applicable to: ALL 320

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.346	.610	1.405	.638	1.414	.642	1.418	.640	1.409	.629	1.398	.613
	3284	339	3014	324	2938	320	2707	307	2416	289	2138	270
	118.5	389	132.7	400	136.4	401	146.5	397	159.9	386	174.8	374
52	1.346	.609	1.405	.637	1.414	.641	1.419	.639	1.410	.627	1.399	.610
	3284	339	3013	323	2937	319	2706	306	2415	288	2136	269
	118.4	389	132.5	399	136.2	400	146.3	396	159.5	385	174.0	372
54	1.347	.608	1.405	.636	1.415	.640	1.419	.638	1.411	.625	1.400	.606
	3284	338	3013	323	2936	319	2704	305	2413	287	2134	267
	118.2	388	132.3	399	136.0	399	146.0	395	159.1	384	173.1	369
56	1.347	.608	1.406	.635	1.415	.639	1.420	.636	1.412	.623	1.402	.602
	3283	338	3012	322	2935	318	2703	305	2412	286	2132	265
	118.1	388	132.1	398	135.8	399	145.7	394	158.6	382	172.1	367
58	1.347	.607	1.406	.634	1.416	.638	1.421	.634	1.413	.620	1.404	.596
	3283	337	3011	322	2934	317	2702	304	2410	285	2128	262
	118.0	387	132.0	397	135.6	398	145.4	393	157.9	381	170.6	363
60	1.347	.606	1.407	.633	1.416	.636	1.421	.633	1.414	.616	1.407	.588
	3282	337	3010	321	2933	317	2700	303	2408	283	2123	259
	117.8	387	131.7	397	135.4	397	145.0	392	157.2	379	168.8	358
62	1.348	.605	1.407	.632	1.417	.635	1.422	.630	1.416	.612	1.411	.578
	3282	336	3009	320	2932	316	2699	302	2405	281	2117	254
	117.7	386	131.5	396	135.1	396	144.6	390	156.4	376	166.5	353
64	1.348	.604	1.408	.630	1.417	.633	1.423	.628	1.418	.608	1.416	.563
	3281	336	3007	319	2930	315	2697	300	2403	279	2108	247
	117.5	386	131.3	395	134.8	395	144.1	389	155.3	373	162.8	343
66	1.349	.603	1.409	.628	1.418	.631	1.424	.625	1.420	.602	1.427	.536
	3281	335	3006	319	2929	314	2694	299	2400	276	2090	235
	117.3	385	131.0	394	134.5	394	143.5	387	154.1	370	156.2	326
68	1.349	.602	1.409	.627	1.419	.629	1.426	.621	1.423	.595		
	3280	335	3004	318	2927	313	2692	297	2394	273		
	117.1	384	130.7	393	134.1	392	142.9	385	152.6	365		
70	1.350	.601	1.410	.624	1.420	.626	1.427	.617	1.426	.584		
	3279	334	3002	317	2925	311	2689	295	2385	268		
	116.9	383	130.3	391	133.6	391	142.1	382	150.4	359		
72	1.350	.599	1.411	.622	1.421	.623	1.430	.612	1.432	.568		
	3279	333	3000	315	2922	310	2685	292	2371	260		
	116.7	383	129.9	390	133.1	389	141.1	379	147.1	349		
74	1.351	.598	1.412	.619	1.423	.620	1.432	.607	1.445	.529		
	3278	332	2998	314	2920	308	2682	290	2337	242		
	116.4	382	129.4	388	132.5	387	140.1	376	139.1	325		
76	1.351	.596	1.414	.616	1.424	.616	1.434	.601				
	3277	331	2995	312	2917	306	2678	287				
	116.1	381	128.8	386	131.8	385	138.9	372				
78	1.352	.594	1.415	.613	1.426	.612	1.438	.590				
	3276	330	2993	310	2913	304	2668	282				
	115.7	379	128.2	384	131.0	382	137.0	366				

ENGINE ANTI ICE ON
△FUEL = + 2%

TOTAL ANTI ICE ON
△FUEL = + 4%

CRUISE - MCT/VMO - 1 ENGINE OUT - ISA

Applicable to: ALL 321

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100	FL150	FL160	FL180	FL200	FL220
50	1.433 .622 3571 346 111.2 397	1.490 .643 3203 326 125.7 403	1.500 .645 3115 321 129.3 403	1.519 .650 2948 311 136.4 402	1.539 .653 2785 301 144.1 401	1.511 .624 2380 276 159.9 381
54	1.434 .619 3569 344 110.8 395	1.492 .639 3199 324 125.1 400	1.501 .641 3111 319 128.6 400	1.521 .644 2943 309 135.6 399	1.541 .647 2777 298 143.1 397	1.515 .616 2373 272 158.1 375
58	1.436 .616 3566 343 110.3 393	1.494 .635 3195 322 124.4 398	1.504 .636 3107 317 127.8 397	1.523 .639 2937 306 134.7 395	1.544 .640 2769 294 142.0 393	1.520 .605 2366 267 155.9 369
62	1.437 .613 3564 341 109.8 391	1.496 .630 3191 319 123.6 395	1.506 .631 3102 314 126.9 394	1.526 .632 2930 302 133.6 391	1.547 .631 2759 290 140.6 388	1.524 .592 2356 261 153.2 361
66	1.439 .610 3561 339 109.3 389	1.499 .624 3186 316 122.8 391	1.509 .625 3097 311 125.9 390	1.530 .624 2922 299 132.3 387	1.551 .621 2748 286 138.9 382	1.531 .567 2338 249 147.9 346
70	1.441 .606 3558 337 108.6 387	1.502 .618 3181 313 121.7 387	1.512 .618 3092 307 124.7 386	1.533 .615 2913 294 130.8 381	1.555 .610 2737 280 136.9 375	
74	1.443 .601 3555 334 108.0 384	1.505 .611 3177 310 120.5 383	1.516 .610 3086 303 123.4 381	1.538 .605 2904 289 129.1 375	1.562 .590 2720 271 133.3 363	
78	1.445 .596 3552 331 107.2 381	1.509 .603 3171 305 119.2 378	1.520 .601 3079 298 121.8 375	1.543 .590 2891 281 126.3 365	1.573 .553 2693 253 126.2 340	
82	1.447 .591 3549 328 106.2 377	1.513 .594 3167 301 117.5 372	1.525 .589 3073 292 119.6 367	1.553 .563 2874 268 121.3 349		
86	1.450 .585 3546 325 105.2 373	1.519 .580 3163 293 114.9 364	1.533 .569 3064 282 115.8 355			
90	1.453 .577 3544 321 104.0 369	1.529 .559 3158 282 110.8 350	1.548 .533 3047 264 109.2 333			
94	1.456 .569 3540 316 102.6 363	1.549 .512 3139 258 102.2 321				

ENGINE ANTI ICE ON
△FUEL = + 1.5 %

TOTAL ANTI ICE ON
△FUEL = + 3 %

10D—08F0A321–131 IAE V2530–A5 12300010C6KG330 0 018590 0 0 3 1 3 .0 .00 0 01100 000 .000 .000 0 FCOM-N0–03–06–50–005–XXX

CRUISE - MCT/VMO - 1 ENGINE OUT - ISA +10

Applicable to: ALL 320

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+10
CG=33.0%

EPR
KG/H
NM/1000KG
MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.346	.609	1.405	.637	1.414	.641	1.419	.639	1.410	.628	1.398	.612
	3358	338	3084	323	3006	319	2770	306	2473	289	2189	270
	117.9	396	131.9	407	135.6	408	145.7	404	159.0	393	173.8	380
52	1.347	.608	1.405	.636	1.415	.640	1.419	.638	1.410	.626	1.399	.609
	3357	338	3083	323	3005	319	2769	305	2472	288	2187	268
	117.7	395	131.8	406	135.5	407	145.4	403	158.6	392	173.0	378
54	1.347	.607	1.406	.635	1.415	.639	1.420	.637	1.411	.624	1.401	.605
	3357	338	3082	322	3004	318	2768	305	2471	287	2185	267
	117.6	395	131.6	406	135.3	406	145.2	402	158.2	391	172.1	376
56	1.347	.607	1.406	.634	1.416	.638	1.420	.635	1.412	.621	1.403	.601
	3357	337	3081	322	3003	317	2767	304	2469	285	2183	265
	117.5	394	131.4	405	135.1	406	144.9	401	157.6	389	171.1	373
58	1.348	.606	1.407	.633	1.416	.636	1.421	.633	1.413	.618	1.405	.594
	3356	337	3080	321	3002	317	2765	303	2467	284	2179	262
	117.3	394	131.2	404	134.9	405	144.6	400	157.0	387	169.5	369
60	1.348	.605	1.407	.632	1.417	.635	1.422	.631	1.415	.615	1.408	.586
	3356	336	3079	320	3001	316	2764	302	2465	282	2174	258
	117.2	393	131.0	403	134.6	404	144.2	399	156.3	385	167.8	365
62	1.348	.604	1.408	.631	1.417	.634	1.423	.629	1.416	.611	1.412	.576
	3355	336	3078	320	3000	315	2762	301	2463	281	2167	253
	117.0	393	130.8	403	134.3	403	143.8	397	155.5	383	165.3	358
64	1.349	.603	1.408	.629	1.418	.632	1.424	.626	1.418	.606	1.417	.560
	3355	335	3076	319	2998	314	2760	300	2460	278	2158	246
	116.9	392	130.5	402	134.0	402	143.3	395	154.4	380	161.5	348
66	1.349	.602	1.409	.627	1.419	.630	1.425	.623	1.421	.600	1.429	.530
	3354	335	3075	318	2997	313	2758	298	2456	276	2137	232
	116.7	391	130.3	401	133.7	401	142.7	394	153.1	376	154.3	330
68	1.349	.601	1.410	.626	1.420	.628	1.426	.620	1.423	.593		
	3353	334	3073	317	2995	312	2755	296	2450	272		
	116.5	391	130.0	399	133.3	399	142.0	391	151.6	372		
70	1.350	.600	1.411	.623	1.421	.625	1.428	.616	1.427	.582		
	3353	333	3071	316	2992	311	2752	294	2440	267		
	116.3	390	129.6	398	132.9	398	141.2	389	149.3	364		
72	1.350	.598	1.412	.621	1.422	.622	1.430	.611	1.433	.565		
	3352	332	3069	315	2990	309	2748	292	2426	259		
	116.0	389	129.1	396	132.3	396	140.3	386	145.9	354		
74	1.351	.597	1.413	.618	1.423	.619	1.432	.605	1.449	.518		
	3352	332	3067	313	2987	308	2745	289	2383	236		
	115.7	388	128.7	395	131.7	394	139.2	382	136.3	325		
76	1.352	.595	1.414	.615	1.425	.615	1.435	.599				
	3350	331	3064	311	2984	306	2740	286				
	115.5	387	128.1	393	131.1	391	138.0	378				
78	1.352	.593	1.415	.611	1.427	.610	1.439	.588				
	3349	329	3061	310	2981	303	2730	281				
	115.1	385	127.5	390	130.2	388	136.0	371				

ENGINE ANTI ICE ON
△FUEL = + 2%

TOTAL ANTI ICE ON
△FUEL = + 4%

CRUISE - MCT/VMO - 1 ENGINE OUT - ISA +10

Applicable to: ALL 321

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.433	.621	1.491	.642	1.500	.644	1.519	.648	1.539	.652	1.512	.623
	3652	345	3278	326	3188	321	3018	311	2852	300	2438	275
	110.5	404	125.0	410	128.5	410	135.6	409	143.2	408	158.9	387
54	1.435	.618	1.492	.638	1.502	.640	1.522	.643	1.542	.646	1.516	.614
	3650	344	3274	324	3184	318	3013	308	2844	297	2431	271
	110.1	402	124.4	407	127.8	407	134.8	406	142.2	405	157.1	382
58	1.436	.615	1.495	.633	1.504	.635	1.524	.637	1.545	.638	1.520	.604
	3647	342	3270	321	3180	316	3007	305	2835	294	2423	266
	109.7	400	123.7	404	127.0	404	133.8	402	141.1	400	154.9	375
62	1.438	.612	1.497	.629	1.507	.630	1.527	.631	1.548	.630	1.525	.591
	3645	340	3265	319	3175	313	3000	302	2825	290	2413	260
	109.2	398	122.9	401	126.1	401	132.7	398	139.7	395	152.2	367
66	1.439	.608	1.499	.623	1.509	.624	1.530	.623	1.552	.620	1.532	.565
	3642	338	3261	316	3170	310	2992	298	2814	285	2394	248
	108.6	396	122.0	398	125.1	397	131.5	393	138.0	388	146.7	351
70	1.441	.605	1.502	.617	1.513	.617	1.534	.614	1.556	.608		
	3639	336	3256	313	3165	306	2983	294	2803	279		
	108.0	393	121.0	394	123.9	392	130.0	388	135.9	381		
74	1.444	.600	1.506	.610	1.516	.609	1.538	.604	1.563	.588		
	3635	334	3251	309	3158	302	2973	288	2786	270		
	107.3	390	119.8	389	122.6	387	128.2	381	132.3	368		
78	1.446	.595	1.510	.602	1.520	.600	1.544	.588	1.574	.550		
	3633	331	3246	305	3151	298	2960	281	2757	251		
	106.5	387	118.4	384	121.0	381	125.4	371	124.9	344		
82	1.448	.590	1.514	.593	1.526	.587	1.554	.561				
	3630	328	3242	300	3145	291	2943	267				
	105.6	383	116.8	379	118.7	373	120.3	354				
86	1.450	.583	1.520	.579	1.534	.567						
	3627	324	3238	293	3137	281						
	104.6	379	114.1	370	114.9	361						
90	1.453	.576	1.530	.557	1.549	.530						
	3624	320	3232	281	3118	262						
	103.4	375	110.0	355	108.0	337						
94	1.457	.567	1.552	.505								
	3621	315	3213	254								
	101.9	369	100.4	323								

ENGINE ANTI ICE ON
△FUEL = + 1.5 %

TOTAL ANTI ICE ON
△FUEL = + 3 %

10D—08F0A321—131 IAE V2530-A5 12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 01100.000 .000 .000 10 FCOM-N0-03-06-50-006-XXX

CRUISE - MCT/VMO - 1 ENGINE OUT - ISA +15

Applicable to: ALL 321

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H
NM/1000KG
MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.406 3488 113.6	.604 336 396	1.462 3131 128.4	.624 316 402	1.473 3052 131.8	.626 312 402	1.494 2895 139.0	.632 302 403	1.515 2745 146.5	.636 293 402	1.486 2337 162.5	.605 267 380
54	1.408 3486 113.1	.601 334 394	1.464 3128 127.7	.620 314 399	1.475 3048 131.0	.622 309 399	1.496 2890 138.1	.626 300 399	1.518 2738 145.3	.629 289 398	1.490 2331 160.3	.595 262 374
58	1.409 3485 112.6	.598 332 392	1.467 3124 126.8	.615 312 396	1.477 3044 130.1	.617 307 396	1.499 2884 137.0	.620 296 395	1.521 2731 143.9	.621 286 393	1.494 2323 157.7	.584 257 366
62	1.411 3483 112.0	.595 330 390	1.469 3120 125.9	.610 309 393	1.480 3039 129.1	.611 304 392	1.502 2877 135.7	.613 293 391	1.525 2722 142.3	.612 281 387	1.500 2312 153.2	.564 248 354
66	1.412 3482 111.3	.591 328 387	1.472 3116 124.9	.604 306 389	1.483 3034 127.9	.604 300 388	1.505 2871 134.2	.604 289 385	1.529 2712 140.3	.602 276 381	1.513 2288 143.8	.524 230 329
70	1.414 3481 110.5	.586 326 385	1.475 3112 123.6	.597 302 385	1.486 3029 126.5	.597 296 383	1.509 2864 132.3	.595 284 379	1.534 2699 137.3	.586 269 371		
74	1.416 3480 109.6	.581 323 381	1.478 3109 122.1	.589 298 380	1.490 3024 124.9	.588 292 378	1.514 2856 129.6	.581 277 370	1.543 2678 131.6	.557 255 352		
78	1.418 3478 108.6	.576 320 378	1.482 3106 120.4	.580 293 374	1.494 3019 122.6	.576 286 370	1.523 2843 125.0	.558 265 355				
82	1.421 3476 107.5	.570 316 374	1.488 3102 117.7	.567 286 365	1.502 3011 118.8	.557 276 358						
86	1.424 3475 106.2	.562 312 369	1.497 3094 113.5	.545 275 351	1.516 2996 112.1	.523 259 336						
90	1.428 3473 104.4	.553 307 363										
94	1.434 3467 102.0	.539 299 353										

ENGINE ANTI ICE ON
△FUEL = + 1.5 %

TOTAL ANTI ICE ON
△FUEL = + 3 %

10D —08F0A321–131 IAE V2530–A5 12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 01100 000 .000 .000 15 FCOM-N0–03–06–50–007–XXX

CRUISE - MCT/VMO - 1 ENGINE OUT - ISA +15

Applicable to: ALL 320

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H
NM/1000KG
MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.328	.596	1.381	.621	1.390	.625	1.394	.623	1.385	.610	1.374	.592
	3242	331	2957	315	2884	311	2656	298	2369	280	2093	261
	120.6	391	135.3	400	139.1	401	149.4	397	163.0	386	177.6	372
52	1.328	.595	1.381	.620	1.391	.624	1.395	.621	1.386	.608	1.375	.588
	3241	331	2956	314	2883	310	2655	297	2367	279	2091	259
	120.5	390	135.2	400	138.9	400	149.1	396	162.5	385	176.6	369
54	1.329	.595	1.382	.619	1.391	.623	1.395	.620	1.387	.605	1.377	.582
	3241	330	2955	314	2882	310	2654	296	2366	278	2088	256
	120.3	390	135.0	399	138.7	400	148.8	395	161.9	383	175.2	366
56	1.329	.594	1.382	.618	1.392	.621	1.396	.618	1.388	.602	1.380	.575
	3241	330	2955	313	2881	309	2653	295	2364	276	2084	253
	120.2	389	134.7	398	138.4	399	148.4	394	161.2	381	173.3	361
58	1.329	.593	1.383	.617	1.392	.620	1.397	.616	1.389	.599	1.383	.567
	3240	329	2954	312	2880	308	2651	294	2362	275	2079	249
	120.0	389	134.5	397	138.1	398	148.0	393	160.4	379	171.1	356
60	1.330	.592	1.383	.615	1.393	.618	1.398	.613	1.391	.594	1.387	.554
	3240	329	2953	312	2879	307	2650	293	2359	273	2072	243
	119.8	388	134.2	396	137.9	397	147.5	391	159.4	376	167.8	348
62	1.330	.591	1.384	.614	1.393	.616	1.399	.611	1.393	.588	1.395	.533
	3240	328	2951	311	2878	306	2648	292	2354	270	2059	234
	119.6	387	134.0	395	137.5	396	147.0	389	158.0	372	162.6	335
64	1.330	.590	1.385	.612	1.394	.614	1.400	.608	1.396	.581	1.411	.486
	3239	327	2950	310	2876	305	2646	290	2349	266	2038	212
	119.4	387	133.6	394	137.1	394	146.3	387	156.4	367	149.6	305
66	1.331	.588	1.385	.610	1.395	.612	1.402	.604	1.399	.572		
	3238	327	2949	309	2874	304	2643	288	2342	262		
	119.2	386	133.3	393	136.7	393	145.6	385	154.4	362		
68	1.331	.587	1.386	.607	1.396	.609	1.403	.599	1.404	.557		
	3237	326	2947	308	2872	303	2640	286	2333	255		
	118.9	385	132.8	391	136.2	391	144.7	382	151.2	353		
70	1.332	.585	1.387	.605	1.397	.606	1.406	.593	1.412	.533		
	3237	325	2945	306	2870	301	2635	283	2313	244		
	118.6	384	132.3	390	135.6	389	143.5	378	145.8	337		
72	1.332	.584	1.389	.602	1.399	.603	1.408	.586				
	3236	324	2943	305	2868	299	2630	280				
	118.3	383	131.8	388	135.0	387	142.1	374				
74	1.333	.582	1.390	.599	1.401	.598	1.412	.577				
	3235	323	2941	303	2864	297	2622	275				
	117.9	382	131.2	386	134.1	384	140.2	368				
76	1.334	.580	1.392	.594	1.403	.593	1.417	.563				
	3234	322	2936	300	2859	294	2612	268				
	117.5	380	130.3	383	133.0	380	137.4	359				
78	1.335	.577	1.394	.588	1.405	.586	1.425	.540				
	3233	320	2932	298	2854	291	2593	257				
	117.1	379	129.3	379	131.9	376	132.8	344				

ENGINE ANTI ICE ON
△FUEL = + 2%

TOTAL ANTI ICE ON
△FUEL = + 4%

CRUISE - MCT/VMO - 1 ENGINE OUT - ISA +20

Applicable to: ALL 320

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H
NM/1000KG
MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.309	.583	1.357	.605	1.366	.608	1.370	.606	1.360	.592	1.349	.570
	3132	324	2826	306	2761	302	2542	289	2261	271	1991	251
	123.1	385	139.2	393	142.8	394	153.3	390	167.1	378	181.5	361
52	1.310	.582	1.357	.604	1.366	.607	1.370	.604	1.361	.589	1.352	.564
	3131	323	2826	306	2760	302	2541	289	2259	270	1989	248
	122.9	385	138.9	393	142.5	393	152.9	389	166.4	376	179.6	357
54	1.310	.581	1.358	.603	1.367	.606	1.371	.602	1.362	.585	1.354	.556
	3131	323	2825	305	2759	301	2540	288	2257	268	1986	244
	122.8	384	138.7	392	142.3	393	152.5	387	165.5	374	177.4	352
56	1.310	.580	1.358	.601	1.367	.604	1.372	.600	1.364	.581	1.358	.546
	3130	322	2824	304	2758	300	2539	287	2255	266	1982	239
	122.6	384	138.4	391	141.9	392	152.1	386	164.5	371	174.5	346
58	1.311	.579	1.359	.600	1.368	.603	1.373	.597	1.366	.575	1.364	.528
	3130	321	2824	304	2757	299	2537	285	2253	263	1973	232
	122.4	383	138.1	390	141.6	391	151.4	384	163.0	367	169.7	335
60	1.311	.578	1.359	.598	1.369	.601	1.374	.594	1.368	.568	1.375	.495
	3129	321	2823	303	2756	298	2535	284	2249	260	1958	217
	122.2	382	137.7	389	141.2	389	150.8	382	161.4	363	160.3	314
62	1.311	.577	1.360	.596	1.370	.598	1.375	.591	1.371	.560		
	3128	320	2822	302	2755	297	2533	282	2245	256		
	122.0	381	137.3	388	140.8	388	150.0	380	159.4	358		
64	1.312	.575	1.361	.593	1.371	.596	1.377	.586	1.375	.548		
	3127	319	2820	300	2753	296	2529	280	2239	251		
	121.7	381	136.8	386	140.2	386	149.0	377	156.4	350		
66	1.312	.574	1.362	.591	1.372	.593	1.379	.580	1.382	.530		
	3127	319	2819	299	2751	294	2526	277	2226	242		
	121.4	380	136.3	384	139.6	384	147.7	373	152.0	338		
68	1.313	.572	1.363	.588	1.373	.589	1.382	.574	1.396	.490		
	3126	318	2817	297	2748	292	2522	273	2207	223		
	121.1	379	135.7	382	138.9	382	146.3	369	141.9	313		
70	1.314	.570	1.364	.584	1.375	.584	1.385	.565				
	3125	317	2815	295	2745	290	2516	269				
	120.8	377	134.9	380	137.9	379	144.5	364				
72	1.314	.568	1.366	.579	1.377	.579	1.389	.553				
	3123	315	2812	293	2741	287	2509	263				
	120.4	376	134.0	377	136.8	375	141.7	356				
74	1.315	.566	1.368	.574	1.379	.572	1.396	.533				
	3122	314	2809	290	2737	284	2494	254				
	119.9	374	132.9	373	135.5	371	137.6	343				
76	1.316	.563	1.370	.568	1.382	.564	1.411	.492				
	3121	313	2805	287	2731	280	2469	233				
	119.4	373	131.6	369	133.9	366	128.1	316				
78	1.317	.560	1.373	.560	1.386	.553						
	3119	311	2800	283	2724	274						
	118.8	371	130.1	364	131.5	358						

ENGINE ANTI ICE ON
△FUEL = + 2%

TOTAL ANTI ICE ON
△FUEL = + 4%

CRUISE - MCT/VMO - 1 ENGINE OUT - ISA +20

Applicable to: ALL 321

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H
NM/1000KG
MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.378	.587	1.434	.606	1.445	.609	1.468	.615	1.492	.620	1.459	.586
	3333	326	2986	307	2917	302	2780	294	2644	285	2243	258
	116.5	388	131.9	394	135.3	395	142.2	396	149.7	396	165.7	372
54	1.380	.584	1.436	.601	1.448	.604	1.471	.609	1.495	.613	1.463	.576
	3332	324	2983	304	2913	300	2776	291	2638	282	2238	253
	116.0	386	131.1	391	134.4	391	141.1	392	148.4	391	163.0	365
58	1.381	.581	1.438	.596	1.450	.599	1.474	.602	1.498	.605	1.469	.560
	3331	322	2981	302	2910	297	2771	288	2631	278	2232	246
	115.3	384	130.1	388	133.3	388	139.8	387	146.8	386	159.1	355
62	1.383	.577	1.441	.591	1.453	.592	1.477	.595	1.502	.595	1.479	.532
	3330	320	2979	299	2907	294	2766	284	2624	273	2218	233
	114.6	382	128.9	384	132.0	384	138.3	382	144.8	380	152.0	337
66	1.384	.572	1.443	.584	1.455	.585	1.480	.585	1.506	.582		
	3330	318	2976	295	2904	290	2760	279	2616	267		
	113.8	379	127.6	380	130.5	379	136.4	377	142.2	372		
70	1.386	.567	1.447	.576	1.459	.576	1.485	.574	1.514	.559		
	3329	315	2974	291	2901	286	2754	273	2602	256		
	112.8	375	126.0	375	128.7	373	134.0	369	137.3	357		
74	1.389	.562	1.450	.567	1.463	.565	1.492	.553	1.532	.504		
	3328	312	2971	287	2897	280	2743	263	2564	230		
	111.7	372	124.1	369	126.4	366	129.7	356	125.6	322		
78	1.391	.555	1.456	.554	1.471	.547	1.507	.513				
	3327	308	2969	279	2891	271	2719	244				
	110.5	368	121.2	360	122.6	354	121.4	330				
82	1.395	.548	1.465	.532	1.484	.515						
	3325	304	2960	268	2875	254						
	109.1	363	116.8	346	116.0	334						
86	1.399	.538										
	3322	299										
	107.3	356										
90	1.405	.524										
	3317	290										
	104.4	346										
94	1.415	.500										
	3312	277										
	99.9	331										

ENGINE ANTI ICE ON
△FUEL = + 1.5 %

TOTAL ANTI ICE ON
△FUEL = + 3 %

10D—08F0A321—131 IAE V2530-A5 12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 01100.000 .000 .000 20 FCOM-N0-03-06-50-008-XXX

CRUISE - MCT/320KT - 1 ENGINE OUT - ISA

Applicable to: ALL 320

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.297	.576	1.393	.631	1.414	.642	1.418	.640	1.409	.629	1.398	.613
	2922	320	2942	320	2938	320	2707	307	2416	289	2138	270
	125.9	368	134.4	395	136.4	401	146.5	397	159.9	386	174.8	374
52	1.299	.576	1.395	.631	1.414	.641	1.419	.639	1.410	.627	1.399	.610
	2929	320	2951	320	2937	319	2706	306	2415	288	2136	269
	125.6	368	134.0	395	136.2	400	146.3	396	159.5	385	174.0	372
54	1.300	.576	1.397	.631	1.415	.640	1.419	.638	1.411	.625	1.400	.606
	2937	320	2960	320	2936	319	2704	305	2413	287	2134	267
	125.3	368	133.6	395	136.0	399	146.0	395	159.1	384	173.1	369
56	1.302	.576	1.399	.631	1.415	.639	1.420	.636	1.412	.623	1.402	.602
	2946	320	2970	320	2935	318	2703	305	2412	286	2132	265
	124.9	368	133.1	395	135.8	399	145.7	394	158.6	382	172.1	367
58	1.304	.576	1.402	.631	1.416	.638	1.421	.634	1.413	.620	1.404	.596
	2955	320	2980	320	2934	317	2702	304	2410	285	2128	262
	124.5	368	132.7	395	135.6	398	145.4	393	157.9	381	170.6	363
60	1.306	.576	1.404	.631	1.416	.636	1.421	.633	1.414	.616	1.407	.588
	2965	320	2991	320	2933	317	2700	303	2408	283	2123	259
	124.1	368	132.2	395	135.4	397	145.0	392	157.2	379	168.8	358
62	1.308	.576	1.407	.631	1.417	.635	1.422	.630	1.416	.612	1.411	.578
	2976	320	3003	320	2932	316	2699	302	2405	281	2117	254
	123.6	368	131.6	395	135.1	396	144.6	390	156.4	376	166.5	353
64	1.310	.576	1.408	.630	1.417	.633	1.423	.628	1.418	.608	1.416	.563
	2987	320	3007	319	2930	315	2697	300	2403	279	2108	247
	123.2	368	131.3	395	134.8	395	144.1	389	155.3	373	162.8	343
66	1.312	.576	1.409	.628	1.418	.631	1.424	.625	1.420	.602	1.427	.536
	2998	320	3006	319	2929	314	2694	299	2400	276	2090	235
	122.7	368	131.0	394	134.5	394	143.5	387	154.1	370	156.2	326
68	1.315	.576	1.409	.627	1.419	.629	1.426	.621	1.423	.595		
	3011	320	3004	318	2927	313	2692	297	2394	273		
	122.2	368	130.7	393	134.1	392	142.9	385	152.6	365		
70	1.317	.576	1.410	.624	1.420	.626	1.427	.617	1.426	.584		
	3025	320	3002	317	2925	311	2689	295	2385	268		
	121.6	368	130.3	391	133.6	391	142.1	382	150.4	359		
72	1.321	.576	1.411	.622	1.421	.623	1.430	.612	1.432	.568		
	3043	320	3000	315	2922	310	2685	292	2371	260		
	120.9	368	129.9	390	133.1	389	141.1	379	147.1	349		
74	1.324	.576	1.412	.619	1.423	.620	1.432	.607	1.445	.529		
	3063	320	2998	314	2920	308	2682	290	2337	242		
	120.1	368	129.4	388	132.5	387	140.1	376	139.1	325		
76	1.327	.576	1.414	.616	1.424	.616	1.434	.601				
	3084	320	2995	312	2917	306	2678	287				
	119.3	368	128.8	386	131.8	385	138.9	372				
78	1.331	.576	1.415	.613	1.426	.612	1.438	.590				
	3106	320	2993	310	2913	304	2668	282				
	118.4	368	128.2	384	131.0	382	137.0	366				

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

CRUISE - MCT/320KT - 1 ENGINE OUT - ISA

Applicable to: ALL 321

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.357	.576	1.471	.631	1.496	.643	1.519	.650	1.539	.653	1.511	.624
	3059	320	3084	320	3091	320	2948	311	2785	301	2380	276
	120.3	368	128.2	395	129.8	401	136.4	402	144.1	401	159.9	381
54	1.363	.576	1.479	.631	1.501	.641	1.521	.644	1.541	.647	1.515	.616
	3091	320	3121	320	3111	319	2943	309	2777	298	2373	272
	119.0	368	126.7	395	128.6	400	135.6	399	143.1	397	158.1	375
58	1.371	.576	1.488	.631	1.504	.636	1.523	.639	1.544	.640	1.520	.605
	3127	320	3160	320	3107	317	2937	306	2769	294	2366	267
	117.7	368	125.1	395	127.8	397	134.7	395	142.0	393	155.9	369
62	1.378	.576	1.496	.630	1.506	.631	1.526	.632	1.547	.631	1.524	.592
	3165	320	3191	319	3102	314	2930	302	2759	290	2356	261
	116.2	368	123.6	395	126.9	394	133.6	391	140.6	388	153.2	361
66	1.387	.576	1.499	.624	1.509	.625	1.530	.624	1.551	.621	1.531	.567
	3207	320	3186	316	3097	311	2922	299	2748	286	2338	249
	114.7	368	122.8	391	125.9	390	132.3	387	138.9	382	147.9	346
70	1.396	.576	1.502	.618	1.512	.618	1.533	.615	1.555	.610		
	3251	320	3181	313	3092	307	2913	294	2737	280		
	113.2	368	121.7	387	124.7	386	130.8	381	136.9	375		
74	1.406	.576	1.505	.611	1.516	.610	1.538	.605	1.562	.590		
	3300	320	3177	310	3086	303	2904	289	2720	271		
	111.5	368	120.5	383	123.4	381	129.1	375	133.3	363		
78	1.416	.576	1.509	.603	1.520	.601	1.543	.590	1.573	.553		
	3354	320	3171	305	3079	298	2891	281	2693	253		
	109.7	368	119.2	378	121.8	375	126.3	365	126.2	340		
82	1.427	.576	1.513	.594	1.525	.589	1.553	.563				
	3410	320	3167	301	3073	292	2874	268				
	107.9	368	117.5	372	119.6	367	121.3	349				
86	1.439	.576	1.519	.580	1.533	.569						
	3470	320	3163	293	3064	282						
	106.0	368	114.9	364	115.8	355						
90	1.451	.576	1.529	.559	1.548	.533						
	3533	320	3158	282	3047	264						
	104.1	368	110.8	350	109.2	333						
94	1.456	.569	1.549	.512								
	3540	316	3139	258								
	102.6	363	102.2	321								

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

10D—08F0A321—131 IAE V2530-A5 12300010C6KG330 0 018590 0 0 3 1 0 .0 .00 0 01100 000 .000 .000 0 FCOM-N0-03-06-50-009-XXX

CRUISE - MCT/320KT - 1 ENGINE OUT - ISA +10

Applicable to: ALL 320

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+10
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.299	.576	1.395	.631	1.414	.641	1.419	.639	1.410	.628	1.398	.612
	2996	320	3020	320	3006	319	2770	306	2473	289	2189	270
	125.1	375	133.4	403	135.6	408	145.7	404	159.0	393	173.8	380
52	1.300	.576	1.397	.631	1.415	.640	1.419	.638	1.410	.626	1.399	.609
	3004	320	3029	320	3005	319	2769	305	2472	288	2187	268
	124.7	375	133.0	403	135.5	407	145.4	403	158.6	392	173.0	378
54	1.302	.576	1.399	.631	1.415	.639	1.420	.637	1.411	.624	1.401	.605
	3012	320	3039	320	3004	318	2768	305	2471	287	2185	267
	124.4	375	132.6	403	135.3	406	145.2	402	158.2	391	172.1	376
56	1.304	.576	1.401	.631	1.416	.638	1.420	.635	1.412	.621	1.403	.601
	3021	320	3049	320	3003	317	2767	304	2469	285	2183	265
	124.0	375	132.2	403	135.1	406	144.9	401	157.6	389	171.1	373
58	1.305	.576	1.404	.631	1.416	.636	1.421	.633	1.413	.618	1.405	.594
	3030	320	3059	320	3002	317	2765	303	2467	284	2179	262
	123.7	375	131.7	403	134.9	405	144.6	400	157.0	387	169.5	369
60	1.307	.576	1.406	.631	1.417	.635	1.422	.631	1.415	.615	1.408	.586
	3040	320	3071	320	3001	316	2764	302	2465	282	2174	258
	123.2	375	131.2	403	134.6	404	144.2	399	156.3	385	167.8	365
62	1.310	.576	1.408	.631	1.417	.634	1.423	.629	1.416	.611	1.412	.576
	3051	320	3078	320	3000	315	2762	301	2463	281	2167	253
	122.8	375	130.8	403	134.3	403	143.8	397	155.5	383	165.3	358
64	1.312	.576	1.408	.629	1.418	.632	1.424	.626	1.418	.606	1.417	.560
	3063	320	3076	319	2998	314	2760	300	2460	278	2158	246
	122.3	375	130.5	402	134.0	402	143.3	395	154.4	380	161.5	348
66	1.314	.576	1.409	.627	1.419	.630	1.425	.623	1.421	.600	1.429	.530
	3075	320	3075	318	2997	313	2758	298	2456	276	2137	232
	121.9	375	130.3	401	133.7	401	142.7	394	153.1	376	154.3	330
68	1.316	.576	1.410	.626	1.420	.628	1.426	.620	1.423	.593		
	3088	320	3073	317	2995	312	2755	296	2450	272		
	121.3	375	130.0	399	133.3	399	142.0	391	151.6	372		
70	1.319	.576	1.411	.623	1.421	.625	1.428	.616	1.427	.582		
	3103	320	3071	316	2992	311	2752	294	2440	267		
	120.8	375	129.6	398	132.9	398	141.2	389	149.3	364		
72	1.322	.576	1.412	.621	1.422	.622	1.430	.611	1.433	.565		
	3122	320	3069	315	2990	309	2748	292	2426	259		
	120.0	375	129.1	396	132.3	396	140.3	386	145.9	354		
74	1.326	.576	1.413	.618	1.423	.619	1.432	.605	1.449	.518		
	3142	320	3067	313	2987	308	2745	289	2383	236		
	119.2	375	128.7	395	131.7	394	139.2	382	136.3	325		
76	1.329	.576	1.414	.615	1.425	.615	1.435	.599				
	3164	320	3064	311	2984	306	2740	286				
	118.4	375	128.1	393	131.1	391	138.0	378				
78	1.333	.576	1.415	.611	1.427	.610	1.439	.588				
	3186	320	3061	310	2981	303	2730	281				
	117.6	375	127.5	390	130.2	388	136.0	371				

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

CRUISE - MCT/320KT - 1 ENGINE OUT - ISA +10

Applicable to: ALL 321

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.359	.576	1.473	.631	1.498	.643	1.519	.648	1.539	.652	1.512	.623
	3137	320	3167	320	3175	320	3018	311	2852	300	2438	275
	119.4	375	127.2	403	128.8	409	135.6	409	143.2	408	158.9	387
54	1.365	.576	1.482	.631	1.502	.640	1.522	.643	1.542	.646	1.516	.614
	3171	320	3204	320	3184	318	3013	308	2844	297	2431	271
	118.2	375	125.7	403	127.8	407	134.8	406	142.2	405	157.1	382
58	1.372	.576	1.491	.631	1.504	.635	1.524	.637	1.545	.638	1.520	.604
	3207	320	3245	320	3180	316	3007	305	2835	294	2423	266
	116.8	375	124.2	403	127.0	404	133.8	402	141.1	400	154.9	375
62	1.380	.576	1.497	.629	1.507	.630	1.527	.631	1.548	.630	1.525	.591
	3246	320	3265	319	3175	313	3000	302	2825	290	2413	260
	115.4	375	122.9	401	126.1	401	132.7	398	139.7	395	152.2	367
66	1.389	.576	1.499	.623	1.509	.624	1.530	.623	1.552	.620	1.532	.565
	3289	320	3261	316	3170	310	2992	298	2814	285	2394	248
	113.9	375	122.0	398	125.1	397	131.5	393	138.0	388	146.7	351
70	1.398	.576	1.502	.617	1.513	.617	1.534	.614	1.556	.608		
	3334	320	3256	313	3165	306	2983	294	2803	279		
	112.4	375	121.0	394	123.9	392	130.0	388	135.9	381		
74	1.408	.576	1.506	.610	1.516	.609	1.538	.604	1.563	.588		
	3385	320	3251	309	3158	302	2973	288	2786	270		
	110.7	375	119.8	389	122.6	387	128.2	381	132.3	368		
78	1.418	.576	1.510	.602	1.520	.600	1.544	.588	1.574	.550		
	3440	320	3246	305	3151	298	2960	281	2757	251		
	108.9	375	118.4	384	121.0	381	125.4	371	124.9	344		
82	1.429	.576	1.514	.593	1.526	.587	1.554	.561				
	3498	320	3242	300	3145	291	2943	267				
	107.1	375	116.8	379	118.7	373	120.3	354				
86	1.441	.576	1.520	.579	1.534	.567						
	3559	320	3238	293	3137	281						
	105.3	375	114.1	370	114.9	361						
90	1.453	.576	1.530	.557	1.549	.530						
	3624	320	3232	281	3118	262						
	103.4	375	110.0	355	108.0	337						
94	1.457	.567	1.552	.505								
	3621	315	3213	254								
	101.9	369	100.4	323								

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

10D —08F0A321–131 IAE V2530–A5 12300010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01100.000 .000 .000 10 FCOM-N0–03–06–50–010–XXX

CRUISE - MCT/320KT - 1 ENGINE OUT - ISA +15

Applicable to: ALL 321

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H
NM/1000KG
MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.359 3176 119.0	.576 320 378	1.462 3131 128.4	.624 316 402	1.473 3052 131.8	.626 312 402	1.494 2895 139.0	.632 302 403	1.515 2745 146.5	.636 293 402	1.486 2337 162.5	.605 267 380
54	1.366 3210 117.8	.576 320 378	1.464 3128 127.7	.620 314 399	1.475 3048 131.0	.622 309 399	1.496 2890 138.1	.626 300 399	1.518 2738 145.3	.629 289 398	1.490 2331 160.3	.595 262 374
58	1.373 3247 116.4	.576 320 378	1.467 3124 126.8	.615 312 396	1.477 3044 130.1	.617 307 396	1.499 2884 137.0	.620 296 395	1.521 2731 143.9	.621 286 393	1.494 2323 157.7	.584 257 366
62	1.381 3287 115.0	.576 320 378	1.469 3120 125.9	.610 309 393	1.480 3039 129.1	.611 304 392	1.502 2877 135.7	.613 293 391	1.525 2722 142.3	.612 281 387	1.500 2312 153.2	.564 248 354
66	1.390 3330 113.5	.576 320 378	1.472 3116 124.9	.604 306 389	1.483 3034 127.9	.604 300 388	1.505 2871 134.2	.604 289 385	1.529 2712 140.3	.602 276 381	1.513 2288 143.8	.524 230 329
70	1.399 3376 112.0	.576 320 378	1.475 3112 123.6	.597 302 385	1.486 3029 126.5	.597 296 383	1.509 2864 132.3	.595 284 379	1.534 2699 137.3	.586 269 371		
74	1.409 3428 110.3	.576 320 378	1.478 3109 122.1	.589 298 380	1.490 3024 124.9	.588 292 378	1.514 2856 129.6	.581 277 370	1.543 2678 131.6	.557 255 352		
78	1.418 3478 108.6	.576 320 378	1.482 3106 120.4	.580 293 374	1.494 3019 122.6	.576 286 370	1.523 2843 125.0	.558 265 355				
82	1.421 3476 107.5	.570 316 374	1.488 3102 117.7	.567 286 365	1.502 3011 118.8	.557 276 358						
86	1.424 3475 106.2	.562 312 369	1.497 3094 113.5	.545 275 351	1.516 2996 112.1	.523 259 336						
90	1.428 3473 104.4	.553 307 363										
94	1.434 3467 102.0	.539 299 353										

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

10D —08F0A321–131 IAE V2530–A5 12300010C6KG330 0 018590 0 0 3 1 0 0 00 0 01100 000 000 000 15 FCOM-N0–03–06–50–011–XXX

CRUISE - MCT/320KT - 1 ENGINE OUT - ISA +15

Applicable to: ALL 320

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+15
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.300	.576	1.381	.621	1.390	.625	1.394	.623	1.385	.610	1.374	.592
	3033	320	2957	315	2884	311	2656	298	2369	280	2093	261
	124.6	378	135.3	400	139.1	401	149.4	397	163.0	386	177.6	372
52	1.301	.576	1.381	.620	1.391	.624	1.395	.621	1.386	.608	1.375	.588
	3041	320	2956	314	2883	310	2655	297	2367	279	2091	259
	124.3	378	135.2	400	138.9	400	149.1	396	162.5	385	176.6	369
54	1.303	.576	1.382	.619	1.391	.623	1.395	.620	1.387	.605	1.377	.582
	3049	320	2955	314	2882	310	2654	296	2366	278	2088	256
	124.0	378	135.0	399	138.7	400	148.8	395	161.9	383	175.2	366
56	1.304	.576	1.382	.618	1.392	.621	1.396	.618	1.388	.602	1.380	.575
	3058	320	2955	313	2881	309	2653	295	2364	276	2084	253
	123.6	378	134.7	398	138.4	399	148.4	394	161.2	381	173.3	361
58	1.306	.576	1.383	.617	1.392	.620	1.397	.616	1.389	.599	1.383	.567
	3067	320	2954	312	2880	308	2651	294	2362	275	2079	249
	123.3	378	134.5	397	138.1	398	148.0	393	160.4	379	171.1	356
60	1.308	.576	1.383	.615	1.393	.618	1.398	.613	1.391	.594	1.387	.554
	3078	320	2953	312	2879	307	2650	293	2359	273	2072	243
	122.8	378	134.2	396	137.9	397	147.5	391	159.4	376	167.8	348
62	1.310	.576	1.384	.614	1.393	.616	1.399	.611	1.393	.588	1.395	.533
	3089	320	2951	311	2878	306	2648	292	2354	270	2059	234
	122.4	378	134.0	395	137.5	396	147.0	389	158.0	372	162.6	335
64	1.313	.576	1.385	.612	1.394	.614	1.400	.608	1.396	.581	1.411	.486
	3101	320	2950	310	2876	305	2646	290	2349	266	2038	212
	121.9	378	133.6	394	137.1	394	146.3	387	156.4	367	149.6	305
66	1.315	.576	1.385	.610	1.395	.612	1.402	.604	1.399	.572		
	3113	320	2949	309	2874	304	2643	288	2342	262		
	121.5	378	133.3	393	136.7	393	145.6	385	154.4	362		
68	1.317	.576	1.386	.607	1.396	.609	1.403	.599	1.404	.557		
	3126	320	2947	308	2872	303	2640	286	2333	255		
	120.9	378	132.8	391	136.2	391	144.7	382	151.2	353		
70	1.320	.576	1.387	.605	1.397	.606	1.406	.593	1.412	.533		
	3142	320	2945	306	2870	301	2635	283	2313	244		
	120.3	378	132.3	390	135.6	389	143.5	378	145.8	337		
72	1.323	.576	1.389	.602	1.399	.603	1.408	.586				
	3161	320	2943	305	2868	299	2630	280				
	119.6	378	131.8	388	135.0	387	142.1	374				
74	1.327	.576	1.390	.599	1.401	.598	1.412	.577				
	3182	320	2941	303	2864	297	2622	275				
	118.8	378	131.2	386	134.1	384	140.2	368				
76	1.330	.576	1.392	.594	1.403	.593	1.417	.563				
	3203	320	2936	300	2859	294	2612	268				
	118.0	378	130.3	383	133.0	380	137.4	359				
78	1.334	.576	1.394	.588	1.405	.586	1.425	.540				
	3226	320	2932	298	2854	291	2593	257				
	117.2	378	129.3	379	131.9	376	132.8	344				

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

CRUISE - MCT/320KT - 1 ENGINE OUT - ISA +20

Applicable to: ALL 320

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.301	.576	1.357	.605	1.366	.608	1.370	.606	1.360	.592	1.349	.570
	3070	320	2826	306	2761	302	2542	289	2261	271	1991	251
	124.2	381	139.2	393	142.8	394	153.3	390	167.1	378	181.5	361
52	1.302	.576	1.357	.604	1.366	.607	1.370	.604	1.361	.589	1.352	.564
	3078	320	2826	306	2760	302	2541	289	2259	270	1989	248
	123.9	381	138.9	393	142.5	393	152.9	389	166.4	376	179.6	357
54	1.304	.576	1.358	.603	1.367	.606	1.371	.602	1.362	.585	1.354	.556
	3086	320	2825	305	2759	301	2540	288	2257	268	1986	244
	123.6	381	138.7	392	142.3	393	152.5	387	165.5	374	177.4	352
56	1.305	.576	1.358	.601	1.367	.604	1.372	.600	1.364	.581	1.358	.546
	3095	320	2824	304	2758	300	2539	287	2255	266	1982	239
	123.2	381	138.4	391	141.9	392	152.1	386	164.5	371	174.5	346
58	1.307	.576	1.359	.600	1.368	.603	1.373	.597	1.366	.575	1.364	.528
	3104	320	2824	304	2757	299	2537	285	2253	263	1973	232
	122.9	381	138.1	390	141.6	391	151.4	384	163.0	367	169.7	335
60	1.309	.576	1.359	.598	1.369	.601	1.374	.594	1.368	.568	1.375	.495
	3115	320	2823	303	2756	298	2535	284	2249	260	1958	217
	122.4	381	137.7	389	141.2	389	150.8	382	161.4	363	160.3	314
62	1.311	.576	1.360	.596	1.370	.598	1.375	.591	1.371	.560		
	3126	320	2822	302	2755	297	2533	282	2245	256		
	122.0	381	137.3	388	140.8	388	150.0	380	159.4	358		
64	1.312	.575	1.361	.593	1.371	.596	1.377	.586	1.375	.548		
	3127	319	2820	300	2753	296	2529	280	2239	251		
	121.7	381	136.8	386	140.2	386	149.0	377	156.4	350		
66	1.312	.574	1.362	.591	1.372	.593	1.379	.580	1.382	.530		
	3127	319	2819	299	2751	294	2526	277	2226	242		
	121.4	380	136.3	384	139.6	384	147.7	373	152.0	338		
68	1.313	.572	1.363	.588	1.373	.589	1.382	.574	1.396	.490		
	3126	318	2817	297	2748	292	2522	273	2207	223		
	121.1	379	135.7	382	138.9	382	146.3	369	141.9	313		
70	1.314	.570	1.364	.584	1.375	.584	1.385	.565				
	3125	317	2815	295	2745	290	2516	269				
	120.8	377	134.9	380	137.9	379	144.5	364				
72	1.314	.568	1.366	.579	1.377	.579	1.389	.553				
	3123	315	2812	293	2741	287	2509	263				
	120.4	376	134.0	377	136.8	375	141.7	356				
74	1.315	.566	1.368	.574	1.379	.572	1.396	.533				
	3122	314	2809	290	2737	284	2494	254				
	119.9	374	132.9	373	135.5	371	137.6	343				
76	1.316	.563	1.370	.568	1.382	.564	1.411	.492				
	3121	313	2805	287	2731	280	2469	233				
	119.4	373	131.6	369	133.9	366	128.1	316				
78	1.317	.560	1.373	.560	1.386	.553						
	3119	311	2800	283	2724	274						
	118.8	371	130.1	364	131.5	358						

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

CRUISE - MCT/320KT - 1 ENGINE OUT - ISA +20

Applicable to: ALL 321

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

EPR
KG/H
NM/1000KG

MACH
IAS (KT)
TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	1.360	.576	1.434	.606	1.445	.609	1.468	.615	1.492	.620	1.459	.586
	3215	320	2986	307	2917	302	2780	294	2644	285	2243	258
	118.6	381	131.9	394	135.3	395	142.2	396	149.7	396	165.7	372
54	1.367	.576	1.436	.601	1.448	.604	1.471	.609	1.495	.613	1.463	.576
	3249	320	2983	304	2913	300	2776	291	2638	282	2238	253
	117.4	381	131.1	391	134.4	391	141.1	392	148.4	391	163.0	365
58	1.374	.576	1.438	.596	1.450	.599	1.474	.602	1.498	.605	1.469	.560
	3286	320	2981	302	2910	297	2771	288	2631	278	2232	246
	116.0	381	130.1	388	133.3	388	139.8	387	146.8	386	159.1	355
62	1.382	.576	1.441	.591	1.453	.592	1.477	.595	1.502	.595	1.479	.532
	3327	320	2979	299	2907	294	2766	284	2624	273	2218	233
	114.6	381	128.9	384	132.0	384	138.3	382	144.8	380	152.0	337
66	1.384	.572	1.443	.584	1.455	.585	1.480	.585	1.506	.582		
	3330	318	2976	295	2904	290	2760	279	2616	267		
	113.8	379	127.6	380	130.5	379	136.4	377	142.2	372		
70	1.386	.567	1.447	.576	1.459	.576	1.485	.574	1.514	.559		
	3329	315	2974	291	2901	286	2754	273	2602	256		
	112.8	375	126.0	375	128.7	373	134.0	369	137.3	357		
74	1.389	.562	1.450	.567	1.463	.565	1.492	.553	1.532	.504		
	3328	312	2971	287	2897	280	2743	263	2564	230		
	111.7	372	124.1	369	126.4	366	129.7	356	125.6	322		
78	1.391	.555	1.456	.554	1.471	.547	1.507	.513				
	3327	308	2969	279	2891	271	2719	244				
	110.5	368	121.2	360	122.6	354	121.4	330				
82	1.395	.548	1.465	.532	1.484	.515						
	3325	304	2960	268	2875	254						
	109.1	363	116.8	346	116.0	334						
86	1.399	.538										
	3322	299										
	107.3	356										
90	1.405	.524										
	3317	290										
	104.4	346										
94	1.415	.500										
	3312	277										
	99.9	331										

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

10D—08F0A321—131 IAE V2530-A5 12300010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01100.000 .000 .000 20 FCOM-N0-03-06-50-012-XXX

IN CRUISE QUICK CHECK AT LONG RANGE SPEED

Applicable to: ALL 320

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and the time required to cover a given air distance from any moment in cruise to landing, with one engine inoperative.

These tables are established for:
- Cruise Mach number : long range
- Descent profile : M .78/300 kt/250 kt
- Approach and landing : 120 kg or 270 lb - 6 min IMC
- ISA
- CG = 33 %
- Pack flow HI
- Anti ice OFF

Note: *1. In the tables, the asterisk (*) means that a step climb of 4 000 ft must be flown to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree Celsius above ISA temperature apply a fuel correction of 0.015 (kg/°C/NM) x Δ ISA (°C) x air distance (NM) or 0.033 (lb/°C/NM) x ΔISA (°C) x air distance (NM).

IN CRUISE QUICK CHECK AT LONG RANGE SPEED

Applicable to: ALL 321

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and the time required to cover a given air distance from any moment in cruise to landing, with one engine inoperative.

These tables are established for :
- Cruise Mach number : long range
- Descent profile : M .78/250 kt/300 kt
- Approach and landing : 140 kg or 340 lb -6 min IMC
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

Note: *1. In the tables, the asterisk (*) means that a step climb of 4 000 ft must be flown to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree Celsius above ISA temperature apply a fuel correction of 0.015 (kg/°C/NM) x Δ ISA (°C) x air distance (NM) or 0.033 (lb/°C/NM) x ΔISA (°C) x air distance (NM).

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

Applicable to: ALL

The in cruise quick check tables are based on a reference initial weight.
A correction on the fuel consumption has to be made, when the actual initial weight is different from the reference initial weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1 000 kg or 1 000 lb below (or above) the reference initial weight (*Refer to PER-OEI-GEN-20 EXAMPLE*).

IN CRUISE QUICK CHECK LONG RANGE

Applicable to: ALL 320

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 55000 KG
PACK FLOW HI
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	220	240	250	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL220	FL240 FL250
200	1410 0.47	1187 0.44	1049 0.42	999 0.41	954 0.40	931 0.40	8	5	4
250	1757 0.58	1502 0.54	1338 0.51	1279 0.50	1227 0.49	1201 0.48	12	8	7
300	2101 1.09	1816 1.03	1627 1.00	1559 0.59	1499 0.57	1470 0.57	15	11	10
350	2444 1.19	2129 1.12	1915 1.09	1838 1.08	1771 1.06	1737 1.05	18	14	12
400	2785 1.30	2442 1.22	2203 1.17	2116 1.16	2041 1.14	2004 1.13	21	16	15
450	3125 1.41	2754 1.31	2490 1.26	2393 1.25	2311 1.22	2270 1.22	23	19	18
500	3464 1.52	3066 1.40	2776 1.35	2669 1.34	2581 1.31	2535 1.30	26	22	20
550	3801 2.03	3377 1.50	3061 1.44	2945 1.43	2849 1.39	2799 1.38	29	25	23
600	4136 2.13	3687 1.59	3346 1.53	3219 1.52	3117 1.48	3063 1.47	32	28	26
650	4469 2.24	3997 2.09	3630 2.02	3493 2.00	3384 1.56	3325 1.55	34	30	29
700	4801 2.36	4307 2.18	3913 2.11	3766 2.09	3650 2.05	3587 2.04	37	33	31
750	5132 2.47	4616 2.27	4196 2.20	4038 2.18	3916 2.13	3849 2.12	39	36	34
800	5461 2.58	4925 2.37	4478 2.28	4309 2.27	4180 2.22	4109 2.20	42	39	37
850	5788 3.09	5233 2.46	4760 2.37	4579 2.36	4443 2.31	4369 2.29	44	41	40
900	6115 3.20	5540 2.55	5041 2.46	4849 2.45	4706 2.39	4628 2.37	47	44	43
950	6439 3.31	5847 3.05	5321 2.55	5117 2.54	4968 2.48	4887 2.46	49	47	45
1000	6763 3.43	6154 3.14	5601 3.04	5385 3.03	5229 2.57	5145 2.54	51	49	48
1050	7084 3.54	6460 3.23	5880 3.13	5652 3.12	5490 3.05	5402 3.03	54	52	51
1100	7405 4.05	6766 3.33	6158 3.22	5918 3.21	5749 3.14	5658 3.11	56	55	54
1150	7724 4.16	7071 3.42	6436 3.31	6184 3.30	6008 3.23	5914 3.20	58	57	57
1200	8042 4.28	7376 3.51	6712 3.40	6449 3.39	6266 3.32	6169 3.28	61	60	60
1250	8358 4.39	7680 4.01	6988 3.49	6714 3.48	6524 3.40	6423 3.37	63	62	63
1300	8673 4.51	7984 4.10	7264 3.59	6978 3.57	6780 3.49	6676 3.46	66	65	66
1350	8990 5.02	8287 4.20	7538 4.08	7242 4.06	7036 3.58	6929 3.54	68	68	69
1400	9311 5.13	8590 4.29	7813 4.17	7505 4.15	7291 4.07	7180 4.03	70	71	72

ENGINE ANTI ICE ON
△FUEL = + 3 %

TOTAL ANTI ICE ON
△FUEL = + 6 %

FLIP23C A320-232 IAE V2527-A5 3610 03301.001011 0250300 .7801 .00100 120 0300350 55 0 100100 40100 18590 N0-03-06-30-013-140

IN CRUISE QUICK CHECK LONG RANGE

Applicable to: ALL 321

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	220	240	250	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL220	FL240 FL250
200	1510 0.46	1317 0.44	1180 0.42	1131 0.41	1083 0.41	1061 0.41	9	7	8
250	1886 0.56	1663 0.54	1503 0.50	1446 0.49	1391 0.49	1366 0.50	12	10	11
300	2260 1.06	2008 1.03	1826 0.59	1761 0.58	1699 0.57	1670 0.58	16	14	15
350	2634 1.16	2352 1.12	2147 1.08	2075 1.06	2006 1.06	1973 1.07	19	17	18
400	3006 1.27	2694 1.22	2468 1.17	2388 1.15	2312 1.14	2275 1.15	22	20	21
450	3376 1.37	3036 1.31	2787 1.26	2699 1.23	2617 1.22	2577 1.23	25	24	25
500	3746 1.47	3377 1.41	3106 1.34	3010 1.32	2921 1.31	2877 1.32	28	27	28
550	4114 1.57	3716 1.51	3423 1.43	3319 1.41	3224 1.39	3176 1.40	31	30	31
600	4481 2.08	4055 2.00	3739 1.52	3627 1.49	3526 1.48	3474 1.49	34	34	35
650	4847 2.18	4393 2.10	4055 2.01	3934 1.58	3827 1.56	3772 1.57	37	37	38
700	5212 2.28	4729 2.19	4369 2.10	4241 2.07	4128 2.04	4068 2.05	40	40	41
750	5576 2.38	5065 2.29	4682 2.19	4546 2.15	4427 2.13	4364 2.13	43	44	44
800	5939 2.49	5399 2.39	4994 2.28	4850 2.24	4725 2.21	4658 2.22	46	47	48
850	6301 2.59	5733 2.48	5305 2.37	5153 2.33	5021 2.30	4953 2.30	49	50	51
900	6661 3.10	6066 2.58	5615 2.46	5456 2.41	5316 2.38	5246 2.38	51	54	54
950	7021 3.20	6397 3.08	5924 2.55	5757 2.50	5611 2.47	5539 2.46	54	57	57
1000	7379 3.30	6728 3.17	6233 3.04	6058 2.59	5904 2.55	5831 2.55	57	60	61
1050	7737 3.41	7058 3.27	6540 3.13	6357 3.08	6196 3.04	6122 3.03	60	63	64
1100	8094 3.51	7387 3.37	6846 3.22	6656 3.16	6488 3.12	6412 3.11	63	66	67
1150	8449 4.02	7714 3.46	7151 3.32	6954 3.25	6778 3.21	6702 3.19	65	70	71
1200	8804 4.12	8041 3.56	7456 3.41	7251 3.34	7068 3.29	6991 3.27	68	73	74
1250	9158 4.23	8367 4.06	7759 3.50	7546 3.43	7357 3.38	7279 3.36	71	76	77
1300	9510 4.34	8692 4.16	8062 3.59	7841 3.52	7644 3.46	7566 3.44	74	80	81
1350	9862 4.44	9016 4.26	8364 4.08	8135 4.01	7931 3.55	7849 3.52	77	83	84
1400	10213 4.55	9339 4.36	8665 4.17	8428 4.10	8216 4.04	8130 4.01	79	86	87

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

FLIP23 A321–131 IAE V2530–A5 3610 03301.001011 0300250 .7801 .000100 140 0300350 560 0 100100 40100 1859 FCOM-N0-03-06-30-010-150

GENERAL

Applicable to: ALL 320

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and the time required to cover a given air distance from any moment in cruise to landing with one engine inoperative.

These tables are established for:
- Cruise speed: MCT/VMO, MCT/320 kt.
- Descent profile: M .78/300 kt/250 kt
- Approach and landing: 120 kg or 270 lb - 6 min IMC
- ISA
- CG = 33 %
- Pack flow HI
- Anti ice OFF

Note: *1. In the tables, the asterisk "*" means that a step climb of 4 000 ft has been made to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree Celsius above ISA apply a fuel correction of
0.015 (kg/°C/NM) x ΔISA (°C) x Air Distance (NM)
or 0.033 (lb/°C/NM) x ΔISA (°C) x Air Distance (NM)

GENERAL

Applicable to: ALL 321

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and the time required to cover a given air distance from any moment in cruise to landing with one engine inoperative.

These tables are established for :
- Cruise speed: MCT/VMO, MCT/320 kt.
- Descent profile: M .78/300 kt/250 kt
- Approach and landing: 140 kg or 310 lb –6 min IMC
- ISA
- CG = 33 %
- Normal Air Conditioning
- Anti ice OFF

Note: *1. In the tables, the asterisk "*" means that a step climb of 4 000 ft has been made to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree Celsius above ISA apply a fuel correction of
0.015 (kg/°C/NM) x ΔISA (°C) x Air Distance (NM)
or 0.033 (lb/°C/NM) x ΔISA (°C) x Air Distance (NM)

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

Applicable to: ALL

The in cruise quick check tables are based on a reference initial weight. The fuel consumption must be corrected when the actual weight is different from the reference initial weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1 000 kg or 1 000 lb below (or above) the reference weight (*Refer to PER-OEI-GEN-20 EXAMPLE*).

IN CRUISE QUICK CHECK VMO

Applicable to: ALL 320

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : MCT/VMO - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 55000 KG
PACK FLOW HI
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	160	180	200	220	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL160 FL180	FL200 FL220
200	1583 0.39	1342 0.39	1294 0.39	1195 0.39	1095 0.39	1002 0.40	0	0	0
250	1986 0.47	1714 0.46	1655 0.46	1533 0.46	1410 0.47	1292 0.48	0	0	0
300	2389 0.55	2086 0.54	2016 0.54	1871 0.54	1724 0.55	1581 0.56	0	0	1
350	2792 1.03	2457 1.02	2377 1.01	2209 1.02	2037 1.03	1871 1.04	0	0	1
400	3195 1.11	2829 1.09	2738 1.09	2547 1.10	2351 1.10	2160 1.12	0	0	1
450	3598 1.19	3200 1.17	3099 1.17	2885 1.17	2665 1.18	2450 1.20	0	0	2
500	4001 1.27	3571 1.24	3459 1.24	3223 1.25	2978 1.26	2738 1.28	0	0	2
550	4403 1.35	3942 1.32	3820 1.32	3560 1.33	3291 1.34	3027 1.37	1	1	3
600	4805 1.43	4313 1.40	4181 1.40	3898 1.40	3604 1.42	3316 1.45	1	1	4
650	5208 1.51	4684 1.47	4541 1.47	4235 1.48	3917 1.50	3604 1.53	1	1	4
700	5610 1.59	5055 1.55	4901 1.55	4573 1.56	4230 1.57	3892 2.01	1	1	5
750	6012 2.07	5426 2.03	5261 2.03	4910 2.03	4543 2.05	4180 2.09	2	2	5
800	6414 2.15	5796 2.10	5621 2.10	5247 2.11	4855 2.13	4468 2.17	2	2	6
850	6815 2.23	6167 2.18	5981 2.18	5583 2.19	5168 2.21	4755 2.25	2	2	6
900	7217 2.32	6537 2.25	6341 2.25	5920 2.26	5480 2.29	5043 2.33	3	3	7
950	7619 2.40	6907 2.33	6700 2.33	6257 2.34	5792 2.36	5330 2.41	3	3	7
1000	8020 2.48	7277 2.41	7060 2.41	6593 2.42	6104 2.44	5617 2.49	3	3	7
1050	8421 2.56	7647 2.48	7419 2.48	6929 2.49	6416 2.52	5904 2.57	4	4	8
1100	8822 3.04	8017 2.56	7778 2.56	7266 2.57	6727 3.00	6190 3.05	4	4	8
1150	9223 3.12	8387 3.04	8137 3.03	7602 3.05	7039 3.08	6476 3.13	4	4	9
1200	9624 3.20	8757 3.11	8496 3.11	7938 3.12	7351 3.15	6763 3.21	4	5	9
1250	10025 3.28	9126 3.19	8855 3.19	8274 3.20	7662 3.23	7049 3.29	5	5	9
1300	10425 3.36	9496 3.26	9214 3.26	8609 3.28	7973 3.31	7335 3.37	5	5	10
1350	10826 3.44	9865 3.34	9573 3.34	8945 3.35	8285 3.39	7621 3.45	5	5	10
1400	11226 3.52	10234 3.42	9932 3.42	9281 3.43	8596 3.46	7907 3.53	6	6	10

ENGINE ANTI ICE ON
△FUEL = + 1.5 %

TOTAL ANTI ICE ON
△FUEL = + 3 %

FLIP23C A320-232 IAE V2527-A5 3611 03301.001011 0250300 .7800 .00100 120 0300350 55 0 100100 40100 18590 N0-03-06-50-014-140

IN CRUISE QUICK CHECK VMO

Applicable to: ALL 321

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : MCT/VMO - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	160	180	200	220	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL160 FL180	FL200 FL220
200	1742 0.38	1454 0.39	1404 0.39	1311 0.39	1227 0.39	1123 0.40	0	0	0
250	2193 0.46	1852 0.46	1792 0.46	1679 0.46	1576 0.47	1446 0.48	0	1	2
300	2644 0.54	2250 0.54	2179 0.54	2046 0.54	1925 0.54	1769 0.56	0	2	3
350	3095 1.01	2648 1.01	2566 1.02	2413 1.02	2273 1.02	2091 1.04	0	3	4
400	3545 1.09	3045 1.09	2953 1.09	2780 1.10	2621 1.10	2413 1.13	0	3	6
450	3995 1.17	3442 1.17	3339 1.17	3146 1.17	2969 1.18	2734 1.21	0	4	7
500	4445 1.24	3839 1.24	3725 1.25	3512 1.25	3316 1.25	3055 1.29	0	5	8
550	4895 1.32	4236 1.32	4111 1.32	3877 1.33	3663 1.33	3376 1.37	0	6	9
600	5344 1.40	4632 1.40	4496 1.40	4242 1.40	4010 1.41	3696 1.45	0	7	10
650	5793 1.47	5027 1.47	4881 1.47	4607 1.48	4356 1.49	4016 1.53	0	8	11
700	6242 1.55	5423 1.55	5266 1.55	4971 1.56	4702 1.56	4335 2.01	0	8	12
750	6690 2.03	5818 2.02	5650 2.03	5336 2.03	5048 2.04	4654 2.09	0	9	13
800	7138 2.10	6213 2.10	6035 2.10	5699 2.11	5393 2.12	4973 2.17	0	10	14
850	7586 2.18	6608 2.18	6419 2.18	6063 2.19	5737 2.19	5292 2.25	0	11	15
900	8034 2.25	7003 2.25	6802 2.25	6426 2.26	6082 2.27	5610 2.33	0	12	16
950	8481 2.33	7397 2.33	7186 2.33	6789 2.34	6426 2.35	5927 2.41	0	12	17
1000	8929 2.41	7791 2.40	7569 2.41	7152 2.41	6770 2.42	6245 2.49	0	13	18
1050	9375 2.48	8184 2.48	7952 2.48	7514 2.49	7113 2.50	6562 2.57	0	14	18
1100	9822 2.56	8578 2.56	8334 2.56	7876 2.57	7456 2.58	6879 3.05	15	14	19
1150	10269 3.04	8971 3.03	8716 3.03	8238 3.04	7799 3.05	7195 3.13	3	15	20
1200	10715 3.11	9363 3.11	9098 3.11	8599 3.12	8142 3.13	7511 3.21	7	16	21
1250	11161 3.19	9756 3.18	9480 3.19	8960 3.19	8484 3.21	7827 3.29	11	17	22
1300	11607 3.26	10148 3.26	9862 3.26	9321 3.27	8826 3.28	8143 3.37	14	17	23
1350	12052 3.34	10540 3.33	10243 3.34	9681 3.35	9168 3.36	8458 3.45	14	18	23
1400	12497 3.42	10932 3.41	10624 3.41	10042 3.42	9509 3.44	8773 3.53	15	19	24

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23 A321–131 IAE V2530–A5 3611 03301.001011 0250300 .7800 .00100 140 0300350 60 0 100100 40100 18590 FCOM-03–06–50–014–150

IN CRUISE QUICK CHECK 320KT

Applicable to: ALL 320

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : MCT/320KT - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 55000 KG
PACK FLOW HI
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)

TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	160	180	200	220	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL160 FL180	FL200 FL220
200	1572 0.39	1342 0.39	1294 0.39	1195 0.39	1095 0.39	1002 0.40	0	0	0
250	1971 0.47	1714 0.46	1655 0.46	1533 0.46	1410 0.47	1292 0.48	0	0	0
300	2371 0.55	2086 0.54	2016 0.54	1871 0.54	1724 0.55	1581 0.56	0	0	1
350	2770 1.03	2457 1.02	2377 1.01	2209 1.02	2037 1.03	1871 1.04	0	0	1
400	3170 1.12	2829 1.09	2738 1.09	2547 1.10	2351 1.10	2160 1.12	0	0	1
450	3569 1.20	3200 1.17	3099 1.17	2885 1.17	2665 1.18	2450 1.20	1	0	2
500	3967 1.28	3571 1.24	3459 1.24	3223 1.25	2978 1.26	2738 1.28	1	0	2
550	4366 1.36	3942 1.32	3820 1.32	3560 1.33	3291 1.34	3027 1.37	2	1	3
600	4764 1.44	4313 1.40	4181 1.40	3898 1.40	3604 1.42	3316 1.45	2	1	4
650	5163 1.52	4684 1.47	4541 1.47	4235 1.48	3917 1.50	3604 1.53	2	1	4
700	5561 2.01	5055 1.55	4901 1.55	4573 1.56	4230 1.57	3892 2.01	3	1	5
750	5958 2.09	5426 2.03	5261 2.03	4910 2.03	4543 2.05	4180 2.09	3	2	5
800	6356 2.17	5796 2.10	5621 2.10	5247 2.11	4855 2.13	4468 2.17	4	2	6
850	6753 2.25	6167 2.18	5981 2.18	5583 2.19	5168 2.21	4755 2.25	4	2	6
900	7151 2.33	6537 2.25	6341 2.25	5920 2.26	5480 2.29	5043 2.33	4	3	7
950	7548 2.41	6907 2.33	6700 2.33	6257 2.34	5792 2.36	5330 2.41	5	3	7
1000	7945 2.49	7277 2.41	7060 2.41	6593 2.42	6104 2.44	5617 2.49	5	3	7
1050	8341 2.58	7647 2.48	7419 2.48	6929 2.49	6416 2.52	5904 2.57	6	4	8
1100	8738 3.06	8017 2.56	7778 2.56	7266 2.57	6727 3.00	6190 3.05	6	4	8
1150	9134 3.14	8387 3.04	8137 3.03	7602 3.05	7039 3.08	6476 3.13	6	4	9
1200	9530 3.22	8757 3.11	8496 3.11	7938 3.12	7351 3.15	6763 3.21	7	5	9
1250	9926 3.30	9126 3.19	8855 3.19	8274 3.20	7662 3.23	7049 3.29	7	5	9
1300	10322 3.38	9496 3.26	9214 3.26	8609 3.28	7973 3.31	7335 3.37	8	5	10
1350	10717 3.46	9865 3.34	9573 3.34	8945 3.35	8285 3.39	7621 3.45	8	5	10
1400	11112 3.55	10234 3.42	9932 3.42	9281 3.43	8596 3.46	7907 3.53	9	6	10

ENGINE ANTI ICE ON
△FUEL = + 2.5 %

TOTAL ANTI ICE ON
△FUEL = + 5 %

FLIP23C A320-232 IAE V2527-A5 3611 03301.001011 0250300 .7800 .00100 120 0300350 55 0 100100 40100 18590 N0-03-06-50-015-140

IN CRUISE QUICK CHECK 320KT

Applicable to: ALL 321

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : MCT/320KT - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	160	180	200	220	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL160 FL180	FL200 FL220
200	1658 0.40	1454 0.39	1404 0.39	1311 0.39	1227 0.39	1123 0.40	1	0	0
250	2084 0.48	1852 0.46	1792 0.46	1679 0.46	1576 0.47	1446 0.48	2	1	2
300	2509 0.56	2250 0.54	2179 0.54	2046 0.54	1925 0.54	1769 0.56	3	2	3
350	2935 1.04	2648 1.01	2566 1.02	2413 1.02	2273 1.02	2091 1.04	4	3	4
400	3359 1.13	3045 1.09	2953 1.09	2780 1.10	2621 1.10	2413 1.13	5	3	6
450	3783 1.21	3442 1.17	3339 1.17	3146 1.17	2969 1.18	2734 1.21	6	4	7
500	4207 1.29	3839 1.24	3725 1.25	3512 1.25	3316 1.25	3055 1.29	7	5	8
550	4630 1.37	4236 1.32	4111 1.32	3877 1.33	3663 1.33	3376 1.37	8	6	9
600	5052 1.45	4632 1.40	4496 1.40	4242 1.40	4010 1.41	3696 1.45	9	7	10
650	5474 1.53	5027 1.47	4881 1.47	4607 1.48	4356 1.49	4016 1.53	10	8	11
700	5896 2.01	5423 1.55	5266 1.55	4971 1.56	4702 1.56	4335 2.01	10	8	12
750	6317 2.10	5818 2.02	5650 2.03	5336 2.03	5048 2.04	4654 2.09	11	9	13
800	6737 2.18	6213 2.10	6035 2.10	5699 2.11	5393 2.12	4973 2.17	12	10	14
850	7157 2.26	6608 2.18	6419 2.18	6063 2.19	5737 2.19	5292 2.25	14	11	15
900	7577 2.34	7003 2.25	6802 2.25	6426 2.26	6082 2.27	5610 2.33	15	12	16
950	7996 2.42	7397 2.33	7186 2.33	6789 2.34	6426 2.35	5927 2.41	16	12	17
1000	8414 2.50	7791 2.40	7569 2.41	7152 2.41	6770 2.42	6245 2.49	16	13	18
1050	8833 2.59	8184 2.48	7952 2.48	7514 2.49	7113 2.50	6562 2.57	17	14	18
1100	9250 3.07	8578 2.56	8334 2.56	7876 2.57	7456 2.58	6879 3.05	18	14	19
1150	9667 3.15	8971 3.03	8716 3.03	8238 3.04	7799 3.05	7195 3.13	19	15	20
1200	10084 3.23	9363 3.11	9098 3.11	8599 3.12	8142 3.13	7511 3.21	20	16	21
1250	10500 3.31	9756 3.18	9480 3.19	8960 3.19	8484 3.21	7827 3.29	21	17	22
1300	10916 3.39	10148 3.26	9862 3.26	9321 3.27	8826 3.28	8143 3.37	22	17	23
1350	11332 3.47	10540 3.33	10243 3.34	9681 3.35	9168 3.36	8458 3.45	23	18	23
1400	11747 3.56	10934 3.41	10624 3.41	10042 3.42	9509 3.44	8773 3.53	24	19	24

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 4 %

FLIP23 A321–131 IAE V2530–A5 3611 03301.001011 0250300 .7800 .00100 140 0300350 60 0 100100 40100 18590 FCOM-03–06–50–015–150

HOLDING

Applicable to: ALL 320

RACE TRACK HOLDING PATTERN AT GREEN DOT SPEED - 1 ENGINE OUT								
MAX. CRUISE THRUST LIMITS CLEAN CONFIGURATION PACK FLOW HI ANTI-ICING OFF					ISA CG=33.0%		**EPR** **FF (KG/H)**	
WEIGHT (1000KG)	**FL 15**	**FL 50**	**FL100**	**FL120**	**FL140**	**FL160**	**FL180**	**FL200**
48	1.077 1582	1.094 1583	1.128 1578	1.144 1583	1.163 1591	1.184 1601	1.207 1595	1.234 1588
50	1.082 1653	1.100 1654	1.136 1650	1.153 1655	1.172 1663	1.194 1669	1.220 1658	1.248 1660
52	1.086 1723	1.106 1723	1.144 1720	1.162 1728	1.182 1740	1.205 1735	1.232 1727	1.263 1726
54	1.091 1795	1.112 1789	1.152 1793	1.171 1801	1.192 1810	1.217 1798	1.245 1798	1.278 1788
56	1.096 1868	1.119 1859	1.160 1866	1.180 1878	1.202 1876	1.228 1866	1.258 1865	1.293 1848
58	1.101 1938	1.125 1930	1.168 1940	1.189 1953	1.212 1940	1.240 1937	1.271 1927	1.308 1910
60	1.107 2006	1.132 1998	1.176 2015	1.198 2019	1.223 2005	1.251 2003	1.285 1988	1.324 1975
62	1.112 2074	1.138 2067	1.185 2093	1.207 2085	1.234 2076	1.264 2066	1.299 2049	1.340 2041
64	1.118 2142	1.145 2138	1.193 2164	1.217 2149	1.244 2141	1.276 2129	1.313 2112	1.357 2113
66	1.123 2210	1.151 2213	1.201 2232	1.227 2217	1.255 2207	1.289 2190	1.328 2178	
68	1.129 2279	1.158 2287	1.210 2297	1.236 2281	1.267 2270	1.302 2252	1.344 2248	
70	1.135 2348	1.164 2363	1.219 2361	1.246 2345	1.278 2333	1.315 2315		
72	1.140 2419	1.171 2438	1.228 2424	1.256 2411	1.290 2395	1.329 2385		
74	1.146 2496	1.178 2516	1.237 2486	1.267 2476	1.302 2457			
76	1.152 2573	1.185 2598	1.246 2552	1.278 2540				
ENGINE ANTI ICE ON △FF = + 2 %			**TOTAL ANTI ICE ON** △FF = + 4.5 %			**PER 1° ABOVE ISA** △FF = + 0.3 %		

10F -08F0A320-232 IAE V2527-A5 14300010C6KG330 0 018590 0 0 1 1.0 180.0 30.00 0 0 1.000 .000 .000 0 FCOM-N0-03-06-55-001-140

HOLDING

Applicable to: ALL 321

RACE TRACK HOLDING PATTERN AT GREEN DOT SPEED - 1 ENGINE OUT								
MAX. CONTINUOUS THRUST LIMITS CLEAN CONFIGURATION NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=33.0%		EPR FF (KG/H)	
WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
50	1.097 1772	1.117 1730	1.155 1717	1.173 1707	1.194 1699	1.220 1688	1.253 1688	1.290 1683
54	1.108 1875	1.130 1869	1.173 1847	1.193 1839	1.218 1827	1.249 1827	1.286 1823	1.328 1827
58	1.119 2015	1.145 2008	1.191 1981	1.215 1969	1.245 1966	1.281 1964	1.321 1966	1.367 1977
62	1.131 2157	1.159 2139	1.210 2112	1.239 2105	1.273 2106	1.312 2105	1.357 2115	1.407 2136
66	1.144 2295	1.174 2273	1.232 2244	1.265 2249	1.302 2244	1.345 2254	1.392 2272	1.447 2307
70	1.157 2429	1.189 2408	1.256 2391	1.291 2386	1.332 2394	1.378 2410	1.430 2439	1.490 2502
74	1.169 2563	1.204 2540	1.280 2531	1.318 2533	1.362 2547	1.411 2573	1.468 2623	1.533 2720
78	1.182 2698	1.221 2674	1.304 2671	1.346 2683	1.392 2705	1.445 2747	1.506 2828	1.576 2970
82	1.195 2835	1.240 2816	1.330 2822	1.374 2840	1.423 2873	1.480 2941	1.546 3055	
86	1.209 2967	1.259 2963	1.355 2975	1.402 3004	1.455 3055	1.516 3153		
90	1.224 3102	1.279 3103	1.380 3134	1.430 3173	1.487 3254	1.552 3385		
94	1.241 3248	1.299 3243	1.406 3300	1.459 3360	1.520 3470			
ENGINE ANTI ICE ON △FF = + 2 %			TOTAL ANTI ICE ON △FF = + 4 %			PER 1° ABOVE ISA △FF = + 0.3 %		

10D -08F0A321--131 IAE V2530-A5 14300010C6KG330 0 018590 0 0 3 1.0 180.0 30.00 0 01 1.000 .000 .000 0 FCOM-N0-03-06-55-001-XXX

DESCENT - M.78/300KT

Applicable to: ALL 320

DESCENT - M.78/300KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA
CG=33.0%

MINIMUM RATE OF DESCENT 500FT/MIN

WEIGHT (1000KG)	50				70				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	42.2	1416	285	MCT					241
370	40.3	1375	271	MCT	40.1	1365	269	MCT	252
350	38.4	1330	257	MCT	38.7	1330	259	MCT	264
330	36.7	1284	244	MCT	37.1	1291	247	MCT	277
310	35.1	1238	232	MCT	35.6	1248	235	MCT	289
290	33.6	1191	220	MCT	34.0	1198	223	MCT	300
270	31.5	1123	204	MCT	31.7	1124	206	MCT	300
250	28.9	1037	186	MCT	29.0	1033	186	MCT	300
230	25.8	929	164	MCT	25.8	922	163	MCT	300
220	24.0	863	151	MCT	24.0	857	151	MCT	300
210	22.0	790	137	V/S	22.0	784	137	V/S	300
200	20.0	717	124	V/S	20.0	711	124	V/S	300
190	18.0	645	111	V/S	18.0	639	111	V/S	300
180	16.0	573	98	V/S	16.0	567	98	V/S	300
170	14.0	501	85	V/S	14.0	495	85	V/S	300
160	12.0	430	72	V/S	12.0	424	72	V/S	300
150	10.0	358	60	V/S	10.0	354	60	V/S	300
140	8.0	287	47	V/S	8.0	283	47	V/S	300
100	.0	0	0	V/S	.0	0	0	V/S	300

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	– 1 %	– 2 %	–
FUEL	+ 1 %	+ 2 %	+ 0.25 %
DISTANCE	– 1 %	– 2 %	+ 0.25 %

10F -08F0A320-232 IAE V2527-A5 23200010C6KG330 0 018590 0 0 3 .0 .0 500.00 0 02 .780300.000 .000 0 FCOM-N0-03-06-30-003-140

DESCENT - M.78/300KT

Applicable to: ALL 321

DESCENT - M.78/300KT - 1 ENGINE OUT									
MAX. CONTINUOUS THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%		MINIMUM RATE OF DESCENT 500FT/MIN				
WEIGHT (1000KG)	70				90				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	40.7	1514	274	MCT					241
370	39.3	1482	264	MCT					252
350	37.9	1444	253	MCT					264
330	36.4	1403	242	MCT	34.4	1389	227	MCT	277
310	35.0	1359	231	MCT	33.2	1352	218	MCT	289
290	33.5	1310	220	MCT	31.8	1307	207	MCT	300
270	31.4	1236	204	MCT	29.9	1239	193	MCT	300
250	28.9	1143	185	MCT	27.6	1158	177	MCT	300
230	25.8	1024	164	MCT	25.1	1059	159	MCT	300
220	24.0	952	151	MCT	23.7	1002	149	MCT	300
210	22.0	871	137	V/S	22.0	932	137	MCT	300
200	20.0	790	124	V/S	20.0	846	124	V/S	300
190	18.0	710	111	V/S	18.0	758	111	V/S	300
180	16.0	630	98	V/S	16.0	672	98	V/S	300
170	14.0	550	85	V/S	14.0	586	85	V/S	300
160	12.0	471	72	V/S	12.0	502	72	V/S	300
150	10.0	392	60	V/S	10.0	417	60	V/S	300
140	8.0	314	47	V/S	8.0	333	47	V/S	300
100	.0	0	0	V/S	.0	0	0	V/S	300

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	– 2.5 %	– 6 %	–
FUEL	– 2 %	– 5.5 %	+ 0.25 %
DISTANCE	– 3 %	– 7.5 %	+ 0.25 %

10D —08F0A321–131 IAE V2530–A5 23200010C6KG330 0 018590 0 0 3 .0 .0 500.00 0 02 .780300.000 .000 0 FCOM-N0–03–06–30–003–XXX

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - ISA

Applicable to: ALL 320

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
HIGH AIR CONDITIONING
ANTI ICE OFF

ISA
CG=33.0%

DISTANCE (NM) **TIME (MIN)**
INITIAL SPEED (KT) **FUEL (1000KG)**
LEVEL OFF (FT)

INIT. GW	INITIAL FLIGHT LEVEL								
(1000KG)	230	250	270	290	310	330	350	370	390
50					154 30 191 0.8 30000	215 42 193 1.0 30100	251 48 195 1.2 30100	278 53 197 1.3 30200	300 57 199 1.3 30200
52				97 19 193 0.5 28700	208 41 195 1.1 29000	252 49 197 1.2 29100	282 54 199 1.4 29200	305 58 201 1.4 29200	325 61 203 1.5 29300
54				172 34 197 0.9 27900	238 47 199 1.2 28000	274 53 201 1.4 28100	301 58 203 1.5 28200	321 61 205 1.6 28200	341 64 207 1.6 28200
56			55 11 199 0.3 26700	203 40 201 1.1 26900	258 51 203 1.4 27000	289 56 205 1.5 27100	315 60 207 1.6 27200	336 64 209 1.7 27200	352 66 211 1.7 27200
58			102 20 203 0.6 26400	171 33 205 1.0 26500	214 41 207 1.2 26500	244 47 209 1.3 26500	268 51 211 1.4 26500	287 54 213 1.4 26600	306 57 215 1.5 26600
60			116 23 207 0.7 26000	166 32 209 0.9 26000	201 38 211 1.1 26100	227 43 213 1.2 26100	249 47 215 1.3 26100	268 50 217 1.4 26100	284 52 219 1.4 26100
62			124 24 211 0.7 25600	165 31 213 1.0 25700	195 37 215 1.1 25700	218 41 217 1.2 25700	239 44 219 1.3 25700	256 47 221 1.3 25700	272 49 223 1.4 25800
64			128 24 215 0.8 25300	165 31 217 1.0 25300	192 36 219 1.1 25400	214 39 221 1.2 25400	232 42 223 1.3 25400	249 45 225 1.3 25400	264 47 227 1.4 25400
66		51 10 217 0.3 24900	134 25 219 0.8 25000	165 31 221 1.0 25000	188 35 223 1.1 25000	210 38 225 1.2 25000	226 41 227 1.2 25100	242 43 229 1.3 25100	257 45 231 1.3 25100
68		129 24 221 0.9 24400	182 34 223 1.2 24500	207 38 225 1.3 24500	228 42 227 1.4 24600	246 45 229 1.5 24600	261 47 231 1.5 24600	277 49 233 1.5 24600	290 51 235 1.6 24600
70		162 30 225 1.1 23800	206 38 227 1.4 23900	230 42 229 1.5 23900	250 46 231 1.6 24000	268 48 233 1.6 24000	282 50 235 1.7 24000	298 53 237 1.7 24000	
72	38 7 227 0.3 22900	185 34 229 1.3 23200	223 41 231 1.5 23300	245 45 233 1.6 23300	265 48 235 1.7 23400	282 51 237 1.7 23400	296 53 239 1.8 23400	310 55 241 1.8 23400	
74	122 23 231 0.9 22500	205 38 233 1.4 22700	236 43 235 1.6 22700	257 47 237 1.7 22700	275 49 239 1.8 22800	293 52 241 1.9 22800	307 54 243 1.9 22800	321 56 245 1.9 22800	
76	159 29 235 1.2 22000	220 40 237 1.6 22100	249 45 239 1.7 22100	268 48 241 1.8 22200	286 51 243 1.9 22200	300 53 245 1.9 22200	316 56 247 2.0 22200	331 58 249 2.0 22200	
78	205 38 239 1.5 21300	252 46 241 1.8 21400	277 50 243 2.0 21500	295 53 245 2.0 21500	312 55 247 2.1 21500	326 58 249 2.2 21600	339 59 251 2.2 21600		

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
FUEL	+ 14 %	+ 28 %
TIME	+ 13 %	+ 26 %
DISTANCE	+ 12 %	+ 23 %
LEVEL OFF	- 700 ft	- 1800 ft

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - ISA

Applicable to: ALL 321

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM) TIME (MIN)
INITIAL SPEED(KT) FUEL(1000KG)
LEVEL OFF (FT)

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 230	250	270	290	310	330	350	370	390
50						174 32 198 .9 31700	228 42 200 1.1 31800	262 47 202 1.3 31900	288 52 204 1.3 31900
54					156 29 202 .9 30100	222 41 204 1.2 30200	258 47 206 1.4 30300	285 52 208 1.5 30300	308 55 210 1.5 30400
58				152 29 206 .9 28200	231 43 208 1.3 28500	269 50 210 1.5 28600	298 54 212 1.7 28600	320 58 214 1.7 28700	339 61 216 1.8 28700
62			157 30 210 1.0 26200	236 45 212 1.5 26400	279 52 214 1.7 26600	309 57 216 1.8 26600	333 61 218 1.9 26700	352 64 220 2.0 26700	369 67 222 2.1 26800
66		155 30 214 1.1 24200	236 45 216 1.6 24400	281 53 218 1.8 24600	314 59 220 2.0 24600	339 63 222 2.1 24700	360 67 224 2.2 24700	378 69 226 2.3 24800	393 71 228 2.3 24800
70	145 28 218 1.1 22300	231 45 220 1.7 22600	277 53 222 1.9 22700	311 59 224 2.1 22800	335 63 226 2.2 22800	357 67 228 2.3 22900	376 70 230 2.4 22900	392 72 232 2.5 22900	406 74 234 2.5 23000
74	161 31 224 1.2 21300	214 41 226 1.6 21300	250 48 228 1.8 21400	278 53 230 2.0 21400	301 56 232 2.1 21400	321 60 234 2.2 21500	339 62 236 2.2 21500	354 65 238 2.3 21500	
78	175 34 230 1.4 20500	212 40 232 1.6 20500	240 45 234 1.8 20500	264 49 236 1.9 20600	283 52 238 2.0 20600	301 55 240 2.1 20600	316 57 242 2.2 20600	330 60 244 2.2 20600	
82	215 41 236 1.8 19600	242 46 238 1.9 19600	263 49 240 2.0 19700	282 52 242 2.1 19700	298 55 244 2.2 19700	313 57 246 2.3 19700	326 59 248 2.3 19800		
86	254 48 242 2.2 18300	278 52 244 2.3 18400	298 56 246 2.4 18400	317 58 248 2.5 18400	332 61 250 2.6 18500	346 63 252 2.6 18500	359 65 254 2.7 18500		
90	279 52 248 2.4 17100	300 56 250 2.6 17100	318 59 252 2.7 17200	335 61 254 2.7 17200	349 64 256 2.8 17200	363 66 258 2.9 17200			
94	297 55 254 2.7 15900	317 59 256 2.8 15900	334 61 258 2.9 15900	350 64 260 3.0 15900	363 66 262 3.0 16000	375 67 264 3.1 16000			

CORRECTIONS	DISTANCE	TIME	FUEL	LEVEL OFF
ENGINE ANTI ICE ON	+ 15 %	+ 12 %	+ 18 %	– 200 FT
TOTAL ANTI ICE ON	+ 20 %	+ 24 %	+ 33 %	– 700 FT

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - ISA +10

Applicable to: ALL 320

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
HIGH AIR CONDITIONING
ANTI ICE OFF

ISA+10
CG=33.0%

DISTANCE (NM) TIME (MIN)
INITIAL SPEED (KT) FUEL (1000KG)
LEVEL OFF (FT)

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL								
	230	250	270	290	310	330	350	370	390
50					161 31 191 0.8 29900	222 42 193 1.1 30000	259 49 195 1.2 30100	287 54 197 1.3 30200	309 57 199 1.4 30200
52				106 21 193 0.6 28700	215 41 195 1.1 29000	260 50 197 1.3 29100	291 55 199 1.4 29100	314 59 201 1.5 29200	336 62 203 1.6 29200
54				179 35 197 1.0 27800	246 47 199 1.3 28000	283 54 201 1.4 28100	311 59 203 1.6 28100	332 62 205 1.6 28200	353 65 207 1.7 28200
56			58 11 199 0.3 26700	203 39 201 1.1 26900	265 51 203 1.4 27000	298 57 205 1.6 27100	323 61 207 1.7 27100	344 64 209 1.7 27200	362 67 211 1.8 27200
58			106 21 203 0.6 26400	176 34 205 1.0 26400	220 42 207 1.2 26500	251 47 209 1.3 26500	276 51 211 1.4 26500	296 54 213 1.5 26500	315 57 215 1.6 26600
60			119 23 207 0.7 26000	171 32 209 1.0 26000	208 39 211 1.2 26100	235 43 213 1.3 26100	257 47 215 1.3 26100	276 50 217 1.4 26100	294 53 219 1.5 26100
62			128 24 211 0.8 25600	169 32 213 1.0 25700	200 37 215 1.1 25700	226 41 217 1.2 25700	247 45 219 1.3 25700	265 47 221 1.4 25700	281 50 223 1.4 25700
64			134 25 215 0.8 25300	170 31 217 1.0 25300	198 36 219 1.1 25300	221 40 221 1.2 25400	240 43 223 1.3 25400	258 46 225 1.4 25400	273 48 227 1.4 25400
66		59 11 217 0.4 24900	138 25 219 0.9 25000	170 31 221 1.0 25000	195 35 223 1.1 25000	216 39 225 1.2 25000	233 41 227 1.3 25000	252 44 229 1.4 25100	267 46 231 1.4 25100
68		135 25 221 0.9 24400	187 34 223 1.2 24500	215 39 225 1.3 24500	236 42 227 1.4 24500	255 45 229 1.5 24600	272 48 231 1.6 24600	285 50 233 1.6 24600	300 52 235 1.7 24600
70		169 31 225 1.2 23800	213 39 227 1.4 23900	237 43 229 1.5 23900	257 46 231 1.6 23900	277 49 233 1.7 24000	292 51 235 1.7 24000	308 54 237 1.8 24000	
72	48 9 227 0.3 22900	193 35 229 1.3 23200	228 41 231 1.5 23300	253 45 233 1.7 23300	273 49 235 1.7 23300	291 51 237 1.8 23400	306 53 239 1.9 23400	321 56 241 1.9 23400	
74	128 23 231 0.9 22500	210 38 233 1.5 22600	244 44 235 1.7 22700	266 47 237 1.8 22700	285 50 239 1.9 22700	303 53 241 1.9 22800	316 55 243 2.0 22800	332 57 245 2.0 22800	
76	165 30 235 1.2 21900	224 40 237 1.6 22100	256 46 239 1.8 22100	277 49 241 1.9 22100	293 51 243 1.9 22200	311 54 245 2.0 22200	326 56 247 2.1 22200	339 58 249 2.1 22200	
78	212 38 239 1.6 21300	260 46 241 1.9 21400	285 50 243 2.0 21400	305 54 245 2.1 21500	322 56 247 2.2 21500	335 58 249 2.2 21500	351 60 251 2.3 21500		

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
FUEL	+ 14 %	+ 28 %
TIME	+ 13 %	+ 26 %
DISTANCE	+ 12 %	+ 23 %
LEVEL OFF	- 700 ft	- 1800 ft

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - ISA +10

Applicable to: ALL 321

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

DISTANCE (NM) TIME (MIN)
INITIAL SPEED(KT) FUEL(1000KG)
LEVEL OFF (FT)

INIT. GW	INITIAL FLIGHT LEVEL								
(1000KG)	230	250	270	290	310	330	350	370	390
50						180 33 198 .9 31700	236 42 200 1.2 31800	270 48 202 1.3 31800	297 52 204 1.4 31900
54					163 30 202 .9 30000	229 41 204 1.2 30200	268 48 206 1.4 30200	295 52 208 1.5 30300	317 56 210 1.6 30300
58				159 29 206 1.0 28200	239 44 208 1.4 28400	279 50 210 1.6 28500	307 55 212 1.7 28600	330 59 214 1.8 28600	349 61 216 1.9 28700
62			163 31 210 1.1 26100	244 45 212 1.5 26400	289 53 214 1.8 26500	319 58 216 1.9 26600	343 62 218 2.0 26700	363 65 220 2.1 26700	381 67 222 2.2 26700
66		161 31 214 1.1 24100	243 46 216 1.6 24400	289 54 218 1.9 24500	322 59 220 2.1 24600	349 64 222 2.2 24700	370 67 224 2.3 24700	388 70 226 2.4 24700	405 72 228 2.4 24800
70	153 29 218 1.1 22200	237 45 220 1.7 22500	286 54 222 2.0 22600	320 60 224 2.2 22700	346 64 226 2.3 22800	368 68 228 2.4 22800	388 71 230 2.5 22900	403 73 232 2.6 22900	419 75 234 2.6 22900
74	166 32 224 1.3 21200	219 41 226 1.6 21300	256 48 228 1.8 21400	285 53 230 2.0 21400	310 57 232 2.1 21400	331 60 234 2.2 21400	349 63 236 2.3 21500	365 65 238 2.4 21500	
78	180 34 230 1.4 20400	218 41 232 1.7 20500	247 46 234 1.9 20500	272 50 236 2.0 20500	291 53 238 2.1 20600	310 56 240 2.2 20600	326 58 242 2.2 20600	341 60 244 2.3 20600	
82	221 41 236 1.8 19500	250 46 238 2.0 19600	272 50 240 2.1 19600	292 53 242 2.2 19700	309 56 244 2.3 19700	323 58 246 2.4 19700	338 60 248 2.4 19700		
86	261 49 242 2.2 18300	287 53 244 2.4 18300	308 56 246 2.5 18400	326 59 248 2.6 18400	343 62 250 2.7 18400	357 64 252 2.7 18500	370 65 254 2.8 18500		
90	286 53 248 2.5 17000	309 56 250 2.6 17100	328 59 252 2.8 17100	345 62 254 2.8 17200	360 64 256 2.9 17200	374 66 258 3.0 17200			
94	306 56 254 2.8 15800	326 59 256 2.9 15900	344 62 258 3.0 15900	360 64 260 3.0 15900	374 66 262 3.1 15900	387 68 264 3.2 16000			

CORRECTIONS	DISTANCE	TIME	FUEL	LEVEL OFF
ENGINE ANTI ICE ON	+ 15 %	+ 12 %	+ 18 %	– 200 FT
TOTAL ANTI ICE ON	+ 20 %	+ 24 %	+ 33 %	– 700 FT

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - ISA +15

Applicable to: ALL 321

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

DISTANCE (NM) TIME (MIN)
INITIAL SPEED(KT) FUEL(1000KG)
LEVEL OFF (FT)

INIT. GW	INITIAL FLIGHT LEVEL								
(1000KG)	230	250	270	290	310	330	350	370	390
50					35 6 196 .2 30900	202 36 198 1.0 31400	258 46 200 1.3 31500	291 51 202 1.4 31600	318 55 204 1.5 31600
54				62 12 200 .4 28900	210 38 202 1.2 29300	266 48 204 1.4 29400	301 54 206 1.6 29500	328 58 208 1.7 29600	350 62 210 1.8 29600
58			87 16 204 .5 26800	216 40 206 1.3 27200	273 50 208 1.6 27400	310 56 210 1.8 27400	337 61 212 1.9 27500	360 64 214 2.0 27600	379 67 216 2.0 27600
62		99 19 208 .7 24700	223 42 210 1.4 25100	278 52 212 1.7 25300	315 58 214 1.9 25400	343 63 216 2.1 25400	367 67 218 2.2 25500	386 70 220 2.2 25500	404 72 222 2.3 25600
66	83 16 212 .6 22700	213 41 214 1.5 23200	270 51 216 1.8 23300	308 58 218 2.0 23400	338 63 220 2.2 23500	362 67 222 2.3 23600	382 70 224 2.3 23600	400 72 226 2.4 23600	415 74 228 2.5 23600
70	160 31 218 1.2 21600	225 43 220 1.6 21600	270 51 222 1.9 21700	304 57 224 2.1 21800	332 62 226 2.2 21800	355 65 228 2.3 21800	375 68 230 2.4 21800	394 71 232 2.5 21800	412 74 234 2.5 21900
74	173 33 224 1.3 20700	215 41 226 1.6 20800	247 46 228 1.8 20800	273 51 230 1.9 20800	295 54 232 2.0 20900	314 57 234 2.1 20900	331 59 236 2.2 20900	347 62 238 2.2 20900	
78	185 35 230 1.5 19900	217 41 232 1.7 20000	244 45 234 1.8 20000	266 49 236 1.9 20000	285 52 238 2.0 20100	303 54 240 2.1 20100	318 57 242 2.2 20100	332 58 244 2.2 20100	
82	257 48 236 2.1 18600	282 53 238 2.3 18700	303 56 240 2.4 18800	323 59 242 2.5 18800	339 61 244 2.5 18800	355 64 246 2.6 18800	368 66 248 2.7 18900		
86	289 54 242 2.5 17300	311 58 244 2.6 17300	334 61 246 2.7 17400	350 64 248 2.8 17400	366 66 250 2.9 17400	380 68 252 2.9 17400			
90	315 58 248 2.7 15900	334 61 250 2.9 16000	353 64 252 3.0 16000	370 67 254 3.0 16000	384 69 256 3.1 16100	397 71 258 3.1 16100			
94	344 63 254 3.1 14600	362 66 256 3.2 14600	378 69 258 3.3 14600	393 71 260 3.3 14700	406 73 262 3.4 14700				

CORRECTIONS	DISTANCE	TIME	FUEL	LEVEL OFF
ENGINE ANTI ICE ON	+ 15 %	+ 12 %	+ 18 %	– 200 FT
TOTAL ANTI ICE ON	+ 20 %	+ 24 %	+ 33 %	–700 FT

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - ISA +15

Applicable to: ALL 320

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
HIGH AIR CONDITIONING
ANTI ICE OFF

ISA+15
CG=33.0%

DISTANCE (NM) TIME (MIN)
INITIAL SPEED (KT) FUEL (1000KG)
LEVEL OFF (FT)

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL								
	230	250	270	290	310	330	350	370	390
50				81 16 189 0.4 28700	207 40 191 1.0 29100	256 49 193 1.2 29200	291 55 195 1.4 29300	317 60 197 1.5 29300	338 63 199 1.5 29400
52				167 33 193 0.9 27900	236 46 195 1.2 28100	275 53 197 1.4 28100	304 58 199 1.5 28200	328 62 201 1.6 28300	348 65 203 1.6 28300
54			55 11 195 0.3 26700	200 39 197 1.1 26900	257 50 199 1.3 27000	289 55 201 1.5 27100	316 60 203 1.6 27200	338 63 205 1.6 27200	356 66 207 1.7 27200
56			65 13 199 0.4 26300	172 33 201 0.9 26400	215 41 203 1.1 26500	246 46 205 1.3 26500	272 51 207 1.4 26500	293 54 209 1.4 26500	311 57 211 1.5 26600
58			118 23 203 0.7 26000	170 32 205 0.9 26000	204 39 207 1.1 26000	232 43 209 1.2 26100	254 47 211 1.3 26100	274 50 213 1.4 26100	292 53 215 1.4 26100
60			126 24 207 0.7 25600	168 32 209 0.9 25600	199 37 211 1.1 25700	224 41 213 1.2 25700	245 45 215 1.3 25700	264 48 217 1.3 25700	280 50 219 1.4 25700
62			131 25 211 0.8 25300	166 31 213 1.0 25300	194 36 215 1.1 25300	217 39 217 1.2 25300	237 43 219 1.2 25400	255 45 221 1.3 25400	271 48 223 1.4 25400
64		61 11 213 0.4 24800	136 25 215 0.8 25000	167 31 217 1.0 25000	190 35 219 1.1 25000	213 38 221 1.2 25000	232 41 223 1.2 25000	248 44 225 1.3 25000	264 46 227 1.3 25000
66		137 25 217 0.9 24300	189 35 219 1.2 24400	214 39 221 1.3 24500	236 43 223 1.4 24500	254 46 225 1.5 24500	272 48 227 1.5 24500	285 50 229 1.6 24600	300 52 231 1.6 24600
68		172 32 221 1.1 23700	214 39 223 1.4 23800	238 43 225 1.5 23900	259 47 227 1.6 23900	277 49 229 1.6 23900	294 52 231 1.7 23900	309 54 233 1.7 23900	
70	60 11 223 0.4 22900	195 36 225 1.3 23100	232 42 227 1.5 23200	255 46 229 1.6 23200	274 49 231 1.7 23300	292 52 233 1.8 23300	307 54 235 1.8 23300	321 56 237 1.9 23300	
72	134 25 227 1.0 22400	214 39 229 1.5 22500	246 44 231 1.6 22600	267 48 233 1.7 22600	286 51 235 1.8 22700	303 53 237 1.9 22700	318 56 239 1.9 22700	333 58 241 2.0 22700	
74	177 32 231 1.3 21800	230 42 233 1.6 22000	258 46 235 1.8 22000	277 49 237 1.8 22000	295 52 239 1.9 22100	313 55 241 2.0 22100	328 57 243 2.0 22100		
76	219 40 235 1.6 21100	266 48 237 1.9 21200	290 52 239 2.0 21300	310 55 241 2.1 21300	327 58 243 2.2 21400	341 60 245 2.2 21400	355 61 247 2.3 21400		
78	248 45 239 1.8 20400	289 52 241 2.1 20500	313 56 243 2.2 20500	331 59 245 2.3 20600	347 61 247 2.4 20600	362 63 249 2.4 20600	377 65 251 2.5 20600		

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
FUEL	+ 14 %	+ 28 %
TIME	+ 13 %	+ 26 %
DISTANCE	+ 12 %	+ 23 %
LEVEL OFF	- 700 ft	- 1800 ft

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - ISA +20

Applicable to: ALL 320

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
HIGH AIR CONDITIONING
ANTI ICE OFF

ISA+20
CG=33.0%

DISTANCE (NM) TIME (MIN)
INITIAL SPEED (KT) FUEL (1000KG)
LEVEL OFF (FT)

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL								
	230	250	270	290	310	330	350	370	390
50				160 32 189 0.8 28000	231 45 191 1.1 28200	273 53 193 1.3 28300	303 58 195 1.4 28400	328 62 197 1.5 28400	349 65 199 1.6 28500
52			53 10 191 0.3 26800	207 41 193 1.1 27000	258 50 195 1.3 27100	293 57 197 1.5 27200	320 61 199 1.6 27200	342 65 201 1.6 27300	361 68 203 1.7 27300
54			63 12 195 0.3 26300	168 33 197 0.9 26400	213 41 199 1.1 26500	245 47 201 1.2 26500	271 51 203 1.3 26500	292 54 205 1.4 26600	313 58 207 1.5 26600
56			114 22 199 0.6 26000	165 32 201 0.9 26000	200 38 203 1.0 26100	228 43 205 1.2 26100	251 47 207 1.2 26100	271 50 209 1.3 26100	290 53 211 1.4 26100
58			123 24 203 0.7 25600	163 31 205 0.9 25600	193 36 207 1.0 25700	218 41 209 1.1 25700	241 44 211 1.2 25700	260 47 213 1.3 25700	277 50 215 1.3 25700
60			130 25 207 0.8 25300	164 31 209 0.9 25300	192 36 211 1.0 25300	214 39 213 1.1 25300	234 43 215 1.2 25300	252 45 217 1.3 25400	268 47 219 1.3 25400
62		62 12 209 0.4 24800	133 25 211 0.8 25000	164 30 213 0.9 25000	187 34 215 1.0 25000	209 38 217 1.1 25000	228 41 219 1.2 25000	246 44 221 1.2 25000	261 46 223 1.3 25000
64		139 26 213 0.9 24300	190 35 215 1.2 24400	215 40 217 1.3 24400	236 43 219 1.4 24500	254 46 221 1.4 24500	270 48 223 1.5 24500	287 51 225 1.5 24500	302 53 227 1.6 24500
66		174 32 217 1.1 23700	216 40 219 1.4 23800	239 44 221 1.5 23800	259 47 223 1.5 23800	278 50 225 1.6 23900	294 52 227 1.7 23900	309 55 229 1.7 23900	
68	77 14 219 0.5 22800	198 37 221 1.3 23100	233 43 223 1.5 23100	256 47 225 1.6 23200	275 50 227 1.7 23200	293 52 229 1.7 23200	308 55 231 1.8 23200	322 57 233 1.8 23300	
70	140 26 223 1.0 22300	216 40 225 1.5 22500	248 45 227 1.6 22500	269 49 229 1.7 22600	286 51 231 1.8 22600	304 54 233 1.8 22600	319 56 235 1.9 22600	334 58 237 1.9 22600	
72	186 34 227 1.3 21700	238 43 229 1.6 21800	264 48 231 1.8 21900	282 51 233 1.8 21900	296 53 235 1.9 22000	314 55 237 1.9 22000	329 58 239 2.0 22000		
74	225 41 231 1.6 21000	270 49 233 1.9 21100	296 53 235 2.0 21100	316 57 237 2.1 21200	332 59 239 2.2 21200	345 61 241 2.2 21200	359 63 243 2.2 21200		
76	252 46 235 1.8 20200	294 53 237 2.1 20300	317 57 239 2.2 20400	335 60 241 2.3 20400	350 62 243 2.3 20400	365 64 245 2.4 20400	381 66 247 2.4 20400		
78	281 51 239 2.1 19400	315 57 241 2.3 19500	337 60 243 2.4 19500	355 63 245 2.5 19600	370 65 247 2.5 19600	384 67 249 2.6 19600			

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
FUEL	+ 14 %	+ 28 %
TIME	+ 13 %	+ 26 %
DISTANCE	+ 12 %	+ 23 %
LEVEL OFF	- 700 ft	- 1800 ft

- For LONG RANGE CRUISE table *Refer to PER-OEI-CRT-10 LONG RANGE CRUISE - 1 ENGINE OUT - ISA*
- For IN CRUISE QUICK CHECK *Refer to PER-OEI-ICQ-10 IN CRUISE QUICK CHECK LONG RANGE*

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - ISA +20

Applicable to: ALL 321

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

DISTANCE (NM) TIME (MIN)
INITIAL SPEED(KT) FUEL(1000KG)
LEVEL OFF (FT)

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 230	250	270	290	310	330	350	370	390
50					164 30 196 .9 30100	244 44 198 1.2 30400	289 52 200 1.4 30500	319 57 202 1.5 30500	344 60 204 1.6 30600
54				176 33 200 1.0 28000	252 47 202 1.4 28200	296 54 204 1.6 28300	326 59 206 1.7 28400	352 63 208 1.8 28400	372 66 210 1.9 28500
58			184 35 204 1.1 25900	256 48 206 1.5 26100	298 55 208 1.7 26200	331 61 210 1.9 26300	357 65 212 2.0 26300	378 68 214 2.1 26400	396 71 216 2.1 26400
62		179 35 208 1.2 23900	251 48 210 1.6 24100	295 56 212 1.8 24200	327 61 214 2.0 24300	354 65 216 2.1 24300	375 69 218 2.2 24400	394 72 220 2.3 24400	412 74 222 2.3 24400
66	167 33 212 1.2 21900	249 48 214 1.7 22100	293 56 216 2.0 22300	325 62 218 2.1 22300	351 66 220 2.2 22400	373 69 222 2.3 22400	393 72 224 2.4 22500	411 75 226 2.5 22500	425 77 228 2.5 22500
70	165 32 218 1.2 21000	213 41 220 1.5 21100	249 47 222 1.7 21100	277 52 224 1.9 21200	300 56 226 2.0 21200	321 59 228 2.1 21200	339 62 230 2.1 21200	354 64 232 2.2 21300	
74	179 34 224 1.4 20200	214 40 226 1.6 20300	243 45 228 1.7 20300	266 49 230 1.9 20300	286 52 232 1.9 20400	304 55 234 2.0 20400	320 57 236 2.1 20400	335 60 238 2.1 20400	
78	246 47 230 2.0 19100	272 51 232 2.1 19200	294 55 234 2.2 19200	313 58 236 2.3 19300	331 61 238 2.4 19300	346 63 240 2.4 19300	360 65 242 2.5 19300		
82	291 55 236 2.4 17600	315 59 238 2.5 17600	335 62 240 2.6 17700	353 65 242 2.7 17700	369 67 244 2.8 17800	384 69 246 2.8 17800	397 71 248 2.9 17800		
86	324 61 242 2.7 16100	344 64 244 2.9 16100	362 67 246 2.9 16200	379 69 248 3.0 16200	394 72 250 3.1 16200	408 74 252 3.1 16200			
90	353 66 248 3.1 14500	371 69 250 3.2 14600	389 72 252 3.3 14600	404 74 254 3.3 14600	418 76 256 3.4 14700	432 78 258 3.5 14700			
94	382 71 254 3.5 12900	399 74 256 3.5 12900	415 76 258 3.6 13000	430 78 260 3.7 13000	444 80 262 3.7 13000				

CORRECTIONS	DISTANCE	TIME	FUEL	LEVEL OFF
ENGINE ANTI ICE ON	+ 15 %	+ 12 %	+ 18 %	– 200 FT
TOTAL ANTI ICE ON	+ 20 %	+ 24 %	+ 33 %	– 700 FT

- For LONG RANGE CRUISE table *Refer to PER-OEI-CRT-10 LONG RANGE CRUISE - 1 ENGINE OUT - ISA*
- For IN CRUISE QUICK CHECK *Refer to PER-OEI-ICQ-10 IN CRUISE QUICK CHECK LONG RANGE*

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DESCENT - M.80/350KT

Applicable to: ALL 320

DESCENT - M.80/350KT - 1 ENGINE OUT									
MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF			ISA CG=33.0%		MINIMUM RATE OF DESCENT 500FT/MIN				
WEIGHT (1000KG)	50				70				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	27.1	1150	200	MCT					248
370	25.6	1116	189	MCT	28.1	1214	208	MCT	260
350	24.0	1079	177	MCT	26.9	1186	199	MCT	272
330	22.7	1043	167	MCT	25.6	1153	189	MCT	284
310	21.5	1007	157	MCT	24.4	1117	179	MCT	297
290	20.4	973	149	MCT	23.1	1079	170	MCT	311
270	19.4	942	141	MCT	21.9	1040	160	MCT	324
250	18.6	913	134	MCT	20.9	1003	152	MCT	338
230	17.8	885	128	MCT	19.9	966	143	MCT	350
220	17.3	866	124	MCT	19.2	941	138	MCT	350
210	16.7	842	119	MCT	18.4	909	132	MCT	350
200	16.0	811	114	MCT	17.4	869	124	MCT	350
190	15.1	772	107	MCT	16.3	819	116	MCT	350
180	14.1	724	99	MCT	15.1	760	106	MCT	350
170	12.9	665	90	MCT	13.6	687	95	MCT	350
160	11.5	593	80	MCT	11.9	602	83	MCT	350
150	9.9	512	68	MCT	10.0	507	69	MCT	350
140	8.0	416	55	V/S	8.0	405	55	V/S	350
100	.0	0	0	V/S	.0	0	0	V/S	350

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	– 5 %	– 12 %	–
FUEL	– 5 %	– 12 %	+ 0.2 %
DISTANCE	– 5 %	– 12 %	+ 0.2 %

10F -08F0A320-232 IAE V2527-A5 23200010C6KG330 0 018590 0 0 3 .0 .0 500.00 0 02 .800350.000 .000 0 FCOM-N0-03-06-50-003-140

DESCENT - M.80/350KT

Applicable to: ALL 321

DESCENT - M.80/350KT - 1 ENGINE OUT									
MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF			ISA CG=33.0%		MINIMUM RATE OF DESCENT 500FT/MIN				
WEIGHT (1000KG)	70				90				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	28.7	1309	212	MCT					248
370	27.4	1280	203	MCT					260
350	26.2	1246	193	MCT					272
330	24.9	1210	184	MCT	24.6	1203	181	MCT	284
310	23.7	1172	174	MCT	23.5	1170	173	MCT	297
290	22.6	1133	165	MCT	22.3	1133	164	MCT	311
270	21.5	1094	157	MCT	21.2	1094	155	MCT	324
250	20.5	1056	149	MCT	20.2	1053	147	MCT	338
230	19.5	1017	141	MCT	19.1	1010	138	MCT	350
220	18.8	989	136	MCT	18.4	979	132	MCT	350
210	18.1	954	129	MCT	17.5	942	126	MCT	350
200	17.0	905	122	MCT	16.5	892	118	MCT	350
190	15.9	846	113	MCT	15.3	832	109	MCT	350
180	14.6	782	103	MCT	14.0	767	99	MCT	350
170	13.1	710	92	MCT	12.7	697	89	MCT	350
160	11.6	631	81	MCT	11.2	620	78	MCT	350
150	9.9	541	69	MCT	9.7	537	67	MCT	350
140	8.0	437	55	V/S	7.9	442	55	MCT	350
100	.0	0	0	V/S	.0	0	0	V/S	350

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	– 4 %	– 12 %	–
FUEL	– 3.5 %	– 11 %	+ 0.4 %
DISTANCE	– 5 %	– 12 %	+ 0.4 %

DESCENT - M.78/320KT

Applicable to: ALL 320

DESCENT - M.78/320KT - 1 ENGINE OUT									
MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF			ISA CG=33.0%		MINIMUM RATE OF DESCENT 500FT/MIN				
WEIGHT (1000KG)	50				70				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	36.5	1351	256	MCT					241
370	34.6	1311	242	MCT	35.7	1332	249	MCT	252
350	32.8	1266	228	MCT	34.2	1298	239	MCT	264
330	31.1	1219	215	MCT	32.7	1259	227	MCT	277
310	29.5	1173	203	MCT	31.2	1215	215	MCT	289
290	28.0	1130	192	MCT	29.6	1170	204	MCT	302
270	26.8	1089	182	MCT	28.2	1124	193	MCT	315
250	25.4	1040	171	MCT	26.5	1064	179	MCT	320
230	23.6	976	158	MCT	24.2	985	163	MCT	320
220	22.6	939	150	MCT	23.0	940	154	MCT	320
210	21.4	893	142	MCT	21.6	887	144	MCT	320
200	19.9	833	131	MCT	20.0	819	132	MCT	320
190	18.0	753	118	V/S	18.0	737	118	V/S	320
180	16.0	668	104	V/S	16.0	653	104	V/S	320
170	14.0	584	90	V/S	14.0	570	90	V/S	320
160	12.0	500	77	V/S	12.0	488	77	V/S	320
150	10.0	416	64	V/S	10.0	406	64	V/S	320
140	8.0	332	50	V/S	8.0	324	50	V/S	320
100	.0	0	0	V/S	.0	0	0	V/S	320

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	– 2 %	– 5 %	–
FUEL	– 1 %	– 2 %	+ 0.3 %
DISTANCE	– 2 %	– 5 %	+ 0.3 %

10F -08F0A320-232 IAE V2527-A5 23200010C6KG330 0 018590 0 0 3 .0 .0 500.00 0 02 .780320.000 .000 0 FCOM-N0-03-06-50-004-140

DESCENT - M.78/320KT

Applicable to: ALL 321

DESCENT - M.78/320KT - 1 ENGINE OUT									
MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF			ISA CG=33.0%		MINIMUM RATE OF DESCENT 500FT/MIN				
WEIGHT (1000KG)	70				90				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	36.6	1489	256	MCT					241
370	35.2	1457	246	MCT					252
350	33.7	1419	235	MCT					264
330	32.3	1378	224	MCT	31.3	1373	216	MCT	277
310	30.9	1334	213	MCT	30.0	1336	207	MCT	289
290	29.5	1288	203	MCT	28.7	1294	197	MCT	302
270	28.2	1242	193	MCT	27.5	1249	187	MCT	315
250	26.6	1181	180	MCT	25.8	1189	175	MCT	320
230	24.5	1098	164	MCT	23.8	1109	160	MCT	320
220	23.3	1049	155	MCT	22.7	1063	151	MCT	320
210	21.8	988	145	MCT	21.4	1008	142	MCT	320
200	20.0	905	132	V/S	19.8	937	131	MCT	320
190	18.0	812	118	V/S	18.0	849	118	MCT	320
180	16.0	720	104	V/S	16.0	753	104	V/S	320
170	14.0	629	90	V/S	14.0	656	90	V/S	320
160	12.0	538	77	V/S	12.0	561	77	V/S	320
150	10.0	448	64	V/S	10.0	466	64	V/S	320
140	8.0	357	50	V/S	8.0	372	50	V/S	320
100	.0	0	0	V/S	.0	0	0	V/S	320

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	– 1 %	– 1 %	–
FUEL	+ 2.5 %	+ 4 %	+ 0.3 %
DISTANCE	– 1 %	– 1 %	+ 0.3 %

DESCENT TO LANDING

Applicable to: ALL 320

DESCENT - M.78/300KT/250KT - 1 ENGINE OUT									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%						
WEIGHT (1000KG)	50				70				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	IAS (KT)
390	14.7	75	88	IDLE					241
370	14.0	71	83	IDLE	17.4	87	104	IDLE	252
350	13.4	68	79	IDLE	16.7	84	99	IDLE	264
330	12.9	66	75	IDLE	16.1	82	94	IDLE	277
310	12.4	64	71	IDLE	15.5	79	89	IDLE	289
290	11.9	62	67	IDLE	14.9	76	85	IDLE	300
270	11.3	59	63	IDLE	14.1	73	79	IDLE	300
250	10.7	56	58	IDLE	13.3	69	73	IDLE	300
240	10.4	55	56	IDLE	12.9	68	70	IDLE	300
220	9.8	53	52	IDLE	12.0	64	64	IDLE	300
200	9.1	50	47	IDLE	11.2	61	59	IDLE	300
180	8.5	47	43	IDLE	10.4	57	53	IDLE	300
160	7.8	44	39	IDLE	9.5	53	47	IDLE	300
140	7.1	41	35	IDLE	8.6	49	42	IDLE	300
120	6.4	38	30	IDLE	7.7	45	36	IDLE	300
100	5.7	34	26	IDLE	6.7	40	31	IDLE	300
50	2.1	13	9	IDLE	2.5	16	11	IDLE	250
15	.0	0	0	IDLE	.0	0	0	IDLE	250

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	+ 2 %	+ 8 %	+ 0.2 %
FUEL	+ 15 %	+ 70 %	+ 0.5 %
DISTANCE	+ 2 %	+ 8 %	+ 0.4 %

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DESCENT TO LANDING

Applicable to: ALL 321

DESCENT - M.78/300KT/250KT - 1 ENGINE OUT									
IDLE THRUST PACK FLOW HI ANTI-ICING OFF			ISA CG=33.0%						
WEIGHT (1000KG)	70				90				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	TIME (MIN)	FUEL (KG)	DIST. (NM)	EPR	IAS (KT)
390	17.2	119	104	IDLE					241
370	16.5	114	98	IDLE					252
350	15.8	109	93	IDLE					264
330	15.2	105	89	IDLE	16.5	114	97	IDLE	277
310	14.6	101	84	IDLE	15.9	110	93	IDLE	289
290	14.0	98	80	IDLE	15.3	106	88	IDLE	300
270	13.3	93	74	IDLE	14.4	100	82	IDLE	300
250	12.5	88	69	IDLE	13.6	95	75	IDLE	300
240	12.1	85	66	IDLE	13.2	92	72	IDLE	300
220	11.4	80	61	IDLE	12.3	86	66	IDLE	300
200	10.6	75	55	IDLE	11.4	81	60	IDLE	300
180	9.8	70	50	IDLE	10.5	75	54	IDLE	300
160	9.0	65	45	IDLE	9.5	69	48	IDLE	300
140	8.1	60	40	IDLE	8.5	63	42	IDLE	300
120	7.3	54	34	IDLE	7.6	56	36	IDLE	300
100	6.4	48	29	IDLE	6.6	49	30	IDLE	300
50	2.4	18	10	IDLE	2.4	19	11	IDLE	250
15	.0	0	0	IDLE	.0	0	0	IDLE	250

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	–	+ 10 %	+ 0.3 %
FUEL	+ 1.5 %	+ 65 %	+ 0.5 %
DISTANCE	–	+ 12 %	+ 0.5 %