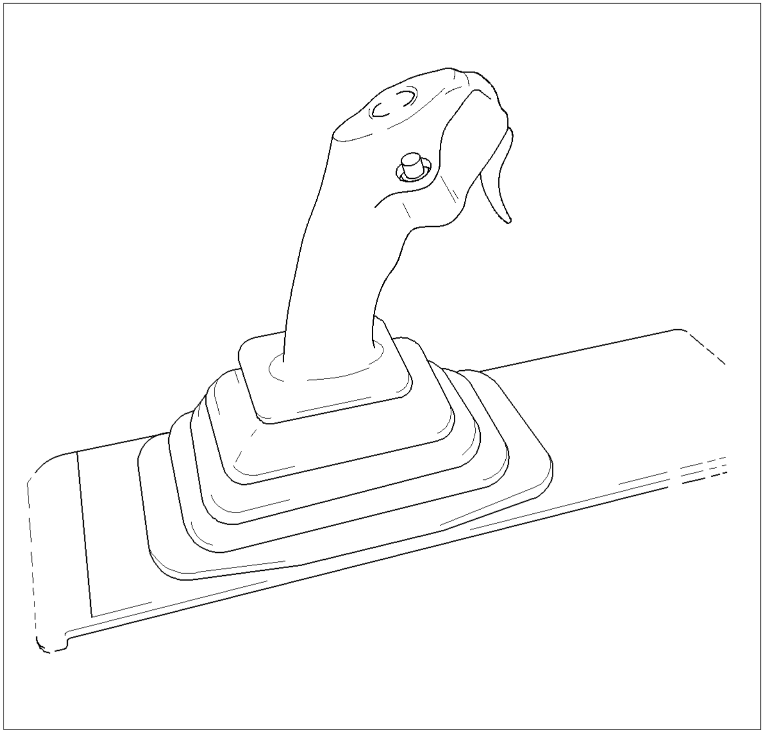
A318/A319/A320/A321

FLIGHT CREW OPERATING MANUAL



FLIGHT OPERATIONS

3

AIRBUS®

FOREWORD

This manual complements the approved Flight Manual. Airbus has attempted to ensure that the data contained in this manual agrees with the data in the Flight Manual. If there is any disagreement, the Flight Manual is the final authority.

COMMENTS - QUESTIONS - SUGGESTIONS

All manual holders and users are encouraged to submit any Flight Crew Operating Manual questions and suggestions to :

AIRBUS - BP N°33
1 ROND POINT MAURICE BELLONTE
31707 BLAGNAC CEDEX - FRANCE
TELEX TLSBI7X or 530526F
FAX 33.5.61.93.29.68
ATTN. Flight Operations Support - STL
EMAIL : fltops.fbwstd@airbus.com

FOR TECHNICAL OR PROCEDURAL CONTENT

AIRBUS - BP N°33
1 ROND POINT MAURICE BELLONTE
31707 BLAGNAC CEDEX - FRANCE
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FAX 33.5.61.93.28.06
ATTN. Technical Documentation Services - SDC
EMAIL : sb.reporting@airbus.com

FOR PRINTING AND DISTRIBUTION

NFC5-03-0010-001-A001AA

CONTENT

The Flight Crew Operating Manual (FCOM), and the associated Quick Reference Handbook (QRH), are developed specifically for flight crews, in order to provide them with all of the necessary information about the operational, technical, procedural, and performance characteristics that are required for the safe and efficient aircraft operation. These manuals take into account all of the operational procedures to be applied during normal and abnormal/emergency situations that may occur on ground or in flight.
The manuals are not designed to provide basic airmanship skills or piloting techniques. They are intended for flight crews that have already been trained to fly this type of aircraft, and are familiar with the aircraft's handling characteristics.
In addition, the purpose of the FCOM is to :

- Be used as a comprehensive reference guide during initial and refresher flight crew training. Practical and training-related information is addressed in the Flight Crew Training Manual (FCTM).
- Provide Airbus operators with a basis for their development of a customized airline operations manual, in accordance with applicable requirements.

The content is divided into four volumes :
Vol 1 = Systems' description (description of the aircraft systems).
Vol 2 = Flight preparation (performance information, plus loading data).
Vol 3 = Flight operations (operating procedures, techniques, and performance information).
Vol 4 = FMGS pilot's guide (procedures for FMGS use).

USE

As a comprehensive set of references, the FCOM :
- can be used by an operator's flight operations department to supplement its own crew manual
- can be issued directly to crew members for training and subsequently for line operations.

WARNINGS, CAUTIONS AND NOTES

WARNING : an operating procedure, technique, etc, which may result in personel injury or loss of life if not carefully followed.
CAUTION : an operating procedure, technique, etc, which may result in damage to equipment if not carefully followed.
NOTE : an operating procedure, technique, etc, considered essential to emphasize.

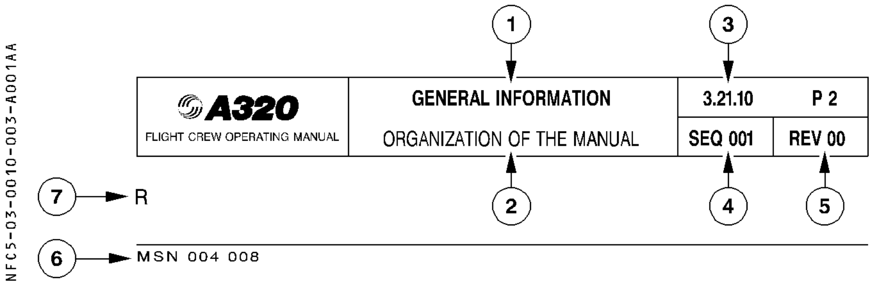
COMPLEMENTARY INFORMATION

The manual includes technical information required for training as well as complementary information.
- Where a paragraph or schematic is preceded by the heading **FOR INFO** the details given are considered to be "nice to know". Knowledge of these items is not required for the type rating qualification.
- ECAM warnings and cautions are summarized in a table at the end of each chapter of volume 1. Numeric values are given for information only.

OPTIONAL EQUIPMENT

The legend "◁" indicates that a paragraph or a shematic is applicable only if the related equipment is installed.

PAGINATION



1. Chapter title

2. Subchapter title

3. FCOM volume number, Chapter number, Section number, Page number

4. Sequence number is used for Airbus Industrie management of different aircraft configurations and allows to enter into list of effective pages

5. Revision number of the manual at which the page has been revised

6. Aircraft MSN
   — 004 008 means that the page is applicable to aircraft MSN 004 and MSN 008
   — 010-014 means that the page is applicable to aircraft MSN 010 to MSN 014
   — ALL means that the page is applicable to all aircraft covered by the manual.
   Correspondance between MSN and registration may be found in the cross reference table

7. An “R” in front of a line indicates that the line has been revised.

REVISIONS

NORMAL REVISIONS

There are issued periodically to cover non-urgent corrections and changes, and to add new data.
They are accompanied by filing instructions and an updated List of Effective Pages that includes customized pages.
A normal revision record sheet is at the front of each volume.
In addition, each volume has a “List of MOD/MP affecting the manual”, that gives a simple explanation of the technical content of each MOD/MP incorporated and its validity per aircraft.

TEMPORARY REVISIONS

Printed on yellow paper these are, issued to cover urgent matters arising between normal revisions. They are accompanied by filing instructions and an updated customized list of effective TR.
A yellow temporary revision record sheet is at the front of each volume.

INCORPORATION OF SERVICE BULLETINS IN THE MANUAL

When a Service Bulletin (SB) has been accomplished on one or more aircraft of the operator fleet, and notified to Airbus Industrie, all affected manuals will reflect the new aircraft configuration at next following revision. If judged necessary by Airbus Industrie, or requested by the operator, a “Temporary Revision” is issued between formal revisions.

OPERATIONS ENGINEERING BULLETINS

These are issued as the need arises to give operators revised or new, but significant, technical and procedural information.
OEBs come with an OEB record sheet. This record sheet is re-issued with each normal revision to update the bulletin embodiment status.
They are accompanied by filling instructions and an updated customized list of effective OEB.

HOW TO INSERT A REVISION

FILING INSTRUCTIONS

Use the filing instructions as follows :

- REMOVE : The page must be removed. It may be replaced by a new page if associated with an "INSERT" instruction. If not, the page is cancelled.
- INSERT : The page must be inserted. If not associated with a "REMOVE" instruction, the page is new for the operator fleet and does not replace an existing one.

The column "NOTE" indicates the reason for change. It states "EFFECTIVITY CHANGE ONLY" if the page is only revised due to effectivity change and not due to technical content.

LIST OF EFFECTIVE PAGES (LEP)

The manual after revision must comply with the LEP, which lists all the pages that are in the manual. The new pages are indicated by "N" and the revised pages by "R".

BEST WAY TO GET UPDATED DOCUMENTATION

The best way to ensure timely receipt of getting correct updated documentation is to advise :

AIRBUS INDUSTRIE
BP 33
31707 BLAGNAC CEDEX
FRANCE
Telex : TLSBP7X.. or 530526F
FAX 33.61.93.28.06
ATTN : Customer Service Directorate – Technical Documentation Services (AI/SE – D)
as soon as any change has been completed on any airplane.

To simplify automatic LEP processing some modifications have been grouped under a common code.

CODE	DESIGNATION
0001	CFM 56-5-B3 = (Mod 31707 + CFM 56-5-B1) = (Mod 34818 + CFM 56-5-B1)
0002	Mod : (21678+26377) = (21678+26999) = (21678+26377+26999)
0003	Mod : (20268+24917+56-5-B3) = (20268+24917+31701+56-5-B1) = (20268+24917+34818+56-5-B1)
0004	Mod : 33909 = 33910 = (33910+31896) = (33910+32475) = (31897+33909) = (32929+33909)
0005	Mod : 20268 = (20268+26999+28495)
0006	Mod : (24105+30020) = (24105+25800+30020)
0007	STD = Mod : (31283+34861) = (31283+34862) = (31283+34864)
0009	STD = Mod : 20057 = 20059 = 30020 = 32236 = (20057+20059)
0010	Mod :(36290+CFM 56-5-A4=A5=B5=B6=V2522A5=V2524A5) = (20802+28053+36290+V2524A5)
0011	Mod : (21054+22013+25199) = (21054+22013+25200)
0012	Mod : (22461+23426) = (22461+23943) = (23408+23426) = (23408+23943)
0013	STD = IAE V2500 = Mod : 25404 = 26017
0015	STD = Mod : (30660+34861) = (30660+34864)
0016	Mod : 28479 = 28702 = 28916 = (28479+34861) = (28479+34862)
0017	Mod : (23108+30748)+V2500 = (23109+30748)+V2500 = (23408+30748)+V2500
0018	Mod : 30363 = (28479+30363+34864)
0019	Mod : (28479+30363) = (28702+30363) = (28916+30363) = (28479+30363+34861) = (28479+30363+34862)
0020	Mod : 24105 = (24105+30660+34861) = (24105+30660+34864)
0021	Mod : (24105+30660) = (24105+30660+34862)
0022	Mod : 35311 = 36331 = 36854 = 36849 = 36932
0023	Mod : 22013 = (22013+31283+34861) = (22013+31283+34862) = (22013+31283+34864)
0025	Mod : STD = (33100+34856) = (33100+34898) = (33100+34997) = (32650+32651) = (33100+34856+32650+32651) = (33100+34898+32650+32651) = (33100+34997+32650+32651)
0026	Mod : 20268 = (20268+25800)
0027	Mod : 25720 = 26609 = (25720+26609)
0028	Mod : (26999+31283+35220) = (27646+31283+35220) = (30361+31283+35220) = (26999+27646+31283+35220)
0029	Mod : (20024+22013+24613+26017) = (20024+22013+24613+26017+25410)
0030	Mod : (22013+26999+31283+35220) = (22013+27646+31283+35220) = (22013+26999+27646+31283+35220)
0031	Mod : (22013+26999+30626+31283+35220+33100) = (22013+26999+27646+30626+31283+35220+33100)
0033	Mod : (26999+30626+31283+33300+35220) = (26999+30626+31283+33100+35220) = (26999+27646+30626+31283+33100+35220) = (26999+27646+30626+31283+33300+35220)
0034	Mod : (26999+31283+33100+35220) = (27646+31283+33100+35220) = (26999+27646+31283+33100+35220)
0035	Mod : (21678+24105) = (21678+26335+28160) = (21678+24105+32207+35100) = (21678+26335+28160+32207+35100)
0036	Mod : 21988 = (21988+22013) = (21988+24105)

CODE	DESIGNATION
0038	STD = (32619+28307) = (27725+32239)
0039	Mod : (20047+20063+20151+26723) = (20047+20063+20151+30277) = (20047+20063+20151+27763) = (20047+20063+26723+31112) = (20047+20063+20151+26723+27763)
0040	Mod : 25871 = 25887 = 25893 = 26149 = 26338 = 26608
0041	Mod : (20031+26723) = (20063+27639) = (20063+26723) = (20047+20063+27639) = (20047+20063+27410) = (20047+20063+26723) = (20047+20063+30277)
0042	Mod : (25871+30660) = (25887+30660) = (25893+30660) = (26149+30660) = (26338+30660) = (26608+30660)
0043	Mod : 26608 = (25357+26608) = (26149+26608) = (25357+25596+26608) = (25357+26149+26608) = (25596+26149+26608) = (25357+25596+26149+26608+IAE V2522 = V2524 = V2527 = V2527E = V2530 = V2533) = (25357+25596+26149+26608+27088+IAE V2522 = V2527 = V2527E = V2530 = V2533)
0044	Mod : 26149 = 26608 = (26149+26608)+IAE V2522 = V2524 = V2527 = V2527E = V2530 = V2533
0045	Mod : (33239+30660) = (32619+30660) = (34156+30660)
0046	Mod : 23661 = 24783 = (23661+24783)
0047	Mod : (20024+22013+26017) = (20024+22013+25410+26017)
0048	Mod : (23222+32929) = (26398+31896) = (26398+31897) = (26398+32475) = (26398+32929) = (26398+32402) = (26057+31896) = (23222+32475) = (23222+31896) = (23222+31897) = (26398+31896+32332+32475) = (26398+31897+32333+32929) = (23222+26398+31896) = (23222+26057+31897) = (23222+26398+31897) = (23222+26398+32475) = (23222+26398+32929) = (26057+26398+31897) = (23222+31897+32333+32929) = (23222+26057+26398+31897) = (23222+31896+32332+32475)
0049	(20057+20059) = (20057+20059+20082+20084+36856)
0052	Mod : (26497+32929) = (26497+32475) = (26497+31896+32402) = (26497+31897+32401) = (26497+31897+32929) = (26497+31897+32333+32929) = (26497+31896+32332+32475)
0053	Mod : 28479 = 28702 = 28916 = (28479+34861) = (28479+34862)
0054	Mod : 24349 = 24785 = 24852 = (23779+24349) = (23779+24785) = (23779+24852) = (23779+24349+24785) = (23779+24785+24852)
0056	Mod : (24511+28479) = (24511+28702) = (24511+28916) = (24511+28479+34861) = (24511+28479+34862)
0057	Mod : (20268+36297) = (20268+24946+26965+36297) = (20268+24946+27773+36297) = (20268+25951+26965+36297) = (20268+25951+27773+36297) = (20268+26760+26965+36297) = (20268+26760+27773+36297) = (20268+26965+32150+36297) = (20268+26965+32238+36297) = (20268+26965+32239+36297) = (20268+26965+32311+36297) = (20268+27773+32150+36297) = (20268+27773+32238+36297) = (20268+27773+32239+36297) = (20268+27773+32311+36297) = (20268+26965+35040+36297) = (20268+27773+35040+36297)
0058	Mod : (24511+26401) = (24511+26401+28479+34864)
0059	Mod : 35426 = (20141+20802+27112+35426)
0061	Mod : (23108+27276) = (23109+27276) = (23408+27276) = (23871+27276+CFM 56-5-A1 = A3) = (23109+23408+27276) = (23108+23109+23408+27276)
0062	Mod : (24511+26401+28479) = (24511+26401+28916) = (24511+26401+28479+34861) = (24511+26401=28479+34862)
0063	Mod : 22536 = 23227 = 23529 = (22536+23529)
0064	Mod : (21615+27942) = (20141+20802+21615+22269+23264+23900+27942)
0065	Mod : (23108+20139+27276) = (23109+20139+27276) = (23408+20139+27276)+V2500A1
0066	STD = Mod : (31283+34861) = (31283+34862) = (31283+34864)

CODE	DESIGNATION
0067	STD = Mod : (20024+22013) = (20024+22013+31283+34861) = (20024+22013+31283+34862) = (20024+22013+31283+34864)
0068	Mod : 20024 = (20024+31283+34861) = (20024+31283+34862) = (20024+31283+34864)
0069	Mod : (25800+36311) = (25800+36297) = (25800+36885)
0070	Mod : (20024+22013) = (20024+22013+31283+34861) = (20024+22013+31283+34862) = (20024+22013+31283+34864)
0071	Mod : (20268+36311) = (20268+36297) = (20268+36885)= (20268+25800+36311) = (20268+25800+36297) = (20268+25800+36885) = (20268+25530+26505+36311) = (20268+25530+26505+36297) = (20268+25530+26505+36885) = (20268+25800+25530+26505+36297) = (20268+25800+25530+26505+36885) = (20268+25800+25530+26505+36311)
0072	Mod : 36311 = 36885 = 36297 = (36311+31896) = (36885+31896) = (36297+31896) = (36311+32475) = (36885+32475) = (36297+32475) = (36311+31896+32332+32475) = (36885+31896+32332+32475) = (36297+31896+32332+32475)
0073	Mod : 22562 = 35864 = (22562+35864) = (22562+25888+27609)
0074	Mod : 22013 = (22013+31283+34861) = (22013+31283+34862) = (22013+31283+34864)
0075	CFM 56-5-B4 = IAE V2527 = V2527M = (23108 = 23109 = 23871+CFM 56-5-B4 = IAE V2527 = V2527E)
0076	Mod : (20139+23108) = (20139+23109) = (20139+23408)+V2500
0077	Mod : (25800+36311) = (25800+36297) = (25800+36885)
0078	Mod : (20024+22013) = (20024+22013+31283) = (20024+22013+31283+34861) = (20024+22013+31283+34862) = (20024+22013+31283+34864)
0079	Mod : 25590 = (25590+31283+34861) = (25590+31283+34862) = (25590+31283+34864)
0080	Mod : 24645 = (24645+28479+34864)
0081	Mod : (24645+28479) = (24645+28702) = (24645+28916) = (24645+28479+34861) = (24645+28479+34862)
0082	Mod : (20268+36311) = (20268+36297) = (20268+36885)= (20268+25800+36311) = (20268+25800+36297) = (20268+25800+36885) = (20268+25530+26505+36311) = (20268+25530+26505+36297) = (20268+25530+26505+36885) = (20268+25800+25530+26505+36297) = (20268+25800+25530+26505+36885) = (20268+25800+25530+26505+36311)

	CODE	DESIGNATION
	0083	Mod : (20268+36311) = (20268+24946+26965+36311) = (20268+24946+27773+36311) = (20268+25951+26965+36311) = (20268+25951+27773+36311) = (20268+26760+26965+36311) = (20268+26760+27773+36311) = (20268+26965+32150+36311) = (20268+26965+32238+36311) = (20268+26965+32239+36311) = (20268+26965+32311+36311) = (20268+27773+32150+36311) = (20268+27773+32238+36311) = (20268+27773+32239+36311) = (20268+27773+32311+36311) = (20268+26965+35040+36311) = (20268+27773+35040+36311) (20268+36297) = (20268+24946+26965+36297) = (20268+24946+27773+36297) = (20268+25951+26965+36297) = (20268+25951+27773+36297) = (20268+26760+26965+36297) = (20268+26760+27773+36297) = (20268+26965+32150+36297) = (20268+26965+32238+36297) = (20268+26965+32239+36297) = (20268+26965+32311+36297) = (20268+27773+32150+36297) = (20268+27773+32238+36297) = (20268+27773+32239+36297) = (20268+27773+32311+36297) = (20268+26965+35040+36297) = (20268+27773+35040+36297)" (20268+36885) = (20268+24946+26965+36885) = (20268+24946+27773+36885) = (20268+25951+26965+36885) = (20268+25951+27773+36885) = (20268+26760+26965+36885) = (20268+26760+27773+36885) = (20268+26965+32150+36885) = (20268+26965+32238+36885) = (20268+26965+32239+36885) = (20268+26965+32311+36885) = (20268+27773+32150+36885) = (20268+27773+32238+36885) = (20268+27773+32239+36885) = (20268+27773+32311+36885) = (20268+26965+35040+36885) = (20268+27773+35040+36885)
	0084	Mod: (24645+26925+28479) = (24645+28702+26925) = (24645+28916+26925) = (24645+26925+28479+34861) = (24645+26925+28479+34862)
R	0085	Mod : (36310+20268) = (36310+20268+25800)
R	0086	Mod : 22013=24105=28160=24701=(24701+28160+28917)
	0087	Mod : 27777 = (26608+27777) = (25357+26608+27777) = (26149+26608+27777) = (25357+25596+26149+27777) = (25357+25596+26608+27777) = (25357+26149+26608+27777) = (25596+26149+26608+27777) = (25357+25596+26149+26608+27777) = (25357+25596+26149+26608+27088+27777)+IAE V2522 = V2524 = V2527 = V2527E = V2527M = V2530 = V2533 = (25357+25596+26149+27088+27777)+IAE V2533
R	0088	Mod : (25800+36311) = (25800+36297) = (25800+36885)
	0089	Mod : 25888 = (22562+25888) = (25888+35864) = (22562+25072+25888)
	0090	Mod : 30660 = (28479+30660) = (30660+34862) = (28479+30660+34862)
	0091	Mod : 28479 = 28916 = (28479+34861)
	0092	Mod : (22013+28479) = (22013+28916) = (25951+28479) = (25951+28916) = (22013+28479+34861) = (22013+28479+34862) = (25951+28479+34861) = (25951+28479+34862)
	0093	STD = Mod : 25072 = (22562+25072) = (25888+27609)
	0094	Mod : 28479 = 28916 = (26017+28916) = (28160+28479+28917) = (28160+28916+28917) = (25410+26017+28916)+CFM
R R	0095	Mod : (20268+24917+56-5-B4) = (20268+24917+36311+56-5-B6) = (20268+24917+36885+56-5-B6) = (20268+24917+36297+56-5-B5)
	0096	STD = Mod : (22013+24044) = (25951+32239) = (31283+34864) = (22013+24044+31283+34864) = (25954+32239+31283+34864)
	0097	Mod : 22013 = 25951 = (22013+31283+34864) = (25951+31283+34864)
	0098	Mod : 28479 = 28702 = 28916 = 30660 = (31283+34861) = (31283+34862) = (28479+25951+32239) = (28702+25951+32239) = (28916+25951+32239) = (30660+25951+32239) = (28479+22013+24044) = (28702+22013+24044) = (28916+22013+24044) = (30660+22013+24044) = (25951+32239+31283+34861) = (25951+32239+31283+34862) = (22013+24044+31283+34861) = (22013+24044+31283+34862)

	CODE	DESIGNATION
R	0099	Mod: (20268+36311) = (20268+36297) = (20268+36885) = (20268+24946+26965+36311) = (20268+24946+27773+36311) = (20268+25951+26965+36311) = (20268+25951+27773+36311) = (20268+26760+26965+36311) = (20268+26760+27773+36311) = (20268+26965+32150+36311) = (20268+26965+32238+36311) = (20268+26965+32239+36311) = (20268+26965+32311+36311) = (20268+27773+32150+36311) = (20268+27773+32238+36311) = (20268+27773+32239+36311) = (20268+27773+32311+36311) = (20268+26965+35040+36311) = (20268+27773+35040+36311) = (20268+24946+26965+36297) = (20268+24946+27773+36297) = (20268+25951+26965+36297) = (20268+25951+27773+36297) = (20268+26760+26965+36297) = (20268+26760+27773+36297) = (20268+26965+32150+36297) = (20268+26965+32238+36297) = (20268+26965+32239+36297) = (20268+26965+32311+36297) = (20268+27773+32150+36297) = (20268+27773+32238+36297) = (20268+27773+32239+36297) = (20268+27773+32311+36297) = (20268+26965+35040+36297) = (20268+27773+35040+36297) = (20268+24946+26965+36885) = (20268+24946+27773+36885) = (20268+25951+26965+36885) = (20268+25951+27773+36885) = (20268+26760+26965+36885) = (20268+26760+27773+36885) = (20268+26965+32150+36885) = (20268+26965+32238+36885) = (20268+26965+32239+36885) = (20268+26965+32311+36885) = (20268+27773+32150+36885) = (20268+27773+32238+36885) = (20268+27773+32239+36885) = (20268+27773+32311+36885) = (20268+26965+35040+36885) = (20268+27773+35040+36885)
R	0100	Mod : (20268+36311) = (20268+36885) = (20268+36297) = (20268+25800+36311) = (20268+25800+36297) = (20268+25800+36885) = (20268+25530+26505+36311) = (20268+25800+25530+26505+36311) = (20268+25530+26505+36297) = (20268+25800+25530+26505+36297) = (20268+25530+26505+36885) = (20268+25800+25530+26505+36885)
	0101	Mod : 24511 = (24511+28479+34864)
R	0102	Mod : (36310+20268) = (36310+20268+25800)
R	0103	Mod : (22013+36310) = (22013+36310+25800)
R	0104	Mod : (20057+20059+20067+20069+20071+21708+35220)
	0105	Mod : 24871 = (24871+25410) = (24871+26017) = (24871+25410+26017)+IAE
	0106	Mod : 25410 = 26017 = (25410+26017)+CFM
	0107	STD = Mod : (22562+25072)+IAE V2522 = V2524 = V2527M
R	0109	Mod : (31896+36481/56-5-B4) = (32475+36481/56-5-B4) = (31896+33910/56-5-B5) = (32475+33910/56-5-B5) = (31896+36481/56-5-B6) = (32475+36481/56-5-B6) = (31896+36481/56-5-B7) = (32475+36481/56-5-B7) = (31896+36481/56-5-B9) = (32475+36481/56-5-B9) = (31896+32332+32475+36481/56-5-B4) = (31896+32332+32475+33910/56-5-B5) = (31896+32332+32475+36481/56-5-B6) = (31896+32332+32475+36481/56-5-B7) = (31896+32332+32475+36481/56-5-B9)
R	0110	Mod : (31896+36481) = (32475+36481) = (31896+32332+32475+36481)
	0111	Mod : (21678+21858) = (20117+21678+21858)
	0112	Mod : 22562 = 35864 = (22562+35864)
	0113	Mod : 26149 = 26608 = (26149+26608) = IAE V2522 = V2524 = V2527 = V2527E = V2527M = V2530 = V2533
	0114	Mod : (20024+24613+25410) = (20024+24105+24613+25410)
	0115	IAE V2500 = V2522 = V2524 = V2527 = V2527E = V2527M = (V2500 = V2522 = V2524 = V2527 = V2527E = V2527M+US) = (26346+IAE V2500 = V2524 = V2527 = V2527M)
	0117	STD = IAE = Mod : 26017 = (26017+IAE)
	0119	Mod : 33100 = 33300 = (33100+32650+32651) = (33300+32650+32651)
R	0120	Mod : (33909/V2522) = (35932/V2524) = (35932/V2527) = (35932/V2527E)
	0121	Mod : 25419 = 27992 = (27992+28377) = (25419+26963+27992)

	CODE	DESIGNATION
	0122	Mod : (22249+24215+24588+25529) = (22249+24215+24588+26117) = (22249+24215+24588+26270) = (22249+24215+24588+26117+26270)
	0123	Mod : 25888 = (25888+35864) = (22562+25072+25888)
R	0124	Mod : (26284+30206) = (26285+30206) = (26284+36136) = (26285+36136)
	0125	Mod : (22562+24105) = (24105+35864) = (24105+22562+35864)
	0126	Mod : 30660 = (25888+30660) = (25888+30660+34862) = (25888+30660+35864)
	0127	Mod : 30660 = (22562+30660) = (25888+30660) = (30660+35864) = (22562+30660+34862) = (25888+30660+34862) = (25888+30660+35864)
	0128	Mod : 22013 = (22013+27846) = (22013+28960) = (22013+28479) = (22013+28916) = (22013+28479+28960) = (22013+27846+28916)
	0130	Mod : (28160+30660) = (25888+28160+30660) = (25888+28160+30660+35864)
	0131	Mod : (22562+30660) = (30660+35864) = (22562+30660+34862) = (22562+30660+35864)
	0132	Mod : (25888+30660) = (25888+34862+30660) = (25888+30660+35864)
R	0133	Mod : 25404 = (25404+30660+34861) = (25404+30660+34864)
R	0134	Mod : 30660 = (30660+27725+33239) = (30660+28307+32619)
R	0135	Mod : (28307+30660) = (27725+30660)
R	0136	Mod : (28307+32619) = (27725+33239)
	0137	Mod : 20063 = (20031+20047) = (20047+20063)
R	0138	Mod : (23672+26284+30206) = (23672+26285+30206) = (23672+26284+36136)
R	0139	Mod : 22013+27276+30748+33323+34540
	0140	Mod : 22562 = (22562+31495+35270) = (20063+22562+31495+35270) = (20063+22562) = (20151+22562) = (20063+20151+22562) = (20063+31495+35270+35864) = (20063+20151+31495+35270+35864) = (20063+22562+31495+35270+35864)
	0141	Mod : (20063+22562+31495) = (20063+31495+35864) = (20063+22562+31495+35864)
	0142	Mod : (22562+31112+31495) = (20151+22562+31495) = (22562+31495+23092) = (20063+20151+22562+31495) = (20063+22562+31112+31495) = (20063+20151+31495+35864) = (20063+31115+31495+35864) = (20063+20151+22562+31495+35864) = (20063+22562+31112+31495+35864)
	0143	Mod : 21054 = (21054+25199) = (21054+25200)
R	0144	Mod : 22013+27276+30748+34540
R	0145	Mod : 22013+27276+33323+34540
R	0146	Mod : 34637 = (26526+34637) = (26526+27046+31375+34637) = (26526+31375+34637+36720)
R	0148	STD = Mod : 25072 = 27609 = (22562+25072) = (25888+27609) = (22562+25072+28897)
R	0149	Mod : 25615 = (25615+25888+27609) = (22562+25072+25615+28897)
R	0150	Mod : 35864 = (22562+28897) = (30784+35864) = (22562+25888+27609+28897)
R	0151	Mod : 25888 = (22562+25888) = (25072+25888) = (25888+30784) = (25888+35864) = (22562+25072+25888) = (25888+30784+35864) = (25615+25888+35864)
	0152	Mod : STD = (20056+33129) = (20056+34664)
	0153	Mod : STD = 22190 = 34664 = (20056+22190) = (20056+33129) = (30626+35110) = (20056+34664)
	0154	Mod : 30626 = (20056+30626+33129) = (20056+30626+34664)
	0156	Mod : 25863 = (25863+28551+34195)
	0157	Mod : (25863+ACA) = (25863+28551+34195+ACA)
	0158	Mod : 25863 = (25863+ACA) = (25863+28551+34195) = (25863+28551+34195+ACA)
	0161	Mod : (31106+32238) = (31106+32311) = (24946+27773) = (31106+32238+32311) = (23871+31106+32311)

	CODE	DESIGNATION
R	0164	Mod : (25615+35864) = (22562+25615+28897) = (22562+25615+25888+27609+28897)
	0165	Mod : (24105+27276) = (24105+31395) = (26334+27276) = (26334+31395) = (26335+27276) = (26335+31395) = (24105+27276+31395) = (26334+27276+31395) = (26335+27276+31395) = (24105+27276+30977+31395+32207+35100) = (26335+27276+30977+31395+32207+35100)
	0166	STD = Mod : (22013+33879) = (22013+30977) = (24105+33879) = (24105+30977) = (30977+35100)
	0167	Mod : 30020 = 30977 = 33879 = (24105+30020+30977)
R	0169	Mod : (20059+20067+20069+20071+30020+30354+31283+35220+36847)
	0170	STD = Mod : 24588 = 35216 = 36368 = (24215+24588) = (26925+35216) = (26925+36368) = (24215+24588+26925+36368) = (24215+24588+26925+35216)
	0171	Mod : 32088 = 32090 = (24588+32088) = (24588+32090) = (32088+32090) = (32088+35216) = (32090+35216) = (32088+36368) = (32090+36368) = (24215+24588+32088) = (24215+24588+32090) = (24588+32088+32090) = (26925+32090+36368) = (32088+26925+35216) = (26925+32090+35216) = (26925+32088+36368) = (24215+24588+32088+32090) = (24215+24588+26925+32088+32090+35216) = (24215+24588+26925+32088+32090+36368)
	0172	Mod : 28258 = 30470 = 26438 = 27624 = 23888 = 25829 = 32015 = 34330 = 34331 = 34332 = 34333 = 34334 = 35436 = (34330+34332) = (27624+28258) = (27624+30470)
R	0173	STD = (22013+23219+23672) = (23672+24105+25294) = (23672+24105+25294+27620+33497)
R	0174	Mod : 27620 = (22013+23219+23672+27620) = (23672+24105+25294+27620)
	0175	Mod : (20406+24035) = (20406+24211) = (20406+24035+33253) = (20406+24035+34660)
R	0176	Mod : (27620+34637) = (22013+23219+23672+27620+34367) = (23672+24105+25294+27620+34637)
R	0177	Mod : 34637 = (22013+23219+23672+34637) = (23672+24105+25294+34637)
	0179	Mod : (30020+26925) = (24105+26925+30020)
R	0180	Mod : 25108 = 35793 = (22013+23672) = (23672+24105) = (24581+36529) = (24785+36529) = (25108+30020) = (22013+23219+36529) =(24105+25294+36529) = (24105+25108+30020) = (24581+30020+36529) = (24785+30020+36529) = (23672+24105+27620+33497) = (22013+23219+23672+35793) = (22013+23219+23672+36529) = (23672+24105+25294+35793) = (23672+24105+25294+36529)
R	0181	Mod : (25108+27620) = (35793+27620) = (22013+23672+27620) = (23672+24105+27620) = (24581+36529+27620) = (24785+36529+27620) = (25108+30020+27620) = (22013+23219+36529+27620) = (24105+25294+36529+27620) = (24105+25108+30020+27620) = (24581+30020+36529+27620) = (24785+30020+36529+27620) = (22013+23219+23672+35793+27620) = (22013+23219+23672+36529+27620) = (23672+24105+25294+35793+27620) = (23672+24105+25294+36529+27620)
	0182	Mod : 35220 = (28479+31283+35220)
	0183	Mod : 24105 = (24105+27846) = (24105+27846+28916) = (24105+27846+28479) = (24105+27846+28702)
R	0184	Mod : (25108+34637) = (35793+34637) = (22013+23672+34637) = (23672+24105+34637) = (24581+36529+34637) = (24785+36529+34637) = (25108+30020+34637) = (22013+23219+36529+34637) = (24105+25294+36529+34637) = (24105+25108+30020+34637) = (24581+30020+36529+34637) = (24785+30020+36529+34637) = (22013+23219+23672+35793+34637) = (22013+23219+23672+36529+34637) = (23672+24105+25294+35793+34637) = (23672+24105+25294+36529+34637)

	CODE	DESIGNATION
R	0185	Mod : (25108+34637+27620) = (35793+34637+27620) = (22013+23672+34637+27620) = (23672+24105+34637+27620) = (24581+36529+34637+27620) = (24785+36529+34637+27620) = (25108+30020+34637+27620) = (22013+23219+36529+34637+27620) = (24105+25294+36529+34637+27620) = (24105+25108+30020+34637+27620) = (24581+30020+36529+34637+27620) = (24785+30020+36529+34637+27620) = (22013+23219+23672+35793+34637+27620) = (22013+23219+23672+36529+34637+27620) = (23672+24105+25294+35793+34637+27620) = (23672+24105+25294+36529+34637+27620)
R	0186	Mod : (26526+35220+35485) = (34637+35220+35485)
R	0187	Mod : (26526+30020+35220+35485) = (30020+34637+35220+35485)
	0188	STD = Mod : 20062+22188
	0189	Mod : 24035 = 24160 = 24211 = (24035+24211)
R	0190	Mod : (30368+32205+33125+35220) = (32205+33125+35220+35485)
R	0191	Mod : (32205+33125+35220+35485) = (30368+32205+33125+35220)
	0192	Mod : (25205+35871) = (23885+35871) = (26999+35871) = (28382+35871) = (30241+35871) = (26485+35871) = (30631+35871) = (26999+28382+28495+35871) = (25205+28495+26999+35871) = (25205+20268+35871) = (23885+20268+35871) = (26999+20268+35871) = (28382+20268+35871) = (28382+20268+35871) = (30241+20268+35871) = (26485+20268+35871) = (30631+20268+35871) = (26999+28382+28495+20268+35871) = (25205+26999+28495+20268+35871) = (20268+31701+25205+35871) = (20268+31701+23885+35871) = (20268+31701+26999+35871) = (20268+31701+28382+35871) = (20268+31701+30241+35871) = (20268+31701+30631+35871) = (20268+31701+26999+28382+28495+35871) = (20268+31701+25205+26999+28495+35871) = (20268+34818+25205+35871) = (20268+34818+23885+35871) = (20268+34818+26999+35871) = (20268+34818+28382+35871) = (20268+34818+30241+35871) = (20268+34818+26485+35871) = (20268+34818+30631+35871) = (20268+34818+26999+28382+28495+35871) = (20268+34818+25205+26999+28495+35871)
	0193	Mod : 26851 = (25529+26185) = (25529+26208) = (25529+26345) = (25529+26851)
R	0194	Mod : (32205+33125+35220+35485+35871) = (30368+32205+33125+35220+35871)
R	0195	Mod : (24105+31283+36847) = (30020+31283+36847)
	0196	Mod : (25205+35871) = (23885+35871) = (26999+35871) = (28382+35871) = (30241+35871) = (26485+35871) = (30631+35871) = (26999+28382+28495+35871) = (25205+26999+28495+35871)
	0197	Mod : 35871 = (20268+35871) = (20268+31701+35871) = (20268+34818+35871)
R	0198	Mod : (22249+25529+30020+36847+31283) = (22249+26270+36847+30020+31283)
	0199	Mod : 22013 = 24105 = 28160 = 24701 = (24701+28160+28917)
	0200	Mod : (21678+26485+27620+26925) = (21678+26999+27620+26925) = (21678+27620+27646+26925) = (21678+27620+30631+26925) = (21678+27620+30635+26925)
R	0201	Mod : (22249+25529+31283+24105+36847) = (22249+26270+31283+24105+36847) = (22249+25529+26117+31283+24105+36847) = (22249+26117+26270+31283+24105+36847) = (22249+25529+31283+24105+36847)
	0202	Mod : (21678+26485+26925) = (21678+26999+26925) = (21678+27646+26925) = (21678+30631+26925) = (21678+30635+26925) = (21678+26999+33497+26925) = (21678+26999+27620+33497+26925) = (21678+26999+27646+33497+26925)
	0203	Mod : 20268/B4 = (20268+36611/B6) = (20268+26999+28495/B4) = (20268+26999+28495+36311/B6)
	0204	Mod : (26526+35871) = (26526+31283+35871) = (26526+30660+31283+35871)
	0205	Mod : 26876 = 26877 = 27698 = 27740 = 27753 = 28739 = 30163 = 28738 = 31001 = 31699

	CODE	DESIGNATION
R	0206	Mod : (22249+24105+26117+26728+31283+34041+36847) = (22249+30020+26117+26728+31283+34041+36847) = (22249+24105+26270+31283+34041+36847) = (22249+30020+26270+31283+34041+36847)
R	0207	Mod : 36609 = 36772 = 36562 = (22013+30096+34313+36562) = (22013+30096+34809+36772) = (24105+30096+34313+36562) = (24105+30096+34809+36772)
R	0208	Mod : 34313 = 34809 = (24105+30096+34313) = (24105+30096+34809) = (22013+30096+34313) = (22013+30096+34809)
	0209	Mod : 35871 = (35871+31105+35220) = (35871+31070+35220) = (35871+31105+34041+35220) = (35871+31070+34041+35220) = (30020+35871+31105+35220) = (35871+30020+31070+35220)
	0210	Mod : (23219+30206) = (23672+30206) = (24579+30206) = (24581+30206) = (23219+23672+30206) = (23219+23672+24579+30206)
	0211	Mod : (25205+20268/B4) = (23885+20268/B4) = (26999+20268/B4) = (28382+20268/B4) = (30241+20268/B4) = (26485+20268/B4) = (30631+20268/B4) = (25205+20268+36311/B6) = (23885+20268+36311/B6) = (26999+20268+36311/B6) = (28382+20268+36311/B6) = (30241+20268+36311/B6) = (26485+20268+36311/B6) = (30631+20268+36311/B6) = (26999+28382+28495+20268/B4) = (25205+26999+28495+20268/B4) = (26999+28382+28495+20268+36311/B6) = (25505+26999+28495+20268+36311/B6)
	0213	Mod : 23219 = 23672 = 24579 = 24581 = (23219+23672) = (23219+23672+24579)
	0214	Mod : (20268/B4) = (20268+36311/B6)
	0215	"Mod : (20268+36311) = (20268+24946+26965+36311) = (20268+24946+27773+36311) = (20268+25951+26965+36311) = (20268+25951+27773+36311) = (20268+26760+26965+36311) = (20268+26760+27773+36311) = (20268+26965+32150+36311) = (20268+26965+32238+36311) = (20268+26965+32239+36311) = (20268+26965+32311+36311) = (20268+27773+32150+36311) = (20268+27773+32238+36311) = (20268+27773+32239+36311) = (20268+27773+32311+36311) = (20268+26965+35040+36311) = (20268+27773+35040+36311) "
	0216	Mod : (20268+36311) = (20268+25800+36311) = (20268+25530+26505+36311) = (20268+25800+25530+26505+36311)
	0219	Mod : (25615+27276) = (23108+25615+27276)
	0220	Mod : (27276+30748) = ((23108+27276+30748)+2527ea5)
	0221	Mod : (23672+26284) = (23672+26285) = (23219+23672+24579+26285)
	0222	STD = Mod : 20067+20069+20071+28474+28478
	0225	Mod : (20268/B4) = (20268+36311/B6)
R	0226	Mod : (30020+31283) = (30020+33374+37127) = (26728+28479+30020+31283+33374+37127)
R	0228	Mod : 28479 = (26728+28479) = (33374+37127) = (26728+28479+31283+33374+37127)
	0229	Mod : (25615+27276+30748) = (23108+25615+27276+30748)
	0230	STD = Mod : (22553+22889+25081+CFM 56-5-A1 = A3) = (22553+22889+25138+CFM 56-5-A1 = A3) = (22553+22889+25411+CFM 56-5-A1 = A3) = (22553+22889+26577+CFM)
R	0231	Mod : (33374+37128) = (26728+28479+31283+33374+37128)
	0232	STD = Mod : 25410 = 26017 = (25410+26017)
R	0233	Mod : 24498 = 24642 = 25568 = 25888 = 28651
	0234	Mod : (20067+20069) = (20067+20069+31283+34861) = (20067+20069+31283+34862) = (20067+20069+31283+33100+34856) = (20067+20069+31283+33100+34898) = (20067+20069+31283+33100+34997)
	0235	Mod : (21678+21858) = (20117+21678+21858)

	CODE	DESIGNATION
	0236	Mod : 28479 = 28916 = (26017+28479) = (26017+28916)
	0238	STD = Mod : (28160+28413) = (28160+28917) = (28160+28413+28917)
R	0239	Mod : (24498+30051) = (24642+30051) = (25568+30051) = (25888+30051) = (28651+30051)
R	0240	Mod : (36847/56-5-B5) = (26017+36847/56-5-A4/A5/B5/B7/B8) = (24105+36847/56-5-B6/IAE) = (24105+26017+36847/56-5-B6/IEA)
R	0241	Mod : (36847/56-5-B4/B6/IAE) = (26017+36847/56-5-A1/A3/B4/B6/IAE)
	0242	Mod : (24105+25615+27276+28162) = (24105+25615+27276+28162+30748)
R	0243	Mod : (34041+36847) = (20268+34041+36847)
	0244	Mod : (22013+28479+28721+30439) = (22013+28479+28960+30439) = (22013+28479+30439+32011) = (22013+28479+30439+32456) = (22013+27846+28721+28916+30439) = (22013+27846+28479+28960+30439) = (22013+28479+28721+30439+32011) = (22013+27846+28479+28721+30439+32011)
	0245	Mod : (24105+27276+30748+34540)
	0247	Mod : (20059+20084) = (30020+30066) = (20057+20059+20084)
	0248	Mod : 24035 = 24160 = 24189 = (24035+24612) = (24160+24612) = (24189+24612)
	0251	Mod : 24064 = 24065 = 24066 = 24067 = (24064+26346+US) = (24065+26346+US) = (24066+26346+US) = (24067+26346+US)
R	0255	Mod : 36847 = (28160+28917+36847)
	0256	Mod : (20067+20069+35220) = (20067+20069+31283+35220)
	0258	STD = Mod : (22013+25199) = (22013+25200)
	0259	Mod : (20059+20067+20069+35220) = (20059+20067+20069+31283+35220)
	0260	STD = Mod : 25072 = (22562+25072) = (25888+27609)+IAE V2522 = V2524 = V2527 = V2527E = V2527M = V2530 = V2533
	0261	Mod : (21533+23222) = (21533+26057) = (21533+23222+26057)
	0262	Mod : (20057+20067+35220+20069) = (20057+20067+20069+31283+35220)
	0263	Mod : (20067+20069+33100+35220) = (20067+20069+31283+33100+35220)
	0264	Mod : 27698 = 27740 = 27753 = 28739 = 30163 = 28738 = 31001 = 26877 = 26876 = 31699 = (22536+27698) = (22536+27740) = (22536+30163) = (23227+27740) = (23227+28738) = (23227+28739) = (23529+26877) = (23529+27698) = (23529+27740) = (23529+27753) = (23529+31699) = (23227+27698+30163) = (23529+26877+31699)
R	0267	Mod : (28160+36847) = (22562+25072+28160+36847)
	0268	Mod : (20059+20067+20069+35220+33100) = (20069+20067+20059+31283+35220+33100)
R	0269	Mod : 36847+(V2522 = V2524 = V2527M = 56-5-A1 = 56-5-A3 = 56-5-A4 = 56-5-A5 = 56-5-B4 = 56-5-B5 = 56-5-B6 = 56-5-B7)
R	0270	Mod : ((20343+36847) = (31276+36847) = (20343+27498+36847) = (27498+31276+36847)) + (V2522 = V2524 = V2527M = 56-5-A1 = 56-5-A3 = 56-5-A4 = 56-5-A5 = 56-5-B4 = 56-5-B5 = 56-5-B6 = 56-5-B7)
R	0271	Mod : (20343+36847) = (31276+36847) = (20343+27498+36847) = (27498+31276+36847)
R	0272	Mod : (22013+36847) + (V2530 = V2533 = 56-5-B1 = 56-5-B2 = 56-5-B3)
	0273	Mod : 25357 = 25596 = (25357+25596)+IAE V2522 = V2524 = V2527 = V2527E = V2530 = V2533
	0274	Mod : 26149 = (25357+26149) = (25596+26149) = (25357+25596+26149)+IAE V2522 = V2524 = V2527 = V2527E = V2530 = V2533
R	0275	Mod : (27498+36847) + (V2522 = V2524 = V2527M = 56-5-A1 = 56-5-A3 = 56-5-A4 = 56-5-A5 = 56-5-B4 = 56-5-B5 = 56-5-B6 = 56-5-B7)
	0276	STD = Mod : 28479 = 28916 =27846 = (27846+28479) = (27846+28916)
R	0277	Mod : (27498+36847) + (V2500 = V2527 = V2527E)

	CODE	DESIGNATION
R	0278	Mod : ((20343+22013+36847) = (22013+31276+36847) = (20343+22013+27498+36847) = (22013+27498+31276+36847)) + (V2530 = V2533 = 56-5-B1 = 56-5-B2 = 56-5-B3)
R	0279	Mod : (22013+27498+36847) + (V2530 = V2533 = 56-5-B1 = 56-5-B2 = 56-5-B3)
R	0280	Mod : ((24035 = 24160 = 24211 = (24035+24211)) + CFM) = (24035+PW)
	0281	Mod : (20067+20069+20071+35220) = (20067+20069+20071+33100+34997+35220) = (20067+20069+20071+31283+34861+35220) = (20067+20069+20071+31283+34862+35220)
	0282	Mod : (20059+20067+20069+20071+35220) = (20067+20069+20071+35236+35220) = (20059+20067+20069+20816+27063+35220) = (20059+20067+20069+20071+32146+35220) = (20059+20067+20069+20071+33100+34856+35220) = (20059+20067+20069+20071+33100+34898+35220) = (20059+20067+20069+20071+31283+34862+35220)
	0283	Mod : (20067+20069+20071+21708+35220) = (20067+20069+20816+21708+27063+35220) = (20067+20069+20071+21708+33100+34856+35220) = (20067+20069+20071+21708+31283+34861+35220) = (20067+20069+20071+21708+31283+34862+35220)
	0284	Mod : (20057+20067+20069+20071+35220) = (20057+20067+20069+20816+27063+35220)
R	0285	Mod : (22013+36847/56-5-B1/B2/B3/IAE) = (22013+26017+36847/56-5-B1/B2//B3/IAE)
	0286	Mod : (20057+20059+20067+20069+20071+35220) = (20057+20059+20067+20069+20071+32146+35220) = (20057+20059+20067+20069+20816+27063+35220) = (20057+20059+20067+20069+20071+31283+34864+35220) = (20057+20059+20067+20069+20071+31283+34862+35220)
R	0287	Mod : (36847/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+28160/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36487+30660/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+25888/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+28160+30660/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+22562+28160/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+25888+28160/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+25888+30660/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+28160+28917/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+22562+30660/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+30660+35864/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+25888+28160+28917/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+25888+30660+34862/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+25888+30660+35864/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+22562+30660+34862/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+25888+28160+30660/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+25888+30660+34861/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+25888+30660+34864/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+22562+28160+30660+34861/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+22562+28160+30660+34864/56-5-B1/B2/B3/B4/B5/B6/B7/B8) = (36847+25888+28160+30660+35864/56-5-B1/B2/B3/B4/B5/B6/B7/B8)
	0288	Mod : (20059+20067+20069+20071+21708+35220) = (20059+20067+20069+20816+21708+27063+35220) = (20059+20067+20069+20071+21708+33100+34856+35220) = (20059+20067+20069+20071+21708+31283+33100+34856+34862+35220)
	0289	Mod : (20059+20067+20069+20071+30020+35220) = (20269+20067+20069+20071+30354+31283+35220) = (20059+20067+20069+20071+33100+31283+35220)

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R	0290	Mod : (36847/56-5-A1/A3/A4/A5/IAE) = (36847+25072/56-5-A1/A3/A4/A5/IAE) = (36847+30660/56-5-A1/A3/A4/A5/IAE) = (36847+28160/56-5-A1/A3/A4/A5/IAE) = (36847+22562/56-5-A1/A3/A4/A5/IAE) = (36847+25888/56-5-A1/A3/A4/A5/IAE) = (36847+35864/56-5-A1/A3/A4/A5/IAE) = (36847+25888+30660/56-5-A1/A3/A4/A5/IAE) = (36847+22562+28160/56-5-A1/A3/A4/A5/IAE) = (36847+28160+30660/56-5-A1/A3/A4/A5/IAE) = (36847+25888+28160/56-5-A1/A3/A4/A5/IAE) = (36847+28160+28917/56-5-A1/A3/A4/A5/IAE) = (36847+30660+34862/56-5-A1/A3/A4/A5/IAE) = (36847+22562+30660/56-5-A1/A3/A4/A5/IAE) = (36847+30660+35864/56-5-A1/A3/A4/A5/IAE) = (36847+22562+25072/56-5-A1/A3/A4/A5/IAE) = (36847+22562+35864/56-5-A1/A3/A4/A5/IAE) = (36847+28160+28917+30660/56-5-A1/A3/A4/A5/IAE) = (36847+25888+28160+28917/56-5-A1/A3/A4/A5/IAE) = (36847+25888+30660+34862/56-5-A1/A3/A4/A5/IAE) = (36847+25888+30660+35864/56-5-A1/A3/A4/A5/IAE) = (36847+22562+25072+28160/56-5-A1/A3/A4/A5/IAE) = (36847+28160+30660+34861/56-5-A1/A3/A4/A5/IAE) = (36847+28160+30660+34864/56-5-A1/A3/A4/A5/IAE) = (36847+25888+28160+30660/56-5-A1/A3/A4/A5/IAE) = (36847+22562+30660+34862/56-5-A1/A3/A4/A5/IAE) = (36847+22562+30660+35864/56-5-A1/A3/A4/A5/IAE) = (36847+22562+30660+34861/56-5-A1/A3/A4/A5/IAE) = (36847+25888+30660+34861/56-5-A1/A3/A4/A5/IAE) = (36847+25888+30660+34864/56-5-A1/A3/A4/A5/IAE) = (36847+22562+30660+34864/56-5-A1/A3/A4/A5/IAE) = (36847+22562+25072+28160/56-5-A1/A3/A4/A5/IAE) = (36847+28160+30660+34862/56-5-A1/A3/A4/A5/IAE) = (36847+22562+28160+30660/56-5-A1/A3/A4/A5/IAE) = (36847+22562+28160+28917/56-5-A1/A3/A4/A5/IAE) = (36847+25888+28160+30660/56-5-A1/A3/A4/A5/IAE) = (36847+25072+28160+28917/56-5-A1/A3/A4/A5/IAE) = (36847+25888+28160+28917/56-5-A1/A3/A4/A5/IAE)= (36847+22562+25072+28160+30660/56-5-A1/A3/A4/A5/IAE) = (36847+22562+28160+30660+34861/56-5-A1/A3/A4/A5/IAE) = (36847+22562+28160+30660+34864/56-5-A1/A3/A4/A5/IAE) = (36847+22562+28160+28917+30660/56-5-A1/A3/A4/A5/IAE) = (36847+25888+28160+28917+30660/56-5-A1/A3/A4/A5/IAE) = (36847+28160+28917+30660+34862/56-5-A1/A3/A4/A5/IAE) = (36847+25888+28160+30660+35864/56-5-A1/A3/A4/A5/IAE) = (36847+25888+28160+30660+34861/56-5-A1/A3/A4/A5/IAE) = (36847+25888+28160+30660+34864/56-5-A1/A3/A4/A5/IAE) = (36847+22562+25072+28160+28917/56-5-A1/A3/A4/A5/IAE) = (36847+25888+28160+30660+34862/56-5-A1/A3/A4/A5/IAE) = (36847+22562+25072+28160+28917/56-5-A1/A3/A4/A5/IAE)
R	0291	Mod : 36847 = (V2522 = V2524 = V2527MA5 = 56-5-A4 = 56-5-A5 = 56-5-B5 = 56-5-B6 = 56-5-B7)
	0293	Mod : 30470 = 35436 = (27624+28258) = (27624+30470)
	0294	STD = Mod : 23450 = 24588 = (20406+23450) = (23450+24588) = (20406+23450+24588) = (20406+23450+24588+28916)
R	0296	Mod : (36847+56-5-A1/A3/B4) = (36847+36311+56-5-B6)
	0297	Mod : (22706+30365+P8232+33907+31283) = (22706+30365+P8175+P8232+33907+31283)
	0298	Mod : 20057 = 20059 = (31276+32013+20057) = (31276+32013+20059)
	0299	Mod : 27140 = (27140+33100+34997) = (27140+32650+32651) = (27140+32650+32651+34898) = (27140+32650+32651+34856) = (27140+32650+32651+33100+34856) = (27140+32650+32651+33100+34898)

	CODE	DESIGNATION
	0301	Mod : (27140+32650) = (27140+32650+34898) = (27140+32650+34856) = (27140+32650+33100+34856) = (27140+32650+33100+34898)
R	0302	Mod : (22013+36847) = (V2530=V2533 = 56-5-B1 = 56-5-B2 = 56-5-B3)
	0303	Mod : (20047+20151) = (20047+23092) = (20063+20151) = (20047+20063+20151) = (20047+20063+23092) = (20047+20063+31112) = (20063+31112)
	0304	Mod : (24105+27276+30748+33323) = (22013+27276+30748+33323) = (22013+27276+30748+33323+56-5-B3) = (22013+27276+30748+33323+IAEEng:V2533)
R	0305	Mod : (28160+36847+25888) = (22562+25072+25888+28160+36847)
R	0306	Mod : 36847 = (36847+22562+25072)
R	0307	Mod : (20343+22013+36847) = (31276+22013+36847)
R	0308	Mod : 36847 = (20246+20510+36847) = (20246+20510+35220+36847)
	0310	Mod : (22249+26270+31283+34041) = (22249+26117+26728+31283+34041)
R	0312	Mod : (21678+36847) = (21678+28160+28917+36847)
R	0313	Mod : 36847 = (28160+28917+36847)
R	0314	Mod : 21678 = (21678+28160+28917)
	0315	Mod : 22013 = 24105 = 34041 = (23893+25225+34041) = AUA
R	0316	Mod : (24105+30020) = (21678+24105+30020) = (24105+30020+36847)
	0317	Mod : 25241 = 25242 = (25241+25242)
R	0318	Mod : 22013 = 24105 = 28160 = (21678+22013) = (21678+24105) = (21678+28160) = (21678+28160+36847)
	0319	STD = Mod : 25072 = 27609 = (22562+25072) = (25888+27609)
	0321	Mod : (26149+27777) = (26149+26608+27777)
	0322	Mod : 30660 = (26728+28479+30660) = (26728+28479+30660+31283)
	0323	Mod : (30020+32088) = (30020+32090) = (24105+30020+32088+32090)
R	0326	Mod : (32619+36847) = (33239+36847) = (34156+36847)
	0327	Mod : (20024+24613+26017) = (20024+24613+25410+26017)
R	0329	Mod : 36847 = (27725+32239+36847) = (28307+32619+36847)
	0333	STD = Mod : (20024+22013) = (20024+22013+US)
R	0334	Mod : (31283+34861) = (31283+34862) = (31283+34864)
	0335	Mod : (24511+28479+31283+34041) = (24511+28916+31283+34041) = (24511+28479+31283+34041+34861) = (24511+28479+31283+34041+34862)
R	0340	Mod : 36847 = (31283+35220+36847)
	0348	Mod : (20268+22461) = (20268+23408) = (20268+22461+23408)
	0349	Mod : 23108 = 23109 = 23408 = (23109+23408) = (23108+23109+23408)
	0350	Mod : (21678+25410) = (21678+26017) = (21678+25410+26017)
	0360	Mod : (22013+23698) = (22013+23698+23699)
	0362	Mod : (23222+CFM 56-5-B4 = IAE V2527) = (22013+26057) = (23222+23871) = (23222+24105) = (24105+26057) = (22013+23222+26057) = (23222+24105+32207+V2527MA5) = (22013+26057+32207) = (23108+23222+32207) = (23222+24105+32207) = (23222+24105+56-5-a5) = (23222+23871+56-5-a1) = (23222+23871+56-5-a3) = (23222+32207+(56-5-b4=V2527A5)) = (23108+23222)
	0363	Mod : (23222+24105+25615+V2527MA5) = (23222+24105+25615+CFM56-5-B7) = (23108+23222+24105+25615+32207+56-5-B7)
	0364	Mod : (20268+24917+56-5-B4) = (20268+24917+36311+56-5-B6)
	0365	Mod : (20268+24404) = (20268+24404+25800) = (20268+25800+27727) = (20268+24404+25800+27727)
	0366	Mod : 20268 = (20268+25800) = (20268+24404+25502) = (20268+24404+25502+25800)

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R	0367	Mod : (20268+36297) = (20268+24946+26965+36297) = (20268+24946+27773+36297) = (20268+25951+26965+36297) = (20268+25951+27773+36297) = (20268+26760+26965+36297) = (20268+26760+27773+36297) = (20268+26965+32150+36297) = (20268+26965+32238+36297) = (20268+26965+32239+36297) = (20268+26965+32311+36297) = (20268+27773+32150+36297) = (20268+27773+32238+36297) = (20268+27773+32239+36297) = (20268+27773+32311+36297) = (20268+26965+35040+36297) = (20268+27773+35040+36297)
	0370	Mod : 20268 = (20268+25800) = (20268+24405+25501) = (20268+24405+25501+25800)
	0376	Mod : 22562 = 35864 = (22562+35864) = (22562+25888+27609)
	0377	Mod : 25888 = (22562+25888) = (25888+35864) = (25888+22562+25072)
	0378	Mod : 20268 = (20268+25800)
	0379	Mod : (20268+24405) = (20268+24405+25800) = (20268+25800+27727) = (20268+24405+25800+27727)
	0380	Mod : (20268+25530) = (20268+25530+25800) = (20268+25800+27727) = (20268+25530+25800+27727)
R	0381	Mod : 22562 = 25888 = 35864 = (22562+35864) = (22562+28160+28917) = (25888+28160+28917) = (22562+30660+34861) = (22562+30660+34864) = (25888+30660+34861) = (25888+30660+34864) = (22562+25072+25888)
	0382	Mod : 30660 = (28160+28917+30660) = (28160+28917+30660+34862) = (25888+28160+28917+30660) = (22562+28160+28917+30660)
	0383	Mod : 28160 = (22562+28160) = (25888+28160) = (22562+28160+30660+34861) = (22562+28160+30660+34864)
	0384	Mod : (28160+30660) = (28160+30660+34862) = (22562+25072+28160+30660)
	0385	Mod : (22562+30660) = (30660+35864) = (22562+34862+30660) = (22562+30660+35864)
R	0386	Mod : 36847 = (V2522 = V2524 = V2527 = V2527E = V2527MA5 = V2500 = 56-5-A1 = 56-5-A3
	0387	STD = Mod : (28160+28917) = (25888+28160+28917)
	0388	Mod : 24404 = 24405 = 25416 = 25530 = (24404+25416) + (24405+25416)
	0389	Mod : (23119+31283) = (22013+24044+31283) = (23119+30660+31283)
R	0390	Mod : (36847+56-5-A1/A3/B4) = (36311+36847+56-5-B6) = (28160+28917+36847+56-5-A1/A3/B4) = (36311+28160+28917+36847+56-5-B6) = (22562+36847+V2500A1) = (22562+28160+28917+36847+V2500A1)
	0391	Mod : (25240+28238) = (25274+28238) = (28238+28711)
	0392	Mod : 23108 = 23109 = 23408 = 23871 = 24105 = (P0164+27522+28360+31371)
	0393	Mod : (21678+22013) = (21678+24105) = (21678+28160) =(21678+30020)
	0394	Mod : (21678+22013) = (21678+24105) = (21678+28160)
	0395	Mod : 31897 = 32929 = (31897+32333+32929)
	0396	Mod : (23742+24064) = (23742+24065) = (23742+24066) = (23742+24067) = (23742+24064+26346+US) = (23742+24065+26346+US) = (23742+24066+26346+US) = (23742+24067+26346+US)
	0397	Mod : (20268+28238) = (20268+25800+25238)
	0399	Mod : (27957+V2500A1) = (32656+V2522A5/V2524A5/V2527A5/V2530A5/V2533A5/2527EA5/2527MA5)
	0401	STD = Mod : 25072 = (22562+25072) = (28160+28917) = (25072+28160+28917) = (22562+25072+28160+28917)
	0402	Mod :(20057+20059+20067+20069+20071+21708+30020) = (20059+20067+20069+20071+21708+31283+33100) = (20057+20059+20067+20069+20071+21708+31283+33100)

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	0403	Mod : 27650 = (24588+27650) = (24215+24588+27650)
	0404	Mod :(20067+20069+20071+21708+30020) = (20067+20069+20071+21708+31283+33100)
	0405	Mod :(20067+20069+20071+21708+30020+35220) = (20067+20069+20071+21708+31283+33100+35220)
	0406	Mod : (20067+20069+20071) = (20067+20069+20071+33100+34997) = (20067+20069+20071+31283+34861) = (20067+20069+20071+31283+34862) = (20067+20069+20071+31283+33100+34856) = (20067+20069+20071+31283+33100+34898) = (20067+20069+20071+31283+33100+34997)
	0407	Mod : (20059+20067+20069+20071) = (20067+20069+20071+35236) = (20059+20067+20069+20816+27063) = (20059+20067+20069+20071+32146) = (20059+20067+20069+20071+33100+34856) = (20059+20067+20069+20071+33100+34898) = (20059+20067+20069+20071+31283+34862) = (20059+20067+20069+20071+31283+33100+34862) = (20059+20067+20069+20071+31283+33100+34898)
	0408	Mod : (20059+20067+20069+20071+30020) = (20059+20067+20069+20071+30354+31283) = (20059+20067+20069+20071+33100+31283) = (20059+20067+20069+20071+30020+30354) = (20057+20067+20069+20071+31283+33100)
	0409	Mod : (20067+20069+20071+30020+35220) = (20067+20069+20071+33100+31283+35220) = (20067+20069+20071+300020+30354+35220)
	0410	Mod : (30660+31371) = (26728+27522+28479+30660+31371)
R	0411	Mod : (36847+56-5-A4/A5/B1/B2/B3/B5/B6/B7/B8/B9) = (28160+36847+56-5-A3/B4) = (36311+28160+36847+56-5-B6) = (22562+28160+36847+V2500A1)
R	0412	Mod : STD = (28160+28917+36847) = (22562+25072+36847) = (25888+27609+36847) = (22562+25072+28160+28917+36847) = (25888+27609+28160+28917+36847)
	0413	Mod : (26999+28244+33253) = (26999+28244+33505) = (26999+28244+34660) = (25205+26999+28244+28382+33253) = (26999+28244+28382+28495+33253) = (26999+28244+28382+28495+34660)
	0414	Mod : 25205 = 26111 = 26485 = 26999 = 28382 = 30241 = 30631 = 34825 = (23885+26111) = (28244+34825) = (25205+26999+28495) = (26999+28382+28495) = (26999+28244+30170) = (28244+28382+30170) = (26999+28244+34825) = (26999+28244+34637+35350) = (26999+28244+28382+28495+34825) = (26999+28244+28382+28495+30170) = (26999+28244+28382+28495+34637+35350)
	0415	Mod : (20024+24105+24613+26017) = (20024+24105+24613+25410+26017)
	0416	Mod : 20406 = (20406+24588) = (20406+24588+28916)
	0417	Mod : 28244 = (23885+28244) = (26999+28244+28495) = (26999+27917+28244)
	0419	Mod : (28244+28382) = (26999+28244) = (25205+28244) = (28244+30631) = (28244+30241) = (26485+28244) = (26111+26999+28244) = (26111+28244+28382) = (26999+28244+30241) = (23885+26111+28244) = (26999+28244+28495+28382) = (23885+26111+26999+28244) = (25205+26999+28244+28495)
	0422	Mod : 28479 = 28702 = 28916 = (28479+31283+34861) = (26728+28479)
R	0423	Mod : (36847+V2522/2524/2527M/2530/2533) = (22562+25072+36847+V2522/2524/2527M/2530/2533) = (25888+27609+36847+V2522/2524/2527M/2530/2533) = (28160+36847+V2527/2527E) = (22562+25072+28160+36847+V2527/2527E) = (25888+27609+28160+36847+V2527/2527E)
	0424	Mod : (23672+24105+27620+33328) = (27620+33328)

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	0425	Mod : (26999+34637+34660) = (26999+34637+33505) = (26999+34637+33253) = (26999+28244+28382+28495+34660+34637) = (26999+28244+28382+25495+34660+34637+34825)
	0426	Mod : (26999+34637+34660+35350) = (26999+28244+34660+34825) = (26999+28244+33253+34825) = (26999+28244+33505+34825) = (26999+28244+34660+34637+35350) = (26999+28244+33253+34637+35350) = (26999+28244+33505+34637+35350) = (26999+28244+34660+34637+34825+35350) = (26999+28244+28382+28495+34660+34825) = (26999+28244+28382+28495+33253+34825) = (26999+28244+28382+28495+34660+34637+35350) = (26999+28244+28382+28495+34660+34637+34825+35350)
	0427	Mod : (26999+28244+34660+34825) = (26999+28244+33253+34825) = (26999+28244+33505+34825) = (26999+28244+34660+34637+34825+35350) = (26999+28244+34660+34637+35350) = (26999+28244+34660+34637+35350) = (26999+28244+28382+28495+34660+34637+34825) = (26999+28244+28382+28495+34660+34637+34825+35350) = (26999+28244+28382+28495+34660+34637+35350) = (26999+28244+28382+28495+34660+34825) = (26999+28244+28382+28495+33253+34825)
	0428	Mod : (22013+24588) = (22013+23450+24588) = (20406+22013+23450+24588) = (20406+22013+23450+24588+28916)
	0429	MSN : 0002 = 0003 = 0004 = 0005 = 0006 = 0007 = 0008 = 0010 = 0011 = 0012 = 0013 = 0014 = 0016 = 0017 = 0018 = 0019 = 0020 = 0021
R	0430	Mod : (28160+36847) = (22562+25072+28160+36847) = (25888+27609+28160+36847)
	0431	Mod : (23779+24349+34637+35220) = (23779+24852+26526+34637+35220) = (23779+24349+24785+26526+34637+35220) = (23779+24852+34637+35220)
	0432	Mod : (21678+22013+26377) = (21678+22013+26999) = (21678+22013+26379+26999)
R	0433	Mod : (25888+36847) = (22562+25072+25888+36847) = (25888+28160+28917+36847) = (22562+25072+25888+28160+28917+36847)
R	0434	Mod : 25888+36847+V2522/2524/2527M/2530/2533) = (22562+25072+25888+36847+V2522/2524/2527M/2530/2533) = (25888+28160+36847+V2527/2527E) = (22562+25072+25888+28160+36847+V2527/2527E)
	0435	Mod : (21946+26169+30308) = (21946+26169+30299+30308)
	0436	Mod : (21678+22536+27522+33100) = (21678+22536+27522+33300) = (21678+23529+27522+33100) = (21678+23529+27522+33300) = (21678+23227+27522+33100) = (21678+23227+27522+33300)
	0437	Mod : (34637+35220) = (26526+34637+35220)
R	0438	Mod : (22562+36847) = (22562+25088+27609+36847) = (22562+28160+28917+36847) = (22562+27609+25888+28160+28917+36847)
R	0439	Mod : 22562+36847+V2522/2524/2527M/2530/2533) = (22562+27609+25888+36847+V2522/2524/2527M/2530/2533) = (22562+28160+36847+V2527/2527E) = (22562+27609+25888+28160+36847+V2527/2527E)
	0440	Mod : (26526+30660+34637) = (30660+34637)
	0441	Mod : (26526+31283+34041) = (26526+30660+31283+34041)
	0444	Mod : (26117+31896) = (26117+31897) = (26270+31896) = (26270+31897) = (27866+31896) = (27866+31897) = (25529+27866+31896) = (25529+27866+31897) = (25529+27866+32475) = (25529+27866+32929) = (26851+27866+31896) = (25529+26185+27866+31897) = (25529+27866+31896+32402) = (27866+32929) = (26270+32475) = (26270+32929) = (27866+31897+32333+32929) = (26270+31896+32332+32475) = (27866+31897+32929) = (26270+31896+32402+32475) = (26117+31896+32402) = (26270+31896+32402) = (27866+31896+32402)

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0445	Mod : (26485+28916+34637) = (26526+26999+28382+28479+28495+34637) = (26526+26999+28479+34637)
0447	Mod : (25205+26526+28916) = (26111+26526+28916) = (26526+26999+28479) = (26526+26999+28702) = (26526+26999+28916) = (26526+28382+28916) = (26526+28916+30631) = (23885+26111+26526+28916) = (24075+25205+26526+28916) = (25205+26526+26999+28495+28916) = (26526+26999+28382+28479+28495) = (26526+26999+28382+28495+28702) = (26526+26999+28382+28495+28916) = (24075+25205+26526+26999+28382+28479) = (24075+25205+26526+26999+28495+28916) = (26526+26999+28916+30241) = (23885+26526+26999+28916)
0448	Mod : 34637 = (26526+34637) = (26526+28244+34637) = (26526+28244+34637+34825)
0449	Mod : (34637+35350) = (26526+34637+35350) = (26526+28244+34637+35350)
0450	Mod : STD = 25404 = (30660+34861) = (30660+34864)
0451	Mod : 30660 = (25404+30660)
0452	Mod : STD = 32619 = 33239 = 36462 = (32619+33239) = (32619+36462) = (33239+36462) = (32619+33239+36462)
0453	Mod : (36462+36481) = (36462+36750) = (36462+32619+36481) = (36462+32619+36750) = (36462+33239+36481) = (36462+33239+36750) = (36462+32619+33239+36481) = (36462+33239+32619+36750)
0455	Mod : 25888 = (25888+28160+28917) = (25888+30660+34861) = (25888+30660+34864) = (22562+25072+25888)
0456	Mod : (21678+25404) = (21678+25404+31283+34862) = (21678+25404+30626+31283+34862+35110)
0457	Mod : (21678+21858+25404) = (21678+21858+25404+30626+35110) = (21678+21858+25404+31283+34864) = (21678+21858+25404+31283+34861) = (21678+21858+25404+31283+34862) = (21678+21858+25404+31283+34864+30626+35110) = (21678+21858+25404+31283+34862+30626+35110)
0458	Mod : (20586+24105) = (20586+24105+28238)
0459	Mod : 26377 = 26999 = (26377+26999) = (26377+26999+31283+34861) = (26377+26999+30626+31283+34862+35110)
0460	Mod : (21678+25404+26377) = (21678+25404+26999) = (21678+25404+26377+26999) = (21678+25404+26377+31283+34861) = (21678+25404+26377+31283+34862) = (21678+25404+26377+31283+34864) = (21678+25404+26377+26999+31283+34862) = (21678+25404+26377+30626+31283+34862+35110) = (21678+25404+26377+26999+30626+31283+34862+35110)
0461	STD = Mod : (28238+31897) = (28238+31896)
0462	Mod : (21678+22013+25404+26377+31283) = (21678+22013+25404+26999+31283) = (21678+22013+25404+26377+26999+31283) = (21678+22013+25404+26999+30626+31283+35110) = (21678+22013+25404+26377+26999+30626+31283+35110)
0463	Mod : (26999+27646+33100) = (26999+30626+31283+33100+34862+35110) = (26999+27646+30626+31283+33100+34862+35110)
0464	Mod : 25888 = (22562+25888) = (25072+25888) = (25888+30784) = (25888+35864) = (22562+25072+25888) = (25888+30784+35864) = (25615+25888+35864) = (22562+25888+28897) = (22562+25616+25888+28897) = (22562+25888+28897+30784)
0465	Mod : 30784 = (22562+25072+28897+30784)
0466	Mod : (23108+24105+25615+27276+28162+30748+33323) = (24105+25615+27276+28162+33323)
0467	Mod : (21678+22013+30660) = (21678+24105+30660) = (21678+28160+30660) = (21678+24105+30020+30660)

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	0468	Mod : 22013 = (22013+25410) = (22013+25409+25410)
	0469	Mod : (24105+27276+28162+30748+34540) = (24105+27276+28162+34540)
	0470	Mod : (24105+25615+30748+34024) = (24105+30478+34024)
R	0471	Mod : (30020+27140) = (33300+27140) = (27140+32650+32651+33100) = (27140+32650+32651+33300)
	0472	Mod : (25404+28479) = (25404+28916) = (25404+28160+28479+28917) = (25404+28160+28916+28917)
	0477	Mod : (24105+25615+27276+34024) = (24105+27276+34024)
	0478	Mod : (24105+25615+27276+28162+34024) = (24105+27276+28162+34024)
R	0479	Mod : 32619 = 33239 = 36462 = (32619+33239) = (32619+36462) = (33239+36462) = (32619+33239+36462)
	0480	Mod : (23108+25820+30748) = (23109+25820+30748) = (23408+25820+30748)+IAE V2500
R	0481	Mod : 36462 = (32619+36462) = (33239+36462) = (32619+33239+36462)
R	0482	Mod (23222+26398+34540) = (23222+26398+32207+34540)
	0483	Mod : (23108+25820) = (23109+25820) = (23408+25820)+V2500
R	0484	Mod : 25888 = (25888+30660+34861) = (25888+30660+34864) = (22562+25072+25888)
R	0485	Mod : (25888+28160) = (22562+25888+28160) = (25888+28160+30660+34861) = (25888+28160+30660+34864) = (22562+25072+25888+28160)
R	0486	Mod : (22562+28160+30660) = (28160+30660+35864)
R	0487	Mod : STD = (25888+27609) = (22562+25072)
R	0488	Mod : 22562 = 35864 = (22562+25888+27609)
	0489	Mod : 25871 = 25887 = 25893 = 26149 = 26338 = 27725 = 28307 = (25871+30660+34861) = (25871+30660+34864) = (25887+30660+34861) = (25887+30660+34864) = (26149+30660+34861) = (26149+30660+34864)
	0490	Mod : 34156 = 32619 = 32656 =33239 = (26338+34156) = (25893+32619) = (25871+33239) = (25893+33239) = (26149+32656) = (25887+34156) = (26338+34156) = (34156+30660+34861) = (34156+30660+34864) = (32656+30660+34861) = (32656+30660+34864) = (33239+30660+34861) = (33239+30660+34864)
R	0492	Mod : 20024 = (20024+32651) = (20024+32650+32651) = (20024+32650+32651+34035)
	0493	Mod : (34156+30660) = (32619+30660) = (33239+30660) = (32656+30660) = (25871+30660+33239) = (25893+30660+32619) = (26149+30660+32656) = (25887+30660+34156) = (26338+30660+34156) = (25893+30660+33239) = (28307+30660+33239)
R	0494	Mod : (20024+32650+34313) = (20024+32650+34809) = (20024+34035+34809)
	0495	Mod : 34156 = 32619 = 33239 = (26338+34156) = (25893+32619) = (25871+33239) = (25893+33239) = (25887+34156) = (26338+34156) = (28307+33239)
R	0496	Mod : 31283 = (28479+31283) = (28916+31283) = (22013+24044+31283) = (25951+31283+32239) = (22013+24044+28479+31283)
	0497	Mod : 32656 = (26149+32656)
	0498	Mod : 31897 = 31896 = (26999+28495+31896) = (26999+28495+31897) = (31897+32401+35651) = (26999+28495+31897+32401+35651)
	0500	Mod : (25241+28138) = (25242+28138) = (25241+25242+28138)
	0501	Mod : (25241+26963) = (25242+26963) = (25241+25242+26963)
	0502	Mod : (25241+26963+28138) = (25242+26963+28138) = (25241+25242+26963+28138)
	0503	STD = Mod (31897+32401+35651)
	0504	STD = Mod : (22013+24044) = (25951+32239)
	0506	Mod : 31896 = 31897 = (31897+32401+35651)

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	0507	Mod : 26497 = (26497+31896) = (26497+32475) = (26497+31896+32332) = (26497+31897+32333) = (26497+31897+32401+35651)
	0508	Mod : (20268+24946+26965) = (20268+24946+27773) = (20268+26760+26965) = (20268+26760+27773) = (20268+26965+32150) = (20268+26965+32238) = (20268+26965+32239) = (20268+26965+32311) = (20268+27773+32150) = (20268+27773+32238) = (20268+27773+32239) = (20268+27773+32311) = (20268+25951+26965) = (20268+25951+27773) = (20268+26965+35040) = (20268+27773+35040)
R	0509	Mod : STD = (34864+28916) = (34864+28479)
R	0510	Mod : 22013 = (22013+34864+28916) = (22013+28479+34864)
R	0511	Mod : (24105+26925+28479) = (24105+26925+28916) = (22013+26925+28479) = (26925+28479+35220)
R	0512	Mod : 36562 = 36772 = 36609 = (31896+32402+34313+36562) = (31897+32401+34809+36772) = (31897+32401+34809+36609)
	0513	STD = Mod : 31896+32332
	0514	Mod : 27455 = (27455+31896+32332)
	0515	Mod : 25800 = (25800+31896+32332)
	0516	STD = Mod : (31897+32333)
	0517	STD = Mod : 31896+32332+CFM 56-5-A1 = A3 = A4 = A5 = B4 = B5 = B6
R	0518	Mod : (25205+26526) = (26111+26526) = (26526+26999) = (26526+28382) = (26526+30241) = (26526+30631) = (26526+30635) = (26485+26526) = (26526+26999+28495) = (26526+26999+30241) = (23885+26111+26526) = (23885+26526+26999) = (24075+25205+26526) = (24075+26526+28382) = (26111+26526+26999) = (26526+26999+28382+28495) = (26526+26999+28495+28916) = (23885+26111+26526+26999) = (26111+26526+28382+30635) = (26526+26999+34864) = (24075+25205+26526+26999+28495)
	0519	Mod : 31896 = 32475 = (31896+32332+32475)
	0520	Mod : (25800+31896) = (25800+32475) = (25800+31896+32332+32475)
	0521	Mod : 31896 = 32475 = (31896+32332+32475)
R	0522	Mod : 22562 = 35864 = (22562+35864) = (22562+25888+27609)
R	0523	Mod : (22562+24105) = (24105+35864) = (24105+22562+35864) = (22562+24105+25888+27609+35864)
	0524	Mod : (20057+20067+20069+20071) = (20057+20067+20062+20816+27063)
R	0525	Mod : (30660+32494) = (26728+27522+28479+31371+32494) = (26728+27522+28479+30660+31371+32494) = (26728+27522+28479+30660+31283+31371+32494)
R	0526	Mod : (30660+32494+32496) = (26728+27522+28479+30660+31371+32494+32496) = (26728+27522+28479+30660+31283+31371+32494+32496)
R	0527	Mod : (30660+32494+35227) = (26728+27522+28479+30660+31283+31371+32494+35227)
R	0528	Mod : (30660+32494+32496+35865) = (26728+27522+28479+30660+31283+31371+32494+32496+35865)
	0529	Mod : (20057+20067) = (20057+20069) = (20057+20067+20069)
R	0530	Mod : (27650+28382) = (26999+27650+28244+28382+28495+34825)
R	0531	Mod : (25205+34637) = (26111+34637) = (26485+34637) = (26999+34637) = (28382+34637) = (30241+34637) = (30631+34637) = (23885+26111+34637) = (26999+28244+34637) + (26999+28244+28382+28495+34637)
R	0532	Mod : (26999+31896) = (26999+31897) = (28382+31897) = (30241+31896) = (30631+31896) = (26999+28382+28495+31896) = (26999+28382+28495+31897) = (26999+31897+32401+35651) = (28382+31897+32401+35651) = (30241+31897+32401+35651) = (26999+28382+28495+31897+32401+35651)

CODE	DESIGNATION
0533	Mod : (22013+31070+26999) = (26002+28218+28382+31070) = (22013+26002+26111+31070) = (24105+26002+26111+31070) = (26002+26999+28218+31070) = (26002+26111+28218+31070) = (25204+26002+26999+28218+31070) = (22013+26002+26999+28218+31070) = (24105+26002+26999+28218+31070) = (25204+26999+28382+28495+31070) = (22013+26002+28218+30241+31070) = (25204+26002+26999+28218+28382+28495+31070) = (22013+26002+26999+28218+28382+28495+31070) = (24105+26002+26999+28218+28382+28495+31070)
0534	STD = Mod : 23885 = (26999+28495) = (26999+27917)
0535	Mod : 25205 = 26111 = 26485 = 26999 = 28382 = 30241 = 30631 = (23885+26111) = (25205+26999+28495) = (26999+28382+28495) = (26999+31896+32332) = (26999+31897+32333) = (26999+28382+28495+31897+32333)
0537	Mod : 25205 = 26111 = 26485 = 26999 = 28382 = 30241 = 30631 = 34825 = (23885+26111) = (28244+34825) = (28244+30241) = (25205+26999+28495) = (26999+28382+28495) = (26999+28244+30170) = (28244+28382+30170) = (26999+28244+34825) = (26999+28244+30241+34825) = (26999+28244+28382+28495+30170) = (26999+28244+28382+28495+34825) = (26999+28244+34647+35350) = (26999+28244+28382+28495+34637+35350)
0538	Mod : 31283 = (28916+31283) = (28479+31283) = (28702+31283)
0539	Mod : (32619+35220) = (33239+35220) = (34156+35220) = (35220+35944) = (25893+32619+35220) = (26149+30660+32656+35220+35944) = (25893+28307+30660+32619+32239+35220)
0541	Mod : (25205+28244) = (26999+28244) = (28244+28382) = (28244+30631) = (26485+28244) = (25205+34637) = (26111+34637) = (26485+34637) = (26999+34637) = (28382+34637) = (30241+34637) = (30631+34637) = (23885+26111+28244) = (26111+26999+28244) = (26111+28244+28382) = (26999+28244+30241) = (26999+28244+28382+28495) = (25205+26999+28244+28495)
0542	Mod : (27650+28382) = (26999+27650+28244+28382+28495+34825)
0543	Mod : (26999+27650+28244) = (27650+28244+28382) = (27650+28244+28382) = (26999+27650+28244+28382+28495)
0544	STD = Mod : (31896+32332) = (31897+32333)
0545	Mod : (26999+28244+33253) = (26999+28244+34660) = (26999+28244+33505) = (25205+26999+28244+28382+33253) = (26999+28244+28382+28495+33253) = (26999+28244+28382+28495+34660) = (26999+28244+28382+28495+34660+34637) = (26999+28244+28382+28495+34660+34637+34825)
0546	(56-5-A3 = V2527) = (23408+V2500) = (21615+56-5-A3) = (23264+26058+26059+56-5-A3)
0547	(56-5-B1 = 56-5-B2 = V2530) = (31810+56-5-B2)
0548	Mod : (25404+28160+28479+34041) = (25404+28160+28916+31283+34041)
0549	Mod : (21678+22013+25404+26017+26377) = (21678+22013+25404+26017+26999) = (21678+22013+25404+26017+26377+26999) = (21678+22013+25404+26017+26377+26999+28479) = (21678+22013+25404+26017+26377+26999+28479) = (21678+22013+25404+26017+26377+26999+28479+31283+34861) = (21678+22013+25404+26017+26377+26999+26728+31283+34864) = (21678+22013+25404+26017+26999+33100+34997) = (21678+22013+25404+26017+26999+30626+31283+33100+34864+34997+35110)
0550	Mod : (21678+25404+26017+26999+33100) = (21678+25404+26017+26999+30626+33100+35110+31283+34862) = (21678+25404+26017+26377+26728+26999+28479+30660+33100) = (21678+25404+26017+26377+26728+26999+28479+30660+33100+34862+35100)

CODE	DESIGNATION
0551	Mod : (21678+25404+26017+26999+31283+33100) = (21678+25404+26017+26999+30626+31283+33100+35110) = (21678+25404+26017+26377+26728+26999+28479+30660+31283+33100) = (21678+25404+26017+26377+26728+26999+28479+30660+31283+33100+35110)
0552	Mod : (21678+25404+26377+26999+31283) = (21678+25404+26377+26999+30626+31283+35110) = (21678+25404+26017+26999+31283+33100+34856) = (21678+25404+26017+26999+31283+33100+34898) = (21678+25404+26017+26999+30626+31283+33100+34856+35110) = (21678+25404+26017+26999+30626+31283+33100+34898+35110) (21678+25404+26017+26377+26728+26999+28479+30660+31283) = (21678+25404+26017+26377+26728+26999+28479+30660+31283+34856+ 35110) = (21678+25404+26017+26377+26728+26999+28479+30660+31283+ 34898+35110)
0553	Mod : (21678+25404+26017+26999+30626+31283) = (21678+25404+26017+26999+30626+31283+33100+34898) = (21678+25404+26017+26377+26728+26999+28479+30626+30660+31283+ 33100+34856) = (21678+25404+26017+26377+26728+26999+28479+30626+30660+ 31283+34898)
0554	Mod : (21678+26999) = (21678+21858+26377) = (21678+21858+26999) = (21678+26377+26999)
0555	Mod : (21678+22013+25404+26017+26999+33100) = (21678+22013+25404+26017+26377+26728+26999+28479+30660+33100)
0556	Mod : (21678+22013+25404+26017+26999+33100) = (21678+22013+25404+26017+26999+31283+33100) = (21678+22013+25404+26017+26999+30626+31283+33100+35110) = (21678+22013+25404+26017+26377+26728+26999+28479+30626+30660+31283+ 33100+35110)
0557	Mod : (21678+22013+25404+26377+26999+31283) = (21678+22013+25404+26999+31283+33100+34997) = (21678+22013+25404+26999+31283+33100+34997+35110) = (21678+22013+25404+26017+26377+26728+26999+28479+30626+30660+31283+ 33100+34997+35110) = (21678+22013+25404+26017+26377+26728+26999+ 28479+30660+31283) = (21678+22013+25404+26017+26377+26728+26999+ 28479+30660+31283+34997+35110)
0558	Mod : (26999+31283) = (27646+31283) = (30631+31283) = (2699+27646+31283) = (26999+31283+33100+34856) = (26999+31283+33100+34898) = (26999+30626+31283+33100+34856+35110) = (26999+30626+31283+33100+34898+35110) = (26999+27646+30626+31283+33100+34898+35110)
0559	Mod : (26999+31283) = (27646+31283) = (30631+31283) = (2699+27646+31283) = (26999+30626+31283) = (26999+30626+31283+33100+34898) = (26999+27646+30626+31283+33100+34856) = (26999+30626+31283+33100+34856)
0560	Mod : (26999+31283+33100) = (27646+31283+33100) = (26999+27646+31283+33100) = (26999+27646+30626+31283+33100+35110) = (26999+30626+31283+33100+35110)
0561	Mod : (22013+26999+30626+31283+33100+35110+35220) = (22013+26999+31283+33100+35220) = (22013+26999+27646+30626+31283+33100+35110+35220)
0562	Mod : (22013+26999+31283) = (22013+27646+31283) = (22013+26999+27646+31283) = (22013+26999+31283+33100) = (22013+26999+30626+31283+33100+35110) = (22013+26999+27646+30626+31283+33100+35110) = (22013+26999+27646+31283+33100+35110)
0563	Mod : 33713 = (25328+33713)
0564	Mod : 36331 = (23900+30479+36331)
0565	STD = Mod : (26526+28956) = (26526+27046+28956)

	CODE	DESIGNATION
R	0566	Mod : 28547 = (23264+23900+28547)
R	0567	Mod : 35311 = (23900+30479+35311)
R	0568	Mod : (23900/56-5-B4/B5/B6/V2527E) = (23264+23900+26058+26059/56-5-B4)
R	0569	Mod : 28547 = (23264+23900+28547)
R	0570	Mod : (30479+56-5-A3/V2527) = (23900+30479+56-5-A3/V2527) = (23264+23900+30479/V2527) = (20802+23264+23900+26059+30479/V2527)
R	0571	Mod : 35735 = (23900+30307+35753)
	0572	Mod : (22013+24385+CFM) = (22013+24385+IAE) = (22013+24385+AUA)
R	0573	Mod : (23264/V2500A1) = (21615+23264/56-5-A1) = (21615+22269+23264+26059/56-5-A1)
R	0575	Mod : (23900/V2500A1) = (23900+21615/56-5-A1)
R	0576	Mod : (31132/56-5-A3) = (31132/V2527-A5) = (23408+31132/V2500A1) = (23900+31132/56-5-A3) = (23900+31132/V2527A5)
R	0577	Mod : (31132/56-5-B4=V2527E) = (23900+31132/56-5-B4=V2527E) = (23264+23900+26058+26059+31132/56-5-B4)
R	0578	Mod : (21601/V2500) = (20802+21601/V2500) = (21601+21615/56-5-A1) = (20141+20802+21601+21615/56-5-A1)
	0579	Mod : (26999+27650 28244) = (27650+28244+28382) = (26999+27650+28244+28382+28495)
	0580	Mod : (31133+CFM 56-5-A3) = (31133+IAE V2527) = (23408+31133+IAE V2500)
R	0581	Mod : (23264+23900/V2500) = (22269+23264+23900/V2500) = (21615+23264+23900/56-5-A1) = (21615+22269+23264+23900/56-5-A1) = (21615+22269+23264+23900+26059/56-5-A1)
R	0582	Mod : (21601/56-5-B4=V2527E) = (21601+23900+25733/56-5-B4)
R	0583	Mod : 34047 = (23900+34047) = (23264+23900+26058+26059+34047)
	0584	Mod : 28479 = 28916 = (26017+28479) = (26017+28916)
	0585	Mod : 28238 = (28238+28479) = (28238+28702) = (28238+28916)
R	0586	Mod : 27942 = (23264+23900+27942)
R	0587	Mod : 31133 = (22269+23900+31133) =(23264+23900+31133) = (23900+26058+31133)
R	0588	Mod : (35198/56-5-A4/A5/B5/B6/V2522/V2524) = (35197+35198/56-5-A4/A5/B5/B6/V2522/V2524)
R	0589	Mod : (35198) = (35197+35198)
	0590	Mod : (22249+25529+26401) = (22249+26117+26401) = (22249+26270+26401)
R	0591	Mod : (35197/56-5-A4/A5/B5/B6/V2522/V2524) = (27112+35197/56-5-B5)
R	0592	Mod : (30479/56-5-B4/V2527E) = (23900+30479/56-5-B4/V2527E) = (23264+23900+30479/56-5-B4/V2527E) = (23900+26058+26059+30479/56-5-B4) = (23264+23900+26058+26059+30479/56-5-B4)
	0593	Mod : (25241+32088) = (25241+32090) = (25242+32088) = (25242+32090) = (25241+25242+32088) = (25241+25242+32090)
	0594	Mod : (25241+28138+32088) = (25241+28138+32090) = (25242+28138+32088) = (25242+28138+32090) = (25241+25242+28138+32088) = (25241+25242+28138+32090)
	0595	Mod : (25241+26963+32088) = (25241+26963+32090) = (25242+26963+32088) = (25242+26963+32090) = (25241+25242+26963+32088) = (25241+25242+26963+32090)
	0596	Mod : (21678+21706+28479) = (21678+21706+28916)
	0597	Mod : (21678+21706+21766+28479) = (21678+21706+21766+28916)
	0598	Mod : (21678+21706+21768+28479) = (21678+21706+21768+28916)
	0599	Mod : (25241+26963+28138+32088) = (25241+26963+28138+32090) = (25242+26963+28138+32088) = (25242+26963+28138+32090) = (25241+25242+26963+28138+32088) = (25241+25242+26963+28138+32090)

	CODE	DESIGNATION
	0600	Mod : 28238 = (27846+28238) = (28238+28479) = (27846+28238+28479) = (27846+28238+26916) = (27846+28238+28702)
R	0601	Mod : 35325 = (23264+23900+35235)
R	0602	Mod : (23264+23900/56-5-A3/V2527) = (22269+23264+23900/56-5-A3/V2527) = (23264+23408+23900/V2500) = (21615+23264+23900/56-5-A3) = (22269+23264+23408+23900/V2500) = (22269+23264+23900+26059/V2527) = (22269+23264+23900+26059/56-5-A3) = (21615+22269+23264+23900/56-5-A3) = (22269+23264+23408+23900+26059/V2500A1) = (21615+22269+23264+23900+26059/56-5-A3)
R	0603	Mod : (22269+23408+23900) = (22269+23264+23408+23900+26058) = (22269+23264+23408+23900+26058+26059)
R	0604	Mod : 35325 = (27112+35426)
R	0605	Mod : (27112+27770/56-5-A4/A5/B5/B6/V2522/V2524)
R	0606	Mod : (22269+23900) = (23264+23900+26058) = (22269+23264+23900+26058+26059)
R	0607	Mod : (22269+23900) = (22269+23264+23900+26058+26059)
R	0608	Mod : 36962 = (26457+36932)
	0609	Mod : (20268+24917+V2533) = (20268+24917+31607+V2530)
	0610	Mod : (20268+24946+26965) = (20268+24946+27773) = (20268+25951+26965) = (20268+25951+27773) = (20268+26760+26965) = (20268+26760+27773) = (20268+26965+32150) = (20268+26965+32238) = (20268+26965+32239) = (20268+26965+32311) = (20268+27773+32150) = (20268+27773+32238) = (20268+27773+32239) = (20268+27773+32311) = (20268+26965+35040) = (20268+27773+35040)
	0611	Mod : 27522 = (27522+31371+31728) = (27522+30660+P0164+31371+31728)
R	0612	Mod : 34251 = (26457+34251)
R	0613	Mod : (22269+23900/56-5-B4/V2527E) = (22269+23900+26058/56-5-B4) = (23264+23900+26058/56-5-B4)
	0614	Mod : 25205 = 26111 = 26485 = 26999 = 28382 = 30241 = 30631 = 30635 = (23885+26111) = (26999+28382+28495) = (24075+25205+26999+28495)
R	0615	Mod : (23264+23900/56-5-B4/V2527E) = (22269+23264+23900/56-5-B4/V2527E) = (23264+23900+26059/56-5-B4)
R	0616	Mod : (21615+27942) = (21615+22269+23264+23900+27942)
R	0617	Mod : (20067+20069+33100+35220) = (20067+20069+31283+33100+35220) = (20067+20069+31283+33300+35220)
R	0618	Mod : (27112+28238+28951/56-5-B7/V2524/27M) = (27112+28238+28951+32635/56-5-B7/V2524/27M)
R	0619	Mod : (20059+20067) = (20059+20069) = (20059+20067+20069) = (35236+20067+20069) = (20059+20067+20069+31283+34861) = (20059+20067+20069+31283+34862) = (20059+20067+20069+31283+33100+34856) = (20059+20067+20069+31283+33100) = (20059+20067+20069+31283+33100+34997)
R	0620	Mod : (28479+P6146) = (28916+P6146) = (28479+31283+P6146) = (28916+31283+P6146) = (28479+34862+P6146) = (28479+31283+34862+P6146)
R	0621	Mod : (28479+P6146) = (28479+31283+P6146)
R	0622	Mod : (30020+31283+P6146) = (28479+30020+31283+P6146)
R	0623	Mod : (30020+31283) = (28479+30020+31283)
R	0624	Mod : 28479 = 28702 = 28916 = (31283+34861) = (31283+34862) = (28479+31283) = (28702+28916) = (28916+31283) = (26728+28479+31283+34862) =
R	0625	Mod : 21678 = (21678+22013) = (21678+24105) = (21678+28160) = (21678+30020) = (21678+28160+36847) = (21678+24105+30020+36847)

	CODE	DESIGNATION
R	0626	Mod : (20067+20069) = (20067+20069+20071+28478) = (20067+20069+20071+21708+28478)
R	0627	Mod : (20067+20069+20071+21708) = (20067+20069+20816+21708+27063) = (20067+20069+20071+21708+33100+34856) = (20067+20069+20071+21708+31283+34861) = (20067+20069+20071+21708+31283+34862) = (20067+20069+20071+21708+31283+33100+34856)
R	0628	Mod : (21615+22269+23900) = (21615+22269+23264+23900+26058+26059)
	0629	Mod : (21678+25404+26017+26999+30020+31283) = (21678+25404+26017+26999+30626+31283+33100) = (21678+25404+26017+26999+30626+31283+33300)
R	0630	Mod : (21711/V2500) = (21615+21711/56-5-A1) = (21615+21711+25733/56-5-A1) = (21615+21711+23900+25733/56-5-A1)
	0631	Mod : (25404+31283) = (25404+26017+28479+31283) = (25404+26017+28916+31283)
R	0632	Mod : (20059+20067+20069+20071+21708+30020+35220) = (20059+20067+20069+20071+21708+31283+33100+35220) = (20059+20067+20069+20071+21708+30354+31283+35220)
R	0633	Mod : (34094+(56-5-B4/B5/B6 = V2527e)) = ((23900+34094)+(56-5-B4/B5/B6 = V2527e)) = (23900+26058+26059+27942+34094+56-5-B4)
R	0634	Mod : 23264+(56-5-A3 = V2527) = ((21615+23264) = (22269+23264))+(56-5-A3 = V2527) = (23264+23408)+V2500 = ((22269+23264+26059)+(56-5-A3 = V2527)) = (21615+22269+23264+26059+56-5-A3)
R	0635	Mod : 22269+(56-5-A3 = V2527) = (22269+23408)+V2500 = ((22269+26058) = (23264+26058) = (21615+22269))+56-5-A3
R	0636	Mod : 23900+(56-5-A3 = V2527) = (23408+23900)+V2500
	0637	Mod : (22249+25529+30020+31283) = (22249+26270+30020+31283)
R	0638	Mod : 25328 = 35306 = (25328+26457)
	0639	Mod : (26526+30020+30660) = (26526+26925+30020+30660+31283)
R	0640	Mod : (24064+26526+35220) = (24065+26526+35220) = (24066+26526+35220) = (24067+26526+35220) = (24067+34637+35220) = (24065+24067+26526+35220) = (24066+24067+26526+35220) = (24067+26526+34637+35220) = (24024+26526+34637+35220) = (24066+26526+34637+35220) = (24065+26526+34637+35220)
R	0641	Mod : (24064+26526) = (24065+26526) = (24066+26526) = (24067+26526) = (24065+34637) = (24065+24067+26526) = (24066+24067+26526) = (24064+24065+26526) = (24064+26526+34637) = (24066+26526+34637)
R	0642	Mod : (20268+24946+27773) = (20268+27773+32311) = (20268+26965+32311) = (20268+27773+32238) = (20268+23871+24946+27773)
R	0643	Mod : (20268+24946+27773) = (20268+25951+27773) = (20268+26760+27773) = (20268+27773+32311) = (20268+26965+32311) = (20268+27773+32238) = (20268+24946+26965+27773) = (20268+24946+25615+27773)
R	0644	Mod : (20268+24946+27773+36311) = (20268+24946+26925+36311)
R	0645	Mod : (20057+20067+20069+20071+30020+35220) = (20057+20067+20069+20071+30354+31283+35220) = (20057+20067+20069+20071+33100+35220+31283)
R	0646	Mod : (22013+22562+23092+31495) = (22013+22562+31112+31495) = (20151+22013+22562+31495) = (20063+20151+22013+22562+31495) = (20063+20151+22013+31495+35864) = (20063+22013+31112+31495+35864) = (20063+20151+22013+22562+31495+35864) = (20063+20151+22013+31112+31495+35864)
R	0647	Mod : (34637+27620) = (28244+34637+27620)
R	0648	Mod : 25590 = (25590+31283+34861) = (25590+31283+34862)
R	0649	Mod : 28916 = 28479 = 28702 = (28479+31283+34862) = (28479+31283+34861)

	CODE	DESIGNATION
	0650	Mod : 31897 = 32929 = (31897+32333+32929)
R	0651	Mod : P0164 = 28360 = 31371 = (P0164+28360) = (P0164+31371) = (28360+31371) = (31371+31728) = (31283+34864) = (31283+34861) = (P0164+30660+31371) = (P0164+28360+31371) = (P0164+31371+31728) = (28360+30660+31371) = (30660+31371+31728) = (P0164+30660+31371+31728) =
R	0652	Mod : (24035+25404) = (24160+25404) = (24189+25404) = (24035+25404+28479+31283+34861) = (24035+25404+28479+31283+34862)
R	0653	Mod : 35220 = (24035+25404+28479+31283+35220)
R	0654	Mod : (24035+25404+35220) = (24160+25404+35220) = (24189+25404+35220) = (24035+25404+28479+31283+35220)
R	0655	Mod : (26999+31896) = (26999+31897) = (28382+31897) = (28382+31896) = (30241+31896) = (30631+31896) = (26999+28382+28495+31896) = (26999+28382+28495+31897) = (26999+31897+32401+35651) = (28382+31897+32401+35651) = (30241+31897+32401+35651) = (26999+28382+28495+31897+32401+35651)
R	0656	Mod : (CFM+33323) = (CFM+25225+28399+33323) = (IAE+33323)
	0657	Mod : (21678+26485+27620) = (21678+26999+27620) = (21678+27620+27646) = (21678+27620+30631) = (21678+27620+30635)
R	0658	STD = Mod: 31896 = 31897 = 32401 = 32402 = 32929 = 32475 = 34313 = 34809 = (31896+32332+32475) = (31897+32333+32929) = (28378+31896) = (31896+32332) = (31896+32402) = (31897+32333) = (31897+32401) = (31897+32929) = (32401+32929) = (32333+32929) = (31896+32402+32475) = (31897+32401+32929)
R	0659	Mod : 28378 = (28378+31897) = (28378+31897+32401+34809)
R	0660	Mod : 35220 = (22013+28479) = (22013+28916) = (24105+28479) = (24105+28702) = (24105+28916) = (28479+35220) = (22013+28702)
	0665	Mod : 26925 = (26925+27979) = (24266+26925+32310)
	0667	Mod :20268 = (20268+25800) = (20268+25530+26505) = (20268+25800+25530+26505)
	0670	Mod : (21678+26485) = (21678+26999) = (21678+27646) = (21678+30631) = (21678+30635) = (21678+26999+33497) = (21678+26999+27620+33497) = (21678+26999+27646+33497)
	0671	Mod : 20268 = (20268+25800)
R	0672	Mod : (24105=28439=30020=30203=30920)
	0678	Mod : (20966+CFM 56-5-A3) = (20966+23408+IAE V2500)
	0685	Mod : K0860 = K4355 = (26169+30308+K0860) = (26169+30308+K4355)
	0686	Mod : (21946+K0860) = (21946+K4355) = (21946+26169+30308+K0860) = (21946+26169+30308+K4355) = (21946+26169+30299+30308+31285+K0860) = (21946+26169+30299+30308+31285+K4355)
	0688	Mod : (26169+30299+K0860) = (26169+30299+K4355)
	0690	Mod : (21532+CFM 56-5-A3) = (21532+23408+IAE V2500)
R	0694	Mod : (26600+31810)=(30310+31810)
	0704	Mod : (21601+CFM 56-5-A3 = IAE V2527) = (21601+23408+IAE V2500)
	0715	Mod : (21711+CFM 56-5-A3) = (21711+23408+IAE V2500)
R	0725	Mod : (28721=28960=32011=32456)
R	0729	Mod : (22013+26401+28479)=(22013+26401+28916)
	0730	Mod : (20268+V2533) = (20268+31607+V2530)
	0732	Mod : 32475 = 32929 = (31896+32402) = (31897+32401) = (26999+28495+32475) = (26999+28495+32929) = (31896+32332+32475) = (26999+28495+31896+32402)
	0734	Mod : 32401 = 32402 = 32475 = 32929 = (31896+32402) = (31897+32401) = (31896+32332+32475) = (31897+32333+32929)
	0735	Mod : (22013+27276) = (22013+31395) = (22013+27276+31395)

	CODE	DESIGNATION
	0739	Mod : (20268+22461+24946+26965) = (20268+22461+24946+27773) = (20268+22461+25951+26965) = (20268+22461+25951+27773) = (20268+22461+26760+26965) = (20268+22461+26760+27773) = (20268+22461+26965+32150) = (20268+22461+26965+32238) = (20268+22461+26965+32239) = (20268+22461+26965+32311) = (20268+22461+27773+32150) = (20268+22461+27773+32238) = (20268+22461+27773+32239) = (20268+22461+27773+32311) = (20268+22461+26965+35040) = (20268+22461+27773+35040) = (20268+23408+24946+26965) = (20268+23408+24946+27773) = (20268+23408+25951+26965) = (20268+23408+25951+27773) = (20268+23408+26760+26965) = (20268+23408+26760+27773) = (20268+23408+26965+32150) = (20268+23408+26965+32238) = (20268+23408+26965+32239) = (20268+23408+26965+32311) = (20268+23408+27773+32150) = (20268+23408+27773+32238) = (20268+23408+27773+32239) = (20268+23408+27773+32311) = (20268+23408+26965+35040) = (20268+23408+27773+35040) = (20268+22461+23408+24946+26965) = (20268+22461+23408+24946+27773) = (20268+22461+23408+25951+26965) = (20268+22461+23408+25951+27773) = (20268+22461+23408+26760+26965) = (20268+22461+23408+26760+27773) = (20268+22461+23408+26965+32150) = (20268+22461+23408+26965+32238) = (20268+22461+23408+26965+32239) = (20268+22461+23408+26965+32311) = (20268+22461+23408+27773+32150) = (20268+22461+23408+27773+32238) = (20268+22461+23408+27773+32239) = (20268+22461+23408+27773+32311) = (20268+22461+23408+26965+35040) = (20268+22461+23408+27773+35040)
R	0740	Mod : (21678+21858+25404+30626+31283)
	0743	Mod : (21678+25404+26377+26999+31283) = (21678+25404+26377+26999+30626+31283+35110)
R	0744	Mod : (21678+25404+26377+26999+30626+31283)
R	0749	Mod :(21678+24105+26017+33100)=(21678+24105+26017+33300)
R	0751	Mod :(21678+22013)=(21678+24105)=(21678+28160)
	0754	STD = Mod : (22013+24044) = (25951+32239)
R	0756	Mod :(22013+31283+P6911)=(25951+31283+P6911)
R	0758	Mod :(21678+22536)=(21678+23227)=(21678+23529)
	0762	Mod : (23222+24105) = (24105+26057) = (23222+24105+26057)
	0766	Mod : 30020 = (24105+26925+30020) = (24105+26925+28479+30020)
R	0771	Mod : 26485=26999=27646=30631=30635
R	0772	Mod : (21678+21706+21766+21768+28479)=(21678+21706+21766+21768+28916)
	0773	Mod : (22013+27846+28479+28721) = (22013+27846+28479+28960) = (22013+27846+28721+28916) = (22013+27846+28916+28960) = (22013+27846+28479+32011) = (22013+28479+30439+32011) = (22013+28479+30439+32456) = (22013+28479+28721+30439) = (22013+28479+28960+30439)
	0774	Mod : (21678+21706+21768) = (21678+21706+21768+21858+26347)
	0775	Mod: (20268+24946+26965+33323) = (20268+24946+27773+33323) = (20268+25951+26965+33323) = (20268+25951+27773+33323) = (20268+26760+26965+33323) = (20268+26760+27773+33323) = (20268+26965+32150+33323) = (20268+26965+32238+33323) = (20268+26965+32239+33323) = (20268+26965+32311+33323) = (20268+27773+32150+33323) = (20268+27773+32238+33323) = (20268+27773+32239+33323) = (20268+27773+32311+33323) = (20268+26965+33323+35040) = (20268+27773+33323+35040)
	0776	Mod : (26018+26398) = (23222+26018) = (26018+26057) = (23222+26018+26057) = (23222+26018+26398) = (26018+26057+26398) = (23222+26018+26057+26398)
	0778	Mod : 26398 = 23222 = 26057 = (23222+26398) = (26057+26398) = (26398+31896+32332) = (26398+31897+32333) = (23222+26057+26398) = (23222+31896+32332) = (23222+31897+32333)

	CODE	DESIGNATION
	0779	Mod: 26398 = 23222 = 26057 = (23222+26057) = (23222+26398) = (26057+26398) = (23222+26057+26398)
	0780	Mod: 32619 = 33239 = (32619+33239)
	0781	Mod : (22013+27846+28479+28721) = (22013+27846+28479+28960) = (22013+27846+28479+32011) = (22013+27846+28721+28916) = (22013+27846+28916+28960) = (22013+27846+28916+32011) = (22013+28479+30439+32011) = (22013+28479+30439+32456) = (22013+28479+28721+30439) = (22013+28479+28960+30439)
	0783	Mod: 32619 = 33239 = (32619+33239) = (26577+33239)
	0784	STD = Mod: 31896 = 31897 = 32401 = 32402 = 32929 = 32475 = (31896+32332+32475) = (31897+32333+32929) = (20586+22013+30422)
	0801	Mod: 32619 = 33239 = (32619+33239) = (22013+24044+33239) = (22013+24044+32619) = (25951+32239+32619) = (22013+24044+32619+33239)
	0802	Mod : (28378+28479) = (28378+28916) = (33973+28479) = (22013+28479+30422) = (22013+28916+30422) = (22013+25453+28479+30422) = (22013+25453+28916+30422)
R	0806	Mod : (21678+21766+28479)=(21678+21766+28916)
R	0808	Mod : (21678+21766+21767+28479)=(21678+21766+21767+28916)
R R	0810	Mod : (21678+21706+21766+21767+21768+28479)=(21678+21706+21766+21767+21768+28916)
	0816	Mod : (26497+32475+32997) = (26497+31896+32402+32997)
	0822	Mod : (23119+31283) = (23013+24044+31283)
	0827	Mod : (20268+24917+V2533) = (20268+24917+31607+V2530)
	0829	STD or Mod : (31395+32207) = (27276+31395+32207)
R	0842	Mod : (24035+31283)=(24160+31283)=(24189+31283)
R	0845	Mod : (28136+28951)=(28136+32635)
	0846	Mod : (21678+26335) = (21678+26334) = (21678+26335+28160+28917)
	0848	Mod : (28479+34456) = (28378+28479) = (28378+28916) = (33973+28479) = (22013+28479+30422) = (22013+28916+30422) = (22013+25453+28479+30422) = (22013+25453+28916+30422)
	0853	(56-5-B4 = V2527E) = (Mod : 20141/56-5-B4)
	0855	(56-5-B8 = 56-5-B9 = PW6122 = PW6124) = (Mod : 20802/PW Eng)
	0857	(56-5-B7 = V2527M) = (Mod : (20141+20802)/56-5-B7)
	0858	Mod : 33713 = (20141+20802+25328+33713)/56-5-B6
	0862	Mod : 23900/(56-5-A3=V2527) = (23408+23900)/V2500 = (20802+23900)/V2527
	0864	Mod : 26457/(56-5-A4 = 56-5-A5 = 56-5-B5 = 56-5-B6 = V2522 = V2524) = (20802+26457)/V2524 = (20141+20802+26457)/(56-5-B5 = 56-5-B6) = (20141+20802+25328+26457+32979)/56-5-B6
	0868	Mod : 25649/(56-5-B1 = 56-5-B2 = V2530) = (24178+25649)/(56-5-B1 = 56-5-B2 = V2530) = (20141+20802+24178+25649)/56-5-B1
	0870	Mod : 24899/(56-5-B1 = 56-5-B2 = V2530) = (20802+24899)/V2530
	0871	(Mod : 24178+(56-5-B1 = 56-5-B2 = V2530)) = (Mod : (20802+24178)+V2530)
	0873	Mod : (30310 = (24899+26600))/(56-5-B1 = 56-5-B2 = V2530) = (20802+30310)/V2530 = (20802+24899+26600)/V2530
	0874	Mod : 27553/(56-5-B3=V2533) = (31607+31615) = (31615+31701) = (31615+31702) = (20141+20802+27553)/56-5-B3
	0875	Mod : 28960/(56-5-B3 = V2533) = (20802+28960)/V2533 = (20141+20802+28960)/56-5-B3
	0877	Mod : 31839/(56-5-B3 = V2533) = (20802+28960+31839)/V2533
	0879	Mod : 23264/(56-5-B4 = V2527E) = (20802+23264)/V2527E
	0882	Mod : 31385/(56-5-B4 = V2527E) = (20141+20802+23900+31385)/56-5-B4
	0885	Mod : (25626 = (20966+25626) = (20802+25626) = (20802+20966+25626))/V2500
	0889	Mod : (21601 = (20802+21601))/V2500 = (20141+20802+21601+21615)/56-5-A1

CODE	DESIGNATION
0890	(Mod : 31672+(56-5-B8 = 56-5-B9 = PW6122 = PW6124) = (Mod : (20141+20802+31672)+56-5-B8)
0891	Mod : 31675/(56-5-B8 = 56-5-B9 = PW6122 = PW6124) = (20141+20802+31675)/56-5-B8
0892	Mod : 33280/(56-5-B8 = 56-5-B9) = (20141+20802+33128+33280)/56-5-B8
0895	(Mod : 28136+(56-5-B7 = V2527M) = (Mod : (20802+28136)+V2527M) = (Mod : (20141+20802+28136)+56-5-B7)
0899	Mod : (27112+27770)/(CFM 56-5-A4 = A5 = B5 = B6 = IAE V2522 = V2524) = (20802+27112+27770)/V2524
0900	Mod : (31321+31607) = (31321+31701) = (31321+31702) = (20802+31321+31607)
0903	(Mod : ((22269+23900) = (26058+23900))+(56-5-B4 = V2527E)) = (Mod : (20141+20802+22269+23900)+56-5-B4) = (Mod : (20802+23264+23900+26058)+V2527) = (Mod : (20141+20802+22269+23900+26058)+56-5-B4)
0904	(Mod : ((23264+23900) = (22269+23264+23900))+(56-5-B4 = V2527E)) = (Mod : (20802+23264+23900)+V2527E) = (Mod : (20141+20802+23264+23900)+56-5-B4) = (Mod : (20141+20802+22269+23264+23900)+56-5-B4)
0905	(Mod : ((25328+27820) = (20141+20802+25328+27820))+56-5-B6)
0907	Mod : (21615+21711+IAE V2500) = (20141+20802+21711+CFM 56-5-A1)= (20141+20802+21615+21711+CFM 56-5-A1) = (20141+20802+21615+21711+25733+CFM 56-5-A1) = (20141+20802+21615+21711+23900+25733+CFM 56-5-A1)
0909	Mod : ((23264+23900+27920) = (20141+20802+23264+23900+27920))+56-5-A3
0910	Mod : ((23264+23900+26891) = (20141+20802+23264+23900+26891))+56-5-A3
0911	(Mod : (23264+23900+27920)+(56-5-B4 = V2527E)) = (Mod : (20141+20802+23264+23900+27920)+56-5-B4)
0913	(Mod : ((23264+23900+27942) = (20802+23264+23900+27942))+V2527)
0915	Mod : (20141+20802+21615+22269+23900) = (20141+20802+21615+26058+23900) = (20141+20802+21615+22269+23264+23900+26058)
0919	Mod : STD = (22013+24044) = (25951+32239) / CFM ALL
0920	Mod : (22249+24215) = (22249+24588) = (22249+25534) = (22249+24588+25534) = (22249+24215+24588+25534) = (22249+24215+24588+26270+34514)
0931	Mod : 21678 = (21678+28160+28917) = (21678+28160+28917+30660)
0953	STD = Mod : 20067+20069+28474+28478
0962	Mod : (21678+24105+32207) = (21678+26335+28160+32207)
0964	Mod : 20343 = 31276 = (20343+27498) = (31276+27498)
0965	Mod : 25240 = 25274 = 28283 = 28711 = (25240+28283) = (25240+28238+28719) = (25274+28238+28719)
0966	Mod : (24785+27620) = (23672+24105+27620) = (24105+24785+27620) = (22013+23672+24785+27620)
0967	Mod : (26526+31283) = (26526+30660+32283)
0968	Mod : (32494+32496) = (P0164+32494+32496)
0970	Mod : (20067+20069+20071+30020) = (20067+20069+20071+30534+31283) = (20067+20069+20071+30534+31283
0976	Mod : 32929 = 32475= (31897+32401) = (31896+32402) = (31897+32333+32929) = (31896+32332+32475)
0977	Mod : 25205 = 26111 = 26485 = 26999 = 28382 = 30241 = 30631 = (23885+26111) = (23885+26999) = (25205+26999+28495) = (26999+28382+28495)
0980	STD = (24105+31364) = (24105+31365) = (24105+31897) = (24105+31896) = (20105+32475) = (24105+32929) = (24105+31380) = (24105+31379) = (24105+31365+31896+31905) = (24105+31364+31897+31906) = (24105+31365+31905+32475) = (24105+31364+31906+32929) = (24105+31365+31905+31380) = (24105+31364+31906+31379)
0981	Mod : 24105 = (24105+31364+31906) = (24105+31365+31905)

	CODE	DESIGNATION
	0984	Mod : 25205 = 26111 = 26485 = 26999 = 28382 = 30241 = 30631 = (23885+26111) = (23885+26999) = (25205+26999+28495) = (26999+28382+28495)
	0986	STD = Mod : (25204+26999+27917) = (26999+28495) = (26999+28218+28495) = (25204+26999+28495) = (24105+25294+26999+28495) = (24105+25294+26002+26999+28218+28495) = (24105+26002+26999+28218+28495+31070) = (25204+26002+26999+28218+28495+31070)
	0992	Mod : (28238+32635) = (28238+28951+32635)
	0993	Mod : (22013+27276+33323) = (24105+27276+33323)
R	0998	Mod :(24035+25404+31283)=(24160+25404+31283)=(24189+25404+31283)
	1000	Mod : ((23108+27276) + (V2527A5+V2527EA5)) = (23109+27276) = (23871+27276)
	1004	Mod : (24105+27276+28162) = (24105+27276+28162+30748)
	1006	Mod : (24105+25615+27276+28162) = (24105+25615+27276+28162+30748) = (23108+24105+25615+27276+28162+30748)
	1007	Mod : (24105+25615+27276+30748+34024) = (24105+27276+30748+34024)
	1016	Mod : 28721 = 28960 = 32011= 32456 = (22013+28721) = (22013+28960) = (22013+32011) = (22013+32456)
	1017	Mod : ((28721 = 28960 = (22013+28960))+US)
	1018	Mod : (20586+30020) = (20586+24105+30020)
	1019	Mod : (STD = 24105 = (30096+32304) = (24105+30096+32304)
	1022	Mod : (23222+24105+30020) = (23222+24105+30020+32207+CFM 56-5-B8)
	1023	Mod : (24105+30020) = (24105+30020+32207+CFM 56-5-B8) = (24105+30020+32207)
	1025	(Mod : 27112+(56-5-A4 = 56-5-A5 = 56-5-B5 = 56-5-B6 = V2522 = V2524)) = (Mod : (20802+27112)+(V2522 = V2524)) = (Mod : (20141+20802+27112)+56-5-B6)
	1026	Mod : (56-5-A4 = 56-5-A5 = 56-5-B5 = 56-5-B6 = V2522 = V2524) = Mod : 32217 = (Mod : 20802+(V2522=V2524)) = ((Mod : 20141+20802)+(56-5-A4 = 56-5-B5 = 56-5-B6 = 56-5-A5)) = (CFM56-5-A5/20141+20802+32979)
	1027	Mod : (20139+21533+27276) = (23109+23408+27276+34540) = (20139+23109+23408+27276+34540) = (20139+21533+23109+23408+27276)
	1028	Mod : (CFM 56-5-B4+23222) = (23222+24105) = (22013+26057+32207)
	1029	Mod : 24785 = (23672+24105) = (22013+23672+24785)
R	1030	Mod : (20024+22013+24613+25410+26017)
R	1034	Mod : (20024+24105+24613+25410+26017)
	1045	Mod : 20343 = 31276 = (20343+27498) = (31276+27498)
	1048	STD = Mod : 26346 = (26346+CFM 56-5-A1 = CFM 56-5-A3 = IAE V2500A1 = V2527A5) = (26346+N:US) = (V2500A1+26346+N:US)
R	1057	Mod : (23108=23109=23408=23871=24105)
	1062	Mod : (23222+26398) = (26057+26398) = (23222+26057+26398)
	1065	Mod : (23222+24105+30020+26398) = (23222+24105+30020+32207+26398+CFM56-5-B8)
	1069	Mod : STD = 26728 = (26728+31283+34864)
	1087	Mod : 24064 = 24065 = 24066 = 24067 = (24064+24065)
	1088	Mod : (24064+26526) = (24065+26526) = (24066+26526) = (24067+26526) = (24065+24067+26526) = (24066+24067+26526) = (24064+24065+26526)
	1089	STD = Mod : 23885 = (26999+28495) = (26999+28495+32929) = (26999+28495+32475) = (26999+28495+31896+32402) = (26999+28495+31897+32401)
	1090	STD = Mod : 23885 = (26999+28495)
	1116	Mod : 28916 = 28479 = 26728 = (26728+31283+34864) = (28479+31283+34861)
	1119	Mod : 26728 = 28479 = (26728+31283+34864) = (28479+31283+34861)
	1129	Mod : (26526+30660) = (26526+26925+30660+31283) = (26526+30660+31283+34862)

CODE	DESIGNATION
1136	Mod : (25404+26017) = (25404+26017+26728) = (25404+26017+26728+31283+34864)
1155	Mod : 23119 = (22013+24044) = (23119+25951+32239) = (23119+28479) = (23119+30660) = (22013+24044+28479) = (23119+28479+31283+34861) = (23119+30660+31283+34862) = (22013+24044+28479+31283+34861)
1156	Mod : 23119 = (22013+24044) = (23119+25951+32239) = (23119+26728) = (23119+30660) = (23119+26728+31283+34861) = (23119+30660+31283+34862)
1158	Mod : (25404+28479) = (25404+28916) = (25404+26017+28479) = (25404+26017+28916) = (25404+28702) = (25404+26017+28702) = (25404+26017+26728+28479) = (25404+26017+28479+31283+34861)
1160	Mod : (24946+26965) = (24946+27773) = (25951+26965) = (25951+27773) = (26760+26965) = (26760+27773) = (26965+32150) = (26965+32238) = (26965+32239) = (26965+32311) = (27773+32150) = (27773+32238) = (27773+32239) = (27773+32311) = (26965+35040) = (27773+35040)
1162	Mod : 30020 = (24105+30020) = (30020+US) = (24105+30020+US)
1166	Mod : (27276+30020+30748) = (24105+27276+30020+30748)
1167	Mod : (V2530 / V2533 / 56-5-B1 / 56-5-B2 / 56-5-B3) = (V2530 / V2533 / 56-5-B1 / 56-5-B2 / 56-5-B3) + LLLLL = 24105 = (24105 + LLLLL) = (V2530 / V2533 / 56-5-B1 / 56-5-B2 / 56-5-B3) + 20268 = (V2530 / V2533 / 56-5-B1 / 56-5-B2 / 56-5-B3) + 20268 + LLLLL = (24105 + 20268) = (24105 + 20268 + LLLLL)
1168	Mod : 20117 = 21678 = (20117+21678)
R 1169	Mod : (21678+26377)=(20117+2637)
1172	Mod : (22013+26999+30626+31283+33100) = (22013+26999+27646+30626+31283+33100)
1173	Mod : (26999+30626+31283+33300) = (26999+30626+31283+33100) = (26999+27646+30626+31283+3310) = (26999+2764630626+31283+33300)
1174	Mod : Std = 26017 = (26017+26377)
1175	Mod : 21678 = (21678+26017)
1176	Mod : (21678+26377) = (21678+26999) = (21678+26377+26999) = (21678+26017+26377)
1177	Mod : (21678+22013) = (21678+22013+26017)
1178	Mod : (21678+22013+26377) = (21678+22013+26999) = (21678+22013+26379+26999) = (21678+22013+26017+26377) = (21678+22013+26017+26377+26999)
R 1179	Mod : (21678+22013+25404+26017+26377+26999+30626+31283+33100)
1180	Mod : (24105+30020) = (24105+30626+31283) = (22013+30626+31283) = (28160+30626+31283) = (24105+30020+30626+31283)
1182	Mod : 22013 = (22013+31283) = (20024+22013) = (20024+22013+31283)
1183	Mod : 23699 = 24281 = (23698+23699) = (23698+24281) = (23699+24281) = (23698+23699+24281)
1186	Mod : (28238+32635) = (28238+28479+32635) = (28238+28702+32635)
1187	Mod : 22013 = 24105 = 30020 = (24105+30020)
1188	Mod : STD = 25398 = (22875+25398)
1190	Mod : (22013+31283) = (25951+31283) = (22013+28479+31283)
1191	Mod : (31283+P6911) = (P6911+28479+31283) = (22013+24044+31283+P6911) = (25951+31283+32239+P6911)
1192	Mod : 20075 = 21776 = 24266 = 24267 = (20075+24267) = (24266+24267)
1193	Mod : 25529 = 26117 = 26270 = 27866 = (26851+27866) = (25529+27866) = (26117+26270) = (25529+26185+27866) = (25529+26208+27866) = (25529+26345+27866) = (26270+31896+32332) = (26270+31897+32333)+(27866+31897+32333) = (25529+27866+31896+32332) = (25529+26185+27866+31897+32333)

CODE	DESIGNATION
1194	Mod : 31896 = 31897 = 32475 = 32929 = (31896+32332+32475) = (31897+32333+32929) = (26270+31897+34514) = (26851+31896) = (31896+32402) = (26270+31897+32333+32929)
1198	Mod : STD = (31495+35270) = (20063+20151+31495+35270) = 20063 = 20151 = (20063+20151) = (20063+31112) = (20063+23092)
1200	Mod : 22013 = (22013+31495+35270) = (20063+20151+22013+31495+35270) = (22013+20063) = (22013+23092) = (20063+20151+22013) = (20063+22013+23092)
1201	Mod : (22013+22562) = (22013+22562+31495+35270) = (20063+22013+22562+31495+35270) = (20063+22013+22562) = (20151+22013+22562) = (20063+20151+22013+22562)
1202	Mod : (20151+31495) = (31112+31495) = (31495+23092) = (20063+20151+31495) = (20063+31112+31495)
1204	Mod : (20151+22013+31495) = (22013+31112+31495) = (22013+23092+31495) = (20063+20151+22013+31495) = (20063+22013+31112+31495)
1206	Mod : 25529 = 25819 = 26117 = 26270 = (25529+25819) = (26117+26270)
1207	Mod : 20233 = 24365 = 25902 = (20233+24365)
1208	Mod : 23698 = 23699 = 24281 = (23698+23699) = (23698+24281) = (23699+24281) = (23698+23699+24281)
1209	Mod : 35220 = (20139+22129+35220)
1212	Mod : 22373 = (22373+25072+28897) = (22373+25072)
1214	Mod : 22199 = 24105 = (22199+24105)
1215	Mod : (21946+24624) = (21946+26169) = (21946+26169) = (21946+26169+30299) = (21946+26169+30299+31285) = (21946+26169+30299+30308) = (21946+26169+30308+31285) = (21946+24624+30299)
1217	Mod : 22013 = 24105 = 24785 = 25108 = (22013+23672) = (23672+24105) = (24785+25108)
1218	Mod : (21946+24624+K0860) = (21946+24624+K4355) = (21946+26169+K0860) = (21946+26169+K4355) = (21946+26169+30299+K0860) = (21946+26169+30299+K4355) = (21946+26169+30299+31285+K0860) = (21946+26169+30299+31285+K4355) = (21946+26169+30299+30308+K0860) = (21946+26169+30299+30308+K4355) = (21946+26169+30308+31285+K0860) = (21946+26169+30308+31285+K4355) = (K0860+21946+24624+30299)
1219	Mod : 26526 = 34637 = (26526+34637)
1223	Mod : (30660+31283+34637) = (26526+30660+31283+34637)
R 1225	Mod : (23885+26111+26526+34637)
1229	Mod : STD = (20046+23450) = 23450
1230	Mod : STD = 24215 = 24215+24588 = 24588
1232	Mod : (24215+32088) = (24215+32090) = (24215+32088+32090)
1233	Mod : (24215+24588+26925+32088) = (24215+24588+26925+32090) = (24215+24588+26925+32088+32090)
1234	Mod : (25205+28916) = (26111+28916) = (26485+28916) = (26999+28479) = (26999+28702) = (26999+28916) = (28382+28916) = (28916+30241) = (28916+30631) = (28916+30635) = (24075+25205+28916) = (25205+26999+28495+28916) = (26999+28382+28479+28495) = (26999+28382+28495+28702) = (26999+28382+28495+28916)
1238	Mod : (22013+26111) = (24105+26111) = (26002+26111) = (28218+26999) = (28218+28382) = (28218+30241) = (26002+28382) = (28218+30635) = (26999+28218+28382) = (26999+28218+28382+28495) = (25204+26999+27917+28218) = (24105+26999+28382+28495) = (25204+26002+26999+28218) = (25204+26002+26999+28218+28382+28495)

	CODE	DESIGNATION
	1242	IAE V2527A5 = CFM 56-5-B4 = Mod : 22013 = 23108 = 23109 = 23408 = 23871 = 24105 = (23108+V2527a5) = (23871+56-5-B4) = (32207+56-5-B4) = (23108+23109) = (23109+23408) = (24105+32207) = (24105+32207+CFM 56-5-B7) =(24105+32207+ IAE V2527M) = (23108+23109+23408) = (22013+32207) = (V2527A5+32207) = (56-5-A1+23871) = (56-5-A3+23871) = (56-5-A4+24105) = (56-5-A5+24105)
	1244	Mod : 23222 = 26057 = (23222+26057) = (23222+56-5-A1) = (56-5-A3+23222)
	1247	Mod : 24105 = 26334= 26335 = (26335+31395+32207) = (26335+27276+32207) = (24105+27276+31395+32207) = (26334+27276+31395+32207) = (26335+27276+31395+32207) = (24105+27276+30977+31395+32207) = (26335+27276+30977+31395+32207)
	1248	Mod : 22013 = (22013+27276+32207) = (22013+31395+32207) = (22013+27276+31395+32207) = (22013+27276+30977+31395) = (22013+27276+30977+31395+32207)
	1249	Mod : (27276+30020+31395) = (24105+27276+30020+31395) = (27276+30020+30977+31395+32207) = (24105+27276+30020+30977+31395+32207)
	1250	Mod : (23222+25615+26398) = (23222+24105+25615+26398) = (23108+23222+25615+26398) = (23108+23222+25615+26398+V2527A5) = (22013+25615+26057+26398) = (22013+25615+26057+26398+32207) = (23222+24105+25615+26398+32207) = (23108+23222+25615+26398+32207+V2527A5)
	1251	Mod : 26925 = (24105+26925)
	1252	Mod : STD = 27979 = (24266+32310) = (20075+27979) = (24266+27979) = (24266+27979+32310)
	1253	Mod : (23222+32207+34024) = (23222+24105+32207+34024)
	1254	Mod : (32207+34024) = (24105+32207+34024)
	1256	Mod : 24404 = 24405 = 25530 = 27640 = (24405+27640)
	1258	Mod : (26526+20343) = (26526+31276) = (26526+31276+27498) = (26526+20343+27498) = (26526+27498+31276+34637)
	1259	Mod : (20343+26526) = (26526+31276) = (26526+27498+31276+34637)
	1260	Mod : (20268+24946+27773)=(20268+27773+32238)=(20268+27773+32311)
	1262	Mod : (22561+30626) = (20082+22561+30626)
	1265	Mod : (20268+24946+27773) = (20268+27773+32311) = (20268+26965+27773+32311)
R	1266	Mod : (22013+22561+30626) = (20082+22013+22561+30626)
	1267	Mod : (20268+27773+32311) = (20268+24946+27773+32150) = (20268+26965+27773+32311)
	1269	Mod : (32087+32088) = (32087+32090) = (32087+32088+32090)
	1271	STD = Mod : 23885 = (26999+28495) = (26999+27917) = (34637+35350)
	1272	Mod : 28244 = 34637 = (23885+28244) = (26999+28244+28495) = (23885+26111+26999+28244)
R	1275	"Mod : (24064+35220)=(24065+35220)=(24066+35220)=(24067+35220) "
	1277	Mod : (26526+35220) = (23779+26526+35220)
	1278	Mod : 24349+35220 = 24785+35220 = 24852+35220 = (23779+24349+35220) = (23779+24785+35220) = (23779+24852+35220) = (23779+24349+24785+35220) = (23779+24785+24852+35220)
	1279	Mod : (24349+26526+35220) = (23779+24349+26526+35220) = (23779+24785+26526+35220) = (23779+24852+26526+35220) = (23779+24349+24785+26526+35220) = (23779+24785+24852+26526+35220)
	1285	Mod : (21678+22536+27522+35227) = (21678+23227+27522+35227) = (21678+23529+27522+35227) = (21678+22536+27522+35865) = (21678+23227+27522+35865) = (21678+23529+27522+35865)

	CODE	DESIGNATION
	1286	Mod : (21678+22536+27522+33100+35227) = (21678+22536+27522+33300+35227) = (21678+23529+27522+33100+35227) = (21678+23529+27522+33300+35227) = (21678+23227+27522+33100+35227) = (21678+23227+27522+33300+35227) = (21678+22536+27522+33100+35865) = (21678+22536+27522+33300+35865) = (21678+23529+27522+33100+35865) = (21678+23529+27522+33300+35865) = (21678+23227+27522+33100+35865) = (21678+23227+27522+33300+35865)
	1287	Mod : 34041 = (20268+34041)
	1288	Mod : 34041 = (23893+25225+34041)
R	1289	Mod : 26645+30439+31040+31283+34041
R	1290	Mod : 26335+27276+30977+31395+32207+34041
R	1291	Mod : 26526+26925+30660+31283+34041
R	1292	Mod : 21678+26335+28160+32207+34041
	1296	Mod : 34313 = 34809 = (32651+34313) = (32651+34809) = (32650+32651+34313) = (32650+32651+34809)
	1297	
	1298	Mod : (20024+32650) = (20024+34035) = (20024+32650+34035)
	1299	Mod : (20024+34313) = (20024+34809) = (20024+32651+34313) = (20024+32651+34809) = (20024+32650+32651+34313) = (20024+32650+32651+34809)
	1300	Mod : (22013+34313) = (22013+34809) = (20024+22013+34313) = (20024+22013+34809)
	1301	Mod : STD = (31283+34861) = (31283+34862) = (31283+34864)
	1302	Mod : 20024 = (20024+31283+34861) = (20024+31283+34862) = (20024+31283+34864)
	1303	Mod : 22013 = (20024+22013) = (20024+22013+31283+34861) = (20024+22013+31283+34862) = (20024+22013+31283+34864)
	1304	Mod : (22013+31283) = (20024+22013+31283)
R	1309	Mod : (32619+35220)=(33239+35220)=(34156+35220)
	1311	Mod : (22013+31283+35220) = (25951+31283+35220) = (22013+28479+31283+35220)
R	1312	Mod : (22013+31283+35220+P6911)=(25951+31283+35220+P6911)
	1313	Mod : 35220 = (35220+33909)
	1314	Mod : 35220 = (35220+33910)
	1317	Mod : (31283+35220) = (28479+31283+35220) = (22013+24044+31283+35220) = (25951+31283+32239+35220)
	1318	Mod : (31283+35220+P6911) = (28479+31283+35220+P6911) = (22013+24044+31283+35220+P6911) = (25951+31283+32239+35220+P6911)
	1319	Mod : (26965+35220) = (22013+26925+35220)
	1320	Mod : (26925+35220) = (24105+26925+35220) = (22013+26925+35220)
	1321	Mod : (25205+20268) = (23885+20268) = (26999+20268) = (28382+20268) = (30241+20268) = (26485+20268) = (30631+20268) = (26999+28382+28495+20268) = (25205+26999+28495+20268)
	1322	Mod : 25205 = 23885 = 26999 = 28382 = 30241 = 26485 = 30631 = (26999+28382+28495) = (25205+26999+28495)

CODE	DESIGNATION
1323	"Mod : (CFM Eng. 56-5-B1+20268+31701+25205)= (CFM Eng. 56-5-B1+20268+31701+23885) = (CFM Eng. 56-5-B1+20268+31701+26999)= (CFM Eng. 56-5-B1+20268+31701+28382) = (CFM Eng. 56-5-B1+20268+31701+30241)= (CFM Eng. 56-5-B1+20268+31701+26485) = (CFM Eng. 56-5-B1+20268+31701+30631)= (CFM Eng. 56-5-B1+20268+31701+26999+28382+28495) = (CFM Eng. 56-5-B1+20268+31701+25205+26999+28495) = (CFM Eng. 56-5-B1+20268+34818+25205)= (CFM Eng. 56-5-B1+20268+34818+23885) = (CFM Eng. 56-5-B1+20268+34818+26999)= (CFM Eng. 56-5-B1+20268+34818+28382) = (CFM Eng. 56-5-B1+20268+34818+30241)= (CFM Eng. 56-5-B1+20268+34818+26485) = (CFM Eng. 56-5-B1+20268+34818+30631)= (CFM Eng. 56-5-B1+20268+34818+26999+28382+28495) = (CFM Eng. 56-5-B1+20268+34818+25205+26999+28495) = (CFM Eng. 56-5-B3+20268+25205)= (CFM Eng. 56-5-B3+20268+23885) = (CFM Eng. 56-5-B3+20268+26999)= (CFM Eng. 56-5-B3+20268+28382) = (CFM Eng. 56-5-B3+20268+30241)= (CFM Eng. 56-5-B3+20268+26485) = (CFM Eng. 56-5-B3+20268+30631)= (CFM Eng. 56-5-B3+20268+26999+28382+28495) = (CFM Eng. 56-5-B3+20268+25205+26999+28495)"
1324	(CFM Eng. 56-5-B3+20268) = (CFM Eng. 56-5-B1+20268+31701) = (CFM Eng. 56-5-B1+20268+34818) = (CFM Eng. 56-5-B3+20268+26999+28495) = (CFM Eng. 56-5-B1+20268+31701+26999+28495) = (CFM Eng. 56-5-B1+20268+34818+26999+28495)
1325	
1326	Mod : (23779+24349+34637) = (23779+24852+26526+34637) = (23779+24349+24785+26526+34637) = (23779+24852+34637)
1333	Mod : 26526 = 34825 = 30170 = (28244+34825) = (28244+30170) = (26526+28244+30170) = (26526+28244+34825)
1334	Mod : (26999+32475) = (26999+32929) = (28382+32475) = (30631+32475) = (25205+32929) = (26999+31896+32402) = (26999+31897+32401) = (30241+31896+32402) = (26999+28382+28495+32475) = (26999+28382+28495+32929) = (26999+31896+32332+32475) = (26999+31897+32333+32929) = (26999+28382+28495+31896+32402) = (26999+28382+28495+31897+32401) = (26999+28382+28495+31896+32332+32475) = (26999+28382+28495+31897+32333+32929)
1335	Mod : (24349+26526) = (24785+26526) = (23779+24349+26526) = (23779+24785+26526) = (23779+24852+26526) = (23779+24349+24785+26526) = (23779+24785+24852+26526)
1340	Mod : 24035 = 24160 = 24211 = (24035+24211) = (23450+24035) = (23450+24211) = (23450+24035) = (23450+24211) = (20406+23450+24035) = (20406+23450+24211) = (23450+24035+24211) = (23450+24035+24211)
1344	Mod : 31896 = 32475 = (31896+32475) = (31896+32332+32475)
1348	Mod : STD = 25800 = (31896+32332) = (25800+31896+32332)
1349	Mod : 31896 = 32475 = (31896+32475) = (25800+31896) = (25800+32475) = (31896+32332+32475) = 25800+31896+32475) = (25800+31896+32332+32475)
1350	Mod : (25800+31896) = (25800+32475) = (25800+31896+32475) = (27455+25800+31896) = (27455+25800+32475) = (25800+31896+32332+32475) = (27455+25800+31896+32475) = (27455+25800+31896+32332+32475)
1351	Mod : 32619 = 33239 = (32619+33239)
1352	Mod : STD = 25800 = 31896 = 32475 = (31896+32475) = (25800+31896) = (25800+32475) = (31896+32332+32475) = (25800+31896+32475) = (25800+31896+32332+32475)
1353	Mod : 31897= 32929 = (31897+32929) = (31897+32333+32929)
1354	Mod : STD = 31896 = 32475 = (31896+32475) = (31896+32332+32475)
1355	Mod : 31896 = 32475 = (31896+32475) = (27455+31896) = (27455+32475) = (31896+32332+32475) = (27455+31896+32475) = (27455+31896+32332+32475)

CODE	DESIGNATION
1356	Mod : 31896 = 32475 = (31896+32475) = (31896+32332+32475)
1357	Mod : STD = 32656 = 34221 = (32656+34221)
1358	Mod : 34221 = (32656+34221)
1359	Mod : 32619 = (28238+32619)
1360	Mod : 28238 = (28238+32656)
1361	Mod : 34221 = (28238+34221) = (32656+34221) = (28238+32656+34221)
1362	Mod : 32656 = 34221 = (32656+34221)
1364	Mod : (21678+22013+25404+26377) = (21678+22013+25404+26999) = (21678+22013+25404+26377+26999) = (21678+22013+25404+26377+31283+34864) = (21678+22013+25404+26377+31283+34861) = (21678+22013+25404+26377+26999+31283+34861) = (21678+22013+25404+26377+26999+30626+35110)
1365	Mod : (26925+30660+31283+34637) = (26526+26925+30660+31283+34637) = (26526+30660+31283+34637+34862)
1366	STD = Mod : 28916 = 26526 = (26999+27917) = (28916+34637) = (26526+28916) = (26999+28495) = (26999+28479+28495) = (26526+26999+27917) = (26526+26999+28479+28495) = (26526+26999+28382+28495+28916+30635)
1373	Mod : (25205+32929) = (26999+32475) = (26999+32929) = (30631+32475) = (28382+32475) = (26999+31896+32402) = (26999+31897+32401) = (30241+31896+32402) = (26999+28382+28495+32475) = (26999+28382+28495+32929) = (26999+31896+32332+32475) = (26999+31897+32333+32929) = (26999+28382+28495+31896+32402) = (26999+28382+28495+31897+32401) = (26999+28382+28495+31897+32929) = (26999+28382+28495+31897+32333+32929) = (26999+28382+28495+31896+32332+32475)
1377	Mod : (21678+26017) = (21678+26017+33100+34856) = (21678+26017+33100+34997)
1378	Mod : (21678+24105+26017) = (21678+24105+26017+33100+34898)
1382	Mod : (20059+20067+20069+20071+21708) = (20059+20067+20069+20816+21708+27063) = (20059+20067+20069+20071+21708+33100+34856) = (20059+20067+20069+20071+21708+31283+33100+34856+34862)
1383	Mod : 24771 = (24771+33100+34856) = (24771+33100+34898)
1385	Mod : (21678+22536+27522) = (21678+23227+27522) = (21678+23529+27522) = (21678+23227+27522+33100+34997) = (21678+22536+27522+33100+34997) = (21678+23529+27522+33100+34898) = (21678+23529+27522+33100+34856) = (21678+23227+27522+33100+34898) = (21678+22536+27522+33100+34856) = (21678+22536+27522+33100+34898) = (21678+23227+27522+33100+34856)
1388	STD = Mod : 26963 = 28377 = 28667 = (25419+26963) = (25419+28667) = (28377+28667) = (27992+28377+28667) = (25419+26963+27992+28667) = (25419+26963+27992+28377) = (26963+28377+28667) = (25419+26963+28377) = (25419+26963+28667) = (25419+26963+28377+28667) = (25419+26963+27992+28377+28667)
1389	STD = Mod: 31896 = 31897 = 32401 = 32402 = 32929 = 32475 = (31896+32332+32475) = (31897+32333+32929) = (28378+31896) = (31896+32332) = (31896+32402) = (31897+32333) = (31897+32401) = (31897+32929) = (32401+32929) = (32333+32929) = (31896+32402+32475) = (31897+32401+32929)
1390	Mod : 32088 = 32090 = (32088+32090)
1391	Mod : (26925+32088) = (26925+32090) = (26925+32088+32090)
1392	Mod : (22013/56-5-B3) = (22013+31607) = (22013+31701) = (22013+31702) = (22013+34818) = (20268+22013)
1393	Mod : (56-5-B3+20268) = (56-5-B1+20268+31701) = (56-5-B1+20268+34818)

	CODE	DESIGNATION
R	1394	Mod : 20268=(20268+31701)=(20268+34818)
	1403	Mod : (20406+22013+28479+28960) = (20406+22013+28721+28916) = (20406+22013+28916+28960) = (20406+22013+24588+28479+28960)
	1404	Mod : STD = (31283+34861) = (31283+34862) = (31283+34864)
	1407	Mod : 21055 = (21055+25199) = (21055+25200)
	1408	Mod : 30626 = (26363+26792+28488+30626)
	1409	Mod : (21899+30363) = (21899+30363+31283+34864) = (21899+30363+31283+34861) = (21899+30363+31283+34862)
	1421	Mod : 31674/(56-5-B8=56-5-B9=6122=6124) = (20141+20802+31674)/56-5-B8
	1427	(26363+26792+28488) = (26363+26792+28488+30626+35110)
	1428	22561 = (22561+30626+35110)
	1429	(22013+22561) = (22013+22561+30626+35110)
	1430	(20082+22013+22561) = (20082+22013+22561+30626+35110)
	1434	Mod : (21678+25404+31283) = (21678+25404+31283+30626+35110)
	1435	Mod : (21678+21858+25404+31283) = (21678+21858+25404+31283+30626+35110)
	1436	Mod : 26377 = 26999 = (26377+26999) = (26377+26999+31283+34864) = (26377+26999+31283+34862) = (26377+26999+31283+34862+30626+35110) = (26377+26999+30626+31283+34864+35110)
	1441	STD = 28685 = 28686 = (28685+34506) = (28686+34506) = (31528+28685) = (31528+28686)
	1442	Mod : 31039 = 31528 = (31528+28685+34506) = (31528+28686+34506)
	1443	Mod : (26377+26999+31283) = (26377+26999+30626+31283+35110)
	1444	Mod : (26377+26999+31283) = (26377+26999+30626+31283+35110)
R R	1446	Mod : (21678+22013+25404+26377+30626+31283)=(21678+22013+25404+26999+30626+31283)
	1447	Mod : 26485 = 26999 = 27646 = 30631 = (26999+27646) = (26999+33100+34856) = (26999+33100+34898) = (26999+31283+34864) = (26999+31283+34861) = (26999+31283+34862) = (26999+27646+31283+34862) = (26999+27646+31283+34861) = (26999+30626+31283+33100+34862+34898+35110) = (26999+30626+31283+33100+34856+34862+35110)
	1448	Mod : (22013+26485) = (22013+26999) = (22013+27646) = (22013+30631) = (22013+26999+27646) = (22013+26999+33100+34997) = (22013+26999+31283+34864) = (22013+26999+27646+31283+34861) = (22013+26999+30626+31283+33100+34864+34887+35110)
	1451	Mod : (22013+26999+31283) = (22013+27646+31283) = (22013+26999+27646+31283) = (22013+26999+31283+33100+34997) = (22013+26999+30626+31283+33100+34997+35110)
	1455	Mod : (21678+22013+25404+26377) = (21678+22013+25404+26999) = (21678+22013+25404+26377+28479) = (21678+22013+25404+26377+28479+31283+34861) = (21678+22013+25404+26377+26728) = (21678+22013+25404+26377+26728+31283+34864) = (21678+25404+26017+26999+33100+34856) = (21678+25404+26017+26999+33100+34898) = (21678+25404+26017+26999+30626+31283+33100+34856+34862+35110) = (21678+25404+26017+26999+30626+31283+33100+34862+34898+35110)
	1461	Mod : 21533 = 34540 = (32207+34540+V2527A5) = (24105+32207+34540)
	1462	Mod : 25615 = (25615+CFM56-5-B4) =(23108+25615) = (24105+25615) = (24105+25615+32207+CFM56-5-B7) = (23108+24105+25615+32207+V2527MA5)
	1463	Mod : (23222+26398) = (23222+26398+V2527A5) = (23222+26398+CFM56-5-B4) = (23222+26057+26398) = (22013+23222+26398) = (22013+26057+26398) = (23222+23408+26398) = (23222+26398+26057+V2527A5) = (23222+26057+26398+CFM56-5-B4) = (23222+24105+26398+32207) = (22013+26057+26398+32207)

	CODE	DESIGNATION
	1464	Mod : 26256 = (26256+31283+34864) = (26256+31283+34861)
	1466	Mod : STD = (31283+24862) = (31283+34861) = (31283+34861) = (31283+34864)
	1467	Mod : (20057+20059+20067+20069+20071) = (20057+20059+20067+20069+20071+32146) = (20057+20059+20067+20069+20816+27063) = (20057+20059+20067+20069+20071+31283+34864) = (20057+20059+20067+20069+20071+31283+34862)
	1470	Mod : (20057+20059+20067+20069) = (20057+20059+20067+20069+26728) = (20057+20059+20067+20069+31283+34864)
	1471	Mod : (56-5-B1 = 56-5-B2 = 56-5-B3) = (25888+ (56-5-B1 = 56-5-B2 = 56-5-B3)) = (25888+30660+34864 + (56-5-B1 = 56-5-B2 = 56-5-B3)) = (25888+30660+34861 + (56-5-B1 = 56-5-B2 = 56-5-B3))
	1475	Mod : 22562 = (22562+30660+34861) = (22562+30660+34864)
	1476	Mod : 25888 = (25888+30660+34861) = (25888+30660+34864)
	1477	Mod : (24105+27276+30020) = (24105+27276+30020+30748+33323)
R	1478	Mod : (22013+27276+30748+25615+33323)
R	1480	Mod : (24105+27276+28162+30748+33323)
R	1481	Mod : (24105+27276+30748+33323+25615)
R	1482	mod : (24105+27276+30748+33323+34540)
	1485	Mod : (21678+22013) = (21678+24105) = (21678+28160) =(21678+30020) = (21678+22013+31283+34861) = (21678+22013+31283+34864) = (21678+28160+31283+34861) = (21678+24105+31283+34861)
	1486	Mod : 25404 = (25404+28160+28917) = (25404+28160+28917+31283+34864)
	1487	Mod : (22013+25404) = (22013+25404+28479+31283+34864)
	1488	Mod : (21678+21706+21766+21767+21768) = (21678+21706+21766+21767+21768+31283+34864)
	1489	Mod : 24105 = 28160 = (24105+30626+35110) = (28160+30626+35110)
	1490	Mod : STD = (28160+28917) = (28160+28917+31283+34864)
	1491	Mod : 22013 = 24015 = 28160 = (22013+31283+34864) = (24105+31283+34861) = (22013+31283+34861) = (24105+31283+34862) = (28160+31283+34861) = (28160+31283+34862) = (22013+30626+31283+34864+35110) = (24105+30626+31283+34862+35110) = (28160+30626+31283+34862+35110)
	1492	Mod : (22013+31283) = (24105+31283) = (28160+31283) = (22013+30626+31283+35110) = (24105+30626+31283+35110) = (28160+30626+31283+35110)
	1493	Mod : STD = (31283+34864)
	1494	Mod : STD = (30626+35110)
R	1495	Mod : (28238+32635+34035)=(28238+32635+32650)
	1496	Mod : 28378 = 33973 = 34456 = (28238+32651) = (33973+32651) = (34456+32651) = (28378+32650+32651) = (33973+32650+32651) = (34456+32650+32651)
R R	1497	Mod :(28378+34035) = (33973+34035) = (34456+34035) = (28378+32650) = (33973+32650) = (34456+32650)
	1498	Mod : STD = 32651 = (32650+32651)
	1499	Mod : STD = (28160+28917)
	1500	Mod : 32088 = 32090 = (32088+28160+28917) = (32090+28160+28917)
R R	1501	Mod : (22013+32088) = (22013+32090) = (24105+32088) = (24105+32090) = (28160+32088) = (28160+32090)
	1502	Mod : STD = (31283+34864) = (31283+34861) = (31283+34862)
	1508	Mod : STD = (31283+34864) = (31283+34862)
	1509	Mod : 22562 = (22562+28160+28917) = (22562+30660+34861) = (22562+30660+34864)
	1511	Mod : 22562 = (22562+30660+34861) = (22562+30660+34864)

CODE	DESIGNATION
1515	Mod : (25888+30660) = (25888+34862+30660)
1523	Mod : STD = 32401 = 32402 = 32475 = 32929 = (31896+32332) = (31897+32333) = (31897+32929) = (31896+32402) = (31897+32401)
1526	Mod : 28160 = (22562+25072+28160) = (28160+30660+34861) = (28160+30660+34864)
1527	Mod : (22562+28160) = (22562+28160+30660+34861) = (22562+28160+30660+34864)
1529	Mod : (22562+28160) = (25888+28160) = (22562+28160+30660+34861) = (22562+28160+30660+34864) = (25888+28160+30660+30660+34861) = (25888+28160+30660+34864)
1532	Mod : ALL CFM = (31283+34861+ALL CFM) = (31283+34862+ALL CFM) = (31283+34864+ALL CFM)
1533	Mod : ALL IAE = (31283+34861+ALL IAE) = (31283+34862+ALL IAE) = (31283+34864+ALL IAE)
1535	Mod : 24035 = 24160 = 24189 = (24035+31283+34861) = (24035+31283+34862) = (24035+31283+34864) = (24160+31283+34861) = (24160+31283+34862) = (24160+31283+34864) = (24189+31283+34861) = (24189+31283+34862) = (24189+31283+34864)
1538	Mod : (26925+28479+34041) = (26925+28479+34041+34861) = (26925+28479+34041+34862)
1539	Mod : (30660+34041) = (30660+34041+34862)
1540	Mod : 20268 = (20268+25800) = (20268+24404+35404) = (20268+27727+35404) = (20268+24404+27727+35404) = (20268+24404+25800+35404) = (20268+25800+27727+35404) = (20268+24404+25800+27727+35404)
1541	STD = Mod : (26645+31040) = (27846+31040) = (28703+31040) = (30439+31040) = (31283+34864) = (26645+31283+34861+31040) = (26645+31283+34862+31040) = (26645+31283+34864+31040) = (26645+30439+31040+31283+34862)
1542	Mod : 26645 = 27846 = 28703 = 30439 = (26645+31283+34861) = (26645+31283+34862) = (26645+31283+34864)
1543	Mod : (22249+25529) = (22249+26117) = (22249+26270) = (22249+25529+31283+34864) = (22249+25529+31283+34862) = (22249+25529+31283+34861) = (22249+26270+31283+34864) = (22249+26270+31283+34862) = (22249+26270+31283+34861)
1544	Mod : (26645+31283) = (26645+30439+31283)
1545	Mod : (26645+31040+31283) = (26645+30439+31040+31283) = (26645+27846+30439+31040+31283)
1546	Mod : (26645+30020+31040+31283) = (26645+27846+30020+30439+31040+31283)
1547	Mod : 22249 = (22249+26270+34514) = (22249+31283+34861) = (22249+31283+34862) = (22249+31283+34864) = (22249+26270+26728+34514)
1548	Mod : (22249+25529+31283) = (22249+26270+31283) = (22249+26117+31283) = (22249+25529+31283) = (22249+25529+26117+31283) = (22249+26117+26270+31283) = (22249+25529+31283)
1549	STD = Mod : 23885 = (26999+28495) =(34637+35350)
1552	Mod : (25204+26999+30823+31105) = (25204+26999+31105+31706) = (25204+26999+28382+28495+31105) = (24105+25204+26999+28382+28495+31105) = (24105+25294+26002+26999+28218+30823+31105) = (24105+25294+26002+26999+28218+31070+31105+31706) = (22013+26002+26999+28218+28382+28495+31105+31706) = (22013+26002+26999+28218+30823+31105+31706) = (22013+26002+26999+31070+31105+31706) = (24105+26002+26999+28218+31070+31105+31706) = (25204+25205+26999+28382+31105) = (25204+26002+26999+28218+30823+31105)

CODE	DESIGNATION
1553	Mod : 25205 = 26485 = 26999 = 28382 = 30241 = 30631 = 30635 = (22013+25204+26999) = (22013+25204+28382) = (24105+25294+26999) = (24105+25294+28382) = (26999+28382+28495) = (24105+25204+28382) = (22013+25204+26999+28382+28495) = (24105+25294+26999+28382+28495) = (24105+25294+26002+26999+28218) = (22013+25204+26002+26999+28218+28382+28495) = (25204+26999) = (25204+26999+28382+28495) = (25204+25205+26999+28495) = (24105+25204+25205+25294+26002) = (24105+25294+26002+26999+28218+28382+28495) = (24105+25294+26002+26999+28218+28382+28495+30635) = (24105+26002+26999+28218+31070+31105) = (22013+25204+26002+26999+28218) = (22013+25204+26002+26999+28218+28382+28495)
1554	Mod : 36847 = (22562+25072+36847) = (25888+27609+36847) = (28160+28917+36847) = (22562+25072+28160+28917+36847) = (25888+27609+28160+28917+36847)

N°	ISSUE DATE	
00	JAN 1987	
01	FEB 1987	
02	SEP 1987	
03	JAN 1988	
04	MAR 1988	
05	MAY 1988	
06	JUL 1988	
07	AUG 1988	
08	OCT 1988	
09	JAN 1989	
10	JAN 1989	
11	APR 1989	
12	JAN 1989	
13	JAN 1990	
14	SEP 1990	
15	FEB 1991	
16	JUL 1991	
17	MAR 1992	
18	DEC 1992	
19	APR 1993	
20	JUL 1993	
21	NOV 1993	
22	JUL 1994	
23	JUL 1995	
24	MAR 1997	
25	JAN 1998	
26	JUL 1998	
27	JAN 1999	

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N°	ISSUE DATE	
28	APR 1999	
29	SEP 1999	
30	MAR 2000	
31	JUL 2000	
32	DEC 2000	
33	JUL 2001	
34	DEC 2001	
35	JUN 2002	
36	MAR 2003	
37	JAN 2004	
38	SEP 2004	
39	SEP 2005	
40	JUL 2006	
41	FEB 2007	

N° TITLE	STATUS	LOCATION
To be filled by the operator, if needed.		

THIS TABLE GIVES, FOR EACH AIRCRAFT INCLUDED IN THE MANUAL, THE CROSS REFERENCE BETWEEN :

- THE MANUFACTURING SERIAL NUMBER (MSN) WHICH APPEARS IN THE LIST OF EFFECTIVE PAGES

- THE REGISTRATION NUMBER OF THE AIRCRAFT AS KNOWN BY AIRBUS INDUSTRIE.

MSN	REGISTRATION
2052	VP-BWA
2069	VP-BDM
2072	VP-BDN
2091	VP-BDO
2093	VP-BWG
2106	VP-BDK
2116	VP-BWD
2133	VP-BWE
2144	VP-BWF
2151	VP-BWH
2163	VP-BWI
2179	VP-BWJ
2222	VP-BWK
2233	VP-BWM
2243	VP-BWL
2330	VP-BWN
2337	VP-BWO
2342	VP-BWP
2875	VP-BQP
2903	VP-BQR
2912	VP-BQS
2920	VP-BQV
2947	VP-BQW
2957	VP-BQX
2965	VP-BQT
3052	VP-BRY
3063	VP-BRX
3157	VP-BRZ
3191	VP-BRW
3267	VP-BUM
3281	VP-BUK
3298	VP-BUN
3334	VP-BUP
3336	VP-BUO
3373	VP-BQU
3410	VP-BKX
3511	VP-BKY
3545	VP-BKC
3574	
3631	

M	V	CH	SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
M	V	CH	SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
3		00	00	001-2	001	REV024	CONTENT	ALL
3		00	10	001	001	REV040	ORGANIZATION OF THE MANUAL	ALL
3		00	10	002	001	REV035	ORGANIZATION OF THE MANUAL	
3		00	10	003	001	REV024	ORGANIZATION OF THE MANUAL	ALL
3		00	10	004	001	REV024	ORGANIZATION OF THE MANUAL	
3		00	10	005	001	REV024	ORGANIZATION OF THE MANUAL	ALL
3		00	20	001	001	REV041	LIST OF CODES	ALL
3		00	20	002	001	REV041	LIST OF CODES	
3		00	20	003	001	REV041	LIST OF CODES	ALL
3		00	20	004	001	REV041	LIST OF CODES	
3		00	20	005	001	REV041	LIST OF CODES	ALL
3		00	20	006	001	REV041	LIST OF CODES	
3		00	20	007	001	REV041	LIST OF CODES	ALL
3		00	20	008	001	REV041	LIST OF CODES	
3		00	20	009	001	REV041	LIST OF CODES	ALL
3		00	20	010	001	REV041	LIST OF CODES	
3		00	20	011	001	REV041	LIST OF CODES	ALL
3		00	20	012	001	REV041	LIST OF CODES	
3		00	20	013	001	REV041	LIST OF CODES	ALL
3		00	20	014	001	REV041	LIST OF CODES	
3		00	20	015	001	REV041	LIST OF CODES	ALL
3		00	20	016	001	REV041	LIST OF CODES	
3		00	20	017	001	REV041	LIST OF CODES	ALL
3		00	20	018	001	REV041	LIST OF CODES	
3		00	20	019	001	REV041	LIST OF CODES	ALL
3		00	20	020	001	REV041	LIST OF CODES	
3		00	20	021	001	REV041	LIST OF CODES	ALL
3		00	20	022	001	REV041	LIST OF CODES	
3		00	20	023	001	REV041	LIST OF CODES	ALL
3		00	20	024	001	REV041	LIST OF CODES	
3		00	20	025	001	REV041	LIST OF CODES	ALL
3		00	20	026	001	REV041	LIST OF CODES	
3		00	20	027	001	REV041	LIST OF CODES	ALL
3		00	20	028	001	REV041	LIST OF CODES	
3		00	20	029	001	REV041	LIST OF CODES	ALL
3		00	20	030	001	REV041	LIST OF CODES	
3		00	20	031	001	REV041	LIST OF CODES	ALL
3		00	20	032	001	REV041	LIST OF CODES	

M V CH SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
3 00 20	033	001	REV041	LIST OF CODES	ALL
3 00 20	034	001	REV041	LIST OF CODES	
3 00 20	035	001	REV041	LIST OF CODES	ALL
3 00 20	036	001	REV041	LIST OF CODES	
3 00 20	037	001	REV041	LIST OF CODES	ALL
3 00 20	038	001	REV041	LIST OF CODES	
3 00 20	039	001	REV041	LIST OF CODES	ALL
3 00 30	001	001	REV027	LIST OF NORMAL REVISION	ALL
3 00 30	002	001	REV041	LIST OF NORMAL REVISION	
3 00 35	001	001	REV025	RECORD OF TEMPORARY REVISION	ALL
3 00 36	001	001	REV041	LETR	ALL
3 00 70	001	001	REV041	CROSS REFERENCE TABLE	ALL
3 00 75	001	001	REV041	HIGHLIGHTS	ALL
3 00 80	001	001	REV041	LIST OF EFFECTIVE PAGES	ALL
3 00 85	001	001	REV041	LIST OF MODIFICATIONS	ALL
3 01 00	001	800	REV028	UR	2052-3191
3 01 00	002	001	REV028	CONTENTS	
3 01 00	001	800	REV028	UR	3267-3631
3 01 00	002	101	REV041	27620	
3 01 10	001	001	REV024		2106-2163 2233 2875 2920-2947 3052-3157 3373-3631
3 01 10	001	100	REV024	M:22013 OR (22013 US)	2330-2342 2903-2912 2957-2965 3191-3267 3334
3 01 10	001	105	REV024	M:24105 OR (24105 US)	2052-2093 2179-2222 2243 3281-3298 3336
3 01 20	001	812	REV039	56-5-B3/UR	2330-2342
3 01 20	002	812	REV039	22013+27276+30748/B3/UR	
3 01 20	001	812	REV039	56-5-B3/UR	2903-2912 2957-2965
3 01 20	002	843	REV040	CODE 0305/56-5-B3/UR	3191-3267 3334
3 01 20	001	815A	REV041	28136/A4/A5/B5/B6/2522/24/UR	2052-2093 2179-2222
3 01 20	002	830	REV039	M:24105+27276+30748	2243 3281-3298 3336
3 01 20	001	823	REV041	23900+30307/56-5-B4/UR	2106-2163 2233
3 01 20	002	820	REV039	M:27276+30748 CFM ENG: 56-5-	
3 01 20	001	823	REV041	23900+30307/56-5-B4/UR	2875 2920-2947
3 01 20	002	834	REV040	M:27276+30748+33323/B4/UR	3052-3157 3373-3631
3 01 20	003	810	REV039	CODE 1028 SEQ 810=(CFM 56-5-	ALL

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3		01	20	004A	100	REV038	22013	2330-2342 2903-2912 2957-2965 3191-3267 3334
3		01	20	004A	115	REV038	24105	2052-2093 2179-2222 2243 3281-3298 3336
3		01	20	005	001	REV027		2106-2163 2233 2875
3		01	20	006	330	REV041	CODE 0643/56-5-B4	2920-2947 3052-3157 3373-3631
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3		01	20	006	068	REV034	CFM 56-5-B5	2243 3281-3298 3336
3		01	20	005	150	REV027	MOD:22013	2330-2342 2903-2912
3		01	20	006	075	REV034	CFM 56-5-B3	2957-2965 3191-3267 3334
3		01	20	007	001	REV031		2106-2163 2233 2875
3		01	20	008	001	REV024		2920-2947 3052-3157 3373-3631
3		01	20	007	001	REV031		2330-2342 2903-2912
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3		01	20	008	105	REV026	MOD:24105	2243 3281-3298 3336
3		01	20	009	020	REV025	CODE 1167	2052-2093 2179-2222
3		01	20	010	105	REV025	M:22013 = 24105	2243-2342 2903-2912 2957-2965 3191-3336
3		01	20	009	110	REV024	MOD:20268 CFM 56-5-A1/A3/B4	2106-2163 2233 2875
3		01	20	010	120	REV026	MOD:20268 CFM 56-5-A1/A3/B4	2920-2947 3052-3157 3373-3631
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3		01	20	011	813	REV041	56-5-B4/UR	2106-2163 2233 2875 2920-2947 3052-3157 3373-3631
3		01	20	011	856	REV037	UR+24105	2052-2093 2179-2222 2243 3281-3298 3336
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	3	01	22	003	108	REV040	24105=(24105/US)/CFM/IAE	3281-3298 3336
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	3	01	22	004A	100	REV040	CODE 0315	2052-2093 2179-2222
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	3	01	24	002	001	REV024		
	3	01	24	001	105	REV036	M:28568	2875-3631
	3	01	24	002	001	REV024		
	3	01	27	001	001	REV024		ALL
	3	01	27	002	001	REV024		
	3	01	28	001	001	REV039		2052-2243 2875
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3		01	32	001	120	REV041	24044/CFM 56-5-B1/B2/B3	2330-2342 2903-2912 2957-2965 3191-3267 3334
3		01	34	001	810	REV040	CODE 1029	ALL
3		01	35	001	105	REV039	CODE 0137	ALL
3		01	49	001	160	REV039	CODE 0089	ALL
3		01	49	002	115	REV032	CODE 0464	
3		01	49	003	810	REV039	M:25888 CFM ENG: 56-5-B3/B4/	ALL
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3		01	70	002	035	REV037	CFM 56-5-B4	2920-2947 3052-3157 3373-3631
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3		02	00	002	102	REV041	CODE 0322	
3		02	00	003	205	REV039	CODE 1501	3157
3		02	00	004	810	REV041	28479/UR	
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3		02	00	004	820	REV041	28479+P6146/UR	
3		02	00	005	001	REV026	CODE 1498	2052-2243 2875
3		02	00	006	300	REV039	M:22875+25590+31283	2920-2947
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	3	02	00	008	105	REV040	M:31283	
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	3	02	00	010	115	REV039	M:31283/CFM	
	3	02	00	009	203	REV037	M:30660+31371	3052-3191
	3	02	00	010	120	REV040	CODE 0653/CFM ALL	
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3		02	24	025	200	REV037	CODE 0751	2903-2912 2957-2965
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3		02	24	027	200	REV037	CODE 1180	2875-3631
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3		02	24	027	205	REV037	CODE 1492	2052-2342
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3		02	25	001	100	REV041	M:32090	ALL
3		02	26	001	001	REV032		2052-2965
3		02	26	002	001	REV033		
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3		02	26	002	100	REV039	35220=20246+20510+35220	
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3		02	26	006A	001	REV040		ALL
3		02	26	006B	100	REV040	CODE 0625	ALL
3		02	26	007	120	REV041	CODE 0318/CFM/PW	2052-2243 2875
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3		02	26	012	210	REV040	CODE 0619	
3		02	26	011	507	REV040	CODE 0408	2875-2965
3		02	26	012	503	REV040	CODE 0243	
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	3	02	27	016	240	REV033	M:21964+22087	
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	3	02	30	001	001	REV037		2052-2965
	3	02	30	002	001	REV024		
	3	02	30	001	001	REV037		3052-3631
	3	02	30	002	105	REV039	M:35220	
	3	02	30	003	100	REV040	M:31283	2052-2965
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3		02	32	009	120	REV040	CODE 0090	3157
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	3	02	34	002	330	REV039	CODE 1279 EQUI 430 530	3336-3631
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3	02	36		006	001	REV024		2243
3	02	36		005	200	REV036	CODE 0125	3281-3298 3336
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3		02	46	001	215	REV039	MOD 30660+31371	2069-2072 2093-2106 2151-2947 3052-3063
3		02	46	001	315	REV039	CODE 0465	2052 2091 2116-2144 2957-2965 3157-3631
3		02	49	001	001	REV024		ALL
3		02	52	001	001	REV024	CODE 0188	ALL
3		02	70	001	125	REV041	CODE 0134/CFM	ALL
3		02	70	002	130	REV030	CODE:0046/56-5-B	
3		02	70	003	120	REV038	M:31283/56-5-B	ALL
3		02	70	004	120	REV041	CODE 0451/CFM ALL	
3		02	70	005	020	REV024	CFM ALL	ALL
3		02	70	006	010	REV041	CFM ALL	
3		02	70	007	020	REV032	CFM	ALL
3		02	70	008	110	REV037	M:31283/CFM	
3		02	70	009	020	REV037	CFM	2052-2965
3		02	70	010	060	REV037	CFM 56-5-B	
3		02	70	009	145	REV039	CODE 1314 CFM ALL	3052-3631
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3		02	70	011	110	REV040	M:31283/CFM	ALL
3		02	70	012	205	REV040	CODE 0631	
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3		02	70	014	103	REV037	M:30660 = (30660+34862)	2330-3267 3334 3373-3631
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3		02	70	014	200	REV037	CODE 0021	2243 3281-3298 3336
3		02	70	015	121	REV037	M:31283/CFM	3052-3157 3281-3298
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3		02	70	015	121	REV037	M:31283/CFM	2052-2243 2875
3		02	70	016	207	REV040	CODE 0493	2920-2947
3		02	70	015	210	REV037	M:22013+31283/CFM	3191-3267 3334
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3		02	70	016	207	REV040	CODE 0493	2957-2965
3		02	70	016A	121	REV040	CODE 0495/CFM	2052-2965

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3		02	70	022	260	REV038	CODE 0035	2243
3		02	70	021	118	REV038	CODE0126/A5/B5/B6/B7/B8/B9	3281-3298 3336
3		02	70	022	310	REV038	CODE 0962	
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3		02	70	022	260	REV038	CODE 0035	
3		02	70	021	212	REV038	CODE 0130/56-5-A1/B4	2875 2920-2947
3		02	70	022	310	REV038	CODE 0962	3052-3157 3373-3631
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3		02	70	024	120	REV024	CODE 1535 CFM ALL	
3		02	70	025	020	REV037	CFM ALL	ALL
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3		02	70	027	130	REV038	CODE 0106	2052-2965
3		02	70	028	850	REV038	UR	
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3		02	70	028	860	REV039	35220 UR	
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3		02	80	005	200	REV039	CODE 1259	ALL
3		02	80	006	910	REV038	CODE 0293/UR/	
3		02	80	007	001	REV034		2330-2342 2903-2912
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3 02 80	015	310	REV038	M:20063+22013+31495	2330-2342
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3	02	80	020	100	REV035	CODE 1206	
3	02	80	021	001	REV039	STD	ALL
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3	02	90	001	001	REV028		2330-2342 2903-2912
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3	02	90	001	001	REV028		2052-2093 2179-2222
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3	02	90	006	001	REV037		
3	02	90	007	001	REV037	STD	ALL
3	02	90	008	001	REV037	STD	
3	03	00	001-2	001	REV027		ALL
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3	03	02	002	001	REV025		
3	03	03	001	001	REV024		ALL
3	03	04	001	001	REV024		ALL
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3	03	04	003	100	REV028	CODE 1212	2052-2342
3	03	04	004	001	REV033		
3	03	04	003	100	REV028	CODE 1212	2875-3631
3	03	04	004	100	REV037	M:26925	
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	3	03	05	003	105	REV036	CODE 1214	2052-2243 2875
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	3	03	05	005	001	REV033		2052-2243 2875
	3	03	05	006	001	REV032		2920-2947 3052-3157
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	3	03	06	005	001	REV031		ALL
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	3	03	06	007	110	REV039	CODE 0506	ALL
	3	03	06	008	001	REV040	CODE 0658	
	3	03	06	009	001	REV024	STD	ALL
	3	03	06	010	200	REV037	M:20406+26358	
	3	03	06	011	001	REV035		ALL
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	3	03	06	013	001	REV039	CODE 1230	ALL
	3	03	06	013A	100	REV039	CODE 0171	ALL
	3	03	06	014	001	REV039		ALL
	3	03	06	015	001	REV039		ALL
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	3	03	08	001	030	REV039	CFM 56-5-B1/B2/B3/B4	2106-2163 2233
	3	03	08	002	020	REV032	CFM ALL	2330-3267 3334
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	3	03	08	003	040	REV030	B1/B2/B3/B4/B5/B6/B7/B8/B9	ALL
	3	03	09	001	020	REV029	CFM ALL	ALL
	3	03	09	002	110	REV039	CODE 0780 /CFM ALL	
	3	03	10	001	001	REV034		2052-2342
	3	03	10	002	001	REV039		
	3	03	10	001	001	REV034		2875-3631
	3	03	10	002	100	REV039	M:26925	
	3	03	10	003	200	REV024	MOD:21964+22087	ALL
	3	03	10	004	001	REV041	STD	
	3	03	10	005	001	REV040	STD	2052-2243
	3	03	10	005	105	REV040	33253=33505	2330-3631
	3	03	10	005A	001	REV039	STD	ALL
	3	03	10	006	001	REV034	STD = (20139+22129)	2106-2163 2233 2875
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	3	03	10	006	105	REV036	24105	2052-2093 2179-2222
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	3	03	10	006	150	REV025	M:22013	2330-2342 2903-2912
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	3	03	11	002	100	REV039	20081	
	3	03	12	001	001	REV040		ALL
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	3	03	12	003	001	REV036		ALL
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	3	03	14	001	100	REV027	CODE 0189	2330-3631
	3	03	14	002	200	REV041	CODE 0173	
	3	03	15	001	001	REV035	CODE 0784	2052-2243
	3	03	15	002	001	REV040		
	3	03	15	001	001	REV035	CODE 0784	2330-3631
	3	03	15	002	100	REV040	33253=33505=34660	
	3	03	16	001	100	REV025	CODE:0965	ALL
	3	03	16	002	001	REV040		
	3	03	16	003	101	REV040	CODE 0783	ALL
	3	03	17	001	100	REV039	CODE 0036	ALL
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	3	03	17	003	203	REV040	M(20406+24035)=(20406+24211)	2052-2243
	3	03	17	004	103	REV041	M:26358	
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	3	03	17	004	103	REV041	M:26358	
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	3	03	18	002	315	REV040	CODE 0413	
	3	03	18	001	200	REV027	CODE 0776	2875-3631
	3	03	18	002	405	REV040	CODE 0426	
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	3	03	18	007	200	REV040	MOD 22013+26925	2903-2912 2957-2965
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3		03	19	006	200	REV040	CODE 0541	
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3		03	19	006	315	REV040	CODE 0545	
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3		03	19	006	405	REV040	CODE 0427	
3		03	19	007	100	REV036	CODE 0984	2052-2342
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3		03	20	001	100	REV035	CODE 0779	ALL
3		03	20	002	001	REV041		
3		03	21	001	001	REV024		ALL
3		03	22	001	020	REV032	56-5-B1/B2/B3	2330-2342 2903-2912
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3		03	22	001	035	REV032	56-5-B5/B6/B7	2052-2093 2179-2222
3		03	22	002	035	REV032	56-5-B5/B6/B7	2243 3281-3298 3336
3		03	22	001	040	REV032	CODE 0120	2106-2163 2233 2875
3		03	22	002	040	REV032	CODE 0120	2920-2947 3052-3157
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	3	03	22	003	105	REV035	24105	2052-2093 2179-2222
	3	03	22	004	105	REV041	M:24105	2243 3281-3298 3336
	3	03	22	005	001	REV039		ALL
	3	03	22	006	001	REV027		
	3	03	23	001	110	REV036	CODE 0156	ALL
	3	03	23	002	102	REV038	CODE 0507	
	3	03	23	003	100	REV036	CODE 0158	ALL
	3	03	23	004	100	REV036	CODE 0156	
	3	03	24	001	100	REV039	20081	ALL
	3	03	24	002	001	REV034	CODE 0754	
	3	03	25	001	020	REV038	CODE 0919/CFM ALL	2052-2243 2875
	3	03	25	002	001	REV039		2920-2947 3052-3157
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	3	03	25	001	020	REV038	CODE 0919/CFM ALL	2330-2342 2903-2912
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	3	03	25	003	235	REV038	CODE 0389/CFM	ALL
	3	03	26	001	102	REV040	MOD. 26284 = 26285	2106-2163 2233 2875
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	3	03	26	001	205	REV040	CODE 0221	2052-2093 2179-2222
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	3	03	90	001	001	REV040		ALL
	3	03	90	002	001	REV040		
	3	03	90	003	001	REV041		2052-2243 2875
	3	03	90	004	001	REV040		2920-2947 3052-3157
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	3	03	90	005	001	REV040		ALL
	3	03	90	006	001	REV040		
	3	03	90	007	001	REV040		ALL
	3	03	90	008	001	REV040	STD	
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3		04	00	003	001	REV040		ALL
3		04	10	001	001	REV024		2106-2163 2233
3		04	10	002	005	REV028	CFM ALL	
3		04	10	001	001	REV024		2330-2342
3		04	10	002	105	REV028	MOD 22013 CFM ALL	
3		04	10	001	001	REV024		2052-2093 2179-2222
3		04	10	002	115	REV028	M:24105/CFM ALL=IAE ALL	2243
3		04	10	001	100	REV037	M:31040	2875 2920-2947
3		04	10	002	120	REV037	31040 CFM ALL	3052-3157 3373-3631
3		04	10	001	100	REV037	M:31040	2903-2912 2957-2965
3		04	10	002	205	REV037	22013+31040 CFM ALL	3191-3267 3334
3		04	10	001	100	REV037	M:31040	3281-3298 3336
3		04	10	002	220	REV037	24105+31040 CFM ALL=IAE ALL	
3		04	10	003	001	REV040		2052-2093 2179-2222
3		04	10	004	100	REV024	MOD:22013 OR 24105	2243-2342 2903-2912
								2957-2965 3191-3336
3		04	10	003	001	REV040		2106-2163 2233 2875
3		04	10	004	110	REV024	MOD:25225	2920-2947 3052-3157
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3		04	21	001	001	REV032		ALL
3		04	21	002	001	REV024		
3		04	23	001	001	REV036		ALL
3		04	23	001A	001	REV036		ALL
3		04	23	002	201	REV033	20137+30239	ALL
3		04	23	003	100	REV024	CODE 0317	ALL
3		04	24	001	001	REV040		ALL
3		04	24	002	001	REV033		
3		04	24	003	001	REV040	STD=26792+28488	ALL
3		04	24	003A	001	REV040		ALL
3		04	24	004	001	REV039		2106-2163 2233
3		04	24	004	100	REV039	M:22013=(22013+33100+34997)	2330-2342
3		04	24	004	103	REV039	CODE 1383	2052-2093 2179-2222
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3		04	24	004	200	REV040	M:22013+33100	2903-2912 2957-2965
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3		04	24	006	300	REV039	CODE 1385	
3		04	24	005	105	REV040	CODE 0299	2052 2091 2116-2144
3		04	24	006	405	REV039	CODE 1285	
3		04	24	005	205	REV040	CODE 0471	2875-2947 3052-3063
3		04	24	006	410	REV040	CODE 0436	
3		04	24	005	205	REV040	CODE 0471	2957-2965 3157-3631
3		04	24	006	505	REV039	CODE 1286	
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3		04	25	002	100	REV041	32088=32090	
3		04	25	001	200	REV041	CODE 1269	2875 2920-2947 3052-3157 3410
3		04	25	002	200	REV041	32087+32088=32087+32090	
3		04	25	003	100	REV041	M:32090	ALL
3		04	27	001	850	REV028	UR	ALL
3		04	27	002	001	REV036		
3		04	27	003	001	REV036		ALL
3		04	27	004	001	REV036		
3		04	27	005	001	REV040		ALL
3		04	27	005A	001	REV040		ALL
3		04	27	006	001	REV040		ALL
3		04	27	007	001	REV036		ALL
3		04	27	008	001	REV036		
3		04	27	009	001	REV039	CODE 0166	2052-2342 2903-2912 2957-2965 3191-3336
3		04	27	010	001	REV039		
3		04	27	009	100	REV039	CODE 0167	2875 2920-2947 3052-3157 3373-3631
3		04	27	010	001	REV039		
3		04	27	011	001	REV039		ALL
3		04	27	012	001	REV036		
3		04	28	001	100	REV024	MOD:20024	2052-2243 2875 2920-2947 3052-3157 3281-3298 3336-3631
3		04	28	001	200	REV024	MOD:20024+22013	2330-2342 2903-2912 2957-2965 3191-3267 3334
3		04	30	001	001	REV039		ALL
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	3	04	32	001	001	REV041		2052-2243 2875
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	3	04	32	001	001	REV041		2330-2342 2903-2912
	3	04	32	002	200	REV041	22013+24044	2957-2965 3191-3267
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	3	04	32	003	001	REV038		2106-2163 2233 2875
	3	04	32	004	001	REV037	STD	2920-2947 3052-3157
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	3	04	32	003	001	REV038		2330-2342 2903-2912
	3	04	32	004	101	REV037	M:22013	2957-2965 3191-3267
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	3	04	32	003	001	REV038		2052-2093 2179-2222
	3	04	32	004	110	REV037	M:24105	2243 3281-3298 3336
	3	04	34	001	001	REV030		ALL
	3	04	34	002	100	REV032	CODE:0317	
	3	04	34	003	001	REV031		ALL
	3	04	34	004	001	REV040		
	3	04	34	005	001	REV026		2052-3191
	3	04	34	006	100	REV035	CODE 1442	
	3	04	34	005	001	REV026		3267-3631
	3	04	34	006	210	REV038	31039+27620=31528+27620	
	3	04	34	007	001	REV038	STD	ALL
	3	04	34	008	001	REV038		
	3	04	34	009	001	REV038	STD	ALL
	3	04	34	010	001	REV038		
	3	04	34	011	100	REV037	CODE:0063	ALL
	3	04	34	012	120	REV024	CODE 0063	
	3	04	34	013	105	REV029	CODE 0264	ALL
	3	04	34	014	105	REV040	CODE 0264	
	3	04	34	015	120	REV024	CODE 0063	ALL
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	3	04	34	017	001	REV039		ALL
	3	04	34	018	001	REV026		
	3	04	34	019	001	REV028	CODE 0258	ALL
	3	04	34	020	001	REV028		
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	3	04	34	021	110	REV039	CODE 1333	2875-3631

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	3	04	46	004	100	REV040	M:35865	2957-2965 3157-3631
	3	04	46	005	100	REV040	M:35865	2052 2091 2116-2144
	3	04	46	006	100	REV040	M:35865	2957-2965 3157-3631
	3	04	46	007	100	REV040	M:35865	2052 2091 2116-2144
	3	04	46	008	100	REV040	M:35865	2957-2965 3157-3631
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	3	04	46	010	100	REV040	M:35865	2957-2965 3157-3631
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	3	04	46	012	100	REV040	M:35865	2957-2965 3157-3631
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	3	04	46	013A	100	REV040	M:35865	2052 2091 2116-2144 2957-2965 3157-3631
	3	04	46	014	100	REV040	M:35865	2052 2091 2116-2144 2957-2965 3157-3631
	3	04	46	015	100	REV040	M:35865	2052 2091 2116-2144
	3	04	46	016	100	REV040	M:35865	2957-2965 3157-3631
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	3	04	46	026	100	REV040	M:35865	2957-2965 3157-3631
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3		04	90	001	020	REV040	CFM ALL	2052-2342
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3		04	91	001A	110	REV040	24105=(20268+24105)	2052-2093 2179-2222 2243 3281-3298 3336
3		04	91	001A	150	REV040	CODE 1392	2330-2342 2903-2912 2957-2965 3191-3267 3334
3		04	91	002	256	REV038	CODE 0003	2330-2342 2903-2912 2957-2965 3191-3267 3334
3		04	91	002	260	REV040	CODE 0095/56-5-B4	2106-2163 2233 2875 2920-2947 3052-3157 3373-3631
3		04	91	002	265	REV038	M:20268+24917 CFM 56-5-B5/B6	2052-2093 2179-2222 2243 3281-3298 3336
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3		04	91	004	001	REV040	STD	
3		04	91	005	001	REV040		ALL
3		04	91	006	001	REV026		

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	3	05	06	002	070	REV027	CODE 0452/56-5-B4	2920-2947 3052-3157
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	3	05	06	001	130	REV036	CODE:1344/56-5-B4/B5/B6	2052-2093 2179-2222
	3	05	06	002	175	REV037	CODE 0479/56-5-B5	2243 3281-3298 3336
	3	05	06	003	068	REV025	CFM 56-5-B3	2330-2342 2903-2912
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	3	05	06	007	065	REV025	STD=32619/CFM 56-5-B3	2330-2342 2903-2912
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	3	05	10	001	115	REV027	M:25800/CFM 56-5-B	2330-2342 2903-2912
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3 05 10	006	165	REV027	CODE:1540 56-5-B3	2957-2965 3191-3267
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3 06 10	002	001	REV024		
3 06 20	001	165	REV037	CODE:1540 56-5-B3	2330-2342 2903-2912
					2957-2965 3191-3267
					3334

M V CH SEC ---PAGE-- SEQ- --REV-- ----VALIDATION CRITERIA----- -----EFFECTIVITY-----

M	V	CH	SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
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								2243 3281-3298 3336
	3	06	20	001	326	REV037	CODE 0610/CFM 56-5-B4	2106-2163 2233 2875
								2920-2947 3052-3157
								3373-3631
	3	06	30	001	125	REV027	M:25800/CFM 56-5-B	2330-2342 2903-2912
	3	06	30	002	165	REV027	CODE:1540 56-5-B3	2957-2965 3191-3267
								3334
	3	06	30	001	125	REV027	M:25800/CFM 56-5-B	2106-2163 2233 2875
	3	06	30	002	170	REV038	CODE 0370 CFM 56-5-B4	2920-2947 3052-3157
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	3	06	30	001	125	REV027	M:25800/CFM 56-5-B	2052-2093 2179-2222
	3	06	30	002	180	REV027	CODE 0667 CFM B5/B6	2243 3281-3298 3336
	3	06	30	003	165	REV028	CODE:1540 56-5-B3	2330-2342 2903-2912
	3	06	30	004	165	REV028	CODE:1540 56-5-B3	2957-2965 3191-3267
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	3	06	30	003	170	REV027	CODE 0370 CFM 56-5-B4	2106-2163 2233 2875
	3	06	30	004	170	REV032	CODE 0370 CFM 56-5-B4	2920-2947 3052-3157
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	3	06	30	003	180	REV027	CODE 0667 CFM B5/B6	2052-2093 2179-2222
	3	06	30	004	180	REV027	CODE 0667 CFM B5/B6	2243 3281-3298 3336
	3	06	30	005	165	REV028	CODE:1540 56-5-B3	2330-2342 2903-2912
	3	06	30	006	165	REV028	CODE:1540 56-5-B3	2957-2965 3191-3267
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	3	06	30	005	170	REV032	CODE 0370 CFM 56-5-B4	2106-2163 2233 2875
	3	06	30	006	170	REV032	CODE 0370 CFM 56-5-B4	2920-2947 3052-3157
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	3	06	30	005	180	REV027	CODE 0667 CFM B5/B6	2052-2093 2179-2222
	3	06	30	006	180	REV027	CODE 0667 CFM B5/B6	2243 3281-3298 3336
	3	06	30	007	165	REV028	CODE:1540 56-5-B3	2330-2342 2903-2912
	3	06	30	008	165	REV028	CODE:1540 56-5-B3	2957-2965 3191-3267
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	3	06	30	007	170	REV032	CODE 0370 CFM 56-5-B4	2106-2163 2233 2875
	3	06	30	008	170	REV032	CODE 0370 CFM 56-5-B4	2920-2947 3052-3157
								3373-3631
	3	06	30	007	180	REV027	CODE 0667 CFM B5/B6	2052-2093 2179-2222
	3	06	30	008	180	REV027	CODE 0667 CFM B5/B6	2243 3281-3298 3336
	3	06	30	009	165	REV028	CODE:1540 56-5-B3	2330-2342 2903-2912
	3	06	30	010	165	REV028	CODE:1540 56-5-B3	2957-2965 3191-3267
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	3	06	30	009	170	REV032	CODE 0370 CFM 56-5-B4	2106-2163 2233 2875
	3	06	30	010	170	REV032	CODE 0370 CFM 56-5-B4	2920-2947 3052-3157
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M	V	CH	SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
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	3	06	30	011	165	REV028	CODE:1540 56-5-B3	2330-2342 2903-2912
	3	06	30	012	220	REV030	M:22013+25800/56-5-B1/B2/B3	2957-2965 3191-3267
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	3	06	30	011	170	REV032	CODE 0370 CFM 56-5-B4	2106-2163 2233 2875
	3	06	30	012	130	REV030	M:25800/56-5-B4	2920-2947 3052-3157
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	3	06	30	012	235	REV030	M:24105+25800/56-5-B5/B6/B7	2243 3281-3298 3336
	3	06	30	013	165	REV028	CODE:1540 56-5-B3	2330-2342 2903-2912
								2957-2965 3191-3267
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	3	06	30	013	170	REV027	CODE 0370 CFM 56-5-B4	2106-2163 2233 2875
								2920-2947 3052-3157
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	3	06	30	013	180	REV027	CODE 0667 CFM B5/B6	2052-2093 2179-2222
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	3	06	40	001	125	REV032	M:25800/CFM 56-5-B	2106-2163 2233 2875
	3	06	40	002	170	REV036	CODE 0370/CFM 56-5-B4	2920-2947 3052-3157
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	3	06	40	001	125	REV032	M:25800/CFM 56-5-B	2052-2093 2179-2222
	3	06	40	002	180	REV036	CODE 0667 CFM B5/B6	2243 3281-3298 3336
	3	06	40	003	165	REV028	CODE:1540 56-5-B3	2330-2342 2903-2912
	3	06	40	004	165	REV028	CODE:1540 56-5-B3	2957-2965 3191-3267
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	3	06	40	003	170	REV032	CODE 0370 CFM 56-5-B4	2106-2163 2233 2875
	3	06	40	004	170	REV032	CODE 0370 CFM 56-5-B4	2920-2947 3052-3157
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	3	06	40	003	180	REV027	CODE 0667 CFM B5/B6	2052-2093 2179-2222
	3	06	40	004	180	REV027	CODE 0667 CFM B5/B6	2243 3281-3298 3336
	3	06	40	005	165	REV028	CODE:1540 56-5-B3	2330-2342 2903-2912
	3	06	40	006	165	REV028	CODE:1540 56-5-B3	2957-2965 3191-3267
								3334
	3	06	40	005	170	REV032	CODE 0370 CFM 56-5-B4	2106-2163 2233 2875
	3	06	40	006	170	REV032	CODE 0370 CFM 56-5-B4	2920-2947 3052-3157
								3373-3631
	3	06	40	005	180	REV027	CODE 0667 CFM B5/B6	2052-2093 2179-2222
	3	06	40	006	180	REV027	CODE 0667 CFM B5/B6	2243 3281-3298 3336
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M V CH SEC ---PAGE-- SEQ- --REV-- ----VALIDATION CRITERIA----- -----EFFECTIVITY-----

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3		06	50	001	125	REV027	M:25800/CFM 56-5-B	2106-2163 2233 2875
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3		06	50	003	170	REV027	CODE 0370 CFM 56-5-B4	2106-2163 2233 2875
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3		06	50	003	180	REV027	CODE 0667 CFM B5/B6	2052-2093 2179-2222
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3		06	50	005	165	REV028	CODE:1540 56-5-B3	2330-2342 2903-2912
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3		06	50	005	170	REV032	CODE 0370/CFM 56-5-B4	2106-2163 2233 2875
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3		06	50	005	180	REV027	CODE 0667 CFM B5/B6	2052-2093 2179-2222
3		06	50	006	180	REV027	CODE 0667 CFM B5/B6	2243 3281-3298 3336
3		06	50	007	165	REV028	CODE:1540 56-5-B3	2330-2342 2903-2912
3		06	50	008	165	REV028	CODE:1540 56-5-B3	2957-2965 3191-3267
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3		06	50	007	170	REV032	CODE 0370/CFM 56-5-B4	2106-2163 2233 2875
3		06	50	008	170	REV032	CODE 0370/CFM 56-5-B4	2920-2947 3052-3157
								3373-3631
3		06	50	007	180	REV027	CODE 0667 CFM B5/B6	2052-2093 2179-2222
3		06	50	008	180	REV027	CODE 0667 CFM B5/B6	2243 3281-3298 3336
3		06	50	009	165	REV028	CODE:1540 56-5-B3	2330-2342 2903-2912
3		06	50	010	165	REV028	CODE:1540 56-5-B3	2957-2965 3191-3267
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3		06	50	009	170	REV032	CODE 0370/CFM 56-5-B4	2106-2163 2233 2875
3		06	50	010	170	REV032	CODE 0370/CFM 56-5-B4	2920-2947 3052-3157
								3373-3631
3		06	50	009	180	REV027	CODE 0667 CFM B5/B6	2052-2093 2179-2222
3		06	50	010	180	REV027	CODE 0667 CFM B5/B6	2243 3281-3298 3336
3		06	50	011	165	REV028	CODE:1540 56-5-B3	2330-2342 2903-2912
3		06	50	012	165	REV028	CODE:1540 56-5-B3	2957-2965 3191-3267
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M	V	CH	SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
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	3	06	50	011	180	REV027	CODE 0667 CFM B5/B6	2052-2093 2179-2222
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	3	06	50	013	130	REV030	M:25800/56-5-B4	2106-2163 2233 2875
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	3	06	50	013	220	REV030	M:22013+25800/56-5-B1/B2/B3	2330-2342 2903-2912
	3	06	50	014	165	REV028	CODE:1540 56-5-B3	2957-2965 3191-3267
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	3	06	50	013	235	REV030	24105+25800/B5/B6/B7/B8/B9	2052-2093 2179-2222
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								2957-2965 3191-3267
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	3	06	50	015	170	REV027	CODE 0370 CFM 56-5-B4	2106-2163 2233 2875
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								3334
	3	06	55	001	170	REV027	CODE 0370 CFM 56-5-B4	2106-2163 2233 2875
								2920-2947 3052-3157
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	3	06	55	001	180	REV031	CODE 0667 CFM B5/B6	2052-2093 2179-2222
								2243 3281-3298 3336
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								2957-2965 3191-3267
								3334
	3	06	60	001	170	REV027	CODE 0370 CFM 56-5-B4	2106-2163 2233 2875
								2920-2947 3052-3157
								3373-3631
	3	06	60	001	180	REV027	CODE 0667 CFM B5/B6	2052-2093 2179-2222
								2243 3281-3298 3336
	3	06	70	001	002	REV024		2106-2163 2233 2875
	3	06	70	002	001	REV039		2920-2947 3052-3157
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	3	06	70	001	002	REV024		2330-2342 2903-2912
	3	06	70	002	100	REV039	MOD:22013	2957-2965 3191-3267
								3334

M	V	CH	SEC	---PAGE--	SEQ-	--REV--	----VALIDATION CRITERIA-----	-----EFFECTIVITY-----
M V CH SEC ---PAGE-- SEQ- --REV-- ----VALIDATION CRITERIA----- -----EFFECTIVITY-----

3		06	70	001	002	REV024		2052-2093 2179-2222
3		06	70	002	110	REV039	MOD:24105	2243 3281-3298 3336
3		06	70	003	001	REV026		ALL
3		07	00	001-2	001	REV024		ALL
3		07	10	001-2	001	REV024		ALL
3		07	20	001-LEBBU	001	REV037	LIST OF OEB & FCOM BULLETINS	ALL
3		07	30	001	001	REV025		ALL
3		07	30	002	001	REV025		

M V T	REV	MOD SB	MP	TITLE / VALIDITY		
.	041A	 28-1159	......	FUEL - MAIN FUEL PUMP SYSTEM - FUEL PUMPS - PPLY CORRECT TORQUE AND SCREW LOCKING ON GAS RETURN OUTLET BOLTS		
				VP-BWA	VP-BDM	VP-BDN
				VP-BDO	VP-BWG	VP-BDK
				VP-BWD	VP-BWE	VP-BWF
				VP-BWH	VP-BWI	VP-BWJ
				VP-BWK	VP-BWM	VP-BWL
				VP-BWN	VP-BWO	VP-BWP
				VP-BQP	VP-BQR	VP-BQS
				VP-BQV	VP-BQW	VP-BQX
				VP-BQT		
.	041	....	P6146	INDICATING/RECORDING SYSTEM - FWC - INTRODUCE "F/CTL FLAP LVR NOT ZERO" RED WARNING		
				VP-BWA	VP-BDM	VP-BDN
				VP-BDO	VP-BWG	VP-BDK
				VP-BWD	VP-BWE	VP-BWF
				VP-BWH	VP-BWI	VP-BWJ
				VP-BWK	VP-BWM	VP-BWL
				VP-BWN	VP-BWO	VP-BWP
				VP-BQP	VP-BQR	VP-BQS
				VP-BQV	VP-BQW	VP-BQX
				VP-BQT	VP-BRY	VP-BRX
				VP-BRW	VP-BUM	VP-BUK
				VP-BUN	VP-BUP	VP-BUO
				VP-BQU	VP-BKX	VP-BKY
				VP-BKC	MSN 3574	MSN 3631
.	040	....	P6911	INDICATING/RECORDING SYSTEM : FROM FWC-F1 PIN-PROGRAMMING FOR IMPROVING THE MONITORING ABOUT THE NORMAL BRAKING SYSTEM		
				VP-BQP	VP-BQR	VP-BQS
				VP-BQV	VP-BQW	VP-BQX
				VP-BQT	VP-BRY	VP-BRX
				VP-BRW	VP-BUM	VP-BUK
				VP-BUN	VP-BUP	VP-BUO
				VP-BQU	VP-BKX	VP-BKY
				VP-BKC	MSN 3574	MSN 3631

M V T	REV	MOD	MP SB	TITLE	VALIDITY
.	041C	......	P8175	INDICATING/RECORDING SYSTEMS - SDAC - ACTIVATE IAS DISCREPANCY MONITORING BY PIN PROGRAMMING	VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	039A	......	P8232 31-1266 02	INDICATING/RECORDING SYSTEMS - FWC - INTRODUCE IAS DISCREPANCY AND DUAL PITOT MONITORING ON FWC H2F1	ALL
.	039A	......	P8757	ENGINE FUEL AND CONTROL - GENERAL INTRODUCE HMU P13 ON CFM56-5A/5B ENGINES	VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	038A	20011	....	ELECTRICS- GENERATION- DISTRIBUTION- V.U.'S AND AVIONICS- DEFINE SYSTEMS OF THE BASIC AIRCRAFT-	ALL
.	035A	20024	....	FUEL- INSTALL A CENTRE TANK SYSTEM-	ALL
.	036	20047	....	EQUIPMENT/FURNISHINGS - FLIGHT COMPARTMENT - INSTALL A 4TH OCCUPANT SEAT -	ALL
.	036	20059	....	AIR CONDITIONING - CARGO COMPARTMENT - VENTILATION - INSTALL SYSTEM IN AFT COMPARTMENT -	ALL

M V T	REV	MOD	MP SB	TITLE	VALIDITY
.	035A	20063	....	OXYGEN - FLIGHT CREW SYSTEM - INSTALL A 77.1 CU/FT BOTTLE IN COMPOSITE MATERIAL -	ALL
.	035A	20067	....	FIRE PROTECTION - FWD CARGO COMPARTMENT - INSTALL SMOKE DETECTION SYSTEM -	ALL
.	035A	20069	....	FIRE PROTECTION - AFT CARGO COMPARTMENT - INSTALL SMOKE DETECTION SYSTEM -	ALL
.	035A	20071	....	FIRE PROTECTION - CARGO COMPARTMENT FIRE EXTINGUISHING - INSTALL A SINGLE SHOT SYSTEM -	ALL
.	035A	20081	....	LIGHTS - EXTERIOR LIGHTS - INSTALL SYNCHRONIZED STROBE LIGHTS	ALL
.	036	20084	....	AIR CONDITIONING - AFT CARGO COMPARTMENT - INSTALL HEATING SYSTEM	ALL
.	036	20137	....	COMMUNICATIONS - RADIO MANAGEMENT - INSTALL A 3RD RMP -	ALL
.	035A	20268	....	WINGS-WING TIP FENCES-INTRODUCE WING TIPS INCLUDING FENCES-	ALL
.	036	20406	....	NAVIGATION - AIR DATA - PROVIDE QFE BARO SETTING	ALL

M V T	REV	MOD SB	MP	TITLE	VALIDITY		
.	036	20856	......	LANDING GEAR - INSTALL CARBON BRAKES AND ASSOCIATED WHEELS BF-GOODRICH -	VP-BWA	VP-BDM	VP-BDN
					VP-BDO	VP-BWG	VP-BDK
					VP-BWD	VP-BWE	VP-BWF
					VP-BWH	VP-BWI	VP-BWJ
					VP-BWK	VP-BWM	VP-BWL
					VP-BQP	VP-BQV	VP-BQW
					VP-BRY	VP-BRX	VP-BRZ
					VP-BUK	VP-BUN	VP-BUO
					VP-BQU	VP-BKX	VP-BKY
					VP-BKC	MSN 3574	MSN 3631
.	037	21125	......	NAVIGATION - ATC MODE "S" - ACTIVATE SELECTIVE INTERROGATION FUNCTION -	ALL		
.	041	21206	......	NAVIGATION - ADIRU - PROVIDE COMMUNITY FOR CFM AND IAE ENGINES -	ALL		
.	035A	21285	......	ENGINE CONTROLS-MODIFY POWER SUPPLY FOR HP FUEL SOLENOID	ALL		
.	035A	21678	......	ELECTRICAL POWER-AC/DC ESSENTIAL POWER DISTRIBUTION-PROVIDE PROVISIONS FOR ETOPS-	ALL		
.	036	21706	......	AIR CONDITIONING - VENTILATION CONT. ISOLATION VALVES - CHANGE POWER SUPPLY FOR ETOPS -	ALL		
.	035A	21729	......	AIR CONDITIONING -AVIONICS VENTILATION- IMPROVE ACCURANCY OF SKIN TEMPERATURE READING	ALL		
.	036	21768	......	AIR CONDITIONING - PROVIDE EMERGENCY POWER SUPPLY FOR AFT CARGO COMPT HEATING CONTROLLER FOR EROPS -	ALL		

M V T	REV	MOD MP SB		TITLE / VALIDITY
.	036	21858	....	COMMUNICATIONS - INSTALL HF1 FOR EROPS ALL
.	035A	21899	....	AIR CONDITIONING-AVIONICS VENTILATION- INSTALL A NRV AT AIR INLET ALL
.	035A	21946	....	OXYGENE - COCKPIT - INSTALL MODIFIED LP OXYGEN SUPPLY SOLENOID VALVE ALL
.	035A	21964	....	FLIGHT CONTROLS - ELAC/EFCS SYSTEM - INTRODUCE SOFTWARE L62 ALL
.	035A	21988	....	FUEL - IMPROVE LOW LEVEL WARNING ALL
.	035A	21992	....	INDICATING/RECORDING SYSTEMS - INTRODUCE CFDIU BATCH 2 ALL
.	037A	22013	....	FUSELAGE - REAR FUSELAGE SECTION 16A - DEFINE A321 BASIC STRUCTURE VP-BWN VP-BWO VP-BWP VP-BQR VP-BQS VP-BQX VP-BQT VP-BRW VP-BUM VP-BUP
.	035A	22087	....	FLIGHT CONTROLS - FCDC - INSTALL SOFTWARE L45 ALL
.	036	22199	....	WINGS - REMOVE LEADING EDGE VENTILATION SYSTEM ALL
.	035A	22249	....	AUTO FLIGHT - ACTIVATE WINDSHEAR FUNCTION ALL
.	035A	22373	....	ELECTRICAL POWER - DC GENERATION - INTRODUCE IMPROVED BCL ALL

M V T	REV	MOD MP SB	TITLE	VALIDITY
.	036	22536	NAVIGATION - INSTALL A BENDIX TCAS II COLLISION AVOIDANCE SYSTEM	ALL
.	035A	22561	FIRE PROTECTION - LAVATORY SMOKE DETECTION - INTRODUCE AMBIENT SYSTEM	ALL
.	038	22706	INDICATING/RECORDING SYSTEMS - CENTRAL WARNING SYSTEM - INSTALL SDAC A320/321 STANDARD	ALL
.	035A	22769	NAVIGATION - GPWS - INSTALL GPWC MARK V WITH INTERFACE WITH CFDS	ALL
.	036	22875	ICE AND RAIN PROTECTION - ICE DETECTION - INSTALL DUAL ADVISORY ICE DETECTION SYSTEM	ALL
.	035A	23119	HYDRAULIC POWER-BLUE MAIN HYDRAULIC POWER-IMPROVE MAINTENANCE STATUS OF BLUE HYDRAULIC RESERVOIR	VP-BWA VP-BDM VP-BDN VP-BDO VP-BWG VP-BDK VP-BWD VP-BWE VP-BWF VP-BWH VP-BWI VP-BWJ VP-BWK VP-BWM VP-BWL VP-BQP VP-BQV VP-BQW VP-BRY VP-BRX VP-BRZ VP-BUK VP-BUN VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	035A	23208	LANDING GEAR - WHEELS AND BRAKES - INTRODUCE BSCU STD 6	ALL
.	037A	23219	NAVIGATION-AIR DATA/INERTIAL REFERENCE SYSTEM (ADIRS)-INSTALL 4 MCU ADIRS HONEYWELL	VP-BWN VP-BWO VP-BWP VP-BQR VP-BQS VP-BQX VP-BQT VP-BRW VP-BUM VP-BUP

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M
V REV   MOD  MP        TITLE
T          SB                             VALIDITY


. 036  23222  ......  CERTIFICATION DOCUMENTS - GENERAL -
     ...........       CERTIFICATION FOR TAKE-OFF WITH
                       15 KNOT TAILWIND
                             VP-BWA      VP-BDM      VP-BDN
                             VP-BDO      VP-BWG      VP-BDK
                             VP-BWD      VP-BWE      VP-BWF
                             VP-BWH      VP-BWI      VP-BWJ
                             VP-BWK      VP-BWM      VP-BWL
                             VP-BQP      VP-BQV      VP-BQW
                             VP-BRY      VP-BRX      VP-BRZ
                             VP-BUK      VP-BUN      VP-BUO
                             VP-BQU      VP-BKX      VP-BKY
                             VP-BKC      MSN 3574    MSN 3631

. 037A 23315  ......  NAVIGATION - ILS - INSTALL NEW
     ...........       BENDIX RIA 35A ILS RECEIVERS
                       (P/N 204.1230.3521)
                             ALL

. 035A 23661  ......  ENGINE FUEL AND CONTROL - CFM 56 -
     ...........       EIU - INTRODUCE VERSION 13
                             ALL

. 035A 23672  ......  NAVIGATION - ADIRS - INSTALL LITTON
     ...........       4MCU ON A321 A/C
                             VP-BWA      VP-BDM      VP-BDN
                             VP-BDO      VP-BWG      VP-BWJ
                             VP-BWK      VP-BWL      VP-BWN
                             VP-BWO      VP-BWP      VP-BQR
                             VP-BQS      VP-BQX      VP-BQT
                             VP-BRW      VP-BUM      VP-BUK
                             VP-BUN      VP-BUP      VP-BUO

. 035A 23698  ......  AUXILIARY POWER UNIT - CONTROL AND
     ...........       MONITORING - INTRODUCE A NEW ECB
                             ALL

. 035A 23699  ......  AUXILIARY POWER UNIT - CONTROL AND
     ...........       MONITORING - MODIFY WIRE HARNESSES
                       FOR NEW ECB 817-1
                             ALL

. 035A 23742  ......  AUTO FLIGHT - FCU - INTRODUCE FCU
     ...........       STANDARD M10
                             ALL
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M V T	REV	MOD MP SB	TITLE / VALIDITY
.	035A	23779	MINOR IMPROVEMENTS INTRODUCED FROM A/C 508 (ST2) TO A/C 521 (ST2) ALL
.	036	23900	GENERAL - INCREASE DESIGN WEIGHT TO 61T MZFW VP-BDK VP-BWD VP-BWE VP-BWF VP-BWH VP-BWI VP-BWM VP-BQP VP-BQV VP-BQW VP-BRY VP-BRX VP-BRZ VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	035A	23901	LANDING GEAR - WHEELS AND BRAKES - INTRODUCE MODIFIED ALTERNATE BRAKE DISTRIBUTION DUAL VALVE ALL
.	035A	24035	INDICATING/RECORDING SYSTEMS - GENERAL- DEFINE CPIP3 ALL
.	037A	24044	LANDING GEAR - WHEELS AND BRAKES - INSTALL MESSIER GOODRICH WHEELS AND BRAKES ON A321 VP-BWN VP-BWO VP-BWP VP-BQR VP-BQS VP-BQX VP-BQT VP-BRW VP-BUM VP-BUP
.	035A	24064	AUTO FLIGHT-FMS-INTRODUCE FMGC A320/321 B1 STD WITH OPTIONS AND 400 KILOWORDS FOR CFM 56 VERSIONS ALL
.	035A	24105	FUSELAGE - REAR FUSELAGE - ADAPT SECTION 17/19 STRUCTURE TO A319 DEFINITION VP-BWA VP-BDM VP-BDN VP-BDO VP-BWG VP-BWJ VP-BWK VP-BWL VP-BUK VP-BUN VP-BUO
.	035A	24215	AUTO FLIGHT - FAC - INSTALL TWO FACS P/N BAM 0509 ALL

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M
V REV   MOD  MP        TITLE
T          SB                            VALIDITY


. 036  24251  ......  POWER PLANT - A320 - CFM 56 -
     ...........       INSTALL DERATED ENGINES CFM 56-B4
                             VP-BDK      VP-BWD      VP-BWE
                             VP-BWF      VP-BWH      VP-BWI
                             VP-BWM      VP-BQP      VP-BQV
                             VP-BQW      VP-BRY      VP-BRX
                             VP-BRZ      VP-BQU      VP-BKX
                             VP-BKY      VP-BKC      MSN 3574
                             MSN 3631

. 036  24349  ......  NAVIGATION - ADIRS - INTRODUCE
     ...........       STD P/N AC06
                             VP-BDK      VP-BWD      VP-BWE
                             VP-BWF      VP-BWH      VP-BWI
                             VP-BWM      VP-BQP      VP-BQV
                             VP-BQW      VP-BRY      VP-BRX
                             VP-BRZ      VP-BQU      VP-BKX
                             VP-BKY      VP-BKC      MSN 3574
                             MSN 3631

. 035A 24373  ......  FUEL - TANK LEVEL SENSING - INTRODUCE
     ...........       MODIFIED LOW FUEL PRESSURE WARNING
                       CONTROL
                             VP-BWA      VP-BDM      VP-BDN
                             VP-BDO      VP-BWG      VP-BDK
                             VP-BWD      VP-BWE      VP-BWF
                             VP-BWH      VP-BWI      VP-BWJ
                             VP-BWK      VP-BWM      VP-BWL
                             VP-BQP      VP-BQV      VP-BQW
                             VP-BRY      VP-BRX      VP-BRZ
                             VP-BUK      VP-BUN      VP-BUO
                             VP-BQU      VP-BKX      VP-BKY
                             VP-BKC      MSN 3574    MSN 3631

. 037A 24385  ......  GENERAL-A321 CFM ENG-EXTEND AUTOLAND
     ...........       CAT IIIB CAPABILITY
                             VP-BWN      VP-BWO      VP-BWP
                             VP-BQR      VP-BQS      VP-BQX
                             VP-BQT      VP-BRW      VP-BUM
                             VP-BUP

. 037  24440  ......  LANDING GEAR-NOSE LANDING GEAR-
     ...........       SHOCK ABSORBER-INTRODUCE MODIFIED
                       THROTTLING ROD  GUIDE
                             ALL
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M V T	REV	MOD MP SB		TITLE / VALIDITY
.	035A	24449	....	LANDING GEAR - A320/A321 TWIN WHEELS - INTRODUCE BSCU STANDARD 7 (70B VERSION) ALL
.	035A	24498	....	APU - STORAGE AND DISTRIBUTION - MODIFY APU COMMON LUBRICATION SYSTEM ALL
.	035A	24511	....	FLIGHT CONTROLS -S.E.C. SYSTEM INTRODUCE A320/A321 S.E.C STANDARD P/N BAM0508 ALL
.	037A	24579	....	NAVIGATION - ADIRS - INSTALL 4MCU ADIRS WITH GPS CAPABILITY VP-BWN VP-BWO VP-BWP VP-BQR VP-BQS VP-BQX VP-BQT VP-BRW VP-BUM VP-BUP
.	035A	24588	....	AUTO FLIGHT-FAC-INTRODUCE FAC P/N BAM 510 ALL
.	035A	24612	....	INDICATING/RECORDING SYSTEMS - FWC - INTRODUCE FWC D2 STD ALL
.	035A	24613	....	FLIGHT CONTROLS - ELAC - INTRODUCE ELAC STD P/N L69 ALL
.	035A	24642	....	ELECTRICAL POWER - AC AUXILIARY GENERATION (APU GENERATOR) - INTRODUCE MODIFIED GENERATOR ALL
.	035A	24645	....	LANDING GEAR-MLG-LGCIU-INTRODUCTION OF STANDARD UNIT P/N A4C ALL

M V T	REV	MOD MP SB	TITLE / VALIDITY
.	040	24701	HYDRAULIC POWER-AUXILIARY HYDRAULIC POWER-RAT-INTRODUCE MODIFIED RAT (NEW BEARING) VP-BDK VP-BWD VP-BWE VP-BWF VP-BWH VP-BWI VP-BWM VP-BQP VP-BQV VP-BQW VP-BRY VP-BRX VP-BRZ VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	036	24771	COMMUNICATIONS-CIDS-INTRODUCE MODIFIED DIRECTOR POWER SUPPLY PRINCIPLE VP-BWA VP-BDM VP-BDN VP-BDO VP-BWG VP-BWJ VP-BWK VP-BWL VP-BQP VP-BQV VP-BQW VP-BRY VP-BRX VP-BRZ VP-BUK VP-BUN VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	035A	24783	ENGINE FUEL AND CONTROL-FUNCTIONAL INTERFACE-INTRODUCE EIU VERSION 14 ON CFM56 ENGINES ALL
.	036	24785	NAVIGATION-ADIRS-INTRODUCE 4MCU ADIRU HONEYWELL P/N C06 VP-BDK VP-BWD VP-BWE VP-BWF VP-BWH VP-BWI VP-BWM VP-BWN VP-BWO VP-BWP VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUP VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	035A	24794	AIR CONDITIONING-COCKPIT AND CABIN TEMPERATURE CTRL-INTRODUCE MODIFIED TEMPERATURE SENSOR P/N-02.ON MIXER UNIT ALL

M V T	REV	MOD SB	MP	TITLE	VALIDITY		
.	035A	24852	....	NAVIGATION-ADIRU-INTRODUCE ADIRU P/N -307	VP-BWA	VP-BDM	VP-BDN
					VP-BDO	VP-BWG	VP-BWJ
					VP-BWK	VP-BWL	VP-BWN
					VP-BWO	VP-BWP	VP-BQR
					VP-BQS	VP-BQX	VP-BQT
					VP-BRW	VP-BUM	VP-BUK
					VP-BUN	VP-BUP	VP-BUO
.	035A	24917	....	FLIGHT CONTROLS-INTRODUCE ELAC STD L69J	ALL		
.	035A	24932	....	POWER PLANT-INSTALL CFM 56-5B5 ENGINES FOR A319 (22 KLBS)	VP-BWA	VP-BDM	VP-BDN
					VP-BDO	VP-BWG	VP-BWJ
					VP-BWK	VP-BWL	VP-BUK
					VP-BUN	VP-BUO	
.	035A	25199	....	FLIGHT MANAGEMENT AND GUIDANCE SYSTEM- INSTALL FMGC ON A320/321 (CFM 56-5A/5B)	ALL		
.	036	25204	....	NAVIGATION-ADIRS-INSTALL HONEYWELL ADIRS WITH GPS PRIMARY NAVIGATION CAPABILITY	VP-BDK	VP-BWD	VP-BWE
					VP-BWF	VP-BWH	VP-BWI
					VP-BWM	VP-BWN	VP-BWO
					VP-BWP	VP-BQP	VP-BQR
					VP-BQS	VP-BQV	VP-BQW
					VP-BQX	VP-BQT	VP-BRY
					VP-BRX	VP-BRZ	VP-BRW
					VP-BUM	VP-BUP	VP-BQU
					VP-BKX	VP-BKY	VP-BKC
					MSN 3574	MSN 3631	

M V T	REV	MOD	MP SB	TITLE	VALIDITY		
.	036	25225	....	AUTO FLIGHT-FMGC-REDUCE VAPP FOR A320 CFM/IAE			
					VP-BDK	VP-BWD	VP-BWE
					VP-BWF	VP-BWH	VP-BWI
					VP-BWM	VP-BQP	VP-BQV
					VP-BQW	VP-BRY	VP-BRX
					VP-BRZ	VP-BQU	VP-BKX
					VP-BKY	VP-BKC	MSN 3574
					MSN 3631		
.	035A	25240	....	AUTO FLIGHT - FMGC - PROVIDE ACARS AND PRINTER INTERFACES IN FMS (CFM VERSION)			
					ALL		
.	035A	25241	....	COMMUNICATIONS - RADIO MANAGEMENT - INSTALL A NEW STD RMP1 AND RMP2 WITH VHS SPACING 8, 33KHZ			
					ALL		
.	036	25242	....	COMMUNICATIONS - RADIO MANAGEMENT - INSTALL A NEW STD RMP3 (3) WITH VHF SPACING 8, 33KHZ			
					ALL		
.	036	25294	....	NAVIGATION - ADIRS - INSTALL HONEYWELL ADIRS CAPABLE OF A319 A/C			
					VP-BWA	VP-BDM	VP-BDN
					VP-BDO	VP-BWG	VP-BWJ
					VP-BWK	VP-BWL	VP-BUK
					VP-BUN	VP-BUO	
.	035A	25335	....	FLIGHT CONTROLS-ELAC-INTRODUCE A319 EIS L77 SOFTWARE STD-			
					VP-BWA	VP-BDM	VP-BDN
					VP-BDO	VP-BWG	VP-BWJ
					VP-BWK	VP-BWL	VP-BUK
					VP-BUN	VP-BUO	

M V T	REV	MOD MP SB	TITLE / VALIDITY		
.	041	25336	NAVIGATION-ADIRS-INTRODUCE AIRU LITTON P/N -308		
			VP-BWA	VP-BDM	VP-BDN
			VP-BDO	VP-BWG	VP-BWJ
			VP-BWK	VP-BWL	VP-BWN
			VP-BWO	VP-BWP	VP-BQR
			VP-BQS	VP-BQX	VP-BQT
			VP-BRW	VP-BUM	VP-BUK
			VP-BUN	VP-BUP	VP-BUO
.	035A	25404	EXHAUST-THRUST REVERSER CONTROL AND INDICATING-ACTIVATE ADDITIONAL THRUST REVERSER LOCK CONTROL		
			ALL		
.	035A	25410	INDICATING RECORDING SYSTEM-FWC- INTRODUCE F.W.C. E1 STANDARD		
			ALL		
.	035A	25419	ICE AND RAIN PROTECTION-WINDSHIELD RAIN PROTECTION-DESACTIVATION OF RAIN REPELLENT SYSTEM		
			ALL		
.	038A	25440	NAVIGATION - GENERAL - CHANGE EQUIPMENTS TO COMPLY WITH MARCH 95 SPECS.		
			ALL		
.	036	25529	NAVIGATION - WEATHER RADAR SYSTEM - ACTIVATE PREDICTIVE WINDSHEAR FUNCTION		
			VP-BWA	VP-BDM	VP-BDN
			VP-BDO	VP-BWG	VP-BDK
			VP-BWD	VP-BWE	VP-BWF
			VP-BWH	VP-BWI	VP-BWJ
			VP-BWK	VP-BWM	VP-BWL
			VP-BWN	VP-BWO	VP-BWP
.	036	25590	INDICATING/RECORDING SYSTEMS - FWC - DEFINE OEB REMINDER WITHIN FWC STD -E1 AND SUBSEQUENT		
			ALL		
.	035A	25800	POWER PLANT-GENERAL-INTRODUCE CFM56-5B/P		
			ALL		

M V T	REV	MOD SB	MP	TITLE	VALIDITY		
.	036	25810	......	LANDING GEAR - WHEELS AND BRAKES - INSTALL BF GOODRICH CARBON BRAKES (SEPCARB III) P/N 2-1600			
					VP-BWA	VP-BDM	VP-BDN
					VP-BDO	VP-BWG	VP-BDK
					VP-BWD	VP-BWE	VP-BWF
					VP-BWH	VP-BWI	VP-BWJ
					VP-BWK	VP-BWM	VP-BWL
					VP-BQP	VP-BQV	VP-BQW
					VP-BRY	VP-BRX	VP-BRZ
					VP-BUK	VP-BUN	VP-BUO
					VP-BQU	VP-BKX	VP-BKY
					VP-BKC	MSN 3574	MSN 3631
.	039A	25819	......	NAVIGATION - WEATHER RADAR SYSTEM - ACTIVATE DUAL PREDICTIVE WINDSHEAR FUNCTION			
					VP-BQP	VP-BQR	VP-BQS
					VP-BQV	VP-BQW	VP-BQX
					VP-BQT	VP-BRY	VP-BRX
					VP-BRZ	VP-BRW	VP-BUM
					VP-BUK	VP-BUN	VP-BUP
					VP-BUO	VP-BQU	VP-BKX
					VP-BKY	VP-BKC	MSN 3574
					MSN 3631		
.	035A	25863	......	AUTO FLIGHT - FCU - DEFINE FLIGHT DIRECTOR ENGAGEMENT IN CROSSED BARS AT GO AROUND	ALL		
.	036	25888	......	A.P.U.-POWER PLANT-INTRODUCE ALLIED SIGNAL APU 131-9(A)	ALL		
.	036	25893	......	ENGINE FUEL AND CONTROL-CONTROLLING INTRODUCE ECU SOFTWARE STD5 BH FOR CFM56-5B -SAC-	ALL		
.	041	26001	......	NAVIGATION-ADIRS-INTRODUCE HONEYWELL 4 MCU P/N AC09	ALL		

M V T	REV	MOD MP SB	TITLE / VALIDITY
.	035A	26002	NAVIGATION-ADIRS-INTRODUCE LITTON ADIRU 4 MCU STD WITH P/N-309 (AIME FUNCTION) VP-BWA VP-BDM VP-BDN VP-BDO VP-BWG VP-BWJ VP-BWK VP-BWL VP-BWN VP-BWO VP-BWP VP-BQR VP-BQS VP-BQX VP-BQT VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO
.	035A	26017	INDICATING/RECORDING SYSTEMS-FLIGHT WARNING COMPUTER (FWC)-INTRODUCE FWC ST2 E2 ALL
.	035A	26018	INDICATING/RECORDING SYSTEMS-DISPLAY MANAGEMENT COMPUTER (DMC)-INTRODCUE DMC V32 STD ALL
.	037A	26057	TAKE OFF WITH A 15 KNOT TAILWIND VP-BWN VP-BWO VP-BWP VP-BQR VP-BQS VP-BQX VP-BQT VP-BRW VP-BUM VP-BUP
.	039A	26117	NAVIGATION - WEATHER RADAR SYSTEM - ACTIVATE COLLINS DUAL PREDICTIVE WINDSHEAR SYSTEM VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	035A	26169	COM-CVR-INSTALL A SOLID STATE COCKPIT VOICE RECORDER (SSCVR) LORAL FAIRCHILD P/N 200-0012-00 (SFE) ALL

M V T	REV	MOD MP SB	TITLE / VALIDITY
.	036	26187	NAVIGATION - VOR - INSTALL VOR RECEIVERS ALLIED SIGNAL QUANTUM LINE P/N 066-50012-0202 ALL
.	037	26229	AIR CONDITIONING - PRESSURE CONTROL - INTRODUCE MODIFIED CABIN PRESSURE CONTROLLER P/N 20791 ALL
.	040	26284	LIGHTS-INTRODUCE EPSU P/N 54-10 ON A319/A320 A/C VP-BWA VP-BDM VP-BDN VP-BDO VP-BWG VP-BDK VP-BWD VP-BWE VP-BWF VP-BWH VP-BWI VP-BWJ VP-BWK VP-BWM VP-BWL VP-BQP VP-BQV VP-BQW VP-BRY VP-BRX VP-BRZ VP-BUK VP-BUN VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	040	26285	LIGHTS-INTRODUCE EPUSU ON ON A321 A/C VP-BWN VP-BWO VP-BWP VP-BQR VP-BQS VP-BQX VP-BQT VP-BRW VP-BUM VP-BUP
.	036	26335	FLIGHT CONTROLS-GENERAL- DELETION OF L.A.F. FEATURE FROM A320 A/C (SERIAL SOLUTION) VP-BDK VP-BWD VP-BWE VP-BWF VP-BWH VP-BWI VP-BWM VP-BQP VP-BQV VP-BQW VP-BRY VP-BRX VP-BRZ VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	037	26358	AUTOFLIGHT-FLIGHT CONTROL UNIT- (FCU) INTRODUCE SEXTANT MODULAR FCU ALL

M V T	REV	MOD	MP SB	TITLE	VALIDITY
.	037A	26359	....	POWER PLANT-GENERAL-INTRODUCE CFM 56-5B3 ENGINE RATED AT 330K LBS	VP-BWN VP-BWO VP-BWP VP-BQR VP-BQS VP-BQX VP-BQT VP-BRW VP-BUM VP-BUP
.	035A	26363	....	AIR CONDITIONING-AIR COOLING SYSTEM-INTRODUCE MODIFIED RAM AIR OUTLET	ALL
.	035A	26377	....	NAVIGATION - ILS - INSTALL ADDITIONAL WIRING PROVISIONS FOR MMR INSTALLATION	ALL
.	035A	26443	....	NAVIGATION - VOR/MARKER - INSTALL TWO VOR/MARKER RECEIVERS 900 COLLINS P/N 822-0297-020	ALL
.	037	26497	....	AUTO FLIGHT-GENERAL-ACTIVATE GLOBAL SPEED PROTECTION AND F/D DISENGAGEMENT UPON SPEED CONSTRAINTS	ALL
.	035A	26526	....	NAVIGATION - GPWS - ACTIVATE ENHANCED FUNCTIONS OF THE EGPWS	ALL
.	035A	26645	....	AUTO-FLIGHT-FAC INTRODUCE FAC STD BAM 0513	ALL
.	035A	26726	....	INDICATING/RECORDING SYSTEM-SDAC-INTRODUCE SDAC (NEW TECHNOLOGY)	ALL
.	035A	26728	....	INDICATING/RECORDING SYSTEM - FWC - INTRODUCE FWC STANDARD H2E2	ALL
.	035A	26785	....	PNEUMATIC-ENG BLEED AIR SYS-INTRODUCE A TEMP THERMOSTAT WITH MODIFIED LIMITATION SETTINGS (P/N 341E020000)	ALL

M V T	REV	MOD	MP SB	TITLE VALIDITY
.	035A	26792	....	AIR CONDITIONING-PACK TEMPERATURE CTRL- INTRODUCE MODIFIED PACK TEMPERATURE CONTROLLER ALL
.	035A	26910	....	FLIGHT CONTROL -ELAC SYSTEM- INTRODUCE E.L.A.C. WITH ENHANCED RELAYS ALL
.	039A	26925	....	LANDING GEAR-ALTERNATE BRAKING- INTRODUCE MODIFIED ALTERNATE BRAKING SYSTEM VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	035A	26963	....	ICE AND RAIN PROTECTION-WINSHIELD RAIN PROTECTION-ACTIVATION OF RAIN REPELLENT SYS.(FLUID COMPATIBLE WITH OZONE RULES) ALL
.	035A	26965	....	LANDING GEAR-WHEELS AND BRAKES- INTRODUCE BSCU COMMON STD VP-BWA VP-BDM VP-BDN VP-BDO VP-BWG VP-BDK VP-BWD VP-BWE VP-BWF VP-BWH VP-BWI VP-BWJ VP-BWK VP-BWM VP-BWL VP-BQP VP-BQV VP-BQW VP-BRY VP-BRX VP-BRZ VP-BUK VP-BUN VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	035A	26968	....	AUTO FLIGHT-FMGC-INTRODUCE FMGC CAM0102 FOR A319 AUTOLAND AND GPS/ACARS FOR CFM ENGINES ALL

M V T	REV	MOD MP SB		TITLE / VALIDITY
.	035A	26999	....	NAVIGATION - MMR - INSTALL COLLINS MMR PROVIDING ILS AND GPS FUNCTION ALL
.	040	27140	....	ELECTRICAL POWER-GENERAL-DEFINE NEW ELECTRICAL GENERATION CONCEPT FOR SINGLE AISLE A/C ALL
.	035A	27276	....	FLIGHT CONTROLS-ELAC SYSTEM-INTRODUCE ELAC SOFTWARE "L80" ALL
.	035A	27498	....	ELECTRICAL POWER - GENERAL - AC-DC MAIN DISTRIBUTION - INSTALL AC-DC SHEDDABLE BUSBARS ALL
.	035A	27522	....	INFORMATION SYSTEM - AIR TRAFFIC AND INFORMATION SYSTEM (ATIMS) - INSTALL ATSU COMPUTER FOR ACARS ALL
.	035A	27572	....	OXYGEN-PASSENGER OXYGEN-INTRODUCE MODIFIED CHEMICAL OXYGEN CONTAINER -15 MIN- PURITAN ALL
.	041A	27620	....	NAVIGATION-STANDBY DATA : ALTITUDE AND HEADING - INSTALL INTEGRATED STANDBY INSTRUMENT SYSTEM (ISIS) VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	036	27698	....	NAVIGATION - TCAS - INSTALL ALLIED SIGNAL TCAS COMPUTER P/N 066-50000-2220 (WITH CHANGE 7.0) ALL
.	035A	27773	....	LANDING GEAR-NORMAL BRAKING-INTRODUCE STD 8 BSCU (TWIN VERSION) ALL

M V T	REV	MOD	MP SB	TITLE / VALIDITY
.	035A	27845	....	FLIGHT CONTROLS-ELAC-INTRODUCE ELAC WITH ADVANCED ELAC POWER SUPPLY BOARD ALL
.	036	27866	....	NAVIGATION - WEATHER RADAR SYSTEM - INSTALL ALLIED SIGNAL WEATHER RADAR TRANSCEIVER P/N 066-50008-0405 ALL
.	035A	27952	....	PNEUMATIC-ENGINE BLEED AIR SYSTEM- INTRODUCE TLT P/N 341E030000 ALL
.	035A	28009	....	AIR CONDITIONING-PRESSURE CONTROL AND MONITORING-INTRODUCE PRESSURE CONTROLLER P/N 9022-15702-10 ALL
.	036	28136	....	GENERAL - INCREASE DESIGN WEIGHT TO : 70,0T MTOW, 62,5T MLW, 58,5T MZFW (WV005) VP-BWA VP-BDM VP-BDN VP-BDO VP-BWG VP-BWJ VP-BWK VP-BWL VP-BUK VP-BUN VP-BUO
.	036	28160	....	ELEC PWR-AC EMERGENCY GENERATION- ACTIVATE A319/A321 ELECTRICAL EMERGENCY CONFIGURATION ON A320 A/C VP-BDK VP-BWD VP-BWE VP-BWF VP-BWH VP-BWI VP-BWM VP-BQP VP-BQV VP-BQW VP-BRY VP-BRX VP-BRZ VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631

M V T	REV	MOD MP SB	TITLE / VALIDITY		
.	035A	28218	NAVIGATION-ADIRS-INTRODUCE LITTON ADIRU 4 MCU STD-312		
			VP-BWA	VP-BDM	VP-BDN
			VP-BDO	VP-BWG	VP-BWJ
			VP-BWK	VP-BWL	VP-BWN
			VP-BWO	VP-BWP	VP-BQR
			VP-BQS	VP-BQX	VP-BQT
			VP-BRW	VP-BUM	VP-BUK
			VP-BUN	VP-BUP	VP-BUO
.	035A	28244	NAVIGATION-GPWS-INTRODUCE EGPWS P/N 206-206 AND INHIBIT AUTOMATIC DEACTIVATION ENHANCED FUNCTIONS		
			ALL		
.	036	28307	ENGINE FUEL AND CONTROL-FADEC SYSTEM-CFM56-5B-SAC-INTRODUCE ECU SOFTWARE 5BI		
			ALL		
.	035A	28377	ICE AND RAIN PROTECTION-WINSHIELD-RAIN PROTECTION-INTRODUCE MODIFIED GAGE ASSY -P/N 4020W35-2		
			ALL		
.	036	28479	INDICATING RECORDING SYSTEM-FWC-INTRODUCE FWC STANDARD H2/E3P		
			ALL		
.	035A	28488	AIR CONDITIONING-PACK TEMP.CTRL INTRODUCE MODIFIED PACK TEMP. CTRL P/N 759D0000-02		
			ALL		
.	039A	28568	ELECTRICAL POWER - AC GENERATION - INSTALL ELECTRICAL OUTLETS IN COCKPIT		
			VP-BQP	VP-BQR	VP-BQS
			VP-BQV	VP-BQW	VP-BQX
			VP-BQT	VP-BRY	VP-BRX
			VP-BRZ	VP-BRW	VP-BUM
			VP-BUK	VP-BUN	VP-BUP
			VP-BUO	VP-BQU	VP-BKX
			VP-BKY	VP-BKC	MSN 3574
			MSN 3631		

M V T	REV	MOD MP SB	TITLE / VALIDITY		
.	041	28651	APU-CONTROL AND MONITORING-INTRODUCE OF VERSATILE ECB ON GTCP 36-300		
			ALL		
.	040A	28658	NAV-STANDBY DATA: ATT AND HDG-INTRODUCE COMPLETE PROV FOR INTEGRATED STANDBY INSTRUMENT SYSTEM ELECTRICAL SUPPLY		
			VP-BRY	VP-BUM	VP-BUK
			VP-BUN	VP-BUP	VP-BUO
			VP-BQU	VP-BKX	VP-BKY
			VP-BKC	MSN 3574	MSN 3631
.	035A	28667	ICE AND RAIN PROTECTION-WINDSHIELD RAIN PROTECTION-INTRODUCE MODIFIED GAGE ASSY WITH INPUT VALUE FUNCTION SUPPRESSED		
			ALL		
.	041B	28916 31-1257	INDICATING RECORDING SYSTEM-FWS INTRODUCE FWC STANDARD H1PE3P		
			VP-BWA	VP-BDM	VP-BDN
			VP-BDO	VP-BWG	VP-BDK
			VP-BWD	VP-BWE	VP-BWF
			VP-BWH	VP-BWI	VP-BWJ
			VP-BWK	VP-BWM	VP-BWL
			VP-BWN	VP-BWO	VP-BWP
.	037A	30051	ELECTRICAL POWER-GALLEY SUPPLY- INSTALL A RELAY FOR GALLEY SHEEDING IN A SINGLE GENERATION CONFIGURATION		
			VP-BWN	VP-BWO	VP-BWP
			VP-BQR	VP-BQS	VP-BQX
			VP-BQT	VP-BRW	VP-BUM
			VP-BUP		

M V T	REV	MOD MP SB	TITLE	VALIDITY		
.	036	30075	LANDING GEAR - WHEELS AND BRAKES - REDUCE LENGTH OF WEAR INDICATOR ON BF GOODRICH BRAKES			
				VP-BWA	VP-BDM	VP-BDN
				VP-BDO	VP-BWG	VP-BDK
				VP-BWD	VP-BWE	VP-BWF
				VP-BWH	VP-BWI	VP-BWJ
				VP-BWK	VP-BWM	VP-BWL
				VP-BQP	VP-BQV	VP-BQW
				VP-BRY	VP-BRX	VP-BRZ
				VP-BUK	VP-BUN	VP-BUO
				VP-BQU	VP-BKX	VP-BKY
				VP-BKC	MSN 3574	MSN 3631
.	036	30096	AUTO-FLIGHT-DEFINE "GUIDED RADAR APPROACH WITH AUTOPILOT ENGAGED" PROCEDURE (MUH 250 FT)			
				VP-BWA	VP-BDM	VP-BDN
				VP-BDO	VP-BWG	VP-BDK
				VP-BWD	VP-BWE	VP-BWF
				VP-BWH	VP-BWI	VP-BWJ
				VP-BWK	VP-BWL	VP-BQP
				VP-BQR	VP-BQS	VP-BQV
				VP-BQW	VP-BQX	VP-BQT
				VP-BRY	VP-BRX	VP-BRZ
				VP-BRW	VP-BUM	VP-BUK
				VP-BUN	VP-BUP	VP-BUO
				VP-BQU	VP-BKX	VP-BKY
				VP-BKC	MSN 3574	MSN 3631
.	035A	30239	INFORMATION SYSTEM - ATIMS - MODIFY ATSU AIRCRAFT INTERFACE SOFTWARE ACCORDING TO SERVICE PROVIDERS LIST			
				ALL		
.	035A	30299	COMMUNICATIONS - COCKPIT VOICE RECORDER - INSTALL A SSCVR L3-C P/N 2100-1020-02 (SFE)			
				ALL		

M V T	REV	MOD MP SB	TITLE / VALIDITY
.	036	30307	GENERAL - DESIGN WEIGHT - INCREASE A320 DESIGN WEIGHT TO 75,5T MTOW, 66,0T MLW AND 62,5T MZFW
			VP-BDK VP-BWD VP-BWE VP-BWF VP-BWH VP-BWI VP-BWM VP-BQP VP-BQV VP-BQW VP-BRY VP-BRX VP-BRZ VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	036	30308	COMMUNICATIONS - COCKPIT VOICE RECORDER - REINTRODUCE SSCVR ALLIED SIGNAL P/N 980-6022-001
			ALL
.	035A	30363	INDICATING/RECORDING SYSTEMS - FWC - ACTIVATE SPECIFIC FWC PROCEDURE
			ALL
.	035A	30365	INDICATING RECORDING SYSTEM-SDAC- INTRODUCE STANDARD SDAC P/N 350E5500202
			ALL
.	037	30368	INDICATING RECORDING SYSTEMS- EIS-INSTALL DMC, DU AND DISKETTES FOR EIS2
			ALL
.	039A	30439	AUTO-FLIGHT-FLIGHT AUGMENTATION COMPUTER-INTRODUCE FAC SOFTWARE STANDARD P/N B397BAM0515
			VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631

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M
V REV   MOD  MP        TITLE
T          SB                             VALIDITY

. 036  30470  ......  EQPT/FURNISHINGS - MISCELLANEOUS EMER
     ...........       EQPT - INSTALL SEXTANT ELT WITH CONTROL
                       PANEL IN COCKPIT AND PROGRAMMING DONGLE
                             VP-BWA      VP-BDM      VP-BDN
                             VP-BDO      VP-BWG      VP-BDK
                             VP-BWD      VP-BWE      VP-BWF
                             VP-BWH      VP-BWI      VP-BWJ
                             VP-BWK      VP-BWM      VP-BWL
                             VP-BWN      VP-BWO      VP-BWP

. 039A 30626  ......  AIR CONDITIONING-AIR COOLING-
     ...........       INSTALL A NEW ECS
                             VP-BQP      VP-BQR      VP-BQS
                             VP-BQV      VP-BQW      VP-BQX
                             VP-BQT      VP-BRY      VP-BRX
                             VP-BRZ      VP-BRW      VP-BUM
                             VP-BUK      VP-BUN      VP-BUP
                             VP-BUO      VP-BQU      VP-BKX
                             VP-BKY      VP-BKC      MSN 3574
                             MSN 3631

. 036  30660  ......  INDICATING/RECORDING SYSTEMS - FWC -
     ...........       INSTALL FWC STANDARD H2E4
                             ALL

. 035A 30748  ......  GENERAL-FLIGHT ENVIRONMENTAL ENVELOPE-
     ...........       EXTENSION  TO 12100 M (39800 FT)
                             ALL

. 035A 30784  ......  AIRBORNE AUXILIARY POWER (APU) -
     ...........       GENERAL - INCREASE OPERATION ENVELOPE
                       TO 39800 FT FOR GTCP 36-300
                             VP-BWA      VP-BDM      VP-BDN
                             VP-BDO      VP-BWG      VP-BDK
                             VP-BWD      VP-BWE      VP-BWF
                             VP-BWH      VP-BWI      VP-BWJ
                             VP-BWK      VP-BWM      VP-BWL
                             VP-BQP      VP-BQV      VP-BQW
                             VP-BRY      VP-BRX      VP-BRZ
                             VP-BUK      VP-BUN      VP-BUO
                             VP-BQU      VP-BKX      VP-BKY
                             VP-BKC      MSN 3574    MSN 3631
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M
V REV   MOD  MP        TITLE
T          SB                            VALIDITY


. 041B 30797  ......  INDICATING/RECORDING SYSTEM-FWC-
     31-1257           INTRODUCE NEW FWC STANDARD H1PE3Q
                             VP-BWA     VP-BDM     VP-BDN
                             VP-BDO     VP-BWG     VP-BDK
                             VP-BWD     VP-BWE     VP-BWF
                             VP-BWH     VP-BWI     VP-BWJ
                             VP-BWK     VP-BWM     VP-BWL
                             VP-BWN     VP-BWO     VP-BWP

. 037  30884  ......  PNEUMATIC-ENGINE BLEED AIR SUPPLY-
     ...........       INTRODUCE MODIFIED TEMPERATURE CONTROL
                       THERMOSTAT (TCT)
                             ALL

. 036  30941  ......  NAVIGATION-ADIRU-INSTALL HONEYWELL ADIR
     ...........       U 4 MCU AD11 (NEW HARD)
                             ALL

. 037A 30977  ......  FLIGHT CONTROLS - ELAC SYSTEM -
     ...........       INTRODUCE ELAC SOFTWARE "L90"
                             VP-BWN     VP-BWO     VP-BWP
                             VP-BQP     VP-BQR     VP-BQS
                             VP-BQV     VP-BQW     VP-BQX
                             VP-BQT     VP-BRY     VP-BRX
                             VP-BRZ     VP-BRW     VP-BUM
                             VP-BUK     VP-BUN     VP-BUP
                             VP-BUO     VP-BQU     VP-BKX
                             VP-BKY     VP-BKC     MSN 3574
                             MSN 3631

. 039A 31040  ......  AUTO-FLIGHT - FLIGHT AUGMENTATION
     ...........       COMPUTER (FAC) - INTRODUCE FAC SOFTWARE
                       "BAM0616"
                             VP-BQP     VP-BQR     VP-BQS
                             VP-BQV     VP-BQW     VP-BQX
                             VP-BQT     VP-BRY     VP-BRX
                             VP-BRZ     VP-BRW     VP-BUM
                             VP-BUK     VP-BUN     VP-BUP
                             VP-BUO     VP-BQU     VP-BKX
                             VP-BKY     VP-BKC     MSN 3574
                             MSN 3631
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M V T	REV	MOD SB	MP	TITLE / VALIDITY		
.	039	31070	....	NAVIGATION-ADIRS-INSTALL LITTON ADIRU 4 MCU STANDARD 0314 (A318 COEFF CFM ADDED)		
				VP-BWN	VP-BWO	VP-BWP
				VP-BQR	VP-BQS	VP-BQX
				VP-BQT	VP-BRW	VP-BUM
				VP-BUK	VP-BUN	VP-BUP
				VP-BUO		
.	040A	31105	....	NAVIGATION - ADIRS - INSTALL HONEYWELL ADIRU 4MCU P/N HG2030AE21 (A318 COEFF CFM ADDED)		
				VP-BRY	VP-BRX	VP-BRZ
				VP-BUM	VP-BUK	VP-BUN
				VP-BUP	VP-BUO	VP-BQU
				VP-BKX	VP-BKY	VP-BKC
				MSN 3574	MSN 3631	
.	035A	31106	....	LANDING GEAR - NORMAL BRAKING - INTRODUCE STD 9 BSCU (TWIN VERSION)		
				ALL		
.	036	31146	....	LANDING GEAR - WHEELS AND BRAKES - INTRODUCE OXIDATION RESISTANT BFG CARBON BRAKE		
				VP-BWA	VP-BDM	VP-BDN
				VP-BDO	VP-BWG	VP-BDK
				VP-BWD	VP-BWE	VP-BWF
				VP-BWH	VP-BWI	VP-BWJ
				VP-BWK	VP-BWM	VP-BWL
				VP-BQP	VP-BQV	VP-BQW
				VP-BRY	VP-BRX	VP-BRZ
				VP-BUK	VP-BUN	VP-BUO
				VP-BQU	VP-BKX	VP-BKY
				VP-BKC	MSN 3574	MSN 3631

M V T	REV	MOD	MP / SB	TITLE	VALIDITY
.	039A	31152	....	LANDING GEAR-STEERING-SUPPLY NOSE WHEEL STEERING WITH YELLOW HYDRAULIC POWER IN PLACE OF GREEN HYDRAULIC POWER	VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	035A	31276	....	ELECTRICAL POWER - GENERAL - INSTALL A COMMERCIAL SHEDDING PUSH-BUTTON SWITCH IN COCKPIT	ALL
.	039A	31283	 31-1257	INDICATING RECORDING SYSTEM-FWC- INTRODUCE FWC STANDARD H2 F1	ALL
.	036	31285	....	COMMUNICATIONS-COCKPIT VOICE RECORDER-REINTRODUCE SSCVR L3C P/N S200-0012-00	ALL
.	041B	31296	....	COMMUNICATIONS - AUDIO MANAGEMENT - INSTALL TEAM DIGITAL AMU P/N 4031-SA-01	ALL
.	035A	31365	....	AUTO-FLIGHT-FMGC-INSTALL FMGC P/N B546CAM0103 (CFM GPS/ACARS)	ALL
.	035A	31371	....	INFORMATION SYSTEMS-ATIMS-DEFINE AND INSTALL MODIFIED SOTFWARE ATSU A/C INTERFACE UPGRADED	ALL
.	037	31375	....	NAVIGATION - EGPWS - ACTIVATE OBSTACLE OPTION ON THE EGPWS	ALL
.	035A	31395	....	FLIGHT CONTROLS - ELAC SYSTEM - INTRODUCE ELAC STD L81	ALL

M V T	REV	MOD	MP SB	TITLE	VALIDITY
.	037	31495	....	INDICATING/RECORDING SYSTEM-EIS2-INSTALL MODIFIED EIS2 SOFTWARE	ALL
.	035A	31528	....	NAVIGATION-ADIRU-RESTORE RVSM 3 CIRCUIT CAPABILITIES (SERIAL SOLUTION)	ALL
.	040A	31706	....	NAVIGATION-ADIRS-INTRODUCE HONEYWELL ADIRU 4 MCU P/N HG2030AE22	VP-BRY VP-BRX VP-BRZ VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	036	31803	....	LANDING GEAR-WHEELS AND BRAKES-INTRODUCE GOODRICH CARBON BRAKE (SEPCARB III) P/N 2-1600-3 WITH ANTI-OXIDANT "M1"	VP-BWA VP-BDM VP-BDN VP-BDO VP-BWG VP-BDK VP-BWD VP-BWE VP-BWF VP-BWH VP-BWI VP-BWJ VP-BWK VP-BWM VP-BWL VP-BQP VP-BQV VP-BQW VP-BRY VP-BRX VP-BRZ VP-BUK VP-BUN VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	035A	31891	....	ELECTRICAL POWER-GENERAL-CHANGE IFE POWER SUPPLY BUSBARS INTO SHEDDABLE BUSBARS 220XP AND 212PP	ALL
.	035A	31896	....	AUTOFLIGHT-FMGC-INSTALL FMGC CFM C13042AA01 (EQUIPPED WITH FMS2) HONEYWELL	ALL

M V T	REV	MOD MP SB	TITLE	VALIDITY
.	039A	32087	COMMUNICATIONS-ANTI HIJACK CAMERA MONITORING-INSTALL A COCKPIT DOOR SURVEILLANCE SYSTEM	VP-BQP VP-BQV VP-BQW VP-BRY VP-BRX VP-BRZ VP-BKX
.	035A	32088	EQUIPMENT FURNISHINGS-CURTAINS AND PARTITIONS-MODIFIED INTRUSION AND PENETRATION RESISTANT COCKPIT DOOR	ALL
.	035A	32090	DOORS-PASSENGER COMPARTMENT FIXED INTERIOR DOORS-INSTALL ELECTRICAL COCKPIT DOOR RELEASE SYSTEM	ALL
.	039	32205	INDICATING RECORDING SYSTEM-SDAC INSTALL WIRING PROVISIONS FOR SDAC H2-E1 PIN PROGRAMMING	ALL
.	037A	32207	FLIGHT CONTROLS - ELAC SYSTEM - INTRODUCE ELAC SOFTWARE L82	VP-BWN VP-BWO VP-BWP VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631

M V T	REV	MOD MP SB	TITLE / VALIDITY		
.	037	32311	LANDING GEAR-WHEELS AND BRAKES-CANCEL MIXABILITY BETWEEN GOODRICH BRAKES 2-1600-2 AND -3 AUTHOR. WITH MOD 31803		
			VP-BWA	VP-BDM	VP-BDN
			VP-BDO	VP-BWG	VP-BDK
			VP-BWD	VP-BWE	VP-BWF
			VP-BWH	VP-BWI	VP-BWJ
			VP-BWK	VP-BWM	VP-BWL
			VP-BQP	VP-BQV	VP-BQW
			VP-BRY	VP-BRX	VP-BRZ
			VP-BUK	VP-BUN	VP-BUO
			VP-BQU	VP-BKX	VP-BKY
			VP-BKC	MSN 3574	MSN 3631
.	037	32494	INFORMATION SYSTEMS-ATIMS-ATSU PROVIDE ATSU A/C INTERFACE SOFTWARE CSB 3.2C CAPABLE OF VDL MODE 2		
			ALL		
.	037	32496	INFORMATION SYSTEMS-ATIMS-ATSU ACTIVATE VDL MODE 2 FUNCTION IN THE ATSU		
			ALL		
.	036	32619	ENGINE FUEL AND CONTROL - FADEC SYSTEM INTRODUCE NEW FADEC SOFTWARE "5BK" ON SAC CFM56-5B ENGINES		
			ALL		
.	039A	32650	FUEL - QUANTITY INDICATION - INTRODUCE FUEL LEAK DETECTION		
			VP-BRY	VP-BRX	VP-BRZ
			VP-BUK	VP-BUN	VP-BUO
			VP-BQU	VP-BKX	VP-BKY
			VP-BKC	MSN 3574	MSN 3631
.	041	32651 ...... 28-1150 01	FUEL-QUANTITY INDICATION-REMOVE FUEL LEAK DETECTION FUNCTION ASSOCIATED WITH FQIC 13-9 (ANTI-MOD FOR MOD 32650)		
			VP-BQP	VP-BQV	VP-BQW
			VP-BRY	VP-BRX	VP-BRZ
			VP-BUK	VP-BUN	VP-BUO
			VP-BQU	VP-BKX	VP-BKY
			VP-BKC	MSN 3574	MSN 3631

M V T	REV	MOD MP SB	TITLE	VALIDITY		
.	039A	33050	NAVIGATION - VOR / MARKER - INSTALL NEW IMPROVED VOR / MARKER (HONEYWELL)			
				VP-BQP	VP-BQR	VP-BQS
				VP-BQV	VP-BQW	VP-BQX
				VP-BQT	VP-BRY	VP-BRX
				VP-BRZ	VP-BRW	VP-BUM
				VP-BUK	VP-BUN	VP-BUP
				VP-BUO	VP-BQU	VP-BKX
				VP-BKY	VP-BKC	MSN 3574
				MSN 3631		
.	039A	33100	COMMUNICATIONS-CIDS-INTRODUCE ENHANCED CIDS (A318 VERSION) AND RELATED SYSTEMS ON SINGLE AISLE FAMILY			
				VP-BQP	VP-BQR	VP-BQS
				VP-BQV	VP-BQW	VP-BQX
				VP-BQT	VP-BRY	VP-BRX
				VP-BRZ	VP-BRW	VP-BUM
				VP-BUK	VP-BUN	VP-BUP
				VP-BUO	VP-BQU	VP-BKX
				VP-BKY	VP-BKC	MSN 3574
				MSN 3631		
.	038	33239	ENGINE FUEL AND CONTROL - FADEC SYSTEM - INSTALL "5BL" STANDARD ECU SOFTWARE FOR CFM56-5B ENGINES (A318 CAPABLE)			
				ALL		
.	040	33253	NAVIGATION - WEATHER RADAR SYSTEM - INSTALL HONEYWELL DUAL CONTROL UNIT CAPABLE OF AUTO-TILT FUNCTION			
				VP-BWN	VP-BWO	VP-BWP
				VP-BQP	VP-BQR	VP-BQS
				VP-BQV	VP-BQW	VP-BQX
				VP-BQT	VP-BRY	VP-BRX
				VP-BRZ	VP-BRW	VP-BUM
				VP-BUK	VP-BUN	VP-BUP
				VP-BUO	VP-BQU	VP-BKX
				VP-BKY	VP-BKC	MSN 3574
				MSN 3631		

M V T	REV	MOD	MP / SB	TITLE / VALIDITY
.	039A	33323	....	CERTIFICATION DOCUMENTS - GENERAL - EXTEND OPERATING FLIGHT ENVELOPE TO MINUS 2000FT PRESSURE ALTITUDE VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	038	33376	 32-1261	LANDING GEAR - NORMAL BRAKING - INSTALL BSCU STD L4.5 ALL
.	041C	33497	....	NAVIGATION - STANDBY DATA: ATTITUDE AND HEADING - REPLACE THALES ISIS BY THE 3 CONVENTIONAL STANDBY INSTRUMENTS VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	039A	33907	...... 31-1266 02	INDICATING/RECORDING SYSTEMS - FWC - INTRODUCE IAS DISCREPANCY AND DUAL PITOT MONITORING ON FWC H2F1 ALL
.	038A	33969	 31-1207	INDICATING RECORDING SYSTEM-ELECTRONIC INSTR. SYS. (EIS)-INSTALL DMC SOFTWARE S4-1 (TEMPORARY LOSS OF DU'S CORRECTION ALL
.	037A	34043	....	FLIGHT CONTROLS - ELAC SYSTEM - INSTALL ELAC L91 SOFTWARE VP-BWN VP-BWO VP-BWP VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631

M V T	REV	MOD MP SB	TITLE / VALIDITY
.	039A	34428	AIR CONDITIONING - PACK TEMPERATURE CONTROL - INSTALL IMPROVED AIR COND. SYSTEM CONTROLLER PN 1803B0000-01 VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	037A	34571 ...... 31A1220 01	INDICATING/RECORDING SYSTEMS-ELECTRONIC INSTRUMENT SYSTEM(EIS)- INSTALL DISPLAY MANAGEMENT COMPUTER SOFTWARE EIS2 S4-2 ALL
.	039A	34573 ...... 22-1168 01	AUTO FLIGHT - FLIGHT MANAGEMENT AND GUIDANCE COMPUTER (FMGC)-INSTALL FMS2 HONEYWELL P1C11 ON A/C WITH CFMI PPS VP-BWA VP-BDM VP-BDN VP-BDO VP-BWG VP-BDK VP-BWD VP-BWE VP-BWF VP-BWH VP-BWI VP-BWJ VP-BWK VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	039A	34825	NAVIGATION- GPWS - USE LATERAL GPS POSITION WITH AUTOMATIC DESELECTION VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631

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M
V REV   MOD  MP        TITLE
T          SB                           VALIDITY

. 039A 35040  ......  LANDING GEAR - WHEELS AND BRAKES
      ...........      INTRODUCE GOODRICH DURACARB CARBON
                       BRAKES WITH ANTI - OXYDAN "M1"
                             VP-BQP      VP-BQV      VP-BQW
                             VP-BRY      VP-BRX      VP-BRZ
                             VP-BUK      VP-BUN      VP-BUO
                             VP-BQU      VP-BKX      VP-BKY
                             VP-BKC      MSN 3574    MSN 3631

. 039A 35216  ......  LANDING GEAR - NORMAL BRAKING -
      ...........      INSTALL BSCU STD L4.8 (EM2)
                             VP-BQP      VP-BQR      VP-BQS
                             VP-BQV      VP-BQW      VP-BQX
                             VP-BQT      VP-BRY      VP-BRX
                             VP-BRZ      VP-BRW      VP-BUM
                             VP-BUK      VP-BUN      VP-BUP
                             VP-BUO      VP-BQU      VP-BKX
                             VP-BKY      VP-BKC      MSN 3574
                             MSN 3631

. 040A 35220  ......  INDICATING/RECORDING SYSTEMS -
      ...........      FLIGHT WARNING COMPUTER (FWC) -
                       INSTALL FWC STANDARD H2F3
                             VP-BRY      VP-BRX      VP-BRZ
                             VP-BRW      VP-BUM      VP-BUK
                             VP-BUN      VP-BUP      VP-BUO
                             VP-BQU      VP-BKX      VP-BKY
                             VP-BKC      MSN 3574    MSN 3631

. 040A 35240  ......  NAVIGATION - ATC/MODE S (SELECT) -
      34-1369 01       CERTIFY EHS FUNCTION
                             ALL

. 039A 35249  ......  LANDING GEAR - STEERING - INSTALL NWS
      ...........      ELECTRICAL BOX WITH NEW MICRO-SWITCH
                       AND IMPROVED SEALING
                             VP-BQP      VP-BQR      VP-BQS
                             VP-BQV      VP-BQW      VP-BQX
                             VP-BQT      VP-BRY      VP-BRX
                             VP-BRZ      VP-BRW      VP-BUM
                             VP-BUK      VP-BUN      VP-BUP
                             VP-BUO      VP-BQU      VP-BKX
                             VP-BKY      VP-BKC      MSN 3574
                             MSN 3631
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M
V REV   MOD  MP        TITLE
T          SB                          VALIDITY


. 040  35436  ......  EQUIPMENT/FURNISHINGS - MISC. EMERGENCY
     ...........       EQUIPMENT-INSTALL ELT(406AF) WITH PROG.
                       DONGLE AND RCP IN COCKPIT - THALES
                             VP-BQP     VP-BQR     VP-BQS
                             VP-BQV     VP-BQW     VP-BQX
                             VP-BQT     VP-BRY     VP-BRX
                             VP-BRZ     VP-BRW     VP-BUM
                             VP-BUK     VP-BUN     VP-BUP
                             VP-BUO     VP-BQU     VP-BKX
                             VP-BKY     VP-BKC     MSN 3574
                             MSN 3631

. 040A 35485  ......  INDICATING/RECORDING SYSTEM-ELECTRONIC
     ...........       INSTRUMENT SYSTEM (EIS)-INSTALL DISPLAY
                       MANAGEMENT COMPUTER SOFTWARE EIS2 S6-1
                             VP-BRY     VP-BRX     VP-BRZ
                             VP-BRW     VP-BUM     VP-BUK
                             VP-BUN     VP-BUP     VP-BUO
                             VP-BQU     VP-BKX     VP-BKY
                             VP-BKC     MSN 3574   MSN 3631

. 041  35517  ......  NAVIGATION - ADIRU - INSTALL
     ...........       NORTHROP GRUMMAN ADIRU
                       P/N 465020-0303-0316
                             VP-BQR     VP-BQS     VP-BQX
                             VP-BQT     VP-BRW     VP-BUM
                             VP-BUK     VP-BUN     VP-BUP
                             VP-BUO

. 041A 35550  ......  PNEUMATIC - ENGINE BLEED AIR SUPPLY
     ...........       SYSTEM - INSTALL BMC STD 9 CAPABLE OF
                       A318 PW
                             VP-BUM     VP-BUK     VP-BUN
                             VP-BUP     VP-BUO     VP-BQU
                             VP-BKX     VP-BKY     VP-BKC
                             MSN 3574   MSN 3631

. 041  35793  ......  NAVIGATION - ADIRU -
     ...........       INSTALL HONEYWELL ADIRU P/N HG2030-AE23
                             VP-BRY     VP-BRX     VP-BRZ
                             VP-BUM     VP-BUK     VP-BUN
                             VP-BUP     VP-BUO     VP-BQU
                             VP-BKX     VP-BKY     VP-BKC
                             MSN 3574   MSN 3631
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M V T	REV	MOD / SB	MP	TITLE / VALIDITY
.	040	35863	......	AIR CONDITIONING - PACK TEMPERATURE CONTROL - INSTALL AIR CONDITIONING CONTROLLER P/N 1803B0000-02 VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	039A	35864	......	AIRBORNE AUXILIARY POWER - GENERAL - INSTALL APIC APS3200 APU AS STANDARD (REPLACES HONEYWELL GTCP36-300) VP-BQP VP-BQR VP-BQS VP-BQV VP-BQW VP-BQX VP-BQT VP-BRY VP-BRX VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	040A	35865 46-1018 02	......	INFORMATION SYSTEMS - GENERAL - CERTIFY FANS B CONFIGURATIONS VP-BWA VP-BDO VP-BWD VP-BWE VP-BWF VP-BQX VP-BQT VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	041C	36368 32-1305	......	LANDING GEAR - NORMAL BRAKING - INSTALL BSCU STD L4.8 (EM2) - BY SB ONLY VP-BDN VP-BDO VP-BWG VP-BDK VP-BWE VP-BWH VP-BWI VP-BWJ VP-BWK VP-BWM VP-BWN VP-BWO VP-BWP

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M
V REV   MOD  MP        TITLE
T          SB                            VALIDITY


N 041I 36427  ......  AUTO-FLIGHT-MULTIPURPOSE CONTROL AND
     ...........       DISPLAY UNIT(MCDU) - ACTIVATE BACK-UP
                       NAV FUNCTION
                             MSN 3574    MSN 3631

. 040A 36462  ......  ENGINE FUEL AND CONTROL - FADEC SYSTEM-
     ...........       INSTALL "5BM" STANDARD ECU SOFTWARE
                       FOR CFM 56-5B ENGINES
                             VP-BQR      VP-BQS      VP-BQV
                             VP-BQW      VP-BQX      VP-BQT
                             VP-BRY      VP-BRX      VP-BRZ
                             VP-BRW      VP-BUM      VP-BUK
                             VP-BUN      VP-BUP      VP-BUO
                             VP-BQU      VP-BKX      VP-BKY
                             VP-BKC      MSN 3574    MSN 3631

. 040B 36725  ......  INDICATING/RECORDING SYSTEMS-ELECTRONIC
     ...........       INSTRUMENT SYSTEM(EIS)-INSTALL DISPLAY
                       MANAGEMENT COMPUTER SOFTWARE EIS2 S7
                             VP-BRY      VP-BRX      VP-BRZ
                             VP-BRW      VP-BUM      VP-BUK
                             VP-BUN      VP-BUP      VP-BUO
                             VP-BQU      VP-BKX      VP-BKY
                             VP-BKC      MSN 3574    MSN 3631

. 041G 36853  ......  LANDING GEAR - NORMAL BRAKING - INSTALL
     ...........       BSCU SOFTWARE STD "L4.9"
                             VP-BUK      VP-BUN      VP-BUP
                             VP-BUO      VP-BKX

. 041G 37147  ......  POWER PLANT - GENERAL - INTRODUCE
     ...........       CFM56-5BX/3 ENGINE (SAC) "TECH
                       INSERTION PROGRAM"
                             VP-BUK      VP-BUN      VP-BUP
                             VP-BUO      VP-BQU      VP-BKX
                             VP-BKY      VP-BKC      MSN 3574
                             MSN 3631

. 041B 37317  ......  ELECTRICAL POWER - AC ESSENTIAL
     ...........       GENERATION SWITCHING - INSTALL AUTO
                       SWITCHING SYSTEM FOR AC AND DC ESS BUS
                             VP-BRZ      VP-BRW      VP-BUM
                             VP-BUK      VP-BUN      VP-BUP
                             VP-BUO      VP-BQU      VP-BKX
                             VP-BKY      VP-BKC      MSN 3574
                             MSN 3631
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M V T	REV	MOD MP SB	TITLE / VALIDITY
.	041C	37329	LIGHTS - INSTRUMENT AND PANEL INTEGRAL LIGHTING- ENSURE EMERGENCY LIGHTING FOR STAND-BY INSTRUMENTS (WITH ISIS PROV) VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
.	041B	37330	LIGHTS- INSTRUMENT AND PANEL INTEGRAL LIGHTING- ENSURE EMERGENCY LIGHTING FOR STAND-BY INSTRUMENTS -WITHOUT ISIS PROV VP-BRZ VP-BRW
.	041C	37356	NAVIGATION - MMR - INSTALL COLLINS MMR STANDARD P/N 822-1152-122 VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631
N	041I	37445	AUTO FLIGHT - FLIGHT AUGMENTATION COMPUTER- INTRODUCE TAIL STRIKE "PITCH-PITCH" CALL-OUT FOR A320 AND A321 A/C MSN 3574 MSN 3631
.	041A	37508 28-1159	FUEL - MAIN FUEL PUMP SYSTEM - INSPECT AND ADMINISTER CORRECT TORQUE AND SCREW LOCKING ON FIXING BOLTS ALL
.	041B	37782	COMMUNICATIONS - AUDIO MANAGEMENT - MODIFY AMU POWER SUPPLY TO COPE WITH DC ESSENTIAL BUS LOSS VP-BRZ VP-BRW VP-BUM VP-BUK VP-BUN VP-BUP VP-BUO VP-BQU VP-BKX VP-BKY VP-BKC MSN 3574 MSN 3631

01.00 CONTENTS

01.00 CONTENTS

GENERAL

This section includes the limitations required by the regulations and contained in the Flight Manual.
All references to airspeed, Mach and altitude relate to indicated airspeed, indicated Mach and pressure altitude, unless otherwise noted.

KIND OF OPERATIONS

This airplane is certified in the public transport category (passengers and freight) for day and night operations, in the following conditions when the appropriate equipment and instruments required by the airworthiness and operating regulations are approved, installed and in an operable condition :
- VFR and IFR
- Extended overwater flight
- Flight in icing conditions
- Maximum number of passenger seats : 180

GENERAL

This section includes the limitations required by the regulations and contained in the Flight Manual.
All references to airspeed, Mach and altitude relate to indicated airspeed, indicated Mach and pressure altitude, unless otherwise noted.

KIND OF OPERATIONS

This airplane is certified in the public transport category (passengers and freight) for day and night operations, in the following conditions when the appropriate equipment and instruments required by the airworthiness and operating regulations are approved, installed and in an operable condition :
- VFR and IFR
- Extended overwater flight
- Flight in icing conditions
- Maximum number of passenger seats : 220.

GENERAL

This section includes the limitations required by the regulations and contained in the Flight Manual.
All references to airspeed, Mach and altitude relate to indicated airspeed, indicated Mach and pressure altitude, unless otherwise noted.

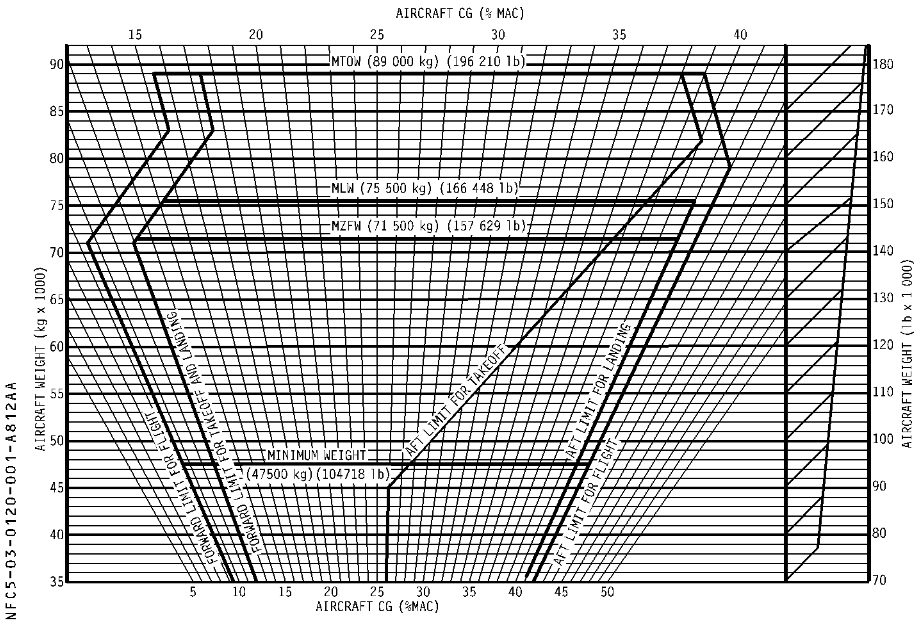
KIND OF OPERATIONS

This airplane is certified in the public transport category (passengers and freight) for day and night operations, in the following conditions when the appropriate equipment and instruments required by the airworthiness and operating regulations are approved, installed and in an operable condition :
- VFR and IFR
- Extended overwater flight
- Flight in icing conditions
- Maximum number of passenger seats : 145.

MINIMUM FLIGHT CREW

The minimum flight crew is 2 pilots.

CENTER OF GRAVITY LIMITS



- CG limits are given in percentage of the reference chord length aft of the leading edge.
- The reference chord length is 4.193 meters (13.76 feet). It is 20.58 meters (67.53 feet) aft of the aircraft nose.
- The CG must always be within these limits, regardless of fuel load.

R – Refer to 3.01.20 page 11 for Center of Gravity Limits on Type B runways.

WEIGHT LIMITATIONS

Maximum taxi weight . . . . 89 400 kg (197 092 lb)
Maximum takeoff weight (brake release) . . . . 89 000 kg (196 210 lb)
Maximum landing weight . . . . 75 500 kg (166 448 lb)
Maximum zero fuel weight . . . . 71 500 kg (157 629 lb)
Minimum weight . . . . 47 500 kg (104 718 lb)

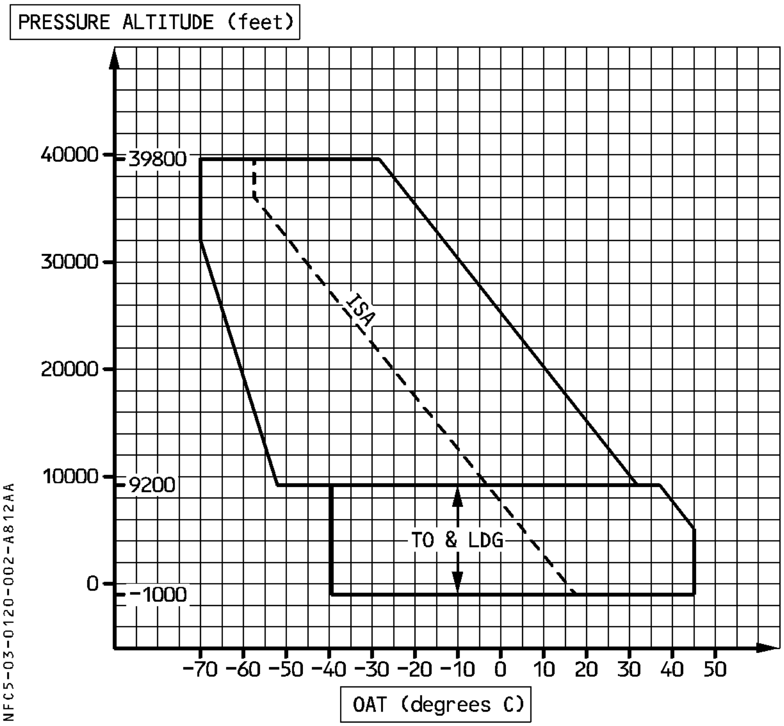
In exceptional cases (in flight turnback or diversion), an immediate landing at weight above maximum landing weight is permitted, provided that the pilot follows the overweight landing procedure.

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Clean configuration . . . . − 1 g to + 2.5 g
Slats and flaps extended . . . . 0 g to + 2 g
Slats extended and flaps retracted . . . . 0 g to + 2 g

ENVIRONMENTAL ENVELOPE

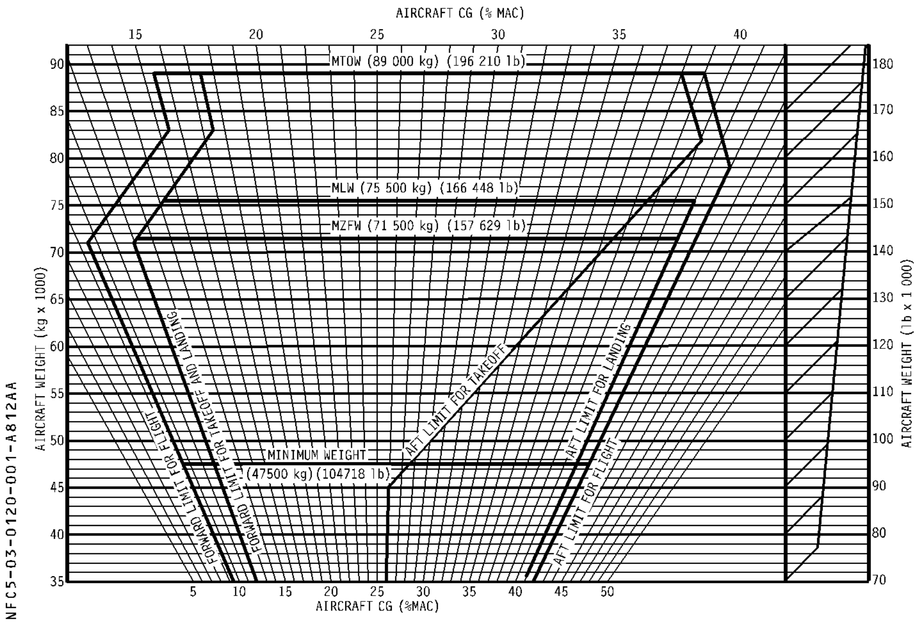
R



MINIMUM FLIGHT CREW

The minimum flight crew is 2 pilots.

CENTER OF GRAVITY LIMITS



— CG limits are given in percentage of the reference chord length aft of the leading edge.
— The reference chord length is 4.193 meters (13.76 feet). It is 20.58 meters (67.53 feet) aft of the aircraft nose.
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R — Refer to 3.01.20 page 11 for Center of Gravity Limits on Type B runways.

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Maximum taxi weight . . . . 89 400 kg (197 092 lb)
Maximum takeoff weight (brake release) . . . . 89 000 kg (196 210 lb)
Maximum landing weight . . . . 75 500 kg (166 448 lb)
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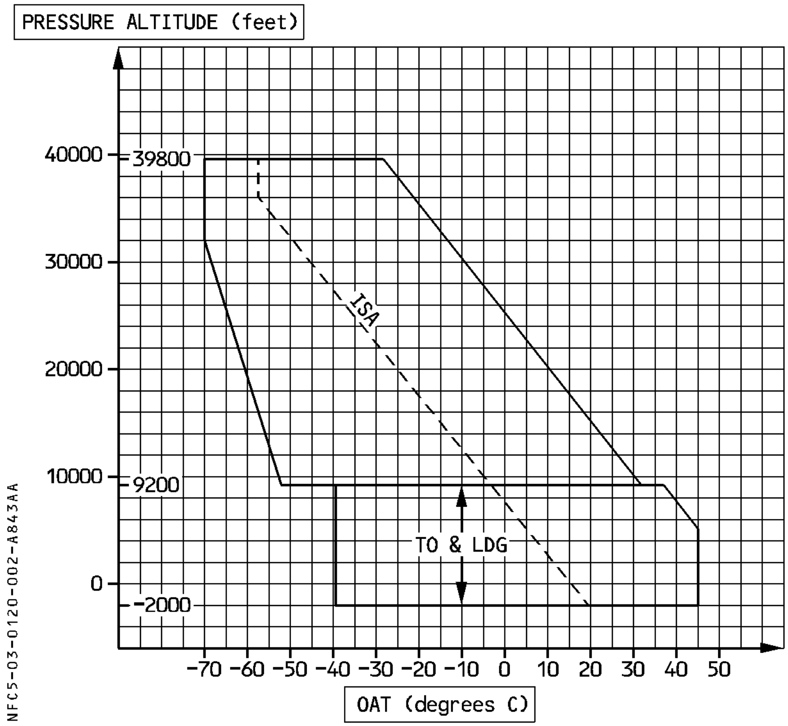
Slats extended and flaps retracted . . . . 0 g to + 2 g

ENVIRONMENTAL ENVELOPE

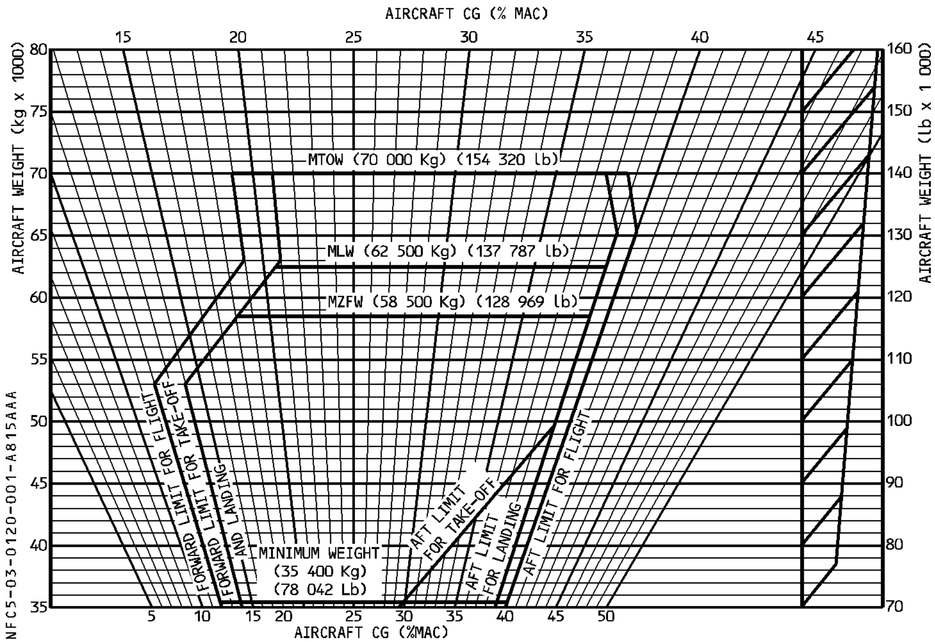
R



MINIMUM FLIGHT CREW

The minimum flight crew consists of 2 pilots.

CENTER OF GRAVITY LIMITS



– CG limits are given in percentage of the reference chord length aft of the leading edge.
– The reference chord length is 4.193 m (13.76 ft). It is 14.71 m (48.26 ft) aft of the aircraft nose.
– The CG must always be within these limits, regardless of fuel load.
– Refer to 3.01.20 page 11 for Center of Gravity Limits on Type B runways.

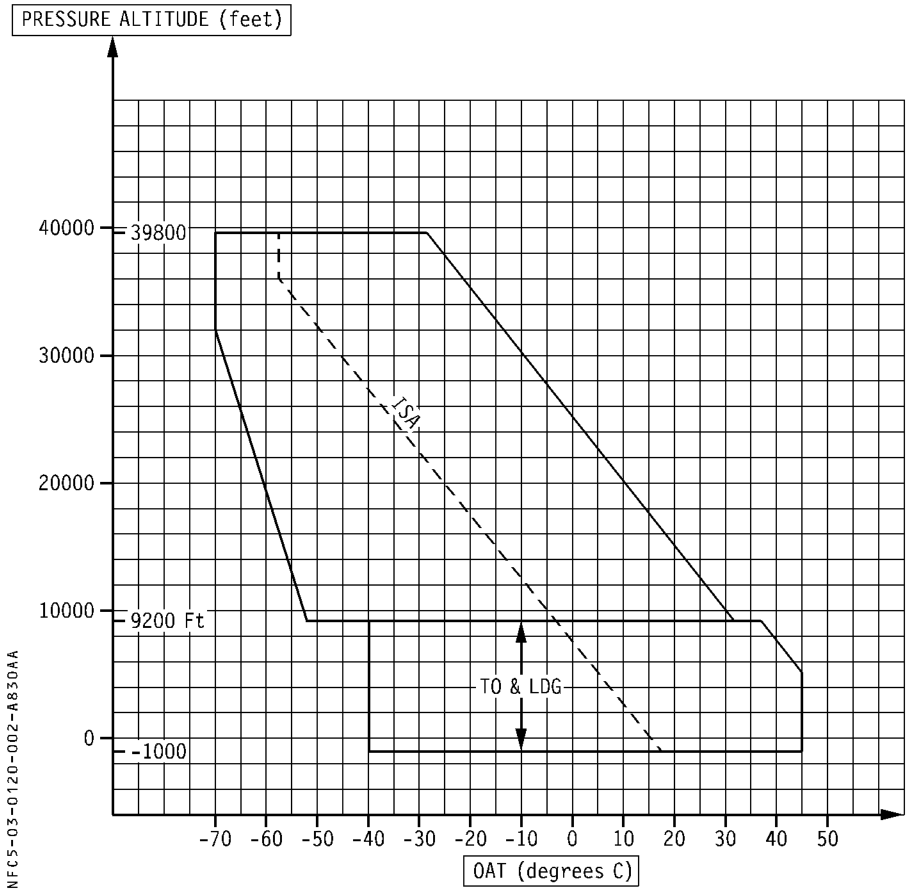
WEIGHT LIMITATIONS

Maximum taxi weight . . . . 70 400 kg (155 200 lb)
Maximum takeoff weight (brake release) . . . . 70 000 kg (154 320 lb)
Maximum landing weight . . . . 62 500 kg (137 787 lb)
Maximum zero fuel weight . . . . 58 500 kg (128 969 lb)
Minimum weight . . . . 35 400 kg (78 042 lb)
In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Clean configuration . . . . − 1 g to + 2.5 g
Slats and flaps extended . . . . 0 g to + 2 g
Slats extended and flaps retracted . . . . 0 g to + 2 g

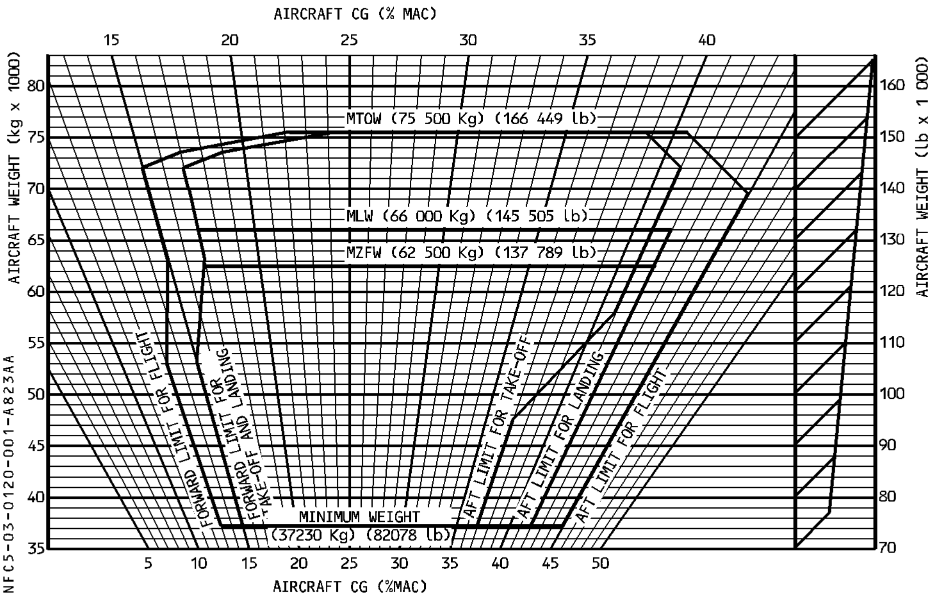
ENVIRONMENTAL ENVELOPE



MINIMUM FLIGHT CREW

The minimum flight crew consists of 2 pilots.

CENTER OF GRAVITY LIMITS



- CG limits are given in percentage of the reference chord length aft of the leading edge.
- The reference chord length is 4.193 m (13.76 ft). It is 16.31 m (53.51 ft) aft of the aircraft nose.
- The CG must always be within these limits, regardless of fuel load.
- Refer to 3.01.20 page 11 for Center of Gravity Limits on Type B runways.

WEIGHT LIMITATIONS

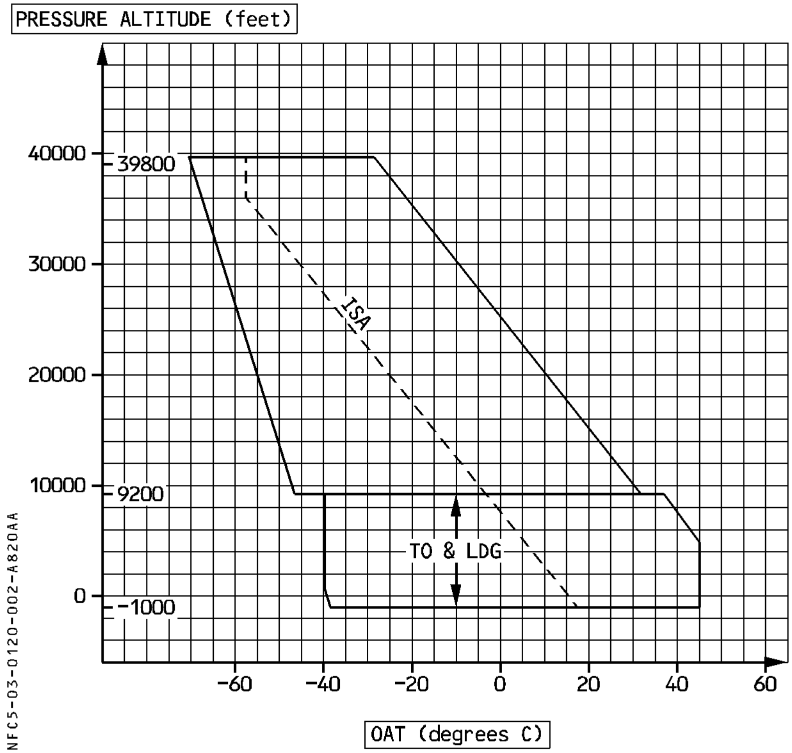
Maximum taxi weight . . . . 75 900 kg (167 331 lb)
Maximum takeoff weight (brake release) . . . . 75 500 kg (166 449 lb)
Maximum landing weight . . . . 66 000 kg (145 505 lb)
Maximum zero fuel weight . . . . 62 500 kg (137 789 lb)
Minimum weight . . . . 37 230 kg (82 078 lb)

In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Clean configuration . . . . – 1 g to + 2.5 g
Slats and flaps extended . . . . 0 g to + 2 g
Slats extended and flaps retracted . . . . 0 g to + 2 g

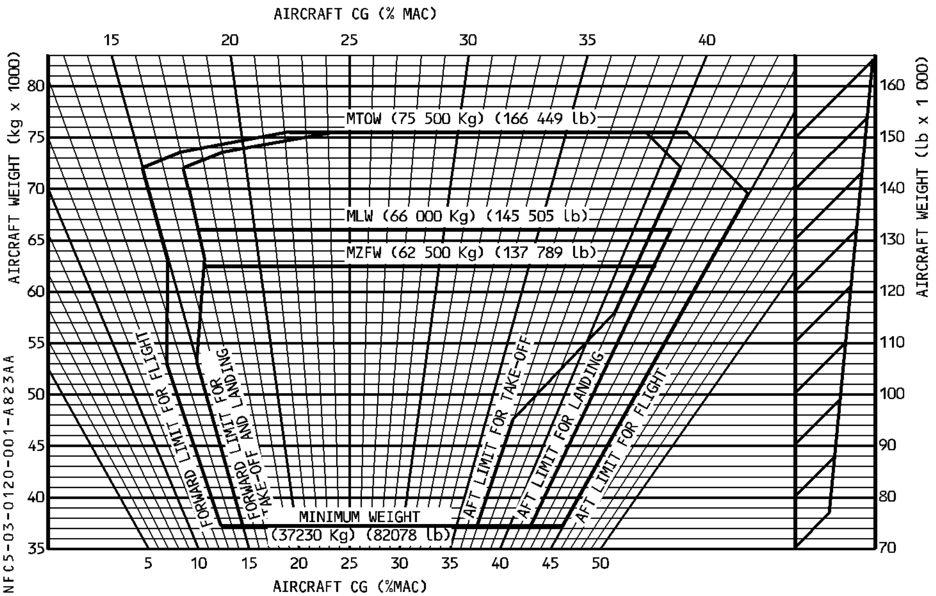
ENVIRONMENTAL ENVELOPE



MINIMUM FLIGHT CREW

The minimum flight crew consists of 2 pilots.

CENTER OF GRAVITY LIMITS



- CG limits are given in percentage of the reference chord length aft of the leading edge.
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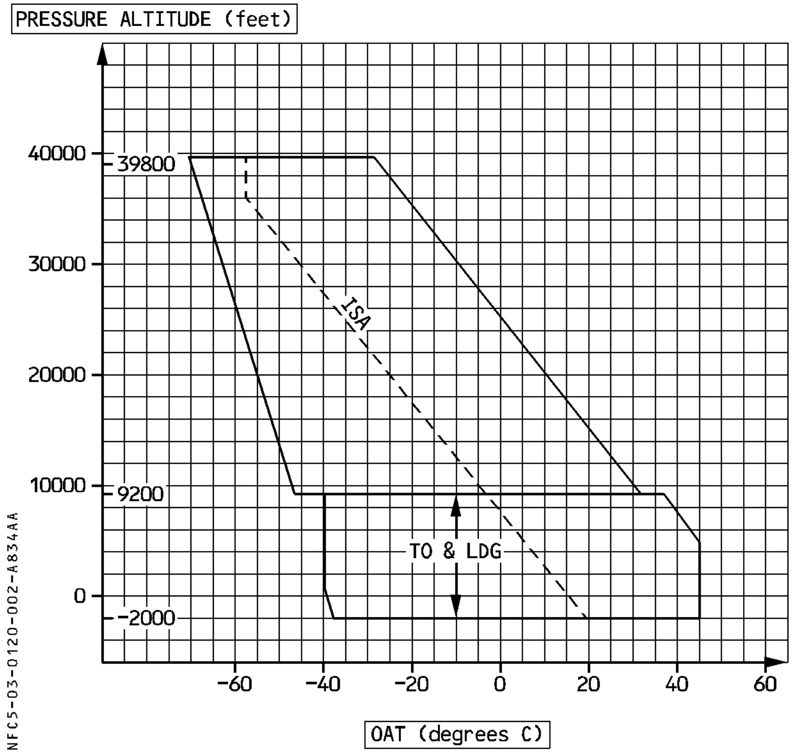
Clean configuration . . . . – 1 g to + 2.5 g
Slats and flaps extended . . . . 0 g to + 2 g
Slats extended and flaps retracted . . . . 0 g to + 2 g

ENVIRONMENTAL ENVELOPE



AIRPORT OPERATIONS

- Runway slope (mean) . . . . ± 2 %
- Runway altitude . . . . 9200 feet
- Nominal runway width . . . . 45 meters
- Wind for takeoff and landing :
  - · Maximum crosswind demonstrated for takeoff . . 29 knots gusting up to 38 knots*
  - · Maximum crosswind demonstrated for landing . . 33 knots gusting up to 38 knots*

  Note : *1. In the case of a loss of 3 spoilers, or of a flaps or slats jam/fault, the crosswind limit is 15 knots.*
  2. Landing conditions, in the case of a dual G + Y hydraulic system failure :
  – Runway condition . . . . Dry
  – Crosswind . . . . No more than 10 knots (5 meter/second)

  - · Maximum tailwind for takeoff . . . . 15 knots
  - · Maximum tailwind for landing . . . . 10 knots

  * : Maximum crosswind values have been demonstrated with flight controls in normal law, as well as in direct law with and without yaw damper.
- Wind for passenger / cargo door operation :
  - · Maximum wind for passenger door operation : . . . . 65 knots
R - · Maximum wind for cargo door opening : 40 knots (or 50 knots, if the aircraft nose is
R oriented into the wind, or the cargo door is on the leeward side).
  - · The cargo door must be closed, before the wind speed exceeds 65 knots.
- Allowable runway conditions :
  - · Runway paved and hard surfaced.
  - · Runway covered with a layer of water, slush, or wet snow, no greater than 1/2 inches (12.7 millimeters).
  - · Runway covered with a layer of dry snow no greater than 2 inches (50 millimeters)
- Maximum crosswind under different runway conditions :
  - · Runway covered with a layer of 1/2 inches (12.7 millimeters) of water, slush, or wet snow . . . . 10 knots (5 meter/second)

For CIS Airports

Reported braking action	Reported runway friction coefficient	Maximum crosswind (kt)	
		Takeoff	Landing
Good	0.60 – 0.50	29 *	33 *
Good/medium	0.49 – 0.45	29	29
Medium	0.44 – 0.40	25	
Medium/poor	0.39 – 0.35	20	
Poor	0.34 – 0.30	15	

It is not permitted to operate on runways covered with ice, or with a friction coefficient of $\mu < 0.3$.

For Other Airports

Reported braking action	Reported runway friction coefficient	Maximum crosswind (knots)		Equivalent runway conditions **
		Takeoff	Landing	
Good	≥ 0.4	29 *	33 *	1
Good/medium	0.39 to 0.36	29	29	1
Medium	0.35 to 0.3	25		2/3
Medium/poor	0.29 to 0.26	20		2/3
Poor	≤ 0.25	15		3/4
Unreliable		5		4/5

* The maximum crosswind demonstrated for dry and wet runways.

** Equivalent runway conditions (only valid for maximum crosswind determination) :

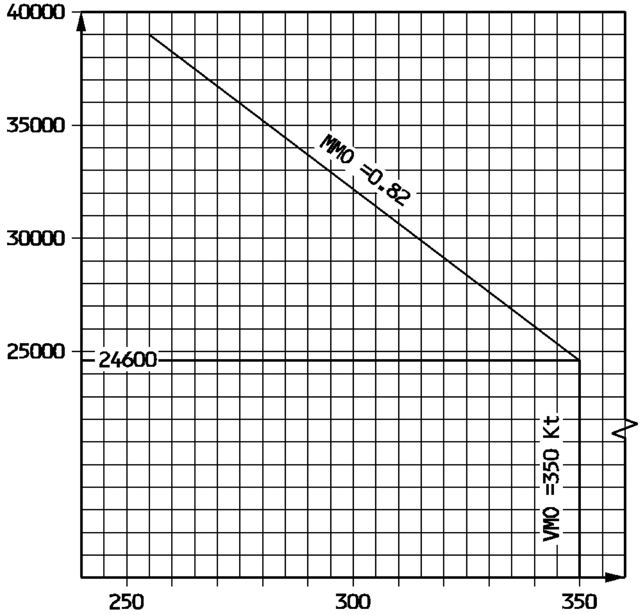
1. Dry, damp or wet runway (less than 3 millimeters water depth)
2. Runway covered with slush
3. Runway covered with dry snow
4. Runway covered with standing water, or with risk of hydroplaning, or with wet snow
5. Icy runway, or high risk of hydroplaning

SPEED LIMITATIONS

MAXIMUM OPERATING SPEED VMO/MMO

R

PRESSURE ALTITUDE (Ft)



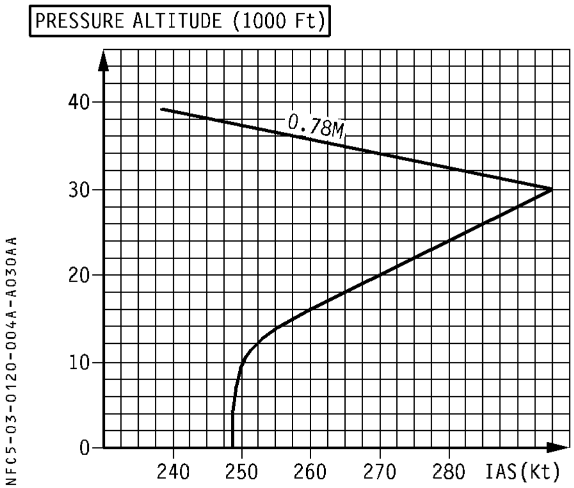
IAS (Kt)

NFC5-03-0120-004-A001AA

The maximum operating limit speed VMO/MMO may not be exceeded deliberately in any regime of flight.

MAXIMUM DESIGN MANOEUVERING SPEED VA

(Applies in alternate or direct flight control laws only).



If alternate or direct law is active, full ailerons and rudder application should be confined to speeds below VA.

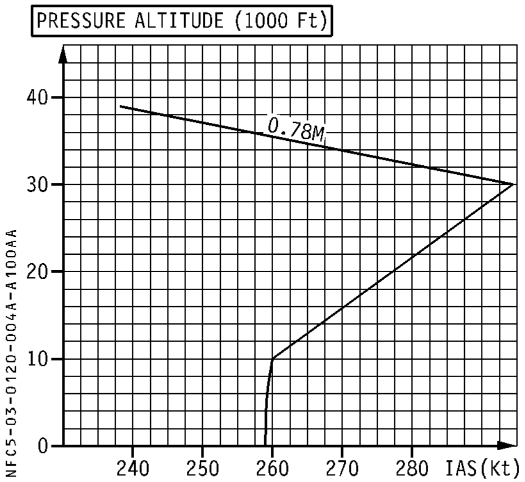
If alternate or direct law is active manoeuvres involving angle of attack near stall should be confined to speeds below VA.

CAUTION

Rapid and large alternating control inputs, especially in combination with large changes in pitch, roll, or yaw (e.g. large sideslip angles) may result in structural failures at any speed, even below VA.

MAXIMUM DESIGN MANOEUVERING SPEED VA

(Applies in alternate or direct flight control laws only).



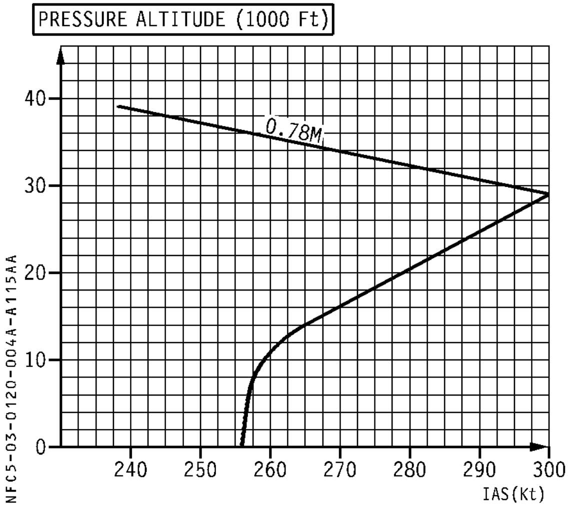
If alternate or direct law is active, full ailerons and rudder application should be confined to speeds below VA.
If alternate or direct law is active manoeuvres involving angle of attack near stall should be confined to speeds below VA.

CAUTION

Rapid and large alternating control inputs, especially in combination with large changes in pitch, roll, or yaw (e.g. large sideslip angles) may result in structural failures at any speed, even below VA.

MAXIMUM DESIGN MANOEUVERING SPEED VA

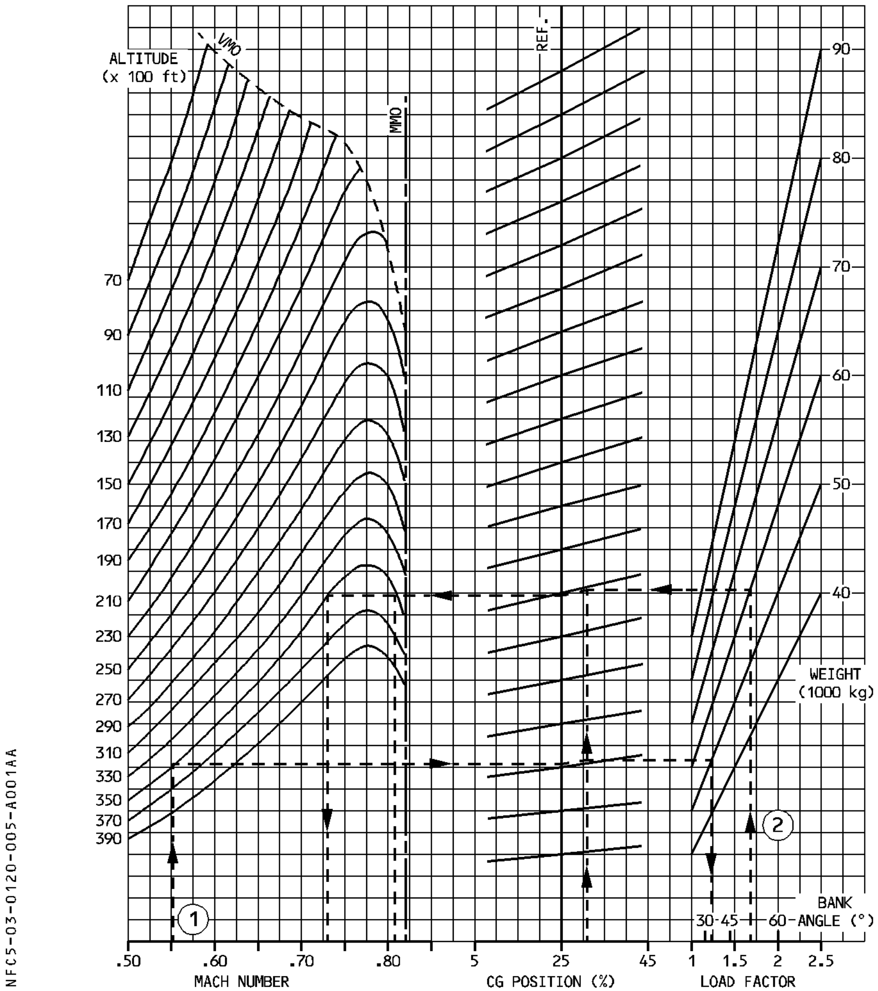
(Applies in alternate or direct flight control laws only).



If alternate or direct law is active, full ailerons and rudder application should be confined to speeds below VA.
If alternate or direct law is active manoeuvres involving angle of attack near stall should be confined to speeds below VA.

CAUTION
Rapid and large alternating control inputs, especially in combination with large changes in pitch, roll, or yaw (e.g. large sideslip angles) may result in structural failures at any speed, even below VA.

R **BUFFET ONSET**



R Examples :

R 1. Determine Maximum Bank Angle limited by buffet :

R DATA : M = 0.55, FL = 350, CG = 31 %, WEIGHT = 50000 kg

R RESULT : load factor = 1.25 g or 35° bank

R 2. Determine low and high speed limited by buffet :

R DATA : 52° bank or 1.7 g, WEIGHT = 60000 kg, CG = 31%, FL = 350

R RESULT : M = 0.73 (low speed buffet) and M = 0.81 (high speed buffet).

MINIMUM CONTROL SPEEDS

R

Altitude (ft)	VMCA (KT CAS)	VMCG (KT IAS)		
		CONF 1 + F	CONF 2	CONF 3
– 2000	112	111.5	109.5	109.0
0	110	109.5	107.5	107.0
2000	108	107.5	105.5	105.0
4000	107.5	107.0	105.0	104.5
6000	105.5	105.0	103.0	103.0
8000	103	103.0	101.0	100.5
10000	100	100.0	98.0	97.5
12000	96.5	96.5	94.5	94.0
14100	93.5	93.5	91.5	91.0

MAXIMUM FLAPS/SLATS SPEEDS

LEVER POSITION	SLATS	FLAPS	Ind. on ECAM	MAX SPD	FLIGHT PHASE
1	18	0	1	230	HOLDING
1	18	10	1 + F	215	TAKEOFF
2	22	15	2	200	TAKEOFF/APPROACH
3	22	20	3	185	TAKEOFF/APPROACH/LANDING
FULL	27	35	FULL	177	LANDING

GEAR DOWN SPEEDS

- Maximum speed with landing gear extended (VLE) 280 kt/M.67
- Maximum speed at which the landing gear may be extended (VLO extension) . 250 kt
- Maximum speed at which the landing gear may be retracted (VLO retraction) . 220 kt
- Maximum altitude at which the landing gear may be extended . . . . 25 000 ft

MAXIMUM TIRE SPEED

- Ground speed . . . . 195 knots

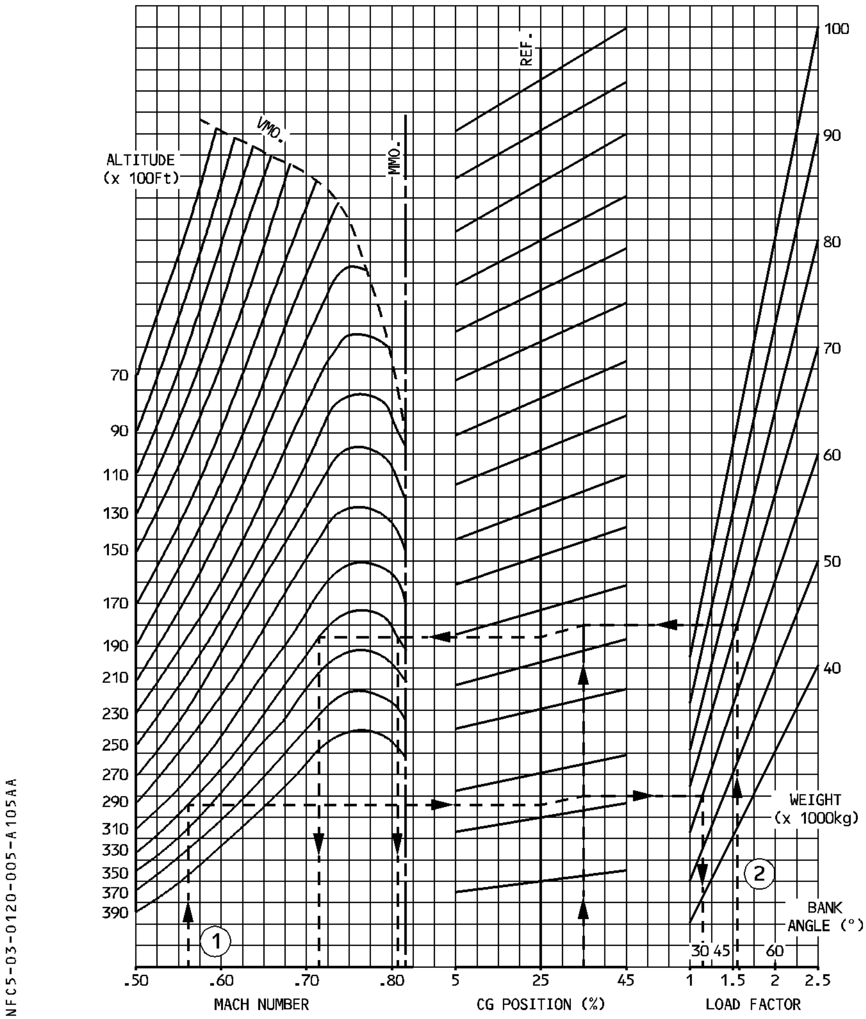
WINDSHIELD WIPERS IN USE

- Maximum speed . . . . 230 knots

COCKPIT WINDOW OPEN

- Maximum speed . . . . 200 knots

R **BUFFET ONSET**



R <u>Examples :</u>

R 1. Determine Maximum Bank Angle limited by buffet :

R DATA : M = 0.56, FL = 330, CG = 35 %, WEIGHT = 60000 kg

R RESULT : load factor = 1.2 g or 30° bank

R 2. Determine low and high speed limited by buffet :

R DATA : 47° bank or 1.6 g, WEIGHT = 70000 kg, CG = 35%, FL = 330

R RESULT : M = 0.72 (low speed buffet) and M = 0.81 (high speed buffet).

MINIMUM CONTROL SPEEDS

R

Altitude (ft)	VMCA (KT CAS)	VMCG (KT IAS)		
		CONF 1 + F	CONF 2	CONF 3
0	108	104.5	104.5	104.5
2 000	106	102.5	102.5	102.5
4 000	104	101.5	101.5	101.5
6 000	102.5	99.5	99.5	99.5
8 000	100	97.5	97.5	97.5
9 200	99	96	96	96

MAXIMUM FLAPS/SLATS SPEEDS

LEVER POSITION	SLATS	FLAPS	Ind. on ECAM	MAX SPD	FLIGHT PHASE
1	18	0	1	230	HOLDING
1	18	10	1 + F	215	TAKEOFF
2	22	15	2	200	TAKEOFF/APPROACH
3	22	20	3	185	TAKEOFF/APPROACH/LANDING
FULL	27	40	FULL	177	LANDING

GEAR DOWN SPEEDS

- Maximum speed with landing gear extended (VLE) 280 kt/M.67
- Maximum speed at which the landing gear may be extended (VLO extension) . 250 kt
- Maximum speed at which the landing gear may be retracted (VLO retraction) . 220 kt
- Maximum altitude at which the landing gear may be extended . . . . 25 000 ft

MAXIMUM TIRE SPEED

- Ground speed . . . . 195 kt

WINDSHIELD WIPERS IN USE

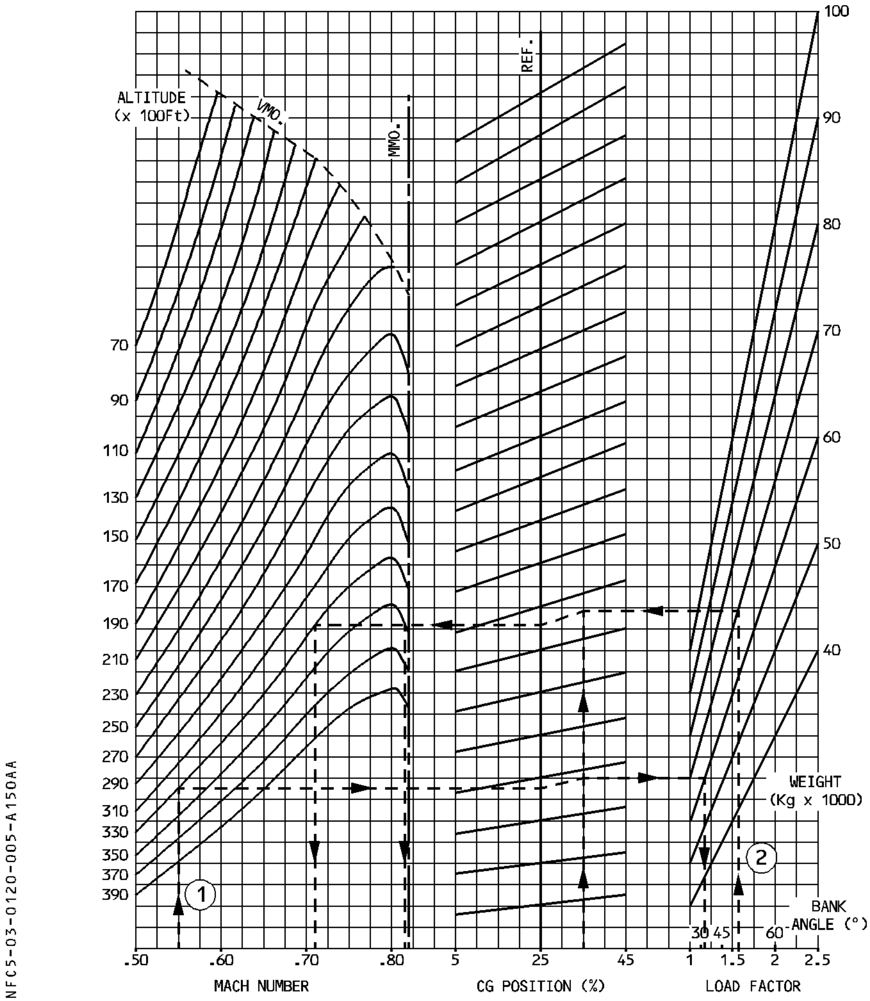
- Maximum speed . . . . 230 kt

COCKPIT WINDOW OPEN

- Maximum speed . . . . 200 kt

BUFFET ONSET

R



R Examples :

R 1. Determine Maximum Bank Angle limited by buffet :

R DATA : M = 0.55, FL = 330, CG = 35 %, WEIGHT = 60000 kg

R RESULT : load factor = 1.2 g or 30° bank

R 2. Determine low and high speed limited by buffet :

R DATA : 49° bank or 1.6 g, WEIGHT = 70000 kg, CG = 35%, FL = 330

R RESULT : M = 0.71 (low speed buffet) and M = 0.82 (high speed buffet).

MINIMUM CONTROL SPEEDS

R

Altitude (ft)	VMCA (KT CAS)	VMCG (KT IAS)	
		CONF 1 + F or 2	CONF 3
0	114	110	108.5
2000	111	107	105.2
4000	108	104	102.5
6000	104	101	99.5
8000	101	97.5	96
9200	98.5	95	94

MAXIMUM FLAPS/SLATS SPEEDS

LEVER POSITION	SLATS	FLAPS	Ind. on ECAM	MAX SPD	FLIGHT PHASE
1	18	0	1	230	HOLDING
1	18	10	1 + F	215	TAKEOFF
2	22	14	2	215	TAKEOFF/APPROACH
3	22	21	3	195	TAKEOFF/APPROACH/LANDING
FULL	27	25	FULL	190	LANDING

GEAR DOWN SPEEDS

- Maximum speed with landing gear extended (VLE) 280 kt/M.67
- Maximum speed at which the landing gear may be extended (VLO extension) . 250 kt
- Maximum speed at which the landing gear may be retracted (VLO retraction) . 220 kt
- Maximum altitude at which the landing gear may be extended . . . . 25 000 ft

MAXIMUM TIRE SPEED

- Ground speed . . . . 195 kt

WINDSHIELD WIPERS IN USE

- Maximum speed . . . . 230 kt

COCKPIT WINDOW OPEN

- Maximum speed . . . . 200 kt

TAXI SPEED

R When the taxi weight is higher than 76 000 kg (167 550 lb), do not exceed a taxi speed of 20 kt during a turn.

STALLING SPEEDS

The following graphs serve to determine the VS according to the configuration.
These graphs have been established for
· Basic forward CG
  – 23 % CG location in clean configuration
  – 25 % CG location in takeoff, approach and landing configuration
· Alternate forward CG
  – forward CG limit. See 3.01.20 p 1.

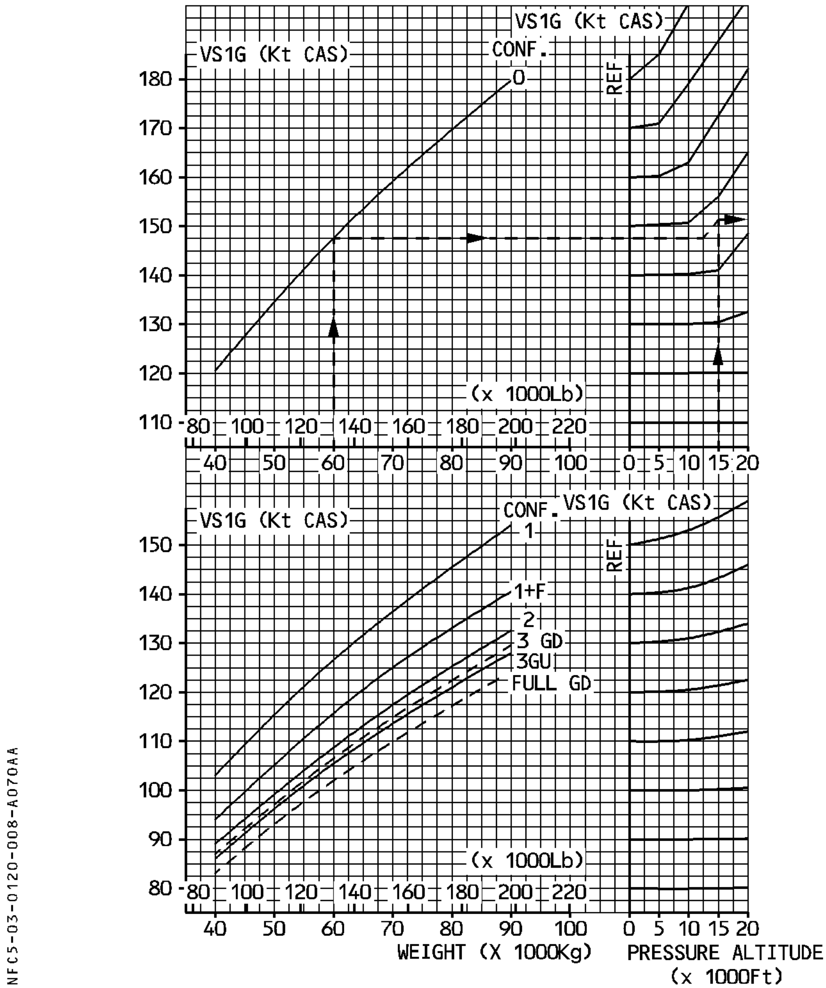
In most cases the CG location remains within the CG envelope below. Consequently the basic forward CG must be retained for any performance determination.
In some rare cases, if more forward CG is anticipated during any part of the flight, the alternate forward CG must be retained for any performance determination.

TAXI SPEED

R When the taxi weight is higher than 76 000 kg (167 550 lb), do not exceed a taxi speed of 20 kt during a turn.

STALLING SPEEDS

R



EXAMPLE : DATA : 60 000 kg (132276 lb), pressure altitude 15 000 ft, clean configuration.

RESULT : VS1G CAS = 152 kt

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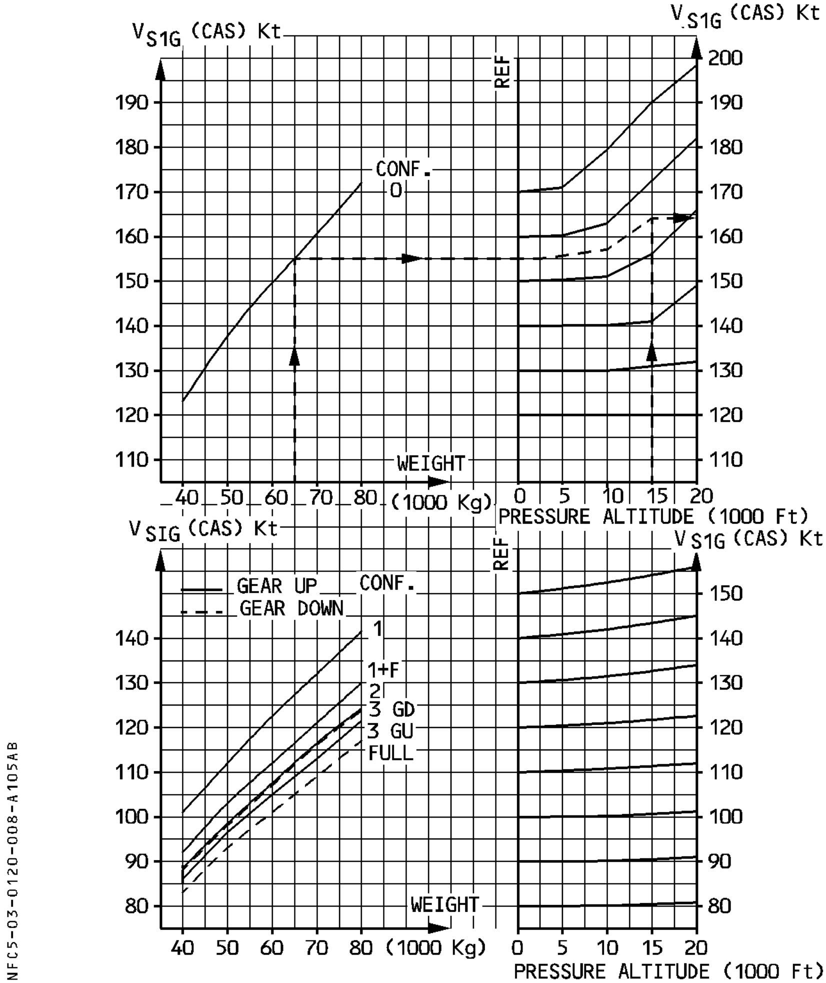
STALLING SPEEDS

R



R EXAMPLE : DATA : 65000 kg (143299 lb), pressure altitude 15000 ft, clean
R configuration.
R RESULT : VS1G CAS = 164 kt

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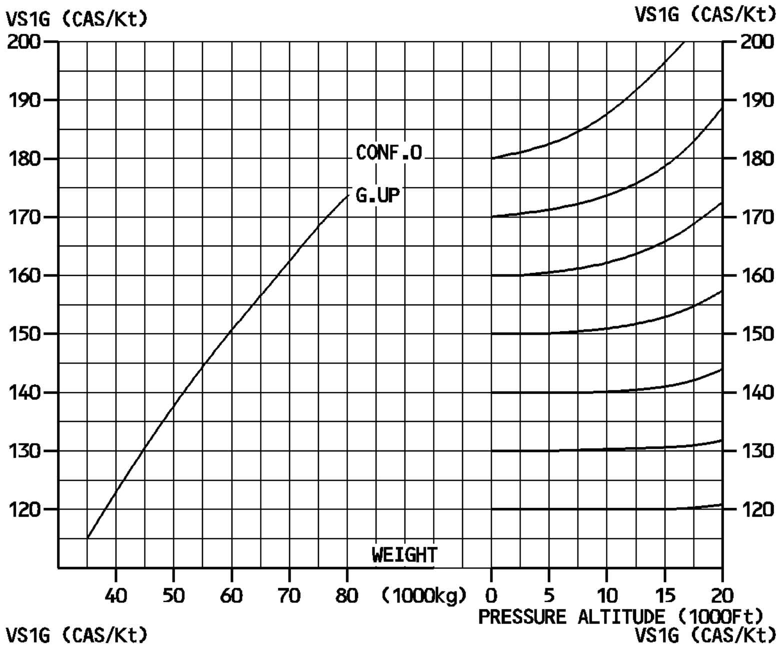
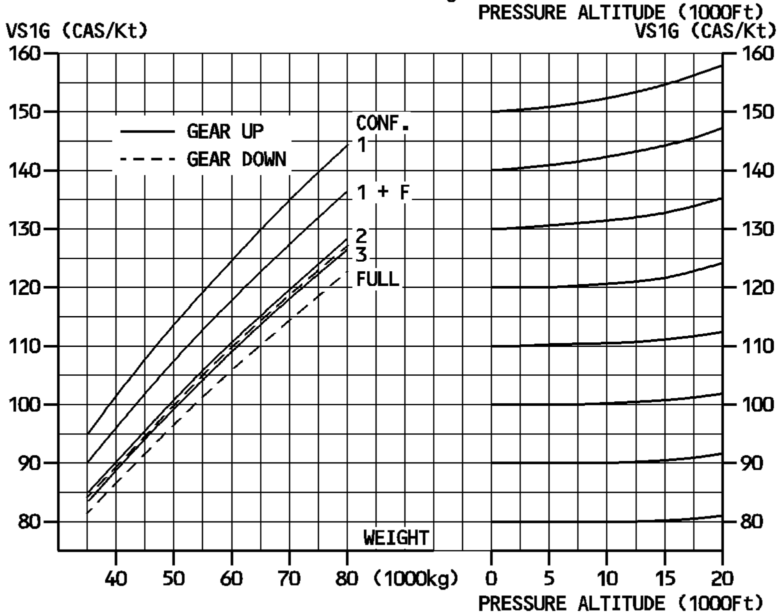
INTENTIONALLY LEFT BLANK

STALLING SPEEDS (BASIC FORWARD C.G.)





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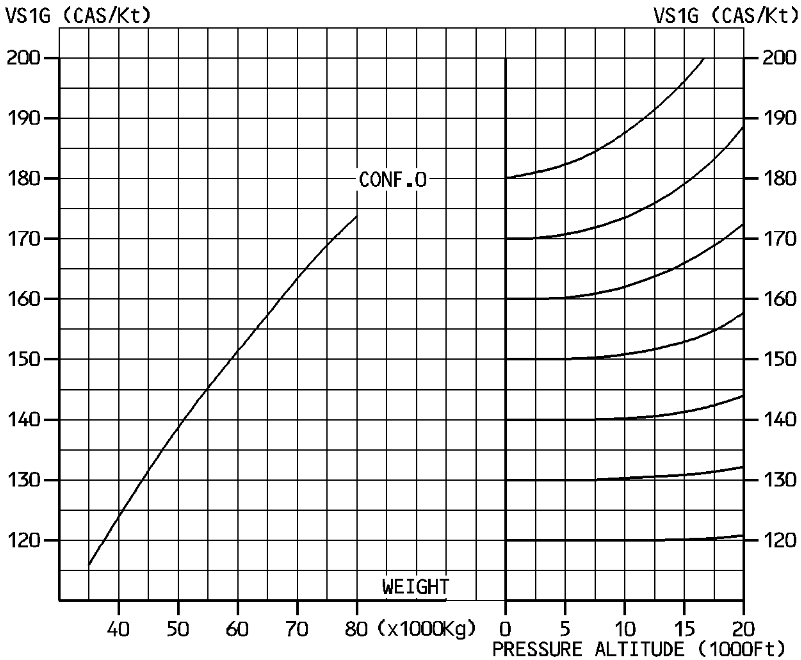
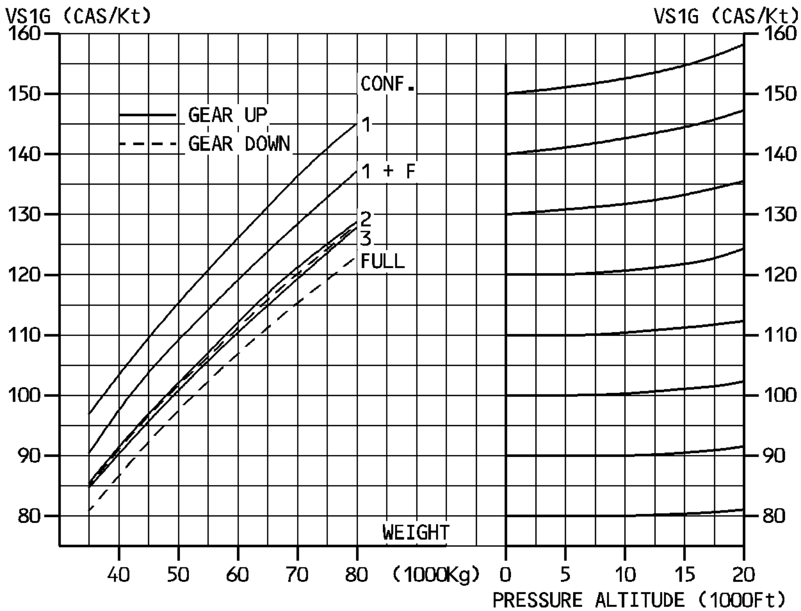
STALLING SPEEDS (ALTERNATE FORWARD C.G.)





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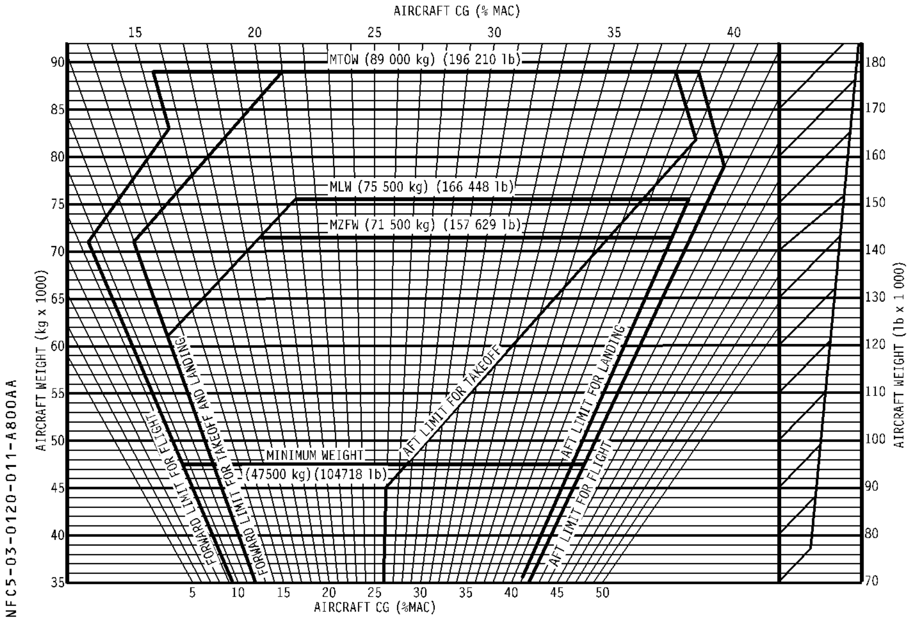
R **CENTER OF GRAVITY LIMITS FOR TYPE B RUNWAYS**
R



R **WEIGHT LIMITATIONS FOR TYPE C RUNWAYS**

R It is not permitted to operate on Type C runways.

WEIGHT LIMITATIONS FOR TYPE “B” RUNWAYS

The following limitations apply to operations on Type “B” Runways :
- The MLW must be lower than 64 500 kg.
- The MZFW must be lower than 61 000 kg.

WEIGHT LIMITATIONS FOR TYPE “C” RUNWAYS

It is not permitted to operate on Type “C” Runways.

WEIGHT LIMITATIONS FOR TYPE “B” RUNWAYS

The following limitations apply to operations on Type “B” Runways :

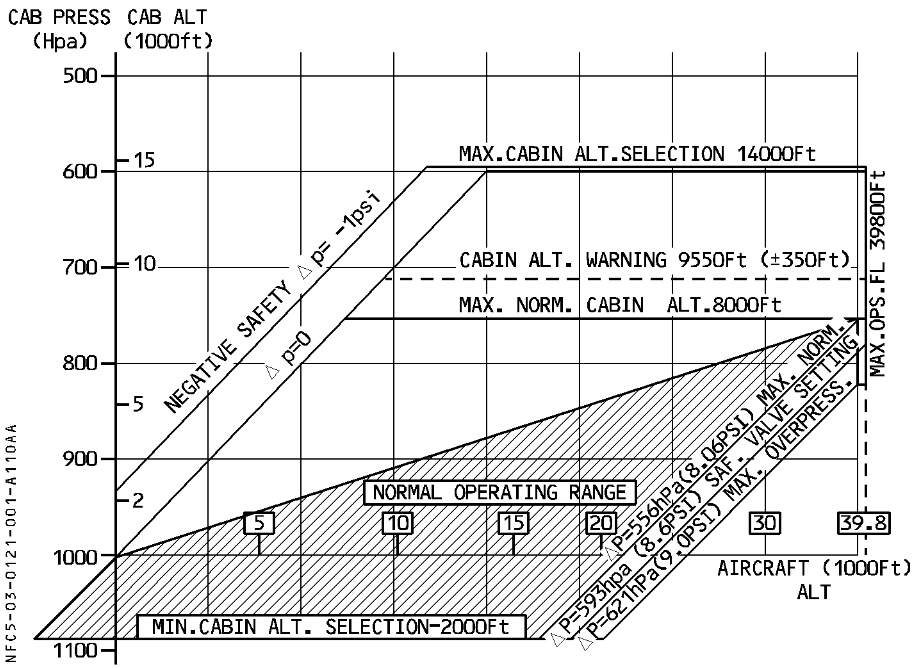
- The MTOW must be lower than 70 000 kg.
- The MLW must be lower than 61 000 kg.
- The MZFW must be lower than 57 000 kg.

WEIGHT LIMITATIONS FOR TYPE “C” RUNWAYS

It is not permitted to operate on Type “C” Runways.

CABIN PRESSURE

- Maximum positive differential pressure . . . . 8.6 psi
- Maximum negative differential pressure . . . . - 1 psi



Note : Max △p and safety valve setting tolerance = ± 7 hPa (0.1 psi)

RAM AIR INLET

Only open if differential pressure is lower than 1 psi.

AIR CONDITIONING WITH LP GROUND UNIT

- Do not use conditioned air simultaneously from packs and LP ground unit (to avoid chattering of the non return valves).
- Airflow supplied by the ground cart shall not exceed 1.2 kg/s (2.60 lb/s).

AIR CONDITIONING WITH HP GROUND UNIT

- Do not use HP ground unit when APU supplies bleed air to avoid bleed system damage.

AVIONICS VENTILATION

During ground operations, limit the aircraft electric power supply with avionics ventilation system in normal configuration as follows :
OAT = 49°C no limitation
OAT = 55°C time limit 2 hours
OAT = 60°C time limit 1 hour
OAT = 64°C time limit 1/2 hour

OZONE RETENTION FACTOR

For aircraft not equipped with ozone converter, the retention factor $R = 0.341 \pm 0.03$ must be used for calculation of flight routes.

GENERAL

AUTO PILOT FUNCTION

Minimum height for use of autopilot on takeoff with SRS mode . . . . 100 ft AGL
(An internal FMGS logic prevents the autopilot from engaging during the 5 seconds after liftoff).
Minimum height for use of the autopilot in :
Straight-in non precision approach . . . . applicable MDA (MDH)
Circling approach . . . . applicable MDA - 100 ft (or MDH - 100 ft)
ILS approach with CAT 1 displayed on FMA . . . . 160 ft AGL
Go-around (AP or FD engagement) . . . . 100 ft AGL
All other phases . . . . 500 ft AGL
Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 500 feet, whichever is the highest.

AUTOTHRUST FUNCTION

R Use of the autothrust is approved with, or without, AP/FD in selected or managed mode.

FLIGHT MANAGEMENT FUNCTION

FMGS lateral and vertical navigation has been certified for after takeoff, en route, and terminal area operations, for instrument approach procedures (except ILS, LOC, LOC-BC, LDA, SDF and MLS), and for missed approach procedures.
RNP accuracy with GPS PRIMARY, or radio updating, has been demonstrated to be :

R

	With AP ON in NAV	With AP OFF and FD ON in NAV	With AP OFF and FD OFF
En route	1 NM	1 NM	1.1 NM
In terminal area	0.5 NM	0.51 NM	0.51 NM
In approach	0.3 NM	0.3 NM	Not authorized

Without GPS PRIMARY (or GPS deselected or inoperative), the accuracy has been demonstrated, provided the appropriate RNP value is checked or entered on the MCDU, and HIGH accuracy is displayed.
Without GPS PRIMARY (or GPS deselected or inoperative), navigation accuracy is a function of ground radio navaid infrastructure, or elapsed time since the last radio update.
The FMGS is also certified for navigation within BRNAV, PRNAV, and RNP 10 airspace.
RNP10 oceanic/remote area operations are approved with GPS PRIMARY or, without GPS PRIMARY (or GPS deselected or inoperative), provided time limitations in IRS only navigation (acceptable to operational authorities), are established.
FMGS approval is based on the assumption that the navigation database has been validated for intended use.
Obstacle clearance and adherence to airspace constraints remains the flight crew's responsibility.
Fuel, time predictions/performance information is provided for advisory purposes only.
NAV mode may be used after takeoff, provided FMGS runway updating has been checked.

TAKEOFF IN GPS PRIMARY

For certain airports, where the difference between the local coordinate system and WGS 84 (geodesic standard used by GPS, FMS) is not negligible, an incorrect NAV guidance may occur after takeoff.
GPS must be deselected for takeoff from these airports, until a safe altitude is reached.

GENERAL

AUTO PILOT FUNCTION

Minimum height for use of the autopilot on takeoff with SRS mode . . . . . . 100 ft AGL
(An internal FMGS logic prevents the autopilot from engaging during the 5 seconds after liftoff).
Minimum height for use of the autopilot in :
Straight-in non precision approach . . . . applicable MDA (MDH)
Circling approach . . . . applicable MDA - 100 ft (or MDH - 100 ft)
ILS approach with CAT 1 displayed on FMA . . . . 160 ft AGL
PAR approach (Precision Approach Radar) . . . . 250 ft AGL
Use of the AP and/or FD is authorized in PAR approach, with HDG V/S or TRK FPA.
Go-around (AP or FD engagement) . . . . 100 ft AGL
All other phases . . . . 500 ft AGL
Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 500 feet, whichever is the highest.

AUTOTHRUST FUNCTION

R Use of the autothrust is approved with, or without, AP/FD in selected or managed mode.

FLIGHT MANAGEMENT FUNCTION

FMGS lateral and vertical navigation has been certified for after takeoff, en route, and terminal area operations, for instrument approach procedures (except ILS, LOC, LOC-BC, LDA, SDF and MLS), and for missed approach procedures.
RNP accuracy with GPS PRIMARY, or radio updating, has been demonstrated to be :

R

	With AP ON in NAV	With AP OFF and FD ON in NAV	With AP OFF and FD OFF
En route	1 NM	1 NM	1.1 NM
In terminal area	0.5 NM	0.51 NM	0.51 NM
In approach	0.3 NM	0.3 NM	Not authorized

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GENERAL

AUTO PILOT FUNCTION

Minimum height for use of autopilot on takeoff with SRS mode . . . . 100 ft AGL
(An internal FMGS logic prevents the autopilot from engaging during the 5 seconds after liftoff).
Minimum height for use of the autopilot in :
Straight-in non precision approach . . . . applicable MDA (MDH)
Circling approach . . . . applicable MDA - 100 ft (or MDH - 100 ft)
ILS approach with CAT I displayed on FMA . . . . 160 ft AGL
Go-around (AP or FD engagement) . . . . 100 ft AGL
All other phases . . . . 900 ft AGL
Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 900 feet, whichever is the highest.

AUTOTHRUST FUNCTION

R Use of the autothrust is approved with, or without, AP/FD in selected or managed mode.

FLIGHT MANAGEMENT FUNCTION

FMGS lateral and vertical navigation has been certified for after takeoff, en route, and terminal area operations, for instrument approach procedures (except ILS, LOC, LOC-BC, LDA, SDF and MLS), and for missed approach procedures.
RNP accuracy with GPS PRIMARY, or radio updating, has been demonstrated to be :

R

	With AP ON in NAV	With AP OFF and FD ON in NAV	With AP OFF and FD OFF
En route	1 NM	1 NM	1.1 NM
In terminal area	0.5 NM	0.51 NM	0.51 NM
In approach	0.3 NM	0.3 NM	Not authorized

Without GPS PRIMARY (or GPS deselected or inoperative), the accuracy has been demonstrated, provided the appropriate RNP value is checked or entered on the MCDU, and HIGH accuracy is displayed.
Without GPS PRIMARY (or GPS deselected or inoperative), navigation accuracy is a function of ground radio navaid infrastructure, or elapsed time since the last radio update.
The FMGS is also certified for navigation within BRNAV, PRNAV, and RNP 10 airspace.
RNP10 oceanic/remote area operations are approved with GPS PRIMARY or, without GPS PRIMARY (or GPS deselected or inoperative), provided time limitations in IRS only navigation (acceptable to operational authorities), are established.
FMGS approval is based on the assumption that the navigation database has been validated for intended use.
Obstacle clearance and adherence to airspace constraints remains the flight crew's responsibility.
Fuel, time predictions/performance information is provided for advisory purposes only.
NAV mode may be used after takeoff, provided FMGS runway updating has been checked.

TAKEOFF IN GPS PRIMARY

For certain airports, where the difference between the local coordinate system and WGS 84 (geodesic standard used by GPS, FMS) is not negligible, an incorrect NAV guidance may occur after takeoff.
GPS must be deselected for takeoff from these airports, until a safe altitude is reached.

GENERAL

AUTO PILOT FUNCTION

Minimum height for use of the autopilot on takeoff with SRS mode . . . . . 100 ft AGL
(An internal FMGS logic prevents the autopilot from engaging during the 5 seconds after liftoff).
Minimum height for use of the autopilot in :
Straight-in non precision approach . . . . applicable MDA (MDH)
Circling approach . . . . applicable MDA - 100 ft (or MDH - 100 ft)
ILS approach with CAT I displayed on FMA . . . . 160 ft AGL
PAR approach (Precision Approach Radar) . . . . 250 ft AGL
The use of AP and/or FD is authorized in PAR approach, with HDG V/S or TRK FPA.
Go-around (AP or FD engagement) . . . . 100 ft AGL
All other phases . . . . 900 ft AGL
Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 900 feet, whichever is the highest.

AUTOTHRUST FUNCTION

R Use of the autothrust is approved with, or without, AP/FD in selected or managed mode.

FLIGHT MANAGEMENT FUNCTION

FMGS lateral and vertical navigation has been certified for after takeoff, en route, and terminal area operations, for instrument approach procedures (except ILS, LOC, LOC-BC, LDA, SDF and MLS), and for missed approach procedures.
RNP accuracy with GPS PRIMARY, or radio updating, has been demonstrated to be :

R

	With AP ON in NAV	With AP OFF and FD ON in NAV	With AP OFF and FD OFF
En route	1 NM	1 NM	1.1 NM
In terminal area	0.5 NM	0.51 NM	0.51 NM
In approach	0.3 NM	0.3 NM	Not authorized

Without GPS PRIMARY (or GPS deselected or inoperative), the accuracy has been demonstrated, provided the appropriate RNP value is checked or entered on the MCDU, and HIGH accuracy is displayed.
Without GPS PRIMARY (or GPS deselected or inoperative), navigation accuracy is a function of ground radio navaid infrastructure, or elapsed time since the last radio update.
The FMGS is also certified for navigation within BRNAV, PRNAV, and RNP 10 airspace.
RNP10 oceanic/remote area operations are approved with GPS PRIMARY or, without GPS PRIMARY (or GPS deselected or inoperative), provided time limitations in IRS only navigation (acceptable to operational authorities), are established.
FMGS approval is based on the assumption that the navigation database has been validated for intended use.
Obstacle clearance and adherence to airspace constraints remains the flight crew's responsibility.
Fuel, time predictions/performance information is provided for advisory purposes only.
NAV mode may be used after takeoff, provided FMGS runway updating has been checked.

TAKEOFF IN GPS PRIMARY

For certain airports, where the difference between the local coordinate system and WGS 84 (geodesic standard used by GPS, FMS) is not negligible, an incorrect NAV guidance may occur after takeoff.
GPS must be deselected for takeoff from these airports, until a safe altitude is reached.

USE OF NAV AND FINAL APP MODES FOR NON PRECISION APPROACH

NAV, or NAV and FINAL APP mode may be used for VOR, VOR/DME, NDB, NDB/DME or RNAV (including GPS) approach, but not for ILS, LOC, LOC-BC, LDA, SDF, or MLS final approach.
R For instrument procedures not coded in the WGS 84 coordinate system, the GPS must be
R deselected, unless the shift between the local coordinate system and the WGS 84 is found
R acceptable for the intended operation.

R *Note : 1. The assesment of this shift can be done :*
R *– in flight, monitoring the navaid raw data in non RNAV procedures,*
R *– on ground performing a GPS survey of the procedure waypoints.*
R *2. RNAV (GPS) and RNP RNAV approach procedures require WGS 84 coordinates*
R *and GPS.*

FINAL APP mode guidance capability with GPS PRIMARY has been demonstrated down to MDH/DH (barometric) 250 feet.
VOR, VOR/DME, NDB or NDB/DME approach procedures may be performed, in NAV, or NAV and FINAL APP mode, provided AP or FD is used, and :
– GPS PRIMARY is available. In this case, the reference navaid may be unserviceable, or the airborne radio equipment may be inoperative, or not installed, provided operational approval is obtained.
– Without GPS PRIMARY :
  · The reference navaid and the corresponding airborne equipment is serviceable, tuned, and monitored during the approach, or
  · The radio navaid coverage supports the RNP value, specified for the approach procedure, and an operational approval is obtained.

For GPS approach, GPS PRIMARY must be available.
RNAV approach without GPS PRIMARY may be performed only if the radio navaid coverage supports the RNP value and HIGH accuracy is displayed on the MCDU with the specified RNP, and operational approval is obtained.
NAV mode may be used in the terminal area, provided :
– GPS PRIMARY is available, or
– HIGH accuracy is displayed, and the appropriate RNP is checked or entered on the MCDU, or
– Navaid raw data is monitored.

Non Precision Approaches with engine-out

If one engine is inoperative, it is not permittted to use the autopilot to perform NPAs in the following modes : FINAL APP, NAV V/S, NAV/FPA.
Only FD use is permitted.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT
R 3 DUAL must be displayed on the FMA.

CATEGORY III FAIL PASSIVE (SINGLE)

Minimum decision height . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
A/THR must be used in selected or managed speed.

CATEGORY III FAIL OPERATIONAL (DUAL)

A/THR must be used in selected or managed speed.
Alert height . . . . 100 feet

- CAT III with DH :
  Minimum decision height . . . . 20 feet
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
- CAT III without DH :
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
  Minimum Runway Visual Range . . . . 75 meters

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLL OUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : *Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above–noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT I automatic approach without autoland can be performed.*

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
- With CAT II and CAT III ILS beam.
- With slope angle within (– 2.5°, – 3.15°) range.
- For airport altitude at or below 2500 feet.
- At or below the maximum landing weight.
- At approach speed (VAPP) = VLS + wind correction.
  Minimum wind correction 5 knots ; maximum 15 knots.

Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.

AUTOMATIC LANDING IN CAT I OR BETTER WEATHER CONDITIONS

The automatic landing system's performance has been demonstrated on runways equipped with CAT II or CAT III ILS approaches. However automatic landing in CAT I or better weather
R conditions is possible on CAT I ground installations or on CAT II/III ground installations when ILS sensitive areas are not protected, if the following precautions are taken :
- The airline has checked that the ILS beam quality and the effect of terrain profile before the runway have no adverse effect on AP/FD guidance. In particular the effect of terrain discontinuities within 300 meters before the runway threshold must be evaluated.
- The crew is aware that LOC or GS beam fluctuations, independent of the aircraft systems, may occur and the PF is prepared to immediately disconnect the AP and take appropriate action, should unsatisfactory guidance occur.
- At least CAT2 capability is displayed on the FMA and CAT II/CAT III procedures are used.
- Visual references are obtained at an altitude appropriate to the performed CAT I
R approach, otherwise go–around is initiated.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT
R 3 DUAL must be displayed on the FMA.

CATEGORY III FAIL PASSIVE (SINGLE)

Minimum decision height . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
A/THR must be used in selected or managed speed.

CATEGORY III FAIL OPERATIONAL (DUAL)

A/THR must be used in selected or managed speed.
Alert height . . . . 100 feet
– CAT III with DH :
  Minimum decision height . . . . 20 feet
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
– CAT III without DH :
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
  Minimum Runway Visual Range . . . . 75 meters

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLL OUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : *Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above–noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT I automatic approach without autoland can be performed.*

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
- With CAT II and CAT III ILS beam.
- With slope angle within (– 2.5°, – 3.15°) range.
- For airport altitude at or below 2500 feet.
- At or below the maximum landing weight.
- At approach speed (VAPP) = VLS + wind correction.
  Minimum wind correction 5 knots ; maximum 15 knots.

Automatic landing is not allowed below – 1000 ft pressure altitude.
Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.

AUTOMATIC LANDING IN CAT I OR BETTER WEATHER CONDITIONS

The automatic landing system's performance has been demonstrated on runways equipped with CAT II or CAT III ILS approaches. However automatic landing in CAT I or better weather conditions is possible on CAT I ground installations or when ILS sensitive areas are not protected, if the following precautions are taken :
- The airline has checked that the ILS beam quality and the effect of terrain profile before the runway have no adverse effect on AP/FD guidance. In particular the effect of terrain discontinuities within 300 meters before the runway threshold must be evaluated.
- The crew is aware that LOC or GS beam fluctuations, independent of the aircraft systems, may occur and the PF is prepared to immediately disconnect the AP and take appropriate action, should unsatisfactory guidance occur.
- At least CAT2 capability is displayed on the FMA and CAT II/CAT III procedures are used.
- Visual references are obtained at an altitude appropriate to the performed CAT I approach, otherwise go–around is initiated.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT
R 3 DUAL must be displayed on FMA.

MAXIMUM WIND CONDITIONS FOR CAT II AUTOMATIC APPROACH WITHOUT AUTOLAND

Head wind : 40 kt
Tail wind : 10 kt
Cross wind : 25 kt

CATEGORY III FAIL PASSIVE

Minimum decision height . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on FMA.
A/THR must be used in selected or managed speed .

CATEGORY III FAIL OPERATIONAL

A/THR must be used in selected or managed speed .
Alert height . . . . 100 feet
- CAT III with DH
  Mini decision height . . . . 18 feet
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on FMA
- CAT III without DH
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on FMA
  Minimum Runway Visual Range . . . . 75 meters

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration 3 and FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT III AUTOMATIC APPROACH LANDING AND ROLLOUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : *Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above-noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT II automatic approach without autoland can be performed, provided wind conditions are within the limitations quoted on FCOM 3.01.22 page 3. Otherwise, only CAT I automatic approach without autoland can be performed.*

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
- With CAT II and CAT III ILS beam.
- With slope angle within (– 2.5°, – 3.15°) range.
- For airport altitude at or below 5 750 feet.
- At or below the maximum landing weight.
- At approach speed (VAPP) = VLS + wind correction.
  Minimum wind correction 5 knots, maximum wind correction 15 knots.

Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.

R During automatic rollout with one engine inoperative, the flight crew can use the remaining
R thrust reverser, provided that :
R – Only IDLE reverse thrust is used
R – The crosswind does not exceed 15 knots.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT
R 3 DUAL must be displayed on FMA.

MAXIMUM WIND CONDITIONS FOR CAT II AUTOMATIC APPROACH WITHOUT AUTOLAND

Head wind : 40 kt
Tail wind : 10 kt
Cross wind : 25 kt

CATEGORY III FAIL PASSIVE

Minimum decision height . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on FMA.
A/THR must be used in selected or managed speed .

CATEGORY III FAIL OPERATIONAL

A/THR must be used in selected or managed speed .
Alert height . . . . 100 feet

- CAT III with DH
  Mini decision height . . . . 18 feet
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on FMA
- CAT III without DH
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on FMA
  Minimum Runway Visual Range . . . . 75 meters

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration 3 and FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT III AUTOMATIC APPROACH LANDING AND ROLLOUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : *Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above-noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT II automatic approach without autoland can be performed, provided wind conditions are within the limitations quoted on FCOM 3.01.22 page 3. Otherwise, only CAT I automatic approach without autoland can be performed.*

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
- With CAT II and CAT III ILS beam.
- With slope angle within (– 2.5°, – 3.15°) range.
- For airport altitude at or below 5 750 feet.
- At or below the maximum landing weight.
- At approach speed (VAPP) = VLS + wind correction.
  Minimum wind correction 5 knots, maximum wind correction 15 knots.

Automatic landing is not allowed below – 1000 ft pressure altitude.
Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.
During automatic rollout with one engine inoperative, the flight crew can use the remaining thrust reverser, provided that :
- Only IDLE reverse thrust is used
- The crosswind does not exceed 15 knots.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT
R 3 DUAL must be displayed on FMA.

CATEGORY III FAIL PASSIVE (SINGLE)

Minimum decision height . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on FMA.
A/THR must be used in selected or managed speed .

CATEGORY III FAIL OPERATIONAL (DUAL)

A/THR must be used in selected or managed speed .
Alert height . . . . 100 feet
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on FMA
Minimum Runway Visual Range . . . . 75 meters
A/THR in selected or managed speed must be used.

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration 3 and FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLLOUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : *Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above-noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT I automatic approach without autoland can be performed.*

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
- With CAT II and CAT III ILS beam.
- With slope angle within (– 2.5°, – 3.15°) range.
- For airport altitude at or below 9200 feet.
- At or below the maximum landing weight.
- At approach speed (VAPP) = VLS + wind correction.
  Minimum wind correction 5 knots ; maximum wind correction 15 knots.

Automatic rollout performance has been approved on dry and wet runways, but performance on snow–covered or icy runways has not been demonstrated.

Note : *Under crew responsability and in case of emergency, autoland can be performed up*
R *to 69 tons (152 117 lb).*

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT
R 3 DUAL must be displayed on FMA.

CATEGORY III FAIL PASSIVE (SINGLE)

Minimum decision height . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on FMA.
A/THR must be used in selected or managed speed .

CATEGORY III FAIL OPERATIONAL (DUAL)

A/THR must be used in selected or managed speed .
Alert height . . . . 100 feet
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on FMA
Minimum Runway Visual Range . . . . 75 meters
A/THR in selected or managed speed must be used.

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration 3 and FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLLOUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : *Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above-noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT I automatic approach without autoland can be performed.*

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
- With CAT II and CAT III ILS beam.
- With slope angle within (– 2.5°, – 3.15°) range.
- For airport altitude at or below 9200 feet.
- At or below the maximum landing weight.
- At approach speed (VAPP) = VLS + wind correction.
  Minimum wind correction 5 knots ; maximum wind correction 15 knots.

Automatic landing is not allowed below – 1000 ft pressure altitude.
Automatic rollout performance has been approved on dry and wet runways, but performance on snow–covered or icy runways has not been demonstrated.

Note : *Under crew responsability and in case of emergency, autoland can be performed up to 69 tons (152 117 lb).*

AUTOMATIC LANDING IN CAT I OR BETTER WEATHER CONDITIONS

The automatic landing system's performance has been demonstrated on runways equipped with CAT II or CAT III ILS/MLS approaches. However, automatic landing in CAT I or better
R weather conditions is possible on CAT I ground installations or on CAT II/III ground
R installations when ILS sensitive areas are not protected, if the following precautions are taken :

- The airline has checked that the ILS/MLS beam quality and the effect of terrain profile before the runway have no adverse effect on AP/FD guidance. In particular, the effect of terrain discontinuities within 300 meters before runway threshold must be evaluated.
- The crew is aware that LOC or GS beam fluctuations, independent of the aircraft systems, may occur and the PF is prepared to immediately disconnect the AP and take appropriate action, should unsatisfactory guidance occur.
- At least CAT2 capability is displayed on the FMA and CAT II/III procedures are used.
- Visual references are obtained at an altitude appropriate to the performed CAT I
R approach, otherwise go–around is initiated.

COMMUNICATIONS

- If the aircraft is to fly in the areas that are not completely covered by VHF stations :
  - one HF radio must be installed in the aircraft if the interruptions between VHF covered zones do not exceed one hour of flight.
  - two HF radios must be installed in the aircraft if these interruptions exceed one hour of flight.
- Flights in polar regions, outside the areas covered by VHF fields, are allowed only when the weather forecast concerning the propagation of HF radio waves is favourable.

ELECTRICAL

- MAX continuous load per generator . . . . 100 % (90 kVA)
- MAX continuous load per TR (continuous) . . . . 200 A

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ELECTRICAL

- MAX continuous load per generator . . . . 100 % (90 kVA)
- MAX continuous load per TR (continuous) . . . . 200 A

Electrical Outlets

It is forbidden to use the electrical outlets during takeoff and landing.

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FLIGHT CONTROL

Flaps and slats :
Max operating altitude with slats or slats and flaps extended is 20 000 feet.

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GENERAL

FUEL AND ADDITIVE SPECIFICATIONS

– See engine manufacturer specification
– Fuel system has been certified for JET A1, JP 8, JET A, JP 5, RT, TS-1, JET B or JP 4.

MAXIMUM ALLOWED WING FUEL IMBALANCE

R · INNER TANKS (OUTER BALANCED)

Tank Fuel Quantity (Heavier tank)	Maximum allowed imbalance
Full (5 350 kg) (11 795 lb)	1 500 kg (3 307 lb)
4 300 kg (9 480 lb)	1 600 kg (3 520 lb)
2 250 kg (4 960 lb)	2 250 kg (4 960 lb)

The variation is linear between these values (No limitation below 2 250 kg/4 960 lb)
· OUTER TANKS

Maximum allowed imbalance	530 kg (11 68 lb)*

* Maximum outer wing tank imbalance (one full/one empty) is allowed provided :
  · Fuel content of one side (outer + inner) is equal to the fuel content of the other side (outer + inner), or
  · On the side of the lighter outer tank, the inner tank fuel quantity is higher than the opposite inner tank quantity, up to a maximum of 3000 kg/6614 lb higher.

R *Note : In exceptional conditions (i.e., fuel system failures) the above-mentioned maximum*
R *fuel imbalance values may be exceeded without significantly affecting the aircraft*
R *handling qualities. The aircraft remains fully controllable in all phases of the flight.*

FUEL TEMPERATURE

	JET A1/ JP 8	JET A	JP 5	RT	TS-1	JET B	JP 4
MINI	– 43°C	– 36°C (1)	– 42°C	– 45°C	– 45°C	– 46°C	– 54°C
MAXI	54°C					49°C	

(1) : For JET A only, if TAT reaches – 34°C, monitor on ECAM FUEL page that fuel temperature remains higher than – 36°C.

MINIMUM FUEL QUANTITY FOR TAKEOFF : 1 500 kg/3 307 lb

WING TK LO LVL warning must not be displayed on ECAM for takeoff.

WHEN USING JP 4 or JET B

Fuel in center tank is to be regarded as unusable if the wing fuel temperature exceeds the following values before engine start and if the given flight level is exceeded before the center tank fuel has been used :

+ 30°C not above FL 350
+ 40°C not above FL 300
+ 49°C not above FL 250

Reason : At high altitude with high fuel temperature, the pressure delivered by the center tank pumps becomes lower than the pressure delivered by the wing tank pumps.

FUEL MANAGEMENT

- Tanks must be emptied in the following order :
  · center tank then wing tanks
- Takeoff on center tank is prohibited

GENERAL

FUEL AND ADDITIVE SPECIFICATIONS

– See Engine manufacturer specification
– The fuel system has been certified for JET A1, JP 8, JET A, JP 5, RT, TS-1, JET B or JP 4.

MAXIMUM ALLOWED WING FUEL IMBALANCE

Wing tanks	
Heavy tank content	Maximum allowed imbalance
FULL	1 320 kg/2 910 lb
4 000 kg/8 818 lb	1 450 kg/3 196 lb
2 350 kg/5 181 lb (empty on the other side)	2 350 kg/5 180 lb

Apply linear interpolation between these values (No limitation below 2 350 kg/5 180 lb).

R *Note : In exceptional conditions (i.e., fuel system failures) the above-mentioned maximum*
R *fuel imbalance values may be exceeded without significantly affecting the aircraft*
R *handling qualities. The aircraft remains fully controllable in all phases of the flight.*

FUEL TEMPERATURE

	JET A1/JP 8	JET A	JP 5	RT	TS-1	JET B	JP 4
MINI	– 43°C	–36°C (1)	– 42°C	– 45°C	– 45°C	– 46°C	– 54°C
MAXI	54°C					49°C	

(1) : For JET A only, if TAT reaches – 34°C, monitor on ECAM FUEL page that fuel temperature remains higher than – 36°C.

MINIMUM FUEL QUANTITY FOR TAKEOFF : 1 500 kg/3 307 lb

WING TK LO LVL warning must not be displayed on ECAM for takeoff.

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HYDRAULIC

Normal operating pressure 3000 psi ± 200

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GENERAL

BRAKES

Maximum brake temperature for takeoff (brake fans (◁) off) . . . . 300° C

AUTOBRAKE

Use of the autobrake does not relieve the pilot of his responsibility to safely stop within the available runway length, by taking over brake control with brake pedals, if necessary.
The pilot may disengage the automatic braking system, either by pressing the armed mode pushbutton, or by applying firm action on the brake pedals.

PARKING BRAKE

CAUTION
Do not set N1 above 75 % on both engines with the parking brake ON.

TAXI WITH DEFLATED TIRES

If tire damage is suspected after landing or after a rejected takeoff, an inspection of the tires is required before taxi. If the tire is deflated but not damaged, the aircraft can be taxied at low speed with the following limitations :

1. If one tire is deflated on one or more gears (ie. a maximum of three tires), the speed should be limited to 7 knots when turning.
2. If two tires are deflated on the same main gear (the other main gear tires not being deflated), speed should be limited to 3 knots and the nose wheel steering angle limited to 30 degrees.

R **NOSEWHEEL STEERING (NWS)**

R The nosewheel steering angle is limited to 75° when using the handwheels.
R For towing and pushback, the nosewheel steering angle is limited to 95°.
R Towbarless towing and pushback on the nose landing gear is approved for the “accepted
R towbarless towing vehicles” that are listed in the Airbus SIL 09–002, but the nosewheel
R steering angle must be limited to 85°.

GENERAL

BRAKES

Maximum brake temperature for takeoff (brake fans (◁) off) . . . . 300° C

AUTOBRAKE

Use of the autobrake does not relieve the pilot of his responsibility to safely stop within the available runway length, by taking over brake control with brake pedals, if necessary.
The pilot may disengage the automatic braking system, either by pressing the armed mode pushbutton, or by applying firm action on the brake pedals.

PARKING BRAKE

CAUTION
Do not set N1 above 70 % on both engines with the parking brake ON.

TAXI WITH DEFLATED TIRES

If tire damage is suspected after landing or after a rejected takeoff, an inspection of the tires is required before taxi. If the tire is deflated but not damaged, the aircraft can be taxied at low speed with the following limitations :

1. If one tire is deflated on one or more gears (ie. a maximum of three tires), the speed should be limited to 7 knots when turning.
2. If two tires are deflated on the same main gear (the other main gear tires not being deflated), speed should be limited to 3 knots and the nose wheel steering angle limited to 30 degrees.

R ### NOSEWHEEL STEERING (NWS)

R The nosewheel steering angle is limited to 75° when using the handwheels.
R For towing and pushback, the nosewheel steering angle is limited to 95°.
R Towbarless towing and pushback on the nose landing gear is approved for the “accepted
R towbarless towing vehicles” that are listed in the Airbus SIL 09–002, but the nosewheel
R steering angle must be limited to 85°.

NAVIGATION

IRS ground alignment is possible up to 82 degrees latitude.
In NAV mode, the IRS will not provide a valid magnetic heading :

R · For latitude greater than 82 degrees North

R · For latitude greater than 73 degrees North, between 90 degrees and 120 degrees West (magnetic polar region)

R · For latitude greater than 60 degrees South.

R Flight outside the above – noted limits is prohibited.

It is not recommended to use TCAS II (ACAS) TA/RA mode in flight in former USSR airspace. When TA mode is selected, pilots should coordinate actions with the ATC.
In the former USSR airspace, aircraft can only fly on routes covered by ATC ground facilities, using RBS mode.
In normal operation, at least one ND should not be in PLAN mode for constantly displaying Weather Radar WX information.

ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS) ◁

· Aircraft navigation is not to be predicated on the use of the terrain display.
The terrain display is only intended as a situational awareness tool, and may not provide the accuracy on which to solely base terrain avoidance maneuvers.
The EGPWS database, display, and alerting algorithms, do not currently take into account man-made obstructions.

· The EGPWS enhanced function should be inhibited (TERR pushbutton to OFF, on the GPWS panel) when the aircraft position is less than 15 NM from the airfield :
  - For operations to/from runways not incorporated in the EGPWS database.
  - For specific approach procedures, which have previously been identified as potentially producing false terrain alerts.

COCKPIT FIXED OXYGEN SYSTEM

MINIMUM FLIGHT CREW OXYGEN PRESSURE

REF TEMPERATURE *		Deg. C	– 10	0	10	20	30	40	50
		Deg. F	14	32	50	68	86	104	122
MIN ** BOTTLE PRESSURE (PSI)	2 CREWMEMBERS		656	681	706	731	756	781	806
	2 CREWMEMBERS	+1 OBS	861	893	926	959	992	1024	1057
	2 CREWMEMBERS	+2 OBS	1090	1132	1173	1215	1256	1298	1339

* REF TEMPERATURE :
. On ground : (OAT + COCKPIT TEMP) / 2
. In flight : CAB TEMP (deg. C) – 10 deg. C
or
CAB TEMP (deg. F) – 18 deg. F

** MINIMUM BOTTLE PRESSURE TO TAKE INTO ACCOUNT :
- Preflight checks
- The use of oxygen, when only one flight crewmember is in the cockpit
- Unusable quantity (to ensure that the regulator functions with minimum pressure)
- Normal system leakage

and

· Protection after loss of cabin pressure, with mask regulator on NORMAL (diluted oxygen):
R — During an emergency descent : For all cockpit members for 13 minutes
R — During cruise at FL 100 : For 2 flight crewmembers for 107 minutes.

or

R · Protection in case of smoke, with 100 % oxygen : For all cockpit members for 15 minutes at a cabin altitude of 8000 feet.

Note : The above times are based on the use of a sealed mask, but may be shorter if the flight crewmember has a beard.

GENERAL

OIL QUANTITY

R The APU may be started and operated even if the LOW OIL LEVEL ECAM advisory is
R displayed. Maintenance action is required within next 10 hours of APU operation.

APU STARTER

After 3 starter motor duty cycles, wait 60 minutes before attempting 3 more cycles.

ROTOR SPEED

· Maximum N (ECAM display) . . . . 107 %

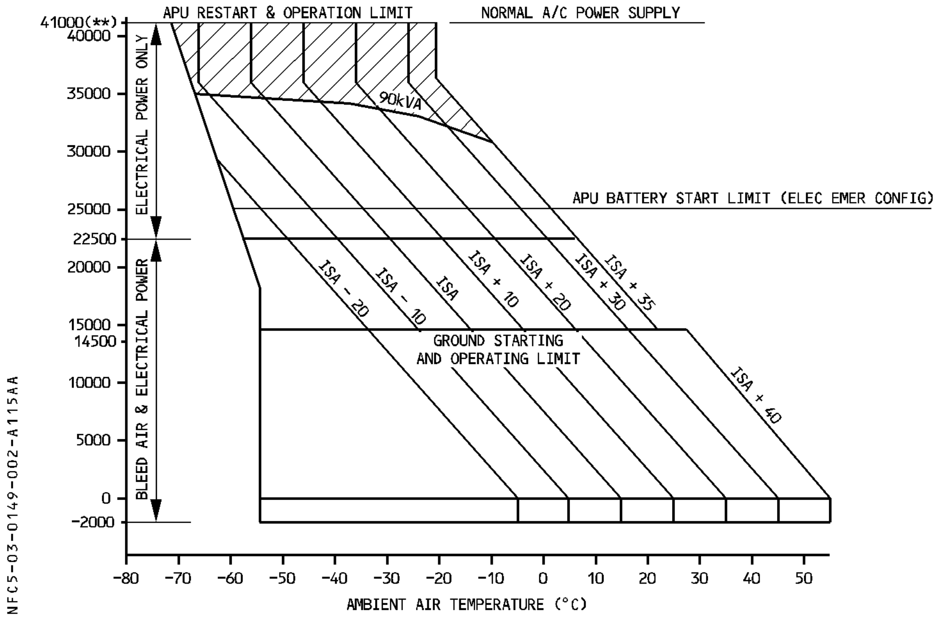
Note : The APU automatically shuts down at 107 % N speed, that appears on the ECAM. This corresponds to an actual N speed of 106 %.

EGT

· Maximum EGT . . . . 675 degrees C
· Maximum for start (below 35000 feet) . . . . 1090 degrees C
· Maximum for start (above 35000 feet) . . . . 1120 degrees C

ENVELOPE

R



GENERATOR LOAD IN FLIGHT					
Altitude (ft)	ISA	ISA + 10	ISA + 20	ISA + 30	ISA + 35
25000	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)
30000	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	98 % (88 KVA)
35000	93 % (84 KVA)	91% (82 KVA)	88 % (79 KVA)	84 % (76 KVA)	79 % (71 KVA)
39000	71 % (64 KVA)	69 % (62 KVA)	68 % (61 KVA)	63 % (57 KVA)	61 % (55 KVA)
41000**	57 % (51 KVA)	55 % (50 KVA)	55 % (50 KVA)	54 % (49 KVA)	53 % (48 KVA)

GENERATOR LOAD ON THE GROUND							
Altitude (ft)	MODE	ISA	IAS + 10	ISA + 20	ISA + 30	ISA + 35	ISA + 40
14500	ENG START	100 % (90 KVA)	100 % (90KVA)	98 % (88 KVA)	85 % (77 KVA*)	79 % (71 KVA*)	68 % (61 KVA*)
	PACKS	100 % (90 KVA)	100 % (90 KVA)	91 % (82 KVA)	78 % (70 KVA)	70 % (63 KVA)	58 % (52 KVA)
9200	ENG START	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	91 % (82 KVA)	83 % (75 KVA)	72 % (65 KVA)
	PACKS	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	87 % (78 KVA)	78 % (70 KVA)	67 % (60 KVA)
8000	ENG START	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	92 % (83 KVA)	84 % (76 KVA)	74 % (67 KVA)
	PACKS	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	89 % (80 KVA)	79 % (71 KVA)	70 % (63 KVA)
0	ENG START	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	90 % (81 KVA)	81 % (73 KVA)
	PACKS	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	91 % (82 KVA)	83 % (75 KVA)	75 % (68 KVA)

(*) : Generator load with maximum bleed performance.
(**) : Only for aircraft certified up to that flight level.

- Electric power extraction :
  At or below 25000 ft :
  · ISA + 35° and below . . . . 90 kVA
- Air bleed and generator load in flight :

MAXIMUM ALTITUDE FOR BLEED AIR AND GENERATOR LOAD IN FLIGHT			
TEMP ► MAX ALT (FT) ▼	ISA	ISA + 20	ISA + 35
ENG START UP TO 20000 ft	92 % (83 KVA)	64 % (58 KVA)	45 % (41 KVA)
ONE PACK UP TO 22500 ft	78 % (70 KVA)	67 % (60 KVA)	63 % (57 KVA)
TWO PACKS UP TO 15000 ft	100 % (90 KVA)	79 % (71 KVA)	64 % (58 KVA)

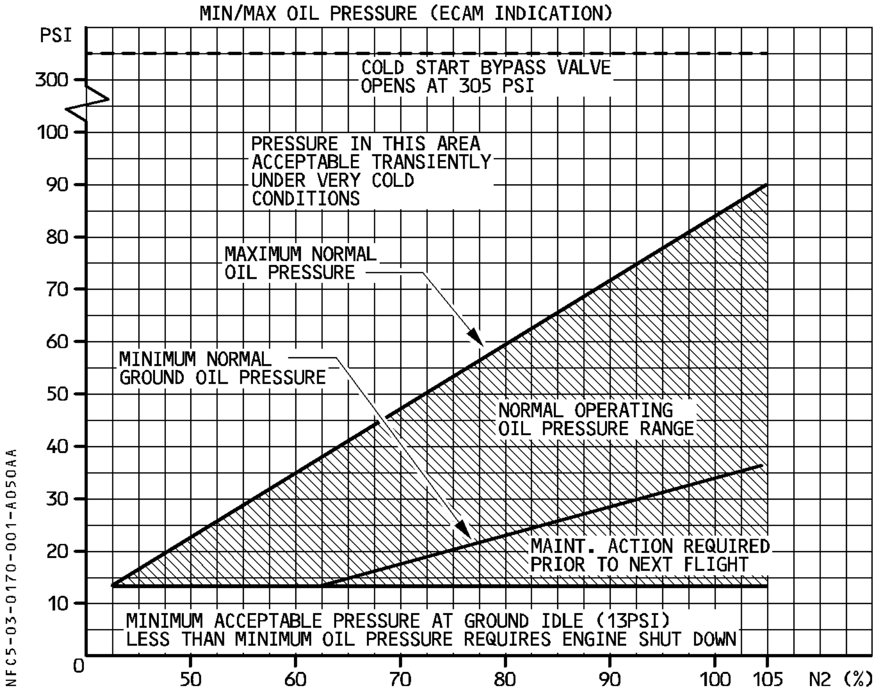
- Air bleed extraction for wing anti-icing is not permitted.
- Use of the APU is not permitted with TS-1 fuel, when the fuel temperature is below - 44°C.
- Use of the APU is not permitted with RT fuel, when the fuel temperature is below - 40°C

THRUST SETTING/EGT LIMITS

OPERATING CONDITION	TIME LIMIT	EGT LIMIT	NOTE
TAKEOFF and GO-AROUND	5 mn	950° C	
	10 mn		Only in case of engine failure
MCT	Unlimited	915° C	
STARTING		725° C	

OIL

Maximum continuous temperature . . . . 140° C
Maximum transient temperature (15 minutes) . . . . 155° C
Minimum starting temperature . . . . – 40° C
R Minimum temperature for takeoff . . . . – 10° C
Minimum oil quantity . . . . refer to 3.03.04



RPM

N1 max . . . . 104 %

Note : *The N1 limit depends upon ambient conditions and engine airbleed configuration. These may limit N1 to a value lower than the one noted above (see 3.05.06).*

N2 max . . . . 105 %

STARTER

– 4 consecutive cycles : Each lasts a maximum of 2 minutes.
– Pause between start attempts : 20 seconds.
– Cooling period, after 4 start attempts : 15 minutes.
– No running engagement of the starter, when N2 is above 20 %.

REVERSE THRUST

– It is not permitted to select reverse thrust in flight.
– It is not permitted to back up the aircraft with reverse thrust.
– Maximum reverse should not be used below 70 knots. (Idle reverse is permitted down to aircraft stop).

REDUCED THRUST TAKEOFF

– Takeoff at reduced thrust is only permitted, if the airplane meets all applicable performance requirements at the planned takeoff weight, with the operating engines at the thrust available for the assumed temperature.
– Thrust reduction must not exceed 25 % of the full rated takeoff thrust. To meet this
R requirement, the flexible temperature must not be higher than ISA + 53 (T MAX FLEX).
– The assumed temperature must not be lower than the flat rating temperature, or the actual OAT.
– Takeoff at reduced thrust is not permitted on contaminated runways.
– Takeoff at reduced thrust is permitted with any inoperative item affecting the performance, only if the associated performance shortfall has been applied to meet all performance requirements at the takeoff weight, with the operating engines at the thrust available for the flex temperature.

THRUST SETTING/EGT LIMITS

OPERATING CONDITION	TIME LIMIT	EGT LIMIT	NOTE
TAKEOFF and GO-AROUND	5 mn	950° C	
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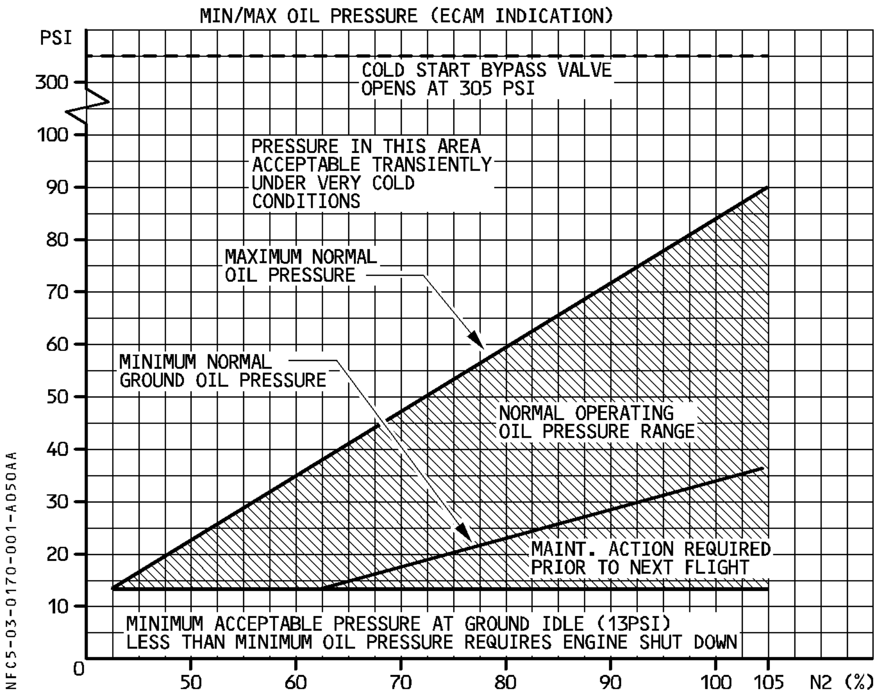

RPM

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N2 max . . . . 105 %

STARTER

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- Pause between start attempts : 20 seconds.
- Cooling period, after 4 start attempts : 15 minutes.
- No running engagement of the starter, when N2 is above 20 %.

REVERSE THRUST

- It is not permitted to select reverse thrust in flight.
- It is not permitted to back up the aircraft with reverse thrust.
- Maximum reverse should not be used below 70 knots (or when the airspeed indication starts to fluctuate). Idle reverse is permitted down to aircraft stop.

REDUCED THRUST TAKEOFF

- Takeoff at reduced thrust is only permitted, if the airplane meets all applicable performance requirements at the planned takeoff weight, with the operating engines at the thrust available for the assumed temperature.
- The flexible takeoff thrust must never be lower than the maximum continuous thrust at ISA + 35.
R Consequently flexible temperature is limited to ISA + 43 (T MAX. FLEX).
- The assumed temperature must not be lower than the flat rating temperature, or the actual OAT.
- Takeoff at reduced thrust is not permitted on contaminated runways.
- Takeoff at reduced thrust is permitted with any inoperative item affecting the performance, only if the associated performance shortfall has been applied to meet all performance requirements at the takeoff weight, with the operating engines at the thrust available for the flex temperature.

THRUST SETTING/EGT LIMITS

OPERATING CONDITION	TIME LIMIT	EGT LIMIT	NOTE
TAKEOFF and GO-AROUND	5 mn	950° C	
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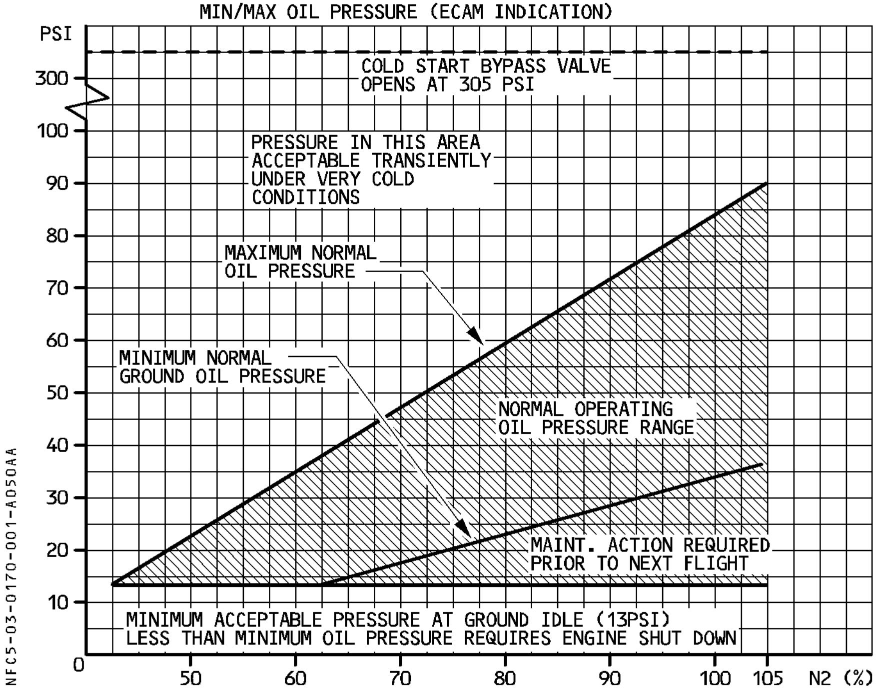


RPM

N1 max . . . . 104 %

Note : *The N1 limit depends on ambient conditions, and the engine airbleed configuration. These may limit N1 to a value that is lower than the value noted above (see 3.05.06).*

N2 max . . . . 105 %

STARTER

- 4 consecutive cycles : Each cycle lasts a maximum of 2 minutes.
- Pause between start attempts : 20 seconds.
- Cooling period, after 4 start attempts : 15 minutes.
- No running engagement of the starter, when N2 is above 20 %.

REVERSE THRUST

- It is not permitted to select reverse thrust in flight.
- It is not permitted to back up the aircraft with reverse thrust.
- Maximum reverse should not be used below 70 knots. (Idle reverse is permitted down to aircraft stop).

REDUCED THRUST TAKEOFF

- Takeoff at reduced thrust is only permitted, if the airplane meets all applicable performance requirements at the planned takeoff weight, with the operating engines at the thrust available for the assumed temperature.
- Thrust reduction must not exceed 25 % of the full rated takeoff thrust. To meet this requirement, the flexible temperature must not be higher than ISA + 60° C (T MAX FLEX).
- The assumed temperature must not be lower than the flat rating temperature, or the current OAT.
- Takeoff at reduced thrust is not permitted on contaminated runways.
- Takeoff at reduced thrust is permitted with any inoperative item affecting the performance, only if the associated performance shortfall has been applied to meet all performance requirements at the takeoff weight, with the operating engines at the thrust available for the flex temperature.

02.22 AUTO FLT

02.23 COMMUNICATIONS

02.00 CONTENTS

02.22 AUTO FLT

02.23 COMMUNICATIONS

02.00 CONTENTS

02.01 INTRODUCTION

02.10 OPERATING TECHNIQUES

02.21 AIR/PRESS/VENT

02.22 AUTO FLT

02.23 COMMUNICATIONS

02.24 ELECTRICAL

02.25 COCKPIT DOOR

02.26 FIRE PROTECTION

02.27 FLIGHT CONTROLS

02.24 ELECTRICAL

02.25 COCKPIT DOOR

02.26 FIRE PROTECTION

02.27 FLIGHT CONTROLS

02.28 FUEL

02.29 HYDRAULIC

02.30 ICE AND RAIN PROTECTION

02.31 INDICATING/RECORDING

02.28 FUEL

02.29 HYDRAULIC

02.30 ICE AND RAIN PROTECTION

02.31 INDICATING/RECORDING

02.28 FUEL

02.29 HYDRAULIC

02.30 ICE AND RAIN PROTECTION

02.31 INDICATING/RECORDING

02.28 FUEL

02.29 HYDRAULIC

02.30 ICE AND RAIN PROTECTION

02.31 INDICATING/RECORDING

02.32 LANDING GEAR

02.34 NAVIGATION

02.32 LANDING GEAR

02.34 NAVIGATION

02.32 LANDING GEAR

02.34 NAVIGATION

02.36 PNEUMATIC

02.46 INFORMATION SYSTEM

02.49 APU

02.52 DOORS

02.70 POWER PLANT

02.36 PNEUMATIC

02.46 INFORMATION SYSTEM

02.49 APU

02.52 DOORS

02.70 POWER PLANT

02.36 PNEUMATIC

02.46 INFORMATION SYSTEM

02.49 APU

02.52 DOORS

02.70 POWER PLANT

02.70 POWERPLANT (CONT'D)

02.80 MISCELLANEOUS

02.90 DETAILED CABIN/COCKPIT EVAC PROC

GENERAL

R Abnormal and Emergency procedures maintain adequate safety and help to ensure the
R conduct of the flight. The flight crew uses the “READ and DO” oral reading principle when
R performing these procedures.

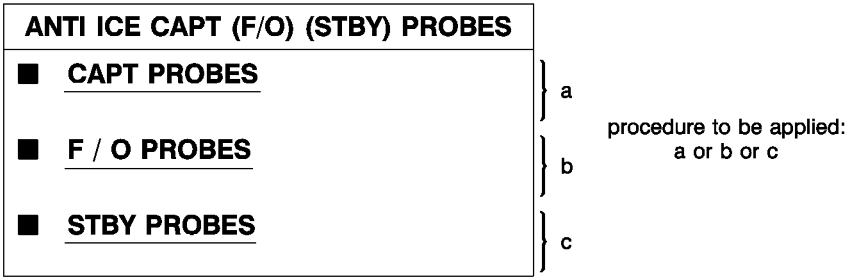
PRESENTATION

The presentation of procedures is, as far as practicable, identical to the presentation on ECAM. The abbreviations are identical to those used on the cockpit panels. All actions and information displayed on ECAM are printed in large letters. Other information, not on ECAM, is printed in small letters.
Expanded information, when inserted in the procedure, appears in italics. This information:
– identifies the particular failure
– explains actions for which the reason is not self-evident
– furnishes additional background.

R **BLACK SQUARE**

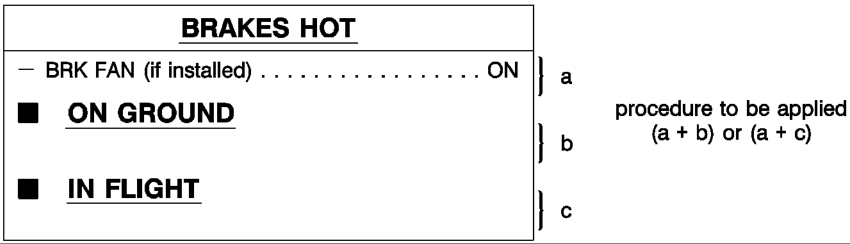
When several procedures appear under the same title, a black square marks the starting point of each procedure.
Only one procedure is applicable at a time.
For example :

NFC5-03-0201-001-A001AA



Black squares also indicate parts of a procedure among which only one is applicable.
For example :

NFC5-03-0201-001-B001AA



The ECAM does not display black squares.

R **BLACK DOT**

If an action depends on a precondition, a black dot identifies the precondition. If the precondition appears on ECAM, it appears in LARGE LETTERS. If not, it appears in small letters.
For example :

NFC5-03-0201-002-A001AA

F / CTL FLAPS FAULT

— FLAPS LEVER . . . . RECYCLE

• If unsuccessful :

— GPWS FLAP MODE . . . . OFF

"If unsuccessful" does not appear on ECAM

R **INDENTATION**

R Indentation is used in order to identify when an action depends on a precondition/flight
R phase/procedure.
R For example :
R

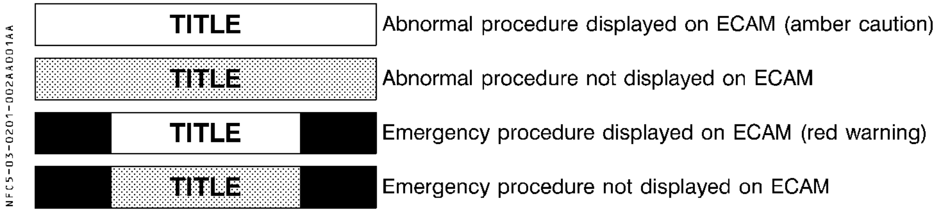
NFC5-03-0201-002-B001AA

■ **IN FLIGHT**
• If Flaps locked
APPR SPEED . . . . VREF +30
— MAX SPEED . . . . 250 kt
INCREASED FUEL CONSUMP

R — The APPR SPEED is equal to VREF + 30 kt, only if the flaps are locked, because "APPR
R SPEED......VREF + 30" is indented below "• If flaps locked".
R — The MAX SPEED of 250 kt does not depend on the flaps locked condition because it is
R aligned with "• If flaps locked". Therefore, MAX SPEED has to be respected whether the
R flaps are locked or not.
R — INCREASED FUEL CONSUMP is aligned with IN FLIGHT. Therefore, this information is
R valid in flight and on ground.

PROCEDURE TITLES

Titles of the procedures appear in the following ways :



TASKSHARING

The general tasksharing shown below applies to all procedures.
The pilot flying remains the pilot flying throughout the procedure.
The PF (pilot flying), is responsible for the :
- Thrust levers
- Control of flight path and airspeed
- Aircraft configuration (request configuration change)
- Navigation
- Communications.

The PNF (pilot not flying), is responsible for :
- Monitoring and reading aloud the ECAM and checklists
- Performing required actions, or actions requested by the PF, if applicable
- Using the engine master switches, IR and guarded switches, with PF's confirmation.

MEMORY ITEMS

The following procedures are to be applied without referring to paper : Windshear ⊲ , windshear ahead ⊲ , TCAS ⊲ , EGPWS ⊲ , loss of braking, immediate actions of EMER DESCENT, immediate actions of UNRELIABLE SPEED INDICATION/ADR CHECK PROC, CREW INCAPACITATION.

USE OF AUTOPILOT

The autopilot (AP) may be used in most failure cases, when available :

- In case of engine failure, including CAT II/CAT III ILS approaches and fail-passive automatic landing.
  When performing an engine-out non precision approach, the use of the AP is not permitted in the following modes : FINAL APP, NAV V/S, NAV FPA.
- In case of other failures, down to 500 ft AGL in all modes.
  However, the AP has not been certified in all configurations, and its performance cannot be guaranteed. If the pilot chooses to use the AP in such circumstances, extra vigilance is required, and the AP must be disconnected, if the aircraft deviates from the desired or safe flight path.

INITIATION OF PROCEDURES

Procedures are initiated on the Pilot Flying's command.
No action is taken (apart from canceling audio warnings, through the MASTER WARN light) until :

- The appropriate flight path is established, and
- The aircraft is at least 400 feet above the runway, if a failure occurs during takeoff, approach or go-around.

A height of 400 feet is recommended, because it is a good compromise between the necessary time for stabilization, and excessive delay in procedure initiation.
In some emergency cases, provided that the appropriate flight path is established, the Pilot Flying may initiate actions before this height.
R If an emergency causes LAND ASAP to appear in red on the ECAM, the flight crew must
R land as soon as possible at the nearest suitable airport at which a safe approach and
R landing can be made.
R If an abnormal procedure causes LAND ASAP to appear in amber on the ECAM, the flight
R crew should consider landing at the nearest suitable airport.

LANDING DISTANCE

Any increase in landing distance, resulting from an emergency or abnormality, must be based on the actual landing distance in Conf FULL (Refer to 3.02.80).

ECAM

Warning inhibition during takeoff

Some warnings (non-inhibited) appear when the situation that prompts them occurs. Other warnings (inhibited) do not appear immediately, when the situation that prompts them occurs during takeoff.

CREW COORDINATION

When carrying out a procedure displayed on ECAM, both pilots must be aware of the present display. Before any “CLEAR” action, the pilots should crosscheck to confirm that there remains no blue message (except in case of no action feedback) that they can eliminate by a direct action.

NO CLEAR ACTION BEFORE CROSS CONFIRMATION

Example of crew coordination and cross confirmation :

WARNING DISPLAY		PILOT FLYING	PILOT NOT FLYING
HYD B RSVR OVHT BLUE ELEC PUMP.....OFF		READ FAILURE TAKE ATC RADIO CTL – REQUEST ECAM ACTION (1)	READ FAILURE – READ ACTION (full line) – PERFORM ECAM ACTION OR REQUEST EXECUTION BY THE PF (thrust levers)
HYD B RSVR OVHT **B SYS LO PR**	* F/CTL	– CHECK ECAM ACTION COMPLETED – CONFIRM CLEAR	– REQUEST CLEAR
SEAT BELTS	* F/CTL	– CONFIRM CLEAR	– REVIEW ALL AFFECTED EQUIPMENT SHOWN IN AMBER ON F/CTL PAGE – REQUEST CLEAR
STATUS APPR PROC HYD LO PR IF BLUE OVHT OUT : BLUE ELEC PUMP .... ON CAT 2 ONLY SLATS SLOW	INOP SYS CAT 3 BLUE HYD SPLR 3	– CONFIRM CLEAR	– READ STATUS LINE BY LINE – REQUEST CLEAR

For standard calls, refer to 3.03.90.

(1) Although it is the responsibility of the pilot flying to request ECAM actions, this does not preclude the captain from either taking control of the aircraft or ordering ECAM actions he considers to be necessary.

R *Note : ECAM procedures and, STATUS information, supplemented by a PFD/ND check*
R *suffice for handling the fault. However, before applying the ECAM procedures,*
R *the fault should be confirmed on the system display. When ECAM actions have*
R *been performed, and the ECAM STATUS has been reviewed, the crew may refer*
R *to FCOM procedure (3.02) for supplementary information, if time permits.*

INTENTIONALLY LEFT BLANK

USE OF SUMMARIES

GENERAL

The summaries consist of QRH procedures. They have been created to help the crew handle the actions to be carried out, in the event of an electrical emergency configuration or dual hydraulic failure.
In any case, the ECAM should be applied first.
This includes both the procedure and the STATUS review.
Only after announcing "ECAM ACTIONS COMPLETED", should the PNF refer to the corresponding QRH summary.
When the failure occurs, and after performing the ECAM actions, the PNF should refer to the "CRUISE" portion of the summary, in order to determine the landing distance coefficient.
Since normal landing distances are also given on this page, the PNF will be able to compute the landing distance taking failure(s) into account, in order for the pilot to decide whether to divert or not.

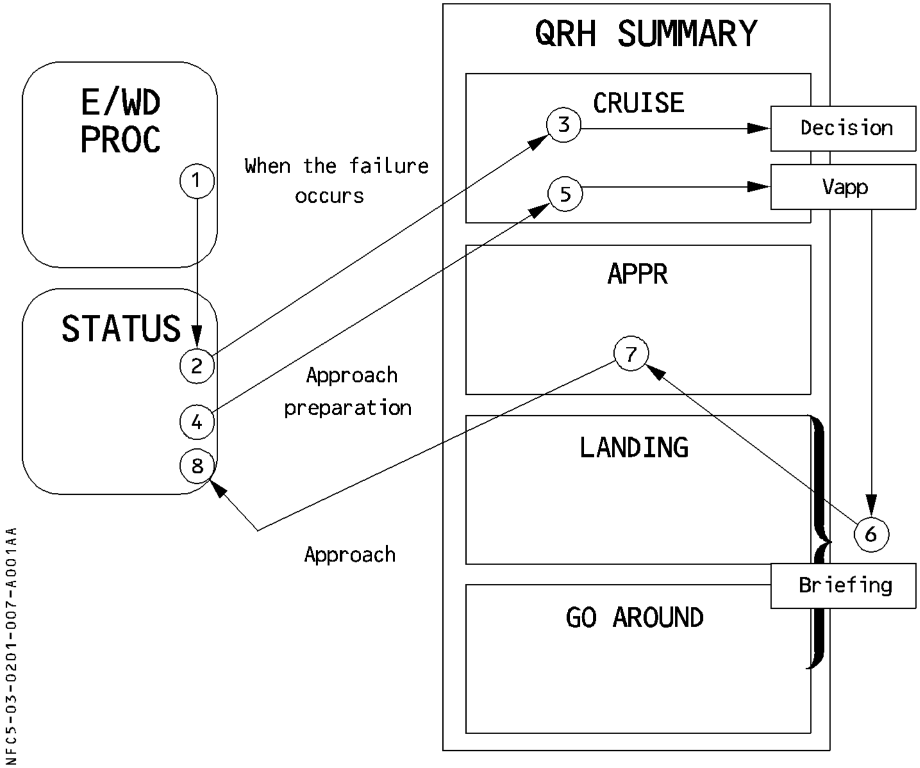
APPROACH PREPARATION

As always, approach preparation includes a review of the ECAM STATUS.
After reviewing the STATUS, the PNF should refer to the "CRUISE" portion of the summary to determine the VREF correction, and compute the VAPP.
The pilot is presumed to know the computation method, and use the VREF given on the MCDU (the destination having been previously updated).
A VREF table is provided in the summary, for failure cases leading to the loss of the MCDU.
The LANDING and GO-AROUND portions of the summary should be used for the approach briefing.

APPROACH

The APPR PROC actions should be performed by reading the APPROACH portion of the summary. This portion has primarily been added due to the flap extension procedure, which is not fully addressed on the ECAM.
As the recommendations provided in this portion of the summary are deemed sufficient, it is not necessary to refer to the "LANDING WITH FLAPS (SLATS) JAMMED" paper procedure.
After referring to the APPROACH portion of the summary, the PNF should then review the ECAM STATUS, and check that all APPR PROC actions have been completed.

SEQUENCE



REJECTED TAKEOFF

GENERAL

The decision to reject the takeoff and the stop action is made by the Captain.
It is therefore recommended that the Captain keeps his hand on the thrust levers until the aircraft reaches V1, whether he is Pilot Flying (PF) or Pilot Not Flying (PNF). As soon as he decides to abort, he calls "stop", takes over control of the aircraft and performs the stop actions.
It is not possible to list all the factors that could lead to the decision to reject the takeoff. However, in order to help the Captain to make a decision, the ECAM inhibits the warnings that are not essential from 80 knots to 1 500 feet (or 2 minutes after lift-off, whichever occurs first).
Experience has shown that rejected takeoffs can be hazardous even if the performance is correctly calculated, based on flight tests.
This may be due to the following factors :

- Delay in Performing the stopping procedure.
- Damaged tires.
- Brakes worn, brakes not working correctly, or higher than normal initial brakes temperature.
- The brakes not being fully applied.
- A runway friction coefficient lower than assumed in computations.
- An error in gross weight calculation.
- Runway line up not considered.

When the aircraft speed is at or above 100 knots, it may become hazardous to reject a takeoff. Therefore, when the aircraft speed approaches V1, the Captain should be "Go-minded" if none of the main failures quoted below ("Above 100 knots and below V1") have occured.

REJECTED TAKEOFF (CONT'D)

DECISION MANAGEMENT

- **Below 100 knots** :
  The decision to reject the takeoff may be taken at the Captain's discretion, depending on the circumstances.
  Although we cannot list all the causes, the Captain should seriously consider discontinuing the takeoff, if any ECAM warning/caution is activated.
  Note : The speed of 100 knots is not critical : It was chosen in order to help the Captain make his decision, and to avoid unnecessary stops from high speed.
- **Above 100 knots and below V1** :
  Rejecting the takeoff at these speeds is a more serious matter, particularly on slippery runways. It could lead to a hazardous situation, if the speed is approaching V1. At these speeds the Captain should be "go-minded" and very few situations should lead to the decision to reject the takeoff :
  1. Fire warning or severe damage.
  2. Sudden loss of engine thrust.
  3. Malfunctions or conditions that give unambiguous indications that the aircraft will not fly safely.
  4. ECAM warnings/cautions, such as :
     . ENG or APU FIRE
     . ENG FAIL
     R . ENG OIL LO PR
     . CONFIG.
     . SIDESTICK FAULT
     . ENG REV UNLOCKED
     . L + R ELEV FAULT

  Nose gear vibration should not lead to an RTO above 100 knots.
  In case of tire failure between V1 minus 20 knots and V1 :
  Unless debris from the tires has caused serious engine anomalies, it is far better to get airborne, reduce the fuel load, and land with a full runway length available.
  The V1 call has precedence over any other call.
- **Above V1**
  Takeoff must be continued, because it may not be possible to stop the aircraft on the remaining runway.

REJECTED TAKEOFF (CONT'D)

PROCEDURE DURING A REJECTED TAKEOFF

R

CAPT	F/O
– CALL . . . . "STOP" Simultaneously : – THRUST LEVERS . . . . IDLE – REVERSE THRUST . . . . MAX AVAIL.	– BRAKE RESPONSE . . . . . MONITOR – REVERSE . . . . CONFIRM – ANY AUDIO . . . . CANCEL
<u>Aircraft stopped</u> Consider positioning the aircraft to keep any possible fire away from the fuselage.	
– REVERSE . . . . STOWED – PARKING BRAKE . . . . APPLY *Set parking brake ON after aircraft stops.* – PA call . "ATTENTION CREW!AT STATIONS" – CALL . . . . "ECAM ACTIONS"	– ATC . . . . INFORM – EMER EVAC checklist . . . . LOCATE – ECAM ACTIONS . . . . INITIATE
The aircraft should remain stationary while the crew evaluates the situation.	
<u>Evacuation phase</u> If required, refer to the EMERGENCY EVACUATION Checklist for evacuation.	Inform ATC of intention and required assistance.

REVERSERS : Full reverse may be used until coming to a complete stop. But, if there is enough runway available at the end of the deceleration, it is preferable to reduce reverse thrust when passing 70 knots.

<u>Note</u> : 1. If the brake response does not seem appropriate for the runway condition, FULL manual braking should be applied and maintained. If IN DOUBT, TAKE OVER MANUALLY. Do not attempt to clear the runway, until it is absolutely clear that an evacuation is not necessary and that it is safe to do so.

2. If the autobrake is unserviceable, the Captain simultaneously reduces thrust and applies maximum pressure on both pedals.
The aircraft will stop in the minimum distance, only if the brake pedals are maintained fully pressed until the aircraft comes to a stop.

3. If normal braking is inoperative, immediately switch the A/SKID & NOSE WHEEL switch OFF and modulate brake pressure, as required, at or below 1000 PSI.
If the brake pedals were fully pressed when switching the A/SKID & NOSE WHEEL switch OFF, full pressure would be applied to the brakes.

4. After a rejected takeoff, if the aircraft comes to a complete stop using autobrake MAX, release brakes prior to taxi by disarming spoilers.

ENG FAILURE AFTER V1 – CONTINUED TAKEOFF

- If an engine fails after the aircraft passes V1, the takeoff must be continued.
- Use rudder conventionally to stay on the runway centerline.
- At VR, rotate the aircraft smoothly using a continuous pitch rate to a pitch attitude of 12.5 degrees. After lift-off, follow the Speed Reference System (SRS).
- When airborne with a positive rate of climb, select the landing gear up.
- Use rudder to prevent yaw. Shortly after lift-off, β target will appear. Adjust rudder position to zero the β target. Control heading conventionally with bank, keeping the β target at zero with rudder.
- Consider the use of TOGA thrust.
- Consider the use of autopilot.
- At 400 feet minimum, apply the ECAM procedure
- At acceleration height, level off and allow the speed to increase.
  · At F speed select CONF 1.
  · At S speed select CONF 0.
- When the flap handle is at zero, β target reverts to side-slip indication. Center the sideslip indication conventionally.
- At green dot speed (engine-out operating speed in clean configuration) resume the climb using maximum continuous thrust and maintain green dot speed.
  (If already in the FLX/MCT gate, move to CL and back to MCT).
- MAXIMUM TAKEOFF THRUST IS ONLY ALLOWED FOR 10 MINUTES.

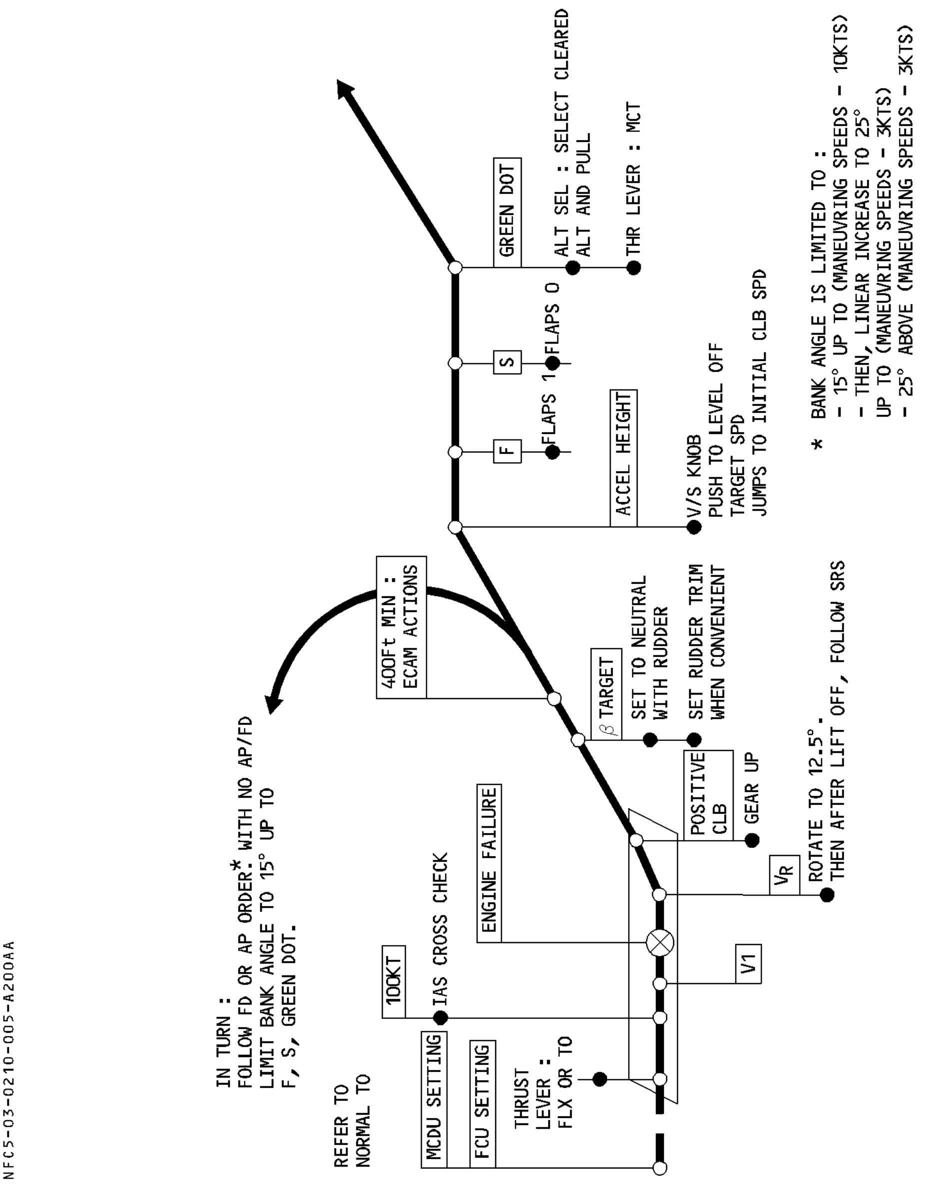
ENGINE FAILURE DURING INITIAL CLIMB-OUT

- Proceed as above. However, if the failure occurs above V2 maintain the SRS commanded attitude (or the speed reached after recovery). In any case, the minimum speed must be equal to V2.

ENG FAILURE AFTER V1 – CONTINUED TAKEOFF (CONT'D)

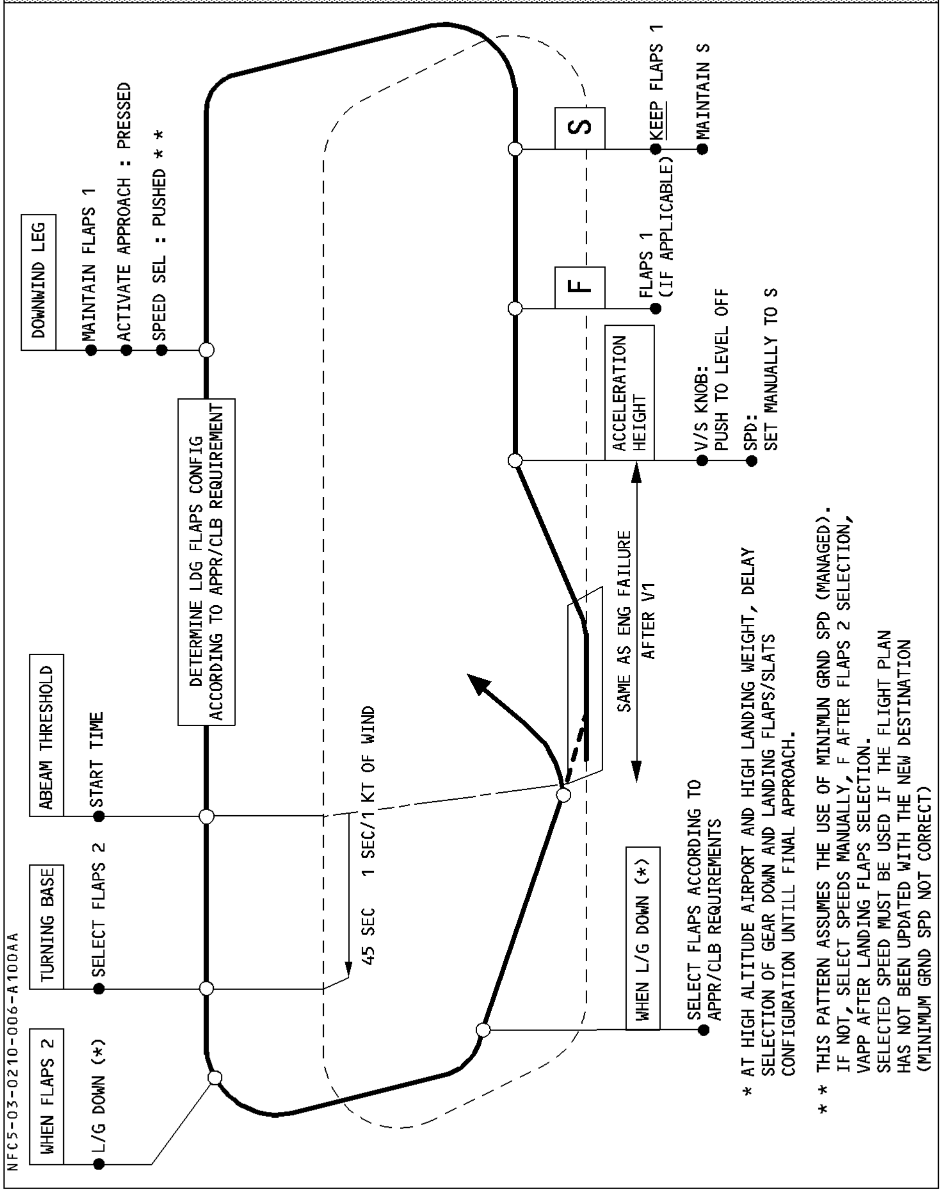
ENGINE OPERATION AT MAX T.O. THRUST IS LIMITED TO 10 MINUTES

R



IMMEDIATE VMC LDG FOLLOWING ENG FAILURE ON TO

R



STRAIGHT-IN APPROACH WITH ONE ENGINE INOPERATIVE

For performance reasons, do not extend flaps full until established on a final descent to landing.
If a level off is expected during the final approach, perform the approach and landing in CONF 3.

CIRCLING APPROACH WITH ONE ENGINE INOPERATIVE

– LANDING WEIGHT . . . . CHECK

● **If the aircraft weight is above the maximum weight for circling in CONF 3 (given in the table below) :**

The aircraft cannot maintain flight level with CONF 3 and the landing gear down.

– FOR LDG . . . . USE FLAP 3

Conf 3 is preferred, to minimize a configuration change in short final.

– GPWS LDG FLAP 3 . . . . ON

– Delay gear extension.

Note : – If the approach is flown at less than 750 feet RA, the "L/G NOT DOWN" warning will be triggered. The pilot can cancel the aural warning by pressing the EMER CANC pushbutton, located on the ECAM control panel.
– A "TOO LOW GEAR" warning is to be expected, if the landing gear is not downlocked at 500 feet RA.

MAXIMUM WEIGHT FOR CIRCLING IN CONF 3 (1000 KG)

OAT (°C)	AIRPORT ELEVATION (feet)							
	0	2000	4000	6000	8000	10000	12000	14000
0	86.0	82.0	78.0	75.0	71.0	67.0	63.0	59.0
5	86.0	82.0	78.0	75.0	71.0	67.0	62.0	
10	86.0	82.0	78.0	75.0	70.0	65.0	60.0	
15	86.0	82.0	78.0	74.0	68.0	63.0		
20	86.0	82.0	76.0	71.0	65.0	60.0		
25	86.0	79.0	73.0	68.0	62.0			
30	82.0	76.0	70.0	65.0	60.0			
35	79.0	72.0	67.0	62.0				
40	74.0	69.0	64.0	59.0				
45	72.0	66.0	61.0					
50	68.0	63.0						
55	65.0							

STRAIGHT-IN APPROACH WITH ONE ENGINE INOPERATIVE

For performance reasons, do not extend flaps full until established on a final descent to landing.
If a level off is expected during the final approach, perform the approach and landing in CONF 3.

R
CIRCLING APPROACH WITH ONE ENGINE INOPERATIVE

R – LANDING WEIGHT . . . . CHECK

R ● **If the aircraft weight is above the maximum weight for**
R **circling in CONF 3 (given in the table below) :**

R *The aircraft cannot maintain flight level with CONF 3 and the landing gear down.*

R – FOR LDG . . . . USE FLAP 3

R *Conf 3 is preferred, to minimize a configuration change in short final.*

R – GPWS LDG FLAP 3 . . . . ON

R – Delay gear extension.

R *Note : – If the approach is flown at less than 750 feet RA, the "L/G NOT DOWN"*
R *warning will be triggered. The pilot can cancel the aural warning by pressing*
R *the EMER CANC pushbutton, located on the ECAM control panel.*
R *– A "TOO LOW GEAR" warning is to be expected, if the landing gear is not*
R *downlocked at 500 feet RA.*
R

MAXIMUM WEIGHT FOR CIRCLING IN CONF 3 (1000 KG)

OAT (°C)	AIRPORT ELEVATION (feet)							
	0	2000	4000	6000	8000	10000	12000	14000
0	77.0	76.0	69.0	63.0	58.0	53.0	48.0	45.0
5	77.0	76.0	69.0	63.0	58.0	53.0	48.0	45.0
10	77.0	76.0	69.0	63.0	58.0	53.0	48.0	45.0
15	77.0	76.0	69.0	63.0	58.0	53.0	48.0	45.0
20	77.0	76.0	69.0	63.0	58.0	53.0	48.0	45.0
25	77.0	75.0	69.0	63.0	58.0	53.0	48.0	45.0
30	77.0	72.0	68.0	63.0	58.0	53.0	48.0	
35	74.0	70.0	66.0	63.0	56.0	51.0		
40	71.0	67.0	63.0	59.0				
45	69.0	65.0	61.0					
50	67.0	63.0						
55	64.0							

STRAIGHT-IN APPROACH WITH ONE ENGINE INOPERATIVE

For performance reasons, do not extend flaps full until established on a final descent to landing.
If a level off is expected during the final approach, perform the approach and landing in CONF 3.

CIRCLING APPROACH WITH ONE ENGINE INOPERATIVE

– LANDING WEIGHT . . . . CHECK

● **If the aircraft weight is above the maximum weight for circling in CONF 3 (given in the table below) :**

The aircraft cannot maintain flight level with CONF 3 and the landing gear down.

– FOR LDG . . . . USE FLAP 3

Conf 3 is preferred, to minimize a configuration change in short final.

– GPWS LDG FLAP 3 . . . . ON

– Delay gear extension.

Note : – If the approach is flown at less than 750 feet RA, the "L/G NOT DOWN" warning will be triggered. The pilot can cancel the aural warning by pressing the EMER CANC pushbutton, located on the ECAM control panel.
– A "TOO LOW GEAR" warning is to be expected, if the landing gear is not downlocked at 500 feet RA.

MAXIMUM WEIGHT FOR CIRCLING IN CONF 3 (1000 KG)

OAT (°C)	AIRPORT ELEVATION (feet)							
	0	2000	4000	6000	8000	10000	12000	14000
0	74.0	72.0	69.0	67.0	64.0	62.0	59.0	55.0
5	74.0	72.0	69.0	67.0	64.0	62.0	58.0	53.0
10	74.0	72.0	69.0	67.0	64.0	59.0	55.0	50.0
15	74.0	72.0	69.0	66.0	61.0	57.0	52.0	48.0
20	74.0	72.0	68.0	63.0	59.0	54.0	50.0	46.0
25	74.0	70.0	66.0	61.0	56.0	52.0	48.0	43.0
30	72.0	68.0	63.0	58.0	54.0	49.0	45.0	
35	71.0	66.0	61.0	56.0	52.0	48.0		
40	68.0	63.0	59.0	54.0				
45	66.0	61.0	56.0					
50	63.0	58.0						
55	61.0							

LANDING WITH SLATS OR FLAPS JAMMED

– LANDING CONF . . . . CONF 3

■ **Repeat the following until landing configuration is reached :**

– SPEED SEL . . . . VFE NEXT – 5 KT

Decelerate towards VFE NEXT – 5 KT but not below VLS. In case of turbulence, to avoid VFE exceedance, the pilot may decide to decelerate to a lower speed, but not below VLS.

Note :
- *The autopilot may be used down to 500 feet AGL. As it is not tuned for abnormal configurations, its behavior can be less than optimum and must be monitored.*
- *Approach with selected speed is recommended.*
- *A/THR is recommended, except in the case of a G+B SYS LO PR warning.*
- *OVERSPEED warning and VLS, displayed on the PFD, are computed according to the actual flaps/slats position.*
- *VFE and VFE NEXT are displayed on the PFD according to the FLAPS' lever position. If not displayed, use the placard speeds.*
- *If VLS is greater than VFE NEXT (overweight landing case), the FLAPS lever can be set in the required next position, while the speed is reduced to follow VLS reduction as surfaces extend. The VFE warning threshold should not be triggered.*
  In this case, disconnect the A/THR. A/THR can be re-engaged when the landing configuration is established.

As speed reduces through VFE NEXT :

– FLAPS LEVER . . . . ONE STEP DOWN

● **When landing configuration is established :**

– DECELERATE TO CALCULATED APPROACH SPEED IN FINAL APPROACH

FOR GO AROUND

The table on page 8 provides the MAX SPEEDS for the abnormal configurations.

■ **IF SLATS FAULT :**

● **FOR CIRCUIT :**

– MAINTAIN SLATS/FLAPS CONFIGURATION

– Recommended speed : MAX SPEED – 10 KT

R ● **FOR DIVERSION**

R – SELECT CLEAN CONFIGURATION

R *Recommended flaps retraction speed is between MAX SPEED – 10 knots and*
R *MAX SPEED.*

R – Recommended diversion speed : MAX SPEED – 10 KT.

LANDING WITH SLATS OR FLAPS JAMMED (CONT'D)

■ IF FLAPS FAULT :

- **FOR CIRCUIT :**
  - MAINTAIN SLATS/FLAPS CONFIGURATION
  - Recommended speed : MAX SPEED – 10 KT
- **FOR DIVERSION :**
  - **If FLAPS jammed at 0**
    - SELECT CLEAN CONFIGURATION

      Note : Recommended speed for slats retraction is between MAX SPEED – 10 KT and MAX SPEED of actual slat/flap position.
    - Normal operating speeds
  - **If FLAPS jammed > 0**
    - MAINTAIN SLAT/FLAP CONFIGURATION
    - Recommended speed for diversion : MAX SPEED – 10 KT

      Note :
      - *In the majority of cases, VFE on PFD is equal to the MAX SPEED. In this case, VFE can be used as MAX SPEED. In case the SPD LIM flag is displayed on the PFD, use the MAX SPEED displayed on the ECAM status page.*
      - R *In some cases, MAX SPEED – 10 knots may be a few knots higher*
        R *than the VFE. In this situation, pilot may follow the VFE.*
      - *In case of a go-around with CONF FULL selected, the L/G NOT DOWN warning is triggered at landing gear retraction.*

<table>
<tr><th colspan="6">MAX SPEED</th></tr>
<tr><th>Flaps
Slats</th><th>F = 0</th><th>0 < F ≤ 1</th><th>1 < F ≤ 2</th><th>2 < F ≤ 3</th><th>F > 3</th></tr>
<tr><td>S = 0</td><td>NO LIMITATION</td><td rowspan="2">215 knots</td><td rowspan="2">200 knots</td><td rowspan="2">185 knots</td><td rowspan="2">Not allowed
(177 knots)</td></tr>
<tr><td>0 < S ≤ 1</td><td>230 knots</td></tr>
<tr><td>1 < S ≤ 3</td><td colspan="2">200 knots</td><td>200 knots</td><td>185 knots</td><td>177 knots</td></tr>
<tr><td>S > 3</td><td colspan="2">177 knots</td><td>177 knots</td><td>177 knots</td><td>177 knots</td></tr>
</table>

CAUTION

For flight with SLATS or FLAPS extended, fuel consumption is increased. Refer to the fuel flow indication. As a guideline, determine the fuel consumption in clean configuration at the same altitude without airspeed limitation (e.g. From ALTERNATE FLIGHT PLANNING tables, refer to 2.05.50) and multiply this result by 1.6 (SLATS EXTENDED), or 1.8 (FLAPS EXTENDED, or 2 (SLATS and FLAPS EXTENDED), to obtain the fuel consumption required to reach the destination in the current configuration.

LANDING WITH SLATS OR FLAPS JAMMED

– LANDING CONF . . . . CONF 3

■ **Repeat the following until landing configuration is reached :**

– SPEED SEL . . . . VFE NEXT – 5 KT

Decelerate towards VFE NEXT – 5 KT but not below VLS. In case of turbulence, to avoid VFE exceedance, the pilot may decide to decelerate to a lower speed, but not below VLS.

Note :
- *The autopilot may be used down to 500 feet AGL. As it is not tuned for abnormal configurations, its behavior can be less than optimum and must be monitored.*
- *Approach with selected speed is recommended.*
- *A/THR is recommended, except in the case of a G+B SYS LO PR warning.*
- *OVERSPEED warning and VLS, displayed on the PFD, are computed according to the actual flaps/slats position.*
- *VFE and VFE NEXT are displayed on the PFD according to the FLAPS' lever position. If not displayed, use the placard speeds.*
- *If VLS is greater than VFE NEXT (overweight landing case), the FLAPS lever can be set in the required next position, while the speed is reduced to follow VLS reduction as surfaces extend. The VFE warning threshold should not be triggered.*
  In this case, disconnect the A/THR. A/THR can be re-engaged when the landing configuration is established.

As speed reduces through VFE NEXT :

– FLAPS LEVER . . . . ONE STEP DOWN

● **When landing configuration is established :**

– DECELERATE TO CALCULATED APPROACH SPEED IN FINAL APPROACH

FOR GO AROUND

The table on page 8 provides the MAX SPEEDS for the abnormal configurations.

■ **IF SLATS FAULT :**

● **FOR CIRCUIT :**

– MAINTAIN SLATS/FLAPS CONFIGURATION
– Recommended speed : MAX SPEED – 10 KT

R ● **FOR DIVERSION**

R – SELECT CLEAN CONFIGURATION
R *Recommended flaps retraction speed is between MAX SPEED – 10 knots and*
R *MAX SPEED.*
R – Recommended diversion speed : MAX SPEED – 10 KT.

LANDING WITH SLATS OR FLAPS JAMMED (CONT'D)

■ IF FLAPS FAULT :

● **FOR CIRCUIT :**

– MAINTAIN SLATS/FLAPS CONFIGURATION
– Recommended speed : MAX SPEED – 10 KT

● **FOR DIVERSION :**

● **If FLAPS jammed at 0**

– SELECT CLEAN CONFIGURATION

Note : Recommended speed for slats retraction is between MAX SPEED – 10 KT and MAX SPEED of actual slat/flap position.

– Normal operating speeds

● **If FLAPS jammed > 0**

– MAINTAIN SLAT/FLAP CONFIGURATION
– Recommended speed for diversion : MAX SPEED – 10KT

Note :
– In the majority of cases, VFE on PFD is equal to the MAX SPEED. In this case, VFE can be used as MAX SPEED. In case the SPD LIM flag is displayed on the PFD, use the MAX SPEED displayed on the ECAM status page.
R *– In some cases, MAX SPEED – 10 knots may be a few knots higher*
R *than the VFE. In this situation, pilot may follow the VFE.*
– In case of a go-around with CONF FULL selected, the L/G NOT DOWN warning is triggered at landing gear retraction.

<table>
<tr><th colspan="6">MAX SPEED</th></tr>
<tr><th>Flaps / Slats</th><th>F = 0</th><th>0 < F ≤ 1</th><th>1 < F ≤ 2</th><th>2 < F ≤ 3</th><th>F > 3</th></tr>
<tr><td>S = 0</td><td>NO LIMITATION</td><td rowspan="2">215 knots</td><td rowspan="2">215 knots</td><td rowspan="2">195 knots</td><td rowspan="2">Not allowed (190 knots)</td></tr>
<tr><td>0 < S ≤ 1</td><td>230 knots</td></tr>
<tr><td>1 < S ≤ 3</td><td colspan="2">215 knots</td><td>215 knots</td><td>195 knots</td><td>190 knots</td></tr>
<tr><td>S > 3</td><td colspan="2">190 knots</td><td>190 knots</td><td>190 knots</td><td>190 knots</td></tr>
</table>

CAUTION

For flight with SLATS or FLAPS extended, fuel consumption is increased. Refer to the fuel flow indication. As a guideline, determine the fuel consumption in clean configuration at the same altitude without airspeed limitation (e.g. from ALTERNATE FLIGHT PLANNING tables, refer to 2.05.50) and multiply this result by 1.6 (SLATS EXTENDED), or 1.8 (FLAPS EXTENDED), or 2 (SLATS and FLAPS EXTENDED) to obtain the fuel consumption required to reach the destination in the current configuration.

AIR PACK 1(2) OVHT

– PACK (affected) .... OFF

High flow is automatically selected on the remaining pack.
Fault light goes out when the overheat disappears.

● **WHEN PACK OVHT OUT :**
– PACK (affected) .... ON

STATUS

● **WHEN PACK OVHT OUT :**
– PACK (affected) .... ON

INOP SYS

● **If pack not recovered :**

INOP SYS
PACK 1(2)

R

AIR PACK 1(2) FAULT

– PACK (affected) .... OFF

STATUS

INOP SYS
PACK 1(2)

AIR PACK 1(2) OFF

R Crew awareness.

One pack is abnormally selected off

STATUS

INOP SYS
PACK 1(2)

AIR PACK 1 + 2 FAULT

– PACK (affected) . . . . OFF

The fault light goes off, when the failure disappears.

– DESCENT TO FL 100/MEA.

Descend to FL 100, or MEA, whichever is higher.

● **WHEN DIFF PR < 1 PSI AND FL BELOW 100 :**

– RAM AIR . . . . ON

MAX FL 100/MEA

● **If FAULT was due to an overheat :**

AIR PACK 1 (2) OVHT

● **WHEN PACK OVHT OUT :**

– PACK (affected) . . . . ON

STATUS

● **If packs not recovered :**

MAX FL 100/MEA

● **If FAULT was due to an overheat :**

● **WHEN PACK OVHT OUT :**

– PACK (affected) . . . . ON

INOP SYS

PACK 1 + 2

AIR PACK 1(2) OVHT

– PACK (affected) .... OFF

High flow is automatically selected on the remaining pack.
Fault light goes out when the overheat disappears.

● **WHEN PACK OVHT OUT :**
– PACK (affected) .... ON

STATUS

● **WHEN PACK OVHT OUT :**
– PACK (affected) .... ON

INOP SYS

● **If pack not recovered :**

INOP SYS
PACK 1(2)

AIR PACK 1(2) FAULT

– PACK (affected) .... OFF

STATUS

R ■ **If ACSC 1 failed**
R CKPT AT FIXED TEMP

R INOP SYS
R PACK 1
COND CTL 1
FWD CRG HEAT◁

R ■ **If ACSC 2 failed**
R CAB AT FIXED TEMP

R INOP SYS
PACK 2
COND CTL 2

AIR PACK 1(2) OFF

Crew awareness.
One pack is abnormally selected off

STATUS

INOP SYS
PACK 1(2)

AIR PACK 1 + 2 FAULT

– PACK .... OFF
The fault light goes off when the failure disappears.
– DESCENT TO FL 100/MEA.
Descend to FL 100, or MEA, whichever is higher.

● **WHEN DIFF PR < 1 PSI AND FL BELOW 100 :**
– RAM AIR .... ON
MAX FL 100/MEA

● **If FAULT was due to an overheat :**
AIR PACK 1 (2) OVHT
● **WHEN PACK OVHT OUT :**
– PACK (affected) .... ON

STATUS

● **If packs not recovered :**
MAX FL 100/MEA
– CKPT AT FIXED TEMP
– CAB AT FIXED TEMP
● **If FAULT was due to an overheat :**
● **WHEN PACK OVHT OUT :**
– PACK (affected) .... ON

INOP SYS
PACK 1 + 2
COND CTL 1
COND CTL 2
FWD CRG HEAT◁

AIR PACK 1(2) REGUL FAULT

Crew awareness.

The temperature regulation performance is degraded.

STATUS

- **In case of By Pass Valve or RAM Air Inlet failure**

  INOP SYS
  PACK 1(2) REGUL

- **In case of Flow Control Valve in backup mode :**

  INOP SYS
  HOT AIR

AIR PACK 1(2) REGUL FAULT

Pack primary channel, or pack primary and secondary channels fault.

Crew awareness.

■ **If the primary channel fails :**

The pack air inlet flap fully opens ; pack flow is fixed at the previous setting.

■ **If the primary and secondary channels fail :**

PACK 1(2) AT FIXED TEMP

The pack outlet temperature is controlled by the pack anti-ice valve and is stabilized to a temperature between 5°C (41°F) and 30°C (86°F) within a maximum of 6 minutes.

STATUS

INOP SYS

PACK 1(2) REGUL

COND FWD CAB/AFT CAB/CKPT DUCT OVHT

● **WHEN DUCT TEMP < 70 DEG C :**
– HOT AIR . . . . OFF THEN ON
Hot air pressure regulating valve reopens.

STATUS

● **If the system is not recovered :**
CAB TEMP BY PACK ONLY
Basic temperature regulation is by packs only (remains automatic).

INOP SYS
HOT AIR

COND AFT CARGO DUCT OVHT

● **WHEN DUCT TEMP < 70 DEG C :**
– HOT AIR (on CARGO HEAT panel) . . . . OFF THEN ON
Hot air pressure regulating valve reopens.

STATUS

R INOP SYS
AFT CRG HEAT

COND HOT AIR FAULT

– HOT AIR (if not closed) . . . . OFF

● **IF HOT AIR STILL OPEN and DUCT OVHT persists :**

– PACK 1 . . . . OFF
– PACK 2 . . . . OFF
– DESCENT TO FL 100/MEA
Descend to FL 100, or MEA, whichever is higher.

● **WHEN DIFF PR < 1 PSI AND FL BELOW 100**

– RAM AIR . . . . ON
MAX FL 100/MEA

STATUS

CAB TEMP BY PACK ONLY
(only if HOT AIR closed)
Basic temperature regulation by packs only (remains automatic). R

INOP SYS
PACK 1 + 2
(if PACKS closed)
HOT AIR

COND TRIM AIR SYS FAULT

■ **One trim valve failed :**

A message corresponding to the affected valve is displayed :
AFT CAB TRIM VALVE
FWD CAB TRIM VALVE
CKPT TRIM VALVE

■ **High pressure detected downstream of the hot air pressure regulating valve :**

TRIM AIR HI PR
Note : If the warning and the TRIM AIR HI PR message are triggered when all trim air valves are closed (during the first 30 seconds after the packs are selected on, or in flight, if all zone heating demands are fulfilled), disregard them.

COND AFT CRG ISOL VALVE

Crew awareness.

STATUS

INOP SYS
AFT CRG HEAT
AFT CRG VENT

COND AFT CRG HEAT FAULT

Crew awareness.

STATUS

INOP SYS
AFT CRG HEAT

AIR AFT CRG VENT FAULT

Crew awareness.
Failure of ventilation fan.

STATUS

INOP SYS
R AFT CRG HEAT
AFT CRG VENT

COND ZONE REGUL FAULT

Crew awareness.
The hot air pressure regulating valve and trim air valves close.

STATUS

■ **If primary channel failed :**

R CAB ZONE AT FIXED TEMP
Zones are controlled to 24°C (75°F) by the packs through the zone controller secondary channel :
· Pack 1 controls the cockpit.
· Pack 2 controls the cabin.

INOP SYS

■ **If primary and secondary channels failed:**

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
R *As the FADEC no longer receives a bleed demand correction, only approach idle can be selected.*
PACKS AT FIXED TEMP
The packs are controlled to deliver a fixed temperature of 20°C (68°F) for pack 1, and 10°C (50°F) for pack 2.

INOP SYS
ZONE REGUL

COND L + R CAB FAN FAULT

Both cabin fan motors overheat. Cabin fans stop.
– PACK FLOW .... HI

STATUS

INOP SYS
L + R CAB FAN

COND LAV + GALLEY FAN FAULT

Crew awareness.
Cabin zone temperature sensors are normally ventilated by the air extracted by the fan. Therefore, cabin zone temperature regulation is lost.

STATUS

CAB ZONE AT FIXED TEMP
· Cabin zone inlet duct temperature is constant (15°C or 59°F).
R *· Cockpit temperature regulation is normal.*

INOP SYS
GALLEY FAN

COND AFT CRG ISOL VALVE

Crew awareness.

STATUS

INOP SYS
AFT CRG HEAT
AFT CRG VENT

COND AFT CRG HEAT FAULT

Crew awareness.

STATUS

INOP SYS
AFT CRG HEAT

AIR AFT CRG VENT FAULT

Crew awareness.
Failure of ventilation fan.

STATUS

INOP SYS
R AFT CRG HEAT
AFT CRG VENT

COND ZONE REGUL FAULT

Crew awareness.

The hot air pressure regulating valve and trim air valves close.

STATUS

■ **If primary channel failed :**

R CAB ZONE AT FIXED TEMP

Zones are controlled to 24°C (75°F) by the packs through the zone controller secondary channel :

· Pack 1 controls the cockpit.

· Pack 2 controls the cabin.

INOP SYS

■ **If primary and secondary channels failed:**

ENG 1 APPR IDLE ONLY

ENG 2 APPR IDLE ONLY

R *As the FADEC no longer receives a bleed demand correction, only approach idle can be selected.*

PACKS AT FIXED TEMP

The packs are controlled to deliver a fixed temperature of 20°C (68°F) for pack 1, and 10°C (50°F) for pack 2.

INOP SYS

ZONE REGUL

COND L + R CAB FAN FAULT

Both cabin fan motors overheat. Cabin fans stop.

– ECON FLOW . . . . NORM

STATUS

INOP SYS

L + R CAB FAN

COND LAV + GALLEY FAN FAULT

Crew awareness.

Cabin zone temperature sensors are normally ventilated by the air extracted by the fan. Therefore, cabin zone temperature regulation is lost.

STATUS

CAB ZONE AT FIXED TEMP

· Cabin zone inlet duct temperature is constant (15°C or 59°F).

R *· Cockpit temperature regulation is normal.*

INOP SYS

GALLEY FAN

COND AFT CRG ISOL VALVE

Crew awareness.

STATUS

INOP SYS

AFT CRG HEAT
AFT CRG VENT

COND AFT CRG HEAT FAULT

Crew awareness.

STATUS

INOP SYS

AFT CRG HEAT

AIR AFT CRG VENT FAULT

Crew awareness.

Failure of ventilation fan.

STATUS

INOP SYS

R AFT CRG HEAT
AFT CRG VENT

R

COND L + R CAB FAN FAULT

Both cabin fan motors overheat. Cabin fans stop.

– PACK FLOW . . . . HI

STATUS

INOP SYS
L + R CAB FAN

COND LAV + GALLEY FAN FAULT

Crew awareness.

Cabin zone temperature sensors are normally ventilated by the air extracted by the fan. Therefore, cabin zone temperature regulation is lost.

STATUS

CAB AT FIXED TEMP
· *Cabin zone inlet duct temperature is constant (15°C or 59°F).*
· *Cockpit temperature regulation is normal.*

INOP SYS
GALLEY FAN

COND AFT CRG ISOL VALVE

Crew awareness.

STATUS

INOP SYS
AFT CRG HEAT
AFT CRG VENT

COND AFT CRG HEAT FAULT

Crew awareness.

STATUS

INOP SYS
AFT CRG HEAT

AIR AFT CRG VENT FAULT

Crew awareness.
Failure of ventilation fan.

STATUS

INOP SYS
R AFT CRG HEAT
AFT CRG VENT

COND L + R CAB FAN FAULT

Both cabin fan motors overheat. Cabin fans stop.

– ECON FLOW .... NORM

STATUS

INOP SYS

L + R CAB FAN

COND LAV + GALLEY FAN FAULT

Crew awareness.

Cabin zone temperature sensors are normally ventilated by the air extracted by the fan. Therefore, cabin zone temperature regulation is lost.

STATUS

CAB AT FIXED TEMP

· Cabin zone inlet duct temperature is constant (15°C or 59°F).

· Cockpit temperature regulation is normal.

INOP SYS

GALLEY FAN

COND AFT CRG ISOL VALVE

Crew awareness.

STATUS

INOP SYS
AFT CRG HEAT
AFT CRG VENT

COND AFT CRG HEAT FAULT

Crew awareness.

STATUS

INOP SYS
AFT CRG HEAT

AIR AFT CRG VENT FAULT

Crew awareness.
Failure of ventilation fan.

STATUS

INOP SYS
R AFT CRG HEAT
AFT CRG VENT

COND L + R CAB FAN FAULT

Both cabin fan motors overheat. Cabin fans stop.

– PACK FLOW .... HI

STATUS

INOP SYS
L + R CAB FAN

COND LAV + GALLEY FAN FAULT

Crew awareness.

Cabin zone temperature sensors are normally ventilated by the air extracted by the fan. Therefore, cabin zone temperature regulation, from the cabin, is lost.

STATUS

■ **If ACSC 2 is operative :**

CAB TEMP CKPT CTL ONLY

– *To adjust the cabin zone temperature, use the FWD CABIN and AFT CABIN zone temperature selectors (overhead panel). The selectors control the cabin duct temperature directly.*
– *Cockpit temperature regulation is normal.*

INOP SYS
GALLEY FAN

■ **If ACSC 2 is inoperative :**

CAB AT FIXED TEMP

– *FWD CABIN and AFT CABIN zone temperature selectors are inoperative.*
– *To adjust the cabin zone temperature, use the COCKPIT zone temperature selector (overhead panel). Cabin duct temperature is the same as cockpit duct temperature.*
– *Cockpit temperature regulation is normal.*

INOP SYS
GALLEY FAN
PACK 2
COND CTL 2

COND AFT CRG ISOL VALVE

Crew awareness.

STATUS

INOP SYS
AFT CRG HEAT
AFT CRG VENT

COND AFT CRG HEAT FAULT

Crew awareness.

STATUS

INOP SYS
AFT CRG HEAT

AIR AFT CRG VENT FAULT

Crew awareness.
Failure of ventilation fan.

STATUS

INOP SYS
R AFT CRG HEAT
AFT CRG VENT

COND L + R CAB FAN FAULT

Both cabin fan motors overheat. Cabin fans stop.

– ECON FLOW . . . . NORM

STATUS

INOP SYS
L + R CAB FAN

COND LAV + GALLEY FAN FAULT

Crew awareness.

Cabin zone temperature sensors are normally ventilated by the air extracted by the fan. Therefore, cabin zone temperature regulation, from the cabin, is lost.

STATUS

■ **If ACSC 2 is operative :**

CAB TEMP CKPT CTL ONLY
- *To adjust the cabin zone temperature, use the FWD CABIN and AFT CABIN zone temperature selectors (overhead panel). The selectors control the cabin duct temperature directly.*
- *Cockpit temperature regulation is normal.*

INOP SYS
GALLEY FAN

■ **If ACSC 2 is inoperative :**

CAB AT FIXED TEMP
- *FWD CABIN and AFT CABIN zone temperature selectors are inoperative.*
- *To adjust the cabin zone temperature, use the COCKPIT zone temperature selector (overhead panel). Cabin duct temperature is the same as cockpit duct temperature.*
- *Cockpit temperature regulation is normal.*

INOP SYS
GALLEY FAN
PACK 2
COND CTL 2

INTENTIONALLY LEFT BLANK

CAB PR EXCESS CAB ALT

– CREW OXY MASK (if above FL100) . . . . ON

It is recommended to descend with autopilot engaged :
· turn ALT selector knob and pull
· turn HDG selector knob and pull
· set target SPD/MACH.

The use of autopilot is also permitted in EXPEDITE mode (◁).

R – DESCENT . . . . INITIATE

R EMER DESCENT FL 100/MEA (or minimum obstacle clearance altitude)

– THR LEVERS (if A/THR not engaged) . . . . IDLE

– SPD BRK . . . . FULL

Extension of speedbrakes will significantly increase Vls.
In order to avoid autopilot disconnection and automatic retraction of speedbrakes due to possible activation of angle of attack protection, allow the speed to increase before starting to use speedbrakes.

– SPD . . . . MAX/APPROPRIATE

Descend at maximum appropriate speed or, if structural damage is suspected use the flight controls with care and reduce speed as appropriate. Landing gear may be extended below 25000 feet ; speed must be reduced to VLO/VLE.

– SIGNS . . . . ON

– ENG MODE . . . . IGN

– ATC . . . . NOTIFY

Notify ATC of the nature of the emergency and state the intentions.
If ATC cannot be contacted, select ATC code A7700 or transmit a distress message on one of the following frequencies :
(VHF) 121.5 MHz or (HF) 2.182 KHz or 8364 KHz.
To save oxygen, set oxygen diluter selector to N position.
With oxygen diluter left to 100%, oxygen quantity may not be sufficient to cover the entire descent profile.
Ensure that the crew can communicate wearing oxygen masks. Avoid the continuous use of interphone position to minimize the interference from oxygen mask breathing noise.

● **IF CAB ALT > 14 000 FT :**

– PAX OXY MASKS . . . . MAN ON

Note : When descent is established and if time permits select manual mode and check parameters on ECAM CAB PRESS.
Notify the cabin crew when a safe flight level has been reached and oxygen mask use can be stopped.

CAB PR SYS 1 (2) (1 + 2) FAULT

■ **if one system affected :**

Crew awareness

STATUS

INOP SYS
CAB PR 1 (2)

■ **if both systems affected :**

R *Due to the slow closure of the outflow valve in manual pressurization mode and*
R *depending on the failure, the following procedure may not avoid the depressurization.*

– MODE SEL . . . . MAN
– MAN V/S CTL . . . . AS RQRD

R · *It may take 10 seconds in manual mode before the crew notices a change of the*
R *outflow valve position. Use the cabin V/S indication to confirm the outlfow valve*
R *operation.*

· *Monitor cabin V/S and CAB ALT frequently and adjust as necessary.*
Maintain aircraft altitude at or above cabin altitude.

· *The two safety valves limit △P to 8.6 psi.*

STATUS

MAN CAB PR CTL
TGT V/S :
CLIMB 500 FT/MIN
DESC 300 FT/MIN

A/C FL	CAB ALT TGT
390	8 000
350	6 500
300	5 000
250	2 500
< 200	0

DURING FINAL APPR :
– V/S CTL . . . . FULL UP

CAUTION
Check that △P is zero before opening the doors.

INOP SYS
CAB PR 1 + 2

R
CABIN OVERPRESSURE

R *Apply the following procedure (not displayed on ECAM) in case of total loss of cabin*
R *pressure control leading to overpressure.*

– PACK 1 or 2 .... OFF
– BLOWER + EXTRACT .... OVRD
  Cabin air is extracted overboard
– △P .... FREQUENTLY MONITOR

● **If △P > 9 PSI**
  – PACK 1 + 2 .... OFF
  LAND ASAP

Before 10 minutes from landing :
– PACK 1 + 2 .... OFF
– BLOWER + EXTRACT .... AUTO

CAUTION
Check that △P is zero before opening the doors.

CAB PR SYS 1 (2) (1 + 2) FAULT

■ **if one system affected :**

Crew awareness

STATUS

INOP SYS
CAB PR 1 (2)

■ **if both systems affected :**

Due to the slow closure of the outflow valve in manual pressurization mode and depending on the failure, the following procedure may not avoid the depressurization.

– MODE SEL . . . . MAN
– MAN V/S CTL . . . . AS RQRD

- *It may take 10 seconds in manual mode before the crew notices a change of the outflow valve position. Use the cabin V/S indication to confirm the outlfow valve operation.*
- *Monitor cabin V/S and CAB ALT frequently and adjust as necessary.*
  Maintain aircraft altitude at or above cabin altitude.
- *The two safety valves limit ΔP to 8.6 psi.*

STATUS

MAN CAB PR CTL
TGT V/S :
CLIMB 500 FT/MIN
DESC 300 FT/MIN

A/C FL	CAB ALT TGT
390	8 000
350	6 500
300	5 000
250	2 500
< 200	0

DURING FINAL APPR :
– MAN V/S CTL . . . . FULL UP

CAUTION
Check that ΔP is zero before opening the doors.

INOP SYS
CAB PR 1 + 2

R
CABIN OVERPRESSURE

R *Apply the following procedure (not displayed on ECAM) in case of total loss of cabin*
R *pressure control leading to overpressure.*

– PACK 1 or 2 .... OFF
– BLOWER + EXTRACT .... OVRD
  Cabin air is extracted overboard
– ΔP .... FREQUENTLY MONITOR

● **If ΔP > 9 PSI**
  – PACK 1 + 2 .... OFF
  LAND ASAP

Before 10 minutes from landing :
– PACK 1 + 2 .... OFF
– BLOWER + EXTRACT .... AUTO

CAUTION
Check that ΔP is zero before opening the doors.

<u>CAB PR</u> LO DIFF PR

– EXPECT HI CAB RATE
– A/C V/S . . . . REDUCE
This line is not displayed in case of Emergency Descent due to Excessive Cabin Altitude.

<u>CAB PR</u> OUTFLOW VALVE NOT OPEN (on ground)

– MODE SEL . . . . MAN
– MAN V/S CTL . . . . FULL UP
It may take 10 seconds in manual mode before the crew notices a change of the outflow valve position.

● **IF UNSUCCESSFUL** :
– PACK 1 and 2 . . . . OFF

<u>CAB PR</u> LDG ELEV FAULT

– LDG ELEV . . . . MAN ADJUST
Landing field elevation from FMGC is not available. Landing elevation must be manually selected with LDG ELEV selector. Refer to the LDG ELEV indication on the CRUISE page or CAB PRESS page to adjust the required landing elevator.
<u>Note</u> : If the landing is performed on QFE, set 0 feet on LDG ELEV selector.

CAB PR SAFETY VALVE OPEN

The failure is probably due to an overpressure.

● **IF DIFF PR ABV 8 PSI :**
- MODE SEL .... MAN
- MAN V/S CTL .... AS RQRD

If overpressure is confirmed, reduce cabin △P.
R *It may take 10 seconds in manual mode before the crew notices a change of the*
R *outflow valve position.*

● **IF UNSUCCESSFUL :**
- A/C FL .... REDUCE

STATUS

MAN CAB PR CTL

TGT V/S :
CLIMB 500 FT/MIN
DESC 300 FT/MIN

A/C FL	CAB ALT TGT
390	8 000
350	6 500
300	5 000
250	2 500
< 200	0

● **DURING FINAL APPR :**
- V/S CTL .... FULL UP

CAUTION
Check that △P is zero before opening the doors.

<u>CAB PR</u> LO DIFF PR

– EXPECT HI CAB RATE
– A/C V/S . . . . REDUCE
This line is not displayed in case of Emergency Descent due to Excessive Cabin Altitude.

<u>CAB PR</u> OFV NOT OPEN (on ground)

– MODE SEL . . . . MAN
– MAN V/S CTL . . . . FULL UP
It may take 10 seconds in manual mode before the crew notices a change of the outflow valve position.

● **IF UNSUCCESSFUL :**
– PACK 1 . . . . OFF
– PACK 2 . . . . OFF

<u>CAB PR</u> EXCESS RESIDUAL PR

– PACK 1 . . . . OFF
– PACK 2 . . . . OFF
– CABIN CREW . . . . ALERT

<u>CAB PR</u> LDG ELEV FAULT

– LDG ELEV . . . . MAN ADJUST
Landing field elevation from FMGC is not available. Landing elevation must be manually selected with LDG ELEV selector. Refer to the LDG ELEV indication on the CRUISE page or CAB PRESS page to adjust the required landing elevator.
<u>Note</u> : If the landing is performed on QFE, set 0 feet on LDG ELEV selector.

CAB PR SAFETY VALVE OPEN

The safety valve has opened due to cabin overpressure, or negative differential pressure.

■ **IF DIFF PR ABV 8 PSI :**

– MODE SEL . . . . MAN
– MAN V/S CTL . . . . AS RQRD

If overpressure is confirmed, reduce cabin △P.
It may take 10 seconds in manual mode before the crew notices a change of the outflow valve position.

● **IF UNSUCCESSFUL** :

– A/C FL . . . . REDUCE

■ **IF DIFF PR BELOW 0 PSI :**

– EXPECT HI CAB RATE
– A/C V/S . . . . REDUCE

STATUS

MAN CAB PR CTL
TGT V/S :
CLIMB 500 FT/MIN
DESC 300 FT/MIN

A/C FL	CAB ALT TGT
390	8 000
350	6 500
300	5 000
250	2 500
< 200	0

● **DURING FINAL APPR** :

– MAN V/S CTL . . . . FULL UP

CAUTION
Check that △P is zero before opening the doors.

VENT BLOWER FAULT

- **If NO DC ESS BUS FAULT**
  - BLOWER .... OVRD

    The ventilation system is in closed circuit configuration, and air from the air conditioning is added to the ventilation air.
- **If DC ESS BUS FAULT**

LAND ASAP

STATUS

- **If DC ESS BUS FAULT**

INOP SYS
VENT BLOWER

VENT EXTRACT FAULT

- EXTRACT .... OVRD

  The ventilation system is in closed circuit configuration and air from air conditioning is added to the ventilation air.

STATUS

INOP SYS
VENT EXTRACT

VENT SKIN VALVE FAULT

- **If INLET valve not fully closed in flight :**

  Crew awareness

  No action is required, since there is a non-return valve at the air inlet.
- **If EXTRACT valve affected :**
  - BLOWER .... OVRD
  - EXTRACT .... OVRD

    These actions send additional closure signals to the inlet and extract valves.
    The weather radar image on both NDs may be lost, in case of insufficient ventilation.
  - **IF UNSUCCESSFUL :**

    MAX FL 100/MEA
    - CAB PR MODE SEL .... MAN
    - MAN V/S CTL .... FULL UP

      The aircraft is manually depressurized.
      It may take 10 seconds in manual mode before the crew notices a change of the outlfow valve position.

STATUS

MAX FL : 100/MEA (or minimum obstacle clearance altitude)

INOP SYS
AVNCS VALVE

VENT AVNCS SYS FAULT

Triggered when the AEVC is not supplied or when valve position disagrees with the commanded position or when the power-up test is not satisfactory.

STATUS

INOP SYS
AVNCS VENT
VENT BLOWER (a)
VENT EXTRACT(a)

(a) If AEVC not supplied.

VENT BLOWER FAULT

- **If NO DC ESS BUS FAULT**
  - BLOWER .... OVRD

    The ventilation system is in closed circuit configuration, and air from the air conditioning is added to the ventilation air.
- **If DC ESS BUS FAULT**

  LAND ASAP

STATUS

- **If DC ESS BUS FAULT**

  INOP SYS
  VENT BLOWER

VENT EXTRACT FAULT

- EXTRACT .... OVRD

  The ventilation system is in closed circuit configuration and air from air conditioning is added to the ventilation air.

STATUS

INOP SYS
VENT EXTRACT

VENT SKIN VALVE FAULT

- **If INLET valve not fully closed in flight :**

  Crew awareness

  No action is required, since there is a non-return valve at the air inlet.
- **If EXTRACT valve affected :**
  - BLOWER .... OVRD
  - EXTRACT .... OVRD

    These actions send additional closure signals to the inlet and extract valves.
    The weather radar image on both NDs may be lost, in case of insufficient ventilation.
  - **IF UNSUCCESSFUL :**

    MAX FL 100/MEA
    - CAB PR MODE SEL .... MAN
    - MAN V/S CTL .... FULL UP

      The aircraft is manually depressurized.
      It may take 10 seconds in manual mode before the crew notices a change of the outlfow valve position.

STATUS

MAX FL : 100/MEA (or minimum obstacle clearance altitude)

INOP SYS
AVNCS VALVE

VENT AVNCS SYS FAULT

Crew awareness.

Triggered when the AEVC is not supplied, or when the valve position disagrees with the commanded position, or when the power-up test is not satisfactory.

STATUS

INOP SYS

AVNCS VENT
VENT BLOWER (a)
VENT EXTRACT(a)

(a) If AEVC not supplied.

R

AIR COND CTL 1(2) - A(B) FAULT

Crew awareness

R *Informs pilots of which air conditioning system controller (1 or 2) lane (A or B) is faulty.*

STATUS

INOP SYS

R COND CTL
1(2)-A(B)

AUTO FLT YAW DAMPER 1(2)

Crew awareness.

Note : The crew can try to reset the affected FAC by using the FAC pushbutton. On ground only, if the reset is unsuccessful, the taxi and takeoff can be continued with the failed yaw damper inoperative.

STATUS

CAT 3 SINGLE ONLY

INOP SYS
CAT 3 DUAL
YAW DAMPER1(2)

AUTO FLT YAW DAMPER SYS

Loss of yaw dampers 1 + 2.

– FAC 1 . . . . OFF THEN ON
– FAC 2 . . . . OFF THEN ON

● **If fault remains :**

F/CTL ALTN LAW
(PROT LOST)
F/CTL normal laws are lost. All protections, except maneuver protections, are lost.
MAX SPEED . . . . 320 KT

STATUS

MAX SPEED . . . . 320 KT
Speed is limited, due to the loss of high-speed protections.
APPR PROC
– FOR LDG . . . . USE FLAP 3
– GPWS LDG FLAP 3 . . . . ON
Will be displayed, when flaps in CONF 3.
APPR SPD . . . . VREF + 10 KT
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
At landing gear extension, control reverts to direct law in pitch, as well as in roll (refer to the DIRECT LAW procedure 3.02.27).
CAT 1 ONLY

INOP SYS
F/CTL PROT
YAW DAMPER
AP 1 + 2

AUTO FLT RUD TRIM 1(2) FAULT

Crew awareness.

STATUS

CAT 3 SINGLE ONLY

INOP SYS
CAT 3 DUAL
RUD TRIM 1(2)

AUTO FLT RUD TRIM SYS

– FAC 1 . . . . OFF THEN ON
– FAC 2 . . . . OFF THEN ON

STATUS

CAT 1 ONLY

INOP SYS
RUD TRIM
AP 1 + 2

AUTO FLT RUD TRV LIM 1(2)

Crew awareness.

STATUS

INOP SYS
RUD TRV LIM 1(2)

AUTO FLT YAW DAMPER 1(2)

Crew awareness.

STATUS

CAT 3 SINGLE ONLY

INOP SYS
CAT 3 DUAL
YAW DAMPER1(2)

AUTO FLT YAW DAMPER SYS

Loss of yaw dampers 1 + 2.

– FAC 1 .... OFF THEN ON
– FAC 2 .... OFF THEN ON

● **If fault remains :**

F/CTL ALTN LAW
(PROT LOST)
F/CTL normal laws are lost. All protections, except maneuver protections, are lost.
MAX SPEED .... 320 KT

STATUS

MAX SPEED .... 320 KT
Speed is limited, due to the loss of high-speed protections.
APPR PROC
– FOR LDG .... USE FLAP 3
– GPWS LDG FLAP 3 .... ON
Will be displayed, when flaps in CONF 3.
APPR SPD .... VREF + 10 KT
LDG DIST PROC .... APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
At landing gear extension, control reverts to direct law in pitch, as well as in roll (refer to the DIRECT LAW procedure 3.02.27).
CAT 1 ONLY

INOP SYS
F/CTL PROT
YAW DAMPER
AP 1 + 2

AUTO FLT RUD TRIM 1(2) FAULT

Crew awareness.

STATUS

CAT 3 SINGLE ONLY

INOP SYS
CAT 3 DUAL
RUD TRIM 1(2)

AUTO FLT RUD TRIM SYS

– FAC 1 . . . . OFF THEN ON
– FAC 2 . . . . OFF THEN ON

STATUS

CAT 1 ONLY

INOP SYS
RUD TRIM
AP 1 + 2

AUTO FLT RUD TRV LIM 1(2)

Crew awareness.

STATUS

INOP SYS
RUD TRV LIM 1(2)

AUTO FLT RUD TRV LIM SYS

RUD WITH CARE ABV 160 KT

Depending on when the failure occurs, the rudder travel limiter system may not be in the correct position for the flight speed. Therefore, to prevent damage to the aircraft structure, use the rudder with care, when the speed is greater than 160 knots.
At slats' extension, full rudder travel authority can be recovered.

– FAC 1 . . . . OFF THEN ON
– FAC 2 . . . . OFF THEN ON

● **AT LDG ROLL** :
– DIFF BRAKING . . . . AS RQRD

STATUS

RUD WITH CARE ABV 160 KT

● **AT LDG ROLL** :
– DIFF BRAKING : . . . . AS RQRD

CAT 3 SINGLE ONLY

Note : An autoland must not be performed with a crosswind greater than 12 knots.

INOP SYS
RUD TRV LIM
CAT 3 DUAL

AUTO FLT FAC 1 (2) FAULT

– FAC (affected) . . . . OFF THEN ON

● **IF UNSUCCESSFUL** :
– FAC (affected) . . . . OFF
All functions are performed by the remaining FAC.

STATUS

BOTH PFD ON SAME FAC
Characteristic speeds, displayed on the two PFDs, are computed by the same FAC.
CAT 3 SINGLE ONLY

INOP SYS
CAT 3 DUAL
FAC 1(2)

AUTO FLT FAC 1 + 2 FAULT

RUD WITH CARE ABV 160 KT

Depending on when the failure occurs, the rudder travel limiter system may not be in the
R *correct position for the flight speed. Therefore, to prevent damage to the aircraft structure,*
R *use the rudder with care, when the speed is above 160 knots.*

At slats' extension, full rudder travel authority is recovered.

– FAC 1 . . . . OFF THEN ON
– FAC 2 . . . . OFF THEN ON

● **IF UNSUCCESSFUL :**

– FAC 1 + 2 . . . . OFF

With FAC 1 + 2 inoperative, the rudder travel limit system, rudder trim control, yaw damper and PFD characteristic speeds are lost.

F/CTL ALTN LAW

(PROT LOST)

F/CTL normal laws are lost. All protections, except maneuver protections, are lost.

MAX SPEED . . . . 320 KT

Speed is limited, due to the loss of high-speed protections.

STATUS

MAX SPEED . . . . 320 KT
RUD WITH CARE ABV 160 KT
APPR PROC
– FOR LDG . . . . USE FLAP 3
– GPWS LDG FLAP 3 . . . . ON
Displayed, when flaps in CONF 3.
APPR SPD . . . . VREF + 10 KT
LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
At landing gear extension, control reverts to direct law in pitch, as well as in roll (refer to the DIRECT LAW procedure 3.02.27).
CAT 1 ONLY

INOP SYS

REAC W/S DET
F/CTL PROT
FAC 1 + 2
AP 1 + 2
A/THR

AUTO FLT FCU 1 + 2 FAULT

– PFD BARO REF : STD ONLY

If both FCU channels fail, the barometric reference on the PFD automatically changes to 1013 hPa. Use the standby altimeter, and set it to the actual barometric setting.

R *Do not insert the MDA (MDH) value on the MCDU PERF APPR page (because the PFD*
R *altitude is referenced to STD, and not to the correct barometric value).*
R *The PNF must then perform the standard callouts ("HUNDRED ABOVE" and "MINIMUM"),*
R *using the STBY altimeter.*

In addition :

- *All FCU controls are inoperative*
- *A/THR, AP 1 + 2, and FD 1 + 2 are not available*
  (Except in LAND or GO AROUND mode, where only A/THR is lost)
- *On the PFD :*
  - *The altitude alert is inoperative*
  - *The ILS deviation scales are displayed*
  - *The flight path vector is displayed*
  - *The Mach indication is inoperative*
  - *The FMA is lost, except in LAND or GA mode.*
- *On the ND :*
  - *The ROSE NAV mode with map (80 NM range) is displayed*
  - *VOR/ADF needles :*
    Needle 1 relates to VOR1 only
    Needle 2 relates to ADF2 only (ADF1, if ADF2 not installed)
    (VOR selection on DDRMI is not affected)
    (ADF selection on DDRMI, if available, is not affected)
  - *The weather radar image may be lost. Disregard the image, if it remains displayed. In all cases, the red "WXR RNG" message appears.*

STATUS

PFD BARO REF : STD ONLY

● **if not in LAND or GA**
CAT 1 ONLY

● **if in LAND or GA**
CAT 2 ONLY

INOP SYS

FCU 1 + 2
AP 1 + 2 (if not LAND or GA)
A/THR
CAT 3 (if in LAND or GA mode)
GPWS TERR

AUTO FLT FCU 1 (2) FAULT

– BARO REF . . . . X CHECK

One FCU channel is lost :
Therefore, crosscheck the barometric reference settings on the FCU and PFDs.

STATUS

INOP SYS
FCU 1 (2)

AUTO FLT AP OFF

This warning is displayed only for involuntary disconnection. For voluntary disconnection a red AP OFF message is displayed in the right lower part of ECAM upper DU.

Crew awareness

STATUS

CAT 1 ONLY
(if both AP lost)

INOP SYS
(affected) AP

AUTO FLT A/THR OFF

In case of involuntary disconnection, amber "A/THR OFF" and "ENG THRUST LOCKED" messages are displayed in the left lower part of ECAM upper DU.
For voluntary disconnection, an amber A/THR OFF message is displayed on the right lower part of ECAM upper DU.
If the A/THR is failed, the flight crew may recover it by engaging the other AP, and then trying to re-engage the A/THR.
Note : It the A/THR is recovered with AP 2, A/THR will be lost again at AP 2 disengagement.

– THR LEVERS . . . . MOVE

If the thrust levers are not moved within 5 seconds, the "ENG THRUST LOCKED" warning is displayed (refer to 3.02.70).

STATUS

CAT 2 ONLY

INOP SYS
A/THR
CAT 3

AUTO FLT A/THR LIMITED

This warning is displayed when A/THR is active and the thrust levers are below the CL detent (or the MCT detent when one engine is out). The caution is repeated every 5 seconds as long as the thrust levers are not moved.

– THR LEVERS . . . . MOVE

Thrust lever(s) must be set in the relevant detent.

R

AUTO FLT REAC W/S DET FAULT

Crew awareness.

STATUS

INOP SYS
REAC W/S DET

Note : On ground, this warning may appear spuriously. This warning is cancelled by resetting both FACs, one after the other.
- *FAC 1: Pull then push AUTO FLT/FAC 1/26VAC and 28VDC circuit breakers B03 and B04 on 49VU.*
- *FAC 2: Pull then push AUTO FLT/FAC 2/26VAC and 28VDC circuit breakers M18 and M19 on 121VU.*

LOW ENERGY WARNING

The "SPEED SPEED SPEED" synthetic voice sounds every 5 seconds, whenever the aircraft's energy goes below a threshold under which the thrust must be increased in order to recover a positive flight path angle.

– THR LEVERS . . . . MOVE FORWARD
Increase thrust until the warning disappears.

LOSS OF FMS DATA IN DESCENT/APPROACH (SEVERE RESET)

AP/FD lateral and vertical selected modes, and A/THR, are available immediately after the reset. If necessary, the pilot may perform the FCU selections for short-term navigation.
When the FMS has automatically recovered :
– The database cycle may have changed
– The FMGS does not autotune the ILS and ADF
– The FMS position bias is lost
– Lateral and vertical managed modes cannot re-engage
– The "CAB PR LDG ELEV FAULT" message is displayed on the ECAM
– A "MAP NOT AVAIL" message may be displayed on one ND.
With respect to the Auto Flight System, and depending on when the flight plan is lost, the following two procedures list the actions to be performed, in their order of priority :

■ INITIAL APPROACH OR CLOSE TO ILS INTERCEPTION

● **When the system has recovered** :
- Access the RAD NAV page, and manually tune the ILS (preferably using Ident). Enter the ILS course, if a frequency has been entered.
- Fly in selected speed.

Note : – LOC and G/S guidance modes are available.
– VLS speed is still available and displayed on the PFD.
– Missed approach trajectory is not available.

■ DESCENT or TERMINAL AREA

● **When the system has recovered** :
- Select the initial database
- Perform DIR TO a downpath waypoint. Select heading, if required.
- Perform a LAT REV at the downpath waypoint and redefine the DESTINATION in the NEW DEST field.
- Redefine the arrival and/or the approach procedure.
- Select the FUEL PRED page, and enter the GW.
- Activate the APPROACH phase.

Enter destination data on the PERF APPR page, as required.
Managed speed is available.

COM CIDS 1 + 2 FAULT

Crew awareness.

Passenger address, cabin and service interphone, and passenger signs are inoperative.

STATUS

INOP SYS

CIDS

◁ COM VHF 1(2)(3)/HF 1(2) EMITTING

1. If any Push To Talk (PTT) transmission selector (sidestick radio selector, hand mike selector, or PTT switch ◁) is jammed in the transmit position, try to release it in order to remove the caution.

R *2. If unsuccessful, deselect the identified failed VHF/HF transmission keys on the associated*
R *Audio Control Panel (ACP) to remove the caution. This ACP should only be used in*
R *reception mode. The associated PTT transmission selectors must not be used.*

Note : In this case, the ACP of the unaffected side may be used to recover the deselected
R *VHF/HF channel.*

3. If no transmission key on the ACP is found in the "transmit" position, pull the affected VHF/HF C/B associated to the ECAM message : COM\HF1 C/B HA 14 on 49 VU, COM NAV\HF2 C/B L13 on 121 VU, COM\VHF\1 C/B G09 on 49 VU, COM NAV\VHF\2 C/B L04 on 121 VU, COM\VHF\3 C/B L05 on 121 VU.

◁ COM ACARS FAULT

Crew awareness.

STATUS

INOP SYS

ACARS

◁ COM SATCOM FAULT

Crew awareness.

ACARS ◁ and telephone communications are inoperative.

STATUS

INOP SYS

SATCOM

COM SATCOM DATA FAULT ⊲

Crew awareness.

STATUS

INOP SYS

SATCOM DATA

COM VHF 3 DATA FAULT ⊲

Crew awareness.

STATUS

INOP SYS

VHF3 DATA

COM HF 1(2) DATA FAULT ⊲

Crew awareness.

Triggered to indicate the loss of the HFs' DATA mode.

STATUS

INOP SYS

HF 1(2) DATA

ELEC IDG 1(2) OIL LO PR/OVHT

– IDG (affected) . . . . OFF

If the associated engine is running, the Integrated Drive Generator (IDG) must be disconnected from the engine at, or above, idle to prevent damage to the disconnect mechanism.
Press the IDG pushbutton until the GEN FAULT light comes on. However, do not press it for more than 3 seconds, because this can cause damage to the disengaged solenoid.
The IDG FAULT light goes off, when the IDG is disconnected.

STATUS

Note : The APU must be started, and the APU GEN must be used.

CAT 3 SINGLE ONLY

INOP SYS
MAIN GALLEY
(only if APU GEN is not online)
GEN 1(2)
CAT 3 DUAL

ELEC GEN 1(2) FAULT

– GEN (affected) . . . . OFF THEN ON

● **IF UNSUCCESSFUL** :

  – GEN (affected) . . . . OFF

STATUS

Note : The APU must be started, and the APU GEN must be used.

CAT 3 SINGLE ONLY

INOP SYS
MAIN GALLEY
(only if APU GEN is not online)
GEN 1(2)
CAT 3 DUAL

ELEC GEN 1(2) OFF

Crew awareness

Turn the affected GEN ON, with the applicable pushbutton.

STATUS

R *Note : The APU must be started, and the APU GEN must be*
R *used.*

CAT 3 SINGLE ONLY

INOP SYS
MAIN GALLEY
(only if APU GEN is not online)
GEN 1(2)
CAT 3 DUAL

ELEC APU GEN FAULT

– APU GEN . . . . OFF THEN ON

● **IF UNSUCCESSFUL** :

  – APU GEN . . . . OFF

STATUS

INOP SYS
MAIN GALLEY (when only one gen operating)
APU GEN

ELEC BAT 1(2) FAULT

Crew awareness

Battery contactor is opened automatically by battery charge limiter.

STATUS

APU BAT START NOT AVAIL

INOP SYS
BAT 1(2)

ELEC BAT 1(2) OFF

Crew awareness

Battery is abnormally selected off.

STATUS

APU BAT START NOT AVAIL

ELEC BCL 1(2) FAULT

Crew awareness

STATUS

APU BAT START NOT AVAIL

INOP SYS
BCL 1(2)

ELEC IDG 1(2) OIL LO PR/OVHT

– IDG (affected) . . . . OFF

If the associated engine is running, the Integrated Drive Generator (IDG) must be disconnected from the engine at, or above, idle to prevent damage to the disconnect mechanism.
Press the IDG pushbutton until the GEN FAULT light comes on. However, do not press it for more than 3 seconds, because this can cause damage to the disengaged solenoid.
The IDG FAULT light goes off, when the IDG is disconnected.

STATUS

Note : The APU must be started, and the APU GEN must be used.

CAT 3 SINGLE ONLY

INOP SYS
MAIN GALLEY
(only if APU GEN is not online)
GEN 1(2)
CAT 3 DUAL

ELEC GEN 1(2) FAULT

– GEN (affected) . . . . OFF THEN ON

● **IF UNSUCCESSFUL :**

– GEN (affected) . . . . OFF

STATUS

Note : The APU must be started, and the APU GEN must be used.

CAT 3 SINGLE ONLY

INOP SYS
MAIN GALLEY
(only if APU GEN is not online :
In this case, all the galleys are shed)
GEN 1(2)
CAT 3 DUAL

ELEC GEN 1(2) OFF

Crew awareness

Turn the affected GEN ON, with the applicable pushbutton.

STATUS

R *Note : The APU must be started, and the APU GEN must be*
R *used.*

CAT 3 SINGLE ONLY

INOP SYS
MAIN GALLEY
(only if APU GEN is not online)
GEN 1(2)
CAT 3 DUAL

ELEC APU GEN FAULT

– APU GEN . . . . OFF THEN ON

● **IF UNSUCCESSFUL :**

– APU GEN . . . . OFF

STATUS

INOP SYS

MAIN GALLEY (when only one gen operating all the galleys are shed)

APU GEN

ELEC BAT 1(2) FAULT

Crew awareness

Battery contactor is opened automatically by battery charge limiter.

STATUS

APU BAT START NOT AVAIL

INOP SYS

BAT 1(2)

ELEC BAT 1(2) OFF

Crew awareness

Battery is abnormally selected off.

STATUS

APU BAT START NOT AVAIL

ELEC BCL 1(2) FAULT

Crew awareness

STATUS

APU BAT START NOT AVAIL

INOP SYS

BCL 1(2)

ELEC AC BUS 1 FAULT

R *AC BUS 1 normally supplies the AC ESS BUS and, through TR1, the DC ESS BUS. In case*
R *of an AC BUS 1 FAULT both the AC and DC ESS BUS will be lost and therefore the AC ESS*
R *BUS FAULT and the DC ESS BUS FAULT will be displayed on the ECAM. However, both AC*
R *and DC ESS BUS can be recovered by switching the AC ESS FEED pushbutton to ALTN as*
R *displayed in the AC ESS BUS FAULT ECAM procedure.*

– BLOWER . . . . OVRD

The avionics ventilation system is in the closed circuit configuration.
Air conditioning is added to the ventilation air.

WHEEL N.W. STEER FAULT

VENT EXTRACT FAULT

– EXTRACT . . . . OVRD

Affected systems
* AVNCS VENT
* HYD
* FUEL
* F/CTL

ELEC AC BUS 1 FAULT (CONT'D)

STATUS

– LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

CAB ZONE AT FIXED TEMP

Due to the loss of the galley fan, the Pack 1 controller, and the primary zone controller channel. (See associated procedures).

SLATS SLOW

CAT 2 ONLY

INOP SYS

See below

INOP SYS displayed on ECAM

BLUE HYD	L+R TK PUMP 1	MAIN GALLEY
SPLR 3	CTR TK PUMP 1	B ELEC PUMP
ADR 3	VENT BLOWER	BRAKES SYS 1
RA 1	GALLEY FAN	DMC 3
CAPT TAT	CRG VENT ◁	GPWS
L WSHLD HEAT	GND COOL ◁	LAV DET
L WNDW HEAT	N.W. STEER	PACK 1 REGUL
CAT 3	REVERSER 1	

Other inoperative systems

Left cabin fan	Engine 1 ignition B	Zone controller prim channel
Radar 1	EVMU eng 1 and eng 2	Hydraulic quantity indication
Stby Pitot/AOA		Partial galley
ACARS ◁	Printer	PVI
Brake fans 5, 6, 7 and 8 ◁	MCDU 3 ◁	TCAS
HUD ◁		

Note : *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

ELEC AC BUS 1 FAULT

R *AC BUS 1 normally supplies the AC ESS BUS and, through TR1, the DC ESS BUS. In case*
R *of an AC BUS 1 FAULT both the AC and DC ESS BUS will be lost and therefore the AC ESS*
R *BUS FAULT and the DC ESS BUS FAULT will be displayed on the ECAM. However, both AC*
R *and DC ESS BUS can be recovered by switching the AC ESS FEED pushbutton to ALTN as*
R *displayed in the AC ESS BUS FAULT ECAM procedure.*

– BLOWER . . . . OVRD

The avionics ventilation system is in the closed circuit configuration.
Air conditioning is added to the ventilation air.

WHEEL N.W. STEER FAULT

VENT EXTRACT FAULT

– EXTRACT . . . . OVRD

Affected systems
* AVNCS VENT
* HYD
* FUEL
* F/CTL

ELEC AC BUS 1 FAULT (CONT'D)

STATUS

– LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

SLATS SLOW

CAT 2 ONLY

INOP SYS

See below

INOP SYS displayed on ECAM

BLUE HYD	L+R TK PUMP 1	MAIN GALLEY
SPLR 3	CTR TK PUMP 1	B ELEC PUMP
ADR 3	VENT BLOWER	BRAKES SYS 1
RA 1	GALLEY FAN	DMC 3
CAPT TAT	CRG VENT ◁	GPWS
L WSHLD HEAT	GND COOL ◁	LAV DET
L WNDW HEAT	N.W. STEER	CAT 3
REVERSER 1		

Other inoperative systems

Left cabin fan	Engine 1 ignition B	COND controller lane A
Radar 1	EVMU eng 1 and eng 2	Hydraulic quantity indication
Stby Pitot/AOA		Partial galley
ATSU	Printer	PVI
Brake fans 5, 6, 7 and 8 ◁		TCAS
HUD ◁		
MCDU 3 ◁		

Note : The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC AC BUS 2 FAULT

– EXTRACT . . . . OVRD

The avionics ventilation system is in the closed circuit configuration.
Air conditioning is added to the ventilation air.

L/G LGCIU 2 FAULT

Affected systems
* AVNCS VENT
* FUEL

STATUS

PACK 2 AT FIXED TEMP

Due to the loss of Pack 2 controller, the pack outlet temperature is controlled by the pack anti-ice valve and is stabilized to a temperature between 5°C (41°F) and 30°C (86°F) within a maximum of 6 minutes.

CAT 1 ONLY

INOP SYS

See below

INOP SYS displayed on ECAM

ADR 2	CTR TK PUMP 2	RUD TRV LIM 2
ILS 2	LGCIU 2	BRAKES SYS 2
GPS 2	RA 2	REVERSER 2
Y ELEC PUMP	F/O PITOT	VENT EXTRACT
SDAC 2	F/O AOA	GND COOL ◁
FWC 2	F/O TAT	PACK 2 REGUL
DMC 2	R WNDW HEAT	MAIN GALLEY
FDIU	CAT 2	YAW DAMPER 2
R WSHLD HEAT	L+R TK PUMP 2	RUD TRIM 2

OTHER INOP SYS

Right cabin fan	MCDU 2	QAR
Brake fans 1, 2, 3 and 4 ◁	ENG 2 ignition B	ATC 2
ADF 2 ◁	VOR 2	ECAM lower DU
DME 2	F/O PFD and ND	HF 2 ◁
RADAR 2 ◁		

Note : *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

<u>ELEC</u> AC ESS BUS FAULT

– AC ESS FEED . . . . ALTN

AC BUS 2 supplies AC ESS BUS.

– ATC . . . . SYS 2

<u>AUTO FLT</u> YAW DAMPER 1

<u>AUTO FLT</u> RUD TRIM 1 FAULT

<u>AUTO FLT</u> RUD TRV LIM 1

STATUS

CAT 1 ONLY	<u>INOP SYS</u> See below

<u>INOP SYS displayed on ECAM</u>

	ADR 1	CAT 2	GPWS
	ILS 1	SDAC 1	YAW DAMPER 1
	GPS 1	CAPT PITOT	FWC 1
	RUD TRIM 1	CAPT AOA	DMC 1
R	RUD TRV LIM 1		ENG 1 + 2 IGN A

<u>Other inoperative systems</u>

	RMP's lighting (RMP's still operative)	ECAM upper display	DDRMI
R	VOR 1	CAPT PFD	
	MCDU 1	ATC 1	APU fuel pump
	CAPT ND	DME 1	Passenger oxygen masks (auto + manual)
	CVR	HF 1	ADF 1 ◁

R *<u>Note</u> : The warning may be caused by a sub BUS failure. As a result, only a part of the above-listed systems may be lost.*

ELEC AC BUS 2 FAULT

– EXTRACT . . . . OVRD

The avionics ventilation system is in the closed circuit configuration.
Air conditioning is added to the ventilation air.

L/G LGCIU 2 FAULT

Affected systems
* AVNCS VENT
* FUEL

STATUS

CAT 1 ONLY

INOP SYS
See below

INOP SYS displayed on ECAM

ADR 2	CTR TK PUMP 2	RUD TRV LIM 2
ILS 2	LGCIU 2	BRAKES SYS 2
GPS 2	RA 2	REVERSER 2
Y ELEC PUMP	F/O PITOT	VENT EXTRACT
SDAC 2	F/O AOA	GND COOL ◁
FWC 2	F/O TAT	DMC 2
R WNDW HEAT	MAIN GALLEY	RECORDER SYS
CAT 2	YAW DAMPER 2	R WSHLD HEAT
L+R TK PUMP 2	RUD TRIM 2	

OTHER INOP SYS

Right cabin fan	MCDU 2	QAR
Brake fans 1, 2, 3 and 4 ◁	ENG 2 ignition B	ATC 2
ADF 2 ◁	VOR 2	ECAM lower DU
DME 2	F/O PFD and ND	HF 2 ◁
RADAR 2 ◁		

Note : The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC AC ESS BUS FAULT

– AC ESS FEED . . . . ALTN

AC BUS 2 supplies AC ESS BUS.

– ATC . . . . SYS 2

AUTO FLT YAW DAMPER 1

AUTO FLT RUD TRIM 1 FAULT

AUTO FLT RUD TRV LIM 1

STATUS

CAT 1 ONLY	INOP SYS See below

INOP SYS displayed on ECAM

ADR 1	CAT 2	GPWS
ILS 1	SDAC 1	YAW DAMPER 1
GPS 1	CAPT PITOT	FWC 1
RUD TRIM 1	CAPT AOA	DMC 1
R RUD TRV LIM 1		ENG 1 + 2 IGN A

Other inoperative systems

RMP's lighting (RMP's still operative)	ECAM upper display	DDRMI
R VOR 1	CAPT PFD	
MCDU 1	ATC 1	APU fuel pump
CAPT ND	DME 1	Passenger oxygen masks (auto + manual)
CVR	HF 1	ADF 1 ◁

R *Note : The warning may be caused by a sub BUS failure. As a result, only a part of the above-listed systems may be lost.*

ELEC AC ESS BUS SHED

ATC . . . . SYS 2

STATUS

INOP SYS
CAPT AOA
See below

Other inoperative systems

MCDU 1	ATC 1	APU fuel pump
CAPT ND	DME 1	Passenger oxygen masks (auto + manual)
CAPT AOA heat	CVR	HF 1
R ADF 1 ⊲		

Note : The warning may be caused by a failure in a sub BUS. Consequently only a part of the systems listed above may be lost.

ELEC DC BUS 1 FAULT

– BLOWER . . . . OVRD
– EXTRACT . . . . OVRD

Avionic ventilation air is supplied from the air conditioning system, and exhausted overboard.

Affected systems
* AVNCS VENT
* FUEL

STATUS

CAB ZONE AT FIXED TEMP *Due to the loss of the galley fan, the Pack 1 controller, and the primary zone controller channel. (See associated procedures).*	INOP SYS See below

INOP SYS displayed on ECAM

ACP 3	CTR TK PUMP 1	BRAKES SYS 1
CAPT STAT heat	AVNCS VENT	LAV DET
STBY STAT heat	GALLEY FAN	PACK 1 REGUL
L. WSHLD HEAT	GND COOL ◁	L. WNDW HEAT
REVERSER 1		

Other inoperative systems

Left cab fan	VHF 3 ◁	Eng 1 oil press and qty ind.
Zone controller primary channel	RMP 3 ◁	TPIS ◁
Sel cal	Hot air	Brake temps ind.
CFDIU	Capt wiper	

Note : *The warning may be caused by a sub BUS failure. As result, only a part of the above-listed systems may be lost.*

ELEC AC ESS BUS SHED

ATC . . . . SYS 2

STATUS

INOP SYS
CAPT AOA
See below

Other inoperative systems

MCDU 1	ATC 1	APU fuel pump
CAPT ND	DME 1	Passenger oxygen masks (auto + manual)
CAPT AOA heat	CVR	HF 1
R ADF 1 ◁		

Note : The warning may be caused by a failure in a sub BUS. Consequently only a part of the systems listed above may be lost.

ELEC DC BUS 1 FAULT

– BLOWER . . . . OVRD
– EXTRACT . . . . OVRD

Avionic ventilation air is supplied to the air conditioning, and exhausted overboard.

Affected systems
* AVNCS VENT
* FUEL

STATUS

CAB ZONE AT FIXED TEMP

Due to the loss of the galley fan, the Pack 1 controller, and the primary zone controller channel. (See associated procedures).

INOP SYS
See below

INOP SYS displayed on ECAM

ACP 3		BRAKES SYS 1
CAPT STAT heat	AVNCS VENT	LAV DET
STBY STAT heat	GALLEY FAN	PACK 1 REGUL
L. WSHLD HEAT	GND COOL ◁	L. WNDW HEAT
REVERSER 1		

Other inoperative systems

Left cab fan	VHF 3 ◁	Eng 1 oil press and qty ind.
Zone controller primary channel	RMP 3 ◁	TPIS ◁
	L CTR TK XFR valve	
Sel cal	Hot air	Brake temps ind.
CFDIU	Capt wiper	

Note : The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC AC ESS BUS SHED

ATC . . . . SYS 2

STATUS

INOP SYS
CAPT AOA
See below

Other inoperative systems

MCDU 1	ATC 1	APU fuel pump
CAPT ND	DME 1	Passenger oxygen masks (auto + manual)
CAPT AOA heat	CVR	HF 1
R ADF 1 ◁		

Note : The warning may be caused by a failure in a sub BUS. Consequently only a part of the systems listed above may be lost.

ELEC DC BUS 1 FAULT

– BLOWER . . . . OVRD
– EXTRACT . . . . OVRD

Avionic ventilation air is supplied to the air conditioning, and exhausted overboard.

Affected systems
* AVNCS VENT
* FUEL

STATUS

INOP SYS
See below

INOP SYS displayed on ECAM

ACP 3 CAPT STAT heat STBY STAT heat L. WSHLD HEAT L. WNDW HEAT	CTR TK PUMP 1 AVNCS VENT GALLEY FAN GND COOL ◁ REVERSER 1	BRAKES SYS 1 LAV DET

Other inoperative systems

Left cab fan COND controller lane A	VHF 3 ◁ RMP 3 ◁	Eng 1 oil press and qty ind. TPIS ◁
Sel cal CFDIU	Hot air Capt wiper	Brake temps ind.

Note : The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC AC ESS BUS SHED

ATC . . . . SYS 2

STATUS

INOP SYS
CAPT AOA
See below

Other inoperative systems

MCDU 1	ATC 1	APU fuel pump
CAPT ND	DME 1	Passenger oxygen masks (auto + manual)
CAPT AOA heat	CVR	HF 1
R ADF 1 ◁		

Note : The warning may be caused by a failure in a sub BUS. Consequently only a part of the systems listed above may be lost.

ELEC DC BUS 1 FAULT

– BLOWER .... OVRD
– EXTRACT .... OVRD

Avionic ventilation air is supplied from the air conditioning system and exhausted overboard.

Affected systems
* AVNCS VENT
* FUEL

STATUS

INOP SYS
See below

INOP SYS displayed on ECAM

ACP 3		BRAKES SYS 1
CAPT STAT heat	AVNCS VENT	LAV DET
STBY STAT heat	GALLEY FAN	
L. WSHLD HEAT	GND COOL ◁	L. WNDW HEAT
REVERSER 1		

Other inoperative systems

Left cab fan	VHF 3 ◁	Eng 1 oil press and qty ind.
COND controller lane A channel	RMP 3 ◁	TPIS ◁
	L CTR TK XFR valve	
Sel cal	Hot air	Brake temps ind.
CFDIU	Capt wiper	

Note: The warning may be caused by a sub BUS failure. As a result only a part of the above-listed systems may be lost.

ELEC DC BUS 2 FAULT

- AIR DATA SWTG .... F/O
- BARO REF .... CHECK

  Since one FCU channel is lost, crosscheck the barometer reference settings on the FCU and PFD.

Affected systems
* CAB PRESS
* FUEL
* WHEEL
* F/CTL

STATUS

LDG DIST PROC .... APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
PACK 2 AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS
See below

INOP SYS displayed on ECAM

SPLR 1+2+5	CAT 3 DUAL	MAIN GALLEY
ELAC 2 (a)	FAC 2	Y ELEC PUMP (if selected ON)
SEC 2 + 3	L TK PUMP 2	BRAKES SYS 2
VHF 2	R TK PUMP 2	F/O STAT
CTR TK PUMP 2	ENG 1 LOOP B	R WSLHD HEAT
LGCIU 2	ENG 2 LOOP A	R WNDW HEAT
REVERSER 2	PACK 2 REGUL	AP 2
CAB PR 2	FCDC 2	FCU 2

Other inoperative systems

SFCC 2	BMC 2	Brake fan ◁
R cabin fan	Bleed X feed auto control	Eng 2 oil low press and qty ind
F/O wiper	RMP 2	R loudspeaker
F/O rain rplnt	FQI channel 2	rudder trim ind
Eng 1 and 2 fire ext btl 2	zone controller sec	FMGC 2
Autobrake (due to loss of 2 SECs)	SDCU 2	CDLS ◁

(a) Lost after 30 seconds, but recovered at landing gear extension.

Note : The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC DC ESS BUS FAULT

– VHF 2 or 3 . . . . USE
– AUDIO SWTG . . . . SELECT
ACP 1 and 2 are lost. Therefore, set the AUDIO SWTG selector to CAPT 3 or F/O 3 to recover communications.
– BARO REF . . . . CHECK
Crosscheck the barometer reference settings on the FCU and the PFD.
– GPWS . . . . OFF

NAV GPWS FAULT

– GPWS . . . . OFF

FUEL L TANK PUMP 1 LO PR

R
FUEL R TANK PUMP 1 LO PR

Note : To shut down the engines on ground, use the ENG FIRE pushbutton.

Affected systems
* CAB PRESS
* HYD
* F/CTL

ELEC DC BUS 2 FAULT

– AIR DATA SWTG . . . . F/O
– BARO REF . . . . CHECK
Since one FCU channel is lost, crosscheck the barometer reference settings on the FCU and PFD.

Affected systems
* CAB PRESS
* FUEL
* WHEEL
* F/CTL

STATUS

LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
PACK 2 AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS
See below

INOP SYS displayed on ECAM

SPLR 1+2+5	CAT 3 DUAL	MAIN GALLEY
ELAC 2 (a)	FAC 2	Y ELEC PUMP (if selected ON)
SEC 2 + 3	L TK PUMP 2	BRAKES SYS 2
VHF 2	R TK PUMP 2	F/O STAT
	ENG 1 LOOP B	R WSLHD HEAT
LGCIU 2	ENG 2 LOOP A	R WNDW HEAT
REVERSER 2	PACK 2 REGUL	AP 2
CAB PR 2	FCDC 2	FCU 2

Other inoperative systems

SFCC 2	BMC 2	Brake fan ◁
R cabin fan	Bleed X feed auto control	Eng 2 oil low press and qty ind
F/O wiper	RMP 2	R loudspeaker
F/O rain rplnt	FQI channel 2	rudder trim ind
Eng 1 and 2 fire ext btl 2	zone controller sec channel	FMGC 2
		CDLS ◁
Autobrake (due to loss of 2 SECs)	CTR tk XFR valve R	SDCU 2

(a) Lost after 30 seconds, but recovered at landing gear extension.
Note : The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC DC ESS BUS FAULT

– VHF 2 or 3 . . . . USE
– AUDIO SWTG . . . . SELECT
ACP 1 and 2 are lost. Therefore, set the AUDIO SWTG selector to CAPT 3 or F/O 3 to recover communications.
– BARO REF . . . . CHECK
Crosscheck the barometer reference settings on the FCU and the PFD.
– GPWS . . . . OFF

NAV GPWS FAULT

– GPWS . . . . OFF

FUEL L TANK PUMP 1 LO PR

R
FUEL R TANK PUMP 1 LO PR

Note : To shut down the engines on ground, use the ENG FIRE pushbutton.

Affected systems
* CAB PRESS
* HYD
* F/CTL

ELEC DC BUS 2 FAULT

– AIR DATA SWTG . . . . F/O
– BARO REF . . . . CHECK

Since one FCU channel is lost, crosscheck the barometer reference settings on the FCU and PFD.

Affected systems
* CAB PRESS
* FUEL
* WHEEL
* F/CTL

STATUS

LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS
See below

INOP SYS displayed on ECAM

SPLR 1+2+5	CAT 3 DUAL	MAIN GALLEY
ELAC 2 (a)	FAC 2	Y ELEC PUMP (if selected ON)
SEC 2 + 3	L TK PUMP 2	BRAKES SYS 2
VHF 2	R TK PUMP 2	F/O STAT
CTR TK PUMP 2	ENG 1 LOOP B	R WSLHD HEAT
LGCIU 2	ENG 2 LOOP A	R WNDW HEAT
REVERSER 2	AP 2	CAB PR 2
FCDC 2	FCU 2	

Other inoperative systems

SFCC 2	BMC 2	Brake fan ◁
R cabin fan	Bleed X feed auto control	Eng 2 oil low press and qty ind
F/O wiper	RMP 2	R loudspeaker
F/O rain rplnt	FQI channel 2	rudder trim ind
Eng 1 and 2 fire ext btl 2	Autobrake (due to loss of 2 SECs)	CIDS 2 SMOKE DETECT
FMGC 2		
CDLS		

(a) Lost after 30 seconds, but recovered at landing gear extension.

Note : The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC DC ESS BUS FAULT

- VHF 2 or 3 . . . . USE
- AUDIO SWTG . . . . SELECT

  ACP 1 and 2 are lost. Therefore, set the AUDIO SWTG selector to CAPT 3 or F/O 3 to recover communications.
- BARO REF . . . . CHECK

  Crosscheck the barometer reference settings on the FCU and the PFD.
- GPWS . . . . OFF

NAV GPWS FAULT

- GPWS . . . . OFF

FUEL L TANK PUMP 1 LO PR

R ## FUEL R TANK PUMP 1 LO PR

Note : To shut down the engines on ground, use the ENG FIRE pushbutton.

Affected systems
* CAB PRESS
* HYD
* F/CTL

ELEC DC BUS 2 FAULT

– AIR DATA SWTG . . . . F/O
– BARO REF . . . . CHECK

Since one FCU channel is lost, crosscheck the barometer reference settings on the FCU and PFD.

Affected systems
* CAB PRESS
* FUEL
* WHEEL
* F/CTL

STATUS

LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS
See below

INOP SYS displayed on ECAM

SPLR 1+2+5	CAT 3 DUAL	MAIN GALLEY
ELAC 2 (a)	FAC 2	Y ELEC PUMP (if selected ON)
SEC 2 + 3	L TK PUMP 2	BRAKES SYS 2
VHF 2	R TK PUMP 2	F/O STAT
	ENG 1 LOOP B	R WSLHD HEAT
LGCIU 2	ENG 2 LOOP A	R WNDW HEAT
REVERSER 2	AP 2	CAB PR 2
FCDC 2	FCU 2	

Other inoperative systems

SFCC 2	BMC 2	Brake fan ◁
R cabin fan	Bleed X feed auto control	Eng 2 oil low press and qty ind
F/O wiper	RMP 2	R loudspeaker
F/O rain rplnt	FQI channel 2	rudder trim ind
Eng 1 and 2 fire ext btl 2	Autobrake (due to loss of 2 SECs)	CIDS 2 SMOKE DETECT
FMGC 2	CTR TK XFR valve R	
CDLS		

(a) Lost after 30 seconds, but recovered at landing gear extension.

Note : The warning may be caused by a sub BUS failure. As a result, only a part of the above-listed systems may be lost.

ELEC DC ESS BUS FAULT

– VHF 2 or 3 .... USE
– AUDIO SWTG .... SELECT
ACP 1 and 2 are lost. Therefore, set the AUDIO SWTG selector to CAPT 3 or F/O 3 to recover communications.
– BARO REF .... CHECK
Crosscheck the barometer reference settings on the FCU and the PFD.
– GPWS .... OFF

NAV GPWS FAULT

– GPWS .... OFF

FUEL L TANK PUMP 1 LO PR

R
FUEL R TANK PUMP 1 LO PR

Note : To shut down the engines on ground, use the ENG FIRE pushbutton.

Affected systems
* CAB PRESS
* HYD
* F/CTL

ELEC DC BUS 2 FAULT

– AIR DATA SWTG F/O3

– BARO REF . . . . CHECK

Since one FCU channel is lost, crosscheck the barometer reference settings on the FCU and PFD.

Affected systems

* CAB PRESS
* FUEL
* WHEEL
* F/CTL

STATUS

LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

See below

INOP SYS displayed on ECAM

SPLR 1+2+5	CAT 3 DUAL	MAIN GALLEY
ELAC 2 (a)	FAC 2	Y ELEC PUMP (if selected ON)
SEC 2 + 3	L TK PUMP 2	BRAKES SYS 2
VHF 2	R TK PUMP 2	F/O STAT
CTR TK PUMP 2	ENG 1 LOOP B	R WSLHD HEAT
LGCIU 2	ENG 2 LOOP A	R WNDW HEAT
REVERSER 2	AP 2	CAB PR 2
FCDC 2	FCU 2	

Other inoperative systems

SFCC 2	BMC 2	Brake fan ◁
R cabin fan	Bleed X feed auto control	Eng 2 oil low press and qty ind
F/O wiper	RMP 2	R loudspeaker
F/O rain rplnt	FQI channel 2	rudder trim ind
Eng 1 and 2 fire ext btl 2	Autobrake (due to loss of 2 SECs)	CIDS 2 SMOKE DETECT
FMGC 2		
CDLS		

(a) Lost after 30 seconds, but recovered at landing gear extension.

Note : The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC DC ESS BUS FAULT

– VHF 2 or 3 . . . . USE
– AUDIO SWTG . . . . SELECT
ACP 1 and 2 are lost. Therefore, set the AUDIO SWTG selector to CAPT 3 or F/O 3 to recover communications.
– BARO REF . . . . CHECK
Crosscheck the barometer reference settings on the FCU and the PFD.
– GPWS . . . . OFF

NAV GPWS FAULT

– GPWS . . . . OFF

FUEL L TANK PUMP 1 LO PR

R ## FUEL R TANK PUMP 1 LO PR

Note : To shut down the engines on ground, use the ENG FIRE pushbutton.

Affected systems
* CAB PRESS
* HYD
* F/CTL

ELEC DC BUS 2 FAULT

– AIR DATA SWTG F/O3
– BARO REF .... CHECK

Since one FCU channel is lost, crosscheck the barometer reference settings on the FCU and PFD.

Affected systems
* CAB PRESS
* FUEL
* WHEEL
* F/CTL

STATUS

LDG DIST PROC .... APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS
See below

INOP SYS displayed on ECAM

SPLR 1+2+5	CAT 3 DUAL	MAIN GALLEY
ELAC 2 (a)	FAC 2	Y ELEC PUMP (if selected ON)
SEC 2 + 3	L TK PUMP 2	BRAKES SYS 2
VHF 2	R TK PUMP 2	F/O STAT
	ENG 1 LOOP B	R WSLHD HEAT
LGCIU 2	ENG 2 LOOP A	R WNDW HEAT
REVERSER 2	AP 2	CAB PR 2
FCDC 2	FCU 2	

Other inoperative systems

SFCC 2	BMC 2	Brake fan ◁
R cabin fan	Bleed X feed auto control	Eng 2 oil low press and qty ind
F/O wiper	RMP 2	R loudspeaker
F/O rain rplnt	FQI channel 2	rudder trim ind
Eng 1 and 2 fire ext btl 2	Autobrake (due to loss of 2 SECs)	CIDS 2 SMOKE DETECT
FMGC 2	CTR TK XFR Valve R	
CDLS		

(a) Lost after 30 seconds, but recovered at landing gear extension.

Note : *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

ELEC DC ESS BUS FAULT

– VHF 2 or 3 . . . . USE
– AUDIO SWTG . . . . SELECT
ACP 1 and 2 are lost. Therefore, set the AUDIO SWTG selector to CAPT 3 or F/O 3 to recover communications.
– BARO REF . . . . CHECK
Crosscheck the barometer reference settings on the FCU and the PFD.
– GPWS . . . . OFF

NAV GPWS FAULT

– GPWS . . . . OFF

FUEL L TANK PUMP 1 LO PR

R
FUEL R TANK PUMP 1 LO PR

Note : To shut down the engines on ground, use the ENG FIRE pushbutton.

Affected systems
* CAB PRESS
* HYD
* F/CTL

ELEC DC ESS BUS FAULT (CONT'D)

STATUS

LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
SLATS/FLAPS SLOW
CAT 2 ONLY (1)

INOP SYS
See below

INOP SYS displayed on ECAM

	B HYD	A/THR	VENT EXTRACT
R	SPLR 3	FCU 1	B ELEC PUMP
R	VHF 1	FAC 1	GPWS
	ACP 1+2	REV 2	ENG 1 LOOP A
	WING A. ICE	ENG 2 START	ENG 2 LOOP B
	AP 1	CAB PR 1	FCDC 1
			CAT 3

Other inoperative systems

BRK PRESS indicator		Hyd fire valves Eng 1 and 2
Flight interphone	Standby Horizon	Ram air inlet
EIU 2 (autothrust, eng start and reverser inop)	Standby compass light	ECAM Control Panel
Capt rain repellent ◁		
Avionics air cond valve	HP fuel shutoff valves	
	SFCC 1	Left loudspeaker
	RMP 1	DC SHED ESS BUS

Note : 1. *Before arming the approach mode, the ECAM STATUS displays "CAT 3 SINGLE". When the approach mode is armed, the ECAM displays "CAT 2 ONLY", and the FMA displays CAT 2. However, when the attitude indicator (Standby Horizon) is inoperative, the real landing category is CAT I (Refer to the QRH 5.04, that indicates the "Required Equipment for CAT II and CAT III Landings".*
2. *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

ELEC DC ESS BUS SHED

– EXTRACT . . . . OVRD

Cooling air is supplied by the air conditioning system, without overboard extraction.

AVOID ICING CONDITIONS

Affected systems

* AVNCS VENT

STATUS

AVOID ICING CONDITIONS
BOTH PFD ON SAME FAC
CAT 3 SINGLE ONLY

INOP SYS

WING A. ICE
AP 1
CAT 3 DUAL
FAC 1
R VENT EXTRACT
AFT CRG HEAT◁
FWD CRG HEAT◁
AFT CRG VENT◁
FWD CRG VENT◁
FCDC 1
See below

OTHER INOP SYS

Cabin oxygen mask (auto drop out)	STBY ALTI vib	BMC 1
X BLEED valve man ctl	Crew oxygen valve	SDCU 1
FQ1 channel 1	FMGC 1	

Note : The warning may be caused by a failure in a sub BUS. Consequently only a part of the systems listed above may be lost.

ELEC DC ESS BUS FAULT (CONT'D)

STATUS

LDG DIST PROC .... APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
SLATS/FLAPS SLOW
CAT 2 ONLY (1)

INOP SYS
See below

INOP SYS displayed on ECAM

	B HYD	A/THR	VENT EXTRACT
R	SPLR 3	FCU 1	B ELEC PUMP
R	VHF 1	FAC 1	GPWS
	ACP 1+2	REV 2	ENG 1 LOOP A
	WING A. ICE	ENG 2 START	ENG 2 LOOP B
	AP 1	CAB PR 1	FCDC 1
			CAT 3

Other inoperative systems

BRK PRESS indicator		Hyd fire valves Eng 1 and 2
Flight interphone	Standby Horizon	Ram air inlet
EIU 2 (autothrust, eng start and reverser inop)	Standby compass light	ECAM Control Panel
Capt rain repellent ◁		
Avionics air cond valve	HP fuel shutoff valves	
	SFCC 1	Left loudspeaker
	RMP 1	DC SHED ESS BUS

Note : 1. *Before arming the approach mode, the ECAM STATUS displays "CAT 3 SINGLE". When the approach mode is armed, the ECAM displays "CAT 2 ONLY", and the FMA displays CAT 2. However, when the attitude indicator (Standby Horizon) is inoperative, the real landing category is CAT I (Refer to the QRH 5.04, that indicates the "Required Equipment for CAT II and CAT III Landings".*
2. *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

ELEC DC ESS BUS SHED

– EXTRACT . . . . OVRD

Cooling air is supplied by the air conditioning system, without overboard extraction.

AVOID ICING CONDITIONS

Affected systems

* AVNCS VENT

STATUS

AVOID ICING CONDITIONS
BOTH PFD ON SAME FAC
CAT 3 SINGLE ONLY

INOP SYS

WING A. ICE
AP 1
CAT 3 DUAL
FAC 1
R VENT EXTRACT
AFT CRG HEAT◁
FWD CRG HEAT◁
AFT CRG VENT◁
FWD CRG VENT◁
FCDC 1
See below

OTHER INOP SYS

Cabin oxygen mask (auto drop out)	STBY ALTI vib	BMC 1
X BLEED valve man ctl	Crew oxygen valve	CIDS 1 SMOKE DETECT
FQ1 channel 1	FMGC 1	

Note : The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC DC ESS BUS FAULT (CONT'D)

STATUS

LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
SLATS/FLAPS SLOW
CAT 2 ONLY (1)

INOP SYS
See below

INOP SYS displayed on ECAM

B HYD	A/THR	VENT EXTRACT
R SPLR 3	FCU 1	B ELEC PUMP
R VHF 1	FAC 1	GPWS
ACP 1+2	REV 2	ENG 1 LOOP A
WING A. ICE	ENG 2 START	ENG 2 LOOP B
AP 1	CAB PR 1	FCDC 1
		CAT 3

Other inoperative systems

BRK PRESS indicator		Hyd fire valves Eng 1 and 2
Flight interphone	Standby Horizon	Ram air inlet
EIU 2 (autothrust, eng start and reverser inop)	Standby compass light	ECAM Control Panel
Capt rain repellent ◁		
Avionics air cond valve	HP fuel shutoff valves	
	SFCC 1	Left loudspeaker
	RMP 1	DC SHED ESS BUS

Note : 1. *Before arming the approach mode, the ECAM STATUS displays "CAT 3 SINGLE". When the approach mode is armed, the ECAM displays "CAT 2 ONLY", and the FMA displays CAT 2. However, when the attitude indicator (Standby Horizon) is inoperative, the real landing category is CAT I (Refer to the QRH 5.04, that indicates the "Required Equipment for CAT II and CAT III Landings".*

2. *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

ELEC DC ESS BUS SHED

– EXTRACT .... OVRD

Cooling air is supplied by the air conditioning system, without overboard extraction.

AVOID ICING CONDITIONS

Affected systems
* AVNCS VENT

STATUS

AVOID ICING CONDITIONS
BOTH PFD ON SAME FAC
● **IF A/C ICING SEVERE** :
– MIN SPD .... ALPHA PROT
R CAT 3 SINGLE ONLY

INOP SYS
WING A. ICE
AP 1
FAC 1
CAT 3 DUAL
VENT EXTRACT
AFT CRG HEAT◁
FWD CRG HEAT◁
AFT CRG VENT◁
FWD CRG VENT◁
FCDC 1
See below

OTHER INOP SYS

Cabin oxygen mask (auto drop out)	STBY ALTI vib	BMC 1
X BLEED valve man ctl	Crew oxygen valve	FQ1 channel 1
SDCU 1	FMGC 1	

Note : *The warning may be caused by a failure in a sub BUS. Consequently only a part of the systems listed above may be lost.*

ELEC DC ESS BUS FAULT (CONT'D)

STATUS

LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
SLATS/FLAPS SLOW
CAT 2 ONLY (1)

INOP SYS
See below

INOP SYS displayed on ECAM

B HYD	A/THR	VENT EXTRACT
R SPLR 3	FCU 1	B ELEC PUMP
R VHF 1	FAC 1	GPWS
ACP 1+2	REV 2	ENG 1 LOOP A
WING A. ICE	ENG 2 START	ENG 2 LOOP B
AP 1	CAB PR 1	FCDC 1
		CAT 3

Other inoperative systems

BRK PRESS indicator		Hyd fire valves Eng 1 and 2
Flight interphone		Ram air inlet
EIU 2 (autothrust, eng start and reverser inop)	Standby compass light	ECAM Control Panel
	HP fuel shutoff valves	Left loudspeaker
Capt rain repellent ◁	SFCC 1	DC SHED ESS BUS
Avionics air cond valve	RMP 1	

Note : 1. *Before arming the approach mode, the ECAM STATUS displays "CAT 3 SINGLE". However, the real landing capability is CAT 2, and is correctly displayed on the FMA when the approach mode is armed.*
2. *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

ELEC DC ESS BUS SHED

– EXTRACT .... OVRD

Cooling air is supplied by the air conditioning system, without overboard extraction.

AVOID ICING CONDITIONS

Affected systems

* AVNCS VENT

STATUS

AVOID ICING CONDITIONS
BOTH PFD ON SAME FAC
CAT 3 SINGLE ONLY

INOP SYS

WING A. ICE
AP 1
CAT 3 DUAL
FAC 1
R VENT EXTRACT
AFT CRG HEAT◁
FWD CRG HEAT◁
AFT CRG VENT◁
FWD CRG VENT◁
FCDC 1
See below

OTHER INOP SYS

Cabin oxygen mask (auto drop out)	STBY ALTI vib	BMC 1
X BLEED valve man ctl	Crew oxygen valve	CIDS 1 SMOKE DETECT
FQ1 channel 1	FMGC 1	

Note : The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC DC ESS BUS FAULT (CONT'D)

STATUS

LDG DIST PROC .... APPLY	INOP SYS
Refer to the QRH Part 2, or to the FCOM 3.02.80.	See below
ENG 1 APPR IDLE ONLY	
ENG 2 APPR IDLE ONLY	
BOTH PFD ON SAME FAC	
SLATS/FLAPS SLOW	
CAT 2 ONLY (1)	

INOP SYS displayed on ECAM

B HYD	A/THR	VENT EXTRACT
R SPLR 3	FCU 1	B ELEC PUMP
R VHF 1	FAC 1	GPWS
ACP 1+2	REV 2	ENG 1 LOOP A
WING A. ICE	ENG 2 START	ENG 2 LOOP B
AP 1	CAB PR 1	FCDC 1
		CAT 3

Other inoperative systems

BRK PRESS indicator		Hyd fire valves Eng 1 and 2
Flight interphone		Ram air inlet
EIU 2 (autothrust, eng start	Standby compass light	ECAM Control Panel
and reverser inop)	HP fuel shutoff valves	Left loudspeaker
Capt rain repellent ◁	SFCC 1	DC SHED ESS BUS
Avionics air cond valve	RMP 1	

Note : 1. Before arming the approach mode, the ECAM STATUS displays "CAT 3 SINGLE". However, the real landing capability is CAT 2, and is correctly displayed on the FMA when the approach mode is armed.

2. The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC DC ESS BUS SHED

– EXTRACT . . . . OVRD

Cooling air is supplied by the air conditioning system, without overboard extraction.

AVOID ICING CONDITIONS

Affected systems
* AVNCS VENT

STATUS

AVOID ICING CONDITIONS
BOTH PFD ON SAME FAC
● **IF A/C ICING SEVERE** :
– MIN SPD . . . . ALPHA PROT
R CAT 3 SINGLE ONLY

INOP SYS
WING A. ICE
AP 1
FAC 1
CAT 3 DUAL
VENT EXTRACT
AFT CRG VENT◁
FWD CRG VENT◁
FCDC 1
See below

OTHER INOP SYS

Cabin oxygen mask (auto drop out)	STBY ALTI vib	BMC 1
X BLEED valve man ctl	Crew oxygen valve	FQ1 channel 1
CIDS 1 SMOKE DETECT	FMGC 1	

Note : *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

ELEC DC BUS 1 + 2 FAULT

- BLOWER .... OVRD
- EXTRACT .... OVRD
- BARO REF .... CHECK

  Crosscheck the barometer reference settings on the FCU and PFDs.

MAX BRK PR .... 1000 PSI

Brake pressure must be limited to approximately 1000 psi, since antiskid is lost.

ELEC DC BAT BUS FAULT

Affected systems
* CAB PRESS
* FUEL
* AIR COND
* BRAKES
* WHEEL
* F/CTL

STATUS

- MAX BRK PR .... 1000 PSI

LDG DIST PROC .... APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
CTR TK FUEL UNUSABLE

ELEC DC BUS 1 + 2 FAULT (CONT'D)

STATUS

APU BAT START NOT AVAIL
CAB ZONE AT FIXED TEMP
PACKS AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 2 ONLY

INOP SYS
See below

INOP SYS displayed on ECAM

SPLR 1 + 2 + 5	CAT 3	GND COOL ◁
ELAC 2 (a)	FAC 2	MAIN GALLEY
SEC 2 + 3		Y ELEC PUMP
VHF 2	ANTI SKID	BRAKES SYS 1
ACP 3	N/W STRG	BRAKES SYS 2
CAPT STAT heat	LGCIU 2	APU FIRE DET
F/O STAT heat	REVERSER 1 + 2	LAV DET
STBY STAT heat	CAB PRESS 2	ENG 1 LOOP B
WSHLD HEAT	AVNCS VENT	ENG 2 LOOP A
WNDW HEAT	L + R CAB FAN	PACK 1 REGUL
AP 2	GALLEY FAN	PACK 2 REGUL
FCU 2		L TK PUMP 2
FCDC 2		R TK PUMP 2
		CTR TK PUMPS

Other inoperative systems

Selcal	VHF 3 ◁	FMGC 2
Brake temp indication	RMP 2	Rudder trim indication
Brake fans ◁	RMP 3 ◁	BMC 2
TPIS ◁	CFDIU	FQI channel 2
Capt and F/O wipers	Right loudspeakers	Eng 1 and 2 fire ext btl 2
Eng 1 and 2 oil pressure and quantity indication	SFCC 2	X Bleed auto control
	CDLS ◁	
Autobrake	APU ECB	APU fuel LP valve
Stick and rudder pedals lock (by AP)	Manual pressure control	SDCU 2

(a) Lost after 30 seconds, but is recovered at landing gear extension.

Note : The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC DC BUS 1 + 2 FAULT

– BLOWER . . . . OVRD
– EXTRACT . . . . OVRD
– BARO REF . . . . CHECK
Crosscheck the barometer reference settings on the FCU and PFDs.
MAX BRK PR . . . . 1000 PSI
Brake pressure must be limited to approximately 1000 psi, since antiskid is lost.

ELEC DC BAT BUS FAULT

Affected systems
* CAB PRESS
* FUEL
* AIR COND
* BRAKES
* WHEEL
* F/CTL

STATUS

– MAX BRK PR . . . . 1000 PSI
LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
CTR TK FUEL UNUSABLE

ELEC DC BUS 1 + 2 FAULT (CONT'D)

STATUS

	INOP SYS
APU BAT START NOT AVAIL CAB ZONE AT FIXED TEMP PACKS AT FIXED TEMP SLATS/FLAPS SLOW CAT 2 ONLY	See below

INOP SYS displayed on ECAM

SPLR 1 + 2 + 5	CAT 3	GND COOL ◁
ELAC 2 (a)	FAC 2	MAIN GALLEY
SEC 2 + 3		Y ELEC PUMP
VHF 2	ANTI SKID	BRAKES SYS 1
ACP 3	N/W STRG	BRAKES SYS 2
CAPT STAT heat	LGCIU 2	APU FIRE DET
F/O STAT heat	REVERSER 1 + 2	LAV DET
STBY STAT heat	CAB PRESS 2	ENG 1 LOOP B
WSHLD HEAT	AVNCS VENT	ENG 2 LOOP A
WNDW HEAT	L + R CAB FAN	PACK 1 REGUL
AP 2	GALLEY FAN	PACK 2 REGUL
FCU 2		L TK PUMP 2
FCDC 2		R TK PUMP 2
		CTR TK PUMPS

Other inoperative systems

Selcal	VHF 3 ◁	FMGC 2
Brake temp indication	RMP 2	Rudder trim indication
Brake fans ◁	RMP 3 ◁	BMC 2
TPIS ◁	CFDIU	FQI channel 2
Capt and F/O wipers	Right loudspeakers	Eng 1 and 2 fire ext btl 2
Eng 1 and 2 oil pressure and quantity indication	SFCC 2	X Bleed auto control
	CDLS ◁	
Autobrake	APU ECB	APU fuel LP valve
Stick and rudder pedals lock (by AP)	Manual pressure control	CIDS 2 SMOKE DETECT

(a) Lost after 30 seconds, but is recovered at landing gear extension.

Note : The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.

ELEC DC BUS 1 + 2 FAULT

– BLOWER .... OVRD
– EXTRACT .... OVRD
– BARO REF .... CHECK

Crosscheck the barometer reference settings on the FCU and PFDs.

MAX BRK PR .... 1000 PSI

Brake pressure must be limited to approximately 1000 psi, since antiskid is lost.

ELEC DC BAT BUS FAULT

Affected systems
* CAB PRESS
* FUEL
* AIR COND
* BRAKES
* WHEEL
* F/CTL

STATUS

– MAX BRK PR .... 1000 PSI
LDG DIST PROC .... APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
CTR TK FUEL USABLE BY GRAVITY
CTR TK FUEL : 2 T UNUSABLE

ELEC DC BUS 1 + 2 FAULT (CONT'D)

STATUS

APU BAT START NOT AVAIL CAB ZONE AT FIXED TEMP PACKS AT FIXED TEMP SLATS/FLAPS SLOW CAT 2 ONLY	INOP SYS See below

INOP SYS displayed on ECAM

SPLR 1 + 2 + 5	CAT 3	GND COOL ◁
ELAC 2 (a)	FAC 2	MAIN GALLEY
SEC 2 + 3		Y ELEC PUMP
VHF 2	ANTI SKID	BRAKES SYS 1
ACP 3	N/W STRG	BRAKES SYS 2
CAPT STAT heat	LGCIU 2	APU FIRE DET
F/O STAT heat	REVERSER 1 + 2	LAV DET
STBY STAT heat	CAB PRESS 2	ENG 1 LOOP B
WSHLD HEAT	AVNCS VENT	ENG 2 LOOP A
WNDW HEAT	L + R CAB FAN	PACK 1 REGUL
AP 2	GALLEY FAN	PACK 2 REGUL
FCU 2		L TK PUMP 2
FCDC 2		R TK PUMP 2

Other inoperative systems

Selcal	VHF 3 ◁	FMGC 2
Brake temp indication	RMP 2	Rudder trim indication
Brake fans ◁	RMP 3 ◁	BMC 2
TPIS ◁	CFDIU	FQI channel 2
Capt and F/O wipers	Right loudspeakers	Eng 1 and 2 fire ext btl 2
Eng 1 and 2 oil pressure and quantity indication	SFCC 2	X Bleed auto control
	CDLS	CTR TK XFR valves
Autobrake	APU ECB	APU fuel LP valve
Stick and rudder pedals lock (by AP)	Manual pressure control	SDCU 2

(a) Lost after 30 seconds, but is recovered at landing gear extension.

Note : *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

ELEC DC BUS 1 + 2 FAULT

– BLOWER .... OVRD
– EXTRACT .... OVRD
– BARO REF .... CHECK
Crosscheck the barometer reference settings on the FCU and PFDs.
MAX BRK PR .... 1000 PSI
Brake pressure must be limited to approximately 1000 psi, since antiskid is lost.

ELEC DC BAT BUS FAULT

Affected systems
* CAB PRESS
* FUEL
* AIR COND
* BRAKES
* WHEEL
* F/CTL

STATUS

– MAX BRK PR .... 1000 PSI
LDG DIST PROC .... APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
BOTH PFD ON SAME FAC
CTR TK FUEL USABLE BY GRAVITY
CTR TK FUEL : 2 T UNUSABLE

ELEC DC BUS 1 + 2 FAULT (CONT'D)

STATUS

APU BAT START NOT AVAIL
CAB ZONE AT FIXED TEMP
PACKS AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 2 ONLY

INOP SYS
See below

INOP SYS displayed on ECAM

SPLR 1 + 2 + 5	CAT 3	GND COOL ◁
ELAC 2 (a)	FAC 2	MAIN GALLEY
SEC 2 + 3		Y ELEC PUMP
VHF 2	ANTI SKID	BRAKES SYS 1
ACP 3	N/W STRG	BRAKES SYS 2
CAPT STAT heat	LGCIU 2	APU FIRE DET
F/O STAT heat	REVERSER 1 + 2	LAV DET
STBY STAT heat	CAB PRESS 2	ENG 1 LOOP B
WSHLD HEAT	AVNCS VENT	ENG 2 LOOP A
WNDW HEAT	L + R CAB FAN	PACK 1 REGUL
AP 2	GALLEY FAN	PACK 2 REGUL
FCU 2		L TK PUMP 2
FCDC 2		R TK PUMP 2
		CTR TK PUMPS

Other inoperative systems

Selcal	VHF 3 ◁	FMGC 2
Brake temp indication	RMP 2	Rudder trim indication
Brake fans ◁	RMP 3 ◁	BMC 2
TPIS ◁	CFDIU	FQI channel 2
Capt and F/O wipers	Right loudspeakers	Eng 1 and 2 fire ext btl 2
Eng 1 and 2 oil pressure and quantity indication	SFCC 2	X Bleed auto control
	CDLS ◁	
Autobrake	APU ECB	APU fuel LP valve
Stick and rudder pedals lock (by AP)	Manual pressure control	CIDS 2 SMOKE DETECT

(a) Lost after 30 seconds, but is recovered at landing gear extension.

Note : *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

ELEC EMER CONFIG

LAND ASAP

MIN RAT SPEED . . . . 140 KT

CAUTION
The RAT is capable of supplying the EMER GEN down to 125 kt, except during flare.

– GEN 1 + 2 . . . . OFF THEN ON

● **IF UNSUCCESSFUL** :

– BUS TIE . . . . OFF

Setting BUS TIE pushbutton switch to OFF segregates both generator channels.

– GEN 1 + 2 . . . . OFF THEN ON

Note : If any generator reset is successful, reset both FAC's.

– EMER ELEC PWR (if EMER GEN not in line) . . . . . MAN ON

– ENG MODE SEL . . . . IGN

Engines are fed by gravity only.

R – VHF1/HF1 ◁ /ATC1/ . . . . USE

Only VHF 1, HF 1 and ATC 1 are supplied in the electrical emergency configuration.

Note : FMGC1, which is lost temporarily, can be regained by flight crew passing through the MCDU MENU page.

⇩

ELEC EMER CONFIG (CONT'D)

FUEL GRVTY FEED

Engines are fed by gravity only. Avoid negative Gs.

PROC : GRVTY FUEL FEEDING

Apply the GRVTY FUEL FEEDING procedure (3.02.28).

– FAC 1 . . . . OFF THEN ON

The rudder trim is recovered, although no indication is available.

– BUS TIE . . . . AUTO

R *Setting BUS TIE pushbutton to AUTO enables the APU to take an available electrical*
R *channel.*

– APU (IF AVAIL) . . . . START

APU start is not available for 45 seconds after the loss of both engine generators. This 45-second delay prevents any interference with emergency generator coupling.
If the APU is available, the APU may be started when below FL 250.

– BLOWER + EXTRACT . . . . OVRD

Cooling air is supplied by the air conditioning system, and exhausted overboard via the extract valve.

Note : On IAE-powered aircraft, the "EPR MODE FAULT N1 DEGRADED MODE" warning is displayed.

FLT CTL ALTN LAW

(PROT LOST)

MAX SPEED . . . . 320 KT

Speed limited, due to the loss of flight control normal laws.

ELEC EMER CONFIG (CONT'D)

STATUS

ECAM lower display is not available. STATUS page is displayed on the upper ECAM display, as long as the STATUS pushbutton is pressed.

MIN RAT SPEED . . . . 140 KT
MAX SPEED . . . . 320 KT
MAX BRK PR . . . . 1000 PSI
FUEL GRVTY FEED
AVOID NEGATIVE G FACTOR

Note : If there are discrepancies between airspeed indications on the Captain's PFD and on the STBY indicator, disregard the STBY indication (probe not deiced).

APPR PROC :
- FOR LDG . . . . USE FLAP 3

ELEC EMER CONFIG (CONT'D)

STATUS

APPR SPD . . . . VREF + 10/140 kt

Approach speed must be at least minimum RAT speed (140 knots).

LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ALTN LAW : PROT LOST

WHEN L/G DN : DIRECT LAW

CTR TK FUEL USABLE BY GRAVITY

CTR TK FUEL : 2 T UNUSABLE

SLATS/FLAPS SLOW

INOP SYS

See below

INOP SYS displayed on ECAM

F/CTL PROT	SPLR 1 + 2 + 5	A/THR
REVERSER 1 + 2	ELAC 2	FUEL PUMPS
ADR 2 + 3	SEC 2 + 3	ANTI SKID
R IR 2 + 3	A/CALL OUT	N/W STRG
RA 1 + 2	AP 1 + 2	

R *For other systems' status : Refer to the "ELEC EMER CONFIG SYS REMAINING" table.*

ELEC EMER CONFIG (CONT'D)

STATUS

ECAM lower display is not available. STATUS page is displayed on the upper ECAM display, as long as the STATUS pushbutton is pressed.

MIN RAT SPEED . . . . 140 KT
MAX SPEED . . . . 320 KT
MAX BRK PR . . . . 1000 PSI
FUEL GRVTY FEED
AVOID NEGATIVE G FACTOR

Note : If there are discrepancies between airspeed indications on the Captain's PFD and on the STBY indicator, disregard the STBY indication (probe not deiced).

APPR PROC :
– FOR LDG . . . . USE FLAP 3

ELEC EMER CONFIG (CONT'D)

STATUS

APPR SPD . . . . VREF + 10/140 kt

Approach speed must be at least minimum RAT speed (140 knots).

LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ALTN LAW : PROT LOST

WHEN L/G DN : DIRECT LAW

CTR TK FUEL UNUSABLE

SLATS/FLAPS SLOW

INOP SYS

See below

INOP SYS displayed on ECAM

F/CTL PROT	SPLR 1 + 2 + 5	A/THR
REVERSER 1 + 2	ELAC 2	FUEL PUMPS
ADR 2 + 3	SEC 2 + 3	ANTI SKID
R IR 2 + 3	A/CALL OUT	N/W STRG
RA 1 + 2	AP 1 + 2	

R *For other systems' status : Refer to the "ELEC EMER CONFIG SYS REMAINING" table.*

ELEC ESS BUSES ON BAT

R *DC ESS BUS is supplied by the batteries. AC ESS BUS is also supplied by the batteries, via*
R *the STATIC INVERTER.*

LAND ASAP

– MIN RAT SPD .... 140 KT

Displayed, if the RAT is extended.

– EMER ELEC PWR .... MAN ON

ESS BUSES are supplied by the emergency generator.

ELEC EMER CONFIG SYS REMAINING		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
AIR COND PRESS	PRESS AUTO SYS 1	Norm	Norm	Norm
	MAN PRESS CTL	Inop	Inop	Inop (1)
	RAM AIR	Norm	Norm	Norm
	PACK VALVE 1	Norm	Closure Inop	Closure Inop
	PACK VALVE 2	Closure Inop	Closure Inop	Closure Inop (1)
	AVIONIC VENT	Norm	Norm	Partial
	AFT CRG ISOL VALVES	Norm	Inop	Inop
	AFT CRG HEAT	Norm	Inop	Inop
APU	ECB-STARTER	Norm (3)	Inop	Inop (1)
	FUEL LP VALVE	Norm	Norm	Norm
	FUEL PUMP	Norm	Norm	Norm
COM	VHF 1	Norm	Norm	Norm
	HF 1	Norm	Inop	Inop
	RMP 1	Norm	Norm	Norm
	ACP (capt., F/O)	Norm	Norm	Norm
	CIDS	Norm	Norm	Norm
	INTERPHONE	Norm	Norm	Norm
	CVR	Norm	Inop	Inop
	LOUDSPEAKER 1	Norm	Norm	Norm
EIS	PFD 1	Norm	Norm	Norm (2)
	ND 1	Norm	Inop	Inop
	ECAM upper disp.	Norm	Norm	Norm (2)
	DMC 1 or 3	Norm	Norm	Norm (2)
	SDAC 1, FWC 1	Norm	Norm	Norm (2)
	ECAM cont. panel	Norm	Norm	Norm

(1) Restored, when the speed is below 100 knots.
R (2) Lost, when the speed is below 50 knots.
(3) For APU start only.

ELEC EMER CONFIG SYS REMAINING CONT'D		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
EMER EQPT	CREW OXY	Norm	Norm (4)	Norm (4)
	PAX OXY mask release (auto + man)	Norm	Inop	Inop
	SLIDES ARM/WARN	Norm	Norm	Norm
FLT INS	CLOCKS	Norm	Norm	Norm
FIRE	ENG 1 LOOP	A only	A only	A only
	ENG 2 LOOP	B only	B only	B only
	APU LOOP	Inop	Inop	Inop (1)
	CARGO SMOKE DET	Channel 1	Inop	Inop
	ENG FIRE EXT.	Bottle 1 only	Bottle 1 only	Bottle 1 only
	APU FIRE EXT.	Squib A only	Squib A only	Squib A only
	CARGO FIRE EXT.	Inop	Inop	Inop (1)
	APU AUTO EXT.	Inop	Inop	Inop (1)
FLT CTL	ELAC	N°1 only	N°1 + 2	N°1 + 2 (3)
	SEC	N°1 only	N°1	N°1 (3)
	FCDC	N°1 only	Inop	Inop
	SFCC	N°1 only	N°1 only	N°1 only
	Flaps pos ind	Norm	Norm	Norm (2)
FMGS	FMGC (NAV FUNCTION)	N°1 only	Inop	Inop
	MCDU	N°1 only	Inop	Inop
	FAC	N°1 only	Inop	Inop
	FCU	ch 1 only	ch 1 only	ch 1 only
FUEL	LP VALVE	Norm	Norm	Norm
	FQI channel 1	Norm	Inop	Inop
	X FEED VALVE	Norm	Inop	Inop
	TRANSFER VALVE	Norm	Inop	Inop

(1) Restored, when the speed is below 100 knots.
R (2) Lost, when the speed is below 50 knots.
(3) Lost, 30 seconds after the last engine shutdown.
(4) Crew oxygen valve inoperative.

R

ELEC EMER CONFIG SYS REMAINING (cont'd)		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
HYD	FIRE VALVES	Norm	Norm	Norm
ICE-RAIN	WING A. ICE	Norm	Inop	Inop
	ENG A.ICE VALVE	OPEN	OPEN	OPEN
	CAPT PITOT	Norm	Norm	Norm (1)
	CAPT AOA	Norm	Inop	Inop
	RAIN REPELLENT (Capt)	Norm	Norm	Norm
L/G	LGCIU SYS 1	Norm	Norm	Norm
	BRK PRESS IND	Norm	Norm	Norm
	PARK BRK	Norm	Norm	Norm
LIGHTS	EMER CKPT	Norm	Norm	Norm
	EMER CAB	Norm	Norm	Norm
NAV	IR	N°1 only (2)	N°1 only (2)	N°1 only (2)
	ADR	N°1 only	N°1 only	N°1 only
	ADF ◁	N°1 only	Inop	Inop
	VOR/MMR	N°1 only	N°1 only	N°1 only (1)
	DME	N°1 only	Inop	Inop
	VOR/DDRMI	Norm	Norm	Norm (1)
	ATC	N°1 only	Inop	Inop
	STBY HORIZON	Norm	Norm	Norm
	STBY COMP (LT)	Norm	Norm	Norm
	STBY ALTI (VIB)	Norm	Inop	Inop

(1) lost when speed below 50 kt
(2) IR 2 and IR 3 are lost 5 minutes after failure of main generators but if IR 3 replaces IR 1 (ATT-HDG selector at CAPT 3), IR 3 remains supplied.

ELEC EMER CONFIG SYS REMAINING CONT'D		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
EMER EQPT	CREW OXY	Norm	Norm (4)	Norm (4)
	PAX OXY mask release (auto + man)	Norm	Inop	Inop
	SLIDES ARM/WARN	Norm	Norm	Norm
FLT INS	CLOCKS	Norm	Norm	Norm
FIRE	ENG 1 LOOP	A only	A only	A only
	ENG 2 LOOP	B only	B only	B only
	APU LOOP	Inop	Inop	Inop (1)
	CARGO SMOKE DET	Channel 1	Inop	Inop
	ENG FIRE EXT.	Bottle 1 only	Bottle 1 only	Bottle 1 only
	APU FIRE EXT.	Squib A only	Squib A only	Squib A only
	CARGO FIRE EXT.	Inop	Inop	Inop (1)
	APU AUTO EXT.	Inop	Inop	Inop (1)
FLT CTL	ELAC	N°1 only	N°1 + 2	N°1 + 2 (3)
	SEC	N°1 only	N°1	N°1 (3)
	FCDC	N°1 only	Inop	Inop
	SFCC	N°1 only	N°1 only	N°1 only
	Flaps pos ind	Norm	Norm	Norm (2)
FMGS	FMGC (NAV FUNCTION)	N°1 only	Inop	Inop
	MCDU	N°1 only	Inop	Inop
	FAC	N°1 only	Inop	Inop
	FCU	ch 1 only	ch 1 only	ch 1 only
FUEL	LP VALVE	Norm	Norm	Norm
	FQI channel 1	Norm	Inop	Inop
	X FEED VALVE	Norm	Inop	Inop
	TRANSFER VALVE	Norm	Inop	Inop

(1) Restored, when the speed is below 100 knots.
R (2) Lost, when the speed is below 50 knots.
(3) Lost, 30 seconds after the last engine shutdown.
(4) Crew oxygen valve inoperative.

ELEC EMER CONFIG SYS REMAINING (cont'd)		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
HYD	FIRE VALVES	Norm	Norm	Norm
ICE-RAIN	WING A. ICE	Norm	Inop	Inop
	ENG A.ICE VALVE	OPEN	OPEN	OPEN
	CAPT PITOT	Norm	Norm	Norm (1)
	CAPT AOA	Norm	Inop	Inop
	RAIN REPELLENT (Capt)	Norm	Norm	Norm
L/G	LGCIU SYS 1	Norm	Norm	Norm
	BRK PRESS IND	Norm	Norm	Norm
	PARK BRK	Norm	Norm	Norm
	ABCU	Norm	Norm	Norm
LIGHTS	EMER CKPT	Norm	Norm	Norm
	EMER CAB	Norm	Norm	Norm
NAV	IR	N°1 only (2)	N°1 only (2)	N°1 only (2)
	ADR	N°1 only	N°1 only	N°1 only
	ADF ◁	N°1 only	Inop	Inop
	VOR/MMR	N°1 only	N°1 only	N°1 only (1)
	DME	N°1 only	Inop	Inop
	VOR/DDRMI	Norm	Norm	Norm (1)
	ATC	N°1 only	Inop	Inop
	STBY HORIZON	Norm	Norm	Norm
	STBY COMP (LT)	Norm	Norm	Norm
	STBY ALTI (VIB)	Norm	Inop	Inop

(1) lost when speed below 50 kt

(2) IR 2 and IR 3 are lost 5 minutes after failure of main generators but if IR 3 replaces IR 1 (ATT-HDG selector at CAPT 3), IR 3 remains supplied.

ELEC EMER CONFIG SYS REMAINING (cont'd)		EMER GEN RUNNING	BAT ONLY	
			IN FLIGHT	ON THE GROUND
PNEU	ENG 1 BLEED	Norm	BMC 1 inop	BMC 1 inop
	ENG 2 BLEED	BMC 2 inop	BMC 2 inop	BMC 2 inop
	APU BLEED	Inop	Inop	Inop (1)
	X BLEED (man ctl)	Norm	Inop	Inop
PWR PLT	FADEC	A + B (2)	A + B (2)	A + B (2)
	IGNITION	A only	A only	A only
	HP FUEL VALVE closure	Norm	Norm	Norm
MISC	MECH HORN	Norm	Norm	Norm

(1) restored when speed below 100 kt
(2) channels A and B self powered above 12 % N2. If N2 below 12 % only channel A is powered.

ELEC GEN 1(2) or APU GEN OVERLOAD

– GALY/CAB . . . . OFF

STATUS

INOP SYS
GALY/CAB

ELEC TR 1(2) or ESS TR FAULT

R Crew awareness.

STATUS

R CAT 3 SINGLE ONLY (if TR1 or TR2 FAULT)

INOP SYS
ESS TR or TR1(2)
R CAT 3 DUAL (if TR1 or TR2 FAULT)

ELEC DC BAT BUS FAULT

Crew awareness.

STATUS

APU BAT START NOT AVAIL
ECB is no longer supplied

INOP SYS
APU FIRE DET
See below

OTHER INOP SYS

APU ECB	Fwd cargo heat controller ◁	APU fuel LP valve
Stick and rudder pedals lock (by AP)	Fwd cargo isol valves ◁	Manual pressure control
Fwd (aft) cargo fire ext ◁		

Note : *The warning may be caused by a sub BUS failure. Consequently, only a part of the above-listed systems may be lost.*

ELEC DC EMER CONFIG

LAND ASAP

Triggered, if DC BUS 1, DC BUS 2 and DC ESS BUS are lost. In addition, DC BAT BUS is lost.

– EMER ELEC PWR . . . . MAN ON

The emergency generator supplies DC ESS BUS.

But, DC BUS 1, DC BUS 2, and DC BAT BUS are still not supplied.

ELEC DC BUS 1 + 2 FAULT

– BLOWER . . . . OVRD
– EXTRACT . . . . OVRD
– BARO REF . . . . CHECK

Crosscheck the barometer reference settings on the FCU and PFDs.

MAX BRK PR . . . . 1000 PSI

Brake pressure must be limited to approximately 1000 psi, since antiskid is lost.

ELEC DC BAT BUS FAULT

Affected systems
* CAB PRESS
* HYD
* FUEL
* AIR COND
* BRAKES
* WHEEL
* F/CTL

STATUS

MIN RAT SPEED . . . . 140 KT
PROC : GRVTY FUEL FEEDING
MAX BRK PR . . . . 1000 PSI
FUEL GRVTY FEED
LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY

ELEC DC EMER CONFIG (CONT'D)

STATUS

BOTH PFD ON SAME FAC
APU BAT START NOT AVAIL
CAB ZONE AT FIXED TEMP
PACKS AT FIXED TEMP
SLATS/FLAPS SLOW
R CAT 2 ONLY

ELEC DC EMER CONFIG

LAND ASAP

Triggered, if DC BUS 1, DC BUS 2 and DC ESS BUS are lost. In addition, DC BAT BUS is lost.

– EMER ELEC PWR . . . . MAN ON

The emergency generator supplies DC ESS BUS.
But, DC BUS 1, DC BUS 2, and DC BAT BUS are still not supplied.

ELEC DC BUS 1 + 2 FAULT

– BLOWER . . . . OVRD
– EXTRACT . . . . OVRD
– BARO REF . . . . CHECK

Crosscheck the barometer reference settings on the FCU and PFDs.

MAX BRK PR . . . . 1000 PSI

Brake pressure must be limited to approximately 1000 psi, since antiskid is lost.

ELEC DC BAT BUS FAULT

Affected systems
* CAB PRESS
* HYD
* FUEL
* AIR COND
* BRAKES
* WHEEL
* F/CTL

STATUS

MIN RAT SPEED . . . . 140 KT
PROC : GRVTY FUEL FEEDING
MAX BRK PR . . . . 1000 PSI
FUEL GRVTY FEED
LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY

ELEC DC EMER CONFIG (CONT'D)

STATUS

BOTH PFD ON SAME FAC
CTR TK ⩤ FUEL UNUSABLE
APU BAT START NOT AVAIL
CAB ZONE AT FIXED TEMP
PACKS AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 2 ONLY

ELEC DC EMER CONFIG

LAND ASAP

Triggered, if DC BUS 1, DC BUS 2 and DC ESS BUS are lost. In addition, DC BAT BUS is lost.

– EMER ELEC PWR .... MAN ON

The emergency generator supplies DC ESS BUS.
But, DC BUS 1, DC BUS 2, and DC BAT BUS are still not supplied.

ELEC DC BUS 1 + 2 FAULT

– BLOWER .... OVRD
– EXTRACT .... OVRD
– BARO REF .... CHECK

Crosscheck the barometer reference settings on the FCU and PFDs.

MAX BRK PR .... 1000 PSI

Brake pressure must be limited to approximately 1000 psi, since antiskid is lost.

ELEC DC BAT BUS FAULT

Affected systems
* CAB PRESS
* HYD
* FUEL
* AIR COND
* BRAKES
* WHEEL
* F/CTL

STATUS

MIN RAT SPEED .... 140 KT
PROC : GRVTY FUEL FEEDING
MAX BRK PR .... 1000 PSI
FUEL GRVTY FEED
LDG DIST PROC .... APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY

<u>ELEC</u> DC EMER CONFIG (CONT'D)

STATUS

BOTH PFD ON SAME FAC
CTR TK FUEL UNUSABLE
APU BAT START NOT AVAIL
CAB AT FIXED TEMP
COCKPIT AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 2 ONLY

ELEC DC EMER CONFIG

LAND ASAP

Triggered, if DC BUS 1, DC BUS 2 and DC ESS BUS are lost. In addition, DC BAT BUS is lost.

– EMER ELEC PWR . . . . MAN ON

The emergency generator supplies DC ESS BUS.
But, DC BUS 1, DC BUS 2, and DC BAT BUS are still not supplied.

ELEC DC BUS 1 + 2 FAULT

– BLOWER . . . . OVRD
– EXTRACT . . . . OVRD
– BARO REF . . . . CHECK

Crosscheck the barometer reference settings on the FCU and PFDs.

MAX BRK PR . . . . 1000 PSI

Brake pressure must be limited to approximately 1000 psi, since antiskid is lost.

ELEC DC BAT BUS FAULT

Affected systems
* CAB PRESS
* HYD
* FUEL
* AIR COND
* BRAKES
* WHEEL
* F/CTL

STATUS

MIN RAT SPEED . . . . 140 KT
PROC : GRVTY FUEL FEEDING
MAX BRK PR . . . . 1000 PSI
FUEL GRVTY FEED
LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY

ELEC DC EMER CONFIG (CONT'D)

STATUS

BOTH PFD ON SAME FAC
APU BAT START NOT AVAIL
CAB AT FIXED TEMP
COCKPIT AT FIXED TEMP
SLATS/FLAPS SLOW
CAT 2 ONLY

ELEC DC EMER CONFIG (CONT'D)

STATUS

INOP SYS
See below

INOP SYS displayed on ECAM

FCU 2	GALLEY FAN	SPLR 1 + 2 + 5
CAT 3	CRG HEAT ◁	ELAC 2
FAC 2	GND COOL ◁	SEC 2 + 3
FUEL PUMPS	MAIN GALLEY	VHF 2
ANTI SKID	ACP 3	N.W. STEER
Y ELEC PUMP	CAPT STAT	LGCIU 2
BRAKES SYS 1	F/O STAT	REVERSER 2
BRAKES SYS 2	STBY STAT	CAB PRESS 2
APU FIRE DET	WSHLD HEAT	AVNCS VENT
LAV DET	WNDW HEAT	VENT BLOWER
ENG 1 LOOP B	PACK 1	ENG 2 LOOP A
L+R CAB FAN	PACK 2	AP2
FCDC 2	COND CTL 1	COND CTL 2

Note : To verify the other INOP SYS not displayed on the ECAM, refer to the DC BUS 1+2 and DC BAT BUS procedures.

ELEC STAT INV FAULT

Crew awareness.

ELEC EMER GEN 1 LINE OFF

With the GEN 1 LINE pushbutton (on the EMER ELEC PWR panel) in the OFF position, the GEN 1 line contactor is open and GEN 2 supplies the AC BUS 1 channel.

Crew awareness.

Set the GEN 1 LINE pushbutton to ON.

C/B TRIPPED

R Crew awareness.

R *If one green circuit breaker (C/B) is tripped, one of the following messages appears after one*
R *minute, depending on the location of the affected C/B :*

C/B TRIPPED ON OVHD PNL
C/B TRIPPED ON L(R) ELEC BAY
C/B TRIPPED REAR PNL J-M or N-R or S-V or W-Z

R *Note : Do not reengage a C/B that has tripped by itself, unless the Captain judges it*
R *necessary to do so for the safe continuation of the flight. This procedure should be*
R *adopted only as a last resort, and only one reengagement should be attempted.*
R *On ground, do not reengage the C/B of the fuel pump(s) of any tank. For all other*
R *C/Bs, if the flight crew coordinates the action with maintenance, the flight crew may*
R *reengage a tripped C/B, provided that the cause of the tripped C/B is identified.*

ELEC DC EMER CONFIG (CONT'D)

STATUS

INOP SYS
See below

INOP SYS displayed on ECAM

FCU 2	GALLEY FAN	SPLR 1 + 2 + 5
CAT 3	CRG HEAT ◁	ELAC 2
FAC 2	GND COOL ◁	SEC 2 + 3
FUEL PUMPS	MAIN GALLEY	VHF 2
ANTI SKID	ACP 3	N/W STRG
Y ELEC PUMP	CAPT STAT	LGCIU 2
BRAKE SYS 1	F/O STAT	REVERSER 2
BRAKE SYS 2	STBY STAT	CAB PRESS 2
APU FIRE DET	WSHLD HEAT	AVNCS VENT
LAV DET	WNDW HEAT	VENT BLOWER
ENG 1 LOOP B	PACK 1 REGUL	ENG 2 LOOP A
L+R CAB FAN	PACK 2 REGUL	AP2
FCDC 2	GPS 1 + 2 ◁	

Note : To verify the other INOP SYS not displayed on the ECAM, refer to the DC BUS 1+2 and DC BAT BUS procedures.

ELEC STAT INV FAULT

Crew awareness.

ELEC EMER GEN 1 LINE OFF

With the GEN 1 LINE pushbutton (on the EMER ELEC PWR panel) in the OFF position, the GEN 1 line contactor is open and GEN 2 supplies the AC BUS 1 channel.

Crew awareness.

Set the GEN 1 LINE pushbutton to ON.

C/B TRIPPED

R Crew awareness.

R *If one green circuit breaker (C/B) is tripped, one of the following messages appears after one*
R *minute, depending on the location of the affected C/B :*

C/B TRIPPED ON OVHD PNL
C/B TRIPPED ON L(R) ELEC BAY
C/B TRIPPED REAR PNL J-M or N-R or S-V or W-Z

R *Note : Do not reengage a C/B that has tripped by itself, unless the Captain judges it*
R *necessary to do so for the safe continuation of the flight. This procedure should be*
R *adopted only as a last resort, and only one reengagement should be attempted.*
R *On ground, do not reengage the C/B of the fuel pump(s) of any tank. For all other*
R *C/Bs, if the flight crew coordinates the action with maintenance, the flight crew may*
R *reengage a tripped C/B, provided that the cause of the tripped C/B is identified.*

COCKPIT DOOR FAULT

This procedure should be applied, if the Cockpit Door Locking System (CDLS) fails. This failure is indicated when the FAULT light on the center pedestal's COCKPIT DOOR panel comes on.
In the case of a DC BUS 2 fault, no FAULT indication appears on the center pedestal's COCKPIT DOOR panel. The CDLS is not electrically-supplied, and is inoperative.

– CKPT DOOR CONT panel . . . . CHECK

This panel is located on the overhead panel. It is used to identify the faulty CDLS item, and to verify the status of the pressure sensors and the three electrical latches (referred to as strikes).

● **If two or more electrical latches (strikes) are faulty :**

The cockpit door is not intrusion-proof.

The system may be recovered by performing the following steps:
– Cockpit door . . . . OPEN
– COCKPIT DOOR toggle switch . . . . SET to UNLOCK
After 10 seconds :
– COCKPIT DOOR toggle switch . . . . SET to NORM

● **If two pressure sensors are faulty :**

Automatic latch release is not available, in case of cockpit decompression.

● **If no LED on the CKPT DOOR CONT panel is on :**

The CDLS control unit is faulty, therefore, the cockpit door might unlock automatically. If it does not, consider using the mechanical override system to unlock the door.

ENG 1(2)/APU FIRE LOOP A (B) FAULT

No crew action required in flight.

STATUS

INOP SYS
R ENG 1(2) LOOP A(B)
or APU LOOP A(B)

ENG 1(2)/APU FIRE DET FAULT

Loss of both fire detection loops.

Crew awareness.

STATUS

INOP SYS
FIRE DET 1(2)
or APU FIRE DET

ENG 1(2) FIRE (on ground)

R – THR LEVERS .... IDLE
Full reverse may be used to stop the aircraft.

● **WHEN A/C IS STOPPED** :
- PARKING BRK .... ON
- ENG MASTER (affected) .... OFF
  Associated LP and HP valves close.
- ENG FIRE P/B (affected) .... PUSH
  · *Aural warning stops.*
  · *ENG FIRE pushbutton remains on, as long as a fire is detected.*
  · *FADEC is no longer supplied. So, the THR LEVERS .... IDLE line reappears, even if the thrust levers are at idle.*
- AGENT 1 + 2 .... DISCH
- ENG MASTER (opposite side) .... OFF

The following items are not displayed on the ECAM, if the APU is not running :
- ATC (VHF 1) .... NOTIFY
  Notify ATC of the nature of the emergency, and state intentions.
  Only VHF1 is available on batteries.
- CABIN CREW (PA) .... ALERT

● **IF EVAC RQRD** :
- EVAC COMMAND .... ON
- APU MASTER SW .... OFF
- BAT 1 + 2 (if time permits before leaving aircraft) .. OFF
  Batteries are left ON, until leaving the aircraft, to ensure cabin communications.
  Note : Keep the batteries on, for at least 10 seconds after switching the 2nd ENG MASTER to OFF, to allow the fuel LP valves to close completely.

ENG 1(2)/APU FIRE LOOP A (B) FAULT

No crew action required in flight.

STATUS

INOP SYS

R ENG 1(2) LOOP A(B)
or APU LOOP A(B)

ENG 1(2)/APU FIRE DET FAULT

Loss of both fire detection loops.

Crew awareness.

STATUS

INOP SYS

FIRE DET 1(2)
or APU FIRE DET

ENG 1(2) FIRE (on ground)

– THR LEVERS .... IDLE
Full reverse may be used to stop the aircraft.

● **WHEN A/C IS STOPPED** :
- – PARKING BRK .... ON
- – ENG MASTER (affected) .... OFF
  Associated LP and HP valves close.
- – ENG FIRE P/B (affected) .... PUSH
  · Aural warning stops.
  · ENG FIRE pushbutton remains on, as long as a fire is detected.
  · FADEC is no longer supplied.
- – AGENT 1 + 2 .... DISCH
- – ENG MASTER (opposite side) .... OFF

The following items are not displayed on the ECAM, if the APU is not running :
- – ATC (VHF 1) .... NOTIFY
  Notify ATC of the nature of the emergency, and state intentions.
  Only VHF1 is available on batteries.
- – CABIN CREW (PA) .... ALERT

● **IF EVAC RQRD** :
- – EVAC COMMAND .... ON
- – APU MASTER SW .... OFF

ENG 1(2) FIRE (in flight)

LAND ASAP

– THR LEVER (affected) . . . . IDLE
– ENG MASTER (affected) . . . . OFF
  LP and HP valves close.
– ENG FIRE P/B (affected) . . . . PUSH
  · Aural warning stops.
  · ENG FIRE pushbutton remains on, as long as a fire is detected.
  · FADEC is no longer supplied. So, the THR LEVER ... IDLE line reappears, even if the thrust lever is at idle.
– AGENT 1 AFTER 10 S . . . . DISCH
  The 10–second delay allows N1 to decrease, reducing nacelle ventilation, and thereby increasing the effect of the agent.
  Automatic countdown on the ECAM.
– ATC . . . . NOTIFY
  Notify ATC of the nature of the emergency, and state intentions

● **IF FIRE AFTER 30 S :**
  – AGENT 2 . . . . DISCH
    Discharge the second agent, if the fire warning remains 30 seconds after the discharge of the first agent.

ENG 1(2) **SHUTDOWN**

Do not attempt to restart the engine.
For the after ENG SHUTDOWN procedure, see the ENG section. (Refer to 3.02.70).

APU FIRE

LAND ASAP

– APU FIRE P/B . . . . PUSH
  · APU LP valve closes.
  · Aural warning stops.
  · APU FIRE pushbutton remains on, as long as a fire is detected.
– AGENT AFTER 10 S . . . . DISCH
  The 10–second delay allows the airflow to decrease, which increases the effect of the agent.
  Automatic countdown on the ECAM.
– MASTER SW . . . . OFF
  Do not attempt to restart the APU.

STATUS

INOP SYS
APU

SMOKE/FUMES/AVNCS SMOKE

This paper procedure includes all the steps of the AVIONICS SMOKE ECAM procedure.
Apply this paper procedure when :

- *The flight (cabin) crew suspect that smoke is coming from the avionics, and/or the air conditioning, and/or the cabin equipment.*
- *The AVIONICS SMOKE ECAM caution is triggered, or, at the latest, after completing the immediate actions of the AVIONICS SMOKE ECAM procedure (before reaching the 5–minutes countdown procedure line)*
- *There is a smell of smoke/fumes in the cockpit :*
  - *If the smell is similar to that of orange peels, suspect a toxic leak of rain repellent fluid.*
  - *If the smell is similar to that of pine needles, suspect a non-toxic leak.*

If any other ECAM SMOKE alert triggers (CARGO, ...), the crew must first apply the ECAM procedure, then consider applying this paper procedure.
Note that these ECAM alerts may be caused by another source, that should usually first be detected by the flight crew/cabin crew/avionics smoke detectors.
The following explains the layout of this paper procedure :

- *The procedure lines above the text boxes indicate the actions that the flight crew must immediately perform, if smoke is detected (with or without ECAM activation and regardless of the smoke source). These immediate actions correspond to the most common steps to be taken in smoke cases. In all cases, the flight crew must also be prepared to immediately perform a diversion. However, this diversion may be avoided if the smoke source is obvious, accessible and extinguishable or confirmed isolated (after completion of the immediate actions).*
- *The text boxes indicate the actions that the flight crew must consider, if at any time during the remainder of the procedure but always after the initial steps :*
  - *Smoke/fumes become the greatest threat and smoke/fumes removal is required, and/or*
  - *The situation becomes critical and can no longer be controlled.*
- *The procedure lines below the text boxes indicate the actions that the flight crew must perform, as soon as they suspect a source of smoke. The actions will depend on whether the smoke is coming from the avionics, and/or air conditioning, and/or cabin equipment.*

LAND ASAP

● **IF PERCEPTIBLE SMOKE, APPLY IMMEDIATELY :**

If smoke is confirmed, the following procedure must be applied.

- BLOWER . . . . OVRD
- EXTRACT . . . . OVRD
  Avionics ventilation air is extracted overboard.
- CAB FANS . . . . OFF
  To prevent smoke from entering the cockpit and cabin.
- GALY & CAB . . . . OFF
- SIGNS . . . . ON

⇩

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

– CKPT/CABIN COM . . . . ESTABLISH

Communication must be established with the cabin crew in order to follow up on the smoke origin and dissipation.

● **If required**

– OXY MASK/GOGGLE ON/100%/EMERG

Ensure crew communication is established. Avoid continuous use of the interphone to minimize interference from the oxygen mask breathing noise.
Turn the emergency knob to remove condensation or smoke from the mask.

● **If smoke source immediately obvious, accessible, and extinguishable :**

– FAULTY EQPT . . . . ISOLATE

● **If smoke source not immediately isolated :**

– DIVERSION . . . . INITIATE

– DESCENT (FL 100, or MEA, or minimum obstacle clearance altitude) . . . . INITIATE

R

● At ANY TIME of the remainder of the procedure, if smoke/fumes becomes the GREATEST THREAT:

- SMOKE FUMES REMOVAL..CONSIDER
- ELEC EMER CONFIG.. CONSIDER
  Refer to the end of the procedure to set ELEC EMER CONFIG

● At ANY TIME of the procedure, if situation becomes critical and can no longer be controlled :

- IMMEDIATE LANDING..CONSIDER

NFC5-03-0226-005-A001AA

Guidelines to determine smoke source :

– *If smoke initially comes out of the ventilation outlets, the crew may suspect AIR COND SMOKE. In addition, very shortly thereafter, several SMOKE warnings (cargo, lavatory, avionics) will be triggered. The displayed ECAM procedures must be applied.*
– *After an ENG or APU failure, smoke may come from the faulty item via the bleed system and be perceived in the cockpit and/or cabin. In such a case, it will be recirculated throughout the aircraft, until it completely disappears from the air conditioning system.*
– *If only the AVIONICS SMOKE warning is triggered, the crew may suspect avionics smoke.*
– *If the smoke is detected while an equipment is declared faulty, the crew may suspect that smoke is coming from this equipment.*
– *Avionics or forward galley smoke may be smelt, or may enter in the cockpit before ECAM warning activation.*

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

R ● **IF AIR COND SMOKE SUSPECTED :**
- APU BLEED .... OFF
- BLOWER and EXTRACT .... AUTO

<u>Note</u> : *When both BLOWER and EXTRACT are in the OVRD position, a single pack may not be able to maintain the cabin pressure.*
- PACK 1 .... OFF

● **If smoke continues :**
- PACK 1 .... ON
- PACK 2 .... OFF
- CRG FWD (AFT) ISOL VALVE ◁ .... OFF

To prevent a cargo smoke warning from being triggered due to cabin smoke.

● **If smoke still continues :**
- PACK 2 .... ON

Restore normal configuration if PACK 2 is not suspected to cause smoke.
- BLOWER and EXTRACT .... OVRD
- SMOKE/FUMES REMOVAL .... CONSIDER

R ● **IF CABIN EQUIPMENT SMOKE SUSPECTED :**

● **If smoke continues :**
- EMER EXIT LIGHT .... ON
- COMMERCIAL .... OFF
- SMOKE DISSIPATION .... CHECK
- FAULTY EQPT .... SEARCH/ISOLATE

Once the cabin has been secured, try to find the smoke source and isolate it. Cabin lights, reading lights, passenger systems, galleys have dedicated control C/B in the cabin or cockpit.

● **If smoke still continues or if faulty equipment confirmed isolated :**
- COMMERCIAL .... NORM
- SMOKE/FUMES REMOVAL .... CONSIDER

At any time of the procedure, considered applying the SMOKE/FUMES REMOVAL procedure.

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

● **IF SMOKE SOURCE CANNOT BE DETERMINED AND STILL CONTINUES OR AVNCS/ELECTRICAL SMOKE SUSPECTED :**

Consider shedding the AC BUS bar on one side. Then, if unsuccessful, on the other. When it is clear that the shedded side is not involved, reconnect it.

● **Shed AC BUS 1 as follows :**

- GEN 2 .... CHECK ON
- ELEC page .... SELECT
- BUS TIE .... OFF
  The BUS TIE OFF caution is triggered after 5 seconds.
- AC ESS FEED .... ALTN
  This action avoids autopilot and autothrust disconnection during electrical transients.

R – GEN 1 .... OFF
  Note : If this electrical configuration is maintained, the Captain's total Air Temperature and Angle Of Attack, and pitot are not de-iced. PFD1 and STBY instruments may display erroneous data in icing conditions. Use PFD2.
- SMOKE DISSIPATION .... CHECK

● **If smoke continues :**

- GEN 1 .... ON
- AC ESS FEED .... NORM

● **Shed AC BUS 2 as follows :**

- GEN 1 .... CHECK ON
- ELEC page .... SELECT
- BUS TIE .... CHECK OFF
- AC ESS FEED .... CHECK NORM
- GEN 2 .... OFF

R *PFD2, ND2 and lower ECAM are lost*
- SMOKE DISSIPATION .... CHECK

● **If smoke continues :**

- GEN 2 .... ON

R – BUS TIE .... AUTO
- SMOKE/FUMES REMOVAL .... CONSIDER

R – ELEC EMER CONFIG .... CONSIDER

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

R ● **IF SMOKE disappears within 5 minutes :**

– NORMAL VENTILATION . . . . RESTORE

To set EMER ELEC CONFIG :

– EMER ELEC GEN 1 LIN . . . . OFF

GEN 1 LINE contactor opens. GEN 1 remains running and supplies one fuel pump in each wing tank. AC BUS 1 is supplied by GEN 2 through the bus tie contactor.

– EMER ELEC PWR . . . . MAN ON

RAT is extended and the emer gen is connected to the aircraft network. Check emergency generator parameters on the ECAM ELEC page (displayed automatically).

● **WHEN EMER GEN AVAIL :**

– APU GEN . . . . OFF

– GEN 2 . . . . OFF

ELEC **EMER CONFIG**

MIN RAT SPEED . . . . 140 KT

Note : The electrical configuration is the same as for loss of both generators (except that one fuel pump in each wing tank remains supplied).

– VHF 1/HF 1ATC 1 . . . . USE

Only VHF 1, HF 1 and ATC 1 are supplied in this configuration. Notify the ATC of the nature of the emergency, and state intentions. If there is no contact with the ATC, switch to code A7700, or transmit a distress message on one of the following frequencies : VHF 121.5 MHz, HF 2182 kHz, or 8364 kHz.

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

– FAC 1 . . . . OFF THEN ON

Rudder trim is recovered, despite the fact that no indication is available.

● **BEFORE L/G EXTENSION**

Restore normal electrical supply for landing.

– GEN 2 . . . . ON

– EMER ELEC GEN 1 LIN . . . . ON

<u>F/CTL</u> ALTN LAW

(PROT LOST)

Flight control normal laws and associated protections are lost. Only the load factor limitation, and the high and low speed stability remain (ALTN law with reduced protection).

MAX SPEED . . . . 320 KT

STATUS

ECAM lower display is not available. STATUS page is displayed on the upper ECAM display, as long as the STATUS pushbutton is pressed.

MIN RAT SPEED . . . . 140 KT

MAX SPEED . . . . 320 KT

MAX BRK PR . . . . 1000 PSI

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

STATUS

– FOR LDG . . . . USE FLAPS 3
– GPWS LDG FLAP 3 . . . . ON
APPR SPD . . . . VREF + 10 KT
LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80
ENG 1 + 2 APPR IDLE ONLY
ENG 1 + 2 N1 DEGRADED MODE
(IAE–powered aircraft ⊲)
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
CTR TK (⊲) FUEL UNUSABLE
INCREASED FUEL CONSUMP
SLATS/FLAPS SLOW
CAT 1 ONLY
APPR PROC

- **BEFORE L/G EXTENSION**
  - GEN 2 . . . . ON
  - EMER ELEC GEN 1 LINE . . . . . . ON
- **After recovery of normal electrical supply, the following STATUS will be displayed :**

  MIN RAT SPEED . . . . 140 KT
  Will disappear at landing gear extension.
  MAX SPEED . . . . 320 KT
  – FOR LDG . . . . USE FLAPS 3
  – GPWS LDG FLAP 3 . . . . ON
  Will be displayed when flaps in CONF3.
  APPR SPD . . . . VREF + 10 KT
  LDG DIST PROC . . . . APPLY
  Refer to the QRH Part 2, or to the FCOM 3.02.80
  ALTN LAW : PROT LOST
  Flight controls remain in alternate law, due to the loss of IR 2 and 3.
  WHEN L/G DN : DIRECT LAW
  At landing gear extension, control reverts to direct law in pitch, as well as in roll (refer to the DIRECT LAW procedure 3.02.27).

INOP SYS

See ELEC EMER CONFIG SYS REMAINING, 3.02.24 (except for fuel pumps)

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

– FAC 1 . . . . OFF THEN ON

Rudder trim is recovered, despite the fact that no indication is available.

● **BEFORE L/G EXTENSION**

Restore normal electrical supply for landing.

– GEN 2 . . . . ON

– EMER ELEC GEN 1 LIN . . . . ON

F/CTL ALTN LAW

(PROT LOST)

Flight control normal laws and associated protections are lost. Only the load factor limitation, and the high and low speed stability remain (ALTN law with reduced protection).

MAX SPEED . . . . 320 KT

STATUS

ECAM lower display is not available. STATUS page is displayed on the upper ECAM display, as long as the STATUS pushbutton is pressed.

MIN RAT SPEED . . . . 140 KT

MAX SPEED . . . . 320 KT

MAX BRK PR . . . . 1000 PSI

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

STATUS

– FOR LDG . . . . USE FLAPS 3
– GPWS LDG FLAP 3 . . . . ON
APPR SPD . . . . VREF + 10 KT
LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80
ENG 1 + 2 APPR IDLE ONLY
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
CTR TK FUEL USABLE BY GRAVITY
CTR TK FUEL : 2T UNUSABLE
INCREASED FUEL CONSUMP
SLATS/FLAPS SLOW
CAT 1 ONLY
APPR PROC

- **BEFORE L/G EXTENSION**
  – GEN 2 . . . . ON
  – EMER ELEC GEN 1 LINE . . . . . . ON
- **After recovery of normal electrical supply, the following STATUS will be displayed :**
  MIN RAT SPEED . . . . 140 KT
  Will disappear at landing gear extension.
  MAX SPEED . . . . 320 KT
  – FOR LDG . . . . USE FLAPS 3
  – GPWS LDG FLAP 3 . . . . ON
  Will be displayed when flaps in CONF3.
  APPR SPD . . . . VREF + 10 KT
  LDG DIST PROC . . . . APPLY
  Refer to the QRH Part 2, or to the FCOM 3.02.80
  ALTN LAW : PROT LOST
  Flight controls remain in alternate law, due to the loss of IR 2 and 3.
  WHEN L/G DN : DIRECT LAW
  At landing gear extension, control reverts to direct law in pitch, as well as in roll (refer to the DIRECT LAW procedure 3.02.27).

INOP SYS

See ELEC EMER CONFIG SYS REMAINING, 3.02.24 (except for fuel pumps)

SMOKE/FUMES REMOVAL

R *Apply the SMOKE/FUMES REMOVAL paper procedure, if smoke/fumes become the greatest*
R *threat when applying the SMOKE/FUMES/AVNICS SMOKE paper procedure.*

– EMER EXIT LIGHT . . . . ON

● **If fuel vapors :**

- – CAB FANS . . . . ON

  The recirculating air ventilates the air mixer bay and other fuselage area. This prevents fuel vapors from accumulating and the risk of explosion. Passenger health is not affected.
- – PACK 1+2 . . . . OFF

● **If no fuel vapors :**

- – CAB FANS . . . . OFF

  To prevent smoke from entering the cockpit and cabin.
- – PACK FLOW . . . . HI

  To provide maximum airflow from the packs.

  Do not shut down the air conditioning packs, and do not reduce ventilation in an attempt to smother the fire.

  Do not deploy oxygen masks, if fire is suspected in the cabin.

– LDG ELEV . . . . 10000 FT/MEA

– DESCENT (FL 100, or MEA, or minimum obstacle clearance altitude) . . . . INITIATE

The most effective means of smoke removal is use of ram air. Therefore, descent is initiated to FL100, or the MEA, or the minimum obstacle clearance altitude, while the cabin altitude is increased to 10 000 feet or the MEA.

The increase in cabin altitude also reduces, at least temporarily, the smoke concentration.

Cabin depressurization starts, when descent is initiated.

Passenger oxygen, as required by regulation.

– ATC . . . . NOTIFY

– SMOKE/FUMES/AVNCS SMOKE PROC . . . . CONTINUE

While descending, continue applying the appropriate steps of the SMOKE/FUMES/AVNCS SMOKE procedure depending on the suspected smoke source.

SMOKE/FUMES REMOVAL (CONT'D)

● **At FL100, or MEA :**

R ● **If electrical emergency configuration :**

R – APU MASTER SW . . . . ON

R *In electrical emergency configuration, when the APU MASTER switch is ON, the*
R *battery contactors will automatically close for a maximum of 3 minutes. This will*
R *enable the flight crew to manually control the outflow valves that are powered by*
R *the DC BAT BUS.*

– PACKS 1 + 2 . . . . OFF

R *In electrical emergency configuration, PACK 2 isolation valve is not powered.*

– MODE SEL . . . . MAN

– MAN V/S CTL . . . . FULL UP

– RAM AIR . . . . ON

At FL100, or MEA, or minimum obstacle clearance altitude, it is possible to open the RAM AIR valve when △P is 1 psi or below. Opening the RAM AIR enables flying with both packs OFF.

R – APU MASTER SW . . . . OFF

● **If smoke persists, open CKPT window :**

If there is smoke in the cockpit, open the cockpit (CKPT) window to evacuate the smoke.

MAX SPEED . . . . 200 KT

– COCKPIT DOOR . . . . OPEN

– HEADSETS . . . . ON

– PNF COCKPIT WINDOW . . . . OPEN

● **When window is open :**

– NON-AFFECTED PACK(s) . . . . ON

– VISUAL WARNINGS (noisy CKPT) . . . . MONITOR

Due to the increased noise level, pay particular attention to visual warnings.

– SMOKE/FUMES/AVNCS SMOKE PROC . . . CONTINUE

Continue applying the appropriate steps of the SMOKE/FUMES/AVNCS SMOKE paper procedure depending on the suspected smoke source.

SMOKE/FUMES REMOVAL

R *Apply the SMOKE/FUMES REMOVAL paper procedure, if smoke/fumes become the greatest*
R *threat when applying the SMOKE/FUMES/AVNICS SMOKE paper procedure.*

– EMER EXIT LIGHT . . . . ON

● **If fuel vapors :**

– CAB FANS . . . . ON

The recirculating air ventilates the air mixer bay and other fuselage area. This prevents fuel vapors from accumulating and the risk of explosion. Passenger health is not affected.

– PACK 1+2 . . . . OFF

● **If no fuel vapors :**

– CAB FANS . . . . OFF

To prevent smoke from entering the cockpit and cabin.

– ECON FLOW . . . . OFF

To provide maximum airflow from the packs.
Do not shut down the air conditioning packs, and do not reduce ventilation in an attempt to smother the fire.
Do not deploy oxygen masks, if fire is suspected in the cabin.

– LDG ELEV . . . . 10000 FT/MEA

– DESCENT (FL 100, or MEA, or minimum obstacle clearance altitude) . . . . INITIATE

The most effective means of smoke removal is use of ram air. Therefore, descent is initiated to FL100, or the MEA, or the minimum obstacle clearance altitude, while the cabin altitude is increased to 10 000 feet or the MEA.
The increase in cabin altitude also reduces, at least temporarily, the smoke concentration.
Cabin depressurization starts, when descent is initiated.
Passenger oxygen, as required by regulation.

– ATC . . . . NOTIFY

– SMOKE/FUMES/AVNCS SMOKE PROC . . . . CONTINUE

While descending, continue applying the appropriate steps of the SMOKE/FUMES/AVNCS SMOKE procedure depending on the suspected smoke source.

SMOKE/FUMES REMOVAL (CONT'D)

- **At FL100, or MEA :**
  - R **If electrical emergency configuration :**
    - R – APU MASTER SW . . . . ON
      R *In electrical emergency configuration, when the APU MASTER switch is ON, the*
      R *battery contactors will automatically close for a maximum of 3 minutes. This will*
      R *enable the flight crew to manually control the outflow valves that are powered by*
      R *the DC BAT BUS.*
  - – PACKS 1 + 2 . . . . OFF
    R *In electrical emergency configuration, PACK 2 isolation valve is not powered.*
  - – MODE SEL . . . . MAN
  - – MAN V/S CTL . . . . FULL UP
  - – RAM AIR . . . . ON
    At FL100, or MEA, or minimum obstacle clearance altitude, it is possible to open the RAM AIR valve when △P is 1 psi or below. Opening the RAM AIR enables flying with both packs OFF.
  - R – APU MASTER SW . . . . OFF
  - **If smoke persists, open CKPT window :**
    If there is smoke in the cockpit, open the cockpit (CKPT) window to evacuate the smoke.
    MAX SPEED . . . . 200 KT
    - – COCKPIT DOOR . . . . OPEN
    - – HEADSETS . . . . ON
    - – PNF COCKPIT WINDOW . . . . OPEN
    - **When window is open :**
      - – NON-AFFECTED PACK(s) . . . . ON
      - – VISUAL WARNINGS (noisy CKPT) . . . . MONITOR
        Due to the increased noise level, pay particular attention to visual warnings.
      - – SMOKE/FUMES/AVNCS SMOKE PROC . . . CONTINUE
        Continue applying the appropriate steps of the SMOKE/FUMES/AVNCS SMOKE paper procedure depending on the suspected smoke source.

SMOKE FWD (AFT) CARGO SMOKE

LAND ASAP

Note : If the warning has been displayed temporarily, and no crew action has been taken, normal cargo ventilation may be recovered when ventilation is required for livestock transportation :
C/B of CARGO VENT controller (S20 on 122VU, or C7 on 49VU, as installed .... PULL then PUSH

– AFT ISOL VALVE (if aft affected) .... OFF

If not automatically closed :

– AGENT .... DISCH

If the SMOKE warning is displayed on the ground with the cargo doors open, do not initiate AGENT DISCH. Request the ground crew to investigate and eliminate the smoke source.

Note : Expect the SMOKE warning to remain after agent discharge, even if the smoke source is extinguished. Gases from the smoke source are not evacuated, and smoke detectors are also sensitive to the extinguishing agent.
Order the ground crew not to open the door of the affected cargo compartment, unless the passengers have disembarked and fire services are present.

STATUS

INOP SYS
AFT CRG VENT
AFT CRG HEAT◁
(if aft affected)

CARGO SMOKE FWD (AFT) BTL SQUIB FAULT

Crew awareness.

R *Fire extinguishing capability is lost in the FWD (AFT) cargo compartment.*

SMOKE FWD (AFT) CRG DET FAULT

● **IF NO LIVE STOCK :**
– AFT ISOL VALVE (if aft affected) .... OFF

STATUS

INOP SYS
FWD (AFT)
CRG DET

SMOKE LAV + CRG DET FAULT

Both SDCU channels fail. Cargo and toilet smoke detection are lost.

- **IF NO LIVE STOCK :**
  - AFT ISOL VALVE . . . . OFF

STATUS

INOP SYS
SDCU

SMOKE LAVATORY SMOKE

Crew awareness.
R *Communication must be established with the cabin crew in order to follow up on the smoke*
R *origin and dissipation.*
R *Consider applying the SMOKE/FUMES/AVNCS SMOKE paper procedure.*

SMOKE LAVATORY DET FAULT

Toilet smoke detection is lost.
Crew awareness.

STATUS

INOP SYS
LAV DET

SMOKE FWD (AFT) CARGO SMOKE

LAND ASAP

Note : If the warning has been displayed temporarily, and no crew action has been taken, normal cargo ventilation may be recovered when ventilation is required for livestock transportation :
C/B of CARGO VENT controller (S20 on 122VU, or C7 on 49VU, as installed) .... PULL then PUSH

– FWD (AFT) ISOL VALVE .... OFF
If not automatically closed :
– AGENT .... DISCH
If the SMOKE warning is displayed on ground, with the cargo doors open, do not initiate AGENT DISCH. Request the ground crew to investigate and eliminate the smoke source.
Note : Expect the SMOKE warning to remain after agent discharge, even if the smoke source is extinguished. Gases from the smoke source are not evacuated, and smoke detectors are also sensitive to the extinguishing agent.
Order the ground crew not to open the door of the affected cargo compartment, unless the passengers have disembarked and fire services are present.

STATUS

INOP SYS
FWD CRG VENT (AFT)
FWD CRG HEAT (AFT)

SMOKE FWD (AFT) CRG BTL (1)(2◁) FAULT

Crew awareness.
R *If bottle 1 is lost, fire extinguishing capability is lost in the FWD (AFT) cargo compartment.*
R *If bottle 2 is lost, agent concentration will not be ensured after fire extinguishing.*

SMOKE FWD (AFT) CRG DET FAULT

● **IF NO LIVE STOCK :**
– FWD (AFT) ISOL VALVE .... OFF

STATUS

INOP SYS
FWD (AFT) CRG DET

SMOKE LAV + CRG DET FAULT

● **IF NO LIVE STOCK :**
– AFT ISOL VALVE .... OFF

STATUS

INOP SYS
SMOKE DET

SMOKE LAVATORY SMOKE

Crew awareness.
Communication must be established with the cabin crew in order to follow up on the smoke origin and dissipation.
Consider applying the SMOKE/FUMES/AVNCS SMOKE paper procedure.

SMOKE LAVATORY DET FAULT

Toilet smoke detection is lost.
Crew awareness.

STATUS

INOP SYS
LAV DET

SMOKE FWD (AFT) CARGO SMOKE

LAND ASAP

Note : If the warning has been displayed temporarily, and no crew action has been taken, normal cargo ventilation may be recovered when ventilation is required for livestock transportation :
C/B of CARGO VENT controller (S20 on 122VU, or C7 on 49VU, as installed) .... PULL then PUSH

R – AFT ISOL VALVE (if aft affected) .... OFF

● **IF FWD (AFT) CRG CLOSED (displayed on ground only)**

Order the ground crew not to open the door of the affected cargo compartment, unless the passengers have disembarked and fire services are present. Also ensure that the FWD (AFT) cargo door is closed before discharging the extinguishing agent.
If not automatically closed :

– AGENT .... DISCH

Note : Expect the SMOKE warning to remain after agent discharge, even if the smoke source is extinguished. Gases from the smoke source are not evacuated, and smoke detectors are also sensitive to the extinguishing agent.

STATUS

INOP SYS

R AFT CRG VENT
R AFT CRG HEAT ◁
(if aft affected)

SMOKE FWD (AFT) CRG BTL (1)(2◁) FAULT

Crew awareness.

If bottle 1 is lost, fire extinguishing capability is lost in the FWD (AFT) cargo compartment.
If bottle 2 is lost, agent concentration will not be ensured after fire extinguishing.

SMOKE FWD (AFT) CRG DET FAULT

● **IF NO LIVE STOCK :**

R – AFT ISOL VALVE (if aft affected) .... OFF

STATUS

INOP SYS

FWD (AFT)
CRG DET

R

SMOKE LAV + CRG DET FAULT

● **IF NO LIVE STOCK :**
– AFT ISOL VALVE .... OFF

STATUS

INOP SYS
SMOKE DET

SMOKE LAVATORY SMOKE

– CKPT/CAB COM .... ESTABLISH
Communication must be established with the cabin crew in order to follow up on the smoke origin and dissipation.
Consider applying the SMOKE/FUMES/AVNCS SMOKE paper procedure.

SMOKE LAVATORY DET FAULT

Toilet smoke detection is lost.
Crew awareness.

STATUS

INOP SYS
LAV DET

F/CTL FLAPS FAULT/LOCKED

● **If flaps locked** :
  – WING TIP BRK ON or ALIGNMENT FAULT
– MAX SPEED . . . . See page 3
Limit speed to the VFE corresponding to the next flap position.
– FLAPS LEVER (if flaps not locked) . . . . RECYCLE
● **If unsuccessful** :
See FCOM 3.02.10 for LANDING WITH SLATS OR FLAPS JAMMED.
The autopilot may be used down to 500 feet AGL. As it is not tuned for the abnormal configurations, its behaviour can be less than optimum and must be monitored.

STATUS

<u>APPR PROC</u>
– FOR LDG (if flaps ≤ 3) . . . USE FLAP 3
Do not select CONF FULL so as not to degrade handling qualities.
– FLAPS (if flaps>3) .. KEEP CONF FULL
– GPWS FLAP MODE (if flaps < 3) . OFF
– GPWS LDG FLAP 3 (if flaps ≥ 3) . . ON
APPR SPD . . . . See page 3
R LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
ENG 1 APPR IDLE ONLY (only in case of FLAPS FAULT)
ENG 2 APPR IDLE ONLY (only in case of FLAPS FAULT)
INCREASED FUEL CONSUMP (see page 3)
CAT 1 ONLY (a)

<u>INOP SYS</u>
FLAPS
AP 1+2 (a)
A/THR (a)
Moreover, both FDs are lost (a)

(a) If both flap channels fault.

F/CTL SLATS FAULT/LOCKED

– WING TIP BRK ON (if slats locked)
– MAX SPEED .... Refer to page 3
Speed is limited to the VFE corresponding to the next slat position.
– FLAPS LEVER (if slats not locked) .... RECYCLE

● **If unsuccessful** :

Refer to the FCOM 3.02.10 for LANDING WITH SLATS OR FLAPS JAMMED.
The autopilot may be used down to 500 feet AGL. As it is not tuned for abnormal configurations, its behavior could be less than optimum and must be monitored.
Note : If there is a SLATS FAULT after both slat channels fail, alternate law becomes active (see associated procedure).

● **If slats not at zero** :

– FUEL MODE SEL .... MAN
To allow CTR TK feeding.
– CTR TK PUMPS .... AS RQRD
Set CTR TK PUMPS to OFF, when the CTR TK is empty, or during approach.

STATUS

APPR PROC	INOP SYS
Maneuver with care. Do not exceed 10 degrees pitch attitude. – FOR LDG .... USE FLAP 3 *Do not select CONF FULL, so as not to degrade handling qualities.* – CTR TK PUMPS .... OFF – GPWS LDG FLAP 3 .... ON APPR SPD .... See page 3 R LDG DIST PROC .... APPLY R *Refer to the QRH Part 2, or to the FCOM 3.02.80.* CTR TK FEED : MAN ONLY ● **If both slat channels fail** : ALTN LAW : PROT LOST WHEN L/G DN : DIRECT LAW INCREASED FUEL CONSUMP (see page 3) CAT 1 ONLY (a)	F/CTL PROT (a) SLATS AP 1 + 2 (a) A/THR (a) Moreover, both FDs are lost (a).

(a) If both slat channels fail.

F/CTL FLAPS FAULT/LOCKED

● **If flaps locked** :

– WING TIP BRK ON or ALIGNMENT FAULT

– MAX SPEED . . . . See page 3

Limit speed to the VFE corresponding to the next flap position.

– FLAPS LEVER (if flaps not locked) . . . . RECYCLE

● **If unsuccessful** :

See FCOM 3.02.10 for LANDING WITH SLATS OR FLAPS JAMMED.
The autopilot may be used down to 500 feet AGL. As it is not tuned for the abnormal configurations, its behaviour can be less than optimum and must be monitored.

STATUS

APPR PROC

– FOR LDG (if flaps ≤ 3) . . . USE FLAP 3

Do not select CONF FULL so as not to degrade handling qualities.

– FLAPS (if flaps>3) .. KEEP CONF FULL

– GPWS FLAP MODE (if flaps < 3) . OFF

– GPWS LDG FLAP 3 (if flaps ≥ 3) . . ON

APPR SPD . . . . See page 3

R LDG DIST PROC . . . . APPLY

R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

ENG 1 APPR IDLE ONLY (only in case of FLAPS FAULT)

ENG 2 APPR IDLE ONLY (only in case of FLAPS FAULT)

INCREASED FUEL CONSUMP (see page 3)

CAT 1 ONLY (a)

INOP SYS

FLAPS
AP 1+2 (a)
A/THR (a)
Moreover, both FDs are lost (a)

(a) If both flap channels fault.

F/CTL SLATS FAULT/LOCKED

– WING TIP BRK ON (if slats locked)
– MAX SPEED . . . . Refer to page 3
Speed is limited to the VFE corresponding to the next slat position.
– FLAPS LEVER (if slats not locked) . . . . RECYCLE

● **If unsuccessful** :
Refer to the FCOM 3.02.10 for LANDING WITH SLATS OR FLAPS JAMMED.
The autopilot may be used down to 500 feet AGL. As it is not tuned for abnormal configurations, its behavior could be less than optimum and must be monitored.
Note : 1. If there is a SLATS FAULT after both slat channels fail, alternate law becomes active (see associated procedure).
2. If the slats are locked in clean configuration (less than 18 degrees), alternate law without protection is selected.

● **If slats not at zero :**
– FUEL MODE SEL . . . . MAN
To allow CTR TK feeding.
– CTR TK PUMPS . . . . AS RQRD
Set CTR TK PUMPS to OFF, when the CTR TK is empty, or during approach.

STATUS

APPR PROC
Maneuver with care. Do not exceed 10 degrees pitch attitude.
– FOR LDG . . . . USE FLAP 3
Do not select CONF FULL, so as not to degrade handling qualities.
– CTR TK PUMPS . . . . OFF
– GPWS LDG FLAP 3 . . . . ON
APPR SPD . . . . See page 3
R LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
CTR TK FEED : MAN ONLY
● **If both slat channels fail, or slats are locked in clean configuration** :
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
INCREASED FUEL CONSUMP (see page 3)
CAT 1 ONLY (a)

INOP SYS
F/CTL PROT (a)
SLATS
AP 1 + 2 (a)
A/THR (a)
Moreover, both FDs are lost (a).

(a) If both slat channels fail.

F/CTL FLAPS FAULT/LOCKED

● **If flaps locked :**
  – WING TIP BRK ON or ALIGNMENT FAULT
– MAX SPEED . . . . See page 3
Limit speed to the VFE corresponding to the next flap position.
– FLAPS LEVER (if flaps not locked) . . . . RECYCLE
● **If unsuccessful :**
See FCOM 3.02.10 for LANDING WITH SLATS OR FLAPS JAMMED.
The autopilot may be used down to 500 feet AGL. As it is not tuned for the abnormal configurations, its behaviour can be less than optimum and must be monitored.

STATUS

APPR PROC
– FOR LDG (if flaps ≤ 3) . . . USE FLAP 3
Do not select CONF FULL so as not to degrade handling qualities.
– FLAPS (if flaps>3) .. KEEP CONF FULL
– GPWS FLAP MODE (if flaps < 3) . OFF
– GPWS LDG FLAP 3 (if flaps ≥ 3) . . ON
APPR SPD . . . . See page 3
R LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
ENG 1 APPR IDLE ONLY (only in case of FLAPS FAULT)
ENG 2 APPR IDLE ONLY (only in case of FLAPS FAULT)
INCREASED FUEL CONSUMP (see page 3)
CAT 1 ONLY (a)

INOP SYS
FLAPS
AP 1+2 (a)
A/THR (a)
Moreover, both FDs are lost (a)

(a) If both flap channels fault.

F/CTL SLATS FAULT/LOCKED

– WING TIP BRK ON (if slats locked)
– MAX SPEED . . . . Refer to page 3
Speed is limited to the VFE corresponding to the next slat position.
– FLAPS LEVER (if slats not locked) . . . . RECYCLE

● **If unsuccessful** :
Refer to the FCOM 3.02.10 for LANDING WITH SLATS OR FLAPS JAMMED.
The autopilot may be used down to 500 feet AGL. As it is not tuned for abnormal configurations, its behavior could be less than optimum and must be monitored.
Note : 1. If there is a SLATS FAULT after both slat channels fail, alternate law becomes active (see associated procedure).
2. If the slats are locked in clean configuration (less than 18 degrees), alternate law without protection is selected.

STATUS

APPR PROC
Maneuver with care. Do not exceed 10 degrees pitch attitude.
– FOR LDG . . . . USE FLAP 3
Do not select CONF FULL, so as not to degrade handling qualities.
– GPWS LDG FLAP 3 . . . . ON
APPR SPD . . . . See page 3
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
● **If both slat channels fail, or slats are locked in clean configuration** :
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
INCREASED FUEL CONSUMP (see page 3)
CAT 1 ONLY (a)

INOP SYS
F/CTL PROT (a)
SLATS
AP 1 + 2 (a)
A/THR (a)
Moreover, both FDs are lost (a).

(a) If both slat channels fail.

FLAPS/SLATS FAULT/LOCKED

<table>
<tr><th colspan="6">MAX SPEED</th></tr>
<tr><th>Flaps (1)
Slats (1)</th><th>F = 0</th><th>0 < F ≤ 1</th><th>1 < F ≤ 2</th><th>2 < F ≤ 3</th><th>F > 3</th></tr>
<tr><td>S = 0</td><td>NO LIMITATION</td><td rowspan="2">215 kt</td><td rowspan="3">200 kt</td><td rowspan="3">185 kt</td><td rowspan="2">Not allowed (177 kt)</td></tr>
<tr><td>0 < S ≤ 1</td><td>230 kt</td></tr>
<tr><td>1 < S ≤ 3</td><td colspan="2">200 kt</td><td></td></tr>
<tr><td>S > 3</td><td colspan="5">177 kt</td></tr>
</table>

<table>
<tr><th colspan="6">APPR SPD</th></tr>
<tr><th>Flaps (1)
Slats (1)</th><th>F = 0</th><th>0 < F < 1</th><th>1 ≤ F < 2</th><th>2 ≤ F < 3</th><th>F ≥ 3</th></tr>
<tr><td>S = 0</td><td>VREF + 60 (Appr)
VREF + 50
(Touch Down)</td><td></td><td rowspan="2">VREF + 30</td><td rowspan="2">VREF + 25</td><td rowspan="2">(FLAPS > 3 not allowed)
VREF + 25</td></tr>
<tr><td>0 < S < 1</td><td colspan="2">VREF + 45</td></tr>
<tr><td>1 ≤ S ≤ 3</td><td colspan="2" rowspan="2">VREF + 25</td><td rowspan="2">VREF + 15</td><td rowspan="2">VREF + 10</td><td>VREF + 10</td></tr>
<tr><td>S > 3</td><td>VREF + 5</td></tr>
</table>

(1) Slats/Flaps position displayed on the upper ECAM display.

CAUTION

For flight with SLATS or FLAPS extended, fuel consumption is increased.
Refer to the fuel flow indication.
As a guideline, determine the fuel consumption in clean configuration, at the same altitude without airspeed limitation (e.g. from ALTERNATE FLIGHT PLANNING tables), and multiply this result by 1.6 (SLATS EXTENDED), or 1.8 (FLAPS EXTENDED), or 2 (SLATS and FLAPS EXTENDED) to obtain the fuel consumption required to reach the destination in the current configuration.

SLATS and FLAPS FAULT in Conf 0

– FLAPS LEVER . . . . RECYCLE

● **If both slat channels fail :**

<u>F/CTL</u> ALTN LAW

(PROT LOST)
MAX SPEED . . . . 320 KT

STATUS

R ● **If both slat channels fail :**
R MAX SPEED . . . . 320 KT
R ALTN LAW : PROT LOST

<u>APPR PROC</u>

– FOR LDG . . . . USE FLAP 1
With FLAPS lever set at 1, AP/FD GO AROUND mode is available.
– CTR TK PUMPS . . . . OFF
– GPWS FLAP MODE . . . . OFF
APPR SPD . . . . VREF + 60 KT
Approach with A/THR in selected mode is recommended.

R ● **If both slat channels fail :**
WHEN L/G DN : DIRECT LAW

● **AT 300 FT AGL :**
TARGET SPD . . . . VREF + 50
Reduce speed between 500 and 300 feet to reach VREF + 50 knots at runway threshold and disconnect A/THR, as the target speed may be below VLS.
LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2 or, to the FCOM 3.02.80.

ENG 1 APPR IDLE ONLY (b)
R ENG 2 APPR IDLE ONLY (b)
CAT 1 ONLY (a)

<u>INOP SYS</u>

F/CTL PROT (c)
SLATS
FLAPS
AP 1 + 2 (a)
A/THR (a)
Moreover, both FDs are lost (a)

(a) If both slat or flap channels fail.
(b) only in case of FLAPS FAULT.
(c) If both slat channels fail.

R

FLAPS/SLATS FAULT/LOCKED

R

<table>
<tr><th colspan="6">MAX SPEED</th></tr>
<tr><th>Flaps (1)
Slats (1)</th><th>F = 0</th><th>0 < F ≤ 1</th><th>1 < F ≤ 2</th><th>2 < F ≤ 3</th><th>F > 3</th></tr>
<tr><td>S = 0</td><td>NO LIMITATION</td><td rowspan="2">215 kt</td><td rowspan="3">200 kt</td><td rowspan="3">185 kt</td><td rowspan="2">Not allowed
(177 kt)</td></tr>
<tr><td>0 < S ≤ 1</td><td>230 kt</td></tr>
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VREF + 50
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VREF + 25</td></tr>
<tr><td>0 < S < 1</td><td colspan="2">VREF + 45</td></tr>
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(1) Slats/Flaps position displayed on the upper ECAM display.

CAUTION

For flight with SLATS or FLAPS extended, fuel consumption is increased.
Refer to the fuel flow indication.
As a guideline, determine the fuel consumption in clean configuration, at the same altitude without airspeed limitation (e.g. from ALTERNATE FLIGHT PLANNING tables), and multiply this result by 1.6 (SLATS EXTENDED), or 1.8 (FLAPS EXTENDED), or 2 (SLATS and FLAPS EXTENDED) to obtain the fuel consumption required to reach the destination in the current configuration.

SLATS and FLAPS FAULT in Conf 0

– FLAPS LEVER . . . . RECYCLE

● **If both slat channels fail :**

F/CTL ALTN LAW

(PROT LOST)
MAX SPEED . . . . 320 KT

STATUS

R ● **If both slat channels fail :**
R MAX SPEED . . . . 320 KT
R ALTN LAW : PROT LOST
APPR PROC
– FOR LDG . . . . USE FLAP 1
With FLAPS lever set at 1, AP/FD GO AROUND mode is available.
– CTR TK PUMPS . . . . OFF
– GPWS FLAP MODE . . . . OFF
APPR SPD . . . . VREF + 60 KT
Approach with A/THR in selected mode is recommended.
R ● **If both slat channels fail :**
WHEN L/G DN : DIRECT LAW
● **AT 300 FT AGL :**
TARGET SPD . . . . VREF + 50
Reduce speed between 500 and 300 feet to reach VREF + 50 knots at runway threshold and disconnect A/THR, as the target speed may be below VLS.
LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2 or, to the FCOM 3.02.80.
ENG 1 APPR IDLE ONLY (b)
R ENG 2 APPR IDLE ONLY (b)
CAT 1 ONLY (a)

INOP SYS
F/CTL PROT (c)
SLATS
FLAPS
AP 1 + 2 (a)
A/THR (a)
Moreover, both FDs are lost (a)

(a) If both slat or flap channels fail.
(b) only in case of FLAPS FAULT.
(c) If both slat channels fail.

FLAPS/SLATS FAULT/LOCKED

<table>
<tr><th colspan="6">MAX SPEED</th></tr>
<tr><th>Flaps (1)
Slats (1)</th><th>F = 0</th><th>0 < F ≤ 1</th><th>1 < F ≤ 2</th><th>2 < F ≤ 3</th><th>F > 3</th></tr>
<tr><td>S = 0</td><td>NO LIMITATION</td><td colspan="2" rowspan="3">215 kt</td><td rowspan="3">195 kt</td><td rowspan="2">Not allowed
(190 kt)</td></tr>
<tr><td>0 < S ≤ 1</td><td>230 kt</td></tr>
<tr><td>1 < S ≤ 3</td><td>215 kt</td><td></td></tr>
<tr><td>S > 3</td><td colspan="5">190 kt</td></tr>
</table>

<table>
<tr><th colspan="6">APPR SPD</th></tr>
<tr><th>Flaps (1)
Slats (1)</th><th>F = 0</th><th>0 < F < 1</th><th>1 ≤ F < 2</th><th>2 ≤ F < 3</th><th>F ≥ 3</th></tr>
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VREF + 50
(Touch Down)</td><td></td><td rowspan="2">VREF + 30</td><td rowspan="2">VREF + 25</td><td rowspan="2">(FLAPS > 3
not
allowed)
VREF + 25</td></tr>
<tr><td>0 < S < 1</td><td colspan="2">VREF + 45</td></tr>
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</table>

(1) Slats/Flaps position displayed on the upper ECAM display.

CAUTION

For flight with SLATS or FLAPS extended, fuel consumption is increased.
Refer to the fuel flow indication.
As a guideline, determine the fuel consumption in clean configuration, at the same altitude without airspeed limitation (e.g. from ALTERNATE FLIGHT PLANNING tables), and multiply this result by 1.6 (SLATS EXTENDED), or 1.8 (FLAPS EXTENDED), or 2 (SLATS and FLAPS EXTENDED) to obtain the fuel consumption required to reach the destination in the current configuration.

SLATS and FLAPS FAULT in Conf 0

– FLAPS LEVER . . . . RECYCLE

● **If both slat channels fail :**

F/CTL ALTN LAW

(PROT LOST)
MAX SPEED . . . . 320 KT

STATUS

● **If both slat channels fail :**
MAX SPEED . . . . 320 KT
ALTN LAW : PROT LOST

APPR PROC
– FOR LDG . . . . USE FLAP 1
With FLAPS lever set at 1, AP/FD GO AROUND mode is available.
– GPWS FLAP MODE . . . . OFF
APPR SPD . . . . VREF + 60 KT
Approach with A/THR in selected mode is recommended.

● **If both slat channels fail :**
WHEN L/G DN : DIRECT LAW

● **AT 300 FT AGL :**
TARGET SPD . . . . VREF + 50
Reduce speed between 500 and 300 feet to reach VREF + 50 knots at runway threshold and disconnect A/THR, as the target speed may be below VLS.
LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.

ENG 1 APPR IDLE ONLY(b)
R ENG 2 APPR IDLE ONLY(b)
CAT 1 ONLY (a)

INOP SYS
F/CTL PROT (c)
SLATS
FLAPS
AP 1 + 2 (a)
A/THR (a)
Moreover, both FDs are lost (a)

(a) If both slat or flap channels fail.
(b) Only in case of FLAPS FAULT.
(c) If both slat channels fail.

F/CTL SLAT SYS 1(2) FAULT

Crew awareness

STATUS

SLATS SLOW

F/CTL FLAP SYS 1(2) FAULT

● **If FLAP sys 1 fault**
– GPWS FLAP MODE . . . . OFF

STATUS

ENG 1(2) APPR IDLE ONLY
FLAPS SLOW

F/CTL SLAT (FLAP) TIP BRK FAULT

Failure of one slat or flap wingtip brake.
Crew awareness

F/CTL L (R) SIDESTICK FAULT

Crew awareness

F/CTL FLAP ATTACH SENSOR

Failure of flap attachment failure detection sensor.
Crew awareness

R ## CONFIG SLATS (FLAPS) NOT IN T.O CONFIG

R Crew awareness.

F/CTL ELAC 1 (2) FAULT

■ **One computer failed :**

CAUTION
Do not reset ELAC, if uncommanded maneuvers occurred during the flight.

– ELAC (affected) . . . . OFF THEN ON

Note : 1. In some cases of sidestick transducer failure, ELAC 1(2) FAULT is triggered without the procedure, and the FAULT light on the associated pushbutton does not come on.

R *2. If the ELAC 1 computer is reset on ground, the pitch trim returns to the*
R *ground setting position (0°).*

● **IF UNSUCCESSFUL :**

– ELAC (affected) . . . . OFF

Functions are performed by the other ELAC. LAF is degraded (A320 with LAF only).

STATUS

CAT 3 SINGLE ONLY

INOP SYS
ELAC 1(2)
CAT 3 DUAL

■ **Both computers failed :**

– ELAC 1 . . . . OFF THEN ON

R *Note : If the ELAC 1 computer is reset on ground, the pitch trim returns to the ground*
R *setting position (0°).*

– ELAC 2 . . . . OFF THEN ON

● **If both ELAC FAULT remain :**

– ELAC 1 . . . . OFF
– ELAC 2 . . . . OFF

F/CTL ALTN LAW

(PROT LOST)

Pitch and roll normal laws are lost : Refer to the F/CTL ALTN LAW procedure.
THS motor 1 and both ailerons are lost.
LAF is degraded and uses spoilers only (A320 only).

MAX SPEED . . . . 320 KT

F/CTL ELAC 1 (2) FAULT (CONT'D)

STATUS

MAX SPEED . . . . 320 KT
APPR PROC
– FOR LDG . . . . USE FLAP 3
Do not select CONF FULL, so as not to degrade handling qualities.
– GPWS LDG FLAP 3 . . . . ON
Will be displayed when flaps in CONF 3
APPR SPD . . . . VREF + 10 KT
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
ALTN LAW : PROT LOST
WHEN L/G DOWN : DIRECT LAW
At landing gear extension, control reverts to direct law in pitch, as well as in roll (Refer to DIRECT LAW procedure).
CAT 1 ONLY

INOP SYS
F/CTL PROT
L + R AIL
ELAC 1 + 2
AP 1 + 2

F/CTL ELAC 1(2) PITCH FAULT

Crew awareness
Pitch function is achieved by the other ELAC.

STATUS

CAT 3 SINGLE ONLY

INOP SYS
ELAC PITCH (if ELAC 1 and 2 PITCH FAULT)
CAT 3 DUAL

F/CTL SEC 1 (2) (3) FAULT

– SEC (affected) . . . . OFF THEN ON

● **IF UNSUCCESSFUL :**

– SEC (affected) . . . . OFF

Associated spoilers are lost. If SEC 1 or 2 fails, LAF is degraded (A320 with LAF only). If all spoilers are inoperative (3 SECs failed), roll direct law and pitch alternate law become active.

– SPD BRK (if SEC 1 affected) . . . . DO NOT USE

VLS would not be corrected, if speedbrakes 2 extend (no speedbrake position sent to FACs).

F/CTL ALTN LAW (c)

(PROT LOST) (c)

STATUS

– SPD BRK . . . . DO NOT USE

(If SEC 1 is affected).

– FOR LDG . . . . USE FLAP 3 (c)

APPR SPD . . . . VREF + 10 (c)

LDG DIST PROC . . . . APPLY

(Not displayed, if only SEC 2 is affected).

R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

ALTN LAW : PROT LOST(c)

WHEN L/G DN : DIRECT LAW(c)

R *When the three SECs are lost, the LGCIU information can no*
R *longer be sent to the ELAC. This prevents activation of DIRECT*
R *law upon landing gear extension. So, the aircraft will revert to*
R *DIRECT law, when slats are extended.*

INOP SYS

F/CTL PROT(c)
SPLR (associated)
SEC (affected)
REVERSER 1(2)(b)
AUTO BRK (a)

(a) If at least 2 SECs fail.
(b) If SEC 1 + 2 fail, reverser 1 is not available for landing.
If SEC 1 + 3 fail, reverser 2 is not available for landing.
(c) If SEC 1 + 2 + 3 fail.

CONFIG SPD BRK NOT RETRACTED

Crew awareness.

F/CTL DIRECT LAW

PFD displays « USE MAN PITCH TRIM » in amber. See the FCOM 3.04.27 for flight characteristics.

(PROT LOST)

Note : In case of GPWS (EGPWS ◁) alerts, since protections are lost, respect stall warning when applying the GPWS (EGPWS ◁) procedure.

MAX SPEED 320/.77

Speed is limited, due to the loss of high-speed protection. Do not exceed M .77, so as not to degrade handling qualities.

– MAN PITCH TRIM (except if HYD Y + G SYS LO PR) . . . USE

Automatic trim is inoperative in direct law.

MANEUVER WITH CARE

Use small control inputs at high speed, since in direct law the controls are powerful. Use of manual thrust is recommended. Avoid large thrust changes.

USE SPD BRK WITH CARE

At high Mach numbers, use speedbrakes with care to avoid too strong nose up changes.

STATUS

MAX SPEED 320/.77
MANEUVER WITH CARE
USE SPD BRK WITH CARE
APPR PROC
– FOR LDG . . . . USE FLAPS 3
– GPWS LDG FLAP 3 . . . . ON
MAN PITCH TRIM . . . . USE
APPR SPD . . . . VREF + 10
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
DIRECT LAW

INOP SYS
F/CTL PROT

CONFIG L (R) SIDESTICK FAULT

BY TAKE OVER

The warning is triggered, when on the ground, if either stick is inoperative (takeover pushbutton pressed more than 30 seconds).

– L (R) TAKEOVER . . . . DEPRESS

The affected stick becomes operative.

CONFIG PITCH TRIM NOT IN T.O RANGE

Crew awareness.

F/CTL ALTN LAW

See the FCOM 3.04.27 for flight characteristics.
With the autopilot engaged, the FMGC (AP mode) controls the aircraft.

(PROT LOST)

All protections, except maneuver protections, are lost.
Depending on the failure, static stability may be introduced.
Note : In case of GPWS (EGPWS ◁) alerts, since protections are lost, respect stall warnings when applying the GPWS (EGPWS ◁) procedure.

MAX SPEED . . . . 320 KT

(320/.77, if dual hydraulic system low pressure).
Speed is limited to 320/.82 or 320/.77 for dual hydraulic failure, due to the loss of high-speed protection.

– SPD BRK (if L or R elevator fault) . . . . DO NOT USE

STATUS

MAX SPEED . . . . 320 KT
(320/.77, if dual hydraulic system low pressure).
– SPD BRK (if L or R elevator fault) . . . DO NOT USE
APPR PROC
- FOR LDG . . . . USE FLAP 3
- GPWS LDG FLAP 3 . . . . ON

APPR SPD . . . . VREF + 10
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to FCOM 3.02.80.*

● **If no AP engaged :**
WHEN L/G DN : DIRECT LAW
At landing gear extension, control reverts to direct law in pitch, as well as in roll.
See the DIRECT LAW procedure.

● **If AP engaged :**
WHEN L/G DN AND AP OFF : DIRECT LAW
If the autopilot is disengaged :
- *Before landing gear extension, flight control alternate law is active.*
- *After landing gear extension, flight control direct law is active.*

See the DIRECT LAW procedure.

ALTN LAW : PROT LOST

INOP SYS
F/CTL PROT

CONFIG RUD TRIM NOT IN T.O RANGE

Crew awareness.

F/CTL FCDC FAULT

■ **FCDC 1(2) FAULT :**

Crew awareness

STATUS

INOP SYS
FCDC 1(2)

■ **FCDC 1 + 2 FAULT :**

– MONITOR F/CTL OVHD PNL

F/CTL data on the ECAM is lost.
Control laws remain normal.
Note : When both FCDCs fail :
- *F/CTL warnings are not available on the ECAM.*
- *Stall warning may be triggered as in alternate or direct law (it may occur at speeds greater than Vα max).*
- *Bank and pitch limits are no longer displayed on the PFD.*
- *Vα prot, Vα max are lost on the PFD.*
- *Vsw, displayed on the PFD, corresponds to the stall warning of the alternate and direct law.*

STATUS

F/CTL INDICATIONS LOST

INOP SYS
FCDC 1 + 2

F/CTL AIL SERVO FAULT

Crew awareness
LAF is degraded (A320 only).

F/CTL L (R) AIL FAULT

Crew awareness
LAF is degraded and uses spoilers only (A320 only).

STATUS

R *Note : With one or both aileron fault(s), fuel consumption*
R *increases by approximately 6 %.*

INOP SYS
L (R) AIL

F/CTL L + R ELEV FAULT

MAX SPEED 320/.77
Due to loss of high speed protections.
– MAN PITCH TRIM .... USE
Only manual trim is available for pitch control.
– SPD BRK .... DO NOT USE
Do not use speedbrakes, because it is difficult to control the induced pitch moment with manual pitch trim only.

STATUS

MAX SPEED 320/.77
SPD BRK .... DO NOT USE
APPR PROC
– FOR LDG .... USE FLAP 3
Do not select CONF FULL, so as not to degrade handling qualities.
– GPWS LDG FLAP 3 .... ON
Will be displayed when flaps in CONF 3.
– MAN PITCH TRIM .... USE
APPR SPD .... VREF + 10
LDG DIST PROC .... APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
PITCH MECH BACK UP
ROLL DIRECT LAW
CAT 1 ONLY

INOP SYS
L + R ELEV
ELAC PITCH
LAF (A320 with LAF only)
AP 1 + 2

F/CTL ELEV SERVO FAULT

Crew awareness
The remaining servojack controls the elevator.

CAUTION
Do not use speedbrakes above 350 KT/M 0.82 (VMO/MMO).

STATUS

CAT 3 SINGLE ONLY

INOP SYS
CAT 3 DUAL

F/CTL L (R) ELEV FAULT

F/CTL ALTN LAW (PROT LOST)

Note : If the L(R) elevator fails, the ELACs loose pitch control through the elevator. Therefore, the SECs control pitch in alternate law. This is not the case, if the right elevator is lost, due to the failure of B+Y hydraulic circuits. Pitch normal law remains active in ELAC.

MAX SPEED . . . . 320 KT

Speed is limited, due to the loss of high-speed protection.

– SPD BRK . . . . DO NOT USE

STATUS

MAX SPEED . . . . 320 KT

SPD BRK . . . . DO NOT USE

APPR PROC

- FOR LDG . . . . USE FLAP 3

  Do not select CONF FULL, so as not to degrade handling qualities.
- GPWS LDG FLAP 3 . . . . ON

  Will be displayed, when flaps in CONF 3.

APPR SPD . . . . VREF + 10 KT

LDG DIST PROC . . . . APPLY

R *Refer to the QRH part 2, or to the FCOM 3.02.80.*

ALTN LAW : PROT LOST

WHEN L/G DN : DIRECT LAW

At landing gear extension, control reverts to direct law in pitch, as well as in roll. Refer to the DIRECT LAW procedure.

CAT 1 ONLY

INOP SYS

F/CTL PROT

L (R) ELEV

ELAC PITCH

AP 1 + 2

F/CTL L (R) ELEV FAULT

F/CTL ALTN LAW (PROT LOST)

Note : If the L(R) elevator fails, the ELACs loose pitch control through the elevator. Therefore, the SECs control pitch in alternate law. This is not the case, if the right elevator is lost, due to the failure of B+Y hydraulic circuits. Pitch normal law remains active in ELAC.

MAX SPEED . . . . 320 KT

Speed is limited, due to the loss of high-speed protection.

– SPD BRK . . . . DO NOT USE

STATUS

MAX SPEED . . . . 320 KT

SPD BRK . . . . DO NOT USE

APPR PROC

- FOR LDG . . . . USE FLAP 3

  Do not select CONF FULL, so as not to degrade handling qualities.
- GPWS LDG FLAP 3 . . . . ON

  Will be displayed, when flaps in CONF 3.

APPR SPD . . . . VREF + 15 KT

LDG DIST PROC . . . . APPLY

R *Refer to the QRH part 2, or to the FCOM 3.02.80.*

ALTN LAW : PROT LOST

WHEN L/G DN : DIRECT LAW

At landing gear extension, control reverts to direct law in pitch, as well as in roll. Refer to the DIRECT LAW procedure.

CAT 1 ONLY

INOP SYS

F/CTL PROT
L (R) ELEV
ELAC PITCH
AP 1 + 2

F/CTL SPLR FAULT

Loss of one or more spoilers.

Note : If heavy vibrations are felt, CONF 3 may be used for landing in order to reduce the buffeting.

– SPD BRK (if spoilers 3 + 4 affected) . . . . DO NOT USE

Do not use speedbrakes, since using only surfaces N° 2 is not efficient and would activate the SPD BRK DISAGREE caution.

STATUS

● **If spoilers 3 + 4 affected :**

– SPD BRK . . . . DO NOT USE

LDG DIST PROC . . . . APPLY

See GND SPLR FAULT below.

INOP SYS

SPLR (affected)

SPD BRK (if spoilers 2 + 3 + 4 affected)

F/CTL GND SPLR / 1 + 2 / 3 + 4 / FAULT

Crew awareness.

- **GND SPLR FAULT** :

  Loss of ground spoiler function in SEC 1 + 3, or 1 + 2, or 2 + 3, or 1 + 2 + 3.
- **GND SPLR 1 + 2 (3 + 4) FAULT** :

  Loss of ground spoiler function in SEC 3 (or 1).

STATUS

– LDG DIST PROC . . . . APPLY

R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

INOP SYS

GND SPLR
(affected)

F/CTL SPD BRK DISAGREE

■ **Surfaces 3 + 4 affected**

Surfaces' position not in agreement with the handle position.

– SPD BRK LEVER . . . . RETRACT

– SPD BRK . . . . DO NOT USE

STATUS

– SPD BRK . . . . DO NOT USE

INOP SYS

SPD BRK 3 + 4

■ **Surfaces 2 + 3 + 4 affected :**

After automatic retraction (due to activation of alpha protection or slats/flaps in configuration FULL), surface position is not in agreement with the handle position.

– SPD BRK LEVER . . . . RETRACT

F/CTL SPD BRK FAULT or SPD BRK 2 (3 + 4) FAULT

Loss of speedbrake surfaces, due to failure of the speedbrake lever transducer(s). In addition, associated ground spoilers are only available through reverse selection.

– SPD BRK (if SPD BRK 3 + 4 affected) . . . . DO NOT USE

Do not use speedbrakes, since it is not efficient to use only Surface n° 2, and would activate the SPD BRK DISAGREE caution.

STATUS

R – SPD BRK . . . . DO NOT USE

(if SPD BRK 3 + 4 affected)

LDG DIST PROC . . . . APPLY

R *If reversers are not used, refer to the QRH Part 2, or to the*
R *FCOM 3.02.80.*

INOP SYS

SPD BRK
(affected)

F/CTL SIDESTICK PRIORITY

A failure is detected in the sidestick priority logic circuit.

– CHECK PRIORITY LOGIC

Check the integrity of flight control priority, as follows (not displayed on ECAM) :

– ELAC 1 . . . . OFF THEN ON

R *Note : When the ELAC 1 computer is reset on ground, the pitch trim returns to the*
R *ground setting position (0°).*

– ELAC 2 . . . . OFF THEN ON

● **If the warning disappears :**

– CAPT TAKE OVER pb . . . . PRESS (at least 3 seconds)

Check that the :

– Aural “priority left” message is activated.

– F/O red arrow light is on.

– CAPT TAKE OVER pb . . . . RELEASE

– F/O TAKE OVER pb . . . . PRESS (at least 3 seconds)

Check that the :

– Aural “priority right” message is activated

– CAPT red arrow light is on.

– F/O TAKE OVER pb . . . . RELEASE

– Check that the warning does not reappear.

Note : There is no need to move the sidestick for the check.

● **If the warning does not disappear, or if the warning reappears after the above check :**

Maintenance action is due.

F/CTL STABILIZER JAM

When the ELACs detect a stabilizer jam, the pitch control law reverts to alternate law.

– MAN PITCH TRIM . . . . CHECK

The force needed on the PITCH TRIM wheel may be higher than during pre-takeoff manual setting.

● **IF MAN TRIM AVAIL** :

– TRIM FOR NEUTRAL ELEV

If manual pitch trim is available, trim to maintain the elevator at the zero position (indications on ECAM F/CTL page).

F/CTL ALTN LAW

(PROT LOST)
MAX SPEED . . . . 320 KT

STATUS

R MAX SPEED . . . . 320 KT

APPR PROC :

– FOR LDG . . . . USE FLAP 3

Do not select configuration FULL, so as not to degrade the handling qualities.

– GPWS LDG FLAP 3 . . . . ON

Will be displayed when flaps in CONF 3

● **IF MAN TRIM NOT AVAIL** :

● **WHEN CONF 3 AND VAPP** :

– L/G . . . . DN

Landing gear extension is delayed, in order to delay the switching to direct law.

APPR SPD : . . . . VREF + 10 KT
LDG DIST PROC . . . . APPLY

R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW

At landing gear extension, control reverts to direct law in pitch, as well as in roll. Refer to DIRECT LAW procedure.

CAT 1 ONLY

INOP SYS

F/CTL PROT
STABILIZER
ELAC PITCH
AP 1 + 2

STABILIZER JAM

The ELACs may not detect a stabilizer jam when the pitch trim wheel is jammed.
The flight control normal law remains active in this case and there is no ECAM warning.
Apply the following procedure.

– AP . . . . OFF

– MAN PITCH TRIM . . . . CHECK

The pitch trim wheel may not be fully jammed, the force needed may be higher than pre-takeoff manual setting.

● **IF MAN TRIM AVAIL** :

– TRIM FOR NEUTRAL ELEV

If manual pitch trim is available, trim to maintain the elevator at the zero position (indications on ECAM F/CTL page).

APPR PROC

● **IF MAN TRIM NOT AVAIL** :

– FOR LDG . . . . USE FLAP 3

Do not select configuration full so as not to degrade the handling qualities.

– GPWS LDG FLAP 3 . . . . ON

CAT 1 ONLY

F/CTL RUDDER JAM

Rudder jamming may be detected by undue (and adverse) pedal movement during rolling maneuvers.
This is because the yaw damper orders can no longer be sent to the rudder, but are fed back to the pedals.
Use ECAM F/CTL page for a visual check of the rudder position.

FOR APPROACH

- AVOID LANDING WITH CROSSWIND from the side where the rudder is deflected.
- MAX CROSSWIND 15 KT
- FOR LDG .... USE NORMAL CONF
- SPEED AND TRAJECTORY .... STABILIZE ASAP

ON GROUND

- DIFFERENTIAL BRAKING .... USE ASAP
  Do not use asymmetric reverse thrust
  Use nosewheel steering handle below 70 kt.

NON-RETRACTION OF SPEEDBRAKES

Non-retraction of speedbrakes may be detected, if there is no flight parameter change after the selection of speedbrake retraction.
Use the ECAM F/CTL page for a visual check of the speedbrakes. Speedbrakes will automatically retract upon selection of CONF FULL for the A319/A320 or upon selection of CONF 3 or FULL for A321.
Note : Fuel consumption is increased by about 1.6 %, when flying with the speedbrakes
R *extended.*

F/CTL SPD BRK STILL OUT

Flight crew awareness.
Speedbrakes are out, with at least one engine not at idle.

R

ACTIVE CONTROL LAW

ACTIVE LAW ►	PITCH		ROLL	YAW
SYS FAILED ▼	LAW	PROTEC		
ELAC 1 or 2 or SEC 1 or 2	NORM	NORM	NORM	NORM
ELAC 1 and 2 or both ailerons	ALTN	REDUCED	DIRECT	ALTN
2 SEC	NORM	NORM	NORM	NORM
3 SEC	ALTN	REDUCED	DIRECT	ALTN
2 FAC	ALTN	REDUCED	DIRECT	MECH
Yaw damper	ALTN	REDUCED	DIRECT	MECH
2 SFCC (slat channel)	ALTN	NO	DIRECT	ALTN
2 ADR or 2 IR (2nd self detected)	ALTN	REDUCED	DIRECT	ALTN
2 ADR (2nd not self detec.)	ALTN	NO – – – – – REDUCED (1)	DIRECT	ALTN
2 IR (2nd not self detec.)	DIRECT – – – – – ALTN (2)	NO – – – – – REDUCED (2)	DIRECT	MECH – – – – – ALTN (2)
3 ADR	ALTN	NO	DIRECT	MECH
3 IR	DIRECT	NO	DIRECT	MECH
2 RADIO ALT	NORM – – – – – DIRECT (4)	NORM – – – – – NO (4)	NORM – – – – – DIRECT (4)	NORM – – – – – MECH (4)
SPOILER 4 or 5 or (4 and 5)	NORM	NORM	NORM	NORM
All SPOILERS	ALTN	REDUCED	DIRECT	ALTN
1 AIL SERVO or 1 AILERON	NORM	NORM	NORM	NORM
1 ELEV SERVO	NORM	NORM	NORM	NORM
1 ELEVATOR	ALTN	NO	DIRECT	ALTN
THS (jammed) (5)	NORM	NORM	NORM	NORM
	ALTN	REDUCED	DIRECT	ALTN
HYD G or Y or B	NORM	NORM	NORM	NORM
HYD G + Y	ALTN	REDUCED	DIRECT	MECH
HYD G + B	ALTN	NO	DIRECT	ALTN
HYD Y + B	NORM	NORM	NORM	NORM
on BATTERIES	ALTN	REDUCED	DIRECT	MECH
on EMER GEN	ALTN	REDUCED	DIRECT	MECH – – – – – ALTN (3)

(1) In case of AOA disagree
(2) After the faulty IR is selected OFF
(3) After FAC 1 is reset
(4) When landing gear down (or CONF 2, if both LGCIUs faulty)
(5) Depending where the failure is, control law may revert to alternate law

F/CTL RUDDER JAM

Rudder jamming may be detected by undue (and adverse) pedal movement during rolling maneuvers.
This is because the yaw damper orders can no longer be sent to the rudder, but are fed back to the pedals.
Use ECAM F/CTL page for a visual check of the rudder position.

FOR APPROACH

- AVOID LANDING WITH CROSSWIND from the side where the rudder is deflected.
- MAX CROSSWIND 15 KT
- FOR LDG . . . . USE NORMAL CONF
- SPEED AND TRAJECTORY . . . . STABILIZE ASAP

ON GROUND

- DIFFERENTIAL BRAKING . . . . USE ASAP
  Do not use asymmetric reverse thrust
  Use nosewheel steering handle below 70 kt.

NON-RETRACTION OF SPEEDBRAKES

Non-retraction of speedbrakes may be detected, if there is no flight parameter change after the selection of speedbrake retraction.
Use the ECAM F/CTL page for a visual check of the speedbrakes. Speedbrakes will automatically retract upon selection of CONF FULL for the A319/A320 or upon selection of CONF 3 or FULL for A321.
Note : Fuel consumption is increased by about 1.6 %, when flying with the speedbrakes extended.

F/CTL FLAP LVR NOT ZERO

Flight crew awareness.
The flap lever is not in the zero position, and the aircraft is above 22 000 ft.

F/CTL SPD BRK STILL OUT

Flight crew awareness.
Speedbrakes are out, with at least one engine not at idle.

R

ACTIVE CONTROL LAW

ACTIVE LAW ►	PITCH		ROLL	YAW
SYS FAILED ▼	LAW	PROTEC		
ELAC 1 or 2 or SEC 1 or 2	NORM	NORM	NORM	NORM
ELAC 1 and 2 or both ailerons	ALTN	REDUCED	DIRECT	ALTN
2 SEC	NORM	NORM	NORM	NORM
3 SEC	ALTN	REDUCED	DIRECT	ALTN
2 FAC	ALTN	REDUCED	DIRECT	MECH
Yaw damper	ALTN	REDUCED	DIRECT	MECH
2 SFCC (slat channel)	ALTN	NO	DIRECT	ALTN
2 ADR or 2 IR (2nd self detected)	ALTN	REDUCED	DIRECT	ALTN
2 ADR (2nd not self detec.)	ALTN	NO – – – – – REDUCED (1)	DIRECT	ALTN
2 IR (2nd not self detec.)	DIRECT – – – – – ALTN (2)	NO – – – – – REDUCED (2)	DIRECT	MECH – – – – – ALTN (2)
3 ADR	ALTN	NO	DIRECT	MECH
3 IR	DIRECT	NO	DIRECT	MECH
2 RADIO ALT	NORM – – – – – DIRECT (4)	NORM – – – – – NO (4)	NORM – – – – – DIRECT (4)	NORM – – – – – MECH (4)
SPOILER 4 or 5 or (4 and 5)	NORM	NORM	NORM	NORM
All SPOILERS	ALTN	REDUCED	DIRECT	ALTN
1 AIL SERVO or 1 AILERON	NORM	NORM	NORM	NORM
1 ELEV SERVO	NORM	NORM	NORM	NORM
1 ELEVATOR	ALTN	NO	DIRECT	ALTN
THS (jammed) (5)	NORM	NORM	NORM	NORM
	ALTN	REDUCED	DIRECT	ALTN
HYD G or Y or B	NORM	NORM	NORM	NORM
HYD G + Y	ALTN	REDUCED	DIRECT	MECH
HYD G + B	ALTN	NO	DIRECT	ALTN
HYD Y + B	NORM	NORM	NORM	NORM
on BATTERIES	ALTN	REDUCED	DIRECT	MECH
on EMER GEN	ALTN	REDUCED	DIRECT	MECH – – – – – ALTN (3)

(1) In case of AOA disagree
(2) After the faulty IR is selected OFF
(3) After FAC 1 is reset
(4) When landing gear down (or CONF 2, if both LGCIUs faulty)
(5) Depending where the failure is, control law may revert to alternate law

ELEVATORS AND STABILIZER CONTROL AFTER FAILURE

	LEFT ELEVATOR		THS	RIGHT ELEVATOR	
	BLUE	GREEN	GREEN AND YELLOW	YELLOW	BLUE
NORM OPERATION		ELAC2	ELAC2	ELAC2	
SINGLE FAILURE					
ELAC2	ELAC1		ELAC1		ELAC1
ELAC1		ELAC2	ELAC2	ELAC2	
SEC2		ELAC2	ELAC2	ELAC2	
SEC1		ELAC2	ELAC2	ELAC2	
G	ELAC1		ELAC1		ELAC1
Y	ELAC1		ELAC1		ELAC1
B		ELAC2	ELAC2	ELAC2	
DOUBLE FAILURE					
ELAC2 + ELAC1		SEC2	SEC2	SEC2	
+ SEC2	ELAC1		ELAC1		ELAC1
+ SEC1	ELAC1		ELAC1		ELAC1
+ G	ELAC1		ELAC1		ELAC1
+ Y	ELAC1		ELAC1		ELAC1
+ B		SEC2	SEC2	SEC2	
ELAC1 + SEC2		ELAC2	ELAC2	ELAC2	
+ SEC1		ELAC2	ELAC2	ELAC2	
+ G	SEC1		SEC2	SEC2	
+ Y		SEC2	SEC2		SEC1
+ B		ELAC2	ELAC2	ELAC2	
SEC2 + SEC1		ELAC2	ELAC2	ELAC2	
+ G	ELAC1		ELAC1		ELAC1
+ Y	ELAC1		ELAC1		ELAC1
+ B		ELAC2	ELAC2	ELAC2	
SEC1 + G	ELAC1		ELAC1		ELAC1
+ Y	ELAC1		ELAC1		ELAC1
+ B		ELAC2	ELAC2	ELAC2	
G + Y	ELAC1		inop		ELAC1
B + G	Damped		ELAC2	ELAC2	
B + Y		ELAC2	ELAC2	Damped	

R

	LEFT ELEVATOR		THS	RIGHT ELEVATOR	
	BLUE	GREEN	GREEN AND YELLOW	YELLOW	BLUE
<u>TRIPLE FAILURE</u>					
<u>ELAC2</u>					
ELAC1 + SEC2	SEC1		SEC1		SEC1
+ SEC1		SEC2	SEC2	SEC2	
+ G	SEC1		SEC2	SEC2	
+ Y		SEC2	SEC2		SEC1
+ B		SEC2	SEC2	SEC2	
SEC2 + SEC1	ELAC1		ELAC1		ELAC1
+ G	ELAC1		ELAC1		ELAC1
+ Y	ELAC1		ELAC1		ELAC1
+ B	Centered		Mechanical	Centered	
SEC1 + G	ELAC1		ELAC1		ELAC1
+ Y	ELAC1		ELAC1		ELAC1
+ B		SEC2	SEC2	SEC2	
G + Y	ELAC1		inop		ELAC1
B + G	Damped		SEC2	SEC2	
B + Y		SEC2	SEC2	Damped	
<u>ELAC1</u>					
SEC2 + SEC1		ELAC2	ELAC2	ELAC2	
+ G	SEC1		SEC1		SEC1
+ Y	SEC1		SEC1		SEC1
+ B		ELAC2	ELAC2	ELAC2	
SEC1 + G	Damped		SEC2	SEC2	
+ Y		SEC2	SEC2	Damped	
+ B		ELAC2	ELAC2	ELAC2	
G + Y	SEC1		inop		SEC1
B + G	Damped		ELAC2	ELAC2	
B + Y		ELAC2	ELAC2	Damped	
<u>SEC2</u>					
SEC1 + G	ELAC1		ELAC1		ELAC1
+ Y	ELAC1		ELAC1		ELAC1
+ B		ELAC2	ELAC2	ELAC2	
G + Y	ELAC1		inop		ELAC1
B + G	Damped		ELAC2	ELAC2	
B + Y		ELAC2	ELAC2	Damped	
<u>SEC1</u>					
G + Y	ELAC1		inop		ELAC1
B + G	Damped		ELAC2	ELAC2	
B + Y		ELAC2	ELAC2	Damped	

FUEL L (R) TK PUMP 1 + 2 LO PR

● **IF NO FUEL LEAK :**

– FUEL X FEED (if above FL150) .... ON

– ENG MODE SEL .... IGN

The selection of continuous relight protects against flameout, caused by possible fuel supply surging.

– TK PUMP 1 (affected) .... OFF

– TK PUMP 2 (affected) .... OFF

● **If FUEL X FEED off :**

As long as the fuel crossfeed valve is closed, the associated engine is fed by gravity only.

– PROC : GRVTY FUEL FEEDING

Apply the GRVTY FUEL FEEDING procedure.

AVOID NEGATIVE G FACTOR

Avoiding negative g factors will prevent fuel surge and, therefore, reduce the risk of engine malfunction.

● **WHEN TK (affected) FUEL RQRD :**

– TK (affected) FEED .... GRVTY ONLY

Apply the GRVTY FUEL FEEDING procedure.

Fuel from the affected tank may be used immediately, if there is no ceiling limitation for gravity fuel feeding.

STATUS

TK (affected) GRVTY FEED ONLY

INOP SYS

TK PUMPS (affected)

FUEL L (R) TK PUMP 1 + 2 LO PR (CONT'D)

R ● **When reaching FL 150 :**

R *PUMP 1 + 2 LO PR caution is automatically recalled.*

– ENG MODE SEL . . . . IGN

● **WHEN TK (affected) FUEL RQRD :**

– TK (affected) FEED . . . . GRVTY ONLY
– FUEL X FEED . . . . OFF
– PROC : GRVTY FUEL FEEDING
AVOID NEGATIVE G FACTOR

STATUS

– PROC : GRVTY FUEL FEEDING
AVOID NEGATIVE G FACTOR
TK (affected) GRVTY FEED ONLY

INOP SYS
TK PUMPS
(affected)

FUEL L (R) TK PUMP 1(2) LO PR

– TK PUMP (affected) . . . . OFF

Note : Aircraft altitude must be limited to 35000 feet if a single fuel pump feeds both engines with hot JET B (JP4) fuel (fuel temperature above 30° C).

STATUS

INOP SYS
TK PUMP
(affected)

FUEL L (R) TK PUMP 1 + 2 LO PR

■ **Center tank not empty :**

- FUEL MODE SEL (if CTR TK not feeding) . . . . MAN
  Setting FUEL MODE SEL to MAN will enable the center tank pumps to run.
- TK PUMP 1 (affected) . . . . OFF
- TK PUMP 2 (affected) . . . . OFF

● **WHEN TK (affected) FUEL RQRD :**

Apply the GRVTY FUEL FEEDING procedure.

- TK (affected) FEED . . . . GRVTY ONLY
- PROC : GRVTY FUEL FEEDING

STATUS

- TK (affected) GRVTY FEED ONLY

INOP SYS

TK PUMPS (affected)

■ **Center tank empty :**

● **IF NO FUEL LEAK :**

- FUEL X FEED (if above FL150) . . . . ON
- ENG MODE SEL . . . . IGN
  The selection of continuous relight protects against flameout, caused by possible fuel supply surging.
- TK PUMP 1 (affected) . . . . OFF
- TK PUMP 2 (affected) . . . . OFF

● **If FUEL X FEED off :**

As long as the fuel crossfeed valve is closed, the associated engine is fed by gravity only.

- PROC : GRVTY FUEL FEEDING
  Apply the GRVTY FUEL FEEDING procedure.

AVOID NEGATIVE G FACTOR

Avoiding negative g factors will prevent fuel surging and, therefore, reduce the risk of engine malfunction.

FUEL L (R) TK PUMP 1 + 2 LO PR (CONT'D)

● **WHEN TK (affected) FUEL RQRD :**

– TK (affected) FEED . . . . GRVTY ONLY

Apply the GRVTY FUEL FEEDING procedure.
Fuel from the affected tank may be used immediately, if there is no ceiling limitation for gravity fuel feeding.

STATUS

TK (affected) GRVTY FEED ONLY

INOP SYS
TK PUMPS
(affected)

● **When reaching FL 150 :**

FUEL L(R) TK PUMP 1 + 2 LO PR caution is automatically recalled.

– ENG MODE SEL . . . . IGN

● **WHEN TK (affected) FUEL RQRD :**

– TK (affected) FEED . . . . GRVTY ONLY
– FUEL X FEED . . . . OFF
– PROC : GRVTY FUEL FEEDING
AVOID NEGATIVE G FACTOR

STATUS

– PROC : GRVTY FUEL FEEDING
AVOID NEGATIVE G FACTOR
TK (affected) GRVTY FEED ONLY

INOP SYS
TK PUMPS
(affected)

FUEL L (R) TK PUMP 1(2) LO PR

– TK PUMP (affected) . . . . OFF

STATUS

INOP SYS
TK PUMP
(affected)

FUEL L (R) WING TK LO LVL

● **If center tank not empty :**
- FUEL MODE SEL . . . . MAN

● **IF NO FUEL LEAK AND FUEL IMBALANCE :**
- FUEL X FEED . . . . ON
- TK PUMP 1 (on side with LO LVL) . . . . OFF
- TK PUMP 2 (on side with LO LVL) . . . . OFF

Note : TK PUMP 1+2 (on side with LO LVL) LO PR warning will be triggered.

STATUS

CTR TK FEED : MAN ONLY (if center tank not empty)	INOP SYS TK PUMPS

FUEL L + R WING TK LO LVL

LAND ASAP

- FUEL MODE SEL (if center tank not empty) . . . . MAN
- ALL TK PUMPS . . . . ON

All pumps in the center tank and in wing tanks will run.
- FUEL X FEED . . . . OFF

FUEL L (R) XFR VALVE CLOSED

Note : When fuel quantity in affected wing reaches low level, corresponding WING TK LO LVL warning is triggered.

OUTER TK UNUSABLE (affected side)

STATUS

OUTER TK UNUSABLE (affected side)

FUEL L (R) XFR VALVE OPEN

Crew awareness

STATUS

INOP SYS
L (R) CELL VALVE

FUEL L (R) WING TK LO LVL

● **If center tank not empty :**
- FUEL MODE SEL . . . . MAN

● **IF NO FUEL LEAK AND FUEL IMBALANCE :**
- FUEL X FEED . . . . ON
- TK PUMP 1 (on side with LO LVL) . . . . OFF
- TK PUMP 2 (on side with LO LVL) . . . . OFF

Note : TK PUMP 1 + 2 (on side with LO LVL) LO PR warning will be triggered.

STATUS

CTR TK FEED : MAN ONLY (if center tank not empty)	INOP SYS TK PUMPS

FUEL L + R WING TK LO LVL

LAND ASAP

- FUEL MODE SEL (if center tank not empty) . . . . MAN
- ALL TK PUMPS . . . . ON

The center tank transfer valves will open, if the associated pushbuttons are ON.
All pumps in the wing tanks will run.

- FUEL X FEED . . . . OFF

FUEL L (R) XFR VALVE FAULT

■ **Valve not fully closed :**

– CTR TK L (R) XFR . . . . OFF

● **IF UNSUCCESSFUL and if the center tank is not empty :**

Stop fuel transfer from the center tank to L (R) wing tank by switching off both L (R) wing tank pumps ; both engines are fed by the R (L) wing tank until the center tank is empty.

– FUEL X FEED . . . . ON
– L (R) TK PUMP 1 . . . . OFF
– L (R) TK PUMP 2 . . . . OFF

Note : FUEL L(R) TK PUMP 1 + 2 LO PR will be triggered.

● **When the center tank is empty (automatic recall of the warning) :**

– L (R) TK PUMP 1 . . . . ON
– L (R) TK PUMP 2 . . . . ON
– FUEL X FEED . . . . OFF

STATUS

INOP SYS
CTR TK L (R) XFR

■ **Valve not fully open**

– FUEL MODE SEL . . . . MAN

● **IF UNSUCCESSFUL and if the center tank is not empty :**

Because fuel does not transfer from the center tank to L (R) wing tank, both engines are fed by R (L) wing tank.

– FUEL X FEED . . . . ON
– L (R) TK PUMP 1 . . . . OFF
– L (R) TK PUMP 2 . . . . OFF

Note : FUEL L(R) TK PUMP 1 + 2 LO PR will be triggered.

● **When the center tank is empty (automatic recall of the warning) :**

– L (R) TK PUMP 1 . . . . ON
– L (R) TK PUMP 2 . . . . ON
– FUEL X FEED . . . . OFF

STATUS

INOP SYS
CTR TK L (R) XFR

FUEL X FEED VALVE FAULT

Crew awareness

If valve failed open, maintain fuel balance with selective use of pumps.
If valve failed closed and if unable to maintain an acceptable balance, land as soon as possible.

STATUS

INOP SYS
FUEL X FEED

FUEL L (R) OUTER TK LO TEMP

R ■ **on the ground before takeoff :**

– DELAY T.O

Do not takeoff until temperatures are within limits.

■ **in flight**

Crew awareness

Consider descending to a lower altitude and/or increasing Mach to increase TAT.

FUEL L (R) INNER TK LO TEMP

R ■ **on the ground before takeoff :**

– DELAY T.O

Do not takeoff until temperatures are within limits.

■ **in flight**

Crew awareness

Consider descending to a lower altitude and/or increasing Mach to increase TAT.

FUEL L (R) OUTER (INNER) TK HI TEMP

R *This caution may spuriously trigger due to interference from communication equipment.*
R *Therefore, the flight crew should wait two minutes while the fuel temperature measurement*
R *is updated. After two minutes, if the ECAM caution has not disappeared, the flight crew must*
R *apply the following procedure :*

– GALLEY . . . . OFF
Reducing electrical loads reduce heat emitted by IDG.

■ **on the ground :**
- – LIMITED TAXI TIME
- ● **if temp reaches 60° C in outer cell or 54° C in inner cell :**
  - – DELAY T.O.
  - – ENG MASTER (affected side) . . . . OFF

■ **in flight :**
- – ENG F. FLOW (affected side) . . . . INCREASE
  Disconnect autothrust. Adjust the thrust lever to increase fuel flow through the IDG oil heat exchanger and decrease the temperature of the fuel returning to the outer cell.
- ● **IF TEMP ABV 65 DEG C in outer cell or 57 DEG C in inner cell**
  - – APU . . . . AS RQRD
    APU if available may be started and APU GEN used to allow IDG disconnection.
  - ● **if opposite GEN avail :**
    - – IDG (affected side) . . . . OFF

FUEL FQI CH 1(2) FAULT

Crew awareness

FUEL ENG 1(2) LP VALVE OPEN

Crew awareness

FUEL APU LP VALVE FAULT

Crew awareness

FUEL X FEED VALVE FAULT

Crew awareness.

If the valve is failed open, maintain fuel balance with selective use of pumps.
If the valve is failed closed and, if unable to maintain an acceptable balance, land as soon as possible.

STATUS

INOP SYS
FUEL X FEED

FUEL L (R) WING TK LO TEMP

■ **On ground, before takeoff :**

– DELAY T.O

Do not takeoff, until temperatures are within limits.

■ **In flight :**

Crew awareness

Consider descending to a lower altitude, and/or increasing mach to increase TAT.

FUEL XFR VALVES FAULT

■ **XFR valves not fully open :**

– FUEL MODE SEL . . . . MAN

● **IF UNSUCCESSFUL :**

– CTR AVAIL BY GRAVITY

If the center tank transfer valves are not fully open, the center tank fuel may be used by gravity.

– 2 T (4400 LBS) UNUSABLE

■ **XFR valves not fully closed :**

– CTR TK L XFR . . . . OFF
– CTR TK R XFR . . . . OFF

STATUS

CTR TK USABLE BY GRAVITY
CTR TK FUEL : 2 T (4400 LBS) UNUSABLE

INOP SYS
CTR TK XFR

FUEL L (R) WING TK HI TEMP

– GALLEY . . . . OFF
Reducing electrical loads reduces heat emitted by IDG.

■ **on the ground :**
LIMITED TAXI TIME
● **if temp reaches 55° C**
– DELAY T.O
– ENG MASTER (affected side) . . . . OFF

■ **in flight :**
– ENG. F. FLOW (affected side) . . . . INCREASE
Disconnect autothrust. Adjust the thrust lever to increase fuel flow through the IDG oil heat exchanger and decrease the temperature of the fuel returning to the wing tank.
● **If temp ABV 57° C**
– APU . . . . AS RQRD
APU if available may be started and APU GEN used allow IDG disconnection.
● **if opposite GEN avail :**
– IDG (affected side) . . . . OFF

FUEL FQI CH 1(2) FAULT

Crew awareness

FUEL ENG 1(2) LP VALVE OPEN

Crew awareness

FUEL APU LP VALVE FAULT

Crew awareness

FUEL AUTO TRANSFER FAULT

– FUEL MODE SEL . . . . MAN
The center tank transfer valves open.
– CTR TK L XFR . . . . check ON
– CTR TK R XFR . . . . check ON
The center tank transfer valves may remain open when the center tank is empty.

STATUS

CTR TK FEED MAN SPLY

FUEL L (R) WING TK OVERFLOW

– CTR TK L (R) XFR . . . . OFF

● **IF UNSUCCESSFUL and if center tank not empty :**

Stop fuel transfer from the center tank to L (R) wing tank by switching off both L (R) wing tank pumps. Both engines are fed by R (L) wing tank until the center tank is empty.
– FUEL X FEED . . . . ON
– L (R) TK PUMP 1 . . . . OFF
– L (R) TK PUMP 2 . . . . OFF

● **When CTR TK empty :**

– L (R) TK PUMP 1 . . . . ON
– L (R) TK PUMP 2 . . . . ON
– FUEL X FEED . . . . OFF

STATUS

INOP SYS
CTR TK L (R) XFR

FUEL CTR TK XFR OFF

Center tank transfer valves pushbuttons at off.
– CTR TK L XFR . . . . ON
– CTR TK R XFR . . . . ON

FUEL LEAK

A fuel leak may be detected, if :
· The sum of FOB and FU significantly less than FOB at engine start or is decreasing, or
· A passenger observes fuel spray from engine/pylon or wing tip, or
· The total fuel quantity is decreasing at an abnormal rate, or
· A fuel imbalance is developing, or
· Fuel quantity in a tank is decreasing too fast (leak from engine/pylon, or hole in a tank), or
· The Fuel flow is excessive (leak from engine), or
· Fuel is smelt in the cabin.
If visibility permits, leak source may be identified by a visual check from the cabin.

WHEN A LEAK IS CONFIRMED

LAND ASAP

■ **LEAK FROM ENGINE/PYLON CONFIRMED:**

Engine fuel leak can be confirmed by excessive fuel flow indication, or a visual check.

– THR LEVER (of affected engine) .... IDLE
– ENG MASTER (of affected engine) .... OFF
– FUEL X FEED .... USE AS RQRD
If the leak stops, the crossfeed valve can now be opened to re-balance fuel quantity, or to enable use of fuel from both wings. Do not restart the engine.

■ **LEAK FROM ENGINE/PYLON NOT CONFIRMED or LEAK NOT LOCATED:**

Stop any fuel transfer, and then monitor the depletion rate of each wing tank, to determine if the leak is from an engine or a wing (case 1), or from the Center tank, or the APU feeding line (case 2).

– FUEL X FEED .... MAINTAIN CLOSED
The crossfeed valve must remain closed to prevent the leak from affecting both sides.
– CTR TK L+R XFR .... OFF
Each engine is fed via its associated wing tank only.
– WING TANK FUEL QUANTITIES .... MONITOR
Monitor the depletion rate of each wing tank.

⇩

FUEL CTR TK PUMP 1(2) LO PR

● **IF NO FUEL LEAK :**
- FUEL X FEED . . . . ON

- CTR TK PUMP (affected) . . . . OFF

FUEL X FEED may be switched OFF, when the center tank is empty, to avoid possible fuel imbalance (if the pump performance of one wing differs from that of the other wing).

STATUS

INOP SYS
CTR TK PUMP 1(2)

FUEL CTR TK PUMPS LO PR

Selecting FUEL MOD SEL to MAN position will prevent repetitive triggering of the warning.
- CTR TK PUMP 1 . . . . OFF
- CTR TK PUMP 2 . . . . OFF
- CTR TK UNUSABLE

Gravity feeding from the center tank is not possible (no bypass valve fitted on the center tank pumps).

STATUS

CTR TK FUEL UNUSABLE

INOP SYS
CTR TK PUMPS

FUEL AUTO FEED FAULT

- FUEL MODE SEL . . . . MAN

The center tank pumps will run and feed the engines.

■ **Fuel in one wing tank < 5000 kg (11000 lb) and in center tank > 250 kg (550 lb) :**
- CTR TK PUMP 1 . . . . ON
- CTR TK PUMP 2 . . . . ON

When the center tank is empty, CTR TK PUMP LO PR warning will come on.

■ **CTR TK PUMPS running after slat extension, or LO LVL in center tank**
- CTR TK PUMP 1 . . . . OFF
- CTR TK PUMP 2 . . . . OFF

STATUS

CTR TK FEED : MAN ONLY

FUEL LEAK

R *A fuel leak may be detected, if :*
R *· The sum of FOB and FU significantly less than FOB at engine start or is decreasing, or*
R *· A passenger observes fuel spray from engine/pylon or wing tip, or*
R *· The total fuel quantity is decreasing at an abnormal rate, or*
R *· A fuel imbalance is developing, or*
R *· Fuel quantity in a tank is decreasing too fast (leak from engine/pylon, or hole in a tank), or*
R *· The Fuel flow is excessive (leak from engine), or*
R *· Fuel is smelt in the cabin.*
R *If visibility permits, leak source may be identified by a visual check from the cabin.*

WHEN A LEAK IS CONFIRMED

LAND ASAP

R ■ **LEAK FROM ENGINE/PYLON CONFIRMED:**

R *Engine fuel leak can be confirmed by excessive fuel flow indication, or a visual check.*
- THR LEVER (of affected engine) .... IDLE
- ENG MASTER (of affected engine) .... OFF
- FUEL X FEED .... USE AS RQRD

R *If the leak stops, the crossfeed valve can now be opened to re-balance fuel quantity,*
R *or to enable use of fuel from both wings. Do not restart the engine.*

R ■ **LEAK FROM ENGINE/PYLON NOT CONFIRMED or LEAK NOT**
R **LOCATED:**

R *Stop any fuel transfer, and then monitor the depletion rate of each inner tank, to*
R *determine if the leak is from an engine or a wing (case 1), or from the Center tank, or*
R *the APU feeding line (case 2).*
- FUEL X FEED .... MAINTAIN CLOSED

The crossfeed valve must remain closed to prevent the leak from affecting both sides.

R – CTR TK PUMP 1+2 .... OFF
R *Each engine is fed via its associated inner tank only.*
R – INNER TANK FUEL QUANTITIES .... MONITOR
R *Monitor the depletion rate of each inner tank.*

⇩

FUEL LEAK (CONT'D)

- **CASE 1: IF ONE INNER TANK DEPLETES FASTER THAN THE OTHER BY AT LEAST 300 kg (660 lb) IN LESS THAN 30 MINUTES:**

  An engine leak may still be suspected. Therefore :

  – THR LEVER (engine on leaking side) . . . . IDLE
  – ENG MASTER (engine on leaking side) . . . . OFF
  – CTR TK PUMP 1+2 . . . . ON
  – FUEL LEAK . . . . MONITOR

  - **If leak stops:**

    If the inner tank fuel quantity of the affected side stops decreasing, the engine leak is confirmed and stopped.

    – FUEL X FEED . . . . USE AS RQRD

    The crossfeed valves can now be opened to re-balance fuel quantity, or to enable use of fuel from both wings. Do not restart the engine.

  - **If leak continues (after engine shutdown):**

    The inner tank fuel quantity of the affected side continues to decrease. If the leak has not stopped after engine shut down, a leak from the wing may be suspected.

    – ENGINE RESTART . . . . CONSIDER

  CAUTION

  Do not apply the FUEL IMBALANCE procedure. Approach and landing can be done, even with one full wing/one empty wing.

- **CASE 2: IF BOTH INNER TANKS DEPLETE AT A SIMILAR RATE:**

  A leak from the Center tank or the APU feeding line may be suspected.

  - **If fuel smell in the cabin:**

    – APU (if ON) . . . . OFF

    This prevents additional fuel loss through the APU feeding line.

  - **When fuel quantity in one inner tank is less than 3 tons (6600 lb):**

    – CTR TK PUMP 1+2 . . . . ON

FUEL LEAK (CONT'D)

- **CASE 1: IF ONE WING TANK DEPLETES FASTER THAN THE OTHER BY AT LEAST 300 kg (660 lb) IN LESS THAN 30 MINUTES:**

  An engine leak may still be suspected. Therefore :

  – THR LEVER (engine on leaking side) .... IDLE
  – ENG MASTER (engine on leaking side) .... OFF
  – FUEL LEAK .... MONITOR

  - **If leak stops:**

    If the wing tank fuel quantity of the affected side stops decreasing, the engine leak is confirmed and stopped.

    – CTR TK L+R XFR .... ON
    – FUEL X FEED .... USE AS RQRD

    The crossfeed valves can now be opened to re-balance fuel quantity, or to enable use of fuel from both wings. Do not restart the engine.

  - **If leak continues (after engine shutdown):**

    The wing tank fuel quantity of the affected side continues to decrease. If the leak has not stopped after engine shut down, a leak from the wing may be suspected.

    – ENGINE RESTART .... CONSIDER
    – CTR TK XFR (non leaking side) .... ON

  CAUTION

  Do not apply the FUEL IMBALANCE procedure. Approach and landing can be done, even with one full wing/one empty wing.

- **CASE 2: IF BOTH WING TANKS DEPLETE AT A SIMILAR RATE:**

  A leak from the Center tank or the APU feeding line may be suspected.

  - **If fuel smell in the cabin:**

    – APU (if ON) .... OFF

    This prevents additional fuel loss through the APU feeding line.

  - **When fuel quantity in one wing tank is less than 3 tons (6600 lb):**

    – CTR TK L+R XFR .... ON

FUEL IMBALANCE

– FOB . . . . CHECK

Compare the FOB + FU, with the FOB at departure.
If the difference is significant, or if the FOB + FU decreases, suspect a fuel leak.

CAUTION

A fuel imbalance may indicate a fuel leak.
Do not apply this procedure, if a fuel leak is suspected.
Refer to the FUEL LEAK procedure.

– FUEL X FEED . . . . ON

● **On the lighter side and in the center tank :**
- – FUEL PUMPS . . . . OFF

● **When fuel is balanced :**
- – FUEL PUMPS (WING + CTR) . . . . ON
- – FUEL X FEED . . . . OFF

Note : *There is no requirement to correct an imbalance, until the ECAM fuel advisory is displayed.*

FUEL CTR TK PUMPS OFF

The center tank pumps pushbuttons are OFF, with slats retracted.

- CTR TK PUMP 1 .... ON
- CTR TK PUMP 2 .... ON

GRVTY FUEL FEEDING

- ENG MODE SEL .... IGN

AVOID NEGATIVE G FACTOR

● **DETERMINE GRAVITY FEED CEILING** :

R Consult the following table to determine the flight altitude
R limitation.

Flight conditions at time of gravity feeding	Gravity feed ceiling
Flight time above FL300 more than 30 minutes (Fuel deaerated)	Current FL*
Flight time above FL300 less than 30 minutes (Fuel non-deaerated)	FL 300*
Aircraft flight level never exceeded FL300 (Fuel non-deaerated)	FL150*, or 7000 ft above takeoff airport, whichever is higher

* For JET B, gravity feed ceiling is FL100 in all cases.

DESCEND TO GRVTY FEED CEILING (if applicable).

● **WHEN REACHING GRVTY FEED CEILING** :

- FUEL X FEED .... OFF

● **IF NO FUEL LEAK AND FOR AIRCRAFT HANDLING** :

If no fuel leak and for flight with only one engine running (this engine being fed by gravity) apply the following :

- FUEL X FEED .... ON
- BANK ANGLE .... 1° WING DOWN ON LIVE ENGINE SIDE

  The fuel from the wing tank on the engine running side is used.
- RUDDER TRIM .... USE

  Use rudder trim to maintain constant course and neutral stick.

● **WHEN FUEL IMBALANCE REACHES 1000 kg (2200 lbs)** :

- BANK ANGLE . 2° or 3° WING DOWN ON LIVE ENG SIDE

  Fuel from the opposite wing tank is used, until fuel imbalance is reduced to 0.

FUEL IMBALANCE

– FOB .... CHECK

Compare the FOB + FU, with the FOB at departure.
If the difference is significant, or if the FOB + FU decreases, suspect a fuel leak.

CAUTION

A fuel imbalance may indicate a fuel leak.
Do not apply this procedure, if a fuel leak is suspected.
Refer to the FUEL LEAK procedure.

– FUEL X FEED .... ON

R – CTR TK L+R XFR .... OFF

● **On the lighter side :**

– FUEL PUMPS .... OFF

● **When fuel is balanced :**

– FUEL PUMPS .... ON
– CTR TK L+R XFR .... ON
– FUEL X FEED .... OFF

Note : *There is no requirement to correct an imbalance, until the ECAM fuel advisory is displayed.*

GRVTY FUEL FEEDING

– ENG MODE SEL . . . . IGN

AVOID NEGATIVE G FACTOR

● **DETERMINE GRAVITY FEED CEILING** :

R Consult the following table to determine the flight altitude
R limitation.

Flight conditions at time of gravity feeding	Gravity feed ceiling
Flight time above FL300 more than 30 minutes (Fuel deaerated)	Current FL*
Flight time above FL300 less than 30 minutes (Fuel non-deaerated)	FL 300*
Aircraft flight level never exceeded FL300 (Fuel non-deaerated)	FL150*, or 7 000 ft above takeoff airport, whichever is higher

* For JET B, gravity feed ceiling is FL100 in all cases.

DESCEND TO GRVTY FEED CEILING (if applicable).

● **WHEN REACHING GRVTY FEED CEILING** :

– FUEL X FEED . . . . OFF

● **IF NO FUEL LEAK AND FOR AIRCRAFT HANDLING** :

If no fuel leak, and for flight with only one engine running (this engine being fed by gravity), apply the following :

– FUEL X FEED . . . . ON

– BANK ANGLE . . . . 1° WING DOWN ON LIVE ENGINE SIDE

The fuel from the wing tank on the engine running side is used.

– RUDDER TRIM . . . . USE

Use rudder trim to maintain constant course and neutral stick.

● **WHEN FUEL IMBALANCE REACHES 1 000 kg (2200 lbs)** :

– BANK ANGLE . 2° or 3° WING DOWN ON LIVE ENG SIDE

Use fuel from the opposite wing tank, until fuel imbalance is reduced to 0.

HYD B RSVR LO AIR PR/OVHT/LO LVL

■ **RSVR OVHT or LO LVL :**

– BLUE ELEC PUMP .... OFF

■ **RSVR LO AIR PR :**

● **IF PRESS FLUCTUATES :**

– BLUE ELEC PUMP .... OFF

B SYS LO PR

Affected systems
* F/CTL

STATUS

■ **Sys lost by RSVR LO AIR PR :**

The probability of cavitation increases with altitude. Therefore, it may be possible to restore the system after descending to a lower altitude.

APPR PROC HYD LO PR

– BLUE ELEC PUMP .... AUTO

● **If sys not recovered :**

LDG DIST PROC .... APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

SLATS SLOW

CAT 3 SINGLE ONLY

■ **Sys lost by RSVR OVHT :**

APPR PROC HYD LO PR

● **IF BLUE OVHT OUT**

– BLUE ELEC PUMP .... AUTO

● **If sys not recovered :**

LDG DIST PROC .... APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

SLATS SLOW

CAT 3 SINGLE ONLY

INOP SYS

BLUE HYD
SPLR 3
CAT 3 DUAL
B ELEC PUMP

■ **Sys lost by RSVR LO LVL :**

LDG DIST PROC .... APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

SLATS SLOW

CAT 3 SINGLE ONLY

INOP SYS

BLUE HYD
SPLR 3
CAT 3 DUAL
EMER GEN
B ELEC PUMP

HYD G RSVR LO AIR PR/OVHT/LO LVL

■ **RSVR OVHT or LO LVL :**

– PTU . . . . OFF
– GREEN ENG 1 PUMP . . . . OFF

■ **RSVR LO AIR PR :**

● **IF PRESS FLUCTUATES :**

– PTU . . . . OFF
– GREEN ENG 1 PUMP . . . . OFF

R G ENG 1 PUMP LO PR

R **G SYS LO PR**

Affected systems
R *WHEEL
R *F/CTL

HYD B RSVR LO AIR PR/OVHT/LO LVL

■ **RSVR OVHT or LO LVL :**

– BLUE ELEC PUMP .... OFF

■ **RSVR LO AIR PR :**

● **IF PRESS FLUCTUATES :**

– BLUE ELEC PUMP .... OFF

B SYS LO PR

Affected systems
* F/CTL

STATUS

■ **Sys lost by RSVR LO AIR PR :**

The probability of cavitation increases with altitude. Therefore, it may be possible to restore the system after descending to a lower altitude.

APPR PROC HYD LO PR

– BLUE ELEC PUMP .... AUTO

● **If sys not recovered :**

LDG DIST PROC .... APPLY

R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

SLATS SLOW

CAT 3 SINGLE ONLY

■ **Sys lost by RSVR OVHT :**

APPR PROC HYD LO PR

● **IF BLUE OVHT OUT**

– BLUE ELEC PUMP .... AUTO

● **If sys not recovered :**

LDG DIST PROC .... APPLY

R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

SLATS SLOW

CAT 3 SINGLE ONLY

INOP SYS
BLUE HYD
SPLR 3
CAT 3 DUAL
B ELEC PUMP

■ **Sys lost by RSVR LO LVL :**

LDG DIST PROC .... APPLY

R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

SLATS SLOW

CAT 3 SINGLE ONLY

INOP SYS
BLUE HYD
SPLR 3
CAT 3 DUAL
EMER GEN
B ELEC PUMP

HYD G RSVR LO AIR PR/OVHT/LO LVL

■ **RSVR OVHT or LO LVL :**

- PTU . . . . OFF
- GREEN ENG 1 PUMP . . . . OFF

■ **RSVR LO AIR PR :**

● **IF PRESS FLUCTUATES :**

- PTU . . . . OFF
- GREEN ENG 1 PUMP . . . . OFF

R G ENG 1 PUMP LO PR

R **G SYS LO PR**

Affected systems
R *WHEEL
R *F/CTL

HYD G RSVR LO AIR PR/OVHT/LO LVL (CONT'D)

STATUS

■ **sys lost by RSVR LO AIR PR :**

APPR PROC HYD LO PR

The probability of cavitation increases with altitude. Therefore, it may be possible to restore the system after descending to a lower altitude.

– GREEN ENG 1 PUMP .... ON
– PTU .... AUTO

● **IF HYD NOT RECOVERED :**

– L/G .... GRVTY EXTN
Refer to 3.02.32

LDG DIST PROC .... APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

■ **sys lost by RSVR OVHT :**

APPR PROC HYD LO PR

● **IF GREEN OVHT OUT**

– GREEN ENG 1 PUMP .... ON
– PTU .... AUTO

● **IF HYD NOT RECOVERED :**

– L/G .... GRVTY EXTN
Refer to 3.02.32

LDG DIST PROC .... APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

■ **sys lost by RSVR LO LVL :**

– L/G .... GRVTY EXTN
Refer to 3.02.32

LDG DIST PROC .... APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

GREEN HYD
SPLR 1 + 5
CAT 3 DUAL
N.W. STEER
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
YAW DAMPER 1

HYD Y RSVR LO AIR PR/OVHT/LO LVL

● **RSVR OVHT**
- PTU . . . . OFF
- YELLOW ENG 2 PUMP . . . . OFF
- YELLOW ELEC PUMP . . . . OFF

● **RSVR LO AIR PR**

  ● **IF PRESS FLUCTUATES :**
  - PTU . . . . OFF
  - YELLOW ENG 2 PUMP . . . . OFF
  - YELLOW ELEC PUMP . . . . OFF

● **RSVR LO LVL**
- PTU . . . . OFF
- YELLOW ENG 2 PUMP . . . . OFF
- R YELLOW ELEC 2 PUMP . . . . OFF

BRK Y ACCU PR MONITOR

This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 minutes. In that case : The only remaining braking means is normal braking, using green pressure. The parking brake should not be used since, it is not available. And, the chocks should be in place before Engine 1 shutdown.

Y ENG 2 PUMP LO PR.

R **Y SYS LO PR**

Affected systems
*F/CTL

HYD G RSVR LO AIR PR/OVHT/LO LVL (CONT'D)

STATUS

■ **Sys lost by RSVR LO AIR PR :**

APPR PROC HYD LO PR

The probability of cavitation increases with altitude. Therefore, it may be possible to restore the system after descending to a lower altitude.

– GREEN ENG 1 PUMP . . . . ON
– PTU . . . . AUTO

● **IF HYD NOT RECOVERED :**

– L/G . . . . GRVTY EXTN
Refer to 3.02.32.

LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

■ **Sys lost by RSVR OVHT :**

APPR PROC HYD LO PR

● **IF GREEN OVHT OUT**

– GREEN ENG 1 PUMP . . . . ON
– PTU . . . . AUTO

● **IF HYD NOT RECOVERED :**

– L/G . . . . GRVTY EXTN
Refer to 3.02.32.

LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

■ **Sys lost by RSVR LO LVL :**

– L/G . . . . GRVTY EXTN
Refer to 3.02.32.

LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

SLATS/FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS

GREEN HYD
SPLR 1 + 5
CAT 3 DUAL
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
YAW DAMPER 1

HYD Y RSVR LO AIR PR/OVHT/LO LVL

● **RSVR OVHT**
- PTU .... OFF
- YELLOW ENG 2 PUMP .... OFF
- YELLOW ELEC PUMP .... OFF

● **RSVR LO AIR PR**

● **IF PRESS FLUCTUATES :**
- PTU .... OFF
- YELLOW ENG 2 PUMP .... OFF
- YELLOW ELEC PUMP .... OFF

● **RSVR LO LVL**
- PTU .... OFF
- YELLOW ENG 2 PUMP .... OFF

R – YELLOW ELEC 2 PUMP .... OFF

BRK Y ACCU PR MONITOR

This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 minutes. In that case : The only remaining braking means is normal braking, using green pressure. The parking brake should not be used since, it is not available. And, the chocks should be in place before Engine 1 shutdown.

Y ENG 2 PUMP LO PR.

R **Y SYS LO PR**

Affected systems
*F/CTL

HYD G RSVR LO AIR PR/OVHT/LO LVL (CONT'D)

STATUS

■ **Sys lost by RSVR LO AIR PR :**

APPR PROC HYD LO PR

The probability of cavitation increases with altitude. Therefore, it may be possible to restore the system after descending to a lower altitude.

– GREEN ENG 1 PUMP .... ON

● **IF HYD NOT RECOVERED :**

– L/G .... GRVTY EXTN

Refer to 3.02.32.

LDG DIST PROC .... APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

SLATS/FLAPS SLOW

CAT 3 SINGLE ONLY

■ **Sys lost by RSVR OVHT :**

APPR PROC HYD LO PR

● **IF GREEN OVHT OUT**

– GREEN ENG 1 PUMP .... ON

● **IF HYD NOT RECOVERED :**

– L/G .... GRVTY EXTN

Refer to 3.02.32.

LDG DIST PROC .... APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

SLATS/FLAPS SLOW

CAT 3 SINGLE ONLY

■ **Sys lost by RSVR LO LVL :**

– L/G .... GRVTY EXTN

Refer to 3.02.32.

LDG DIST PROC .... APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

SLATS/FLAPS SLOW

CAT 3 SINGLE ONLY

INOP SYS

GREEN HYD
SPLR 1 + 5
CAT 3 DUAL
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
YAW DAMPER 1

HYD Y RSVR LO AIR PR/OVHT/LO LVL

● **RSVR OVHT**
- PTU . . . . OFF
- YELLOW ENG 2 PUMP . . . . OFF
- YELLOW ELEC PUMP . . . . OFF

● **RSVR LO AIR PR**

● **IF PRESS FLUCTUATES :**
- PTU . . . . OFF
- YELLOW ENG 2 PUMP . . . . OFF
- YELLOW ELEC PUMP . . . . OFF

● **RSVR LO LVL**
- PTU . . . . OFF
- YELLOW ENG 2 PUMP . . . . OFF

R - YELLOW ELEC 2 PUMP . . . . OFF

BRK Y ACCU PR MONITOR

This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 minutes. In that case : The only remaining braking means is normal braking, using green pressure. The parking brake should not be used since, it is not available. And, the chocks should be in place before Engine 1 shutdown.

Y ENG 2 PUMP LO PR.

R **Y SYS LO PR**

Affected systems
*F/CTL

HYD Y RSVR LO AIR PR/OVHT/LO LVL (CONT'D)

STATUS

■ **sys lost by RSVR LO AIR PR :**

The probability of cavitation increases with altitude. Therefore it may be possible to restore the system after descending to a lower altitude.

APPR PROC HYD LO PR

– YELLOW ENG 2 PUMP . . . . ON
– PTU . . . . AUTO

● **if sys not recovered :**

LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
FLAPS SLOW
CAT 3 SINGLE

■ **sys lost by RSVR OVHT :**

APPR PROC HYD LO PR

● **IF YELLOW OVHT OUT**

– YELLOW ENG 2 PUMP . . . . ON
– PTU . . . . AUTO

● **if not recovered :**

LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
FLAPS SLOW
CAT 3 SINGLE

■ **sys lost by RSVR LO LVL :**

LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
FLAPS SLOW
CAT 3 SINGLE

Note : Following a yellow hydraulic system failure, the parking brake may be inoperative due to a yellow accumulator low pressure.

INOP SYS

YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
ALTN BRK
REVERSER 2
CARGO DOOR (if LO LVL)
YAW DAMPER 2

HYD G + B SYS LO PR

Note : If green system has been lost because of fluid low level or overheat, "HYD PTU FAULT" should appear demanding that the flight crew switches the PTU OFF.

LAND ASAP

● **if blue sys lost by ELEC PUMP LO PR**

– RAT . . . . MAN ON
MIN RAT SPD . . . . 140 KT

– Affected PUMPS . . . . OFF
– MANEUVER WITH CARE

F/CTL ALTN LAW

(PROT LOST)
The flight control normal laws and associated protections are lost. Only load factor limitation is furnished (alternate law without protection).
MAX SPEED 320/.77
Speed is limited due to loss of high speed protection.
– SPD BRK . . . . DO NOT USE

■ **if blue sys recovered :**

See procedure for single failure

■ **if blue sys not recovered :**

(Refer to 3.02.10) LANDING WITH SLATS OR FLAPS JAMMED.

Affected systems
R * WHEEL
R * F/CTL

HYD Y RSVR LO AIR PR/OVHT/LO LVL (CONT'D)

STATUS

■ **Sys lost by RSVR LO AIR PR :**

The probability of cavitation increases with altitude. Therefore, it may be possible to restore the system after descending to a lower altitude.

APPR PROC HYD LO PR
– YELLOW ENG 2 PUMP . . . . ON
– PTU . . . . AUTO

● **If sys not recovered :**
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
FLAPS SLOW
CAT 3 SINGLE

■ **Sys lost by RSVR OVHT :**

APPR PROC HYD LO PR

● **IF YELLOW OVHT OUT**
– YELLOW ENG 2 PUMP . . . . ON
– PTU . . . . AUTO

● **If not recovered :**
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
FLAPS SLOW
CAT 3 SINGLE

■ **Sys lost by RSVR LO LVL :**

LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
FLAPS SLOW
CAT 3 SINGLE

Note : Following a yellow hydraulic system failure, the parking brake may be inoperative due to a yellow accumulator low pressure.

INOP SYS

YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
N.W. STEER
ALTN BRK
REVERSER 2
CARGO DOOR (if LO LVL)
YAW DAMPER 2

HYD G + B SYS LO PR

Note : If green system has been lost because of fluid low level or overheat, "HYD PTU FAULT" should appear demanding that the flight crew switches the PTU OFF.

LAND ASAP

● **if blue sys lost by ELEC PUMP LO PR**

– RAT . . . . MAN ON
MIN RAT SPD . . . . 140 KT

– Affected PUMPS . . . . OFF

– MANEUVER WITH CARE

F/CTL ALTN LAW

(PROT LOST)

The flight control normal laws and associated protections are lost. Only load factor limitation is furnished (alternate law without protection).

MAX SPEED 320/.77

Speed is limited due to loss of high speed protection.

– SPD BRK . . . . DO NOT USE

■ **if blue sys recovered :**

See procedure for single failure

■ **if blue sys not recovered :**

(Refer to 3.02.10) LANDING WITH SLATS OR FLAPS JAMMED.

Affected systems
R * WHEEL
R * F/CTL

HYD Y RSVR LO AIR PR/OVHT/LO LVL (CONT'D)

STATUS

■ **Sys lost by RSVR LO AIR PR :**

The probability of cavitation increases with altitude. Therefore, it may be possible to restore the system after descending to a lower altitude.

APPR PROC HYD LO PR

– YELLOW ENG 2 PUMP . . . . ON

● **If sys not recovered :**

LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

FLAPS SLOW

CAT 3 SINGLE

■ **Sys lost by RSVR OVHT :**

APPR PROC HYD LO PR

● **IF YELLOW OVHT OUT**

– YELLOW ENG 2 PUMP . . . . ON

● **If not recovered :**

LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

FLAPS SLOW

CAT 3 SINGLE

■ **Sys lost by RSVR LO LVL :**

LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

FLAPS SLOW

CAT 3 SINGLE

Note : Following a yellow hydraulic system failure, the parking brake may be inoperative due to a yellow accumulator low pressure.

INOP SYS

YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
N/W STRG
ALTN BRK
REVERSER 2
CARGO DOOR (if LO LVL)
YAW DAMPER 2

HYD G + B SYS LO PR

Note : If green system has been lost because of fluid low level or overheat, "HYD PTU FAULT" should appear demanding that the flight crew switches the PTU OFF.

LAND ASAP

● **if blue sys lost by ELEC PUMP LO PR**

– RAT . . . . MAN ON

MIN RAT SPD . . . . 140 KT

– Affected PUMPS . . . . OFF

– MANEUVER WITH CARE

F/CTL ALTN LAW

(PROT LOST)

The flight control normal laws and associated protections are lost. Only load factor limitation is furnished (alternate law without protection).

MAX SPEED 320/.77

Speed is limited due to loss of high speed protection.

– SPD BRK . . . . DO NOT USE

■ **if blue sys recovered :**

See procedure for single failure

■ **if blue sys not recovered :**

(Refer to 3.02.10) LANDING WITH SLATS OR FLAPS JAMMED.

Affected systems

R * WHEEL

R * F/CTL

HYD G + B SYS LO PR (CONT'D)

STATUS

MIN RAT SPD (if RAT out) . . . . 140 KT
(if B PUMP LO PR)
MAX SPEED 320/.77
MANEUVER WITH CARE
R – SPD BRK . . . . DO NOT USE
APPR PROC DUAL HYD LO PR (line not displayed for a double LO LVL) :

- **if sys lost by RSVR LO AIR PR** :
  - related PUMPS . . . . ON
  - PTU (if green affected) . . . . . AUTO
- **if sys lost by RSVR OVHT** :
  - **IF BLUE OVHT OUT** :
    - BLUE ELEC PUMP . . . . . . AUTO
  - **IF GREEN OVHT OUT** :
    - GREEN ENG 1 PUMP . . . . . . ON
    - PTU . . . . AUTO

HYD G + B SYS LO PR (CONT'D)

STATUS

● **IF HYD NOT RECOVERED (line not displayed for a double LO LVL) :**

– A/THR . . . . OFF

Select the target speed on the FCU. Due to the loss of slats and some flight control surfaces, the A/THR may not satisfactorily maintain speed.

– FOR LDG . . . . USE FLAP 3

– GPWS LDG FLAP 3 . . . . ON

– L/G . . . . GRVTY EXTN

R *Refer to FCOM 3.02.32.*

Extend landing gear at 200 knots, for improved controllability, when on a single elevator.

APPR SPD . . . . VREF + 25 KT

Approach speed must be increased, due to the loss of ailerons and slats.

LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ALTN LAW : PROT LOST

WHEN L/G DN : DIRECT LAW

At landing gear extension, control reverts to direct law in pitch, as well as in roll. (See the DIRECT LAW procedure 3.02.27)

FLAPS SLOW

CAT 1 ONLY

INOP SYS

G + B HYD
F/CTL PROT
L ELEV
L + R AIL
SPLR 1+3+5
SLATS
AP 1 + 2
N/W STRG
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
EMER GEN
(if B RSVR LO LVL)
B ELEC PUMP
YAW DAMPER 1

HYD G + B SYS LO PR (CONT'D)

STATUS

MIN RAT SPD (if RAT out) . . . . 140 KT
(if B PUMP LO PR)
MAX SPEED 320/.77
MANEUVER WITH CARE
R – SPD BRK . . . . DO NOT USE
APPR PROC DUAL HYD LO PR (line not displayed for a double LO LVL) :

- **if sys lost by RSVR LO AIR PR** :
  - – related PUMPS . . . . ON
  - – PTU (if green affected) . . . . . AUTO
- **if sys lost by RSVR OVHT** :
  - **IF BLUE OVHT OUT** :
    - – BLUE ELEC PUMP . . . . . . AUTO
  - **IF GREEN OVHT OUT** :
    - – GREEN ENG 1 PUMP . . . . . . ON
    - – PTU . . . . AUTO

HYD G + B SYS LO PR (CONT'D)

STATUS

- **IF HYD NOT RECOVERED (line not displayed for a double LO LVL) :**
  - A/THR .... OFF
    Select the target speed on the FCU. Due to the loss of slats and some flight control surfaces, the A/THR may not satisfactorily maintain speed.
  - FOR LDG .... USE FLAP 3
  - GPWS LDG FLAP 3 .... ON
  - **WHEN SPD 200 KT (displayed when slats are retracted)**
    - L/G .... GRVTY EXTN
      Refer to FCOM 3.02.32.
      Extend landing gear at 200 knots, for improved controllability, when on a single elevator.

R APPR SPD .... VREF + 25 KT
Approach speed must be increased, due to the loss of ailerons and slats.
LDG DIST PROC .... APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
At landing gear extension, control reverts to direct law in pitch, as well as in roll. (See the DIRECT LAW procedure 3.02.27)
FLAPS SLOW
CAT 1 ONLY

INOP SYS

G + B HYD
F/CTL PROT
L ELEV
L + R AIL
SPLR 1+3+5
SLATS
AP 1 + 2
N/W STRG
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
EMER GEN
(if B RSVR LO LVL)
B ELEC PUMP
YAW DAMPER 1

HYD G + B SYS LO PR (CONT'D)

STATUS

MIN RAT SPD (if RAT out) . . . . 140 KT
(if B PUMP LO PR)
MAX SPEED 320/.77
MANEUVER WITH CARE
R – SPD BRK . . . . DO NOT USE
APPR PROC DUAL HYD LO PR (line not displayed for a double LO LVL) :

- **if sys lost by RSVR LO AIR PR** :
  - – related PUMPS . . . . ON
  - – PTU (if green affected) . . . . . AUTO
- **if sys lost by RSVR OVHT** :
  - **IF BLUE OVHT OUT** :
    - – BLUE ELEC PUMP . . . . . . AUTO
  - **IF GREEN OVHT OUT** :
    - – GREEN ENG 1 PUMP . . . . . . ON
    - – PTU . . . . AUTO

HYD G + B SYS LO PR (CONT'D)

STATUS

● **IF HYD NOT RECOVERED (line not displayed for a double LO LVL) :**

- A/THR .... OFF
  Select the target speed on the FCU. Due to the loss of slats and some flight control surfaces, the A/THR may not satisfactorily maintain speed.
- FOR LDG .... USE FLAP 3
- GPWS LDG FLAP 3 .... ON
- L/G .... GRVTY EXTN
  Refer to FCOM 3.02.32.
  Extend landing gear at 200 knots, to improve controllability when on a single elevator.

APPR SPD .... VREF + 25 KT
Approach speed must be increased, due to the loss of ailerons and slats.
LDG DIST PROC .... APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
At landing gear extension, control reverts to direct law in pitch, as well as in roll. (See the DIRECT LAW procedure 3.02.27)
FLAPS SLOW
CAT 1 ONLY

INOP SYS

G + B HYD
F/CTL PROT
L ELEV
L + R AIL
SPLR 1+3+5
SLATS
AP 1 + 2
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
EMER GEN
(if B RSVR LO LVL)
B ELEC PUMP
YAW DAMPER 1

HYD G + B SYS LO PR (CONT'D)

STATUS

MIN RAT SPD (if RAT out) . . . . 140 KT
(if B PUMP LO PR)
MAX SPEED 320/.77
MANEUVER WITH CARE
R – SPD BRK . . . . DO NOT USE
APPR PROC DUAL HYD LO PR (line not displayed for a double LO LVL) :

- **if sys lost by RSVR LO AIR PR** :
  - related PUMPS . . . . ON
  - PTU (if green affected) . . . . . AUTO
- **if sys lost by RSVR OVHT** :
  - **IF BLUE OVHT OUT** :
    - BLUE ELEC PUMP . . . . . . AUTO
  - **IF GREEN OVHT OUT** :
    - GREEN ENG 1 PUMP . . . . . . ON
    - PTU . . . . AUTO

HYD G + B SYS LO PR (CONT'D)

STATUS

● **IF HYD NOT RECOVERED (line not displayed for a double LO LVL) :**
– ATHR . . . . OFF
Select the target speed on the FCU. Due to the loss of slats and some flight control surfaces, the A/THR may not satisfactorily maintain the speed.
– FOR LDG . . . . USE FLAP 3
– GPWS LDG FLAP 3 . . . . ON
R ● **WHEN SPD 200 KT (displayed**
R **when slats are retracted)**
R – L/G . . . . GRVTY EXTN
R *Refer to FCOM 3.02.32.*
R *Extend landing gear at 200 knots, for improved*
R *controllability, when on a single elevator.*

APPR SPD . . . . VREF + 25 KT
Approach speed must be increased due to loss of ailerons and slats.
LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
At landing gear extension control reverts to direct law in pitch as well as in roll. (See DIRECT LAW procedure 3.02.27)
FLAPS SLOW
CAT 1 ONLY

INOP SYS
G + B HYD
F/CTL PROT
L ELEV
L + R AIL
SPLR 1+3+5
SLATS
AP 1 + 2
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
EMER GEN
(if B RSVR LO LVL)
B ELEC PUMP
YAW DAMPER 1

HYD G + B SYS LO PR (CONT'D)

STATUS

MIN RAT SPD (if RAT out) . . . . 140 KT
(if B PUMP LO PR)
MAX SPEED 320/.77
MANEUVER WITH CARE
– SPD BRK . . . . DO NOT USE
APPR PROC DUAL HYD LO PR (line not displayed for a double LO LVL) :

- **if sys lost by RSVR LO AIR PR** :
  – related PUMPS . . . . ON
- **if sys lost by RSVR OVHT** :
  - **IF BLUE OVHT OUT** :
    – BLUE ELEC PUMP . . . . . . AUTO
  - **IF GREEN OVHT OUT** :
    – GREEN ENG 1 PUMP . . . . . . ON

<u>HYD</u> G + B SYS LO PR (CONT'D)

STATUS

● **IF HYD NOT RECOVERED (line not displayed for a double LO LVL) :**
- ATHR . . . . OFF
Select the target speed on the FCU. Due to the loss of slats and some flight control surfaces, the A/THR may not satisfactorily maintain the speed.
- FOR LDG . . . . USE FLAP 3
- GPWS LDG FLAP 3 . . . . ON

R ● **WHEN SPD 200 KT (displayed**
R **when slats are retracted)**
R - L/G . . . . GRVTY EXTN
R *Refer to FCOM 3.02.32.*
R *Extend landing gear at 200 knots, for improved*
R *controllability, when on a single elevator.*

APPR SPD . . . . VREF + 25 KT
Approach speed must be increased due to loss of ailerons and slats.
LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
At landing gear extension control reverts to direct law in pitch as well as in roll. (See DIRECT LAW procedure 3.02.27)
FLAPS SLOW
CAT 1 ONLY

<u>INOP SYS</u>
G + B HYD
F/CTL PROT
L ELEV
L + R AIL
SPLR 1+3+5
SLATS
AP 1 + 2
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
EMER GEN
(if B RSVR LO LVL)
B ELEC PUMP
YAW DAMPER 1

HYD G + Y SYS LO PR

LAND ASAP

For landing refer to 3.01.20 p 3 OPERATING LIMITATIONS.

– Affected PUMPS . . . . OFF

● **if yellow sys lost by ENG 2 PUMP LO PR**

– YELLOW ELEC PUMP . . . . ON

MANEUVER WITH CARE

F/CTL ALTN LAW
(PROT LOST)

Flight control normal laws and associated protections are lost. Only load factor limitation, high and low speed stability are provided (alternate law with reduced protection).

MAX SPEED 320/.77

Speed is limited due to loss of high speed protection.

■ **if yellow sys recovered :**

Refer to procedure for single failure

■ **if yellow sys not recovered**

Refer to 3.02.10 LANDING WITH SLATS OR FLAPS JAMMED.

Affected systems
* F/CTL
* WHEEL

HYD G + Y SYS LO PR (CONT'D)

STATUS

MAX SPEED 320/.77
MAX BRK PR . . . . 1000 PSI
MANEUVER WITH CARE
R APPR PROC DUAL HYD LO PR (line not
R displayed for a double LO LVL)

- **if sys lost by RSVR LO AIR PR** :
  - related PUMP . . . . ON
  - R PTU (if no RSVR OVHT and no RSVR
    R LO LVL) . . . . AUTO
- **if sys lost by RSVR OVHT** :
  - **IF GREEN OVHT OUT** :
    - GREEN ENG 1 PUMP . . . . . . ON
    - R PTU (if no Y RSVR OVHT and no
      R RSVR LO LVL) . . . . AUTO
  - **IF YELLOW OVHT OUT** :
    - YELLOW ENG 2 PUMP . . . . . ON
    - R PTU (if no G RSVR OVHT and no
      R RSVR LO LVL) . . . . AUTO

R ● **IF HYD NOT RECOVERED (line not**
R **displayed for a double LO LVL)** :

- FOR LDG . . . . USE FLAP 3
- GPWS FLAP MODE . . . . OFF

⇩

HYD G + Y SYS LO PR

LAND ASAP

For landing refer to 3.01.20 p 3 OPERATING LIMITATIONS.

– Affected PUMPS .... OFF

● **if yellow sys lost by ENG 2 PUMP LO PR**

– YELLOW ELEC PUMP .... ON

MANEUVER WITH CARE

F/CTL ALTN LAW
(PROT LOST)

Flight control normal laws and associated protections are lost. Only load factor limitation, high and low speed stability are provided (alternate law with reduced protection).

MAX SPEED 320/.77

Speed is limited due to loss of high speed protection.

■ **if yellow sys recovered :**

Refer to procedure for single failure

■ **if yellow sys not recovered**

Refer to 3.02.10 LANDING WITH SLATS OR FLAPS JAMMED.

Affected systems
* F/CTL
* WHEEL

HYD G + Y SYS LO PR (CONT'D)

STATUS

MAX SPEED 320/.77
MAX BRK PR . . . . 1000 PSI
MANEUVER WITH CARE
R APPR PROC DUAL HYD LO PR (line not
R displayed for a double LO LVL)

- **if sys lost by RSVR LO AIR PR :**
  - related PUMP . . . . ON
  - R PTU (if no RSVR OVHT and no RSVR
    R LO LVL) . . . . AUTO
- **if sys lost by RSVR OVHT :**
  - **IF GREEN OVHT OUT :**
    - GREEN ENG 1 PUMP . . . . . . ON
    - R PTU (if no Y RSVR OVHT and no
      R RSVR LO LVL) . . . . AUTO
  - **IF YELLOW OVHT OUT :**
    - YELLOW ENG 2 PUMP . . . . . ON
    - R PTU (if no G RSVR OVHT and no
      R RSVR LO LVL) . . . . AUTO

- R **IF HYD NOT RECOVERED (line not**
  R **displayed for a double LO LVL) :**
  - FOR LDG . . . . USE FLAP 3
  - GPWS FLAP MODE . . . . OFF

HYD G + Y SYS LO PR

LAND ASAP

For landing refer to 3.01.20 p 3 OPERATING LIMITATIONS.

– Affected PUMPS . . . . OFF

● **if yellow sys lost by ENG 2 PUMP LO PR**

– YELLOW ELEC PUMP . . . . ON

MANEUVER WITH CARE

F/CTL ALTN LAW
(PROT LOST)

Flight control normal laws and associated protections are lost. Only load factor limitation, high and low speed stability are provided (alternate law with reduced protection).

MAX SPEED 320/.77

Speed is limited due to loss of high speed protection.

■ **if yellow sys recovered :**

Refer to procedure for single failure

■ **if yellow sys not recovered**

Refer to 3.02.10 LANDING WITH SLATS OR FLAPS JAMMED.

Affected systems
* F/CTL
* WHEEL

HYD G + Y SYS LO PR (CONT'D)

STATUS

MAX SPEED 320/.77
MAX BRK PR . . . . 1000 PSI
MANEUVER WITH CARE
APPR PROC DUAL HYD LO PR (line not displayed for a double LO LVL)

- **if sys lost by RSVR LO AIR PR :**
  - related PUMP . . . . ON
- **if sys lost by RSVR OVHT :**
  - **IF GREEN OVHT OUT :**
    - GREEN ENG 1 PUMP . . . . . . ON
  - **IF YELLOW OVHT OUT :**
    - YELLOW ENG 2 PUMP . . . . . ON
- **IF HYD NOT RECOVERED (line not displayed for a double LO LVL) :**
  - FOR LDG . . . . USE FLAP 3
  - GPWS FLAP MODE . . . . OFF

<u>HYD</u> G + Y SYS LO PR (CONT'D)

STATUS

- **WHEN CONF 3 AND VAPP :**
  - L/G . . . . GRVTY EXTN

    (Refer to 3.02.32). Being stabilized at VAPP before selecting the gear down enables the aircraft to be trimmed for approach.

  APPR SPD . . . . VREF + 25 KT

  Approach speed must be increased, due to the loss of flaps.

  LDG DIST PROC . . . . APPLY

  R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

  ALTN LAW : PROT LOST

  WHEN L/G DN : DIRECT LAW

  At landing gear extension, control reverts to direct law in pitch as well as in roll (see DIRECT LAW procedure 3.02.27).

  BRK Y ACCU PR ONLY

  7 full brake applications are available.

  SLATS SLOW

  CAT 1 ONLY

  <u>Note</u> : *Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.*

<u>INOP SYS</u>

G + Y HYD
F/CTL PROT
STABILIZER
REVERSER 1 + 2
SPLR 1+2+4+5
FLAPS
YAW DAMPER
AP 1 + 2
ANTI SKID
N.W. STEER
L/G RETRACT
CARGO DOOR
(if Y RSVR LO LVL)

HYD B + Y SYS LO PR

Note : If the yellow system has been lost by low level or overheat, "HYD PTU FAULT" should appear to demand the PTU switch at OFF.

LAND ASAP

● **if yellow sys lost by ENG 2 PUMP LO PR :**
– YELLOW ELEC PUMP . . . . ON

● **if blue sys lost by ELEC PUMP LO PR :**
– RAT . . . . MAN ON
MIN RAT SPD . . . . 140 KT

– Affected PUMPS . . . . OFF
MAX SPEED 320/.77

Note : Flight controls remain in normal law

– MANEUVER WITH CARE

■ **if blue or yellow sys recovered**

See procedure for single failure

■ **if neither system recovered**

Affected systems
* F/CTL

HYD G + Y SYS LO PR (CONT'D)

STATUS

● **WHEN CONF 3 AND VAPP :**

– L/G . . . . GRVTY EXTN
(Refer to 3.03.32). Being stabilized at VAPP, before selecting the gear down, enables the aircraft to be trimmed for approach.

APPR SPD . . . . VREF + 30 KT
Approach speed must be increased, due to the loss of flaps.

LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
At landing gear extension, control reverts to direct law in pitch, as well as in roll (see DIRECT LAW procedure 3.02.27).

BRK Y ACCU PR ONLY
7 full brake applications are available.

SLATS SLOW
CAT 1 ONLY

Note : *Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.*

INOP SYS

G + Y HYD
F/CTL PROT
STABILIZER
REVERSER 1 + 2
SPLR 1+2+4+5
FLAPS
YAW DAMPER
AP 1 + 2
ANTI SKID
N.W. STEER
L/G RETRACT
CARGO DOOR
(if Y RSVR LO LVL)

HYD B + Y SYS LO PR

Note : If the yellow system has been lost by low level or overheat, "HYD PTU FAULT" should appear to demand the PTU switch at OFF.

LAND ASAP

- **if yellow sys lost by ENG 2 PUMP LO PR :**
  - YELLOW ELEC PUMP . . . . ON
- **if blue sys lost by ELEC PUMP LO PR :**
  - RAT . . . . MAN ON

  MIN RAT SPD . . . . 140 KT

– Affected PUMPS . . . . OFF

MAX SPEED 320/.77

Note : Flight controls remain in normal law

– MANEUVER WITH CARE

■ **if blue or yellow sys recovered**

See procedure for single failure

■ **if neither system recovered**

Affected systems
* F/CTL

HYD G + Y SYS LO PR (CONT'D)

STATUS

● **WHEN CONF 3 AND VAPP :**

– L/G . . . . GRVTY EXTN

(Refer to 3.02.32). Being stabilized at VAPP before selecting the gear down enables the aircraft to be trimmed for approach.

APPR SPD . . . . VREF + 25 KT

Approach speed must be increased, due to the loss of flaps.

LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

ALTN LAW : PROT LOST

WHEN L/G DN : DIRECT LAW

At landing gear extension, control reverts to direct law in pitch as well as in roll (see DIRECT LAW procedure 3.02.27). A slight transient pitch up may occur, depending on the frozen THS position.

BRK Y ACCU PR ONLY

7 full brake applications are available.

SLATS SLOW

CAT 1 ONLY

Note : Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.

INOP SYS

G + Y HYD
F/CTL PROT
STABILIZER
REVERSER 1 + 2
SPLR 1+2+4+5
FLAPS
YAW DAMPER
AP 1 + 2
ANTI SKID
N.W. STEER
L/G RETRACT
CARGO DOOR
(if Y RSVR LO LVL)

HYD B + Y SYS LO PR

Note : If the yellow system has been lost by low level or overheat, "HYD PTU FAULT" should appear to demand the PTU switch at OFF.

LAND ASAP

● **if yellow sys lost by ENG 2 PUMP LO PR :**
– YELLOW ELEC PUMP . . . . ON

● **if blue sys lost by ELEC PUMP LO PR :**
– RAT . . . . MAN ON
MIN RAT SPD . . . . 140 KT

– Affected PUMPS . . . . OFF
MAX SPEED 320/.77

Note : Flight controls remain in normal law

– MANEUVER WITH CARE

■ **if blue or yellow sys recovered**

See procedure for single failure

■ **if neither system recovered**

Affected systems
* F/CTL

HYD B + Y SYS LO PR (CONT'D)

STATUS

MIN RAT SPD .... 140 KT
(If B PUMP LO PR)
MAX SPEED 320/.77
MANEUVER WITH CARE
APPR PROC : DUAL HYD LO PR (line not displayed for dual LO LVL)

- **If sys lost by RSVR LO AIR PR** :
  - Related PUMP .... ON
  - PTU (if yellow affected) .... AUTO
- **If sys lost by RSVR OVHT** :
  - **IF BLUE OVHT OUT**
    - BLUE ELEC PUMP ...... AUTO
  - **IF YELLOW OVHT OUT**
    - YELLOW ENG 2 PUMP ..... ON
    - PTU .... AUTO
- **IF HYD NOT RECOVERED (line not displayed for dual LO LVL)** :
  - L/G .... GRVTY EXTN

  Landing gear is extended by gravity to preserve green system integrity (Refer to 3.02.32).

LDG DIST PROC .... APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
SLATS/FLAPS SLOW
CAT 1 ONLY

Note : *Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.*

INOP SYS
B + Y HYD
R ELEV
SPLR 2+3+4
SPD BRK
AP 1 + 2
ALTN BRK
CARGO DOOR
(if Y RSVR LO LVL)
REVERSER 2
B ELEC PUMP
EMER GEN
(if B RSVR LO LVL)
YAW DAMPER 2

HYD Y ELEC PUMP LO PR or OVHT

If the ELEC PUMP overheats, or if the Y ELEC PUMP fails, while the Y ENG PUMP and the PTU are inoperative :

– YELLOW ELEC PUMP . . . . OFF

Y SYS LO PR

BRK Y ACCU PR MONITOR

This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator whithin 10 minutes. In that case : The only remaining braking means is the normal braking using the green pressure, the parking brake should not be used since it is not available and the chocks should be in place before the engine 1 shutdown.

Affected systems
*F/CTL

STATUS

APPR PROC HYD LO PR

● **IF YELLOW OVHT OUT**

– YELLOW ENG 2 PUMP . . . . ON

– PTU . . . . AUTO

The above three lines are only displayed, in case of an electrical pump overheat.

LDG DIST PROC . . . . APPLY

R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

FLAPS SLOW

CAT 3 SINGLE ONLY

INOP SYS

YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
ALTN BRK
REVERSER 2
Y ELEC PUMP
YAW DAMPER 2

HYD B + Y SYS LO PR (CONT'D)

STATUS

MIN RAT SPD . . . . 140 KT
(If B PUMP LO PR)
MAX SPEED 320/.77
MANEUVER WITH CARE
APPR PROC : DUAL HYD LO PR (line not displayed for dual LO LVL)

- **If sys lost by RSVR LO AIR PR**
  - Related PUMP . . . . ON
  - PTU (if yellow affected) . . . . AUTO
- **If sys lost by RSVR OVHT**
  - **IF BLUE OVHT OUT**
    - BLUE ELEC PUMP . . . . . . AUTO
  - **IF YELLOW OVHT OUT**
    - YELLOW ENG 2 PUMP . . . . . ON
    - PTU . . . . AUTO
- **IF HYD NOT RECOVERED (line not displayed for dual LO LVL) :**
  - L/G . . . . GRVTY EXTN

  Landing gear is extended by gravity to preserve green system integrity (Refer to 3.02.32).

LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
SLATS/FLAPS SLOW
CAT 1 ONLY

Note : Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.

INOP SYS

B + Y HYD
R ELEV
SPLR 2+3+4
SPD BRK
AP 1 + 2
ALTN BRK
CARGO DOOR
(if Y RSVR LO LVL)
REVERSER 2
B ELEC PUMP
EMER GEN
(if B RSVR LO LVL)
YAW DAMPER 2

HYD Y ELEC PUMP LO PR or OVHT

If the ELEC PUMP overheats, or if the Y ELEC PUMP fails, while the Y ENG PUMP and the PTU are inoperative :

– YELLOW ELEC PUMP . . . . OFF

Y SYS LO PR

BRK Y ACCU PR MONITOR

This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator whithin 10 minutes. In that case : The only remaining braking means is the normal braking using the green pressure, the parking brake should not be used since it is not available and the chocks should be in place before the engine 1 shutdown.

Affected systems
*F/CTL

STATUS

APPR PROC HYD LO PR
- **IF YELLOW OVHT OUT**
  - YELLOW ENG 2 PUMP . . . . ON
  - PTU . . . . AUTO

  The above three lines are only displayed, in case of an electrical pump overheat.

LDG DIST PROC . . . . APPLY

R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS
YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
ALTN BRK
REVERSER 2
Y ELEC PUMP
YAW DAMPER 2

HYD B + Y SYS LO PR (CONT'D)

STATUS

MIN RAT SPD . . . . 140 KT
(If B PUMP LO PR)
MAX SPEED 320/.77
MANEUVER WITH CARE
APPR PROC : DUAL HYD LO PR (line not displayed for dual LO LVL)

- **If sys lost by RSVR LO AIR PR**
  - Related PUMP . . . . ON
  - PTU (if yellow affected) . . . . AUTO
- **If sys lost by RSVR OVHT**
  - **IF BLUE OVHT OUT**
    - BLUE ELEC PUMP . . . . . . AUTO
  - **IF YELLOW OVHT OUT**
    - YELLOW ENG 2 PUMP . . . . . ON
    - PTU . . . . AUTO
- **IF HYD NOT RECOVERED (line not displayed for dual LO LVL)** :
  - FOR LDG . . . . USE FLAP 3
  - GPWS LDG FLAP 3 . . . . ON
  - L/G . . . . GRVTY EXTN

    Landing gear is extended by gravity to preserve green system integrity (Refer to 3.02.32).

APPR SPEED . . . . VREF + 10 KT
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
SLATS/FLAPS SLOW
CAT 1 ONLY
Note : *Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.*

INOP SYS

B + Y HYD
R ELEV
SPLR 2+3+4
SPD BRK
AP 1 + 2
ALTN BRK
CARGO DOOR
(if Y RSVR LO LVL)
REVERSER 2
B ELEC PUMP
EMER GEN
(if B RSVR LO LVL)
YAW DAMPER 2

HYD Y ELEC PUMP LO PR or OVHT

If the ELEC PUMP overheats, or if the Y ELEC PUMP fails, while the Y ENG PUMP and the PTU are inoperative :

– YELLOW ELEC PUMP . . . . OFF

Y SYS LO PR

BRK Y ACCU PR MONITOR

This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator whithin 10 minutes. In that case : The only remaining braking means is the normal braking using the green pressure, the parking brake should not be used since it is not available and the chocks should be in place before the engine 1 shutdown.

Affected systems
*F/CTL

STATUS

APPR PROC HYD LO PR

● **IF YELLOW OVHT OUT**

– YELLOW ENG 2 PUMP . . . . ON

– PTU . . . . AUTO

The above three lines are only displayed, in case of an electrical pump overheat.

LDG DIST PROC . . . . APPLY

R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

FLAPS SLOW

CAT 3 SINGLE ONLY

INOP SYS

YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
ALTN BRK
REVERSER 2
Y ELEC PUMP
YAW DAMPER 2

HYD B + Y SYS LO PR (CONT'D)

STATUS

MIN RAT SPD . . . . 140 KT
(If B PUMP LO PR)
MAX SPEED 320/.77
MANEUVER WITH CARE
APPR PROC : DUAL HYD LO PR (line not displayed for dual LO LVL).

- **If sys lost by RSVR LO AIR PR**

R *In approach, system lost by RSVR LO AIR PR may be*
R *recovered at low altitude.*

  – Related PUMP . . . . ON
  – PTU (if yellow affected) . . . . AUTO

- **If sys lost by RSVR OVHT**

R *In approach, system lost by RSVR OVHT may be*
R *recovered if OVHT indication disappears.*

  - **IF BLUE OVHT OUT**
    – BLUE ELEC PUMP . . . . . . AUTO
  - **IF YELLOW OVHT OUT**
    – YELLOW ENG 2 PUMP . . . . . ON
    – PTU . . . . AUTO

- **IF HYD NOT RECOVERED (line not displayed for dual LO LVL) :**
  – L/G . . . . GRVTY EXTN
  Landing gear is extended by gravity to preserve green system integrity. Refer to 3.02.32.

LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
SLATS/FLAPS SLOW
CAT 1 ONLY

Note : *Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.*

INOP SYS

B + Y HYD
R ELEV
SPLR 2+3+4
SPD BRK
AP 1 + 2
N.W. STEER
ALTN BRK
CARGO DOOR
(if Y RSVR LO LVL)
REVERSER 2
B ELEC PUMP
EMER GEN
(if B RSVR LO LVL)
YAW DAMPER 2

HYD Y ELEC PUMP LO PR or OVHT

If the ELEC PUMP overheats, or if Y ELEC PUMP fails, while the Y ENG PUMP and the PTU are inoperative :

– YELLOW ELEC PUMP . . . . OFF

Y SYS LO PR

BRK Y ACCU PR MONITOR

This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 minutes. In that case : The only remaining braking means is the normal braking using the green pressure ; the parking brake should not be used, since it is not available, and the chocks should be in place before engine 1 shutdown.

Affected systems
*F/CTL

STATUS

APPR PROC HYD LO PR

R ● **IF YELLOW OVHT OUT**
- YELLOW ENG 2 PUMP . . . . ON
- PTU . . . . AUTO

The above two lines are only displayed, in case of an electrical pump overheat.

LDG DIST PROC . . . . APPLY

R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS
YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
N.W. STEER
ALTN BRK
REVERSER 2
Y ELEC PUMP
YAW DAMPER 2

HYD B + Y SYS LO PR (CONT'D)

STATUS

MIN RAT SPD . . . . 140 KT
(If B PUMP LO PR)
MAX SPEED 320/.77
MANEUVER WITH CARE
APPR PROC : DUAL HYD LO PR (line not displayed for dual LO LVL).

- **If sys lost by RSVR LO AIR PR**
  In approach, system lost by RSVR LO AIR PR may be recovered at low altitude.
  – Related PUMP . . . . ON
- **If sys lost by RSVR OVHT**
  In approach, system lost by RSVR OVHT may be recovered if OVHT indication disappears.
  - **IF BLUE OVHT OUT**
    – BLUE ELEC PUMP . . . . . . AUTO
  - **IF YELLOW OVHT OUT**
    – YELLOW ENG 2 PUMP . . . . . ON
- **IF HYD NOT RECOVERED (line not displayed for dual LO LVL) :**
  – L/G . . . . GRVTY EXTN
  Landing gear is extended by gravity to preserve green system integrity. Refer to 3.02.32.
  LDG DIST PROC . . . . APPLY
  Refer to the QRH Part 2, or to the FCOM 3.02.80.
  SLATS/FLAPS SLOW
  CAT 1 ONLY
  Note : Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.

INOP SYS

B + Y HYD
R ELEV
SPLR 2+3+4
SPD BRK
AP 1 + 2
N/W STRG
ALTN BRK
CARGO DOOR
(if Y RSVR LO LVL)
REVERSER 2
B ELEC PUMP
EMER GEN
(if B RSVR LO LVL)
YAW DAMPER 2

HYD Y ELEC PUMP LO PR or OVHT

If the ELEC PUMP overheats, or if Y ELEC PUMP fails, while the Y ENG PUMP and the PTU are inoperative :

– YELLOW ELEC PUMP . . . . OFF

Y SYS LO PR

BRK Y ACCU PR MONITOR

This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 minutes. In that case : The only remaining braking means is the normal braking using the green pressure ; the parking brake should not be used, since it is not available, and the chocks should be in place before engine 1 shutdown.

Affected systems
*F/CTL

STATUS

APPR PROC HYD LO PR
R ● **IF YELLOW OVHT OUT**
– YELLOW ENG 2 PUMP . . . . ON
– PTU . . . . AUTO
The above two lines are only displayed, in case of an electrical pump overheat.
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS
YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
N.W. STEER
ALTN BRK
REVERSER 2
Y ELEC PUMP
YAW DAMPER 2

HYD B + Y SYS LO PR (CONT'D)

STATUS

MIN RAT SPD . . . . 140 KT
(If B PUMP LO PR)
MAX SPEED 320/.77
MANEUVER WITH CARE
APPR PROC : DUAL HYD LO PR (line not displayed for dual LO LVL)

- **If sys lost by RSVR LO AIR PR**
  - Related PUMP . . . . ON
  - PTU (if yellow affected) . . . . AUTO
- **If sys lost by RSVR OVHT**
  - **IF BLUE OVHT OUT**
    - BLUE ELEC PUMP . . . . . . AUTO
  - **IF YELLOW OVHT OUT**
    - YELLOW ENG 2 PUMP . . . . . ON
    - PTU . . . . AUTO
- **IF HYD NOT RECOVERED (line not displayed for dual LO LVL)** :
  - FOR LDG . . . . USE FLAP 3
  - GPWS LDG FLAP 3 . . . . ON
  - L/G . . . . GRVTY EXTN

    Landing gear is extended by gravity to preserve green system integrity (Refer to 3.02.32).

APPR SPEED . . . . VREF + 10 KT
LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
SLATS/FLAPS SLOW
CAT 1 ONLY

Note : Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.

INOP SYS

B + Y HYD
R ELEV
SPLR 2+3+4
SPD BRK
AP 1 + 2
N.W. STEER
ALTN BRK
CARGO DOOR
(if Y RSVR LO LVL)
REVERSER 2
B ELEC PUMP
EMER GEN
(if B RSVR LO LVL)
YAW DAMPER 2

HYD Y ELEC PUMP LO PR or OVHT

If the ELEC PUMP overheats, or if Y ELEC PUMP fails, while the Y ENG PUMP and the PTU are inoperative :

– YELLOW ELEC PUMP . . . . OFF

Y SYS LO PR

BRK Y ACCU PR MONITOR

This check is recommended to cover the case of a pipe rupture, which could lead to the simultaneous loss of the hydraulic system and the accumulator fluid. If this occurs, the loss of the accumulator should be observed on the indicator within 10 minutes. In that case : The only remaining braking means is the normal braking using the green pressure ; the parking brake should not be used, since it is not available, and the chocks should be in place before engine 1 shutdown.

Affected systems
*F/CTL

STATUS

APPR PROC HYD LO PR
R ● **IF YELLOW OVHT OUT**
– YELLOW ENG 2 PUMP . . . . ON
– PTU . . . . AUTO
The above two lines are only displayed, in case of an electrical pump overheat.
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
FLAPS SLOW
CAT 3 SINGLE ONLY

INOP SYS
YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
N.W. STEER
ALTN BRK
REVERSER 2
Y ELEC PUMP
YAW DAMPER 2

HYD G (Y) ENG 1(2) PUMP LO PR

– ENG PUMP (affected) . . . . OFF

■ **PTU operative**

STATUS

INOP SYS
G (Y) ENG 1(2) PUMP

■ **PTU inoperative**

G (Y) SYS LO PR

Note : If yellow system is affected, the yellow elec pump may be used

Affected systems
* WHEEL
(if G SYS affected)
* F/CTL

STATUS

● **G sys lost**

– L/G . . . . GRVTY EXTN
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
SLATS/FLAPS SLOW
CAT 3 SINGLE

INOP SYS
GREEN HYD
SPLR 1 + 5
CAT 3 DUAL
N.W. STEER
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
PTU
G ENG 1 PUMP
YAW DAMPER 1

● **Y sys lost :**

LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
FLAPS SLOW
CAT 3 SINGLE

Note : Following a yellow hydraulic system failure, the parking brake may be inoperative due to a yellow accumulator low pressure.

INOP SYS
YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
ALTN BRK
REVERSER 2
PTU
Y ENG 2 PUMP
YAW DAMPER 2

HYD PTU FAULT

Note : This warning is triggered, if the second engine is started within 40 seconds, following the end of the cargo doors operation. In this case, reset the warning by switching the yellow elec pump ON, then OFF.

- **If green or yellow reservoir low level and system low press:**
  - – PTU . . . . OFF

STATUS

INOP SYS
PTU

HYD RAT FAULT

Crew awareness.

STATUS

INOP SYS
RAT

HYD B ELEC PUMP LO PR or OVHT

– BLUE ELEC PUMP . . . . OFF

B SYS LO PR

Affected systems
*F/CTL

STATUS

APPR PROC HYD LO PR
- **IF BLUE OVHT OUT**
  - – BLUE ELEC PUMP . . . . AUTO

LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
SLATS SLOW
CAT 3 SINGLE ONLY

INOP SYS
BLUE HYD
SPLR 3
CAT 3 DUAL
B ELEC PUMP

HYD G (Y) ENG 1(2) PUMP LO PR

– ENG PUMP (affected) .... OFF

■ **PTU operative :**

STATUS

INOP SYS
G (Y) ENG 1(2)
PUMP

■ **PTU inoperative :**

G (Y) SYS LO PR

Note : If the yellow system is affected, the yellow elec pump may be used.

Affected systems
* WHEEL
(if G SYS affected)
* F/CTL

STATUS

● **G sys lost :**
– L/G .... GRVTY EXTN
LDG DIST PROC .... APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
SLATS/FLAPS SLOW
CAT 3 SINGLE

INOP SYS
GREEN HYD
SPLR 1 + 5
CAT 3 DUAL
AUTO BRK
NORM BRK
L/G RETRACT
REVERSER 1
PTU
G ENG 1 PUMP
YAW DAMPER 1

● **Y sys lost :**
LDG DIST PROC .... APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
FLAPS SLOW
CAT 3 SINGLE

Note : Following a yellow hydraulic system failure, the parking brake may be inoperative due to yellow accumulator low pressure.

INOP SYS
YELLOW HYD
SPLR 2 + 4
CAT 3 DUAL
N.W. STEER
ALTN BRK
REVERSER 2
PTU
Y ENG 2 PUMP
YAW DAMPER 2

HYD PTU FAULT

Note : This warning is triggered, if the second engine is started within 40 seconds, following the end of the cargo doors operation. In this case, reset the warning by switching the yellow elec pump ON, then OFF.

● **If green or yellow reservoir low level and system low press:**
– PTU . . . . OFF

STATUS

INOP SYS
PTU

HYD RAT FAULT

Crew awareness.

STATUS

INOP SYS
RAT

HYD B ELEC PUMP LO PR or OVHT

– BLUE ELEC PUMP . . . . OFF

B SYS LO PR

Affected systems
*F/CTL

STATUS

APPR PROC HYD LO PR
● **IF BLUE OVHT OUT**
– BLUE ELEC PUMP . . . . AUTO
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
SLATS SLOW
CAT 3 SINGLE ONLY

INOP SYS
BLUE HYD
SPLR 3
CAT 3 DUAL
B ELEC PUMP

ANTI ICE L (R) WINDSHIELD (WINDOW)

R Crew awareness.

STATUS

INOP SYS
L (R) WSHLD
(WNDW) HEAT

ANTI ICE L + R WINDSHIELD

R Crew awareness.

STATUS

INOP SYS
WSHLD HEAT

ANTI ICE CAPT PITOT or L (R) STAT

Failure of probe heating.

– AIR DATA SWTG .... CAPT

ADR 3 supplies data to PFD 1 and ND 1.

When ADR 3 is selected on captain side, deicing of pitot associated with ADR 1 is lost.

Note : AIR DATA SWTG should not be selected to CAPT 3 if ADR 3 is not available.

STATUS

INOP SYS

CAPT PITOT/
L STAT/
R STAT

ANTI ICE F/O PITOT or L (R) STAT

Failure of probe heating.

– AIR DATA SWTG .... F/O

ADR 3 supplies data to PFD 2 and ND 2.

Note : AIR DATA SWTG should not be selected to F/O 3 if ADR 3 is not available.

STATUS

INOP SYS

F/O PITOT/
L STAT/
R STAT

ANTI ICE L (R) WINDSHIELD (WINDOW)

R Crew awareness.

STATUS

INOP SYS
L (R) WSHLD (WNDW) HEAT

ANTI ICE L + R WINDSHIELD

R Crew awareness.

STATUS

INOP SYS
WSHLD HEAT

ANTI ICE CAPT PITOT or L (R) STAT or AOA

Failure of probe heating.

– AIR DATA SWTG .... CAPT 3

ADR 3 supplies data to PFD 1 and ND 1.

When ADR 3 is selected on the captain's side, deicing of the pitot associated with ADR 1 is lost.

Note : AIR DATA SWTG should not be set to CAPT 3, if ADR 3 is not available.

STATUS

INOP SYS

CAPT PITOT/
L STAT/
R STAT
CAPT AOA

ANTI ICE F/O PITOT or L (R) STAT or AOA

Failure of probe heating.

– AIR DATA SWTG .... F/O 3

ADR 3 supplies data to PFD 2 and ND 2.

Note : AIR DATA SWTG should not be set to F/O 3, if ADR 3 is not available.

STATUS

INOP SYS

F/O PITOT/
L STAT/
R STAT
F/O AOA

ANTI ICE CAPT (F/O) AOA or TAT

Crew awareness.

STATUS

INOP SYS
CAPT (F/O)
AOA/TAT

ANTI ICE STBY PITOT or L (R) STAT or AOA

Crew awareness.
When using standby instruments, monitor air data information.

STATUS

INOP SYS
STBY PITOT/
L(R) STAT/
AOA

R
DOUBLE AOA HEAT FAILURE

R *In case of double failure of the alpha probe heaters in icing conditions, the choice made by the computers among the 3 ADR values may be erroneous.*

● **If icing conditions cannot be avoided** :

– One of affected ADRs .... OFF

There will be a disagreement between the two remaining ADRs, which will trigger the NAV ADR DISAGREE ECAM caution.

ANTI ICE CAPT (F/O) (STBY) PROBES

■ CAPT PROBES fault :

– AIR DATA SWTG . . . . CAPT

Note : AIR DATA SWTG should not be selected to CAPT 3 if ADR 3 is not available.

STATUS

INOP SYS
CAPT PROBES

■ F/O PROBES fault :

– AIR DATA SWTG . . . . F/O

Note : AIR DATA SWTG should not be selected to F/O 3 if ADR 3 is not available.

STATUS

INOP SYS
F/O PROBES

■ STBY PROBES fault :

Crew awareness

STATUS

INOP SYS
STBY PROBES

ANTI ICE CAPT (F/O) TAT

Crew awareness.

STATUS

INOP SYS
CAPT (F/O) TAT

ANTI ICE STBY PITOT or L (R) STAT or AOA

Crew awareness.
When using standby instruments, monitor air data information.

STATUS

INOP SYS
STBY PITOT/
L(R) STAT/
AOA

R ## DOUBLE AOA HEAT FAILURE

R *In case of double failure of the alpha probe heaters in icing conditions, the choice made by the computers among the three ADR values may be erroneous.*

- **If icing conditions cannot be avoided :**
  - One of the affected ADRs . . . . OFF
    There will be a disagreement between the two remaining ADRs, which will trigger the F/CTL ADR DISAGREE ECAM caution.

ANTI ICE CAPT (F/O) (STBY) PROBES

■ **CAPT PROBES fault :**

– AIR DATA SWTG .... CAPT 3

Note : AIR DATA SWTG should not be set to CAPT 3, if ADR 3 is not available.

STATUS

INOP SYS

CAPT PROBES

■ **F/O PROBES fault :**

– AIR DATA SWTG .... F/O 3

Note : AIR DATA SWTG should not be set to F/O 3, if ADR 3 is not available.

STATUS

INOP SYS

F/O PROBES

■ **STBY PROBES fault :**

Crew awareness

STATUS

INOP SYS

STBY PROBES

ANTI ICE ENG 1 (2) VALVE CLSD

AVOID ICING CONDITIONS

STATUS

AVOID ICING CONDITIONS

INOP SYS
ENG 1 (2) A. ICE

ANTI ICE ENG 1 (2) VALVE OPEN

THRUST LIM PENALTY

STATUS

THRUST LIM PENALTY

ANTI ICE ICE DETECTED

In flight, ice is detected.

– ENG 1 ANTI ICE . . . . ON
– ENG 2 ANTI ICE . . . . ON

ANTI ICE DETECT FAULT

Both ice detectors failed.

– ANTI ICE . . . . AS RQRD

STATUS

INOP SYS
ICE DETECT

SEVERE ICE DETECTED

In flight, severe ice is detected.

– WING ANTI ICE . . . . ON
– ENG MODE SEL . . . . IGN

WING ANTI ICE L (R) VALVE OPEN

■ **Failure detected on ground :**

- WING ANTI ICE .... OFF
- ENG BLEED (affected side) .... OFF
- X BLEED (if not closed) .... SHUT
- APU BLEED (if left wing affected and if APU running) .. OFF

WAI AVAIL IN FLT

STATUS

WAI AVAIL IN FLT	INOP SYS ENG 1 (2) BLEED PACK 1 (2)

● **After takeoff when above 1500 feet (automatic recall) :**

WAI AVAIL IN FLT

- ENG BLEED .... ON
- WING ANTI ICE .... AS RQRD

  Wing anti ice is available if needed and anyway is continually on, on failed side.
- THRUST LIM PENALTY

STATUS

R THRUST LIM PENALTY

● **After landing (automatic recall) :**

- WING ANTI ICE .... OFF
- ENG BLEED (affected side) .... OFF
- X BLEED (if not closed) .... SHUT
- APU BLEED (if left wing affected) .... OFF

STATUS

INOP SYS
ENG 1 (2) BLEED
PACK 1 (2)

WING ANTI ICE L (R) VALVE OPEN (CONT'D)

■ **Failure detected in flight :**

WAI AVAIL IN FLT

– WING ANTI ICE . . . . AS RQRD

Wing anti-ice is available if needed and anyway is continually on on failed side.

– THRUST LIM PENALTY

STATUS

THRUST LIM PENALTY
WAI AVAIL IN FLT

● **After landing (automatic recall) :**

– ENG BLEED (affected side) . . . . OFF
– X BLEED (if not closed) . . . . SHUT
– APU BLEED (if left wing affected) . . . . OFF
– WING ANTI ICE . . . . OFF

STATUS

INOP SYS
ENG 1(2) BLEED
PACK 1 (2)

WING ANTI ICE OPEN ON GND

Following ground test the valves are still open after 35 seconds.

– WING ANTI ICE . . . . OFF

STATUS

WAI AVAIL IN FLT

WING ANTI ICE SYS FAULT

● **If one wing valve remains closed when the wing anti-ice is turned on :**

– WING ANTI ICE . . . . OFF

AVOID ICING CONDITIONS

R *Note : If ice accretion, the speed must not be lower than :*
R *– VLS + 15 knots when in CONF 0.*
R *– VLS + 10 knots when in other configurations*
R *– For landing distance determination, refer to QRH part 2 or to FCOM 3.02.80*

STATUS

AVOID ICING CONDITIONS	INOP SYS WING ANTI ICE

● **If the wing anti-ice is turned on after one engine shutdown or after the loss of one bleed :**

– X BLEED . . . . OPEN

Note : The affected pack has to be selected OFF due to precooler performance.

WING ANTI ICE L (R) HI PR

THRUST LIM PENALTY

STATUS

THRUST LIM PENALTY	INOP SYS WAI REGUL

WING ANTI ICE L (R) VALVE OPEN (CONT'D)

■ **Failure detected in flight :**

WAI AVAIL IN FLT

– WING ANTI ICE . . . . AS RQRD

Wing anti-ice is available if needed and anyway is continually on on failed side.

– THRUST LIM PENALTY

STATUS

THRUST LIM PENALTY
WAI AVAIL IN FLT

● **After landing (automatic recall) :**

– ENG BLEED (affected side) . . . . OFF
– X BLEED (if not closed) . . . . SHUT
– APU BLEED (if left wing affected) . . . . OFF
– WING ANTI ICE . . . . OFF

STATUS

INOP SYS
ENG 1(2) BLEED
PACK 1 (2)

WING ANTI ICE OPEN ON GND

Following ground test, the valves are still open after 35 seconds.

– WING ANTI ICE . . . . OFF

STATUS

WAI AVAIL IN FLT

WING ANTI ICE SYS FAULT

● **If one wing valve remains closed when the wing anti-ice is turned on :**

– WING ANTI ICE . . . . OFF

AVOID ICING CONDITIONS

R *Note : If ice accretion, the speed must not be lower than :*

R *– VLS + 15 knots when in CONF 0.*

R *– VLS + 10 knots when in other configurations*

R *– For landing distance determination, refer to QRH part 2 or to FCOM 3.02.80*

STATUS

AVOID ICING CONDITIONS | INOP SYS
WING ANTI ICE

● **If the wing anti-ice is turned on after one engine shutdown or after the loss of one bleed :**

– X BLEED . . . . OPEN

Note : The affected pack has to be selected OFF due to precooler performance.

WING ANTI ICE L (R) HI PR

THRUST LIM PENALTY

STATUS

THRUST LIM PENALTY | INOP SYS
WAI REGUL

WING ANTI ICE L (R) VALVE OPEN (CONT'D)

■ **Failure detected in flight :**

WAI AVAIL IN FLT

– WING ANTI ICE .... AS RQRD

Wing anti-ice is available if needed and anyway is continually on on failed side.

– THRUST LIM PENALTY

STATUS

THRUST LIM PENALTY
WAI AVAIL IN FLT

● **After landing (automatic recall) :**

– ENG BLEED (affected side) .... OFF
– X BLEED (if not closed) .... SHUT
– APU BLEED (if left wing affected) .... OFF
– WING ANTI ICE .... OFF

STATUS

INOP SYS
ENG 1(2) BLEED
PACK 1 (2)

WING ANTI ICE OPEN ON GND

Following ground test the valves are still open after 35 seconds.

– WING ANTI ICE .... OFF

STATUS

WAI AVAIL IN FLT

WING ANTI ICE SYS FAULT

- **If one wing valve remains closed when the wing anti-ice is turned on :**

  – WING ANTI ICE .... OFF

  AVOID ICING CONDITIONS

R *Note : If ice accretion, the speed must not be lower than :*
R *– VLS + 15 knots when in CONF 0.*
R *– VLS + 10 knots when in other configurations*
R *– For landing distance determination, refer to QRH part 2 or to FCOM 3.02.80*

STATUS

- **If one wing valve remains closed when the wing anti ice is turned on :**
  - **IF A/C ICING SEVERE**

    – MIN SPD .... ALPHA PROT

    Never fly below Vα prot since the margin versus stall may be reduced.

INOP SYS

WING ANTI ICE

- **If the wing anti-ice is turned on after one engine shutdown or after the loss of one bleed :**

  – X BLEED .... OPEN

  Note : The affected pack has to be selected OFF due to precooler performance.

WING ANTI ICE L (R) HI PR

THRUST LIM PENALTY

STATUS

THRUST LIM PENALTY

INOP SYS

WAI REGUL

ANTI ICE CAPT + F/O PITOT

Capt and F/O pitot heating is lost. In case of simultaneous pitot icing and in the same amount, ADR 1 and ADR 2 speeds will be in agreement, but incorrect. Therefore, flight controls will consider the remaining correct source as being faulty, and will reject the only correct source. The following ECAM procedure avoids that the flight controls use 2 erroneous, but coherent, sources.

■ **If ADR 3 operative and ON**

– ADR 1 (2) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1 or 2 be switched OFF.

Note : In case of subsequent, significant, speed discrepancy between the 2 remaining ADRs, the "ADR DISAGREE" ECAM caution will be triggered.

■ **If ADR 3 failed or OFF**

No action is required, as long as there are no icing conditions, in order to keep 2 independent speed sources.

● **IF ICING EXPECTED :**

– ADR 1 (2) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1 or 2 be switched OFF.

– UNREL SPD PROC . . . . CONSIDER

Only one ADR is available, and the corresponding pitot probe may be affected by
R *ice accretion. Be prepared to use the UNRELIABLE SPEED INDICATION/ADR*
R *CHECK PROC procedure.*

NAV ADR FAULT

■ **If ADR 3 failed or OFF**

● **IF ICING EXPECTED :**

– ADR 1 (2) . . . . OFF

– UNREL SPD PROC . . . . CONSIDER

STATUS

INOP SYS

CAPT PITOT
F/O PITOT
CAPT PROBES
(If all CAPT PROBES heating is lost)
F/O PROBES
(If all F/O PROBES heating is lost)

ANTI ICE CAPT + STBY PITOT

Capt and STBY pitot heating is lost. In case of simultaneous pitot icing and in the same amount, ADR 1 and ADR 3 speeds will be in agreement, but incorrect. Flight controls will consider the remaining correct source as being faulty, and will reject the only correct source. The following ECAM procedure avoids that the flight controls use 2 erroneous, but coherent, sources.

■ **If ADR 2 operative and ON**

– ADR 1 (3) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1 or 3 be switched OFF.

Note : In case of subsequent, significant, speed discrepancy between the 2 remaining ADRs, the "ADR DISAGREE" ECAM caution will be triggered.

■ **If ADR 2 failed or OFF**

No action is required, as long as there are no icing conditions, in order to keep 2 independent speed sources.

● **IF ICING EXPECTED :**

– ADR 1 (3) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1 or 3 be switched OFF.

– UNREL SPD PROC . . . . CONSIDER

Only one ADR is available, and the corresponding pitot probe may be affected by
R *ice accretion. Be prepared to use the UNRELIABLE SPEED INDICATION/ADR*
R *CHECK PROC procedure.*

NAV ADR FAULT

STATUS

■ **If ADR 2 failed or OFF**

● **IF ICING EXPECTED :**

– ADR 1 (3) . . . . OFF

– UNREL SPD PROC . . . . CONSIDER

INOP SYS

CAPT PITOT
STBY PITOT
CAPT PROBES
(If all CAPT PROBES heating is lost)
STBY PROBES
(If all STBY PROBES heating is lost)

ANTI ICE CAPT + F/O PITOT

Capt and F/O pitot heating is lost. In case of simultaneous pitot icing, and in the same amount, ADR 1 and ADR 2 speeds will be in agreement, but incorrect. Therefore, flight controls will consider the remaining correct source as being faulty, and will reject the only correct source. The following ECAM procedure avoids that the flight controls use two erroneous, but coherent, sources.

■ **If ADR 3 operative and ON**

– ADR 1 (2) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1 or 2 be switched OFF.

Note : In case of subsequent, significant, speed discrepancy between the two remaining ADRs, the "ADR DISAGREE" ECAM caution will be triggered.

■ **If ADR 3 failed or OFF**

No action is required, as long as there are no icing conditions, in order to keep two independent speed sources.

● **IF ICING EXPECTED :**

– ADR 1 (2) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1 or 2 be switched OFF.

– UNREL SPD PROC . . . . APPLY

Only one ADR is available, and the corresponding pitot probe may be affected by
R *ice accretion. Be prepared to use the UNRELIABLE SPEED INDICATION/ADR*
R *CHECK PROC procedure.*

NAV ADR FAULT

	STATUS
■ **If ADR 3 failed or OFF** ● **IF ICING EXPECTED :** – ADR 1 (2) . . . . OFF – UNREL SPD PROC . . . . APPLY	INOP SYS CAPT PITOT F/O PITOT CAPT PROBES (If all CAPT PROBES heating is lost) F/O PROBES (If all F/O PROBES heating is lost)

ANTI ICE CAPT + STBY PITOT

Capt and STBY pitot heating is lost. In case of simultaneous pitot icing, and in the same amount, ADR 1 and ADR 3 speeds will be in agreement, but incorrect. Flight controls will consider the remaining correct source as being faulty, and will reject the only correct source. The following ECAM procedure avoids that the flight controls use two erroneous, but coherent, sources.

■ **If ADR 2 operative and ON**

- ADR 1 (3) . . . . OFF

  Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1 or 3 be switched OFF.

  Note : In case of subsequent, significant, speed discrepancy between the two remaining ADRs, the "ADR DISAGREE" ECAM caution will be triggered.

■ **If ADR 2 failed or OFF**

No action is required, as long as there are no icing conditions, in order to keep two independent speed sources.

● **IF ICING EXPECTED :**

- ADR 1 (3) . . . . OFF

  Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1 or 3 be switched OFF.
- UNREL SPD PROC . . . . APPLY

  Only one ADR is available, and the corresponding pitot probe may be affected by
R *ice accretion. Be prepared to use the UNRELIABLE SPEED INDICATION/ADR*
R *CHECK PROC procedure.*

NAV ADR FAULT

■ **If ADR 2 failed or OFF**

● **IF ICING EXPECTED :**

- ADR 1 (3) . . . . OFF
- UNREL SPD PROC . . . . APPLY

STATUS

INOP SYS

CAPT PITOT
STBY PITOT
CAPT PROBES
(If all CAPT PROBES heating is lost)
STBY PROBES
(If all STBY PROBES heating is lost)

ANTI ICE F/O + STBY PITOT

F/O and STBY pitot heating is lost. In case of simultaneous pitot icing and in the same amount, ADR 2 and ADR 3 speeds will be in agreement, but incorrect. Therefore, flight controls will consider the remaining correct source as being faulty, and will reject the only correct source. The following ECAM procedure avoids that the flight controls use 2 erroneous, but coherent, sources.

■ **If ADR 1 operative and ON**

– ADR 2 (3) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 2 or 3 be switched OFF.

Note : In case of subsequent, significant, speed discrepancy between the 2 remaining ADRs, the "ADR DISAGREE" ECAM caution will be triggered.

■ **If ADR 1 failed or OFF**

No action is required, as long as there are no icing conditions, in order to keep 2 independent speed sources.

● **IF ICING EXPECTED :**

– ADR 2 (3) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 2 or 3 be switched OFF.

– UNREL SPD PROC . . . . CONSIDER

Only one ADR is available, and the corresponding pitot probe may be affected by ice accretion. Be prepared to use the UNRELIABLE SPEED INDICATION/ADR CHECK PROC procedure.

NAV ADR FAULT

■ **If ADR 1 failed or OFF**

● **IF ICING EXPECTED :**

– ADR 2 (3) . . . . OFF

– UNREL SPD PROC . . . . CONSIDER

STATUS

INOP SYS

F/O PITOT
STBY PITOT
F/O PROBES
(If all F/O PROBES heating is lost)
STBY PROBES
(If all STBY PROBES heating is lost)

ANTI ICE ALL PITOT

Capt, F/O and STBY pitot heating is lost. In case of simultaneous pitot icing and in the same amount, ADR 1, ADR 2, and ADR 3 speeds will be in agreement, but incorrect. The following ECAM procedure avoids that the flight controls use erroneous, but coherent, sources.

– ADR 1 (2) (3) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1, 2 or 3 be switched OFF.

Note : In case of subsequent, significant, speed discrepancy between the 2 remaining ADRs, the "ADR DISAGREE" ECAM caution will be triggered.

● **IF ICING EXPECTED :**

– ADR 2 (3) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 2 or 3 be switched OFF.

– UNREL SPD PROC . . . . CONSIDER

Only one ADR is available, and the corresponding pitot probe may be affected by ice
R *accretion. Be prepared to use the UNRELIABLE SPEED INDICATION/ADR CHECK PROC*
R *procedure.*

NAV ADR FAULT

Single ADR FAULT or double ADR FAULT ECAM cautions may be triggered, depending on the number of ADRs switched OFF.

F/CTL ALTN LAW (PROT LOST)

Alternate law becomes active, if :

- *One ADR has already been switched OFF, and the 2 remaining ADRs are not in agreement, or*
- *Two ADRs have been switched OFF.*

ANTI ICE F/O + STBY PITOT

F/O and STBY pitot heating is lost. In case of a simultaneous pitot icing, and in the same amount, ADR 2 and ADR 3 speeds will be in agreement, but incorrect. Therefore, flight controls will consider the remaining correct source as being faulty, and will reject the only correct source. The following ECAM procedure avoids that the flight controls use two erroneous, but coherent, sources.

■ **If ADR 1 operative and ON**

– ADR 2 (3) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 2 or 3 be switched OFF.

Note : In case of subsequent, significant, speed discrepancy between the two remaining ADRs, the "ADR DISAGREE" ECAM caution will be triggered.

■ **If ADR 1 failed or OFF**

No action is required, as long as there are no icing conditions, in order to keep two independent speed sources.

● **IF ICING EXPECTED :**

– ADR 2 (3) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 2 or 3 be switched OFF.

– UNREL SPD PROC . . . . APPLY

Only one ADR is available, and the corresponding pitot probe may be affected by
R *ice accretion. Be prepared to use the UNRELIABLE SPEED INDICATION/ADR*
R *CHECK PROC procedure.*

NAV ADR FAULT

■ **If ADR 1 failed or OFF**

● **IF ICING EXPECTED :**

– ADR 2 (3) . . . . OFF

– UNREL SPD PROC . . . . APPLY

STATUS

INOP SYS

F/O PITOT
STBY PITOT
F/O PROBES
(If all F/O PROBES heating is lost)
STBY PROBES
(If all STBY PROBES heating is lost)

ANTI ICE ALL PITOT

Capt, F/O and STBY pitot heating is lost. In case of a simultaneous pitot icing, and in the same amount, ADR 1, ADR 2, and ADR 3 speeds will be in agreement, but incorrect. The following ECAM procedure avoids that the flight controls use erroneous, but coherent, sources.

– ADR 1 (2) (3) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 1, 2 or 3 be switched OFF.

Note : In case of subsequent, significant, speed discrepancy between the two remaining ADRs, the "ADR DISAGREE" ECAM caution will be triggered.

● **IF ICING EXPECTED :**

– ADR 2 (3) . . . . OFF

Depending on the status of the static, AOA, and TAT heating, the ECAM requires that either ADR 2 or 3 be switched OFF.

– UNREL SPD PROC . . . . APPLY

Only one ADR is available, and the corresponding pitot probe may be affected by ice
R *accretion. Be prepared to use the UNRELIABLE SPEED INDICATION/ADR CHECK PROC*
R *procedure.*

NAV ADR FAULT

Single ADR FAULT or double ADR FAULT ECAM cautions may be triggered, depending on the number of ADRs switched OFF.

F/CTL ALTN LAW (PROT LOST)

Alternate law becomes active, if :

– One ADR has already been switched OFF, and the two remaining ADRs are not in agreement, or

– Two ADRs have been switched OFF.

ANTI ICE ALL PITOT (CONT'D)

STATUS

● **IF ICING EXPECTED :**
- ADR 2 (3) . . . . OFF
- UNREL SPD PROC . . . . . . CONSIDER

INOP SYS

CAPT PITOT
F/O PITOT
STBY PITOT
CAPT PROBES
(If all CAPT PROBES heating is lost)
F/O PROBES
(If all F/O PROBES heating is lost)
STBY PROBES
(If all STBY PROBES heating is lost)

ANTI ICE ALL PITOT (CONT'D)

STATUS

● **IF ICING EXPECTED :**
- ADR 2 (3) .... OFF
- UNREL SPD PROC .... APPLY

INOP SYS

CAPT PITOT
F/O PITOT
STBY PITOT
CAPT PROBES
(If all CAPT PROBES heating is lost)
F/O PROBES
(If all F/O PROBES heating is lost)
STBY PROBES
(If all STBY PROBES heating is lost)

RECORDER DFDR FAULT

Crew awareness.

STATUS

INOP SYS
DFDR

RECORDER SYS FAULT

Crew awareness.

STATUS

INOP SYS
RECORDER SYS

FWS OEB/FWC DISCREPANCY

– OEB DATABASE . . . . XCHECK

This action is normally performed by maintenance.

<u>FWS</u> SDAC 1(2) FAULT

Crew awareness

R *<u>Note</u> : Although the ECAM may display some symbols and/or*
R *parameters in amber, this does not always signify that*
R *additional systems are failed.*

STATUS

<u>INOP SYS</u>
SDAC 1(2)

<u>FWS</u> SDAC 1 + 2 FAULT

– MONITOR OVERHEAD PANEL
Amber cautions are lost. Aircraft status on the ECAM STATUS page is lost.
Only red warnings, engine and fuel parameters, and slat/flap positions are available on the upper ECAM DU.

– ECAM ENG FUEL F/CTL WHEEL (L/G pos ind) SYS PAGES AVAIL.

<u>Note</u> : Although this failure does not affect engine idle, the "ENG 1 APPR IDLE ONLY" and "ENG 2 APPR IDLE ONLY" messages are displayed. Disregard them.

STATUS

<u>INOP SYS</u>
SDAC 1 + 2

EIS DMC 1(2)(3) FAULT

■ **DMC 1**

– EIS DMC SWITCH . . . . CAPT

DMC 3 replaces DMC 1.

■ **DMC 2**

– EIS DMC SWITCH . . . . F/O

DMC 3 replaces DMC 2.

■ **DMC 3**

Crew awareness.

STATUS

INOP SYS
DMC 1(2)(3)

FWS FWC 1(2) FAULT

Crew awareness.

STATUS

CAT 3 SINGLE ONLY

INOP SYS
CAT 3 DUAL
FWC 1(2)

FWS FWC 1 + 2 FAULT

– MONITOR SYS
– MONITOR OVERHEAD PANEL

R CAT 1 ONLY (not displayed on the ECAM)

NOT AVAIL
ECAM WARN
ALTI ALERT
STATUS
A/CALL OUT
MEMO

ECAM cautions and warnings, aural warnings, master caution and warning lights are lost. ECAM system pages are still available. Therefore cockpit panels must be monitored for local warnings and ECAM system pages must be regularly called for system checks.

DISPLAY UNIT FAILURE

R ■ **The DU is blank, or the display is distorted :**

- DU (affected) . . . . AS RQRD
  The DU can be switched off.
- ECAM/ND XFR (if the ECAM DUs are affected) . . . . . . USE
  Transfer SD to F/O or CAPT ND.
- PFD/ND XFR (if the EFIS DUs are affected) . . . . USE

R ■ **INVALID DISPLAY UNIT message is displayed :**

R *This may be caused by a DU failure.*

R – FOR AUTOMATIC DU RECOVERY .. WAIT MORE THAN 40s

R ● **IF DU IS AUTOMATICALLY RECOVERED :**

R No crew action is required.

R ● **IF DU IS NOT RECOVERED :**

R – Non-recovered DU . . . . AS RQRD

R *The DU can be switched off.*

■ **The INVALID DATA message appears (not on all DUs) :**

This failure may be because of a DMC FAULT, or a communication interruption between the DMC and DU.

- EIS DMC SWITCHING . . . . AS RQRD

● **If unsuccessful :**

- DU (affected) . . . . OFF THEN ON
  Note : The ND display may disappear, if too many waypoints and associated information are displayed. Reduce the range, or deselect WPT or CSTR, and the display will automatically recover, after about 30 seconds.

■ **The INVALID DATA message appears on all DUs :**

The autopilot, autothrust and MCDU navigation data are still available, and may be used.

- FOR AUTOMATIC DUs RECOVERY . WAIT MORE THAN 40S

● **IF ALL DUs ARE AUTOMATICALLY RECOVERED :**

No crew action is required.

● **IF ONE OR MORE DUs ARE NOT RECOVERED :**

- Non-recovered DUs . . . . OFF FOR 40S
- Non-recovered DUs . . . . BACK ON sequentially

● **If the initial failure re-occurs (the INVALID DATA message appears on all DUs), when switching a given DU back ON :**

Apply the entire procedure again, from the beginning. Leave this specific DU permanently OFF.

■ **INVERSION OF THE EWD AND THE SD :**

- ECAM UPPER DISPLAY . . . . OFF THEN ON
  The action on the EIS DMC SWITCHING selector produces the same effect.

EIS DMC 1(2)(3) FAULT

■ **DMC 1**

– EIS DMC SWITCH . . . . CAPT 3

DMC 3 replaces DMC 1.

■ **DMC 2**

– EIS DMC SWITCH . . . . F/O 3

DMC 3 replaces DMC 2.

■ **DMC 3**

Crew awareness.

STATUS

INOP SYS
DMC 1(2)(3)

FWS FWC 1(2) FAULT

Crew awareness.

STATUS

CAT 3 SINGLE ONLY

INOP SYS
CAT 3 DUAL
FWC 1(2)

FWS FWC 1 + 2 FAULT

– MONITOR SYS
– MONITOR OVERHEAD PANEL

R CAT 1 ONLY (not displayed on the ECAM)

NOT AVAIL
ECAM WARN
ALTI ALERT
STATUS
A/CALL OUT
MEMO

ECAM cautions and warnings, aural warnings, master caution and warning lights are lost. ECAM system pages are still available. Therefore cockpit panels must be monitored for local warnings and ECAM system pages must be regularly called for system checks.

DISPLAY UNIT FAILURE

R ■ **The DU is blank, or the display is distorted :**

- DU (affected) . . . . AS RQRD
  The DU can be switched off.
- ECAM/ND XFR (if the ECAM DUs are affected) . . . . . . USE
  Transfer SD to F/O or CAPT ND.
- PFD/ND XFR (if the EFIS DUs are affected) . . . . USE

R ■ **INVALID DISPLAY UNIT message is displayed :**

R *This may be caused by a DU failure.*

R – FOR AUTOMATIC DU RECOVERY .. WAIT MORE THAN 40s

R ● **IF DU IS AUTOMATICALLY RECOVERED :**

R No crew action is required.

R ● **IF DU IS NOT RECOVERED :**

R – Non-recovered DU . . . . AS RQRD

R *The DU can be switched off.*

■ **The INVALID DATA message appears (not on all DUs) :**

This failure may be because of a DMC FAULT, or a communication interruption between the DMC and DU.

- EIS DMC SWITCHING . . . . AS RQRD

● **If unsuccessful :**

- DU (affected) . . . . OFF THEN ON

Note : The ND display may disappear, if too many waypoints and associated information are displayed. Reduce the range, or deselect WPT or CSTR, and the display will automatically recover, after about 30 seconds.

■ **The INVALID DATA message appears on all DUs :**

The autopilot, autothrust and MCDU navigation data are still available, and may be used.

- FOR AUTOMATIC DUs RECOVERY . WAIT MORE THAN 40S

● **IF ALL DUs ARE AUTOMATICALLY RECOVERED :**

No crew action is required.

● **IF ONE OR MORE DUs ARE NOT RECOVERED :**

- Non-recovered DUs . . . . OFF FOR 40S
- Non-recovered DUs . . . . BACK ON sequentially

● **If the initial failure re-occurs (the INVALID DATA message appears on all DUs), when switching a given DU back ON :**

Apply the entire procedure again, from the beginning. Leave this specific DU permanently OFF.

■ **INVERSION OF THE EWD AND THE SD :**

- ECAM UPPER DISPLAY . . . . OFF THEN ON
  The action on the EIS DMC SWITCHING selector produces the same effect.

ECAM SINGLE DISPLAY

Only the EWD is available. There is no SD on the other DUs.

■ **To call a SYS page :**

– PRESS AND MAINTAIN the SYS page key on the ECP.

■ **OVERFLOW ON THE STATUS page :**

– PRESS AND MAINTAIN the STS KEY ON the ECP
The first page of STATUS appears.
– RELEASE IT, THEN PRESS AGAIN WITHIN 2 SECONDS
The second page of STATUS appears.
– CONTINUE UNTIL THE OVERFLOW ARROW DISAPPEARS.
When the STS key is released for more than 2 seconds, the EWD reappears.

L/G SHOCK ABSORBER FAULT

■ **Shock absorber not extended after liftoff :**

MAX SPEED 280/.67
– L/G . . . . KEEP DOWN

STATUS

MAX SPEED 280/.67	INOP SYS
– L/G . . . . KEEP DOWN	L/G RETRACT
INCREASED FUEL CONSUMP	

Flight with landing gear extended has a significant effect on fuel consumption and climb gradient (see "SPECIAL OPERATIONS" - FLIGHT WITH GEAR DOWN).

R *Note : If WHEEL N.W. STEER FAULT is also displayed, then the nose wheels may be at*
R *maximum deflection. (turned 90 degrees from center). During landing, delay nose*
R *wheel touchdown for as long as possible.*

■ **Shock absorber extended on the ground :**

Crew awareness.

L/G GEAR NOT UPLOCKED

This warning appears if the landing gear sequence is not completed after 30 seconds.

■ **L/G doors closed :**

AVOID EXCESS G FACTOR

Because the gear rests on the doors, avoid excessive load factors in order not to damage door structure.

L/G GEAR NOT UPLOCKED (CONT'D)

■ **L/G doors not closed :**

MAX SPEED 220/.54
– L/G .... RECYCLE

● **IF UNSUCCESSFUL :**

– L/G .... DOWN
MAX SPEED 280/.67

STATUS

MAX SPEED 280/.67	INOP SYS
INCREASED FUEL CONSUMP	L/G RETRACT

Note : – Flight with landing gear extended has a significant effect on fuel consumption and climb gradient (see "SPECIAL OPERATIONS" - FLIGHT WITH GEAR DOWN - FCOM 2.04.25). Multiply fuel consumption by approximately 2.8. Disregard FM fuel predictions.
– Other predictions should also be disregarded (altitude, speed and time), except time predictions at waypoints when in cruise.
– Do not use managed speed (except in approach) and CLB and DES autopilot modes.

L/G GEAR NOT DOWNLOCKED

This warning appears, if the landing gear sequence is not completed after 30 seconds.

– L/G lever .... RECYCLE

● **IF UNSUCCESSFUL :**

– L/G .... GRVTY EXTN
Rotate the handle clockwise about 3 turns until reaching the mechanical stop. See the procedure on the next page.

STATUS

– L/G .... GRVTY EXTN	INOP SYS
CAT 3 SINGLE ONLY	CAT 3 DUAL
If gravity extension is unsuccessful, see "LDG WITH ABNORMAL L/G" procedure.	N.W. STEER

Note : As nose gear doors remain open, hydraulic power for nosewheel steering is lost.

L/G SHOCK ABSORBER FAULT

■ **Shock absorber not extended after liftoff :**

MAX SPEED 280/.67
– L/G .... KEEP DOWN

STATUS

MAX SPEED 280/.67	INOP SYS
– L/G .... KEEP DOWN	L/G RETRACT
INCREASED FUEL CONSUMP	

Flight with landing gear extended has a significant effect on fuel consumption and climb gradient (see "SPECIAL OPERATIONS" - FLIGHT WITH GEAR DOWN).

R *Note : If WHEEL N.W. STEER FAULT is also displayed, then the nose wheels may be at*
R *maximum deflection. (turned 90 degrees from center). During landing, delay nose*
R *wheel touchdown for as long as possible.*

■ **Shock absorber extended on the ground :**

Crew awareness.

L/G GEAR NOT UPLOCKED

This warning appears if the landing gear sequence is not completed after 30 seconds.

■ **L/G doors closed :**

AVOID EXCESS G FACTOR

Because the gear rests on the doors, avoid excessive load factors in order not to damage door structure.

L/G GEAR NOT UPLOCKED (CONT'D)

■ **L/G doors not closed :**

MAX SPEED 220/.54
– L/G . . . . RECYCLE

● **IF UNSUCCESSFUL :**

– L/G . . . . DOWN
MAX SPEED 280/.67

STATUS

MAX SPEED 280/.67	INOP SYS
INCREASED FUEL CONSUMP	L/G RETRACT

Note : – *Flight with landing gear extended has a significant effect on fuel consumption and climb gradient (see "SPECIAL OPERATIONS" - FLIGHT WITH GEAR DOWN - FCOM 2.04.25). Multiply fuel consumption by approximately 2.3. Disregard FM fuel predictions.*
– *Other predictions should also be disregarded (altitude, speed and time), except time predictions at waypoints when in cruise.*
– *Do not use managed speed (except in approach) and CLB and DES autopilot modes.*

L/G GEAR NOT DOWNLOCKED

This warning appears, if the landing gear sequence is not completed after 30 seconds.

– L/G lever . . . . RECYCLE

● **IF UNSUCCESSFUL :**

– L/G . . . . GRVTY EXTN
Rotate the handle clockwise about 3 turns until reaching the mechanical stop. See the procedure on the next page.

STATUS

– L/G . . . . GRVTY EXTN	INOP SYS
CAT 3 SINGLE ONLY	CAT 3 DUAL
If gravity extension is unsuccessful, see "LDG WITH ABNORMAL L/G" procedure.	

L/G GRAVITY EXTENSION

– GRAVITY GEAR EXTN handcrank . . . . PULL AND TURN

Rotate the handle clockwise 3 turns until reaching the mechanical stop, even if resistance is felt.

– L/G lever . . . . DOWN

The landing gear lever should be confirmed in the DOWN position for the following reasons :

- *To extinguish the UNLK lights on the landing gear indication panel.*
- *To prevent the L/G CTL message from appearing on the WHEEL page.*
- *To minimize the risk of landing gear retraction on the ground, due to an unknown system fault, when the free-fall system is reset.*

– GEAR DOWN indications (if available) . . . . CHECK

Note : 1. *Depending on aircraft speed, the display may show the landing gear doors in the amber transit position.*

2. *In the event of gravity extension, caused by the failure of both LGCIUs, landing gear position indications on the ECAM are lost. LDG GEAR lights on the LDG GEAR control panel remain available, if LGCIU 1 is electrically-supplied.*
3. *The LGCIU 2 FAULT or BRAKES SYS 1(2) FAULT warning may be spuriously triggered after a gravity extension.*
4. *If the three green downlock arrows are not on, it is possible that the handcrank is not at the mechanical stop. Check that the handcrank is firmly against the mechanical stop.*

CAUTION

Nosewheel steering is lost.

■ **If successful :**

Do not reset the freefall system. This will avoid such undesirable effects as further loss of fluid, in the event of a leak, or possible landing gear unlocking, in the event of a gear selector valve jamming in the UP position.

Note : The freefall system may be reset in flights used for training. If the green hydraulic system is available, resetting the freefall system allows the landing gear doors to be closed and the nosewheel steering to operate.
The flight crew should not reset the freefall system on ground after the flight.

■ **If unsuccessful :**

– LDG WITH ABNORMAL L/G procedure . . . . APPLY

L/G DOORS NOT CLOSED

- **If aircraft speed is below 220 knots and the L/G lever is UP:**
  – L/G . . . . RECYCLE
- **IF UNSUCCESSFUL :**
  MAX SPEED 250/.60

STATUS

MAX SPEED . . . . 250/.60 INCREASED FUEL CONSUMP	INOP SYS L/G DOOR

L/G GEAR UPLOCK FAULT

– L/G . . . . KEEP DOWN

The landing gear must be left down to avoid structural damage, because the uplock device will stay in the locked position.

MAX SPEED 280/.67

STATUS

MAX SPEED . . . . 280/.67 – L/G . . . . KEEP DOWN INCREASED FUEL CONSUMP	INOP SYS L/G RETRACT

Flight with the landing gear extended has a significant effect on fuel consumption and climb gradient (see "SPECIAL OPERATIONS" - FLIGHT WITH GEAR DOWN). Multiply fuel consumption by approximately 2.8.

L/G GRAVITY EXTENSION

- GRAVITY GEAR EXTN handcrank . . . . PULL AND TURN
  Rotate the handle clockwise 3 turns until reaching the mechanical stop, even if resistance is felt.
- L/G lever . . . . DOWN
  The landing gear lever should be confirmed in the DOWN position for the following reasons :
  - *To extinguish the UNLK lights on the landing gear indication panel.*
  - *To prevent the L/G CTL message from appearing on the WHEEL page.*
  - *To minimize the risk of landing gear retraction on the ground, due to an unknown system fault, when the free-fall system is reset.*
- GEAR DOWN indications (if available) . . . . CHECK
  Note : 1. Depending on aircraft speed, the display may show the landing gear doors in the amber transit position.
  2. In the event of gravity extension, caused by the failure of both LGCIUs, landing gear position indications on the ECAM are lost. LDG GEAR lights on the LDG GEAR control panel remain available, if LGCIU 1 is electrically-supplied.
  3. The LGCIU 2 FAULT or BRAKES SYS 1(2) FAULT warning may be spuriously triggered after a gravity extension.
  4. If the three green downlock arrows are not on, it is possible that the handcrank is not at the mechanical stop. Check that the handcrank is firmly against the mechanical stop.

■ **If successful :**

Do not reset the freefall system. This will avoid such undesirable effects as further loss of fluid, in the event of a leak, or possible landing gear unlocking, in the event of a gear selector valve jamming in the UP position.

Note : The freefall system may be reset in flights used for training. If the green hydraulic system is available, resetting the freefall system allows the landing gear doors to be closed.
The flight crew should not reset the freefall system on ground after the flight.

■ **If unsuccessful :**

- LDG WITH ABNORMAL L/G procedure . . . . APPLY

L/G DOORS NOT CLOSED

- **If aircraft speed is below 220 knots and the L/G lever is UP:**
  – L/G .... RECYCLE
- **IF UNSUCCESSFUL :**
  MAX SPEED 250/.60

STATUS

MAX SPEED 250/.60	INOP SYS
INCREASED FUEL CONSUMP	L/G DOOR

L/G GEAR UPLOCK FAULT

– L/G .... KEEP DOWN

The landing gear must be left down to avoid structural damage, because the uplock device will stay in the locked position.

MAX SPEED 280/.67

STATUS

MAX SPEED 280/.67	INOP SYS
– L/G .... KEEP DOWN	L/G RETRACT
INCREASED FUEL CONSUMP	

Flight with the landing gear extended has a significant effect on fuel consumption and climb gradient (see "SPECIAL OPERATIONS" - FLIGHT WITH GEAR DOWN). Multiply fuel consumption by approximately 2.8.

L/G GRAVITY EXTENSION

– GRAVITY GEAR EXTN handcrank . . . . PULL AND TURN

Rotate the handle clockwise 3 turns until reaching the mechanical stop, even if resistance is felt.

– L/G lever . . . . DOWN

The landing gear lever should be confirmed in the DOWN position for the following reasons :

- *To extinguish the UNLK lights on the landing gear indication panel.*
- *To prevent the L/G CTL message from appearing on the WHEEL page.*
- *To minimize the risk of landing gear retraction on the ground, due to an unknown system fault, when the free-fall system is reset.*

– GEAR DOWN indications (if available) . . . . CHECK

Note :
1. *Depending on aircraft speed, the display may show the landing gear doors in the amber transit position.*
2. *In the event of gravity extension, caused by the failure of both LGCIUs, landing gear position indications on the ECAM are lost. LDG GEAR lights on the LDG GEAR control panel remain available, if LGCIU 1 is electrically-supplied.*
3. *The LGCIU 2 FAULT or BRAKES SYS 1(2) FAULT warning may be spuriously triggered after a gravity extension.*
4. *If the three green downlock arrows are not on, it is possible that the handcrank is not at the mechanical stop. Check that the handcrank is firmly against the mechanical stop.*

■ **If successful :**

Do not reset the freefall system. This will avoid such undesirable effects as further loss of fluid, in the event of a leak, or possible landing gear unlocking, in the event of a gear selector valve jamming in the UP position.

Note : The freefall system may be reset in flights used for training. If the green hydraulic system is available, resetting the freefall system allows the landing gear doors to be closed.
The flight crew should not reset the freefall system on ground after the flight.

■ **If unsuccessful :**

– LDG WITH ABNORMAL L/G procedure . . . . APPLY

L/G DOORS NOT CLOSED

- **If the L/G lever is UP :**
  - **WHEN SPD < 220/.54**
    - L/G . . . . RECYCLE
- **IF UNSUCCESSFUL :**

  MAX SPEED 250/.60

STATUS

MAX SPEED 250/.60	<u>INOP SYS</u>
INCREASED FUEL CONSUMP	L/G DOOR

L/G GEAR UPLOCK FAULT

– L/G . . . . KEEP DOWN

The landing gear must be kept down to avoid structural damage, because the uplock device will stay in the locked position.

MAX SPEED 280/.67

STATUS

MAX SPEED 280/.67	<u>INOP SYS</u>
– L/G . . . . KEEP DOWN	L/G RETRACT
INCREASED FUEL CONSUMP	

Flight with the landing gear extended has a significant effect on fuel consumption and climb gradient (see "SPECIAL OPERATIONS" - FLIGHT WITH GEAR DOWN). Multiply the fuel consumption by approximately 2.8.

L/G SYS DISAGREE

Disagreement between the landing gear positions are detected by LGCIU 1 and LGCIU 2. Provided there is no other L/G ECAM warning, the landing gear position is in agreement with the landing gear lever position.

Crew awareness.

L/G LGCIU 1(2) FAULT

■ **one LGCIU faulty :**

– GPWS (if LGCIU 1 affected) . . . . OFF

If LGCIU 1 is lost, GPWS receives "L/G in up position" information even if the landing gear is down.
Setting the GPWS SYS pushbutton to OFF will prevent untimely warnings during the approach.

STATUS

	INOP SYS
ENG 1(2) APPR IDLE ONLY *When idle is selected on the ground with slats extended, only approach idle is available.*	LGCIU 1(2) REV 1(2) GPWS (if LGCIU 1 fault)

■ **both LGCIUs faulty :**

Normal landing gear control and position indications are lost. LDG GEAR lights on LDG GEAR control panel remain available if LGCIU 1 is electrically supplied.

– L/G . . . . GRVTY EXTN

See the L/G GRAVITY EXTENSION procedure.

– GPWS . . . . OFF

As LGCIU 1 is lost, GPWS receives "L/G in up position" information even if the landing gear is down.
Setting the GPWS SYS pushbutton to OFF will prevent untimely warnings during approach.

STATUS

	INOP SYS
– L/G . . . . GRVTY EXTN L/G CONTROL NOT AVAIL ENG 1 APPR IDLE ONLY ENG 2 APPR IDLE ONLY CAT 1 ONLY	REVERSER 1 + 2 AP 1 + 2 (except in LAND mode) A/THR N.W STEER LGCIU 1 and 2 GPWS

Note : 1. The partial spoiler extension (◁) at landing when only one main landing gear is compressed is not available. The spoilers extend normally on ground when wheel speed greater than 72 knots.
2. Depending on the LGCIU failure, only a part of the above systems may be lost.

L/G GEAR NOT DOWN

Select landing gear down.

LDG WITH ABNORMAL L/G

The procedure is intended for use when the nose or main landing gear fail to extend and/or lock down following the application of the L/G GRVTY EXTN procedure.
It is preferable to use any available landing gear, rather than carry out a belly landing.
Under these circumstances, a hard surface runway landing is recommended.
Full advantage should be taken of any foam, spread on the runway.

PREPARATION

– CABIN CREW .... NOTIFY
Notify the cabin crew of the nature of the emergency encountered and state intentions. Specify the amount of available preparation time.
– ATC .... NOTIFY
Notify ATC of the nature of the emergency and state intentions.
Consider fuel reduction to a safe minimum. This reduces VREF and, consequently, the load factor at impact and the energy to be dissipated.
– GALLEY .... OFF

● **If NOSE L/G abnormal**
– CG location (if possible) .... AFT
· 10 passengers from front to rear moves the CG roughly 4 % aft
· 10 passengers from mid to rear moves the CG roughly 2.5 aft.

● **If one MAIN L/G abnormal**
– FUEL IMBALANCE .... CONSIDER
Open the fuel X-FEED valve and switch off the pumps on the side with landing gear normally extended.

– OXYGEN CREW SUPPLY .... OFF
R – SIGNS .... ON
– CABIN and COCKPIT .... PREPARE
· Loose equipment secured.
· Survival equipment prepared.
· Belts and shoulder harnesses locked.

APPROACH

– GPWS SYS .... OFF
– L/G lever .... CHECK DOWN
– GRVTY GEAR EXTN handcrank .. TURN BACK TO NORMAL
Rotating three turns back to normal may, in certain cases, pressurize the landing gear down actuators, thereby reducing the probability of gear collapse after touchdown.

L/G LGCIU 1(2) FAULT

■ **One LGCIU is faulty the:**

– GPWS (if LGCIU 1 affected) . . . . OFF

If LGCIU 1 is lost, the GPWS receives "L/G in up position" information, even if the landing gear is down.
Setting the GPWS SYS pushbutton to OFF will prevent untimely warnings during the approach.

STATUS

ENG 1(2) APPR IDLE ONLY
When idle is selected on ground with slats extended, only approach idle is available.

INOP SYS
LGCIU 1(2)
REV 1(2)
GPWS (if LGCIU 1 fault)

■ **Both LGCIUs are faulty :**

Normal landing gear control and position indications are lost. LDG GEAR lights on LDG GEAR control panel remain available, if LGCIU 1 is electrically–supplied.

– L/G . . . . GRVTY EXTN
See the L/G GRAVITY EXTENSION procedure.

– GPWS . . . . OFF
As LGCIU 1 is lost, the GPWS receives "L/G in up position" information, even if the landing gear is down.
Setting the GPWS SYS pushbutton to OFF will prevent untimely warnings during approach.

STATUS

– L/G . . . . GRVTY EXTN
L/G CONTROL NOT AVAIL
ENG 1 APPR IDLE ONLY
ENG 2 APPR IDLE ONLY
CAT 1 ONLY

INOP SYS
REVERSER 1 + 2
AP 1 + 2 (except in LAND mode)
A/THR
LGCIU 1 and 2
GPWS

Note : 1. The partial spoiler extension (⊲) at landing, when only one main landing gear is compressed, is not available. The spoilers extend normally on ground, when the wheel speed greater than 72 knots.
2. Depending on the LGCIU failure, only a part of the above systems may be lost.

L/G GEAR NOT DOWN

Crew awareness.
Select landing gear down.

LDG WITH ABNORMAL L/G

The procedure is intended for use when the nose or main landing gear fail to extend and/or lock down following the application of the L/G GRVTY EXTN procedure.
It is preferable to use any available landing gear, rather than carry out a belly landing.
Under these circumstances, a hard surface runway landing is recommended.
Full advantage should be taken of any foam, spread on the runway.

PREPARATION

- CABIN CREW .... NOTIFY
  Notify the cabin crew of the nature of the emergency encountered and state intentions. Specify the amount of available preparation time.
- ATC .... NOTIFY
  Notify ATC of the nature of the emergency and state intentions.
  Consider fuel reduction to a safe minimum. This reduces VREF and, consequently, the load factor at impact and the energy to be dissipated.
- GALLEY .... OFF

● **If NOSE L/G abnormal**
  - CG location (if possible) .... AFT
    · 10 passengers from front to rear moves the CG roughly 4 % aft
    · 10 passengers from mid to rear moves the CG roughly 2.5 aft.

● **If one MAIN L/G abnormal**
  - FUEL IMBALANCE .... CONSIDER
    Open the fuel X-FEED valve and switch off the pumps on the side with landing gear normally extended.

- OXYGEN CREW SUPPLY .... OFF
R - SIGNS .... ON
- CABIN and COCKPIT .... PREPARE
  · Loose equipment secured.
  · Survival equipment prepared.
  · Belts and shoulder harnesses locked.

APPROACH

- GPWS SYS .... OFF
- L/G lever .... CHECK DOWN
- GRVTY GEAR EXTN handcrank .. TURN BACK TO NORMAL
  Rotating three turns back to normal may, in certain cases, pressurize the landing gear down actuators, thereby reducing the probability of gear collapse after touchdown.

⇩

LDG WITH ABNORMAL L/G (CONT'D)

– AUTOBRAKE . . . . DO NOT ARM

R *Manual braking will enable better pitch and roll control. Moreover, with at least one*
R *main landing gear in the abnormal position the autobrake cannot be activated (ground*
R *spoilers not armed).*

– EMER EXIT LT . . . . ON

– CABIN REPORT . . . . OBTAIN

● **If one or both MAIN L/G abnormal**

– A/SKID & N/S STRG . . . . OFF

R *With one main landing gear not extended, the reference speed used by the*
R *anti-skid to detect a wheel blockage is not correctly initialized. Consequently, the*
R *anti-skid must be switched off to prevent permanent brake release.*

– MAX BRAKE PR 1000PSI

R *Modulate the brake pressure to 1000 psi because the anti-skid is off.*

– GROUND SPOILERS . . . . DO NOT ARM

R *To keep as much roll authority as possible for maintaining the wings level.*
R *Ground spoiler extension would prevent spoilers from acting as roll surfaces.*

BEFORE LANDING

– RAM AIR . . . . ON

To ensure full depressurization of the aircraft before impact.

– BRACE FOR IMPACT . . . . ORDER

FLARE, TOUCH DOWN AND ROLL OUT

Engines should be shut down sufficiently early to ensure fuel is shut off before the nacelles impact, but sufficiently late to ensure adequate hydraulic supplies for the flight controls.

Engine pumps continue to supply adequate hydraulic pressure for 30 seconds after engine shutdown.

– REVERSE . . . . DO NOT USE

R *Do not use reverse to prevent ground spoiler extension, and because the engine will*
R *touch the ground during roll-out.*

● **if NOSE L/G abnormal**

– NOSE . . . . MAINTAIN UP

After touchdown, keep the nose off the runway by the use of the elevator. Then, lower the nose on to the runway before elevator control is lost.

– BRAKES (compatible with elevator efficiency) . . . APPLY

– ENG MASTERS . . . . OFF

Shutdown the engines before nose impact.

LDG WITH ABNORMAL L/G (CONT'D)

● **If one MAIN L/G abnormal**

- ENG MASTERS . . . . OFF
  At touchdown, shut down both engines.
- FAILURE SIDE WING . . . . MAINTAIN UP
  Use roll control, as necessary, to maintain the unsupported wing up as long as possible.
- DIRECTIONAL CONTROL . . . . MAINTAIN
  Use rudder and brakes (maximum 1000 psi) to maintain the runway axis as long as possible.

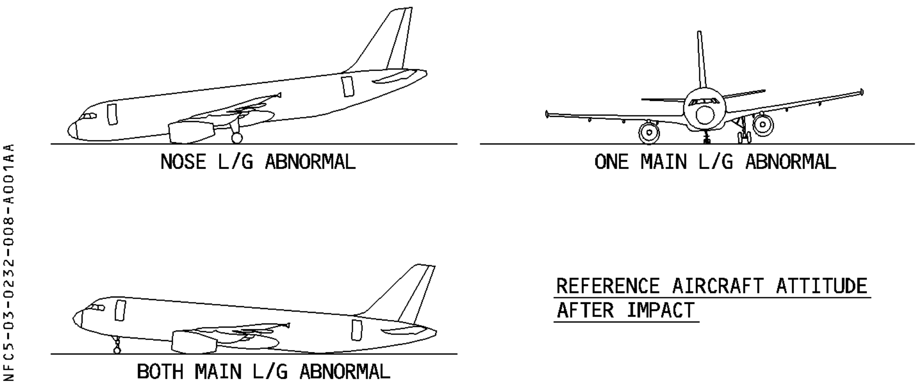
● **If both MAIN L/G abnormal**

- ENG MASTERS . . . . OFF
  Shut down the engines in the flare, before touchdown.
- PITCH ATTITUDE (at touchdown) . . NOT LESS THAN 6°

WHEN A/C STOPPED

- ENG (all) and APU FIRE pushbutton . . . . PUSH
  Pressing the ENG FIRE pushbutton shuts off the related hydraulic pressure within a short time.
- ALL ENG and APU AGENT . . . . DISCH

R – EVACUATION . . . . INITIATE
  · Announce : "PASSENGER EVACUATION" over the Passenger Address system, and press the EVAC COMMAND pushbutton.
  · All emergency and passenger doors may be used to evacuate the aircraft.



R

CONFIG PARK BRK ON

Check that the parking brake handle is in the OFF position. If warning stays on, check that the brake pressure is at zero on the BRAKES PRESSURE indicator.

WHEEL N/W STRG FAULT

STATUS

CAT 3 SINGLE ONLY

Note : 1. Use differential braking to steer the aircraft during taxi.
2. If the L/G SHOCK ABSORBER FAULT is also displayed, then the nose wheels may be at maximum deflection. (turned 90 degrees from center). During landing, delay nose wheel touchdown as long as possible.
3. As specified in the QRH 5.04, automatic rollout is not permitted.

INOP SYS

CAT 3 DUAL
N/W STRG

BRAKES A/SKID NWS FAULT or ANTI SKID/NWS OFF

Either both BSCU channels are failed, or the A/SKID & N/W STRG switch is OFF.

MAX BRK PR . . . . 1000 PSI

Monitor brake pressure on the BRAKES PRESS indicator. Limit brake pressure to approximately 1000 psi and, at low ground speed, adjust brake pressure as required.
Avoid landing on an icy runway.

STATUS

MAX BRK PR . . . . 1000 PSI
LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80

● **If Y SYS LO PR**
BRK Y ACCU PR ONLY

CAT 3 SINGLE ONLY

Note : As specified in the QRH 5.04, automatic rollout is not permitted.

INOP SYS

CAT 3 DUAL
ANTI SKID
N/W STRG
NORM BRK
AUTO BRK

BRAKES SYS 1(2) FAULT

Crew awareness.

STATUS

INOP SYS

BRK SYS 1(2)

BRAKES HOT

■ **On ground :**

– PARK BRK : PREFER CHOCKS

· *If the BRAKES HOT message is still on when the aircraft is parked, the flight crew should not set the PARKING BRK ON.*

– BRK FAN (if installed) . . . . ON

– DELAY T.O. FOR COOL

· *Delay takeoff, until the brake temperature is below 300° C with the brake fans OFF, and 150°C with the brake fans ON (◁).*

· *Refer to 3.04.32 for brake temperature limitations requiring maintenance actions.*

■ **In flight :**

● **IF PERF PERMITS :**

– L/G . . . . DN FOR COOL

MAX SPEED 250/.60

· *If performance permits, the landing gear should be extended or, if already extended, it should remain so, to improve brake cooling.*

· *Reduce speed to 220 knots, for landing gear retraction, when the brake temperature is within limits.*

STATUS

MAX SPEED 280/.67

As long as the landing gear is extended, limit the speed to 280kt/M.67.

For landing gear retraction when the brake temperature is within limits, reduce the speed to 220 knots.

BRAKES AUTO BRK FAULT

Crew awareness

BRAKE RELEASED

The AUTOBRAKE FAULT warning may be due to a failure of the autobrake mode itself, or to a brake released condition. The crew should, therefore, be prepared to counter a possible slight lateral drift at landing, by using the rudder.

STATUS

LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

INOP SYS

AUTO BRK

R

CONFIG PARK BRK ON

Check that the parking brake handle is in the OFF position. If warning stays on, check that the brake pressure is at zero on the BRAKES PRESSURE indicator.

WHEEL N/W STRG FAULT

STATUS

CAT 3 SINGLE ONLY

Note : 1. Use differential braking to steer the aircraft during taxi.
2. If the L/G SHOCK ABSORBER FAULT is also displayed, then the nose wheels may be at maximum deflection. (turned 90 degrees from center). During landing, delay nose wheel touchdown as long as possible.
3. As specified in the QRH 5.04, automatic rollout is not permitted.

INOP SYS

CAT 3 DUAL
N/W STRG

BRAKES A/SKID NWS FAULT or ANTI SKID/NWS OFF

Either both BSCU channels are failed, or the A/SKID & N/W STRG switch is OFF.

MAX BRK PR .... 1000 PSI

Monitor brake pressure on the BRAKES PRESS indicator. Limit brake pressure to approximately 1000 psi and, at low ground speed, adjust brake pressure as required.
Avoid landing on an icy runway.

STATUS

MAX BRK PR .... 1000 PSI
LDG DIST PROC .... APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80

● **If Y SYS LO PR**

BRK Y ACCU PR ONLY

CAT 3 SINGLE ONLY

Note : As specified in the QRH 5.04, automatic rollout is not permitted.

INOP SYS

CAT 3 DUAL
ANTI SKID
N/W STRG
NORM BRK
AUTO BRK

BRAKES SYS 1(2) FAULT

Crew awareness.

STATUS

INOP SYS

BRK SYS 1(2)

BRAKES HOT

■ **On ground :**

– PARK BRK : PREFER CHOCKS

· *If the BRAKES HOT message is still on when the aircraft is parked, the flight crew should not set the PARKING BRK ON.*

– BRK FAN (if installed) . . . . ON

– DELAY T.O. FOR COOL

· *Delay takeoff, until the brake temperature is below 300° C with the brake fans OFF, and 150°C with the brake fans ON (◁).*

· *Refer to 3.04.32 for brake temperature limitations requiring maintenance actions.*

■ **In flight :**

● **IF PERF PERMITS :**

– L/G . . . . DN FOR COOL

MAX SPEED 250/.60

If performance permits, the landing gear should be extended or, if already extended, it should remain so, to improve brake cooling.

● **For L/G RETRACTION :**

MAX SPEED 220/.52

Reduce speed for landing gear retraction, when the brake temperature is within limits.

STATUS

MAX SPEED 280/.67

As long as the landing gear is extended, limit the speed to 280kt/M.67.

For landing gear retraction when the brake temperature is within limits, reduce the speed to 220 knots.

BRAKES AUTO BRK FAULT

Crew awareness

BRAKE RELEASED

The AUTOBRAKE FAULT warning may be due to a failure of the autobrake mode itself, or to a brake released condition. The crew should, therefore, be prepared to counter a possible slight lateral drift at landing, by using the rudder.

STATUS

LDG DIST PROC . . . . APPLY

Refer to the QRH Part 2, or to the FCOM 3.02.80.

INOP SYS

AUTO BRK

R

CONFIG PARK BRK ON

Check that the parking brake handle is in the OFF position. If warning stays on, check that the brake pressure is at zero on the BRAKES PRESSURE indicator.

WHEEL N/W STRG FAULT

STATUS

CAT 3 SINGLE ONLY

Note : 1. Use differential braking to steer the aircraft during taxi.
2. If the L/G SHOCK ABSORBER FAULT is also displayed, then the nose wheels may be at maximum deflection. (turned 90 degrees from center). During landing, delay nose wheel touchdown as long as possible.
3. As specified in the QRH 5.04, automatic rollout is not permitted.

INOP SYS
CAT 3 DUAL
N/W STRG

BRAKES A/SKID NWS FAULT or ANTI SKID/NWS OFF

Either both BSCU channels are failed, or the A/SKID & N/W STRG switch is OFF.

MAX BRK PR . . . . 1000 PSI

Monitor brake pressure on the BRAKES PRESS indicator. Limit brake pressure to approximately 1000 psi and, at low ground speed, adjust brake pressure as required.
Avoid landing on an icy runway.

STATUS

MAX BRK PR . . . . 1000 PSI
LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80

● **If Y SYS LO PR**
BRK Y ACCU PR ONLY

CAT 3 SINGLE ONLY

Note : As specified in the QRH 5.04, automatic rollout is not permitted.

INOP SYS
CAT 3 DUAL
ANTI SKID
N/W STRG
NORM BRK
AUTO BRK

BRAKES SYS 1(2) FAULT

Crew awareness.

STATUS

INOP SYS
BRK SYS 1(2)

BRAKES HOT

■ **On ground :**

– PARK BRK : PREFER CHOCKS

· *If the BRAKES HOT message is still on when the aircraft is parked, the flight crew should not set the PARKING BRK ON.*

– BRK FAN (if installed) . . . . ON

– DELAY T.O. FOR COOL

· *Delay takeoff, until the brake temperature is below 300° C with the brake fans OFF, and 150°C with the brake fans ON (◁).*

· *Refer to 3.04.32 for brake temperature limitations requiring maintenance actions.*

■ **In flight :**

● **IF PERF PERMITS :**

– L/G . . . . DN FOR COOL

MAX SPEED 250/.60

· *If performance permits, the landing gear should be extended or, if already extended, it should remain so, to improve brake cooling.*

· *Reduce speed to 220 knots, for landing gear retraction, when the brake temperature is within limits.*

STATUS

MAX SPEED 280/.67

As long as the landing gear is extended, limit the speed to 280kt/M.67.

For landing gear retraction when the brake temperature is within limits, reduce the speed to 220 knots.

BRAKES AUTO BRK FAULT

Autobrake function is lost.

STATUS

INOP SYS

AUTO BRK

R

CONFIG PARK BRK ON

Check that the parking brake handle is in the OFF position. If warning stays on, check that the brake pressure is at zero on the BRAKES PRESSURE indicator.

WHEEL N/W STRG FAULT

STATUS

CAT 3 SINGLE ONLY

Note : 1. Use differential braking to steer the aircraft during taxi.
2. If the L/G SHOCK ABSORBER FAULT is also displayed, then the nose wheels may be at maximum deflection. (turned 90 degrees from center). During landing, delay nose wheel touchdown as long as possible.
3. As specified in the QRH 5.04, automatic rollout is not permitted.

INOP SYS
CAT 3 DUAL
N/W STRG

BRAKES A/SKID NWS FAULT or ANTI SKID/NWS OFF

Either both BSCU channels are failed, or the A/SKID & N/W STRG switch is OFF.

MAX BRK PR .... 1000 PSI

Monitor brake pressure on the BRAKES PRESS indicator. Limit brake pressure to approximately 1000 psi and, at low ground speed, adjust brake pressure as required.
Avoid landing on an icy runway.

STATUS

MAX BRK PR .... 1000 PSI
LDG DIST PROC .... APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80

● **If Y SYS LO PR**
BRK Y ACCU PR ONLY

CAT 3 SINGLE ONLY

Note : As specified in the QRH 5.04, automatic rollout is not permitted.

INOP SYS
CAT 3 DUAL
ANTI SKID
N/W STRG
NORM BRK
AUTO BRK

BRAKES SYS 1(2) FAULT

Crew awareness.

STATUS

INOP SYS
BRK SYS 1(2)

BRAKES HOT

■ **On ground :**

– PARK BRK : PREFER CHOCKS

· *If the BRAKES HOT message is still on when the aircraft is parked, the flight crew should not set the PARKING BRK ON.*

– BRK FAN (if installed) . . . . ON

– DELAY T.O. FOR COOL

· *Delay takeoff, until the brake temperature is below 300° C with the brake fans OFF, and 150°C with the brake fans ON (◁).*

· *Refer to 3.04.32 for brake temperature limitations requiring maintenance actions.*

■ **In flight :**

● **IF PERF PERMITS** :

– L/G . . . . DN FOR COOL

MAX SPEED 250/.60

If performance permits, the landing gear should be extended or, if already extended, it should remain so, to improve brake cooling.

● **For L/G RETRACTION** :

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STATUS

MAX SPEED 280/.67

As long as the landing gear is extended, limit the speed to 280kt/M.67.

For landing gear retraction when the brake temperature is within limits, reduce the speed to 220 knots.

BRAKES AUTO BRK FAULT

Autobrake function is lost.

STATUS

INOP SYS

AUTO BRK

LOSS OF BRAKING

● **IF AUTOBRAKE IS SELECTED :**
- BRAKE PEDALS . . . . PRESS
  This will override the autobrake.

● **IF NO BRAKING AVAILABLE :**
- REV . . . . MAX
- BRAKE PEDALS . . . . RELEASE
  Brake pedals should be released when the A/SKID & N/W STRG selector is switched OFF, since the pedal force or displacement produces more braking action in alternate mode than in normal mode.
- A/SKID & N/W STRG . . . . OFF
  Braking system reverts to alternate mode.
- BRAKE PEDALS . . . . PRESS
  Apply brake with care, since initial pedal force or displacement produces more braking action in alternate mode than in normal mode.
- MAX BRK PR . . . . 1000 PSI
  Monitor brake pressure or BRAKES PRESS indicator. Limit brake pressure to approximately 1000 psi and, at low ground speed, adjust brake pressure as required.

  ● **If STILL NO BRAKING :**
  - PARKING BRAKE . . . . USE
    Use short successive parking brake applications to stop the aircraft. Brake onset asymmetry may be felt at each parking brake application. If possible, delay the use of the parking brake until low speed, to reduce the risk of tire burst and lateral control difficulties.

<u>WHEEL</u> HYD SEL FAULT

R *Failure of normal brake selector valve, or the steering selector valve, in the open position.*
R *– If the normal brake selector valve is failed open, full green hydraulic pressure is present*
R *at normal servovalves' entry.*
R *Nosewheel steering remains available.*
R *– On ground, do not tow the aircraft with the green hydraulic system pressurized :*
R *Nosewheel steering remains pressurized, and so towing may either break the towbar*
R *shear pin, or the nose gear (if towbarless towing).*
R *– Selecting A/SKID & N/W STRG OFF, or resetting the BSCU, will cause the nosewheel to*
R *go to maximum deflection.*

- A/SKID & N/W STRG . . . . KEEP ON
  As long as antiskid is operative, brake pressure is regulated by normal servovalves.

RESIDUAL BRAKING PROC

R ■ **IN FLIGHT :**

– BRAKE PEDALS . . . . APPLY SEVERAL TIMES

Press the brake pedals several times. This could zero a residual pressure on the alternate system.

● **IF RESIDUAL PRESSURE REMAINS :**

– A/SKID & N/W STRG selector . . . . KEEP ON

■ **IF AUTOBRAKE IS AVAILABLE :**

– FOR LANDING . . . . AUTO/BRK MED

Using MED mode gives immediate priority to normal braking upon landing gear touchdown, which cancels residual alternate pressure.

■ **IF AUTOBRAKE IS NOT AVAILABLE :**

– JUST AFTER TOUCHDOWN . . . . APPLY BRAKING

Pressing the brake pedals gives immediate priority to normal braking, which cancels residual alternate pressure.

– Beware of possible braking asymmetry after touchdown, which can be controlled by using the pedals.

Note : In case of taxi with deflated or damaged tires, refer to the TAXI WITH DEFLATED
R *TIRES procedure (FCOM 3.01.32).*

LOSS OF BRAKING

- **IF AUTOBRAKE IS SELECTED :**
  - BRAKE PEDALS .... PRESS
    This will override the autobrake.
- **IF NO BRAKING AVAILABLE :**
  - REV .... MAX
  - BRAKE PEDALS .... RELEASE
    Brake pedals should be released when the A/SKID & N/W STRG selector is switched OFF, since the pedal force or displacement produces more braking action in alternate mode than in normal mode.
  - A/SKID & N/W STRG .... OFF
    Braking system reverts to alternate mode.
  - BRAKE PEDALS .... PRESS
    Apply brake with care, since initial pedal force or displacement produces more braking action in alternate mode than in normal mode.
  - MAX BRK PR .... 1000 PSI
    Monitor brake pressure or BRAKES PRESS indicator. Limit brake pressure to approximately 1000 psi and, at low ground speed, adjust brake pressure as required.
  - **If STILL NO BRAKING :**
    - PARKING BRAKE .... USE
      Use short successive parking brake applications to stop the aircraft. Brake onset asymmetry may be felt at each parking brake application. If possible, delay the use of the parking brake until low speed, to reduce the risk of tire burst and lateral control difficulties.

WHEEL HYD SEL FAULT

Failure of normal brake selector valve, or the steering selector valve, in the open position.

- *If the normal brake selector valve is failed open, full green hydraulic pressure is present at normal servovalves' entry.*
  Nosewheel steering remains available.
- *On ground, do not tow the aircraft with the yellow hydraulic system pressurized : Nosewheel steering remains pressurized, and so towing may either break the towbar shear pin, or the nose gear (if towbarless towing).*
- *Selecting A/SKID & N/W STRG OFF, or resetting the BSCU, will cause the nosewheel to go to maximum deflection.*
- A/SKID & N/W STRG .... KEEP ON
  As long as antiskid is operative, brake pressure is regulated by normal servovalves.

RESIDUAL BRAKING PROC

R ■ **IN FLIGHT :**

– BRAKE PEDALS . . . . APPLY SEVERAL TIMES

Press the brake pedals several times. This could zero a residual pressure on the alternate system.

● **IF RESIDUAL PRESSURE REMAINS :**

– A/SKID & N/W STRG selector . . . . KEEP ON

■ **IF AUTOBRAKE IS AVAILABLE :**

– FOR LANDING . . . . AUTO/BRK MED

Using MED mode gives immediate priority to normal braking upon landing gear touchdown, which cancels residual alternate pressure.

■ **IF AUTOBRAKE IS NOT AVAILABLE :**

– JUST AFTER TOUCHDOWN . . . . APPLY BRAKING

Pressing the brake pedals gives immediate priority to normal braking, which cancels residual alternate pressure.

– Beware of possible braking asymmetry after touchdown, which can be controlled by using the pedals.

Note : In case of taxi with deflated or damaged tires, refer to the TAXI WITH DEFLATED TIRES procedure (FCOM 3.01.32). R

LOSS OF BRAKING

- **IF AUTOBRAKE IS SELECTED :**
  - BRAKE PEDALS .... PRESS
    This will override the autobrake.
- **IF NO BRAKING AVAILABLE :**
  - REV .... MAX
  - BRAKE PEDALS .... RELEASE
    Brake pedals should be released when the A/SKID & N/W STRG selector is switched OFF, since the pedal force or displacement produces more braking action in alternate mode than in normal mode.
  - A/SKID & N/W STRG .... OFF
    Braking system reverts to alternate mode.
  - BRAKE PEDALS .... PRESS
    Apply brake with care, since initial pedal force or displacement produces more braking action in alternate mode than in normal mode.
  - MAX BRK PR .... 1000 PSI
    Monitor brake pressure or BRAKES PRESS indicator. Limit brake pressure to approximately 1000 psi and, at low ground speed, adjust brake pressure as required.
  - **If STILL NO BRAKING :**
    - PARKING BRAKE .... USE
      Use short successive parking brake applications to stop the aircraft. Brake onset asymmetry may be felt at each parking brake application. If possible, delay the use of the parking brake until low speed, to reduce the risk of tire burst and lateral control difficulties.

WHEEL HYD SEL FAULT

Failure of normal brake selector valve, or the steering selector valve, in the open position.

- *If the normal brake selector valve is failed open, full green hydraulic pressure is present at normal servovalves' entry.*
  Nosewheel steering remains available.
- *On ground, do not tow the aircraft with the yellow hydraulic system pressurized : Nosewheel steering remains pressurized, and so towing may either break the towbar shear pin, or the nose gear (if towbarless towing).*
- *Selecting A/SKID & N/W STRG OFF, or resetting the BSCU, will cause the nosewheel to go to maximum deflection.*
- A/SKID & N/W STRG .... KEEP ON
  As long as antiskid is operative, brake pressure is regulated by normal servovalves.

RESIDUAL BRAKING PROC

■ **IN FLIGHT :**

– BRAKE PEDALS . . . . APPLY SEVERAL TIMES

Press the brake pedals several times. This could zero a residual pressure on the alternate system.

● **IF RESIDUAL PRESSURE REMAINS :**

– A/SKID & N/W STRG selector . . . . KEEP ON

■ **IF AUTOBRAKE IS AVAILABLE :**

– FOR LANDING . . . . AUTO/BRK MED

Using MED mode gives immediate priority to normal braking upon landing gear touchdown, which cancels residual alternate pressure.

■ **IF AUTOBRAKE IS NOT AVAILABLE :**

– JUST AFTER TOUCHDOWN . . . . APPLY BRAKING

Pressing the brake pedals gives immediate priority to normal braking, which cancels residual alternate pressure.

– Beware of possible braking asymmetry after touchdown, which can be controlled by using the pedals.

Note : In case of taxi with deflated or damaged tires, refer to the TAXI WITH DEFLATED
R *TIRES procedure (FCOM 3.01.32).*

BRAKES PRK BRK ON

Parking brake is selected in flight.

– PARK BRK . . . . OFF

BRAKES NORM + ALTN FAULT

Normal and alternate braking functions are lost.
PARK BRK ONLY

STATUS

PARK BRK ONLY
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
CAT 2 ONLY

INOP SYS
CAT 3
ANTI SKID
N/W STRG
NORM BRK
AUTO BRK
ALTN BRK

BRAKES NORM BRK FAULT

Crew awareness.
Normal braking function is lost.

STATUS

LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*
ALTN Y BRK WITH A/SKID
CAT 2 ONLY

INOP SYS
CAT 3
NORM BRK
AUTO BRK

BRAKES BRK Y ACCU LO PR

R *The yellow electrical pump can be used to pressurize the accumulator. If the accu pressure*
R *is still low, chocks are required before Engine 1 shut down.*

- **On ground :**
  - **BEFORE ENG SHUT DOWN :**
    – CHOCKS CONSIDER

STATUS

- **If Y SYS LO PR**
  NORM BRK ONLY

INOP SYS
BRK Y ACCU

BRAKES RELEASED

Crew awareness
At least one wheel is released.

STATUS

LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

INOP SYS
AUTO BRK

BRAKES – N/WS MINOR FAULT

Crew awareness.

BRAKES ALTN BRK FAULT

Crew awareness.
Alternate braking function is lost.

STATUS

INOP SYS
ALTN BRK

BRAKES ALTN L(R) RELEASED

R As long as the normal braking system is available, braking is normal.
R In alternate braking mode, braking of all wheels on one gear is lost.
R ● **If normal braking is lost :**
R – ASYM BRK PROC . . . . APPLY

STATUS

● **If normal braking is lost :**
LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

INOP SYS
ALTN L(R) BRK

R
ASYMMETRIC BRAKING

R Normal braking is faulty, or the green hydraulic system is in low
R pressure, and one gear is released.
R – Progressively apply brake on the available side. Counter swing
R with the rudder.
R – Avoid crosswind in excess of 10 knots from the side of available
R brake.
R ● **IF ONLY ONE REVERSE IS AVAILABLE**
R – Do not use Reverse on the side of available brake
R – LDG DIST PROC . . . . APPLY
R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

NAV HDG DISCREPANCY

– HDG . . . . X CHECK
  Compare the 3 IR headings on ADIRS CDU or crosscheck with standby compass.
– ATT HDG SWTG . . . . AS RQRD
  Select IR 3 (if available) to faulty side.

NAV ATT DISCREPANCY

– ATT . . . . X CHECK
  Crosscheck with standby horizon.
– ATT HDG SWTG . . . . AS RQRD
  Select IR 3 (if available) to faulty side.

NAV ALTI DISCREPANCY

Crew awareness.

OVERSPEED

VMO/MMO 350/.82
(235/.60 in case of dispatch with landing gear down).
VLE 280/.67
VFE . . . . see below

CONF	VFE
FULL	177
3	185
2	200
1 + F	215
1	230

NAV BARO REF DISCREPANCY

– BARO REF . . . . X CHECK
  Crosscheck the barometric reference selection, captain side versus first officer side.

NAV ADR FAULT

Note : In case of simultaneous failure of ADR and IR (same ADIRU), apply ADR FAULT procedure before IR FAULT procedure.

■ **ADR 1 FAULT :**

– AIR DATA SWTG . . . . CAPT

R *Select ADR 3 (if available) to captain side.*
The GPWS TERR amber FAULT light comes on as the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR pushbutton should be switched OFF.

– ADR 1 . . . . OFF

Depending on ADR failure, ADR should be switched off.

STATUS

	INOP SYS
CAT 3 SINGLE ONLY	ADR 1 CAT 3 DUAL GPWS

■ **ADR 2 FAULT :**

– AIR DATA SWTG . . . . F/O

Select ADR 3 (if available) to first officer side.

– ADR 2 . . . . OFF

– BARO REF . . . . CHECK

If ADR 2 fails, both baro reference channels are driven by the same FCU channel. Consequently the baro reference displays must be checked.

STATUS

	INOP SYS
CAT 3 SINGLE ONLY	ADR 2 CAT 3 DUAL

■ **ADR 3 FAULT :**

– AIR DATA SWTG (if ADR 3 in use) . . . . NORM

– ADR 3 . . . . OFF

STATUS

	INOP SYS
CAT 3 SINGLE ONLY	ADR 3 CAT 3 DUAL

NAV HDG DISCREPANCY

– HDG . . . . X CHECK
Compare the 3 IR headings on ADIRS CDU or crosscheck with standby compass.
– ATT HDG SWTG . . . . AS RQRD
Select IR 3 (if available) to faulty side.

NAV ATT DISCREPANCY

– ATT . . . . X CHECK
Crosscheck with standby horizon.
– ATT HDG SWTG . . . . AS RQRD
Select IR 3 (if available) to faulty side.

NAV ALTI DISCREPANCY

Crew awareness.

OVERSPEED

VMO/MMO 350/.82
(235/.60 in case of dispatch with landing gear down).
VLE 280/.67
VFE . . . . see below

CONF	VFE
FULL	177
3	185
2	200
1 + F	215
1	230

NAV BARO REF DISCREPANCY

– BARO REF . . . . X CHECK
Crosscheck the barometric reference selection, captain side versus first officer side.

NAV ADR FAULT

Note : In the case of a simultaneous failure of ADR and IR (same ADIRU), apply ADR FAULT procedure before IR FAULT procedure.

■ **ADR 1 FAULT :**

– AIR DATA SWTG . . . . CAPT 3

Set ADR 3 (if available) to the Captain's side.

The GPWS TERR amber FAULT light comes on, because the enhanced functions of the EGPWS are inhibited. So, the GPWS TERR pushbutton should be switched OFF.

– ADR 1 . . . . OFF

Depending on ADR failure, ADR should be switched off.

STATUS

CAT 3 SINGLE ONLY

INOP SYS
ADR 1
CAT 3 DUAL
GPWS

■ **ADR 2 FAULT :**

– AIR DATA SWTG . . . . F/O 3

Set ADR 3 (if available) to the First Officer's side.

– ADR 2 . . . . OFF

– BARO REF . . . . CHECK

If ADR 2 fails, both baro reference channels are driven by the same FCU channel. Consequently, the baro reference displays must be checked.

STATUS

CAT 3 SINGLE ONLY

INOP SYS
ADR 2
CAT 3 DUAL

■ **ADR 3 FAULT :**

– AIR DATA SWTG (if ADR 3 in use) . . . . NORM

– ADR 3 . . . . OFF

STATUS

CAT 3 SINGLE ONLY

INOP SYS
ADR 3
CAT 3 DUAL

NAV HDG DISCREPANCY

– HDG . . . . X CHECK
Compare the 3 IR headings on ADIRS CDU or crosscheck with standby compass.
– ATT HDG SWTG . . . . AS RQRD
Select IR 3 (if available) to faulty side.

NAV ATT DISCREPANCY

– ATT . . . . X CHECK
Crosscheck with standby horizon.
– ATT HDG SWTG . . . . AS RQRD
Select IR 3 (if available) to faulty side.

NAV ALTI DISCREPANCY

Crew awareness.

OVERSPEED

VMO/MMO 350/.82
(235/.60 in case of dispatch with landing gear down).
VLE 280/.67
VFE . . . . see below

CONF	VFE
FULL	190
3	195
2	215
1 + F	215
1	230

NAV BARO REF DISCREPANCY

– BARO REF . . . . X CHECK
Crosscheck the barometric reference selection, captain side versus first officer side.

NAV ADR FAULT

Note : In case of simultaneous failure of ADR and IR (same ADIRU), apply ADR FAULT procedure before IR FAULT procedure.

■ ADR 1 FAULT :

– AIR DATA SWTG . . . . CAPT

R *Select ADR 3 (if available) to captain side.*

The GPWS TERR amber FAULT light comes on as the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR pushbutton should be switched OFF.

– ADR 1 . . . . OFF

Depending on ADR failure, ADR should be switched off.

STATUS

CAT 3 SINGLE ONLY

INOP SYS
ADR 1
CAT 3 DUAL
GPWS

■ ADR 2 FAULT :

– AIR DATA SWTG . . . . F/O

Select ADR 3 (if available) to first officer side.

– ADR 2 . . . . OFF

– BARO REF . . . . CHECK

If ADR 2 fails, both baro reference channels are driven by the same FCU channel. Consequently the baro reference displays must be checked.

STATUS

CAT 3 SINGLE ONLY

INOP SYS
ADR 2
CAT 3 DUAL

■ ADR 3 FAULT :

– AIR DATA SWTG (if ADR 3 in use) . . . . NORM

– ADR 3 . . . . OFF

STATUS

CAT 3 SINGLE ONLY

INOP SYS
ADR 3
CAT 3 DUAL

NAV HDG DISCREPANCY

- HDG . . . . X CHECK
  Compare the 3 IR headings on ADIRS CDU or crosscheck with standby compass.
- ATT HDG SWTG . . . . AS RQRD
  Select IR 3 (if available) to faulty side.

NAV ATT DISCREPANCY

- ATT . . . . X CHECK
  Crosscheck with standby horizon.
- ATT HDG SWTG . . . . AS RQRD
  Select IR 3 (if available) to faulty side.

NAV ALTI DISCREPANCY

Crew awareness.

OVERSPEED

VMO/MMO 350/.82
(235/.60 in case of dispatch with landing gear down).
VLE 280/.67
VFE . . . . see below

CONF	VFE
FULL	190
3	195
2	215
1 + F	215
1	230

NAV BARO REF DISCREPANCY

- BARO REF . . . . X CHECK
  Crosscheck the barometric reference selection, captain side versus first officer side.

NAV ADR FAULT

Note : In the case of a simultaneous failure of ADR and IR (same ADIRU), apply ADR FAULT procedure before IR FAULT procedure.

■ **ADR 1 FAULT :**

– AIR DATA SWTG . . . . CAPT 3

Set ADR 3 (if available) to the Captain's side.

The GPWS TERR amber FAULT light comes on, because the enhanced functions of the EGPWS are inhibited. So, the GPWS TERR pushbutton should be switched OFF.

– ADR 1 . . . . OFF

Depending on ADR failure, ADR should be switched off.

STATUS

CAT 3 SINGLE ONLY

INOP SYS
ADR 1
CAT 3 DUAL
GPWS

■ **ADR 2 FAULT :**

– AIR DATA SWTG . . . . F/O 3

Set ADR 3 (if available) to the First Officer's side.

– ADR 2 . . . . OFF

– BARO REF . . . . CHECK

If ADR 2 fails, both baro reference channels are driven by the same FCU channel. Consequently, the baro reference displays must be checked.

STATUS

CAT 3 SINGLE ONLY

INOP SYS
ADR 2
CAT 3 DUAL

■ **ADR 3 FAULT :**

– AIR DATA SWTG (if ADR 3 in use) . . . . NORM

– ADR 3 . . . . OFF

STATUS

CAT 3 SINGLE ONLY

INOP SYS
ADR 3
CAT 3 DUAL

NAV ADR FAULT (CONT'D)

■ Two ADR FAULT :

R *Flight control normal laws are lost. Pitch alternate law preserves the neutral static*
R *stability. All protections, except maneuver protections, are lost.*

● ADR 1 + 2 FAULT :

– AIR DATA SWTG . . . . CAPT
Set ADR 3 (if available) to the captain's side.
– ADR (affected) . . . . OFF
The GPWS TERR amber FAULT light comes on, as the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR pushbutton should be switched OFF.

F/CTL ALTN LAW (PROT LOST)

MAX SPEED . . . . 320 KT
Speed is limited, due to the loss of high-speed protections.

● ADR 1 + 3 (or 2 + 3) FAULT :

Air data information is lost on one PFD.
Note : In case of an ADR 1 + 3 FAULT, the landing gear safety valve is controlled closed:
· Landing gear retraction is inoperative.
· Landing gear extension must be performed by gravity.

– AIR DATA SWTG . . . . NORM
– ATC (if ADR 1 failed) . . . . SYS 2
– ATC (if ADR 2 failed) . . . . SYS 1
– ADR (affected) . . . . OFF
R *In case of an ADR 1 + 3 FAULT, the GPWS TERR amber FAULT light comes on, as*
R *the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR*
R *pushbutton should be switched OFF.*

F/CTL ALTN LAW

(PROT LOST)
MAX SPEED . . . . 320 KT
Speed is limited, due to the loss of high-speed protections.

NAV ADR FAULT (CONT'D)

STATUS

MAX SPEED .... 320 KT
APPR PROC
– FOR LDG .... USE FLAP 3
Do not select CONF FULL to not degrade handling qualities.
– GPWS LDG FLAP 3 .... ON
Appears when CONF 3 is selected.
● **If ADR 1+3 FAULT**
– L/G .... GRVTY EXTN
(Refer to 3.02.32).
R APPR SPD .... VREF + 10 KT
R LDG DIST PROC .... APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
ALTN LAW : PROT LOST
– WHEN L/G DN : DIRECT LAW
At L/G extension, control reverts to direct law in pitch and roll (Ref. DIRECT LAW proc. 3.02.27).
CAT 1 ONLY
● **ADR 1 + 3 (or 2 + 3) FAULT** :
BOTH PFD ON THE SAME FAC
In the case of an ADR 1 + 3 FAULT, the GPWS TERR amber FAULT light comes on, because the enhanced EGPWS functions are inhibited. So, the GPWS TERR pushbutton should be switched OFF.

INOP SYS
F/CTL PROT
ADR 1 + 2 or (2 + 3) or (1 + 3)
AP 1 + 2
A/THR
RUD TRV LIM 1(2)(a)
GPWS (if ADR1 fault)
YAM DAMPER 1(2)(a)

R (a) 1, in the case of an ADR 1 + 3 FAULT
R 2, in the case of an ADR 2 + 3 FAULT

ADR 1 + 2 + 3 FAULT

The ECAM does not display this procedure. In the case of a triple ADR failure, the ECAM only displays dual ADR warnings.
– ADR (all) .... OFF
– STBY INST (ALT + ASI) .... USE
Note : *Disregard ECAM actions for AIR DATA SWTG and ATC, because these have no effect in the case of a total loss of ADRs.*

NAV ADR FAULT (CONT'D)

■ Two ADR FAULT :

R *Flight control normal laws are lost. Pitch alternate law preserves the neutral static*
R *stability. All protections, except maneuver protections, are lost.*

● ADR 1 + 2 FAULT :

– AIR DATA SWTG . . . . CAPT

Set ADR 3 (if available) to the captain's side.

– ADR (affected) . . . . OFF

The GPWS TERR amber FAULT light comes on, as the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR pushbutton should be switched OFF.

F/CTL ALTN LAW (PROT LOST)

MAX SPEED . . . . 320 KT

Speed is limited, due to the loss of high-speed protections.

● ADR 1 + 3 (or 2 + 3) FAULT :

Air data information is lost on one PFD.

Note : In case of an ADR 1 + 3 FAULT, the landing gear safety valve is controlled closed:
· Landing gear retraction is inoperative.
· Landing gear extension must be performed by gravity.

– AIR DATA SWTG . . . . NORM
– ATC (if ADR 1 failed) . . . . SYS 2
– ATC (if ADR 2 failed) . . . . SYS 1
– ADR (affected) . . . . OFF

R *In case of an ADR 1 + 3 FAULT, the GPWS TERR amber FAULT light comes on, as*
R *the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR*
R *pushbutton should be switched OFF.*

F/CTL ALTN LAW

(PROT LOST)
MAX SPEED . . . . 320 KT

Speed is limited, due to the loss of high-speed protections.

NAV ADR FAULT (CONT'D)

STATUS

MAX SPEED . . . . 320 KT

APPR PROC

– FOR LDG . . . . USE FLAP 3

Do not select CONF FULL to not degrade handling qualities.

– GPWS LDG FLAP 3 . . . . ON

Appears when CONF 3 is selected.

● **If ADR 1+3 FAULT**

– L/G . . . . GRVTY EXTN

(Refer to 3.02.32).

APPR SPD . . . . VREF + 10 KT

LDG DIST PROC . . . . APPLY

R *Refer to the QRH Part 2, or to the FCOM 3.02.80.*

R ALTN LAW : PROT LOST

– WHEN L/G DN : DIRECT LAW

At L/G extension, control reverts to direct law in pitch and roll (Ref. DIRECT LAW proc. 3.02.27).

CAT 1 ONLY

● **ADR 1 + 3 (or 2 + 3) FAULT** :

BOTH PFD ON THE SAME FAC

In the case of an ADR 1 + 3 FAULT, the GPWS TERR amber FAULT light comes on, because the enhanced EGPWS functions are inhibited. So, the GPWS TERR pushbutton should be switched OFF.

INOP SYS

F/CTL PROT

ADR 1 + 2 or (2 + 3) or (1 + 3)

AP 1 + 2

A/THR

RUD TRV LIM 1(2)(a)

GPWS (if ADR1 fault)

N.W. STEER (if ADR 1 + 3 fault)

YAM DAMPER 1(2)(a)

R (a) 1, in the case of an ADR 1 + 3 FAULT

R 2, in the case of an ADR 2 + 3 FAULT

ADR 1 + 2 + 3 FAULT

The ECAM does not display this procedure. In the case of a triple ADR failure, the ECAM only displays dual ADR warnings.

– ADR (all) . . . . OFF

– STBY INST (ALT + ASI) . . . . USE

Note : Disregard ECAM actions for AIR DATA SWTG and ATC, because these have no effect in the case of a total loss of ADRs.

NAV ADR FAULT (CONT'D)

■ Two ADR FAULT :

Flight control normal laws are lost. Pitch alternate law preserves the neutral static stability. All protections, except maneuver protections, are lost.

● ADR 1 + 2 FAULT :

– AIR DATA SWTG .... CAPT 3
Set ADR 3 (if available) to the Captain's side.

– ADR (affected) .... OFF
The GPWS TERR amber FAULT light comes on, because the enhanced functions of the EGPWS are inhibited. As such, the GPWS TERR pushbutton should be switched OFF.

F/CTL ALTN LAW (PROT LOST)

MAX SPEED .... 320 KT
Speed is limited, due to the loss of high-speed protections.

● ADR 1 + 3 (or 2 + 3) FAULT :

Air data information is lost on one PFD.

Note : In the case of an ADR 1 + 3 FAULT, the landing gear safety valve is controlled closed:
· Landing gear retraction is inoperative.
· Landing gear extension must be performed by gravity.

– AIR DATA SWTG .... NORM
– ATC (if ADR 1 failed) .... SYS 2
– ATC (if ADR 2 failed) .... SYS 1
– ADR (affected) .... OFF
In the case of an ADR 1 + 3 FAULT, the GPWS TERR amber FAULT light comes on, because the enhanced functions of the EGPWS are inhibited. So, the GPWS TERR pushbutton should be switched OFF.

F/CTL ALTN LAW

(PROT LOST)
MAX SPEED .... 320 KT
Speed is limited, due to the loss of high-speed protections.

NAV ADR FAULT (CONT'D)

STATUS

MAX SPEED .... 320 KT
APPR PROC
– FOR LDG .... USE FLAP 3
Do not select CONF FULL to not degrade handling qualities.
– GPWS LDG FLAP 3 .... ON
Appears when CONF 3 is selected.
● **If ADR 1+3 FAULT**
– L/G .... GRVTY EXTN
(Refer to 3.02.32).
R APPR SPD .... VREF + 10 KT
R LDG DIST PROC .... APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.
ALTN LAW : PROT LOST
– WHEN L/G DN : DIRECT LAW
At L/G extension, control reverts to direct law in pitch and roll (Ref. DIRECT LAW proc. 3.02.27).
CAT 1 ONLY
● **ADR 1 + 3 (or 2 + 3) FAULT** :
BOTH PFD ON THE SAME FAC
In the case of an ADR 1 + 3 FAULT, the GPWS TERR amber FAULT light comes on, because the enhanced EGPWS functions are inhibited. So, the GPWS TERR pushbutton should be switched OFF.

INOP SYS
F/CTL PROT
ADR 1 + 2 or (2 + 3) or (1 + 3)
AP 1 + 2
A/THR
RUD TRV LIM 1(2)(a)
GPWS (if ADR1 fault)
YAM DAMPER 1(2)(a)

R (a) 1, in the case of an ADR 1 + 3 FAULT
R 2, in the case of an ADR 2 + 3 FAULT

ADR 1 + 2 + 3 FAULT

The ECAM does not display this procedure. In the case of a triple ADR failure, the ECAM only displays dual ADR warnings.

– ADR (all) .... OFF
– STBY INST (ALT + ASI) .... USE

Note : Disregard ECAM actions for AIR DATA SWTG and ATC, because these have no effect in the case of a total loss of ADRs.

ADR 1 + 2 + 3 FAULT (CONT'D)

F/CTL ALTN LAW

(PROT LOST)

Note : The STALL WARNING is lost.

MAX SPEED 320/.82

See the following table for the IAS/M relationship for .82

FL	390	370	350	330	310	290	280 and below
MAX SPD	252	265	278	290	305	315	320

– WHEN L/G DN : DIRECT LAW

At landing gear extension, control reverts to direct law in pitch, as well as in roll (see the DIRECT LAW procedure 3.02.27).

Note : Use manual control of cabin pressurization :

– MODE SEL . . . . . . MAN

– MAN V/S CTL . . . . . . AS RQRD

These lines are not displayed on the ECAM. (For details, refer to 3.02.21).

STATUS

MAX SPEED 320/.82

RUD WITH CARE ABV 160 KT

The rudder travel limit value is frozen at the moment when the
R *failure occurs. Therefore, to prevent damage to the aircraft*
R *structure, use the rudder with care, when the speed is above*
R *160 knots. At slats' extension, full rudder travel authority is*
recovered.

APPR PROC :

Note : As the landing gear safety valve is closed, landing gear extension must be performed by gravity (Refer to 3.02.32).

WHEN L/G DN : DIRECT LAW

At landing gear extension, control reverts to direct law in pitch, as well as in roll.

– FOR LDG . . . . USE FLAP 3

Do not select CONF FULL, so as not to degrade handling qualities.

– GPWS LDG FLAP 3 . . . . ON

Displayed, when CONF 3 is selected.

APPR SPD . . . . VREF + 10 KT

CAT 1 ONLY

ADR 1 + 2 + 3 FAULT (CONT'D)

STATUS

● **DURING FINAL APPR**
– V/S CTL . . . . FULL UP
– LDG DIST PROC . . . . APPLY
Refer to the QRH part 2, or to the FCOM 3.02.80.
Note : In case of a go-around, respect the maximum speed of 215 knots in CONF 1+F, due to loss of flap auto retraction to CONF 1.

CAUTION
R Check that the outflow valve is fully open and
R that cabin altitude is at airfield elevation before
R opening the doors.

INOP SYS
See below

INOP SYS displayed on ECAM

F/CTL PROT	ADR 1+2+3	A/THR
WINDSHEAR DET	AP 1 + 2	RUD TRV LIM 1+2
GPWS		CAB PR 1 + 2

Other inoperative systems

	ATC ALTI MODE	TCAS ◁
		L/G RETRACT

RAT automatic extension.

ADR 1 + 2 + 3 FAULT (CONT'D)

F/CTL ALTN LAW

(PROT LOST)
MAX SPEED 320/.82
See the following table for the IAS/M relationship for .82

FL	390	370	350	330	310	290	280 and below
MAX SPD	252	265	278	290	305	315	320

– WHEN L/G DN : DIRECT LAW

At landing gear extension, control reverts to direct law in pitch, as well as in roll (see the DIRECT LAW procedure 3.02.27).

Note : Use manual control of cabin pressurization :
– MODE SEL . . . . . . MAN
– MAN V/S CTL . . . . . . AS RQRD
These lines are not displayed on the ECAM. (For details, refer to 3.02.21).

STATUS

MAX SPEED 320/.82
RUD WITH CARE ABV 160 KT
The rudder travel limit value is frozen at the moment when the failure occurs. Therefore, to prevent damage to the aircraft structure, use the rudder with care, when the speed is above 160 knots. At slats' extension, full rudder travel authority is recovered.

APPR PROC :

Note : As the landing gear safety valve is closed, landing gear extension must be performed by gravity (Refer to 3.02.32).

WHEN L/G DN : DIRECT LAW
At landing gear extension, control reverts to direct law in pitch, as well as in roll.

– FOR LDG . . . . USE FLAP 3
Do not select CONF FULL, so as not to degrade handling qualities.

– GPWS LDG FLAP 3 . . . . ON
Displayed, when CONF 3 is selected.

APPR SPD . . . . VREF + 10 KT
CAT 1 ONLY

ADR 1 + 2 + 3 FAULT (CONT'D)

STATUS

● **DURING FINAL APPR**
– V/S CTL . . . . FULL UP
– LDG DIST PROC . . . . APPLY
Refer to the QRH part 2, or to the FCOM 3.02.80.
Note : In case of a go-around, respect the maximum speed of 215 knots in CONF 1+F, due to loss of flap auto retraction to CONF 1.

CAUTION
R Check that the outflow valve is fully open and
R that cabin altitude is at airfield elevation before
R opening the doors.

INOP SYS
See below

INOP SYS displayed on ECAM

F/CTL PROT
WINDSHEAR DET
GPWS

ADR 1+2+3
AP 1 + 2

A/THR
RUD TRV LIM 1+2
CAB PR 1 + 2

Other inoperative systems

ATC ALTI MODE

TCAS ◁
L/G RETRACT

RAT automatic extension.

NAV IR FAULT

Note : In case of a simultaneous ADR and IR (same ADIRU) failure, apply the ADR FAULT procedure prior to the IR FAULT procedure.

■ **IR 1 FAULT :**

R – ATT HDG SWTG .... CAPT

STATUS

IR MAY BE AVAIL IN ATT
Refer to the IR ALIGNMENT IN ATT MODE procedure.
CAT 3 SINGLE ONLY

INOP SYS
IR 1
CAT 3 DUAL
GPWS TERR
R TCAS (*)

Note : (*) In case of an IR 1 fault, the TCAS may be inoperative (depending on the TCAS manufacturer). If the IR 1 is available in ATT mode, the TCAS can be recovered by entering the aircraft magnetic heading into the CDU, as per IR ALIGNMENT IN ATT MODE procedure.

■ **IR 2 FAULT :**

– ATT HDG SWTG .... F/O

STATUS

IR MAY BE AVAIL IN ATT
Refer to the IR ALIGNMENT IN ATT MODE procedure.
CAT 3 SINGLE ONLY

INOP SYS
IR 2
CAT 3 DUAL

■ **IR 3 FAULT :**

– ATT HDG SWTG (if IR 3 in use) .... NORM
This line is not displayed on the ECAM.

STATUS

IR MAY BE AVAIL IN ATT
Refer to the IR ALIGNMENT IN ATT MODE procedure.
CAT 3 SINGLE ONLY

INOP SYS
IR 3
CAT 3 DUAL

NAV IR FAULT (CONT'D)

■ **Two IR FAULT :**

● **If IR 1 + 2 FAULT :**

– ATT HDG SWTG .... CAPT

Select IR 3 (if available) to captain side.
Attitude information on F/O PFD is lost.

● **If IR 1 + 3 (or 2 + 3) FAULT :**

– ATT HDG SWTG .... NORM

Attitude information is lost on one side (captain or first officer).

F/CTL ALTN LAW

(PROT LOST)

Flight control normal laws are lost. Pitch alternate law with static stability becomes active.
All protections except maneuver protections are lost.

MAX SPEED .... 320 KT

Speed is limited because of loss of high-speed protection.

NAV IR FAULT

Note : In the case of a simultaneous ADR and IR (same ADIRU) failure, apply the ADR FAULT procedure before the IR FAULT procedure.

■ **IR 1 FAULT :**

R – ATT HDG SWTG . . . . CAPT 3

STATUS

IR MAY BE AVAIL IN ATT *Refer to the IR ALIGNMENT IN ATT MODE procedure.* CAT 3 SINGLE ONLY	INOP SYS IR 1 CAT 3 DUAL R GPWS TERR TCAS (*)

Note : (*) In case of an IR 1 fault, the TCAS may be inoperative (depending on the TCAS manufacturer). If the IR 1 is available in ATT mode, the TCAS can be recovered by entering the aircraft magnetic heading into the CDU, as per IR ALIGNMENT IN ATT MODE procedure.

■ **IR 2 FAULT :**

– ATT HDG SWTG . . . . F/O 3

STATUS

IR MAY BE AVAIL IN ATT *Refer to the IR ALIGNMENT IN ATT MODE procedure.* CAT 3 SINGLE ONLY	INOP SYS IR 2 CAT 3 DUAL

■ **IR 3 FAULT :**

– ATT HDG SWTG (if IR 3 in use) . . . . NORM

This line is not displayed on the ECAM.

STATUS

IR MAY BE AVAIL IN ATT *Refer to the IR ALIGNMENT IN ATT MODE procedure.* CAT 3 SINGLE ONLY	INOP SYS IR 3 CAT 3 DUAL

NAV IR FAULT (CONT'D)

■ **Two IR FAULT :**

● **If IR 1 + 2 FAULT :**

– ATT HDG SWTG .... CAPT 3

Set IR 3 (if available) to the Captain's side.
Attitude information on F/O PFD is lost.

● **If IR 1 + 3 (or 2 + 3) FAULT :**

– ATT HDG SWTG .... NORM

Attitude information is lost on one side (Captain or First Officer).

F/CTL ALTN LAW

(PROT LOST)

Flight control normal laws are lost. Pitch alternate law with static stability becomes active.

All protections except maneuver protections are lost.

MAX SPEED .... 320 KT

Speed is limited due to the loss of high-speed protections.

NAV IR FAULT (CONT'D)

STATUS

MAX SPEED . . . . 320 KT
APPR PROC
– FOR LDG . . . . USE FLAP 3
Do not select CONF FULL, so as not to degrade handling qualities.
– GPWS LDG FLAP 3 . . . . ON
Will appear, when CONF 3 is selected.
APPR SPD : VREF + 10 KT
LDG DIST PROC . . . . APPLY
Refer to the QRH part 2, or to the FCOM 3.02.80.
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
At landing gear extension, control reverts to direct law, in pitch, as well as in roll (see the DIRECT LAW procedure 3.02.27).
IR (affected) MAY BE AVAIL IN ATT
Refer to the IR ALIGNMENT IN ATT MODE procedure.
CAT 1 ONLY

INOP SYS
F/CTL PROT
IR 1 (2)(3)
IR 1 + 2 or 1 + 3 or 2 + 3
AP 1 + 2
A/THR
YAW DAMPER 1(2)(a)
GPWS TERR (if IR 1 fault)
TCAS (*)

(a) Yaw damper 1, in case of an IR 1 + 3 fault
Yaw damper 2, in case of an IR 2 + 3 fault

Note : *(*) In case of an IR 1 fault, the TCAS may be inoperative (depending on the TCAS manufacturer). If the IR 1 is available in ATT mode, the TCAS can be recovered by entering the aircraft magnetic heading into the CDU, as per IR ALIGNMENT IN ATT MODE procedure.*

IR ALIGNMENT IN ATT MODE

If IR alignment is lost, the navigation mode is inoperative (red ATT flag on PFD and red HDG flag on ND). Aircraft attitude and heading may be recovered by applying the following
R *procedure. Aircraft must stay level with constant speed during 30 seconds.*

– MODE SELECTOR .... ATT
ALIGN light on during 30 seconds. ATT MODE displayed on CDU.
– LEVEL A/C ATTITUDE .... HOLD
– CONSTANT A/C SPEED .... MAINTAIN
– DISPLAY SYS switch .... AFFECTED SYS
– DISPLAY DATA switch .... HDG

■ **MCDU INITIALIZATION :**

– DATA (MCDU KEY) .... PRESS
The DATA INDEX page is displayed.
– IRS MONITOR (2L KEY) .... PRESS
The IRS MONITOR page is displayed.
– A/C HEADING .... ENTER
The heading must be entered in the SET HDG field (5R KEY).

■ **CDU INITIALIZATION :**

Depending on the CDU keyboard installed, an “H” may be written on the “5” key :

■ **If “H” is written on the “5” key :**

– H KEY .... PRESS
Degree marker, 0 decimal point, ENT and CLR lights come on.
– A/C HEADING .... ENTER

■ **If “H” is not written on the “5” key :**

– A/C HEADING .... ENTER
Enter the aircraft’s magnetic heading on the CDU keyboard. Then, press the ENT key to enter data.
Example : To enter heading of 320°, dial 3, 2, 0, 0 then press ENT. Heading will be displayed on the associated ND. “HDG–ATT MODE” will be displayed on the CDU.
Due to IR drift, the magnetic heading has to be periodically crosschecked and updated with standby compass, if required.

NAV PRED W/S DET FAULT

The predictive windshear function is lost.
Crew awareness

STATUS
INOP SYS
PRED W/S DET

NAV IR FAULT (CONT'D)

STATUS

MAX SPEED . . . . 320 KT
APPR PROC
– FOR LDG . . . . USE FLAP 3
Do not select CONF FULL, so as not to degrade handling qualities.
– GPWS LDG FLAP 3 . . . . ON
Will appear, when CONF 3 is selected.
APPR SPD : VREF + 10 KT
LDG DIST PROC . . . . APPLY
Refer to the QRH part 2, or to the FCOM 3.02.80.
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
At landing gear extension, control reverts to direct law, in pitch, as well as in roll (see the DIRECT LAW procedure 3.02.27).
IR (affected) MAY BE AVAIL IN ATT
Refer to the IR ALIGNMENT IN ATT MODE procedure.
CAT 1 ONLY

INOP SYS
F/CTL PROT
IR 1 (2)(3)
IR 1 + 2 or 1 + 3 or 2 + 3
AP 1 + 2
A/THR
YAW DAMPER 1(2)(a)
GPWS TERR (if IR 1 Fault)
TCAS (*)

(a) Yaw damper 1, in case of an IR 1 + 3 fault
Yaw damper 2, in case of an IR 2 + 3 fault

Note : *(*) In case of an IR 1 fault, the TCAS may be inoperative (depending on the TCAS manufacturer). If the IR 1 is available in ATT mode, the TCAS can be recovered by entering the aircraft magnetic heading into the CDU, as per IR ALIGNMENT IN ATT MODE procedure.*

NAV IR NOT ALIGNED

This caution is available in Phase 2 (after first engine start, until takeoff)

■ **POSITION DISAGREE**

■ **POSITION MISSING**

– PRESENT POS . . . . INSERT

■ **EXCESS MOTION**

■ **IR 1 (2) (3) (1+2) (2+3) (1+2+3) IN ALIGN**

IR ALIGNMENT IN ATT MODE

If IR alignment is lost, the navigation mode is inoperative (red ATT flag on PFD and red HDG flag on ND). Aircraft attitude and heading may be recovered by applying the following procedure. Aircraft must stay level with constant speed during 30 seconds. R

– MODE SELECTOR .... ATT
ALIGN light on during 30 seconds. ATT MODE displayed on CDU.
– LEVEL A/C ATTITUDE .... HOLD
– CONSTANT A/C SPEED .... MAINTAIN
– DISPLAY SYS switch .... AFFECTED SYS
– DISPLAY DATA switch .... HDG

■ **MCDU INITIALIZATION :**

– DATA (MCDU KEY) .... PRESS
The DATA INDEX page is displayed.
– IRS MONITOR (2L KEY) .... PRESS
The IRS MONITOR page is displayed.
– A/C HEADING .... ENTER
The heading must be entered in the SET HDG field (5R KEY).

■ **CDU INITIALIZATION :**

Depending on the CDU keyboard installed, an "H" may be written on the "5" key :

■ **If "H" is written on the "5" key :**

– H KEY .... PRESS
Degree marker, 0 decimal point, ENT and CLR lights come on.
– A/C HEADING .... ENTER

■ **If "H" is not written on the "5" key :**

– A/C HEADING .... ENTER
Enter the aircraft's magnetic heading on the CDU keyboard. Then, press the ENT key to enter data.
Example : To enter heading of 320°, dial 3, 2, 0, 0 then press ENT. Heading will be displayed on the associated ND. "HDG–ATT MODE" will be displayed on the CDU.
Due to IR drift, the magnetic heading has to be periodically crosschecked and updated with standby compass, if required.

NAV PRED W/S DET FAULT

The predictive windshear function is lost.
Crew awareness

STATUS

INOP SYS
PRED W/S DET

NAV IR DISAGREE

Disagreement between two IRs, the third one having failed or been rejected by the ELACs. Pitch direct, roll direct, and yaw mechanical laws become active. All protections (pitch and roll) are lost.

– ATT . . . . X CHECK

Use the standby horizon to determine the faulty IR.

● **IF DISAGREE CONFIRMED :**

– FAULTY IR . . . . OFF

This will also switch off the associated ADR.

– ELAC 2 . . . . OFF THEN ON

– ELAC 1 . . . . OFF THEN ON

Note : When the ELAC 1 computer is reset on ground, the pitch trim returns to the ground setting position (0°).

After corrective action (faulty IR switched off and ELACs reset), pitch alternate law with reduced protections is recovered.

F/CTL ALTN LAW

(PROT LOST)

– MAX SPEED . . . . 320 KT

STATUS

– MAX SPEED . . . . 320 KT

APPR PROC

– FOR LDG . . . . USE FLAP 3

Do not select CONF FULL, so as not to degrade handling qualities.

– GPWS LDG FLAP 3 . . . . ON

Will be displayed, when CONF 3 is selected.

APPR SPD . . . . VREF + 10

LDG DIST PROC . . . . APPLY

R *Refer to the QRH part 2, or to the FCOM 3.02.80.*

ALTN LAW : PROT LOST

WHEN L/G DN : DIRECT LAW

At landing gear extension, control reverts to direct law in pitch, as well as in roll (see the DIRECT LAW procedure 3.02.27).

INOP SYS

F/CTL PROT

NAV RA 1(2) FAULT

Crew awareness.

STATUS

■ **One RA FAULT :**

CAT 2 ONLY

INOP SYS
RA 1(2)
R CAT 3
GPWS (if RA 1 fault)

■ **Both RA FAULT :**

WHEN L/G DN : DIRECT LAW

At landing gear extension, flight controls revert to direct law in pitch, as well as in roll (see DIRECT LAW procedure 3.02.27).

CAT 1 ONLY

R *ILS APPR mode cannot be engaged ; LOC mode is*
R *available via the FCU LOC pushbutton.*

INOP SYS
RA 1 + 2
A/CALLOUT
AP 1 + 2 (when landing gear is down)
GPWS

NAV TCAS FAULT ◁

Crew awareness.

STATUS

INOP SYS
TCAS

NAV GPS 1(2) FAULT

Crew awareness.

STATUS

INOP SYS
GPS 1(2)

NAV FM/GPS POS DISAGREE

The FMS and GPS positions differ by more than :
– A longitude threshold that depends on the latitude :
· 0.5 minutes for latitudes below 55 degrees
· 0.9 minutes for latitudes at, or above, 55 degrees, and below 70 degrees
– A latitude threshold of 0.5 minutes, regardless of the latitude.

– A/C POS . . . . CHECK

The following procedure is not displayed on the ECAM :

R ● **If the message occurs during takeoff initiation** :
R – Continue takeoff and monitor navigation.
R ● **If the message occurs during ILS/LOC approach (LOC**
R **green):**
R – DISREGARD it.

● **If the message occurs during climb, cruise, or descent** :
– CHECK navigation accuracy, using raw data :
■ **If the check is positive :**
– NAV mode and ND ARC/ROSE NAV may be used.
■ **If the check is negative :**
– HDG/TRK mode and raw data must be used.
– Consider switching off the terrain functions of the EGPWS.
– When possible, compare the FM position with the GPIRS position, on the POSITION MONITOR page :
■ **If one FM position agrees with the GPIRS position on the POSITION MONITOR page :**
– Use the associated FD/AP.
■ **If not :**
– Deselect GPS and revert to basic information.

● **If the message occurs during a non-precision approach** :
■ **Overlay approach :**
– SELECT HDG or TRK, and use raw data.
■ **GPS or RNAV approach :**
– GO AROUND or fly visual, if visual conditions are met.

NAV ILS 1(2) FAULT

Crew awareness.

STATUS

CAT 1 ONLY

INOP SYS
ILS 1(2)
CAT 2

NAV GPWS FAULT

– GPWS . . . . OFF

R *This line remains displayed, even after the GPWS pushbutton has been switched OFF.*

STATUS

INOP SYS
GPWS

NAV GPS 1(2) FAULT

Crew awareness.

STATUS

INOP SYS
GPS 1(2)

NAV FM/GPS POS DISAGREE

The FMS and GPS positions differ by more than :
– A longitude threshold that depends on the latitude :
· 0.5 minutes for latitudes below 55 degrees
· 0.9 minutes for latitudes at, or above, 55 degrees, and below 70 degrees
– A latitude threshold of 0.5 minutes, regardless of the latitude.

– A/C POS . . . . CHECK

The following procedure is not displayed on the ECAM :

R ● **If the message occurs during takeoff initiation** :
R – Continue takeoff and monitor navigation.
R ● **If the message occurs during ILS/LOC approach (LOC**
R **green)**:
R – DISREGARD it.

● **If the message occurs during climb, cruise, or descent** :
– CHECK navigation accuracy, using raw data :
■ **<u>If the check is positive :</u>**
– NAV mode and ND ARC/ROSE NAV may be used.
■ **<u>If the check is negative :</u>**
– HDG/TRK mode and raw data must be used.
– Consider switching off the terrain functions of the EGPWS.
– When possible, compare the FM position with the GPIRS position, on the POSITION MONITOR page :
■ **<u>If one FM position agrees with the GPIRS position on the POSITION MONITOR page :</u>**
– Use the associated FD/AP.
■ **<u>If not :</u>**
– Deselect GPS and revert to basic information.

● **If the message occurs during a non-precision approach** :
■ **<u>Overlay approach :</u>**
– SELECT HDG or TRK, and use raw data.
■ **<u>GPS or RNAV approach :</u>**
– GO AROUND or fly visual, if visual conditions are met.

NAV ILS 1(2) FAULT

Crew awareness.

STATUS

INOP SYS
ILS 1(2)
CAT 2

NAV GPWS FAULT

– GPWS . . . . OFF

This line remains displayed, even after the GPWS pushbutton has been switched OFF.

STATUS

INOP SYS
GPWS

EGPWS ALERTS

CAUTION
During night or IMC conditions, apply the procedure immediately. Do not delay reaction for diagnosis.
During daylight VMC conditions, with terrain and obstacles clearly in sight, the alert may be considered cautionary. Take positive corrective action until the alert stops or a safe trajectory is ensured.

■ **"PULL UP" - "TERRAIN TERRAIN PULL UP" - "TERRAIN AHEAD PULL UP" - "OBSTACLE AHEAD PULL UP" :**

Simultaneously :
- AP . . . . OFF
- PITCH . . . . PULL UP

  Pull up to full backstick and maintain.
- THRUST LEVERS . . . . TOGA
- SPEEDBRAKE lever . . . . CHECK RETRACTED
- R BANK . . . . WINGS LEVEL or ADJUST

  R *Best climb performance is obtained when close to wings level. Then, for "TERRAIN AHEAD PULL UP" only, and if the crew concludes that turning is the safest way of action, a turning maneuver can be initiated.*

R ● **When flight path is safe and the warning stops :**
Decrease pitch attitude and accelerate.

● **When speed is above VLS, and vertical speed is positive :**
Clean up aircraft, as required.

■ **"TERRAIN TERRAIN" - "TOO LOW TERRAIN" :**

Adjust the flight path, or initiate a go-around.

■ **"TERRAIN AHEAD" - "OBSTACLE AHEAD"**

Adjust the flight path. Stop descent. Climb and/or turn, as necessary, based on analysis of all available instruments and information.

■ **"SINK RATE" - "DON'T SINK" :**

Adjust pitch attitude and thrust to silence the alert.

■ **"TOO LOW GEAR" - "TOO LOW FLAPS" :**

Perform a go-around.

■ **"GLIDE SLOPE" :**

Establish the aircraft on the glideslope, or switch OFF the G/S mode pushbutton, if flight below the glideslope is intentional (non precision approach (NPA)).

NAV GPWS TERR DET FAULT

The enhanced TCF and TAD modes of the EGPWS are inoperative.

– GPWS TERR . . . . OFF

The basic GPWS mode 1 to mode 5 are still operative if the SYS pushbutton switch lights FAULT or OFF are not illuminated.

TCAS WARNINGS

■ **Traffic advisory : "TRAFFIC" messages**

Do not maneuver based on a TA alone.
Attempt to see the reported traffic.

R ■ **Resolution advisory : All "CLIMB" and "DESCEND" or "MAINTAIN VERTICAL SPEED MAINTAIN" or "ADJUST VERTICAL SPEED ADJUST" or "MONITOR VERTICAL SPEED" type messages**

- AP (if engaged) . . . . OFF
- BOTH FDs . . . . OFF
- Respond promptly and smoothly to an RA by adjusting or maintaining the vertical speed, as required, to reach the green area and/or avoid the red area of the vertical speed scale.

  Note : Avoid excessive maneuvers while aiming to keep the vertical speed just outside the red area of the VSI, and within the green area. If necessary, use the full speed range between Vαmax and Vmax.
- Respect stall, GPWS, or windshear warning.
- Notify ATC.
- When "CLEAR OF CONFLICT" is announced :
  - *Resume normal navigation in accordance with ATC clearance.*
  - *AP/FD can be re-engaged as desired.*

● **GO AROUND procedure must be performed when a RA "CLIMB" or "INCREASE CLIMB" is triggered on final approach.**

Note : Resolution Advisories (RA) are inhibited below 900 feet.

NAV ADR DISAGREE

If one ADR is faulty, or has been rejected by the ELAC, and if there is a speed or alpha disagreement between the 2 remaining ADRs, alternate law becomes active, and protections are lost.

– AIR SPD . . . . X CHECK

■ **IF SPD DISAGREE :**

R – ADR CHECK PROC . . . . APPLY

Refer to the ADR CHECK PROC paper procedure to determine the faulty ADR.

■ **IF NO SPD DISAGREE :**

– AOA DISCREPANCY

F/CTL ALTN LAW

(PROT LOST)

– MAX SPEED . . . . 320 KT

STATUS

– MAX SPEED . . . . 320 KT

APPR PROC

– FOR LDG . . . . USE FLAP 3

Do not select CONF FULL, so as not to degrade handling qualities.

– GPWS LDG FLAP 3 . . . . ON

Displayed, when CONF 3 is selected.

APPR SPD . . . . VREF + 10

LDG DIST PROC . . . . APPLY

R *Refer to the QRH part 2, or to the FCOM 3.02.80.*

ALTN LAW : PROT LOST

WHEN L/G DN : DIRECT LAW

At landing gear extension, control reverts to direct law in pitch, as well as in roll (see DIRECT LAW procedure 3.02.27).

● **IF NO SPD DISAGREE :**

RISK OF UNDUE STALL WARN

INOP SYS

F/CTL PROT

NAV IAS DISCREPANCY

– AIR SPD .... X CHECK
– AIR DATA SWTG .... AS RQRD

STATUS

CAT 3 SINGLE ONLY

INOP SYS
CAT 3 DUAL

R
UNRELIABLE SPEED INDIC/ADR CHECK PROC

Unreliable speed indication may be due to radome damage, or due to air probe failure or obstruction.
The indicated altitude may also be affected, if static probes are affected.
Unreliable speed cannot be detected by the ADIRU. The flight control and flight guidance computers normally reject erroneous speed/altitude source(s), provided a significant difference is detected.
However, they will not be able to reject two erroneous speeds or altitudes that synchronously and similarly drift away. In this remote case, the aircraft systems will consider the remaining correct source as being faulty and will reject it. Consequently, the flight control and flight guidance computers will use the remaining two wrong ADRs for their computation.
Therefore, in all cases of unreliable speed situation, the pilots must identify the faulty ADR(s) and then switch it (them) OFF. If all ADRs provide unreliable data, keep one ADR on to keep the stall warning protection. During this failure identification time, since the flight control laws may be affected, it is recommended to maneuver the aircraft with care until the ADR(s) is (are) switched OFF.
Unreliable speed indications may be suspected, either by :
- Speed discrepancies (between ADR 1, 2, 3, and standby instruments).
- Fluctuating or unexpected increase/decrease/steady indicated speed, or pressure altitude.
- Abnormal correlation of the basic flight parameters (speed, pitch attitude, thrust, climb rate).
- Abnormal AP/FD/ATHR behavior.
- STALL warning, or OVERSPEED warnings, that contradicts with at least one of the indicated speeds.
  - Rely on the stall warning that could be triggered in alternate or direct law. It is not affected by unreliable speeds, because it is based on angle of attack.
  - Depending on the failure, the OVERSPEED warning may be false or justified. Buffet, associated with the OVERSPEED VFE warning, is a symptom of a real overspeed condition.
- Inconsistency between radio altitude and pressure altitude.
- Reduction in aerodynamic noise with increasing speed, or increase in aerodynamic noise with decreasing speed.
- Impossibility of extending the landing gear by the normal landing gear control.

R ## UNREADABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

R ● **If the safe conduct of the flight is impacted :**

R

NFC5-03-0234-021-A251AA

MEMORY ITEMS :
- AP/FD....................OFF
- A/THR....................OFF
- PITCH/THRUST :
  - Below THRUST RED ALT....................15°/TOGA
  - Above THRUST RED ALT and Below FL 100....................10°/CLB
  - Above THRUST RED ALT and Above FL 100....................5°/CLB
- FLAPS....................Maintain current CONFIG
- SPEEDBRAKES....................Check retracted
- L/G....................UP

When at, or above MSA or Circuit Altitude: level off for troubleshooting

– GPS ALTITUDE .... Display on MCDU

R ● **To level off for troubleshooting :**

R *Note : Check the actual slat/flap config. on ECAM, as flap auto-retraction may occur.*

PITCH/THRUST FOR INITIAL LEVEL OFF

SLATS/FLAPS EXTENDED				
		Above 66 t	66 t – 56 t	Below 56 t
CONF	Speed	Pitch (°)/Thrust (% N1)		
3	F	7.0/62	7.0/57.9	7.0/52.6
2	F	8.5/61.8	8.5/57.6	8.5/52.3
1 + F	S	3.5/60.6	3.5/56.4	4.0/51.5
1	S	7.5/60.1	7.0/55.7	7.0/50.9
CLEAN				
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 200	250 kts	4.0/64.3	3.0/62.0	2.0/60.2
FL 200 - FL 320	275 kts	2.5/78.0	2.0/76.3	1.5/74.8
Above FL 320	M 0.76	3.0/84.2	2.5/82.6	2.0/80.4

R **Flying technique to stabilize speed :**
- Adjust pitch in order to fly the required flight path.
- When target pitch is reached, flying intended flight path, adjust thrust to target.
  - If the aircraft pitch tends to increase, aircraft is slow, then increase thrust ;
  - If the aircraft pitch tends to decrease, aircraft is fast, then decrease thrust.

R

UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

WHEN FLIGHT PATH IS STABILIZED

– PROBE/WINDOW HEAT .... ON

Technical recommendations :

– Respect Stall Warning.
– To monitor speed, refer to IRS Ground Speed or GPS Ground Speed variations.

● **If remaining altitude indication is unreliable** :
  – Do not use FPV and/or V/S, which are affected.
  – ATC altitude is affected. Notify the ATC.
  – Refer to GPS altitude : altitude variations may be used to control level flight, and is an altitude cue.
  – Refer to Radio altimeter.

CAUTION
If the failure is due to radome destruction, the drag will increase and therefore N1 must be increased by 5. Fuel flow will increase by about 27 %.

UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

● **If the safe conduct of the flight is impacted :**

NFC5-03-0234-021-A253AA

MEMORY ITEMS :
- AP/FD..OFF
- A/THR..OFF
- PITCH/THRUST :
  - Below THRUST RED ALT..............................15°/TOGA
  - Above THRUST RED ALT and Below FL 100...............10°/CLB
  - Above THRUST RED ALT and Above FL 100................5°/CLB
- FLAPS..............................Maintain current CONFIG
- SPEEDBRAKES..................................Check retracted
- L/G...UP

When at, or above MSA or Circuit Altitude: level off for troubleshooting

– GPS ALTITUDE .... Display on MCDU

● **To level off for troubleshooting :**

Note : Check the actual slat/flap config. on ECAM, as flap auto-retraction may occur.

PITCH/THRUST FOR INITIAL LEVEL OFF

SLATS/FLAPS EXTENDED				
		Above 67 t	67 t – 57 t	Below 57 t
CONF	Speed	Pitch (°)/Thrust (% N1)		
3	F	7.0/62.4	7.0/58.4	7.0/53.0
2	F	8.5/62.3	8.5/58.3	8.5/53.0
1 + F	S	4.5/61.3	4.5/57.2	4.5/52.3
1	S	7.5/60.2	7.5/55.8	7.5/51.0
CLEAN				
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 200	250 kts	3.5/64.7	3.0/62.3	2.0/60.3
FL 200 - FL 320	275 kts	2.5/78.7	2.0/76.8	1.0/75.3
Above FL 320	M 0.76	3.0/84.6	2.5/83.3	2.0/80.8

Flying technique to stabilize speed :
- Adjust pitch in order to fly the required flight path.
- When target pitch is reached, flying intended flight path, adjust thrust to target.
  - If the aircraft pitch tends to increase, aircraft is slow, then increase thrust ;
  - If the aircraft pitch tends to decrease, aircraft is fast, then decrease thrust.

R

UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

WHEN FLIGHT PATH IS STABILIZED

– PROBE/WINDOW HEAT . . . . ON

Technical recommendations :

- Respect Stall Warning.
- To monitor speed, refer to IRS Ground Speed or GPS Ground Speed variations.

● **If remaining altitude indication is unreliable** :
  - Do not use FPV and/or V/S, which are affected.
  - ATC altitude is affected. Notify the ATC.
  - Refer to GPS altitude : altitude variations may be used to control level flight, and is an altitude cue.
  - Refer to Radio altimeter.

CAUTION

If the failure is due to radome destruction, the drag will increase and therefore N1 must be increased by 5. Fuel flow will increase by about 27 %.

R # UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

R R ● **If the safe conduct of the flight is impacted :**

MEMORY ITEMS :
- AP/FD..OFF
- A/THR..OFF
- PITCH/THRUST :
  - Below THRUST RED ALT....................................15°/TOGA
  - Above THRUST RED ALT and Below FL 100....................10°/CLB
  - Above THRUST RED ALT and Above FL 100.....................5°/CLB
- FLAPS..................................Maintain current CONFIG
- SPEEDBRAKES......................................Check retracted
- L/G..UP

When at, or above MSA or Circuit Altitude: level off for troubleshooting

NFC5-03-0234-021-A255AA

– GPS ALTITUDE .... Display on MCDU

R ● **To level off for troubleshooting :**

R *Note : Check the actual slat/flap config. on ECAM, as flap auto-retraction may occur.*

PITCH/THRUST FOR INITIAL LEVEL OFF

SLATS/FLAPS EXTENDED				
		Above 81 t	81 t – 68 t	Below 68 t
CONF	Speed	Pitch (°)/Thrust (% N1)		
3	F	4.0/71.4	4.0/66.7	4.0/61.4
2	F	6.5/69.6	6.5/64.7	6.5/59.7
1 + F	S	3.0/67.9	3.0/63.4	3.0/58.5
1	S	7.0/66.5	7.0/62.2	7.0/57.0
CLEAN				
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 200	270 kts	3.5/71.8	2.5/68.3	1.5/66.2
FL 200 - FL 280	300 kts	2.0/83.5	1.5/81.6	1.0/80.0
Above FL 280	M 0.76	2.5/87.4	2.0/85.8	1.5/83.8

R **Flying technique to stabilize speed :**
- Adjust pitch in order to fly the required flight path.
- When target pitch is reached, flying intended flight path, adjust thrust to target.
  - If the aircraft pitch tends to increase, aircraft is slow, then increase thrust ;
  - If the aircraft pitch tends to decrease, aircraft is fast, then decrease thrust.

R

UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

WHEN FLIGHT PATH IS STABILIZED

– PROBE/WINDOW HEAT . . . . ON

Technical recommendations :

– Respect Stall Warning.
– To monitor speed, refer to IRS Ground Speed or GPS Ground Speed variations.

● **If remaining altitude indication is unreliable** :
  – Do not use FPV and/or V/S, which are affected.
  – ATC altitude is affected. Notify the ATC.
  – Refer to GPS altitude : altitude variations may be used to control level flight, and is an altitude cue.
  – Refer to Radio altimeter.

CAUTION

If the failure is due to radome destruction, the drag will increase and therefore N1 must be increased by 5. Fuel flow will increase by about 27 %.

UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

<u>Affected ADR identification :</u>

– Crosscheck all speed indications and refer to QRH 4.01 (for F, S speeds) or 5.01 (for speed in clean CONF):

■ **<u>If at least one ADR is reliable :</u>**

- Faulty ADR(s) . . . . OFF
- REMAINING AIR DATA . . . . CONFIRM

  Alternate sources may be used to evaluate the air data :

  – GPS altitude

  – GPS and IRS ground speeds, taking into account altitude and wind effect.

■ **<u>If affected ADR(s) cannot be identified, or if all ADRs are affected :</u>**

- ONE ADR . . . . KEEP ON

  Keep one ADR ON to maintain the STALL WARNING protection.
- TWO ADRS . . . . OFF

  This prevents flight control laws from using two coherent but unreliable ADR data.
- LDG CONF . . . . USE FLAP 3
- APP SPD . . . . VLS + 10
- LDG DIST PROC . . . . APPLY

  Refer to the QRH Part 2, or to the FCOM 3.02.80.

■ **<u>To return to departure airport :</u>**

Keep takeoff configuration preferably.
Refer to initial and intermediate approach, and final approach tables.

■ **<u>To accelerate and clean up after takeoff :</u>**

Accelerate and clean up the aircraft in level flight :

- THRUST . . . . CLB
- FLAPS . . . . RETRACT

Retract from 3 or 2 to 1, once CLB thrust is set.
Retract from 1 to 0, when the aircraft pitch is lower than the pitch for S speed (refer to the "Pitch/Thrust for initial level off" table).
Once in clean configuration, refer to climb, cruise, descent, approach tables for flight continuation.

■ **<u>Other cases :</u>**

- Refer to climb, cruise, descent, approach tables for flight continuation.

R

UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

CLIMB

Set the thrust to CL.

CLEAN				
		Above 81 t	81 t - 68 t	Below 68 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 50	270 kts	8.5/CLB	9.0/CLB	10.0/CLB
FL 50 - FL 100		7.5/CLB	8.0/CLB	8.5/CLB
FL 100 - FL 150		7.0/CLB	7.0/CLB	7.5/CLB
FL 150 - FL 200		5.5/CLB	5.5/CLB	6.0/CLB
FL 200 - FL 270	300 kts	3.5/CLB	3.5/CLB	3.5/CLB
FL 270 - FL 280		2.5/CLB	2.5/CLB	2.5/CLB
Above FL 280	M 0.76	3.0/CLB	3.0/CLB	3.0/CLB

CRUISE

Adjust N1 to maintain approximate level flight with pitch attitude held constant. When time permits, refer to FCOM 3.04.91 (SEVERE TURBULENCE) and adjust pitch to maintain level flight.

CLEAN				
		Above 81 t	81 t - 68 t	Below 68 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 200	270 kts	3.5/71.8	2.5/68.3	1.5/66.2
FL 200 - FL 280	300 kts	2.0/83.5	1.5/81.6	1.0/80.0
Above FL 280	M 0.76	2.5/87.4	2.0/85.8	1.5/83.8

DESCENT

Set the thrust to IDLE

CLEAN				
		Above 81 t	81 t - 68 t	Below 68 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Above FL 280	M 0.76	-1.5/IDLE	-1.5/IDLE	-2.5/IDLE
FL 280 - FL 200	300 kts	-1.0/IDLE	-2.0/IDLE	-3.0/IDLE
FL 200 - FL 100	270 kts	0.5/IDLE	-0.5/IDLE	-2.0/IDLE
Below FL 100	270 kts	0.0/IDLE	-1.0/IDLE	-2.5/IDLE
Below FL 100	G-DOT	1.5/IDLE	1.5/IDLE	1.5/IDLE

R ## UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

R **Affected ADR identification :**

– Crosscheck all speed indications and refer to QRH 4.01 (for F, S speeds) or 5.01 (for speed in clean CONF):

R ■ **If at least one ADR is reliable :**

– Faulty ADR(s) . . . . OFF
– REMAINING AIR DATA . . . . CONFIRM

R *Alternate sources may be used to evaluate the air data :*
R *– GPS altitude*
R *– GPS and IRS ground speeds, taking into account altitude and wind effect.*

R ■ **If affected ADR(s) cannot be identified, or if all ADRs are**
R **affected :**

R – ONE ADR . . . . KEEP ON
R *Keep one ADR ON to maintain the STALL WARNING protection.*
R – TWO ADRS . . . . OFF
R *This prevents flight control laws from using two coherent but unreliable ADR data.*
R – LDG CONF . . . . USE FLAP 3
R – APP SPD . . . . VLS + 10
R – LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.

■ **To return to departure airport :**

Keep takeoff configuration preferably.
Refer to initial and intermediate approach, and final approach tables.

■ **To accelerate and clean up after takeoff :**

Accelerate and clean up the aircraft in level flight :
– THRUST . . . . CLB
– FLAPS . . . . RETRACT

Retract from 3 or 2 to 1, once CLB thrust is set.
Retract from 1 to 0, when the aircraft pitch is lower than the pitch for S speed (refer to the “Pitch/Thrust for initial level off” table).
Once in clean configuration, refer to climb, cruise, descent, approach tables for flight continuation.

■ **Other cases :**

– Refer to climb, cruise, descent, approach tables for flight continuation.

R

UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

CLIMB

Set the thrust to CL.

CLEAN				
		Above 67 t	67 t - 57 t	Below 57 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 50	250 kts	10.5/CLB	11.0/CLB	12.5/CLB
FL 50 - FL 100		10.5/CLB	10.0/CLB	11.0/CLB
FL 100 - FL 150		8.0/CLB	8.5/CLB	9.5/CLB
FL 150 - FL 200		7.0/CLB	7.0/CLB	7.5/CLB
FL 200 - FL 250	275 kts	5.0/CLB	5.0/CLB	5.0/CLB
FL 250 - FL 320		3.5/CLB	3.5/CLB	3.5/CLB
Above FL 320	M 0.76	3.5/CLB	3.5/CLB	3.5/CLB

CRUISE

Adjust N1 to maintain approximate level flight with pitch attitude held constant. When time permits, refer to FCOM 3.04.91 (SEVERE TURBULENCE) and adjust pitch to maintain level flight.

CLEAN				
		Above 67 t	67 t - 57 t	Below 57 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 200	250 kts	3.5/64.7	3.0/62.3	2.0/60.3
FL 200 - FL 320	275 kts	2.5/78.7	2.0/76.8	1.0/75.3
Above FL 320	M 0.76	3.0/84.6	2.5/83.3	2.0/80.8

DESCENT

Set the thrust to IDLE

CLEAN				
		Above 67 t	67 t - 57 t	Below 57 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Above FL 320	M 0.76	-0.5/IDLE	-1.0/IDLE	-2.0/IDLE
FL 320 - FL 200	275 kts	-0.5/IDLE	-1.0/IDLE	-2.0/IDLE
FL 200 - FL 100	250 kts	1.0/IDLE	0.0/IDLE	-1.0/IDLE
Below FL 100	250 kts	0.5/IDLE	-0.5/IDLE	-2.0/IDLE
Below FL 100	G-DOT	1.5/IDLE	2.0/IDLE	2.0/IDLE

UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

<u>Affected ADR identification :</u>

– Crosscheck all speed indications and refer to QRH 4.01 (for F, S speeds) or 5.01 (for speed in clean CONF):

■ **<u>If at least one ADR is reliable :</u>**

– Faulty ADR(s) . . . . OFF
– REMAINING AIR DATA . . . . CONFIRM
Alternate sources may be used to evaluate the air data :
– GPS altitude
– GPS and IRS ground speeds, taking into account altitude and wind effect.

■ **<u>If affected ADR(s) cannot be identified, or if all ADRs are affected :</u>**

– ONE ADR . . . . KEEP ON
Keep one ADR ON to maintain the STALL WARNING protection.
– TWO ADRS . . . . OFF
This prevents flight control laws from using two coherent but unreliable ADR data.
– LDG CONF . . . . USE FLAP 3
– APP SPD . . . . VLS + 10
– LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.

■ **<u>To return to departure airport :</u>**

Keep takeoff configuration preferably.
Refer to initial and intermediate approach, and final approach tables.

■ **<u>To accelerate and clean up after takeoff :</u>**

Accelerate and clean up the aircraft in level flight :
– THRUST . . . . CLB
– FLAPS . . . . RETRACT
Retract from 3 or 2 to 1, once CLB thrust is set.
Retract from 1 to 0, when the aircraft pitch is lower than the pitch for S speed (refer to the "Pitch/Thrust for initial level off" table).
Once in clean configuration, refer to climb, cruise, descent, approach tables for flight continuation.

■ **<u>Other cases :</u>**

– Refer to climb, cruise, descent, approach tables for flight continuation.

R

UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

CLIMB

Set the thrust to CL.

CLEAN				
		Above 66 t	66 t – 56 t	Below 56 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 50	250 kts	10.5/CLB	11.5/CLB	12.5/CLB
FL 50 - FL 100		9.5/CLB	10.0/CLB	11.0/CLB
FL 100 - FL 150		8.5/CLB	8.5/CLB	9.5/CLB
FL 150 - FL 200		7.0/CLB	7.0/CLB	7.5/CLB
FL 200 - FL 250	275 kts	5.0/CLB	5.0/CLB	5.0/CLB
FL 250 - FL 320		4.0/CLB	3.5/CLB	4.0/CLB
Above FL 320	M 0.76	3.5/CLB	3.5/CLB	3.5/CLB

CRUISE

Adjust N1 to maintain approximate level flight with pitch attitude held constant. When time permits, refer to FCOM 3.04.91 (SEVERE TURBULENCE) and adjust pitch to maintain level flight.

CLEAN				
		Above 66 t	66 t – 56 t	Below 56 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Below FL 200	250 kts	3.5/64.3	3.0/62.0	2.0/60.2
FL 200 - FL 320	275 kts	2.5/78.1	2.0/76.3	1.5/74.8
Above FL 320	M 0.76	3.0/84.2	2.5/82.6	2.0/80.4

DESCENT

Set the thrust to IDLE

CLEAN				
		Above 66 t	66 t – 56 t	Below 56 t
FL	Speed	Pitch (°)/Thrust (% N1)		
Above FL 320	M 0.76	-0.5/IDLE	-1.0/IDLE	-2.0/IDLE
FL 320 - FL 200	275 kts	-0.5/IDLE	-1.0/IDLE	-2.0/IDLE
FL 200 - FL 100	250 kts	1.0/IDLE	0.0/IDLE	-1.0/IDLE
Below FL 100	250 kts	0.5/IDLE	-0.5/IDLE	-2.0/IDLE
Below FL 100	G-DOT	1.5/IDLE	2.0/IDLE	2.0/IDLE

R
UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

INITIAL AND INTERMEDIATE APPROACH IN LEVEL FLIGHT

R
R
The approach phase between Green Dot speed (clean configuration) and the landing configuration (CONF 3), is flown in level flight.

LANDING GEAR UP IN LEVEL FLIGHT				
		Above 81 t	81 t - 68 t	Below 68 t
CONF	Speed (kts)	Pitch (°)/Thrust (% N1)		
0	G-DOT	5.0/64.4	5.0/60.4	5.0/55.2
1	S	7.0/66.5	7.0/62.3	7.0/57.2
1+F (a)	S	3.0/67.9	3.0/63.4	3.0/58.5
2	F	6.5/69.2	6.5/64.8	6.5/59.8
LANDING GEAR DOWN IN LEVEL FLIGHT (EXPECT GRVTY EXTENSION)				
3	F	4.0/75.9	4.0/71.7	4.0/66.0

(a) Due to the fact that the speed is unreliable, the SFCC may select the 1+F configuration in approach, instead of 1.

FINAL APPROACH AT STANDARD - 3° DESCENT FLIGHT PATH

LANDING GEAR DOWN				
		Above 81 t	81 t - 68 t	Below 68 t
CONF	Speed (kts)	Pitch (°)/Thrust (% N1)		
3	VLS + 10	1.5/60.4	1.5/55.7	1.0/50.5

Flying technique to stabilize speed :

– Adjust pitch in order to fly the required flight path.
– When target pitch is reached, flying intended flight path, adjust thrust to target.
  · If the aircraft pitch tends to increase, aircraft is slow, then increase thrust ;
  · If the aircraft pitch tends to decrease, aircraft is fast, then decrease thrust.

R # UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

INITIAL AND INTERMEDIATE APPROACH IN LEVEL FLIGHT

The approach phase between Green Dot speed (clean
R configuration) and the landing configuration (CONF 3), is flown in
R level flight.

LANDING GEAR UP IN LEVEL FLIGHT				
		Above 67 t	67 t - 57 t	Below 57 t
CONF	Speed (kts)	Pitch (°)/Thrust (% N1)		
0	G-DOT	5.0/58.7	5.0/54.4	5.5/50.0
1	S	7.5/60.3	7.5/56.0	7.5/51.2
1+F (a)	S	4.5/61.3	4.5/57.2	4.5/52.3
2	F	8.5/62.2	8.5/58.4	8.5/53.0
LANDING GEAR DOWN IN LEVEL FLIGHT (EXPECT GRVTY EXTENSION)				
3	F	7.0/67.7	7.0/63.3	7.5/58.6

(a) Due to the fact that the speed is unreliable, the SFCC may select the 1+F configuration in approach, instead of 1.

FINAL APPROACH AT STANDARD - 3° DESCENT FLIGHT PATH

LANDING GEAR DOWN				
		Above 67 t	67 t - 57 t	Below 57 t
CONF	Speed (kts)	Pitch (°)/Thrust (% N1)		
3	VLS + 10	4.0/49.7	4.0/45.8	4.0/42.1

Flying technique to stabilize speed :

– Adjust pitch in order to fly the required flight path.
– When target pitch is reached, flying intended flight path, adjust thrust to target.
  · If the aircraft pitch tends to increase, aircraft is slow, then increase thrust ;
  · If the aircraft pitch tends to decrease, aircraft is fast, then decrease thrust.

R # UNRELIABLE SPEED INDIC/ADR CHECK PROC (CONT'D)

INITIAL AND INTERMEDIATE APPROACH IN LEVEL FLIGHT

R The approach phase between Green Dot speed (clean configuration) and the landing configuration (CONF 3), is flown in
R level flight.

LANDING GEAR UP IN LEVEL FLIGHT				
		Above 66 t	66 t - 56 t	Below 56 t
CONF	Speed (kts)	Pitch (°)/Thrust (% N1)		
0	G-DOT	5.0/58.1	5.5/53.9	5.5/49.5
1	S	7.5/60.2	7.0/55.8	7.5/51.0
1+F (a)	S	3.5/60.6	3.5/56.4	3.5/51.5
2	F	8.5/61.8	8.5/57.7	8.5/52.4
LANDING GEAR DOWN IN LEVEL FLIGHT (EXPECT GRVTY EXTENSION)				
3	F	7.5/67.1	7.0/62.8	7.0/58.0

(a) Due to the fact that the speed is unreliable, the SFCC may select the 1+F configuration in approach, instead of 1.

FINAL APPROACH AT STANDARD - 3° DESCENT FLIGHT PATH

LANDING GEAR DOWN				
		Above 66 t	66 t - 56 t	Below 56 t
CONF	Speed (kts)	Pitch (°)/Thrust (% N1)		
3	VLS + 10	5.0/49.0	4.5/45.4	4.5/41.9

Flying technique to stabilize speed :

– Adjust pitch in order to fly the required flight path.
– When target pitch is reached, flying intended flight path, adjust thrust to target.
  · If the aircraft pitch tends to increase, aircraft is slow, then increase thrust ;
  · If the aircraft pitch tends to decrease, aircraft is fast, then decrease thrust.

AIR BLEED 1(2) OFF

One engine bleed is switched off with no fault.

Crew awareness.

AIR ENG BLEED NOT CLSD

Engine bleed valve fails to close :

– during engine start or when APU BLEED is selected on.

– at engine shutdown or when APU BLEED is selected OFF with engine not running.

– ENG BLEED . . . . OFF

Note : The warning may be triggered
– after engine shutdown, or
– after APU BLEED is selected OFF with engine not running
due to residual pressure between the HP or IP valves and the engine bleed valve.
Select the ENG BLEED pushbutton OFF then on. If the warning disappears, no maintenance action is due.

STATUS

ONE PACK ONLY IF WAI ON

INOP SYS
ENG 1(2) BLEED

AIR ENG 1(2) BLEED ABNORM PR

● **If wing anti-ice is on and both packs are on :**

– PACK (affected) . . . . OFF

One pack must be closed when the pilot is using wing anti-ice because of precooler performance.

– X BLEED . . . . OPEN

STATUS

ONE PACK ONLY IF WAI ON

INOP SYS
ENG 1(2) BLEED
PACK 1(2) (if closed)

AIR ENG 1(2) BLEED FAULT

– ENG BLEED affected (if not automatically closed) .... OFF
  · *With the ENG BLEED pushbutton switch on, the FAULT light remains on.*
  · *With the ENG BLEED pushbutton switch OFF, the FAULT light goes out when the failure*
R *(overheat or overpressure) disappears.*

● **If wing anti-ice is on and both packs are on** :
  – PACK affected .... OFF
    One pack must be closed when the pilot is using wing anti-ice because of precooler perfomance.

– X BLEED .... OPEN

STATUS

ONE PACK ONLY IF WAI ON

INOP SYS
ENG 1(2) BLEED
PACK 1(2)
(if closed)

AIR BLEED 1(2) OFF

One engine bleed is switched off, with no fault.

Crew awareness.

AIR ENG 1(2) BLEED NOT CLSD

The engine bleed valve fails to close :

– During engine start, or when the APU BLEED is selected on.

– At engine shutdown, or when the APU BLEED is selected OFF, with the engine not running.

– ENG BLEED . . . . OFF

Note : The warning may be triggered :

– After engine shutdown, or

– After the APU BLEED is selected OFF, with the engine not running,

due to residual pressure between the HP or IP valves and the engine bleed valve.

Set the ENG BLEED pushbutton OFF, then on. If the warning disappears, no maintenance action is due.

STATUS

ONE PACK ONLY IF WAI ON

INOP SYS

ENG 1(2) BLEED

AIR ENG 1(2) BLEED ABNORM PR

● **If wing anti-ice is on, and both packs are on :**

– PACK (affected) . . . . OFF

One pack must be closed, when the pilot is using wing anti-ice, due to precooler performance.

– X BLEED . . . . OPEN

● **If wing anti-ice is off, and both packs are on :**

– ECON FLOW . . . . ON

– AFT CRG HOT AIR . . . . OFF

The ECON FLOW must be selected ON, and the aft cargo heat must be selected off, due to precooler performance.

STATUS

ONE PACK ONLY IF WAI ON

INOP SYS

ENG 1(2) BLEED

PACK 1(2)

(if closed)

AIR ENG 1(2) BLEED FAULT

– ENG BLEED affected (if not automatically closed) .... OFF
· *With the ENG BLEED pushbutton on, the FAULT light remains on.*
· *With the ENG BLEED pushbutton OFF, the FAULT light goes off when the failure (overheat or overpressure) disappears.*

● **If wing anti-ice is on, and both packs are on :**
– PACK affected .... OFF
One pack must be closed, when the pilot is using wing anti-ice, due to precooler performance.

– X BLEED .... OPEN

● **If wing anti-ice is off, and both packs are on :**
– ECON FLOW .... ON
– AFT CRG HOT AIR .... OFF
The ECON FLOW must be selected ON and the aft cargo heat must be selected off, due to precooler performance.

STATUS

ONE PACK ONLY IF WAI ON

INOP SYS
ENG 1(2) BLEED
PACK 1(2)
(if closed)

AIR DUAL BLEED FAULT

■ **If ENG 1 BLEED was lost due to a :**

LEAK on side 1
ENG 1 FIRE
Start Air Valve 1 failed open.

– DESCENT TO FL100/MEA .... INITIATE

Descend rapidly to FL100/MEA, to prevent excessive cabin altitude.

AVOID ICING CONDITIONS

■ **If ENG 2 BLEED was lost due to a :**

LEAK on side 2
ENG 2 FIRE
Start Air Valve 2 failed open.

– X BLEED .... CHECK CLOSED
– DESCENT TO FL225/MEA .... INITIATE

Descend rapidly to FL225, to recover the bleed supply from the APU.

– APU .... START

Start the APU during the descent.

● **AT, OR BELOW, FL225 :**

– WING A.ICE .... OFF

APU BLEED must not be used for wing anti-ice.

– APU BLEED .... ON

MAX FL225
AVOID ICING CONDITIONS

■ **In all other cases :**

– DESCENT .... INITIATE

Descend rapidly to FL225, so that the bleed supply may be supplied by the APU, if the bleed system recovery is not successful.

● **If both packs are available :**

If both packs are operative, it can be suspected that the second bleed system failed due to excessive demand. Recovery of the second failed engine bleed may be attempted.

■ **If ENG 1 BLEED is lost first :**

– PACK 1 .... OFF
– ENGINE 2 BLEED .... ON

■ **If ENG 2 BLEED is lost first :**

– PACK 2 .... OFF
– ENGINE 1 BLEED .... ON

⇩

AIR DUAL BLEED FAULT (CONT'D)

- **If engine bleed recovery was not successful, or if one pack is inoperative :**
  - X BLEED .... CHECK OPEN
  - DESCENT TO FL225/MEA .... CONTINUE
    Descend rapidly to FL225, to recover the bleed supply from the APU.
  - APU .... START
    Start the APU during the descent.
  - **AT, OR BELOW, FL225 :**
    - WING A.ICE .... OFF
      APU BLEED must not be used for wing anti-ice.
    - APU BLEED .... ON

    MAX FL225
    AVOID ICING CONDITIONS

AIR L (R) WING or ENG 1(2) BLEED LEAK

- ENG BLEED affected (if not automatically closed) .... OFF
  - *With the ENG BLEED pushbutton switch on, the FAULT light remains on.*
  - *With the ENG BLEED pushbutton switch off, the FAULT light goes off when the overheat disappears.*
- **If left wing or bleed leak :**
  - APU BLEED (if not closed) .... OFF
- X BLEED (if not closed) .... SHUT
- WING ANTI-ICE .... OFF
- AVOID ICING CONDITIONS

STATUS

AVOID ICING CONDITIONS

INOP SYS
WING A.ICE
ENG 1(2) BLEED
PACK 1(2)

AIR DUAL BLEED FAULT

■ **<u>If ENG 1 BLEED was lost due to a :</u>**

LEAK on side 1
ENG 1 FIRE
Start Air Valve 1 failed open.

– DESCENT TO FL100/MEA . . . . INITIATE

Descend rapidly to FL100/MEA, to prevent excessive cabin altitude.

AVOID ICING CONDITIONS

■ **<u>If ENG 2 BLEED was lost due to a :</u>**

LEAK on side 2
ENG 2 FIRE
Start Air Valve 2 failed open.

– X BLEED . . . . CHECK CLOSED

– DESCENT TO FL225/MEA . . . . INITIATE

Descend rapidly to FL225, to recover the bleed supply from the APU.

– APU . . . . START

Start the APU during the descent.

● **AT, OR BELOW, FL225 :**

– WING A.ICE . . . . OFF

APU BLEED must not be used for wing anti-ice.

– APU BLEED . . . . ON

MAX FL225
AVOID ICING CONDITIONS

■ **<u>In all other cases :</u>**

– DESCENT . . . . INITIATE

Descend rapidly to FL225, so that the bleed supply may be supplied by the APU, if the bleed system recovery is not successful.

● **If both packs are available :**

If both packs are operative, it can be suspected that the second bleed system failed due to excessive demand. Recovery of the second failed engine bleed may be attempted.

■ **<u>If ENG 1 BLEED is lost first :</u>**

– PACK 1 . . . . OFF

– ENGINE 2 BLEED . . . . ON

■ **<u>If ENG 2 BLEED is lost first :</u>**

– PACK 2 . . . . OFF

– ENGINE 1 BLEED . . . . ON

AIR DUAL BLEED FAULT (CONT'D)

- **If engine bleed recovery was not successful, or if one pack is inoperative** :
  - – X BLEED . . . . CHECK OPEN
  - – DESCENT TO FL225/MEA . . . . CONTINUE
    Descent rapidly to FL225, to recover the bleed supply from the APU.
  - – APU . . . . START
    Start the APU during the descent.
  - **AT, OR BELOW, FL225** :
    - – WING A.ICE . . . . OFF
      APU BLEED must not be used for wing anti-ice.
    - – APU BLEED . . . . ON

  MAX FL225
  AVOID ICING CONDITIONS

AIR L (R) WING or ENG 1(2) BLEED LEAK

– ENG BLEED affected (if not automatically closed) . . . . OFF
- *With the ENG BLEED pushbutton switch on, the FAULT light remains on.*
- *With the ENG BLEED pushbutton switch off, the FAULT light goes off when the overheat disappears.*

- **If left wing or bleed leak** :
  - – APU BLEED (if not closed) . . . . OFF

– X BLEED (if not closed) . . . . SHUT
– WING ANTI-ICE . . . . OFF
– AVOID ICING CONDITIONS

STATUS

	INOP SYS
AVOID ICING CONDITIONS	WING A.ICE
● IF A/C ICING SEVERE	ENG 1(2) BLEED
– MIN SPD . . . . ALPHA PROT	PACK 1(2)

AIR X BLEED FAULT

– X BLEED .... MAN CTL

Select OPEN, when the APU BLEED pushbutton is ON, or for engine start, or when WING
R *ANTI-ICE is ON and one bleed is inoperative.*
Select SHUT in other cases.

● **If manual opening inoperative, and only one bleed available:**

– WING ANTI ICE .... OFF

AVOID ICING CONDITIONS

● **If manual opening inoperative :**

AVOID ICING CONDITIONS

R X BLEED MAN CTL

STATUS

INOP SYS

X BLEED
WING A. ICE

AIR APU BLEED LEAK

– APU BLEED (if not closed) .... OFF

· *With the APU BLEED pushbutton ON, the FAULT light remains on.*
· *With the APU BLEED pushbutton off, the FAULT light goes off when the overheat disappears.*

STATUS

INOP SYS

APU BLEED

AIR APU BLEED FAULT

The valve position disagrees with the commanded position, when the APU is running.

Crew awareness.

STATUS

INOP SYS

APU BLEED
(if valve closed)

AIR ENG HP VALVE FAULT

Crew awareness.

STATUS

AIR PRESS LOW AT IDLE

AIR L (R) WNG LEAK DET FAULT

Crew awareness.

STATUS

INOP SYS
L(R) LEAK DET

BLEED MONITORING FAULT

Crew awareness.

STATUS

INOP SYS
BMC 1 + 2

AIR X BLEED FAULT

– X BLEED . . . . MAN CTL

Select OPEN, when the APU BLEED pushbutton is ON, or for engine start, or when WING
R *ANTI-ICE is ON and one bleed is inoperative.*
Select SHUT in other cases.

● **If manual opening inoperative, and only one bleed available:**

– WING ANTI ICE . . . . OFF

AVOID ICING CONDITIONS

● **If manual opening inoperative :**

AVOID ICING CONDITIONS

R X BLEED MAN CTL

STATUS

INOP SYS

X BLEED
WING A. ICE

AIR APU BLEED LEAK

Note : This warning may spuriously appear after electrical transients. In that case, an APU bleed reset may be attempted by switching the APU BLEED pushbutton OFF, then on.

– APU BLEED (if not closed) . . . . OFF

· *With the APU BLEED pushbutton ON, the FAULT light remains on.*
· *With the APU BLEED pushbutton off, the FAULT light goes off, when the overheat disappears.*

STATUS

INOP SYS

APU BLEED

AIR APU BLEED FAULT

The valve position disagrees with the commanded position, when the APU is running.

Crew awareness.

Note : Switching the APU BLEED pushbutton once may allow APU bleed recovery.

STATUS

INOP SYS

APU BLEED
(if valve closed)

AIR ENG HP VALVE FAULT

Crew awareness.

STATUS

AIR PRESS LOW AT IDLE

AIR L (R) WNG LEAK DET FAULT

Crew awareness.

STATUS

INOP SYS
L(R) LEAK DET

BLEED MONITORING FAULT

Crew awareness.

STATUS

INOP SYS
BMC 1 + 2

AIR X BLEED FAULT

– X BLEED .... MAN CTL
Select OPEN, when the APU BLEED pushbutton is ON, or for engine start, or when WING
R *ANTI-ICE is ON and one bleed is inoperative.*
Select SHUT in other cases.

● **If manual opening inoperative, and only one bleed available:**
– WING ANTI ICE .... OFF
AVOID ICING CONDITIONS

● **If manual opening inoperative :**
AVOID ICING CONDITIONS
R X BLEED MAN CTL

STATUS

INOP SYS
X BLEED
WING A. ICE

AIR APU BLEED LEAK

Note : This warning may spuriously appear after electrical transients. In that case, an APU bleed reset may be attempted by switching the APU BLEED pushbutton OFF, then on.

– APU BLEED (if not closed) .... OFF
- *With the APU BLEED pushbutton ON, the FAULT light remains on.*
- *With the APU BLEED pushbutton off, the FAULT light goes off, when the overheat disappears.*

STATUS

INOP SYS
APU BLEED

AIR APU BLEED FAULT

The valve position disagrees with the commanded position, when the APU is running.
Crew awareness.
Note : Switching the APU BLEED pushbutton once may allow APU bleed recovery.

STATUS

INOP SYS
APU BLEED
(if valve closed)

AIR ENG 1(2) HP VALVE FAULT

Crew awareness.

STATUS

AIR PRESS LOW AT IDLE

AIR ENG 1(2) LEAK DET FAULT

Crew awareness.

STATUS

INOP SYS
ENG 1 (2) LK DET

AIR L (R) WNG LEAK DET FAULT

Crew awareness.

STATUS

INOP SYS
L(R) WNG LK DET

BLEED MONIT SYS 1(2) FAULT

Crew awareness.

STATUS

INOP SYS
BMC 1 (2)

BLEED MONITORING FAULT

Crew awareness.

STATUS

INOP SYS
BMC 1 + 2

AIR X BLEED FAULT

– X BLEED .... MAN CTL

Select OPEN, when the APU BLEED pushbutton is ON, or for engine start, or when WING
R *ANTI-ICE is ON with one bleed inoperative.*
Select SHUT in other cases.

● **If manual opening inoperative, and only one bleed available**:
– WING ANTI ICE .... OFF
AVOID ICING CONDITIONS

STATUS

● **If manual opening inoperative, and only one bleed available :**
AVOID ICING CONDITIONS
● **IF A/C ICING SEVERE** :
– MIN SPD .... ALPHA PROT
X BLEED MAN CTL

INOP SYS
WING A. ICE
X BLEED

AIR APU BLEED LEAK

– APU BLEED (if not closed) .... OFF

· *With the APU BLEED pushbutton ON, the FAULT light remains on.*
· *With the APU BLEED pushbutton off, the FAULT light goes off, when the overheat disappears.*

STATUS

INOP SYS
APU BLEED

AIR APU BLEED FAULT

The valve position disagrees with the commanded position, when the APU is running.

Crew awareness.

STATUS

INOP SYS
APU BLEED
(if valve closed)

AIR ENG HP VALVE FAULT

Crew awareness.

STATUS

AIR PRESS LOW AT IDLE

AIR L (R) WNG LEAK DET FAULT

Crew awareness.

STATUS

INOP SYS
L(R) LEAK DET

BLEED MONITORING FAULT

Crew awareness.

STATUS

INOP SYS
BMC 1 + 2

AIR X BLEED FAULT

– X BLEED . . . . MAN CTL

Select OPEN, when the APU BLEED pushbutton is ON, or for engine start, or when WING
R *ANTI-ICE is on with one bleed inoperative.*
Select SHUT in other cases.

● **If manual opening inoperative, and only one bleed available:**
– WING ANTI ICE . . . . OFF
AVOID ICING CONDITIONS

STATUS

● **If manual opening inoperative, and only one bleed available :**
AVOID ICING CONDITIONS
● **IF A/C ICING SEVERE :**
– MIN SPD . . . . ALPHA PROT
X BLEED MAN CTL

INOP SYS
WING A. ICE
X BLEED

AIR APU BLEED LEAK

Note : This warning may spuriously appear after electrical transients. In that case, an APU bleed reset may be attempted by switching the APU BLEED pushbutton OFF, than ON.

– APU BLEED (if not closed) . . . . OFF
· *With the APU BLEED pushbutton ON, the FAULT light remains on.*
· *With the APU BLEED pushbutton off, the FAULT light goes off, when the overheat disappears.*

STATUS

INOP SYS
APU BLEED

AIR APU BLEED FAULT

The valve position disagrees with the commanded position, when the APU is running.
Crew awareness.
Note : Switching the APU BLEED pushbutton once may allow APU bleed recovery.

STATUS

INOP SYS
APU BLEED
(if valve closed)

AIR ENG 1(2) HP VALVE FAULT

Crew awareness.

STATUS

AIR PRESS LOW AT IDLE

AIR ENG 1(2) LEAK DET FAULT

Crew awareness.

STATUS

INOP SYS
ENG 1 (2) LK DET

AIR L (R) WNG LEAK DET FAULT

Crew awareness.

STATUS

INOP SYS
L(R) WNG LK DET

BLEED MONIT SYS 1(2) FAULT

Crew awareness.

STATUS

INOP SYS
BMC 1 (2)

BLEED MONITORING FAULT

Crew awareness.

STATUS

INOP SYS
BMC 1 + 2

<u>AIR</u> ENG 1(2) BLEED LO TEMP

In flight, engine bleed temperature is too low for correct wing de-icing.

– A/THR . . . . OFF
– THR LEVER (affected engine) . . . . ADVANCE
R *The thrust lever of the affected engine must be advanced, with the autothrust OFF.*
R *Low bleed temperature may be due to low outside air temperature. Therefore, increasing*
R *engine thrust may increase bleed temperature and clear the ECAM caution.*

● **IF UNSUCCESSFUL and opposite bleed available** :
– X BLEED . . . . OPEN
– ENG BLEED (affected) . . . . OFF
– associated PACK (if opposite pack ON) . . . . OFF
One pack must be closed, when the pilot is using wing anti-ice, due to precooler performance.

STATUS

ONE PACK ONLY IF WAI ON

<u>INOP SYS</u>
ENG 1(2) BLEED
PACK 1(2)
(if selected OFF)

● **IF UNSUCCESSFUL and opposite bleed not available** :
– WING A. ICE . . . . OFF
AVOID ICING CONDITIONS

STATUS

AVOID ICING CONDITIONS

<u>AIR</u> ENG 1 + 2 BLEED LO TEMP

– A/THR . . . . OFF
– THR LEVERS . . . . ADVANCE
R *The thrust lever of the affected engine must be advanced, with the autothrust OFF.*
R *Low bleed temperature may be due to low outside air temperature. Therefore, increasing*
R *engine thrust may increase bleed temperature and clear the ECAM caution.*

● **IF UNSUCCESSFUL** :
– WING A. ICE . . . . OFF
AVOID ICING CONDITIONS

STATUS

AVOID ICING CONDITIONS

AIR ENG 1(2) BLEED LO TEMP

In flight, ENG BLEED temperature is too low for correct wing de-icing.

- A/THR .... OFF
- THR LEVER (affected engine) .... ADVANCE

R *The thrust lever of the affected engine must be advanced, with the autothrust OFF.*
R *Low bleed temperature may be due to low outside air temperature. Therefore, increasing*
R *engine thrust may increase bleed temperature and clear the ECAM caution.*

● **IF UNSUCCESSFUL and opposite bleed available :**

- X BLEED .... OPEN
- ENG BLEED (affected) .... OFF
- associated PACK (if opposite pack ON) .... OFF

One pack must be closed, when the pilot is using wing anti-ice, due to precooler performance.

STATUS

ONE PACK ONLY IF WAI ON

INOP SYS
ENG 1(2) BLEED
PACK 1(2)
(if selected OFF)

● **IF UNSUCCESSFUL and opposite bleed not available :**

- WING A. ICE .... OFF

AVOID ICING CONDITIONS

STATUS

AVOID ICING CONDITIONS

● **IF A/C ICING SEVERE :**

- MIN SPD .... ALPHA PROT

AIR ENG 1 + 2 BLEED LO TEMP

- A/THR .... OFF
- THR LEVERS .... ADVANCE

R *The thrust lever of the affected engine must be advanced, with the autothrust OFF.*
R *Low bleed temperature may be due to low outside air temperature. Therefore, increasing*
R *engine thrust may increase bleed temperature and clear the ECAM caution.*

● **IF UNSUCCESSFUL :**

- WING A. ICE .... OFF

AVOID ICING CONDITIONS

STATUS

AVOID ICING CONDITIONS

● **IF A/C ICING SEVERE :**

- MIN SPD .... ALPHA PROT

R

<u>DATALINK</u> ATSU FAULT

Crew awareness.

ATSU INIT FAULT

Displayed, in case of failure upon ATSU initialization. Refer to 3.04.46, for ATSU initialization.

STATUS

<u>INOP SYS</u>

ATSU
DATA COMPANY

<u>DATALINK</u> COMPANY FAULT

Crew awareness.

STATUS

<u>INOP SYS</u>

DATA COMPANY

DATALINK ATSU FAULT

Crew awareness.
ATSU INIT FAULT
Displayed, in case of failure at ATSU initialization. Refer to 3.04.46, for ATSU initialization.

STATUS

ATC COM VOICE ONLY

INOP SYS
ATSU
DATALINK ATC
DATA COMPANY

DATALINK ATC FAULT

Crew awareness.
ATC COM VOICE ONLY

STATUS

ATC COM VOICE ONLY

INOP SYS
DATALINK ATC

DATALINK COMPANY FAULT

Crew awareness.

STATUS

INOP SYS
DATA COMPANY

APU AUTO (EMER) SHUT DOWN

APU EMER SHUT DOWN is triggered if :
- *an APU fire is detected on ground, or*
- *the ground crew shuts down the APU manually by pushing the APU SHUT OFF pushbutton on the nose gear interphone panel, or*
- *the flight crew presses the APU FIRE pushbutton in the cockpit.*

– MASTER SW .... OFF

STATUS

INOP SYS
APU

DOORS (L/R/FWD/AFT) AVIONICS

■ **On the ground**

Crew awareness.

■ **In flight**

No crew action required as long as cabin pressure is normal.

● **IF ABN CAB V/S :**

– MAX FL 100/MEA

Limit maximum flight level to FL100 or MEA or minimum obstacle clearance altitude.

Avionics doors are of plug type. Therefore full depressurization is not recommended.

STATUS

MAX FL 100/MEA

DOORS CABIN/EMER EXIT/CARGO

Crew may confirm a cabin door warning by checking the visual indicator on the door.

■ **On the ground**

Crew awareness.

Crew may confirm a cargo door warning by removing the detachable inspection panel on the base of cargo door.

■ **In flight**

No crew action required as long as cabin pressure is normal.

● **IF ABN CAB V/S :**

– MAX FL 100/MEA

Limit maximum flight level to FL100 or MEA or minimum obstacle clearance altitude.

If door warning is accompanied by abnormal increase of cabin altitude, flight crew must reduce cabin ΔP and altitude by descending.

STATUS

MAX FL 100/MEA

ENG 1(2) FUEL FILTER CLOG

Crew awareness.
Maintenance action is due.

ENG 1(2) REVERSER FAULT

LAND ASAP

● **If reverser position fault with reverser pressurized :**
ENG 1(2) AT IDLE
Thrust of the affected engine is locked at idle.
– THR LEVER 1(2) .... IDLE
Set thrust lever of affected engine at idle.

STATUS

INOP SYS
REVERSER 1(2)

ENG 1(2) REV PRESSURIZED

Reverse thrust system is pressurized with reverser doors stowed and locked.
– THR LEVER 1(2) .... IDLE
If flight conditions permit, reduce the thrust of the affected engine to IDLE as a precautionary measure.

ENG 1(2) EIU FAULT

The data bus between the EIU and ECU fails. Therefore :
· affected engine start is lost
· autothrust control is lost
· thrust reverser on the affected engine is lost
· when idle is selected, only approach idle is available
· bleed corrections on N1 limit are lost (See BLEED STATUS FAULT procedure).
Crew awareness.

STATUS

ENG 1(2) APPR IDLE ONLY
Minimum idle is lost.

INOP SYS
A/THR
REVERSER 1(2)
ENG 1(2) START

ENG VIB SYS FAULT

Crew awareness.

ENG 1(2) OIL LO PR

● **IF OIL PR < 13 PSI :**

Check oil pressure indication on ECAM ENG page.

– THR LEVER (of affected engine) .... IDLE
– ENG MASTER (of affected engines) .... OFF

ENG 1(2) **SHUT DOWN**

Carry out after ENG SHUT DOWN procedure.

Note : If oil pressure is low (< 13 psi) is indicated only on ECAM ENG page (red indication) without the ENG OIL LO PR warning, it can be assumed, that the oil pressure transducer is faulty. Flight crew may continue engine operation while monitoring other engine parameters.

ENG 1(2) OIL HI TEMP

Oil temperature between 140° C and 155° C for more than 15 minutes or oil temperature above 155° C.

– THR LEVER (of affected engine) .... IDLE
– ENG MASTER (of affected engine) .... OFF

ENG 1(2) **SHUT DOWN**

Apply after ENG SHUT DOWN procedure.

ENG 1(2) OIL FILTER CLOG

Crew awareness.

R *Maintenance action is due, except if the caution is temporarily displayed during cold engine*
R *start with engine oil temperature lower than 40°C.*

ENG 1(2) N1/N2/EGT OVERLIMIT

■ **Max pointer indication :**

EGT between 915 and 950°C (except during takeoff, alpha floor activation, or reverse selected), or EGT between 950 and 990° C, or
N1 between 104.0 % and 105.8 % or
N2 between 105.0 % and 105.8 %.

– THR LEVER (of affected engine) . . . . BELOW LIMIT

Normal operation may be resumed and maintained, until the next landing.
Report in the maintenance log.

■ **Max pointer indication :**

EGT above 990° C, or
N1 above 105.8 %, or
N2 above 105.8 %.

– THR LEVER (of affected engine) . . . . IDLE
– ENG MASTER (of affected engine) . . . . OFF

If conditions do not permit engine shutdown, land ASAP, using the minimum thrust required to sustain safe flight.

ENG 1(2) **SHUT DOWN**

Apply the after ENG SHUT DOWN procedure.

R

ENG REV SET

Reverse thrust has been selected in flight.

– THR LEVER (affected engine) . . . . FWD THR

ENG 1(2) REVERSE UNLOCKED

One or more reverser doors are not stowed.
If N1 is above 70%, the auto-restow function is inhibited in flight and on ground.

■ **On ground :**

ENG 1(2) AT IDLE
Only displayed, if the FADEC automatically sets the engine at idle (i.e. when 4 reverser doors are not stowed, or 1, 2 or 3 reverser doors are not stowed with the reverser pressurized).
– THR LEVER (affected engine) . . . . IDLE
– ENG MASTER (affected engine) . . . . OFF

■ **In flight :**

R LAND ASAP
ENG 1(2) AT IDLE
Only displayed, if the engine is automatically set at idle.
– THR LEVER (affected engine) . . . . IDLE
MAX SPEED 300/.78

● **IF BUFFET :**
The warning alone, without buffet or vibration, may be a false warning.
MAX SPEED . . . . 240 KT
– ENG MASTER (affected engine) . . . . OFF

● **If reverser is actually deployed :**
– RUD TRIM . . . . FULL R (L)
– CONTROL HDG WITH ROLL

ENG 1(2) **SHUT DOWN**

Apply the after ENG SHUT DOWN procedure.

ENG 1(2) STALL

This warning is triggered for an N2 between 50 % and IDLE.

A stall may be indicated by varying degrees of abnormal engine noises, accompanied by flame from the engine exhaust (and possibly from the engine inlet in severe case), fluctuating performance parameters, sluggish or no thrust lever response, high EGT and/or a rapid EGT rise when thrust lever is advanced. Engine stalls must be reported for maintenance action.

– ENG MASTER (affected engine) . . . . OFF

ENG 1(2) **SHUT DOWN**

Apply after ENG SHUT DOWN procedure.
Engine restart at crew discretion.

If the N2 is above IDLE, this warning is not displayed on the ECAM. Consequently, if the crew detects a stall, it must apply the following procedure :

■ **On the ground :**

– ENG MASTER (affected engine) . . . . OFF

■ **In flight :**

– THR LEVER (affected engine) . . . . IDLE
– ENG PARAMETERS (affected engine) . . . . CHECK

● **Abnormal :**

– ENG MASTER (affected engine) . . . . OFF

ENG 1(2) **SHUT DOWN**

Apply after ENG SHUT DOWN procedure.
Engine restart at crew discretion.

● **Normal :**

– ENG A. ICE (affected engine) . . . . ON
– WING A. ICE . . . . ON

Operation of engine and wing anti ice will increase the stall margin, but EGT will increase accordingly.

– THR LEVER (affected engine) . . . . . . SLOWLY ADVANCE

● **If stall recurs :**

– THR LEVER (affected engine) . . . . REDUCE

Reduce thrust and operate below the stall threshold.

● **If stall does not recur :**

Continue engine operation.

ENG 1(2) START VALVE FAULT

■ **START VALVE NOT CLOSED :**

Remove all bleed sources supplying the faulty start valve.
- APU BLEED (if ENG 1 affected) . . . . OFF
- X BLEED . . . . SHUT

● **In flight :**
- ENG BLEED (affected side) . . . . OFF

● **On the ground :**
- MAN START (if man start performed) . . . . OFF
- ENG MASTER (affected side) . . . . OFF

On the ground, consider application of "START VALVE MANUAL OPERATION" procedure.

■ **START VALVE NOT OPEN :**

● **If opposite engine running :**
- X BLEED . . . . ON

● **If APU AVAIL below FL 200 :**
- APU BLEED . . . . ON

● **If UNSUCCESSFUL :**
- MAN START (if man start performed) . . . . OFF
- ENG MASTER (affected) (if auto start performed) . . OFF

MAN START procedure is useless since in both cases, the start valve is controlled by FADEC.
On the ground, consider application of "START VALVE MANUAL OPERATION" procedure.

ENG 1(2) HP FUEL VALVE

■ **Associated engine below idle :**

HP FUEL VALVE NOT OPEN.
Failure of HP fuel valve.

● **On the ground :**
- MAN START (if man start performed) . . . . OFF
- ENG MASTER (affected) . . . . OFF

■ **Associated engine at or above idle :**

Failure of HP fuel valve position switch.
HP FUEL POS SWT FAULT.

ENG 1(2) REV SWITCH FAULT

Crew awareness.

ENG 1(2) START FAULT

■ ENG 1(2) IGNITION FAULT

(No light up within the 18 seconds following ignition start).

● **In flight** :

– ENG MASTER (affected) . . . . OFF

Wait 30 seconds before attempting a new start (to drain the engine).

● **On the ground (auto start)** :

R *In case of no light up, the FADEC can perform one additional start attempt. After each unsuccessful start attempt, a dry crank phase is automatically performed.*

R *The following message will be displayed on the ECAM :*

R – NEW START IN PROGRESS

● **When the final dry cranking process is finished** :

– ENG MASTER (affected) . . . . OFF

Following starter cooldown, the pilot must decide whether to attempt auto or manual start, or to report the nostart condition for appropriate maintenance action.

● **On the ground (manual start)** :

R – MAN START (affected) . . . . OFF

R – ENG MASTER (affected) . . . . OFF

– MODE SEL . . . . CRANK

R – MAN START (affected) . . . . ON

Note : The last two lines are not displayed on the ECAM.
Dry crank the engine for 30 seconds. The start valve automatically reopens when N2 is below 20 %.
The pilot must decide whether to attempt a new start, or to report the no start condition for appropriate maintenance action.

ENG 1(2) START FAULT (CONT'D)

■ ENG 1(2) STALL, ENG 1(2) EGT OVERLIMIT :

● **In flight** :

– ENG MASTER (affected) . . . . OFF

Wait 30 seconds before attempting a new start (to drain the engine).

● **On ground (autostart)** :

If it detects a stall, or a potential EGT overheat, the FADEC will reduce the fuel schedule in stages, if necessary, to achieve a normal condition. The following message will be displayed on the ECAM :

– NEW START IN PROGRESS

If a normal condition cannot be achieved, the fuel valve is closed, and the following message is displayed on the ECAM :

– ENG MASTER (affected) . . . . OFF

· The fuel metering valve and starter air valve are automatically closed. Both igniters are turned off.

· Setting ENG MASTER to OFF confirms automatic start abort.

· In case of ENG STALL, consider making a XBLEED start, if pressure is low.

● **On ground (manual start)** :

– MAN START (affected) . . . . OFF

– ENG MASTER (affected) . . . . OFF

– MODE SEL . . . . CRANK

– MAN START (affected) . . . . ON

Note : *The last two lines are not displayed on the ECAM.*
Dry crank the engine for 30 seconds. The start valve automatically reopens when N2 is below 20 %.
The pilot must decide whether to attempt a new start, or to report the no start condition for appropriate maintenance action.

■ STARTER TIME EXCEEDED :

– MAN START (if manual start is performed) . . . . OFF

– ENG MASTER (affected) . . . . OFF

■ LO START AIR PRESS :

– BLEED AIR SUPPLY . . . . CHECK

■ THR LEVER NOT AT IDLE :

– THR LEVER . . . . IDLE

ENG 1(2) LOW N1 (on ground)

No N1 rotation during start.

● **IF CONFIRMED** :

– THR LEVER (affected) . . . . IDLE

– ENG MASTER (affected) . . . . OFF

ENG 1(2) N1 or N2 or EGT or FF DISCREPANCY

There is discrepancy between the value displayed on the ECAM and the real value. The upper ECAM upper displays a CHECK message below the affected indication.

Crew awareness.

Normal indication may be recovered by switching from DMC 1 to DMC 3.

If unsuccessful, and if both thrust levers are at the same position, crosscheck with the opposite parameter.

ENG FLEX TEMP NOT SET

At takeoff, the pilot sets the thrust levers at MCT/FLEX without having entered the flex TO temperature. The FADEC selects MCT thrust.

– THR LEVERS .... TO/GA

ENG 1(2) FADEC ALTERNATOR

Loss of electrical auto supply of either FADEC channel.

Crew awareness.

ENG RELIGHT (in flight)

MAX ALTITUDE .... See below
- ENG MASTER (affected) .... OFF
- THR LEVER (affected) .... Check IDLE
- MAN START pushbutton .... OFF

  Autostart is recommended in flight. Be aware that, unlike the procedure for auto start on the ground, the crew must take appropriate action in case of abn start.
- ENG MODE SEL .... IGN
- X BLEED .... OPEN

  If outside the windmilling start envelope, the FADEC will open the starter valve.
- WING A. ICE (for starter assist) .... OFF
- ENG MASTER (affected) .... ON

R *Engine light-up must be achieved within 30 seconds after the fuel flow increases. Monitor N2. If uncertain about successful relight, move the thrust lever forward and check engine response.*
- ENG PARAMETERS (N2, EGT) .... CHECK

  If the START FAULT-ENG STALL warning is triggered although engine parameters are normal, disregard the warning.

■ **When idle is reached :**
- ENG MODE SEL .... NORM
- TCAS MODE SEL ◁ .... check TA/RA

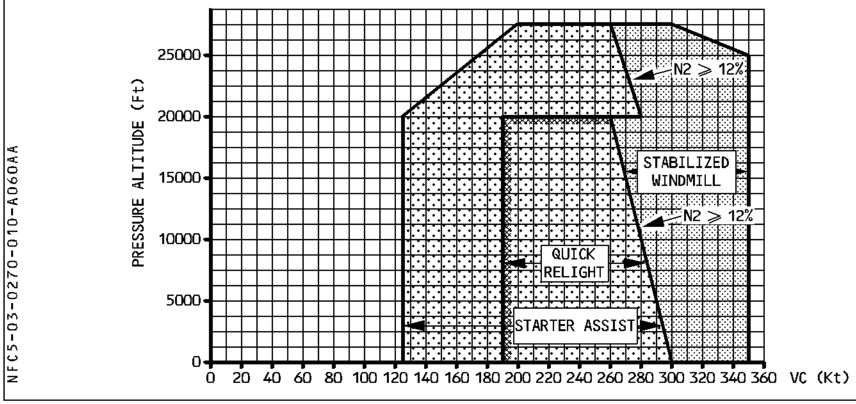
  Check that the selector is at TA/RA since, if the ENG SHUT DOWN procedure has been applied, the TCAS mode selector may have been set to the TA position.
- Affected SYS .... RESTORE

  Restore affected systems, and set the X BLEED selector to AUTO.

■ **If no relight :**
- ENG MASTER (affected) .... OFF

  Wait 30 seconds before attempting a new start (to drain the engine).

R



ENG 1(2) N1 or N2 or EGT or FF DISCREPANCY

There is discrepancy between the value displayed on the ECAM and the real value. The upper ECAM upper displays a CHECK message below the affected indication.

Crew awareness.

Normal indication may be recovered by switching from DMC 1 to DMC 3.

If unsuccessful, and if both thrust levers are at the same position, crosscheck with the opposite parameter.

ENG 1(2) FADEC ALTERNATOR

Loss of electrical auto supply of either FADEC channel.

Crew awareness.

ENG THR LEVERS NOT SET

This caution triggers at takeoff, if there is a disagreement between the position of the thrust levers and the thrust mode selected by the FADECs.

- **If neither FLX temp, nor derate level are set, and if the thrust levers are at CL or FLX-MCT :**
  - THR LEVERS . . . . TOGA
- **If FLX is set, and thrust levers below FLX-MCT :**
  - THR LEVERS . . . . MCT/FLX
- **If derate level is set, and the thrust levers are at TO GA, or below FLX-MCT :**
  - THR LEVERS . . . . MCT/FLX

ENG RELIGHT (in flight)

MAX ALTITUDE .... See below

- ENG MASTER (affected) .... OFF
- THR LEVER (affected) .... Check IDLE
- MAN START pushbutton .... OFF

  Autostart is recommended in flight. Be aware that, unlike the procedure for auto start on the ground, the crew must take appropriate action in case of abn start.
- ENG MODE SEL .... IGN
- X BLEED .... OPEN

  If outside the windmilling start envelope, the FADEC will open the starter valve.
- WING A. ICE (for starter assist) .... OFF
- ENG MASTER (affected) .... ON

R *Engine light-up must be achieved within 30 seconds after the fuel flow increases. Monitor N2. If uncertain about successful relight, move the thrust lever forward and check engine response.*
- ENG PARAMETERS (N2, EGT) .... CHECK

  If the START FAULT-ENG STALL warning is triggered although engine parameters are normal, disregard the warning.

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- TCAS MODE SEL ◁ .... check TA/RA

  Check that the selector is at TA/RA since, if the ENG SHUT DOWN procedure has been applied, the TCAS mode selector may have been set to the TA position.
- Affected SYS .... RESTORE

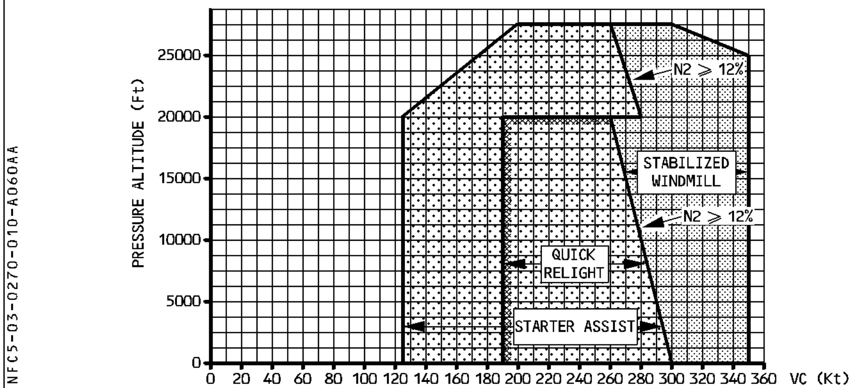
  Restore affected systems, and set the X BLEED selector to AUTO.

■ **If no relight :**

- ENG MASTER (affected) .... OFF

  Wait 30 seconds before attempting a new start (to drain the engine).

R



ENG 1(2) FAIL

An engine flame-out may be recognized by a rapid decrease in EGT, N2, FF, followed by a decrease in N1.
Engine damage may be accompanied by :
– Loud noise,
– Significant increase in aircraft vibrations and/or buffeting,
– Repeated or uncontrollable engine stalls,
– Associated abnormal indications such as hydraulic fluid loss, or no N2 indication.

LAND ASAP

■ **Before takeoff or after landing**

- THR LEVER (affected engine) . . . . IDLE
R - ENG MASTER (affected engine) . . . . OFF

● **IF DAMAGE**

R - ENG FIRE P/B (affected engine) . . . . PUSH
- AGENT 1 . . . . DISCH

● **IF NO DAMAGE**

If conditions permit, do not restart the engine. A new engine start would erase FADEC troubleshooting data.

- ENG (affected) RELIGHT . . . . CONSIDER

If no damage, a new start sequence may be initiated.

ENG 1(2) $\boxed{\text{SHUT DOWN}}$

Apply the After ENG SHUT DOWN procedure, if damage or if engine relight is unsuccessful.

ENG 1(2) FAIL (CONT'D)

■ **In flight :**

– ENG MODE SEL . . . . IGN

Selection of continuous ignition confirms the immediate relight attempt made by the FADEC.

– THR LEVER (affected engine) . . . . IDLE

Note : In case of GPWS (EGPWS ◁) alerts, reduce speed with care below VLS, with flaps extended (at light weights VMC may be reached before αMax), when applying the GPWS (EGPWS ◁) procedure.

● **IF NO ENG RELIGHT AFTER 30 S**

– ENG MASTER (affected engine) . . . . OFF

● **IF DAMAGE**

R – ENG FIRE P/B (affected engine) . . . . PUSH

– AGENT 1 AFTER 10 s . . . . DISCH

ENG 1(2) SHUT DOWN

Apply the After ENG SHUT DOWN procedure, if damage, or if engine relight unsuccessful.

If high vibration occurs and continues after engine shutdown, reduce airspeed and descend to a safe altitude.

Attempt to determine and use a pratical airspeed and altitude for minimum vibrations.

● **IF NO DAMAGE**

– ENG (affected) RELIGHT . . . . CONSIDER

If there is no damage, an engine relight can be considered. To restart the engine, apply the ENG RELIGHT (in flight) procedure.

ENG 1(2) REV ISOL FAULT

Crew awareness.

The thrust reverser shut-off valve is detected failed open.

After ENG 1(2) SHUT DOWN

LAND ASAP

- **If wing Anti-ice is ON :**
  - **If Elec Emer Config :**
    - PACK 1 . . . . OFF

      In Emer ELEC, only Pack 1 can be controlled off.
  - **If not Elec Emer Config :**
    - PACK (affected side) . . . . OFF

      One pack must be closed, when wing anti-ice is in use, due to precooler performance.
  - X BLEED (if ENG FIRE pb not pushed) . . . . OPEN

    X BLEED must be opened to have symmetrical wing anti-icing.
- ENG MODE SEL . . . . IGN

  Continuous ignition is selected, in order to protect the remaining engine.
- **IF NO FUEL LEAK :**
  - IMBALANCE . . . . MONITOR
- TCAS MODE SEL (if installed) . . . . TA
- **If REV unlocked, and if BUFFET :**

  MAX SPEED . . . . 240 KT
- **If ENG FIRE pushbutton pushed :**
  - XBLEED . . . . SHUT
  - WING ANTI ICE . . . . OFF

  AVOID ICING CONDITIONS

<u>Affected systems</u>
* HYD
* ELEC
* AIR BLEED

<u>Note</u> : *In some conditions, with full asymmetric power, the aircraft may be control-limited before reaching the protection system limit. Therefore, in extreme conditions, where low speed may be advantageous (GPWS, WINDSHEAR, etc), reduce speed with care below VLS and respect the minimum control speed.*

STATUS

- **If ENG 1(2) FIRE pushbutton pushed :**

  AVOID ICING CONDITIONS

After ENG 1(2) SHUT DOWN (CONT'D)

STATUS

- **If REV unlocked :**
  MAX SPEED 300/.78
  APPR PROC
  - **4 doors not stowed (CFM) or reverser deployed (IAE) :**
    - **IF BUFFET :**
      – FOR LDG . . . . USE FLAP 1
      – APPR SPD . . . . . . VREF + 55 KT
      – RUD TRIM . . . . 5 DEG R(L)
      When committed to land, set 5° rudder trim towards live engine.
      – A/THR . . . . OFF
      – GPWS FLAP MODE . . . . OFF
    - **WHEN LDG ASSURED :**
      – L/G . . . . DOWN
    - **AT 800 FT AGL :**
      – TARGET SPD . . . VREF + 40 KT
      LDG DIST PROC . . . . APPLY
      See QRH part 2, or FCOM 3.02.80.
  - **1, 2, or 3 doors not stowed (CFM), or reverse detected unlocked (IAE) :**
    - **IF BUFFET :**
      – FOR LDG . . . . USE FLAP 3
      – GPWS LDG FLAP 3 . . . . ON
      – APPR SPD . . . . . . VREF + 10 kt
      – LDG DIST PROC . . . . APPLY
      See QRH part 2, or FCOM 3.02.80.
- **If WING A/ICE off and ENG 1(2) FIRE pushbutton not pressed :**
  - **IF PERF PERMITS**
    – X BLEED . . . . OPEN
    If no obstacle constraint exists, the XBLEED should be selected OPEN, and the single engine gross ceiling (Refer to 3.06.20 p. 1) must be decreased by 1200 feet.

After ENG 1(2) SHUT DOWN

LAND ASAP

- **If wing Anti-ice is ON :**
  - **If Elec Emer Config :**
    - PACK 1 . . . . OFF
      In Emer ELEC, only Pack 1 can be controlled off.
  - **If not Elec Emer Config :**
    - PACK (affected side) . . . . OFF
      One pack must be closed, when wing anti-ice is in use, due to precooler performance.
  - X BLEED (if ENG FIRE pb not pushed) . . . . OPEN
    X BLEED must be opened to have symmetrical wing anti-icing.
- ENG MODE SEL . . . . IGN
  Continuous ignition is selected, in order to protect the remaining engine.
- **IF NO FUEL LEAK :**
  - IMBALANCE . . . . MONITOR
- TCAS MODE SEL (if installed) . . . . TA
- **If REV unlocked, and if BUFFET :**
  MAX SPEED . . . . 240 KT
- **If ENG FIRE pushbutton pushed :**
  - XBLEED . . . . SHUT
  - WING ANTI ICE . . . . OFF
  AVOID ICING CONDITIONS

Affected systems
* HYD
* ELEC
* AIR BLEED

Note : *In some conditions, with full asymmetric power, the aircraft may be control-limited before reaching the protection system limit. Therefore, in extreme conditions, where low speed may be advantageous (GPWS, WINDSHEAR, etc), reduce speed with care below VLS and respect the minimum control speed.*

STATUS

- **If ENG 1(2) FIRE pushbutton pushed :**
  AVOID ICING CONDITIONS

After ENG 1(2) SHUT DOWN (CONT'D)

STATUS

- **IF A/C ICING SEVERE**
  MIN SPD . . . . ALPHA PROT
- **If REV unlocked :**
  MAX SPEED 300/.78
  APPR PROC
  - ■ **4 doors not stowed (CFM) or reverser deployed (IAE) :**
    - **IF BUFFET :**
      – FOR LDG . . . . USE FLAP 1
      – APPR SPD . . . . . . VREF + 55 KT
      – RUD TRIM . . . . 5 DEG R(L)
      When committed to land, set 5° rudder trim towards live engine.
      – A/THR . . . . OFF
      – GPWS FLAP MODE . . . . OFF
    - **WHEN LDG ASSURED :**
      – L/G . . . . DOWN
    - **AT 800 FT AGL :**
      – TARGET SPD . . . VREF + 40 KT
      LDG DIST PROC . . . . APPLY
      See QRH part 2, or FCOM 3.02.80.
  - ■ **1, 2, or 3 doors not stowed (CFM) or reverse detected unlocked (IAE) :**
    - **IF BUFFET :**
      – FOR LDG . . . . USE FLAP 3
      – GPWS LDG FLAP 3 . . . . ON
      – APPR SPD . . . . . . VREF + 10 kt
      – LDG DIST PROC . . . . APPLY
      See QRH part 2, or FCOM 3.02.80.
- **If WING A/ICE off and ENG 1(2) FIRE pushbutton not pressed :**
  - **IF PERF PERMITS :**
    – X BLEED . . . . OPEN
    If no obstacle constraint, open the XBLEED, and decrease the single engine gross ceiling by 1200 feet (Refer to 3.06.20 p 1).

After ENG 1(2) SHUT DOWN (CONT'D)

- **IF NO ENG 1(2) DAMAGE :**
  CONSIDER ENG 1(2) RELIGHT

ONE PACK ONLY IF WAI ON

Note : – *If available, the APU may be started and the APU GEN used.*
– *If the ENG 1 FIRE pushbutton is pushed, APU bleed must not be used.*
If ENG 2 FIRE pushbutton is pushed, APU bleed may be used, provided the X BLEED selector is set at SHUT.
– *After landing, the Fuel Used value of the engine, shutdown in flight, becomes incorrect.*

STATUS

INOP SYS
ENG 1(2) BLEED
PACK 1(2)
MAIN GALLEY
GEN 1(2)
G ENG 1 PUMP or
Y ENG 2 PUMP
WING A. ICE
(if affected ENG
FIRE pushbutton
pushed)
AFT CRG HEAT

ENG 1(2) ONE TLA FAULT

Crew awareness.

ENG 1(2) IGN FAULT

■ **IGN A or B FAULT :**
Crew awareness.

STATUS

INOP SYS
ENG 1(2) IGN A
(B)

■ **IGN A + B FAULT :**
– AVOID ADVERSE CONDITIONS

STATUS

INOP SYS
ENG 1(2) IGN

ENG 1(2) THR LEVER DISAGREE

LAND ASAP

Both Thrust Lever Angle (TLA) sensors not in agreement on one engine.

■ **On ground (if both TLA not at TOGA or FLX/MCT or if only one TLA is at TOGA or FLX/MCT and the other is below IDLE) :**

ENG (affected) IDLE POWER ONLY.

In that situation, the FADEC automatically selects IDLE

– THR LEVER (affected) . . . . IDLE

■ **During take-off (if both TLA are above IDLE) :**

ENG (affected) TO, FLX, or DRT TO ◁

If both TLA are above IDLE, the FADEC automatically selects TO, FLX TO, or DRT TO ◁ thrust until thrust reduction, after which the maximum available thrust is CLB.

■ **In cruise (with slats retracted) :**

AVAIL MAX POWER : CLB

In flight, if the failure occurs while the thrust lever is between idle and MCT, and if the slats are not extended, (or when MN > 0.55, if the onside EIU is failed) the FADEC selects the larger TLA limited to CLB.

– A/THR (if engaged) . . . . KEEP ON

– A/THR (if not engaged and if slats are not extended) . . ON

With A/THR engaged, thrust is automatically managed between IDLE and higher TLA position.

■ **In approach (with slats extended) :**

ENG (affected) AT IDLE (when slats are extended for approach).

If TLA at, or below, MCT with slats extended for approach (or when MN < 0.47, if the onside EIU is failed).

– THR LEVER (affected) . . . . IDLE

After ENG 1(2) SHUT DOWN (CONT'D)

STATUS

- **IF NO ENG 1(2) DAMAGE :**
  CONSIDER ENG 1(2) RELIGHT

ONE PACK ONLY IF WAI ON

Note : – *If available, the APU may be started and the APU GEN used.*
– *If the ENG 1 FIRE pushbutton is pushed, APU bleed must not be used.*
If ENG 2 FIRE pushbutton is pushed, APU bleed may be used, provided the X BLEED selector is set at SHUT.
– *After landing, the Fuel Used value of the engine, shutdown in flight, becomes incorrect.*

INOP SYS
ENG 1(2) BLEED
PACK 1(2)
MAIN GALLEY
GEN 1(2)
G ENG 1 PUMP or
Y ENG 2 PUMP
WING A. ICE
(if affected ENG FIRE pushbutton pushed)
AFT CRG HEAT

ENG 1(2) ONE TLA FAULT

Crew awareness.

ENG 1(2) IGN FAULT

■ **IGN A or B FAULT :**

Crew awareness.

STATUS

INOP SYS
ENG 1(2) IGN A (B)

■ **IGN A + B FAULT :**

– AVOID ADVERSE CONDITIONS

STATUS

INOP SYS
ENG 1(2) IGN

ENG 1(2) THR LEVER DISAGREE

LAND ASAP

Both Thrust Lever Angle (TLA) sensors not in agreement on one engine.

■ **On ground (if both TLA not at TOGA or FLX/MCT or if only one TLA is at TOGA or FLX/MCT and the other is below IDLE) :**

ENG (affected) IDLE POWER ONLY.

In that situation, the FADEC automatically selects IDLE.

– THR LEVER (affected) . . . . IDLE

■ **During take-off (if both TLA are above IDLE) :**

ENG (affected) TO, FLX, or DRT TO ◁

If both TLA are above IDLE, the FADEC automatically selects TO, FLX TO, or DRT TO ◁ thrust until thrust reduction, after which the maximum available thrust is CLB.

■ **In cruise (with slats retracted) :**

AVAIL MAX POWER : MCT

In flight, if the failure occurs while the thrust lever is between idle and MCT, and if the slats are not extended, (or when MN > 0.55, if the onside EIU is failed) the FADEC selects the larger TLA limited to CLB.

Even if AVAIL MAX POWER : MCT appears on the ECAM, only CLB power is available.

– A/THR (if engaged) . . . . KEEP ON

– A/THR (if not engaged and if slats are not extended) . . ON

With A/THR engaged, thrust is automatically managed between IDLE and higher TLA position.

■ **In approach (with slats extended) :**

ENG (affected) AT IDLE (when slats are extended for approach).

If TLA at, or below, MCT with slats extended for approach (or when MN < 0.47, if the onside EIU is failed).

– THR LEVER (affected) . . . . IDLE

⇩

After ENG 1(2) SHUT DOWN (CONT'D)

- ECON FLOW .... ON
- AFT CRG HOT AIR ◁ .... OFF

  The ECON FLOW must be selected ON, and the aft cargo heat (if installed) must be selected OFF, due to precooler performance.

● **IF NO ENG 1(2) DAMAGE :**

CONSIDER ENG 1(2) RELIGHT

ONE PACK ONLY IF WAI ON

Note :
- *If available, the APU may be started and the APU GEN used.*
- *If the ENG 1 FIRE pushbutton is pushed, APU bleed must not be used.*
  If ENG 2 FIRE pushbutton is pushed, APU bleed may be used, provided the X BLEED selector is set at SHUT.
- *After landing, the Fuel Used value of the engine, shutdown in flight, becomes incorrect.*

STATUS

INOP SYS
ENG 1(2) BLEED
PACK 1(2)
MAIN GALLEY
GEN 1(2)
G ENG 1 PUMP or
Y ENG 2 PUMP
WING A. ICE
(if affected ENG FIRE pushbutton pushed)
AFT CRG HEAT

ENG 1(2) ONE TLA FAULT

Crew awareness.

ENG 1(2) IGN FAULT

■ **IGN A or B FAULT :**

Crew awareness.

STATUS

INOP SYS
ENG 1(2) IGN A (B)

■ **IGN A + B FAULT :**

- AVOID ADVERSE CONDITIONS

STATUS

INOP SYS
ENG 1(2) IGN

ENG 1(2) THR LEVER DISAGREE

LAND ASAP

Both Thrust Lever Angle (TLA) sensors not in agreement on one engine.

- **On ground (if both TLA not at TOGA or FLX/MCT or if only one TLA is at TOGA or FLX/MCT and the other is below IDLE) :**

  ENG (affected) IDLE POWER ONLY.

  In that situation, the FADEC automatically selects IDLE

  – THR LEVER (affected) . . . . IDLE

- **During take-off (if both TLA are above IDLE) :**

  ENG (affected) TO, FLX, or DRT TO ◁

  If both TLA are above IDLE, the FADEC automatically selects TO, FLX TO, or DRT TO ◁ thrust until thrust reduction, after which the maximum available thrust is CLB.

- **In cruise (with slats retracted) :**

  AVAIL MAX POWER : CLB

  In flight, if the failure occurs while the thrust lever is between idle and MCT, and if the slats are not extended, (or when MN > 0.55, if the onside EIU is failed) the FADEC selects the larger TLA limited to CLB.

  – A/THR (if engaged) . . . . KEEP ON

  – A/THR (if not engaged and if slats are not extended) . . ON

  With A/THR engaged, thrust is automatically managed between IDLE and higher TLA position.

- **In approach (with slats extended) :**

  ENG (affected) AT IDLE (when slats are extended for approach).

  If TLA at, or below, MCT with slats extended for approach (or when MN < 0.47, if the onside EIU is failed).

  – THR LEVER (affected) . . . . IDLE

After ENG 1(2) SHUT DOWN (CONT'D)

STATUS

- ECON FLOW .... ON
- AFT CRG HOT AIR ◁ .... OFF

The ECON FLOW must be selected ON, and the aft cargo heat (if installed) must be selected OFF, due to precooler performance.

● **IF NO ENG 1(2) DAMAGE :**
CONSIDER ENG 1(2) RELIGHT

ONE PACK ONLY IF WAI ON

Note : – *If available, the APU may be started and the APU GEN used.*
– *If the ENG 1 FIRE pushbutton is pushed, APU bleed must not be used.*
If ENG 2 FIRE pushbutton is pushed, APU bleed may be used, provided the X BLEED selector is set at SHUT.
– *After landing, the Fuel Used value of the engine, shutdown in flight, becomes incorrect.*

INOP SYS
ENG 1(2) BLEED
PACK 1(2)
MAIN GALLEY
GEN 1(2)
G ENG 1 PUMP or
Y ENG 2 PUMP
WING A. ICE
(if affected ENG FIRE pushbutton pushed)
AFT CRG HEAT

ENG 1(2) ONE TLA FAULT

Crew awareness.

ENG 1(2) IGN FAULT

■ **IGN A or B FAULT :**
Crew awareness.

STATUS

INOP SYS
ENG 1(2) IGN A (B)

■ **IGN A + B FAULT :**
- AVOID ADVERSE CONDITIONS

STATUS

INOP SYS
ENG 1(2) IGN

ENG 1(2) THR LEVER DISAGREE

LAND ASAP

Both Thrust Lever Angle (TLA) sensors not in agreement on one engine.

■ **On ground (if both TLA not at TOGA or FLX/MCT or if only one TLA is at TOGA or FLX/MCT and the other is below IDLE) :**

ENG (affected) IDLE POWER ONLY.

In that situation, the FADEC automatically selects IDLE.

– THR LEVER (affected) . . . . IDLE

■ **During take-off (if both TLA are above IDLE) :**

ENG (affected) TO, FLX, or DRT TO ◁

If both TLA are above IDLE, the FADEC automatically selects TO, FLX TO, or DRT TO ◁ thrust until thrust reduction, after which the maximum available thrust is CLB.

■ **In cruise (with slats retracted) :**

AVAIL MAX POWER : MCT

In flight, if the failure occurs while the thrust lever is between idle and MCT, and if the slats are not extended, (or when MN > 0.55, if the onside EIU is failed) the FADEC selects the larger TLA limited to CLB.

Even if AVAIL MAX POWER : MCT appears on the ECAM, only CLB power is available.

– A/THR (if engaged) . . . . KEEP ON
– A/THR (if not engaged and if slats are not extended) . . ON

With A/THR engaged, thrust is automatically managed between IDLE and higher TLA position.

■ **In approach (with slats extended) :**

ENG (affected) AT IDLE (when slats are extended for approach).

If TLA at, or below, MCT with slats extended for approach (or when MN < 0.47, if the onside EIU is failed).

– THR LEVER (affected) . . . . IDLE

⇩

ENG 1(2) THR LEVER DISAGREE (CONT'D)

- **If TLA at, or below, MCT**
  - **WHEN SLATS OUT**

    (Displayed, if slats not extended), or
  - **WHEN MN < 0.47**

    (Displayed, if the onside EIU is failed)

    ENG (affected) AT IDLE

    For any case of thrust lever disagree (TO, FLEX, or between Idle and MCT), the FADEC will command idle thrust for the approach when slats are extended (or when the Mach number is less than 0.47, if associated EIU is failed). It is independent of the autothrust condition. The affected engine's thrust remains definitively at idle, even for go-around.

REV AVAIL ON GND

ENG (affected) AVAIL MAX PWR : MCT

Even if AVAIL MAX POWER : MCT appears on the ECAM, only CLB power is available.

ON GND ENG (affected) MAX PWR : IDLE.

STATUS

INOP SYS

ENG 1(2) THR

ENG 1(2) THR LEVER DISAGREE (CONT'D)

STATUS

- **If TLA at, or below, MCT**
  - **WHEN SLATS OUT**
    (Displayed, if slats not extended), or
  - **WHEN MN < 0.47**
    (Displayed, if the onside EIU is failed)
    ENG (affected) AT IDLE
    For any case of thrust lever disagree (TO, FLEX, or between Idle and MCT), the FADEC will command idle thrust for the approach when slats are extended (or when the Mach number is less than 0.47, if associated EIU is failed). It is independent of the autothrust condition. The affected engine's thrust remains definitively at idle, even for go-around.

REV AVAIL ON GND
ENG (affected) AVAIL MAX PWR : CLB
ON GND ENG (affected) MAX PWR : IDLE.

INOP SYS
ENG 1(2) THR

ENG 1(2) THR LEVER FAULT

No validated thrust lever angle for one engine thrust lever.

LAND ASAP

■ **On the ground :**

ENG (affected) IDLE POWER ONLY.

Idle power is automatically selected by FADEC.
If associated thrust reverser is already deployed, FADEC commands restow.

– THR LEVER (affected) . . . . IDLE

■ **In flight :**

If selected thrust lever position at the time of fault detection is :
TO or FLEX : FADEC freezes TO or flex TO thrust until slat retraction. At slat retraction it will select MCT thrust.
Between IDLE and MCT : in manual thrust setting mode, engine rating increases and freezes at MCT or IDLE with slats extended (or MN < 0.47 if the FADEC no longer receives the slats position due to EIU failure). It is possible to activate autothrust. If selected, autothrust mode will manage thrust between idle and MCT.

– ENG (affected) AT IDLE

For any case of thrust lever fault (TO, FLEX or between IDLE and MCT) the FADEC will command idle thrust for the approach when slats are extended (or when MN < 0.47 if associated EIU is failed). It is independant of the autothrust condition. Thrust of affected engine remains definitively at idle even for go around.

– THR LEVER (affected) . . . . IDLE

When slats are extended or MN < 0.47, if on side EIU is failed.

● **A/THR engaged :**

– A/THR . . . . KEEP ON

● **A/THR not engaged :**

ENG (affected) HI PWR IN MAN THR.

Inhibited when the FADEC commands the affected engine at IDLE.

● **BEFORE SLATS IN :**

– A/THR . . . . ON

HI POWER ONLY (if thrust lever angle failed in TO or flex position).

STATUS

● **WHEN SLATS OUT**

(Displayed if slats not extended) or,

● **WHEN MN < 0.47**

(Displayed if the onside EIU is failed).

ENG 1(2) AT IDLE

INOP SYS

REVERSER 1(2)
ENG 1(2) THR

ENG 1(2) COMPRESSOR VANE

Failure of VBV or VSV.

- **On ground :**
  - THR LEVER (affected) .... IDLE
  - ENG MASTER (affected) .... OFF
- AVOID RAPID THR CHANGES or

If the A/THR is engaged, adjust the thrust lever (of the affected engine) to align the thrust lever command with actual N1 and disconnect A/THR.

ENG (affected) SLOW RESPONSE

Depending on the type of failure, one of the above two messages is displayed.

STATUS

AVOID RAPID THR CHANGES, or
ENG (affected) SLOW RESPONSE

ENG COMPRESSOR VANE

Engine 1 and 2 VBV or VSV motor fault detected on the standby ECU channel.

Crew awareness.

ENG 1(2) FUEL CTL FAULT

Failure of Fuel Metering Valve.

- **On ground :**
  - THR LEVER (affected) .... IDLE
  - ENG MASTER (affected) .... OFF
- AVOID RAPID THR CHANGES, or

ENG (affected) SLOW RESPONSE

Depending on the type of failure, one of the above two messages is displayed.

STATUS

AVOID RAPID THR CHANGES, or
ENG (affected) SLOW RESPONSE

ENG 1(2) OVSPD PROT FAULT

Crew awareness.

Note : If the warning appears during engine start, shut down the engine. Restart the engine. If the warning still appears, maintenance action is due.

ENG 1(2) CTL VALVE FAULT

Failure of Burner staging valve, or HP Turbine clearance system, or RACC system.

MAX N2 . . . . 96 %

Retard associated thrust lever to limit N2 to 96 %.

STATUS

MAX ENG (affected) N2 . . . . 96 %

ENG 1(2) SENSOR FAULT

PS3, T25, T3, N1, N2 data not available on both ECU channels.

■ **On ground :**
- THR LEVER (affected) . . . . IDLE
- ENG MASTER (affected) . . . . OFF

■ **In flight :**

AVOID RAPID THR CHANGES.

STATUS

AVOID RAPID THR CHANGES.

ENG 1(2) PROBES FAULT

P0, PT2, T12 data not available on both ECU channels.

Crew awareness.

ENG 1(2) FUEL RETURN VALVE

■ **VALVE NOT OPEN**

The valve is failed closed.

Crew awareness.

■ **VALVE NOT CLOSED**

The valve is failed open.

Crew awareness.

ENG DUAL FAILURE

R *The ENG DUAL FAILURE warning inhibits the ELEC EMER CONFIG warning.*
R *The FCOM Volume 3 includes all steps of the ECAM ENG DUAL FAILURE procedure.*
R *However, to facilitate handling of all the ECAM procedures associated with a dual engine*
R *failure, it is recommended using the QRH ENG DUAL FAILURE paper procedure that also*
R *includes the DITCHING and FORCED LANDING procedures. When applying the QRH ENG*
R *DUAL FAILURE paper procedure :*
R *– If one or more engines are recovered, apply the corresponding ECAM procedure instead*
R *– If no engines are recovered, continue to apply the QRH ENG DUAL FAILURE paper*
R *procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.*

LAND ASAP

– ENG MODE SEL . . . . IGN

An immediate relight attempt is made.

– THR LEVERS . . . . IDLE

OPTIMUM RELIGHT SPD . . . . 300 KT

The optimum airspeed to allow an effective windmilling start attempt is 300 kt.
In case of a speed indication failure (volcanic ash), the pitch attitude for optimum relight speed is 4.5 degrees down. For weight above 50 000 kg/110 000 lb, raise the nose by 1 degree for every additional 10 000 kg/22 000 lb (e.g. if weight is 60 000 kg/132 000 lb pitch is 3.5 degrees down).
At 300 kt, the aircraft can fly up to about :
· 2 NM per 1000 ft at 50 000 kg/110 000 lb
· 2.2 NM per 1000 ft at 60 000 kg/132 000 lb
· 2.4 NM per 1000 ft at 70 000 kg/154 000 lb

– EMER ELEC PWR (if EMER GEN not in line) . . . . MAN ON

Pressing EMER ELEC PWR MAN ON pushbutton allows extension of RAT and emer gen coupling.

– VHF1/HF1 (◁) /ATC1 . . . . USE

· In Elec emer configuration only VHF1, HF1 (◁) and ATC1 are supplied.
· Notify traffic control of the nature of the emergency and state intention.
If there is no contact with air traffic control, switch to code A7700 or transmit a distress message on one of the following frequencies, VHF frequency 121.5 MHz, HF 2182 KHz or 8364 KHz.

– FAC1 . . . . OFF THEN ON

Aircraft is out of trim due to right aileron up float.
Resetting FAC 1 permits to recover rudder trim even if no indication is available.

● **IF NO RELIGHT AFTER 30 S :**

– ENG MASTERS . . . . OFF 30 S/ON

Engine masters must be left OFF for 30 seconds to allow ventilation of combustion chamber.

ENG 1(2) CTL VALVE FAULT

Failure of Burner staging valve, or HP Turbine clearance system, or RACC system.

MAX N2 . . . . 96 %

Retard associated thrust lever to limit N2 to 96 %.

STATUS

MAX ENG (affected) N2 . . . . 96 %

ENG 1(2) SENSOR FAULT

PS3, T25, T3, N1, N2 data not available on both ECU channels.

■ **On ground :**

– THR LEVER (affected) . . . . IDLE
– ENG MASTER (affected) . . . . OFF

■ **In flight :**

AVOID RAPID THR CHANGES.

STATUS

AVOID RAPID THR CHANGES.

ENG 1(2) PROBES FAULT

P0, PT2, T12 data not available on both ECU channels.

Crew awareness.

ENG 1(2) FUEL RETURN VALVE

■ **VALVE NOT OPEN**

The valve is failed closed.

Crew awareness.

■ **VALVE NOT CLOSED**

The valve is failed open.

Crew awareness.

ENG DUAL FAILURE

R *The ENG DUAL FAILURE warning inhibits the ELEC EMER CONFIG warning.*
R *The FCOM Volume 3 includes all steps of the ECAM ENG DUAL FAILURE procedure.*
R *However, to facilitate handling of all the ECAM procedures associated with a dual engine*
R *failure, it is recommended using the QRH ENG DUAL FAILURE paper procedure that also*
R *includes the DITCHING and FORCED LANDING procedures. When applying the QRH ENG*
R *DUAL FAILURE paper procedure :*
R *– If one or more engines are recovered, apply the corresponding ECAM procedure instead*
R *– If no engines are recovered, continue to apply the QRH ENG DUAL FAILURE paper*
R *procedure. If time permits, clear ECAM alerts, and check the ECAM STATUS page.*

LAND ASAP

– ENG MODE SEL . . . . IGN

An immediate relight attempt is made.

– THR LEVERS . . . . IDLE

OPTIMUM RELIGHT SPD . . . . 300 KT

The optimum airspeed to allow an effective windmilling start attempt is 300 kt.
In case of a speed indication failure (volcanic ash), the pitch attitude for optimum relight speed is 4.5 degrees down. For weight above 60 000 kg/132 000 lb, raise the nose by 1 degree for every additional 10 000 kg/22 000 lb (e.g. if weight is 70 000 kg/154 000 lb pitch is 3.5 degrees down).
At 300 kt, the aircraft can fly up to about :
· 2 NM per 1000 ft at 60 000 kg/132 000 lb
· 2.2 NM per 1000 ft at 70 000 kg/154 000 lb
· 2.4 NM per 1000 ft at 80 000 kg/176 000 lb

– EMER ELEC PWR (if EMER GEN not in line) . . . . MAN ON

Pressing EMER ELEC PWR MAN ON pushbutton allows extension of RAT and emer gen coupling.

– VHF1/HF1 (◁) /ATC1 . . . . USE

· In Elec emer configuration only VHF1, HF1 (◁) and ATC1 are supplied.
· Notify traffic control of the nature of the emergency and state intention.
If there is no contact with air traffic control, switch to code A7700 or transmit a distress message on one of the following frequencies, VHF frequency 121.5 MHz, HF 2182 KHz or 8364 KHz.

– FAC1 . . . . OFF THEN ON

Aircraft is out of trim due to right aileron up float.
Resetting FAC 1 permits to recover rudder trim even if no indication is available.

● **IF NO RELIGHT AFTER 30 S :**

– ENG MASTERS . . . . OFF 30 S/ON

Engine masters must be left OFF for 30 seconds to allow ventilation of combustion chamber.

ENG DUAL FAILURE (CONT'D)

● **If UNSUCCESSFUL :**

– APU (IF AVAIL) . . . . START

If the APU is available, APU may be started when below FL 250, and APU BLEED may be used for engine start below FL 200.

APU start is unavailable for 45 seconds after the loss of both engine generators. This 45–second delay prevents any interference with emergency generator coupling.

– WING ANTI ICE . . . . OFF

– APU BLEED . . . . ON

– ENG MASTERS . . . . OFF 30 S/ON

Start one engine at a time.

OPTIMUM SPEED . . . . G DOT

Green dot is displayed on the Captain's PFD. It represents the best lift-to-drag ratio.

● **EARLY IN APPR**

(If ditching is foreseen, apply the DITCHING procedure, instead of the following) :

– CAB SECURE . . . . ORDER

– FOR LDG . . . . USE FLAP 3

As only blue hydraulic power is available, only the slats will extend and operating times are noticeably increased.

● **AT 5000 FEET AGL :**

– L/G . . . . GRVTY EXTN

See the L/G GRVTY EXTN procedure (3.02.32).

TARGET SPEED . . . . 150 KT

● **AT TOUCHDOWN :**

– ENG MASTERS . . . . OFF

LP and HP valves close.

– APU MASTER SW . . . . OFF

APU LP valve closes.

– EVAC . . . . INITIATE

– BAT 1 + 2 (if time permits before leaving aircraft) . . . . OFF

Batteries are left ON, until the flight crew leaves the aircraft, to ensure cabin communications.

Note : *Keep batteries on for at least 10 seconds after switching the ENG MASTERS to OFF, to allow complete closure of fuel LP valves.*

R HYD **G + Y SYS LO PR**

ENG DUAL FAILURE (CONT'D)

STATUS

MIN RAT SPEED . . . . 140 KT
MAX SPEED 320/.77
MAX BRK PR . . . . 1000 PSI
MANEUVER WITH CARE
FUEL GRVTY FEED
AVOID NEGATIVE G FACTOR
APPR PROC :

● **IF HYD NOT RECOVERED**
  – FOR LDG . . . . USE FLAP 3
● **WHEN CONF 3 AND VAPP** :
  – L/G . . . . GRVTY EXTN
  (Refer to 3.02.32). Being stabilized at VAPP before selecting the gear down enables the aircraft to be trimmed for approach.

APPR SPD . . . . VREF + 25 KT
Approach speed must be increased, due to the loss of flaps.

LDG DIST PROC . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80.

ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
At landing gear extension, control reverts to direct law in pitch as well as in roll (see DIRECT LAW procedure 3.02.27). A slight transient pitch up may occur, depending on the frozen THS position.

BRK Y ACCU PR ONLY
7 full brake applications are available.

SLATS SLOW

INOP SYS

G+Y HYD
F/CTL PROT
STABILIZER
R AIL
REVERSER 1+2
ADR 2+3
IR 2+3
RA 1+2
SPLR 1+2+4+5
ELAC 2
SEC 2+3
FLAPS
YAW DAMPER
A/CALL OUT
AP 1+2
A/THR
FUEL PUMPS
ANTI SKID
N/W. STEER
AUTO BRK
L/G RETRACT
CAB PR 1+2
PACK 1+2

ENG DUAL FAILURE (CONT'D)

- **If UNSUCCESSFUL :**
  - – APU (IF AVAIL) . . . . START
    If the APU is available, APU may be started when below FL 250, and APU BLEED may be used for engine start below FL 200.
    APU start is unavailable for 45 seconds after the loss of both engine generators. This 45–second delay prevents any interference with emergency generator coupling.
  - – WING ANTI ICE . . . . OFF
  - – APU BLEED . . . . ON
  - – ENG MASTERS . . . . OFF 30 S/ON
    Start one engine at a time.

  OPTIMUM SPEED . . . . G DOT
  Green dot is displayed on the Captain's PFD. It represents the best lift-to-drag ratio.

- **EARLY IN APPR**

  (If ditching is foreseen, apply the DITCHING procedure, instead of the following) :
  - – CAB SECURE . . . . ORDER
  - – FOR LDG . . . . USE FLAP 3
    As only blue hydraulic power is available, only the slats will extend and operating times are noticeably increased.

- **AT 5000 FEET AGL :**
  - – L/G . . . . GRVTY EXTN
    See the L/G GRVTY EXTN procedure (3.02.32).

  TARGET SPEED . . . . 150 KT

- **AT TOUCHDOWN :**
  - – ENG MASTERS . . . . OFF
    LP and HP valves close.
  - – APU MASTER SW . . . . OFF
    APU LP valve closes.
  - – EVAC . . . . INITIATE
  - – BAT 1 + 2 (if time permits before leaving aircraft) . . . . OFF
    Batteries are left ON, until the flight crew leaves the aircraft, to ensure cabin communications.

  Note : *Keep batteries on for at least 10 seconds after switching the ENG MASTERS to OFF, to allow complete closure of fuel LP valves.*

R HYD **G + Y SYS LO PR**

⇩

ENG DUAL FAILURE (CONT'D)

STATUS

MIN RAT SPEED . . . . 140 KT
MAX SPEED 320/.77
MAX BRK PR . . . . 1000 PSI
MANEUVER WITH CARE
FUEL GRVTY FEED
AVOID NEGATIVE G FACTOR
APPR PROC :

- **IF HYD NOT RECOVERED**
  - FOR LDG . . . . USE FLAP 3
- **WHEN CONF 3 AND VAPP** :
  - L/G . . . . GRVTY EXTN

    (Refer to 3.02.32). Being stabilized at VAPP before selecting the gear down enables the aircraft to be trimmed for approach.

  APPR SPD . . . . VREF + 25 KT

  Approach speed must be increased, due to the loss of flaps.

  LDG DIST PROC . . . . APPLY

  Refer to the QRH Part 2, or to the FCOM 3.02.80.

  ALTN LAW : PROT LOST

  WHEN L/G DN : DIRECT LAW

  At landing gear extension, control reverts to direct law in pitch as well as in roll (see DIRECT LAW procedure 3.02.27).

  BRK Y ACCU PR ONLY

  7 full brake applications are available.

  SLATS SLOW

INOP SYS

G+Y HYD
F/CTL PROT
STABILIZER
R AIL
REVERSER 1+2
ADR 2+3
IR 2+3
RA 1+2
SPLR 1+2+4+5
ELAC 2
SEC 2+3
FLAPS
YAW DAMPER
A/CALL OUT
AP 1+2
A/THR
FUEL PUMPS
ANTI SKID
N/W. STEER
AUTO BRK
L/G RETRACT
CAB PR 1+2
PACK 1+2

ENG DUAL FAILURE (CONT'D)

- **If UNSUCCESSFUL :**
  - APU (IF AVAIL) . . . . START

    If the APU is available, APU may be started when below FL 250, and APU BLEED may be used for engine start below FL 200.

    APU start is unavailable for 45 seconds after the loss of both engine generators. This 45–second delay prevents any interference with emergency generator coupling.
  - WING ANTI ICE . . . . OFF
  - APU BLEED . . . . ON
  - ENG MASTERS . . . . OFF 30 S/ON

    Start one engine at a time.

  OPTIMUM SPEED . . . . G DOT

  Green dot is displayed on the Captain's PFD. It represents the best lift-to-drag ratio.

- **EARLY IN APPR**

  (If ditching is foreseen, apply the DITCHING procedure, instead of the following) :
  - CAB SECURE . . . . ORDER
  - FOR LDG . . . . USE FLAP CONF 3

    As only blue hydraulic power is available, only the slats will extend and operating times are noticeably increased.
- **AT 5000 FEET AGL** :
  - L/G . . . . GRVTY EXTN

    See the L/G GRVTY EXTN procedure (3.02.32).

  MIN TARGET SPEED . . . . 160 KT
- **AT TOUCHDOWN** :
  - ENG MASTERS . . . . OFF

    LP and HP valves close.
  - APU MASTER SW . . . . OFF

    APU LP valve closes.
  - EVAC . . . . INITIATE
  - BAT 1 + 2 (if time permits before leaving aircraft) . . . . OFF

    Batteries are left ON, until the flight crew leaves the aircraft, to ensure cabin communications.

  Note : *Keep batteries on for at least 10 seconds after switching the ENG MASTERS to*
R *OFF, to allow complete closure of fuel LP valves.*

R HYD $\boxed{\text{G + Y SYS LO PR}}$

ENG DUAL FAILURE (CONT'D)

STATUS

MIN RAT SPEED . . . . 140 KT
MAX SPEED 320/.77
MAX BRK PR . . . . 1000 PSI
MANEUVER WITH CARE
FUEL GRVTY FEED
AVOID NEGATIVE G FACTOR
APPR PROC :

- **IF HYD NOT RECOVERED**
  - FOR LDG . . . . USE FLAP 3
- **WHEN CONF 3 AND VAPP** :
  - L/G . . . . GRVTY EXTN
    (Refer to 3.02.32). Being stabilized at VAPP before selecting the gear down enables the aircraft to be trimmed for approach.

  APPR SPD . . . . VREF + 30 KT
  Approach speed must be increased, due to the loss of flaps.
  LDG DIST PROC . . . . APPLY
  Refer to the QRH Part 2, or to the FCOM 3.02.80.
  ALTN LAW : PROT LOST
  WHEN L/G DN : DIRECT LAW
  At landing gear extension, control reverts to direct law in pitch as well as in roll (see DIRECT LAW procedure 3.02.27).
  BRK Y ACCU PR ONLY
  7 full brake applications are available.
  SLATS SLOW

INOP SYS

G+Y HYD
F/CTL PROT
STABILIZER
R AIL
REVERSER 1+2
ADR 2+3
IR 2+3
RA 1+2
SPLR 1+2+4+5
ELAC 2
SEC 2+3
FLAPS
YAW DAMPER
A/CALL OUT
AP 1+2
A/THR
FUEL PUMPS
ANTI SKID
N/W. STEER
AUTO BRK
L/G RETRACT
CAB PR 1+2
PACK 1+2

ENG DUAL FAILURE (CONT'D)

● **If UNSUCCESSFUL :**

– APU (IF AVAIL) .... START

If the APU is available, APU may be started when below FL 250, and APU BLEED may be used for engine start below FL 200.

APU start is unavailable for 45 seconds after the loss of both engine generators. This 45–second delay prevents any interference with emergency generator coupling.

– WING ANTI ICE .... OFF

– APU BLEED .... ON

– ENG MASTERS .... OFF 30 S/ON

Start one engine at a time.

OPTIMUM SPEED .... G DOT

Green dot is displayed on the Captain's PFD. It represents the best lift-to-drag ratio.

● **EARLY IN APPR**

(If ditching is foreseen, apply the DITCHING procedure, instead of the following) :

– CAB SECURE .... ORDER

– USE RUDDER WITH CARE.

As hydraulic power is available from RAT only, avoid large or rapid rudder deflection.

– FOR LDG .... USE FLAP 3

As only blue hydraulic power is available, only the slats will extend and operating times are noticeably increased.

● **AT 5000 FEET AGL :**

– L/G .... GRVTY EXTN

See the L/G GRVTY EXTN procedure (3.02.32).

TARGET SPEED .... 150 KT

● **AT TOUCHDOWN :**

– ENG MASTERS .... OFF

LP and HP valves close.

– APU MASTER SW .... OFF

APU LP valve closes.

– EVAC .... INITIATE

– BAT 1 + 2 (if time permits before leaving aircraft) .... OFF

Batteries are left ON, until the flight crew leaves the aircraft, to ensure cabin communications.

Note : Keep batteries on for at least 10 seconds after switching the ENG MASTERS to OFF, to allow complete closure of fuel LP valves.

R HYD **G + Y SYS LO PR**

ENG DUAL FAILURE (CONT'D)

STATUS

MIN RAT SPEED . . . . 140 KT
MAX SPEED 320/.77
MAX BRK PR . . . . 1000 PSI
MANEUVER WITH CARE
FUEL GRVTY FEED
AVOID NEGATIVE G FACTOR
APPR PROC :

- **IF HYD NOT RECOVERED**
  – FOR LDG . . . . USE FLAP 3
- **WHEN CONF 3 AND VAPP** :
  – L/G . . . . GRVTY EXTN
  (Refer to 3.02.32). Being stabilized at VAPP before selecting the gear down enables the aircraft to be trimmed for approach.

  APPR SPD . . . . VREF + 25 KT
  Approach speed must be increased, due to the loss of flaps.
  LDG DIST PROC . . . . APPLY
  Refer to the QRH Part 2, or to the FCOM 3.02.80.
  ALTN LAW : PROT LOST
  WHEN L/G DN : DIRECT LAW
  At landing gear extension, control reverts to direct law in pitch as well as in roll (see DIRECT LAW procedure 3.02.27). A slight transient pitch up may occur, depending on the frozen THS position.
  BRK Y ACCU PR ONLY
  7 full brake applications are available.
  SLATS SLOW

INOP SYS

G+Y HYD
F/CTL PROT
STABILIZER
R AIL
REVERSER 1+2
ADR 2+3
IR 2+3
RA 1+2
SPLR 1+2+4+5
ELAC 2
SEC 2+3
FLAPS
YAW DAMPER
A/CALL OUT
AP 1+2
A/THR
FUEL PUMPS
ANTI SKID
N/W. STEER
AUTO BRK
L/G RETRACT
CAB PR 1+2
PACK 1+2

ENG DUAL FAILURE (CONT'D)

- **If UNSUCCESSFUL :**
  - APU (IF AVAIL) . . . . START

    If the APU is available, APU may be started when below FL 250, and APU BLEED may be used for engine start below FL 200.

    APU start is unavailable for 45 seconds after the loss of both engine generators. This 45–second delay prevents any interference with emergency generator coupling.
  - WING ANTI ICE . . . . OFF
  - APU BLEED . . . . ON
  - ENG MASTERS . . . . OFF 30 S/ON

    Start one engine at a time.

  OPTIMUM SPEED . . . . G DOT

  Green dot is displayed on the Captain's PFD. It represents the best lift-to-drag ratio.

- **EARLY IN APPR**

  (If ditching is foreseen, apply the DITCHING procedure, instead of the following) :
  - CAB SECURE . . . . ORDER
  - USE RUDDER WITH CARE.

    As hydraulic power is available from RAT only, avoid large or rapid rudder deflection.
  - FOR LDG . . . . USE FLAP 3

    As only blue hydraulic power is available, only the slats will extend and operating times are noticeably increased.

- **AT 5000 FEET AGL :**
  - L/G . . . . GRVTY EXTN

    See the L/G GRVTY EXTN procedure (3.02.32).

  TARGET SPEED . . . . 150 KT

- **AT TOUCHDOWN :**
  - ENG MASTERS . . . . OFF

    LP and HP valves close.
  - APU MASTER SW . . . . OFF

    APU LP valve closes.
  - EVAC . . . . INITIATE
  - BAT 1 + 2 (if time permits before leaving aircraft) . . . . OFF

    Batteries are left ON, until the flight crew leaves the aircraft, to ensure cabin communications.

  Note : Keep batteries on for at least 10 seconds after switching the ENG MASTERS to OFF, to allow complete closure of fuel LP valves.

R HYD $\boxed{\text{G + Y SYS LO PR}}$

ENG DUAL FAILURE (CONT'D)

STATUS

MIN RAT SPEED . . . . 140 KT
MAX SPEED 320/.77
MAX BRK PR . . . . 1000 PSI
MANEUVER WITH CARE
FUEL GRVTY FEED
AVOID NEGATIVE G FACTOR
APPR PROC :

- **IF HYD NOT RECOVERED**
  - FOR LDG . . . . USE FLAP 3
- **WHEN CONF 3 AND VAPP** :
  - L/G . . . . GRVTY EXTN

    (Refer to 3.02.32). Being stabilized at VAPP before selecting the gear down enables the aircraft to be trimmed for approach.

  APPR SPD . . . . VREF + 25 KT

  Approach speed must be increased, due to the loss of flaps.

  LDG DIST PROC . . . . APPLY

  Refer to the QRH Part 2, or to the FCOM 3.02.80.

  ALTN LAW : PROT LOST

  WHEN L/G DN : DIRECT LAW

  At landing gear extension, control reverts to direct law in pitch as well as in roll (see DIRECT LAW procedure 3.02.27).

  BRK Y ACCU PR ONLY

  7 full brake applications are available.

  SLATS SLOW

INOP SYS

G+Y HYD
F/CTL PROT
STABILIZER
R AIL
REVERSER 1+2
ADR 2+3
IR 2+3
RA 1+2
SPLR 1+2+4+5
ELAC 2
SEC 2+3
FLAPS
YAW DAMPER
A/CALL OUT
AP 1+2
A/THR
FUEL PUMPS
ANTI SKID
N/W. STEER
AUTO BRK
L/G RETRACT
CAB PR 1+2
PACK 1+2

ENG 1(2) FADEC A(B) FAULT

Loss of one FADEC channel.

Crew awareness.

Note : Some cases of spurious FADEC fault have been experienced at engine start on ground.
The warning can be considered as spurious, if it disappears after application of the following procedure :
- *Set the master lever to OFF, and wait until N2 speed goes below 5 %.*
- *Pull and reset the C/Bs of the affected ECU electrical supply (A04, or A05 on 49 VU, or R41, or Q40 on 120 VU).*
- *Wait for the ECU power-up sequence, and restart the engine.*

ENG 1(2) FADEC FAULT

– CONFIRM ENG STATUS.

ON SYS PAGES :

Since engine indications are lost, other system pages such as HYD ELEC or BLEED must be used to confirm engine status.

● **IF ENG FAIL CONFIRMED** :
- THR LEVER (affected) . . . . IDLE
- ENG MASTER (affected) . . . . OFF

ENG 1(2) **SHUT DOWN**

Apply the after ENG SHUT DOWN procedure.

ENG 1(2) FADEC A(B) FAULT

Loss of one FADEC channel.

Crew awareness.

Note : Some cases of spurious FADEC fault have been experienced at engine start on ground.
The warning can be considered as spurious, if it disappears after application of the following procedure :
- *Set the master lever to OFF, and wait until N2 speed goes below 5 %.*
- *Pull and reset the C/Bs of the affected ECU electrical supply (A04, or A05 on 49 VU, or R41, or Q40 on 120 VU).*
- *Wait for the ECU power-up sequence, and restart the engine.*

ENG 1(2) FADEC FAULT

- ENG INDICATIONS . . . . CHECK

  Since engine indications are lost, other system pages such as HYD ELEC or BLEED must be used to confirm engine status.

● **IF ENG FAIL CONFIRMED** :
- THR LEVER (affected) . . . . IDLE
- ENG MASTER (affected) . . . . OFF

ENG 1(2) **SHUT DOWN**

Apply the after ENG SHUT DOWN procedure.

ENG 1(2) FADEC HI TEMP

■ **On ground :**

- THR LEVER (affected) . . . . IDLE
- ENG MASTER (associated engine) . . . . OFF
- ENG MODE SEL . . . . NORM
- FADEC GND PWR . . . . Check OFF

■ **In flight :**

● **If the ECU temp is above the overheat threshold :**

FADEC OVHT

Reducing engine power should decrease temperature in the ECU area. If overheating is severe enough, ECU failure could result in a significant loss of engine functions.

ENG TYPE DISAGREE

This caution is triggered when a rating discrepancy is detected between two engines.

Crew awareness

<u>ENG</u> THRUST LOCKED

The thrust is frozen on one or more engine after a failure or an involuntary autothrust disconnections.
This caution is automatically repeated every 5 seconds until thrust levers are moved.

– THR LEVERS . . . . MOVE

ENG TAILPIPE FIRE

Internal engine fire may be encountered during engine start or engine shutdown.
It may be seen by the ground crew, or the EGT may fail to decrease after the MASTER switch is turned OFF.

> CAUTION
> External fire agents can cause severe corrosive damage and should, therefore, only be considered after having applied the following procedure :

- MAN START (if manual start performed) . . . . OFF
- ENG MASTER (affected) . . . . OFF

  Note : Do not press the engine fire pushbutton, since this would cut off the FADEC power supply, which would prevent motoring sequence.
- AIR BLEED PRESS . . . . ESTABLISH
  - *Select the APU, or opposite BLEED, to motor the engine.*
  - *If APU BLEED is not available, and the opposite engine is shut down, connect external pneumatic power (if readily available).*
- R BEACON . . . . ON
- ENG MODE SEL . . . . CRANK
- MAN START . . . . ON

  The start valve automatically reopens, when N2 is below 20 %.

● **When burning has stopped** :
- MAN START . . . . OFF
- ENG MODE SEL . . . . NORM
- Maintenance action is due.

HIGH ENGINE VIBRATION

The VIB advisory on ECAM (N1 ≥ 6 units, N2 ≥ 4.3 units) is mainly a guideline to induce the crew to monitor engine parameters more closely.

VIB detection alone does not require engine shut down.

Note : 1. High engine vibrations may be accompanied by cockpit and cabin smoke and/or the smell of burning. This may be due only to compressor blade tip contact with associated abradable seals.

2. High N1 vibrations are generally accompanied by perceivable airframe vibrations. High N2 vibrations can occur without perceivable airframe vibrations.

■ **If no icing conditions :**

– ENG PARAMETERS . . . . CHECK

Check engine parameters and especially EGT ; crosscheck with other engine.
Report in maintenance log.

● **If rapid increase above the advisory :**

– THRUST LEVER (affected engine) . . . . RETARD

Flight conditions permitting reduce N1 to maintain vibration level below advisory threshold.

Note : If the VIB indication does not decrease following thrust reduction, this may indicate other problems on the engine. Apply adequate procedure.

■ **If icing conditions :**

An increase of engine vibration in icing conditions with or without engine anti-ice may be due to fan blades and/or spinner icing.

– ATHR . . . . OFF

– ENGINE ANTI ICE . . . . CHECK

If ENG ANTI ICE is off, switch it ON at idle fan speed, one engine after the other with approximately 30 seconds interval.

– THRUST LEVER (one engine at a time) . INCREASE THRUST

Increase thrust to a setting compatible with the flight phase. VIB level will come back to normal after ice shed despite a slight increase during acceleration.
Resume normal operation.

Note : If possible, shut the engine down after landing for taxiing, when vibrations above the advisory level have been experienced during the flight.

ENG 1(2) BLEED STATUS FAULT

Status of bleed valves, pack valves, wing and engine anti ice valves, X bleed valve is not received by the FADEC active channel.

■ **on ground :**

– HI GND IDLE

FADEC increases minimum idle as if valves were opened.

● **If ENG ANTI ICE on :**

– ENG MODE SEL . . . . IGN

When eng anti ice is on, there is no automatic selection of continuous relight since FADEC does not know position of engine anti ice valves position.

● **BEFORE T.O. :**

– PACK (associated side) . . . . OFF

Associated pack must be closed to reduce risk of excessive EGT.

STATUS

ENG 1(2) HI GND IDLE

■ **In flight**

● **If ENG ANTI ICE on**

– ENG MODE SEL . . . . IGN

STATUS

ENG 1(2) HI GND IDLE

UNCOMMANDED THRUST TO TOGA DURING APPROACH

If during final approach uncommanded engine thrust to TO GA occurs, a GO AROUND must be initiated.
Affected engine must be shut-down and a single engine approach initiated.

ENG 1(2) BLEED STATUS FAULT

Status of bleed valves, pack valves, wing and engine anti ice valves, X bleed valve is not received by the FADEC active channel.

■ **on ground :**

– HI GND IDLE

FADEC increases minimum idle as if valves were opened.

● **If ENG ANTI ICE on :**

– ENG MODE SEL . . . . IGN

When eng anti ice is on, there is no automatic selection of continuous relight since FADEC does not know position of engine anti ice valves position.

● **BEFORE T.O. :**

– PACK (associated side) . . . . OFF

Associated pack must be closed to reduce risk of excessive EGT.

STATUS

ENG 1(2) HI GND IDLE

■ **In flight**

● **If ENG ANTI ICE on**

– ENG MODE SEL . . . . IGN

STATUS

ENG 1(2) HI GND IDLE

UNCOMMANDED THRUST TO TOGA DURING APPROACH

If during final approach uncommanded engine thrust to TO GA occurs, a GO AROUND must be initiated.
Affected engine must be shut-down and a single engine approach initiated.

ENG 1(2) THR LEVER ABV IDLE

This alert is triggered at landing when one thrust lever is in the reverse detent while the other lever is above IDLE.

– THR LEVER (affected engine) . . . . IDLE

R # EMERGENCY EVACUATION

R *Apply this procedure when considering an emergency evacuation, or when required by the*
R *ECAM. Carefully analyze the situation before deciding to evacuate passengers. However do*
R *not waste valuable time.*

R – AIRCRAFT/PARKING BRK . . . . STOP/ON
R – ATC (VHF1) . . . . NOTIFY
Notify ATC of the nature of the emergency, and state intentions.
Only VHF 1 is available on batteries.
– CABIN CREW (PA) . . . . ALERT
R *Make a short and precise announcement to warn that an emergency evacuation may be*
R *required.*
– △P (only if MAN CAB PR has been used) . . . . . . CHECK ZERO
If △P is not at zero, MODE SEL on MAN and V/S CTL FULL UP, to fully open the outflow valve.
– ENG MASTER (ALL) . . . . OFF
Associated LP and HP valves close.
– FIRE Pushbuttons (ALL : ENG and APU) . . . . PUSH
– AGENTS (ENG and APU) . . . . AS RQRD
R *Engine Agent 2 is not available.*
R *The use of agents is required if the ENG FIRE or APU FIRE is displayed.*

R ■ **If Evacuation required :**
R – EVACUATION . . . . INITIATE
R *Announce an appropriate command such as "PASSENGER EVACUATION-EVACUATE*
R *THROUGH LH or RH DOORS" using the Passenger Address (PA) system, and press the*
R *EVAC COMMAND pushbutton, if installed.*

R ■ **If Evacuation not required :**
R – CABIN CREW and PASSENGERS (PA) . . . . NOTIFY

DITCHING

This procedure applies when engines are running. If engines are not running, refer to the QRH "ENG DUAL FAILURE" (with or without fuel remaining) procedure, which has been amended to include the ditching procedure when the engines are not running.

PREPARATION

– ATC/TRANSPONDER . . . . NOTIFY/AS RQRD
Notify ATC of the nature of emergency encountered and state intentions.
If not in contact with ATC, select transponder code A7700 or transmit a distress message on : (VHF) 121.5 MHZ or (HF) 2182 KHZ or 8364 KHZ.
– CABIN AND COCKPIT . . . . PREPARE
Notify the cabin crew of the nature of the emergency and state intentions.
Specify the available time.
· loose equipment secured
· survival equipment prepared
· belts and shoulder harnesses locked
– GPWS SYS . . . . OFF
– GPWS TERR . . . . OFF
Pressing OFF the SYS and TERR pushbuttons avoids nuisance warnings.
R – SIGNS . . . . ON
– EMER EXIT LT . . . . ON
– COMMERCIAL . . . . OFF
– LDG ELEV . . . . SELECT 00
– BARO . . . . SET
Omit normal approach and landing check list.
– CREW MASKS/OXY SUPPLY (below FL100) . . . . OFF

APPROACH

– L/G lever . . . . UP
– SLATS and FLAPS . . . . MAX AVAIL

DITCHING (CONT'D)

R **AT 2000 FEET AGL**

– CAB PRESS MODE SEL . . . . CHECK AUTO
The outflow valve would remain open, if the MODE SEL were not at AUTO.

– BLEED (ENGs and APU) . . . . OFF

R – CABIN . . . . NOTIFY FOR DITCHING

– DITCHING pushbutton . . . . ON
The outflow valve, emergency ram air inlet, avionics ventilation inlet and extract valves, and pack flow control valves close.
The ditching direction mainly depends on the wind direction, and on the state of the sea. These factors may be considered as follows :

1. Wind direction :
This may be determined by observing of the waves, which move and break downwind. Spray from the wave tops is also a reliable indicator.

2. Wind speed :
The following guidelines can be used to evaluate wind speed :
A few white crests . . . . 8-17 knots
Many white crests . . . . 17-26 knots
Streaks of foam along the water . . . . 23-35 knots
Spray from the waves . . . . 35-43 knots

3. Sea state :
This is best determined from a height of 500 to 1000 feet.
At a lower altitude, the swell direction may be less obvious than the wave direction, even though the waves are much smaller.

4. When there is no swell, align into the wind. In the presence of swell, and provided that drift does not exceed 10 degrees, ditch parallel to the swell and as nearly into wind as possible. If drift exceeds 10 degrees, ditch into the wind. The presence of drift on touchdown is not dangerous, but every effort should be made to minimize roll.
Touch down with approximately 11 degrees of pitch, and minimum aircraft vertical speed.

DITCHING (CONT'D)

R **AT 500 FEET AGL**

R – BRACE FOR IMPACT .... ORDER

R **AT TOUCHDOWN**

R – ENG MASTERS .... OFF
R – APU MASTER SW .... OFF

AFTER DITCHING

– ATC (VHF 1) .... NOTIFY
With engine and APU shutdown, only VHF 1 is supplied.
– FIRE pushbutton (ENG and APU) .... PUSH
– AGENTS (ENG and APU) .... DISCH
– EVACUATION .... INITIATE
– ELT .... CHECK EMITTING
If not, switch ON the transmitter.
After impact, the lowest point of the passenger exits (aft door) remains above the waterline for more than 7 minutes.
Note : The VHF emergency radios (P855A1 Russian type design), should be used in accordance with the instruction that is attached to it.
This emergency radio is required for use, only outside the aircraft, after emergency ditching.

FORCED LANDING

This procedure applies when engines are running. If engines are not running, refer to the QRH "ENG DUAL FAILURE" (with or without fuel remaining) procedure, which has been amended to include the forced landing procedure when the engines are not running.

PREPARATION

– ATC/TRANSPONDER . . . . NOTIFY/AS RQRD

Notify the ATC of the emergency encountered and state intentions.
If not in contact with the ATC, select transponder code A7700, or transmit a distress message on (VHF) 121.5 MHZ, or (HF) 2182 khz, or 8364 khz.

– CABIN and COCKPIT . . . . PREPARE

Notify the cabin crew of the nature of the emergency and state intentions.
Specify the available time.
· Loose equipment secured.
· Survival equipment prepared.
· Belts and shoulder harnesses locked.

– GPWS SYS . . . . OFF
– GPWS TERR . . . . OFF

Switching the SYS and TERR pushbuttons OFF avoids nuisance warnings.

R – SIGNS . . . . ON
– EMER EXIT LT . . . . ON
– COMMERCIAL . . . . OFF
– LDG ELEV . . . . SET

If not known, select an approximate value.

– BARO . . . . SET

Omit normal approach and landing checklist.

– CREW MASKS/OXY SUPPLY (below FL100) . . . . OFF

APPROACH

– RAM AIR . . . . ON

Switch ON the RAM AIR to ensure complete cabin depressurization on ground.

– L/G lever . . . . DOWN
– SLATS and FLAPS . . . . MAX AVAIL
– GND SPLR . . . . ARM
– MAX BRK PR . . . . 1000 PSi

FORCED LANDING (CONT'D)

R **AT 2000 FEET AGL**

R – CABIN . . . . NOTIFY FOR LANDING

R **AT 500 FEET AGL**

R – BRACE FOR IMPACT . . . . ORDER

R **AT TOUCHDOWN**

– ENG MASTERS . . . . OFF
R – APU MASTER SW . . . . OFF

AFTER LANDING

● **When the aircraft has stopped** :
– PARKING BRK . . . . ON
– ATC (VHF 1) . . . . USE
With both engines and APU shutdown, only VHF 1 is supplied.
– FIRE pushbutton (ENG and APU) . . . . PUSH
– AGENTS (ENG and APU) . . . . DISCH
– EVACUATION . . . . INITIATE
– ELT . . . . CHECK EMITTING
If not, switch ON the transmitter.
R *Note : The VHF emergency radios (P855A1 Russian type design), should be used*
R *in accordance with the instruction that is attached to it.*
R *This emergency radio is required for use, only outside the aircraft, after*
R *forced landing.*

EMER DESCENT

R **IMMEDIATE ACTIONS**

– CREW OXY MASKS . . . . ON

Descend with the autopilot engaged :
. Turn the ALT selector knob and pull.
. Turn the HDG selector knob and pull.
. Adjust the target SPD/MACH.
Use of the autopilot is also permitted in EXPEDITE mode (⩤).

– THR LEVERS (if A/THR not engaged) . . . . IDLE

– SPD BRK . . . . FULL

Extension of the speedbrakes will significantly increase Vls.
To avoid autopilot disconnection and automatic retraction of the speedbrakes, due to possible activation of the angle of attack protection, allow the speed to increase before starting to use the speedbrakes.

R **WHEN DESCENT ESTABLISHED**

– EMER DESCENT FL 100 or minimum allowable altitude.

– SPEED . . . . MAX/APPROPRIATE

CAUTION

Descend at the maximum appropriate speed. If structural damage is suspected, use the flight controls with care and reduce speed as appropriate.

Landing gear may be extended below 25000 feet. Speed must be reduced to VLO/VLE.

– SIGNS . . . . ON

– ENG MODE SEL . . . . IGN

– ATC . . . . NOTIFY

Notify ATC of the nature of the emergency, and state intentions.
If not in contact with ATC, select transponder code A 7700, or transmit a distress message on (VHF) 121.5 MHZ, or (HF) 2182 KHZ, or 8364 KHZ.
· To save oxygen, set the oxygen diluter selector to the N position.
· With the oxygen diluter selector left at 100 %, oxygen quantity may be insufficient to cover the entire emergency descent profile.
· Ensure crew communication is established with oxygen masks. Avoid continuous use of the interphone to minimize interference from the oxygen mask breathing noise.

● **IF CAB ALT > 14 000 feet :**

– PAX OXY MASKS . . . . MAN ON

Confirm passenger oxygen masks released.
Note : Notify the cabin crew, when a safe flight level has been reached and oxygen mask use can be terminated.

OVERWEIGHT LANDING

– LDG CONF . . . . AS REQUIRED

Use the ECAM flap setting, if required for abnormal operations. In all other cases :
– FULL is preferred for optimized landing performance.
– If the aircraft weight is above the maximum weight for go-around (given in the table below), use FLAP 3 for landing.

In all cases, if landing configuration is different from FLAP FULL, use 1+F for go-around.

Note : At very high weights, VFE CONF1 is close to VLS clean. To select CONF1, deselect A/THR, decelerate to (or slightly below) VLS and select CONF1 when below VFE. When established at CONF1, the crew can reengage A/THR and use managed speed again.

– LDG DIST . . . . CHECK

– PACK 1 and 2 . . . . OFF or supplied by APU

Selecting packs OFF (or supplied from APU) will increase the maximum thrust available from the engines, in the event of a go-around.

● **In the final stages of approach**

– TARGET SPEED . . . . VLS

Reduce the selected speed on the FCU to reach VLS at runway threshold.
Touch down as smoothly as possible (Maximum V/S at touchdown 360 ft/min).

● **At main landing gear touchdown**

– REVERSE THRUST . . . . USE MAX AVAILABLE

● **After nosewheel touchdown**

– BRAKES . . . . APPLY AS NECESSARY

Maximum braking may be used after nosewheel touchdown. But, if landing distance permits, delay or reduce braking to take full benefit of the available runway length.

● **Landing complete**

– BRAKE FANS (◅) . . . . ON

R *Be prepared for tire deflation, if temperatures exceed 800° C.*

MAXIMUM WEIGHT FOR GO AROUND IN CONF 3 (1000 kg)

OAT °C	AIRPORT ELEVATION (FT)							
	0	**2000**	**4000**	**6000**	**8000**	**10000**	**12000**	**14000**
<10	94	90	85	79	74	68	62	57
15	94	90	85	79	73	67	60	55
20	94	89	84	78	71	64	58	53
25	94	89	82	76	69	62	57	51
30	93	86	80	73	66	60	55	
35	89	83	77	69	63			
40	85	79	72	66				
45	80	74	68					
50	75	69						
55								

EMER DESCENT

R **IMMEDIATE ACTIONS**

- CREW OXY MASKS . . . . ON

  Descend with the autopilot engaged :
  . Turn the ALT selector knob and pull.
  . Turn the HDG selector knob and pull.
  . Adjust the target SPD/MACH.
  Use of the autopilot is also permitted in EXPEDITE mode (◁).
- THR LEVERS (if A/THR not engaged) . . . . IDLE
- SPD BRK . . . . FULL

  Extension of the speedbrakes will significantly increase Vls.
  To avoid autopilot disconnection and automatic retraction of the speedbrakes, due to possible activation of the angle of attack protection, allow the speed to increase before starting to use the speedbrakes.

R **WHEN DESCENT ESTABLISHED**

- EMER DESCENT FL 100 or minimum allowable altitude.
- SPEED . . . . MAX/APPROPRIATE

> CAUTION
> Descend at the maximum appropriate speed. If structural damage is suspected, use the flight controls with care and reduce speed as appropriate.

Landing gear may be extended below 25000 feet. Speed must be reduced to VLO/VLE.

- SIGNS . . . . ON
- ENG MODE SEL . . . . IGN
- ATC . . . . NOTIFY

  Notify ATC of the nature of the emergency, and state intentions.
  If not in contact with ATC, select transponder code A 7700, or transmit a distress message on (VHF) 121.5 MHZ, or (HF) 2182 KHZ, or 8364 KHZ.
  · To save oxygen, set the oxygen diluter selector to the N position.
  · With the oxygen diluter selector left at 100 %, oxygen quantity may be insufficient to cover the entire emergency descent profile.
  · Ensure crew communication is established with oxygen masks. Avoid continuous use of the interphone to minimize interference from the oxygen mask breathing noise.

● **IF CAB ALT > 14 000 feet :**

- PAX OXY MASKS . . . . MAN ON

  Confirm passenger oxygen masks released.
  Note : Notify the cabin crew, when a safe flight level has been reached and oxygen mask use can be terminated.

OVERWEIGHT LANDING

Note : Automatic landing is certified up to MLW, but flight tests have been performed
R *successfully up to 69 tons (152 117 lb). In case of emergency, and under crew*
R *responsibility, an automatic landing may be performed up to 69 tons (152 117 lb) provided that the runway is approved for automatic landing.*

– LDG CONF . . . . AS REQUIRED

Use the ECAM flap setting, if required for abnormal operations. In all other cases :
- *FULL is preferred for optimized landing performance.*
- *If the aircraft weight is above the maximum weight for go-around (given in FCOM 3.02.80 p 8a), use FLAP 3 for landing.*

In all cases, if landing configuration is different from FLAP FULL, use 1+F for go-around.

Note : For weights greater than 68000 kg (150 000 lb) S speed is greater than VFE CONF 2 (200 knots). Consequently the crew must select on FCU a speed below 200 knots before setting FLAPS 2. When in FLAPS 2, the crew can use managed speed again.

– LDG DIST . . . . CHECK

– PACK 1 and 2 . . . . OFF or supplied by APU

Selecting packs OFF (or supplied from APU) will increase the maximum thrust available from the engines, in the event of a go-around.

● **In the final stages of approach**

– TARGET SPEED . . . . VLS

Reduce the selected speed on the FCU to reach VLS at runway threshold.
Touch down as smoothly as possible (Maximum V/S at touchdown 360 ft/min)

● **At main landing gear touchdown**

– REVERSE THRUST . . . . USE MAX AVAILABLE

● **After nosewheel touchdown**

– BRAKES . . . . APPLY AS NECESSARY

Maximum braking may be used after nosewheel touchdown. But, if landing distance permits, delay or reduce braking to take full benefit of the available runway length.

● **Landing complete**

– BRAKE FANS (◁) . . . . ON

Be prepared for tire deflation, if temperatures exceed 800° C.

EMER DESCENT

R **IMMEDIATE ACTIONS**

– CREW OXY MASKS . . . . ON

Descend with the autopilot engaged :
. Turn the ALT selector knob and pull.
. Turn the HDG selector knob and pull.
. Adjust the target SPD/MACH.
Use of the autopilot is also permitted in EXPEDITE mode (⊲).

– THR LEVERS (if A/THR not engaged) . . . . IDLE

– SPD BRK . . . . FULL

Extension of the speedbrakes will significantly increase Vls.
To avoid autopilot disconnection and automatic retraction of the speedbrakes, due to possible activation of the angle of attack protection, allow the speed to increase before starting to use the speedbrakes.

R **WHEN DESCENT ESTABLISHED**

– EMER DESCENT FL 100 or minimum allowable altitude.

– SPEED . . . . MAX/APPROPRIATE

CAUTION

Descend at the maximum appropriate speed. If structural damage is suspected, use the flight controls with care and reduce speed as appropriate.

Landing gear may be extended below 25000 feet. Speed must be reduced to VLO/VLE.

– SIGNS . . . . ON

– ENG MODE SEL . . . . IGN

– ATC . . . . NOTIFY

Notify ATC of the nature of the emergency, and state intentions.
If not in contact with ATC, select transponder code A 7700, or transmit a distress message on (VHF) 121.5 MHZ, or (HF) 2182 KHZ, or 8364 KHZ.
· To save oxygen, set the oxygen diluter selector to the N position.
· With the oxygen diluter selector left at 100 %, oxygen quantity may be insufficient to cover the entire emergency descent profile.
· Ensure crew communication is established with oxygen masks. Avoid continuous use of the interphone to minimize interference from the oxygen mask breathing noise.

● **IF CAB ALT > 14 000 feet :**

– PAX OXY MASKS . . . . MAN ON

Confirm passenger oxygen masks released.
Note : Notify the cabin crew, when a safe flight level has been reached and oxygen mask use can be terminated.

OVERWEIGHT LANDING

– LDG CONF . . . . AS REQUIRED

Use the ECAM flap setting, if required for abnormal operations. In all other cases :

– FULL is preferred for optimized landing performance.

– If the aircraft weight is above the maximum weight for go-around (given in the table below), use FLAP 3 for landing.

In all cases, if landing configuration is different from FLAP FULL, use 1+F for go-around.

R *Note : For weights greater than 70000 kg (or 154 000 lb) S speed is greater than VFE*
R *CONF 2 (200 knots). Consequently the crew must select on FCU a speed below*
R *200 knots before setting FLAPS 2. When in FLAPS 2, the crew can use managed*
R *speed again.*

– LDG DIST . . . . CHECK

– PACK 1 and 2 . . . . OFF or supplied by APU

Selecting packs OFF (or supplied from APU) will increase the maximum thrust available from the engines, in the event of a go-around.

● **In the final stages of approach**

– TARGET SPEED . . . . VLS

Reduce the selected speed on the FCU to reach VLS at runway threshold.
Touch down as smoothly as possible (Maximum V/S at touchdown 360 ft/min).

● **At main landing gear touchdown**

– REVERSE THRUST . . . . USE MAX AVAILABLE

● **After nosewheel touchdown**

– BRAKES . . . . APPLY AS NECESSARY

Maximum braking may be used after nosewheel touchdown. But, if landing distance permits, delay or reduce braking to take full benefit of the available runway length.

● **Landing complete**

– BRAKE FANS (◁) . . . . ON

Be prepared for tire deflation, if temperatures exceed 800° C.

MAXIMUM WEIGHT FOR GO AROUND IN CONF 3 (1000 kg)								
OAT °C	AIRPORT ELEVATION (FT)							
	0	2000	4000	6000	8000	10000	12000	14000
<10	85	83	84	81	77	71	66	61
15	85	83	83	81	77	70	64	57
20	85	83	83	81	75	67	61	55
25	85	83	83	79	72	64	58	
30	84	83	81	77	69			
35	84	83	79	73	66			
40	84	81	75	69				
45	82	76	70					
50	78	72						
55								

OVERWEIGHT LANDING (CONT'D)

MAXIMUM WEIGHT FOR GO AROUND IN CONF 3 (1000 kg)								
OAT °C	AIRPORT ELEVATION (FT)							
	0	2000	4000	6000	8000	10000	12000	14000
<10	70	68	66	63	61	59	57	54
15	69	67	66	63	61	59	56	54
20	69	67	66	63	61	59	56	52
25	69	67	65	63	61	58	53	49
30	69	67	65	63	59	55	50	
35	69	67	65	61	57			
40	69	67	63	58				
45	68	64	60					
50	65	61						
55								

CREW INCAPACITATION

If a cockpit crew member becomes incapacitated, the remaining crew member must call a cabin attendant as soon as practicable. The best way to request assistance from the cabin crew, is by means of the passenger address system :
"ATTENTION, PURSER TO COCKPIT PLEASE". The purser or any other cabin attendant must proceed to the cockpit immediately.
The cabin attendant must then :

- tighten and manually lock the shoulder harness of the incapacitated crew member ;
- push the seat completely aft ;
- recline the seat back.

It takes 2 people to remove the dead weight of an unconscious body from a seat without endangering any controls and switches.
If it is not possible to remove the body, one cabin attendant must remain in the cockpit to take care of and observe the incapacited crew member.
In coordination with the purser :

- request assistance from any medically qualified passenger.
- check if a type qualified company pilot is on board to replace the incapacitated crew member.

BOMB ON BOARD

IF POSSIBLE, LAND AND EVACUATE THE AIRCRAFT IMMEDIATELY.

R If it is not possible to land and evacuate the aircraft within 30 minutes, apply the following procedures :

COCKPIT PROCEDURES

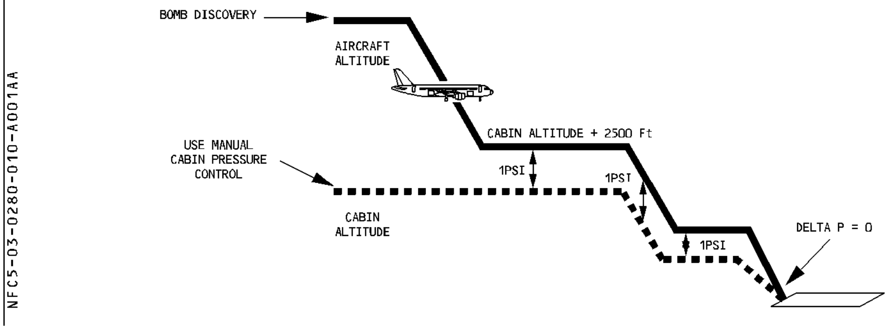
Background

To avoid the activation of an altitude-sensitive bomb, the cabin altitude should not exceed the value at which the bomb has been discovered.
To reduce the effects of the explosion, the aircraft should fly as long as possible with approximately 1 PSI differential pressure, to help the blast go outwards. 1 PSI differential pressure corresponds to a 2500 feet difference between the aircraft and the cabin altitude.
These conditions are achieved by using the manual pressure control.

Procedure

The following procedure assumes that it is initiated during climb or cruise :
- First, maintain the cabin altitude.
- While maintaining the cabin altitude, descend the aircraft to the cabin altitude + 2500 feet and maintain delta P at 1 PSI.
- During further steps of descent, maintain delta P at 1 PSI.
- For landing, reduce the differential pressure to zero, until the final approach.

If flight conditions are different, the crew should adapt the procedure, bearing in mind the above-mentioned principles (background paragraph).



BOMB ON BOARD (CONT'D)

R – AIRCRAFT (if climbing) . . . . LEVEL OFF
R – CABIN PRESS MODE SEL . . . . MAN
R *The purpose is to immediately prevent the cabin altitude from increasing, in order to avoid*
R *the activation of an altitude-sensitive bomb.*
R – CAB ALT . . . . MAINTAIN
R *Use MAN V/S CTL to maintain the cabin altitude at the value it had when the bomb was*
R *discovered.*
R – CABIN CREW . . . . NOTIFY
R – ATC/COMPANY OPERATIONS . . . . NOTIFY
R *To obtain expert advice from explosive specialists.*
R – FUEL RESERVES . . . . DETERMINE
R *Keep in mind that when flying at cabin altitude + 2500ft, fuel consumption in CONF 1,*
R *with landing gear down, will be about 2.1 times that consumed in clean configuration.*
R – NEXT SUITABLE AIRPORT . . . . DETERMINE
R – FCU SPEED SELECTION KNOB . . . . PULL AND TURN
R *Select the most appropriate speed, taking into account the time to destination, the fuel*
R *consumption and the fact that low speed could reduce the consequences of possible*
R *structural damage, if the bomb explodes.*
R – DESCENT TO CAB ALT + 2500 FT or MEA or minimum obstacle
R clearance altitude . . . . INITIATE
R *Descending to 2500ft above the cabin altitude gives a cabin differential pressure of*
R *approximately 1 PSI, which helps to ensure that the blast goes outwards, if the bomb*
R *explodes.*
R – AVOID SHARP MANEUVERS
R *which might result in the bomb moving.*
R – CAB ALT . . . . MAINTAIN
R *Use MAN V/S CTL to maintain the cabin altitude. Initially brief UP input should be*
R *required; but, be careful not to increase the cabin altitude.*
R ● **When at CAB ALT + 2500 FT :**
R – 1 PSI DELTA P . . . . MAINTAIN
R *Use MAN V/S CTL to adjust delta P to 1 PSI. Brief DN input should be initially required*
R *to set 0 ft/min cabin vertical speed.*
R – GALLEY/COMMERCIAL (⊲) . . . . OFF
R – FLAPS (fuel permitting) . . . . AT LEAST CONF 1
R *For landing, use normal configuration.*

⇩

BOMB ON BOARD (CONT'D)

- LANDING GEAR (fuel permitting, except for flight over water) .... DOWN

  The detonation could damage the landing systems. Therefore, if fuel permits, configure the aircraft for landing as soon as possible. Reducing the speed will minimize stress on the aircraft structure.

● **For any other steps of descent :**

- 1 PSI DELTA P .... MAINTAIN

  Use MAN V/S CTL to DN to adjust delta P to 1 PSI.

● **During approach :**

- CABIN PRESS MODE SEL .... AUTO

  The purpose is to allow the CPC to automatically control the cabin altitude to 0 during final approach.

● **When the aircraft is on ground and stopped in a remote area (if possible) :**

- EVACUATION .... INITIATE

  Avoid exits and exiting on the same side as the bomb and near the bomb.

CABIN PROCEDURES

If a suspect device is found in the cabin :

> WARNING
> Do not cut or disconnect any wires and do not open or attempt to gain entry to internal components of a closed or concealed suspect device. Any attempt may result in an explosion. Booby-trapped closed devices have been used on aircraft in the past.

> WARNING
> Alternate locations must not be used without consulting with an aviation explosives security specialist. Never take a suspect device to the flight deck.

> CAUTION
> The least risk bomb location for the aircraft structure and systems is center of the RH aft cabin door.

- EOD PERSONNEL ON BOARD .... CHECK

  Announce "Is there any EOD personnel on board ?". By using the initials, only persons familiar with EOD (Explosive Ordnance Disposal) will be made aware of the problem.

BOMB ON BOARD (CONT'D)

– BOMB .... DO NOT OPEN, DO NOT CUT WIRES, SECURE AGAINST SLIPPING, AVOID SHOCKS

Secure in the attitude found and do not lift before having checked for an anti-lift ignition device.

– PASSENGERS .... LEAD AWAY FROM BOMB

Move passengers at least 4 seat rows away from the bomb location. On full flights, it may be necessary to double up passengers to achieve standoff from the suspect device.
Passengers near the bomb should protect their heads with pillows, blankets.
All passengers must remain seated with seatbelts on and, if possible, head below the top of the head rest. Seat backs and tray tables should be in their full upright position.
Service items may need to be collected in order to secure tray tables.

– PORTABLE ELECTRONIC DEVICES .... SWITCH OFF

The cabin crews must command passengers to switch off all portable electronic devices.

– BOMB .... CHECK NO ANTI-LIFT DEVICE

To check for an anti-lift switch or lever, slide a string or stiff card, (such as the emergency information card) under the bomb, without disturbing the bomb.
If the string or card cannot be slipped under the bomb, it may indicate that an anti-lift switch or lever is present and that the bomb cannot be moved.
If a card is used and can be slid under the bomb, leave it under the bomb and move together with the bomb.
If it is not possible to move the bomb, then it should be surrounded with a single thin sheet of plastic (e. g. trash bag), then with wetted materials, and other blast attenuation materials such as seat cushions and soft carry-on baggage. Move personnel as far away from the bomb location as possible.

– EMERGENCY EQUIPMENTS .... REMOVE AND STOW

Emergency equipments (PBE, fire extinguisher, ...) located close to the LRBL must be removed and stowed in alternate location.

– GALLEY/IFE POWER .... OFF

All galley and IFE equipments located close to the LRBL must be switched off.

● **If the bomb can be moved** :

– RH AFT CABIN DOOR SLIDE .... DISARM

BOMB ON BOARD (CONT'D)

– LEAST RISK BOMB LOCATION (LRBL) . . . . PREPARE

Build up a platform of solid baggage against the door up to about 25 cm (10 in) below the middle of the door.
On top of this, build up at least 25 cm (10 in) of wetted material such as blankets and pillows.
Place a single thin sheet of plastic (e. g. trash bag) on top of the wetted materials. This prevents any possible short circuit.

CAUTION
DO NOT OMIT THE PLASTIC SHEETS, AS THE SUSPECT DEVICE COULD GET WET AND POSSIBLY SHORT CIRCUIT ELECTRONIC COMPONENTS CAUSING INADVERTENT DEVICE ACTIVATION.

– BOMB INDICATION LINE . . . . POSITION

Note : *A bomb location indicator line is a 6 to 8 foot (1.8 to 2.4 m) (e.g. neckties, headset cord, or belts connected together) preferably of constrating color, that helps the responding bomb squad find the precise location of the suspect device within the LRBL stack once constructed.*

Position the bomb indication line from the location on the platform where you will place the suspect device, EXTENDING outward into the aisle.

– BOMB . . . . MOVE TO LRBL

Carefully carry in the attitude found and place on top of the wetted materials in the same attitude and as close to the door structure as possible.

CAUTION
Ensure that the suspect device, when placed on the stack against the door, is above the slide pack but not against the door handle, and if possible, avoid placement in the view port.

– LEAST RISK BOMB LOCATION (LRBL) . . . . COMPLETE

Place an additional single thin sheet of plastic over the bomb.

CAUTION
DO NOT OMIT THE PLASTIC SHEETS, AS THE SUSPECT DEVICE COULD GET WET AND POSSIBLY SHORT CIRCUIT ELECTRONIC COMPONENTS CAUSING INADVERTENT DEVICE ACTIVATION.

BOMB ON BOARD (CONT'D)

Build up at 25 cm (10 in) of wetted material around the sides and on top of the bomb.

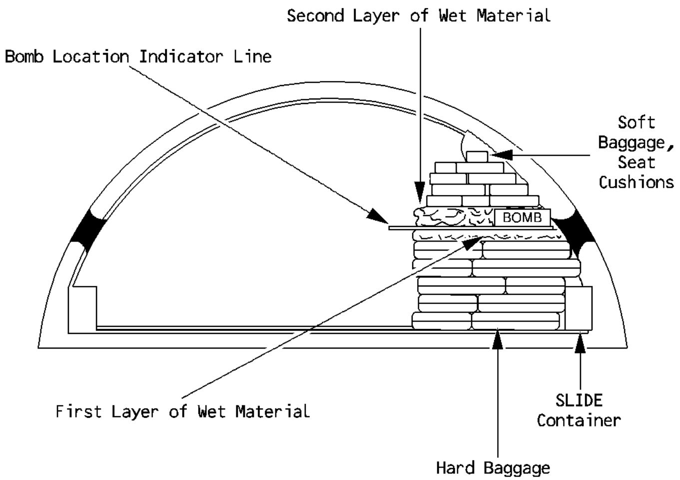
DO NOT PLACE ANYTHING BETWEEN THE BOMB AND THE DOOR, AND MINIMIZE AIRSPACE AROUND THE BOMB.

The idea is to build up a protective surrounding of the bomb so that the explosive force is directed in the only unprotected area into the door structure.

Fill the area around the bomb with seat cushions and other soft materials such as hand luggage (saturated with water or any other nonflammable liquid) up to the cabin ceiling, compressing as much as possible. Secure the LRBL stack in place using belt, ties or other appropriate materials. The more material stacked around the bomb, the less the damage will be.

USE ONLY SOFT MATERIAL. AVOID USING MATERIALS CONTAINING ANY INFLAMMABLE LIQUID AND ANY METAL OBJECTS WHICH COULD BECOME DANGEROUS PROJECTILES.

LRBL STACK



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BOMB ON BOARD (CONT'D)

– PASSENGERS .... MOVE/ADVISE

Move passengers at least 4 seat rows away from the least risk bomb location (RH aft cabin door). On full flights, it may be necessary to double up passengers to achieve standoff from the suspect device.

Passengers near the bomb should protect their heads with pillows, blankets. All passengers must remain seated with seatbelts on and, if possible, head below the top of the head rest. Seat backs and tray tables must be in their full upright position.

– CABIN CREW .... NOTIFY COCKPIT CREW

Cabin crew notify the flight crew that the bomb is secured at the LRBL.

– EVACUATION/DISEMBARKATION .... EXECUTE

Evacuate through normal and emergency exits on the opposite side of the "bomb" location. Do not use the door just opposite the "bomb".

Use all available airport facilities to disembark without delay.

VOLCANIC ASH ENCOUNTER

Accomplish the following while making a 180 degrees turn:

– ATC . . . . NOTIFY
– A/THR . . . . OFF
  This prevents the autothrust from generating thrust variations.
– THRUST (conditions permitting) . . . . DECREASE
  So as to reduce ash ingestion.
  If altitude permits, reduce thrust to idle. This maximizes engine surge margin and lowers engine turbine temperature.
– CREW OXYGEN MASKS . . . . ON/100 %
– CABIN CREW . . . . NOTIFY
– PASSENGER OXYGEN . . . . AS RQRD
  Depending on contamination.
– ENG ANTI ICE . . . . ON
– WING ANTI ICE . . . . ON
– PACK FLOW . . . . HI
– APU . . . . START
  If possible, start the APU and have it ready for an assisted engine relight in the event of an engine flame-out. Refer to APU limitations (refer to 3.01.49).
– ENGINE PARAMETERS . . . . MONITOR
  Monitor particularly EGT. If EGT exceeds limits, it may become necessary to consider a precautionary engine shutdown and engine restart in flight.
– AIRSPEED INDICATIONS . . . . MONITOR
R *If airspeed is unreliable or lost, use the UNRELIABLE SPEED INDICATION/ADR CHECK*
R *PROC procedure.*
  Note : · *If both engines flame out and speed indications are lost, use the DUAL ENGINE FAILURE procedure to get the required pitch attitude for the optimum relight speed.*
  · *In case of engine failure, switch off the wing anti ice before engine restart.*

COCKPIT WINDSHIELD/WINDOW CRACKED

In case of a one ply failure, whichever one it may be, the windshield is still able to sustain the maximum differential pressure. However, because the pilot is unable to accurately determine how many plies have failed, the differential pressure must be reduced to 5 PSI by applying the following procedure :

MAX FL 230

The maximum flight level is restricted to FL230 to obtain △P 5 PSI, without resulting in an excessive cabin altitude and corresponding EXCESS CAB ALT warning.
The following procedure, allows maintaining △P 5 PSI in manual cabin pressure mode.

– CAB PRESS MODE SEL . . . . MAN
– MAN V/S CTL . . . . AS RQRD
  Set the cabin altitude, according to the table below :

△P = 5 PSI	FL	100	150	200	230
	CABIN ALTITUDE	0	3 000	6 000	8 000

● **When starting the final descent :**
  – CAB PRESS MODE SEL . . . . AUTO

COCKPIT WINDSHIELD/WINDOW ARCING

– Affected WINDOW/WINSHIELD ANTI ICE C/B . . . . PULL
  In case of electrical arcing, pull the circuit breaker of the affected window/windshield heating system on the rear C/B panel :

R *. ANTI ICE L WHSLD (AF10 on 123VU) . ANTI ICE/WINDOWS L C/B (X14 on 122VU)*
R *. ANTI ICE R WHSLD (AF03 on 123VU). ANTI ICE/WINDOWS R C/B (W14 on 122VU)*

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Accomplish the following while making a 180 degrees turn:

- ATC . . . . NOTIFY
- A/THR . . . . OFF
  This prevents the autothrust from generating thrust variations.
- THRUST (conditions permitting) . . . . DECREASE
  So as to reduce ash ingestion.
  If altitude permits, reduce thrust to idle. This maximizes engine surge margin and lowers engine turbine temperature.
- CREW OXYGEN MASKS . . . . ON/100 %
- CABIN CREW . . . . NOTIFY
- PASSENGER OXYGEN . . . . AS REQUIRED
  Depending on contamination.
- ENG ANTI ICE . . . . ON
- WING ANTI ICE . . . . ON
- ECON FLOW . . . . OFF
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ECAM ADVISORY CONDITIONS

SYSTEM	CONDITIONS	RECOMMENDED ACTION
CAB PRESS	CAB VERTICAL SPEED V/S > 1800 ft/min	CPC changeover may be attempted : MODE SEL . . . . MAN Wait 10 seconds, then : MODE SEL . . . . .AUTO
	CAB ALTITUDE altitude ≥ 8800 ft	MODE SEL . . . . MAN Manual pressure control
	CAB DIFF PRESS △ P ≥ 1.5 psi in phase 7	LDG ELEV . . . . MAN ADJUST If unsuccessful : MODE SEL . . . . MAN Manual pressure control
ELEC	IDG OIL TEMP ≥ 147°C	Reduce IDG load, if possible (GALLEY or GEN OFF). If required, restore when the temperature has dropped. Restrict generator use to a short time, if temperature rises again excessively.
FUEL	Difference between wing fuel quantities is greater than 1500 kg (3307 lb).	FUEL MANAGEMENT . . . . CHECK If a fuel leak is suspected, refer to the FUEL LEAK procedure. For limitations, see 3.01.28.
	Fuel temp is greater than : 45°C in inner cell, or 55°C in outer cell.	GALLEY . . . . OFF
	Fuel temp is lower than – 40°C in inner or outer cell.	Consider descending to a lower altitude, and/or increasing Mach to increase TAT.
OXY	Cockpit oxygen bottle pressure < 800 psi.	If mask is not being used, check if it is correctly stowed, as per FCOM 1.35.20.
APU	EGT > EGT MAX – 33°C (inhibited during APU start).	
	OIL QTY (LOW OIL LEVEL message pulses).	If there is no oil leak, then the remaining oil quantity allows normal APU operation for about 10 hours.

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SYSTEM	CONDITIONS	RECOMMENDED ACTION
ENG	OIL PRESS P < 16 PSI	· If oil pressure is between 16 and 13 psi (advisory), continue normal operation. · If oil pressure is below 13 psi (red indication) without the ENG OIL LO PR ECAM warning, continue normal engine operation (it can be assumed that the oil pressure transducer is faulty). In both cases, monitor other engine parameters especially oil temperature and oil quantity.
	OIL PRESS P > 90 PSI	Monitor other engine parameters closely for symptoms of engine malfunction. If high oil pressure is not accompanied by other abnormal indications operate engine normally for remainder of flight. Record high oil pressure and corresponding N2 readings for maintenance action.
	OIL TEMP T > 140°C	A rise in oil temperature during normal steady-state operation indicates a system malfunction and should be closely monitored for other symptoms of engine malfunction. *Note : If OIL TEMP rise follows thrust reduction, increasing thrust may reduce oil temperature.* In addition, a rise in oil temperature could be related to the IDG oil cooling system. To reduce oil temperature rise before limits are reached, the following are recommended : 1. Low Speed - Increase engine speed to increase fuel flow and thereby cool IDG oil. 2. High Speed - Reduce generator load or turn off generator. If oil temperature continues to rise, mechanically disconnect IDG.
	OIL QTY < 3 qt	If oil quantity low at high power setting, expect level increase after power reduction
	NAC TEMP ≥ 240°C	Monitor engine parameters and cross check with other engine
	VIBRATION N1 ≥ 6 units N2 ≥ 4,3 units	Refer to HIGH ENGINE VIBRATION procedure. *Note : The advisory threshold may be decreased by a MCDU procedure at the level of vibration reached during the last flight.* *If this function has been activated, the N1 and N2 VIB indication will respectively pulse below 6 and 4.3.*

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LDG CONF/APPR SPD/LDG DIST FOLLOWING FAILURES

A320 FAMILY	FAILURE		FLAPS LEVER POSITION FOR LDG	△ VREF APPR SPD INCREMENT	MULTIPLY LDG DIST (CONF FULL) BY		
					DRY	WET (b)	CONTA (b)
ELEC	AC BUS 1		Norm (a)	–	1.20	1.20	1.10
	DC BUS 2		Norm (a)	–	1.25	1.35	1.25
	DC ESS BUS (if no Ice accretion)		Norm (a)	–	1.20	1.25	1.20
	DC ESS BUS (if Ice accretion)		Norm (a)	10	1.35	1.40	1.30
	DC EMER CONF		Norm (a)	–	3.05	2.55	2.25
	DC BUS 1+2 (if no Ice accretion)		Norm (a)	–	1.95	1.65	1.45
	DC BUS 1+2 (if Ice accretion)		Norm (a)	10	2.20	1.85	1.65
	EMER ELEC CONF		3	10	2.65	2.30	2.15
FTL CTL	ONE SPLR FAULT		Norm (a)	–	1.20	1.20	1.10
	TWO SPLR FAULT		Norm (a)	–	1.25	1.25	1.15
	THREE SPLR FAULT		Norm (a)	–	1.30	1.25	1.20
	ALL SPLR FAULT		Norm (a)	–	1.50	1.50	1.40
	SEC 1 or SEC 3 FAULT		Norm (a)	–	1.25	1.25	1.15
	SEC 2 FAULT		Norm (a)	–	1.20	1.20	1.10
	SEC 2+3 FAULT		Norm (a)	–	1.25	1.25	1.15
	SEC 1+3 FAULT		Norm (a)	–	1.35	1.45	1.40
	SEC 1+2 FAULT		Norm (a)	–	1.25	1.30	1.25
	SEC 1+2+3 FAULT		3	10	1.60	2.20	2.25
	ALTN LAW/DIRECT LAW/ELAC 1+2/L+R ELEV FAULT/L(R) ELEV FAULT/STAB JAM		3	10	1.35*	1.30*	1.25*
FLAPS/ SLATS	FLAPS and SLATS at zero		1	60 (APPR) 50 (THRESHOLD)	2.40*	2.10*	2.10*
	FLAPS <1	S<1	3	45	2.30*	2.00*	2.00*
		S≥1	3	25	1.95*	1.60*	1.60*
	1≤FLAPS<2	S<1	3	30	1.85*	1.70*	1.60*
		S≥1	3	15	1.50*	1.45*	1.35*
	2≤FLAPS<3	S<1	3	25	1.70*	1.55*	1.50*
		S≥1	3	10	1.40*	1.35*	1.25*
	FLAPS = 3	S<1	3	25	1.65*	1.55*	1.50*
		1≤S≤3	3	10	1.35*	1.30*	1.25*
		S>3	3	5	1.30*	1.25*	1.20*
	FLAPS > 3	S<1	NOT ALLOWED				
		1≤S≤3	FULL	10	1.30*	1.30*	1.20*
		S>3	FULL	5	1.25*	1.25*	1.15*
HYD	GREEN		Norm (a)	–	1.30	1.35	1.30
	BLUE		Norm (a)	–	1.20	1.20	1.10
	YELLOW		Norm (a)	–	1.25	1.30	1.20
	GREEN + BLUE		3	25	1.80	2.00	1.95
	GREEN + YELLOW		3	25	2.80	2.45	2.45
	BLUE + YELLOW		Norm (a)	–	1.70	1.90	1.85

(a) If “CONF 3” is used when “NORM” is indicated in the table, add 6 knots to the VREF and multiply the resulting landing distance by an additional factor of 1.10.

(b) The landing distance coefficients for wet or contaminated runways assume the use of maximum reverse thrust on all of the operative reversers. Apply these coefficients to the actual landing distance with reversers.

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A320 FAMILY	FAILURE	FLAPS LEVER POSITION FOR LDG	△ VREF APPR SPD INCREMENT	MULTIPLY LDG DIST (CONF FULL) BY		
				DRY	WET (b)	CONTA (b)
BRK	ANTI SKID	Norm (a)	–	1.75	1.30	1.10
	AUTO BRK FAULT	Norm (a)	–	1.40	1.25	1.20
NAV	IR 1+2+3 FAULT	3	10	2.60	2.10	1.70
	UNRELIABLE SPEED INDICATION/ADR CHECK PROC	3	15	1.45*	1.4*	1.3*
	DUAL IR FAULT/DUAL ADR FAULT ADR 1+2+3 FAULT	3	10	1.35*	1.30*	1.25*
BLEED	WING ANTI ICE NOT AVAIL (if Ice Accretion)	Norm (a)	10	1.30	1.30	1.20
ENG	REV UNLOCK with buffet	1**	55 (APPR) 40 (THRESHOLD)	2.15*	2.05*	2.05*
	REV UNLOCK with buffet	3**	10	1.35*	1.40*	1.35*

(a) If “CONF 3” is used when “NORM” is indicated in the table, add 6 knots to the VREF and multiply the resulting landing distance by an additional factor of 1.10.

(b) The landing distance coefficients for wet or contaminated runways assume the use of maximum reverse thrust on all of the operative reversers. Apply these coefficients to the actual landing distance with reversers.

* See below for multiple failures

** The applicable landing configuration (CONF 1 or CONF 3) is displayed on the ECAM STATUS page.

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LDG CONF/APPR SPD/LDG DIST FOLLOWING FAILURES

A320 FAMILY	FAILURE		FLAPS LEVER POSITION FOR LDG	△ VREF APPR SPD INCREMENT	MULTIPLY LDG DIST (CONF FULL) BY		
					DRY	WET (b)	CONTA (b)
ELEC	AC BUS 1		Norm (a)	–	1.20	1.20	1.10
	DC BUS 2		Norm (a)	–	1.25	1.35	1.25
	DC ESS BUS (if no Ice accretion)		Norm (a)	–	1.20	1.25	1.20
	DC ESS BUS (if Ice accretion)		Norm (a)	10	1.35	1.40	1.30
	DC EMER CONF		Norm (a)	–	3.05	2.55	2.25
	DC BUS 1+2 (if no Ice accretion)		Norm (a)	–	1.95	1.65	1.45
	DC BUS 1+2 (if Ice accretion)		Norm (a)	10	2.20	1.85	1.65
	EMER ELEC CONF		3	10	2.65	2.30	2.15
FTL CTL	ONE SPLR FAULT		Norm (a)	–	1.20	1.20	1.10
	TWO SPLR FAULT		Norm (a)	–	1.25	1.25	1.15
	THREE SPLR FAULT		Norm (a)	–	1.30	1.25	1.20
	ALL SPLR FAULT		Norm (a)	–	1.50	1.50	1.40
	SEC 1 or SEC 3 FAULT		Norm (a)	–	1.25	1.25	1.15
	SEC 2 FAULT		Norm (a)	–	1.20	1.20	1.10
	SEC 2+3 FAULT		Norm (a)	–	1.25	1.25	1.15
	SEC 1+3 FAULT		Norm (a)	–	1.35	1.45	1.40
	SEC 1+2 FAULT		Norm (a)	–	1.25	1.30	1.25
	SEC 1+2+3 FAULT		3	10	1.60	2.20	2.25
	ALTN LAW/DIRECT LAW/ELAC 1+2/L+R ELEV FAULT/L(R) ELEV FAULT/STAB JAM		3	10	1.35*	1.30*	1.25*
FLAPS/ SLATS	FLAPS and SLATS at zero		1	60 (APPR) 50 (THRESHOLD)	2.40*	2.10*	2.10*
	FLAPS <1	S<1	3	45	2.30*	2.00*	2.00*
		S≥1	3	25	1.95*	1.60*	1.60*
	1≤FLAPS<2	S<1	3	30	1.85*	1.70*	1.60*
		S≥1	3	15	1.50*	1.45*	1.35*
	2≤FLAPS<3	S<1	3	25	1.70*	1.55*	1.50*
		S≥1	3	10	1.40*	1.35*	1.25*
	FLAPS = 3	S<1	3	25	1.65*	1.55*	1.50*
		1≤S≤3	3	10	1.35*	1.30*	1.25*
		S>3	3	5	1.30*	1.25*	1.20*
	FLAPS > 3	S<1	NOT ALLOWED				
		1≤S≤3	FULL	10	1.30*	1.30*	1.20*
		S>3	FULL	5	1.25*	1.25*	1.15*
HYD	GREEN		Norm (a)	–	1.30	1.35	1.30
	BLUE		Norm (a)	–	1.20	1.20	1.10
	YELLOW		Norm (a)	–	1.25	1.30	1.20
	GREEN + BLUE		3	25	1.80	2.00	1.95
	GREEN + YELLOW		3	25	2.80	2.45	2.45
	BLUE + YELLOW		Norm (a)	–	1.70	1.90	1.85

(a) If “CONF 3” is used when “NORM” is indicated in the table, add 6 knots to the VREF and multiply the resulting landing distance by an additional factor of 1.10.

(b) The landing distance coefficients for wet or contaminated runways assume the use of maximum reverse thrust on all of the operative reversers. Apply these coefficients to the actual landing distance with reversers.

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A320 FAMILY	FAILURE	FLAPS LEVER POSITION FOR LDG	△ VREF APPR SPD INCREMENT	MULTIPLY LDG DIST (CONF FULL) BY		
				DRY	WET (b)	CONTA (b)
BRK	ANTI SKID	Norm (a)	–	1.75	1.30	1.10
	BRK RELEASED	Norm (a)	–	1.40	1.25	1.20
	ALTN L(R) RELEASED (IF NORM BRK FAULT)	Norm (a)	–	2.35	1.85	1.90
	ALTN L(R) RELEASED (if G SYS LO PR)	Norm (a)	–	2.50	2.25	2.75
	NORM BRK FAULT	Norm (a)	–	1.25	1.20	1.15
	NORM + ALTN BRK FAULT	Norm (a)	–	1.75	1.30	1.10
NAV	IR 1+2+3 FAULT	3	10	2.60	2.10	1.70
	UNRELIABLE SPEED INDICATION/ADR CHECK PROC	3	15	1.45*	1.4*	1.3*
	DUAL IR FAULT/DUAL ADR FAULT ADR 1+2+3 FAULT	3	10	1.35*	1.30*	1.25*
BLEED	WING ANTI ICE NOT AVAIL (if Ice Accretion)	Norm (a)	10	1.30	1.30	1.20
ENG	REV UNLOCK with buffet	1**	55 (APPR) 40 (THRESHOLD)	2.15*	2.05*	2.05*
	REV UNLOCK with buffet	3**	10	1.35*	1.40*	1.35*

(a) If “CONF 3” is used when “NORM” is indicated in the table, add 6 knots to the VREF and multiply the resulting landing distance by an additional factor of 1.10.

(b) The landing distance coefficients for wet or contaminated runways assume the use of maximum reverse thrust on all of the operative reversers. Apply these coefficients to the actual landing distance with reversers.

* See below for multiple failures

** The applicable landing configuration (CONF 1 or CONF 3) is displayed on the ECAM STATUS page.

LDG CONF/APPR SPD/LDG DIST FOLLOWING FAILURES

A320 FAMILY	FAILURE		FLAPS LEVER POSITION FOR LDG	△ VREF APPR SPD INCREMENT	MULTIPLY LDG DIST (CONF FULL) BY		
					DRY	WET (b)	CONTA (b)
ELEC	AC BUS 1		Norm (a)	–	1.20	1.15	1.10
	DC BUS 2		Norm (a)	–	1.30	1.30	1.30
	DC ESS BUS (if no Ice accretion)		Norm (a)	–	1.20	1.20	1.20
	DC ESS BUS (if Ice accretion)		Norm (a)	10	1.35	1.40	1.35
	DC EMER CONF		Norm (a)	–	2.80	2.55	2.30
	DC BUS 1+2 (if no Ice accretion)		Norm (a)	–	1.85	1.60	1.50
	DC BUS 1+2 (if Ice accretion)		Norm (a)	10	2.05	1.80	1.70
	EMER ELEC CONF		3	10	2.45	2.25	2.10
FTL CTL	ONE SPLR FAULT		Norm (a)	–	1.25	1.20	1.15
	TWO SPLR FAULT		Norm (a)	–	1.25	1.25	1.20
	THREE SPLR FAULT		Norm (a)	–	1.30	1.25	1.20
	ALL SPLR FAULT		Norm (a)	–	1.45	1.45	1.40
	SEC 1 or SEC 3 FAULT		Norm (a)	–	1.25	1.25	1.20
	SEC 2 FAULT		Norm (a)	–	1.20	1.15	1.10
	SEC 2+3 FAULT		Norm (a)	–	1.30	1.25	1.20
	SEC 1+3 FAULT		Norm (a)	–	1.40	1.45	1.45
	SEC 1+2 FAULT		Norm (a)	–	1.25	1.30	1.30
	SEC 1+2+3 FAULT		3	10	1.65	2.05	2.20
	ALTN LAW/DIRECT LAW/ELAC 1+2/L(R) ELEV FAULT/L+R ELEV FAULT/STAB JAM		3	10	1.35*	1.30*	1.25*
FLAPS/ SLATS	FLAPS and SLATS at zero		1	60 (APPR) 50 (THRESHOLD)	2.40*	2.05*	2.00*
	FLAPS <1	S<1	3	45	2.30*	1.95*	1.95*
		S≥1	3	30	1.95*	1.65*	1.60*
	1≤FLAPS<2	S<1	3	30	1.85*	1.65*	1.60*
		S≥1	3	15	1.50*	1.40*	1.35*
	2≤FLAPS<3	S<1	3	25	1.70*	1.55*	1.50*
		S≥1	3	10	1.40*	1.35*	1.25*
	FLAPS = 3	S<1	3	25	1.65*	1.55*	1.45*
		1≤S≤3	3	10	1.35*	1.30*	1.25*
		S>3	3	5	1.25*	1.25*	1.15*
	FLAPS > 3	S<1	NOT ALLOWED				
		1≤S≤3	FULL	10	1.30*	1.30*	1.20*
		S>3	FULL	5	1.25*	1.20*	1.15*
HYD	GREEN		Norm (a)	–	1.35	1.35	1.35
	BLUE		Norm (a)	–	1.20	1.15	1.10
	YELLOW		Norm (a)	–	1.25	1.25	1.25
	GREEN + BLUE		3	25	1.85	2.05	1.90
	GREEN + YELLOW		3	30	2.50	2.35	2.40
	BLUE + YELLOW		3	10	1.75	1.95	1.85

(a) If “CONF 3” is used when “NORM” is indicated in the table, add 6 knots to the VREF and multiply the resulting landing distance by an additional factor of 1.10.

(b) The landing distance coefficients for wet or contaminated runways assume the use of maximum reverse thrust on all of the operative reversers. Apply these coefficients to the actual landing distance with reversers.

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A320 FAMILY	FAILURE	FLAPS LEVER POSITION FOR LDG	△ VREF APPR SPD INCREMENT	MULTIPLY LDG DIST (CONF FULL) BY		
				DRY	WET (b)	CONTA (b)
BRK	ANTI SKID	Norm (a)	–	1.60	1.30	1.10
	AUTO BRK FAULT	Norm (a)	–	1.45	1.25	1.20
NAV	IR 1+2+3 FAULT	3	10	2.45	2.00	1.55
	UNRELIABLE SPEED INDICATION/ADR CHECK PROC	3	15	1.45*	1.4*	1.3*
	DUAL IR FAULT/DUAL ADR FAULT ADR 1+2+3 FAULT	3	10	1.35*	1.30*	1.25*
BLEED	WING ANTI ICE NOT AVAIL (if Ice accretion)	Norm (a)	10	1.30	1.30	1.20
ENG	REV UNLOCK with buffet	1**	55 (APPR) 40 (THRESHOLD)	2.15*	1.95*	1.95*
	REV UNLOCK with buffet	3**	10	1.35*	1.35*	1.35*

(a) If "CONF 3" is used when "NORM" is indicated in the table, add 6 knots to the VREF and multiply the resulting landing distance by an additional factor of 1.10.

(b) The landing distance coefficients for wet or contaminated runways assume the use of maximum reverse thrust on all of the operative reversers. Apply these coefficients to the actual landing distance with reversers.

* See below for multiple failures

** The applicable landing configuration (CONF 1 or CONF 3) is displayed on the ECAM STATUS page.

LDG CONF/APPR SPD/LDG DIST FOLLOWING FAILURES

A320 FAMILY	FAILURE		FLAPS LEVER POSITION FOR LDG	△ VREF APPR SPD INCREMENT	MULTIPLY LDG DIST (CONF FULL) BY		
					DRY	WET (b)	CONTA (b)
ELEC	AC BUS 1		Norm (a)	–	1.20	1.15	1.10
	DC BUS 2		Norm (a)	–	1.30	1.30	1.30
	DC ESS BUS (if no Ice accretion)		Norm (a)	–	1.20	1.20	1.20
	DC ESS BUS (if Ice accretion)		Norm (a)	10	1.35	1.40	1.35
	DC EMER CONF		Norm (a)	–	2.80	2.55	2.30
	DC BUS 1+2 (if no Ice accretion)		Norm (a)	–	1.85	1.60	1.50
	DC BUS 1+2 (if Ice accretion)		Norm (a)	10	2.05	1.80	1.70
	EMER ELEC CONF		3	10	2.45	2.25	2.10
FTL CTL	ONE SPLR FAULT		Norm (a)	–	1.25	1.20	1.15
	TWO SPLR FAULT		Norm (a)	–	1.25	1.25	1.20
	THREE SPLR FAULT		Norm (a)	–	1.30	1.25	1.20
	ALL SPLR FAULT		Norm (a)	–	1.45	1.45	1.40
	SEC 1 or SEC 3 FAULT		Norm (a)	–	1.25	1.25	1.20
	SEC 2 FAULT		Norm (a)	–	1.20	1.15	1.10
	SEC 2+3 FAULT		Norm (a)	–	1.30	1.25	1.20
	SEC 1+3 FAULT		Norm (a)	–	1.40	1.45	1.45
	SEC 1+2 FAULT		Norm (a)	–	1.25	1.30	1.30
	SEC 1+2+3 FAULT		3	10	1.65	2.05	2.20
	ALTN LAW/DIRECT LAW/ELAC 1+2/L(R) ELEV FAULT/L+R ELEV FAULT/STAB JAM		3	10	1.35*	1.30*	1.25*
FLAPS/ SLATS	FLAPS and SLATS at zero		1	60 (APPR) 50 (THRESHOLD)	2.40*	2.05*	2.00*
	FLAPS <1	S<1	3	45	2.30*	1.95*	1.95*
		S≥1	3	30	1.95*	1.65*	1.60*
	1≤FLAPS<2	S<1	3	30	1.85*	1.65*	1.60*
		S≥1	3	15	1.50*	1.40*	1.35*
	2≤FLAPS<3	S<1	3	25	1.70*	1.55*	1.50*
		S≥1	3	10	1.40*	1.35*	1.25*
	FLAPS = 3	S<1	3	25	1.65*	1.55*	1.45*
		1≤S≤3	3	10	1.35*	1.30*	1.25*
		S>3	3	5	1.25*	1.25*	1.15*
	FLAPS > 3	S<1	NOT ALLOWED				
		1≤S≤3	FULL	10	1.30*	1.30*	1.20*
		S>3	FULL	5	1.25*	1.20*	1.15*
HYD	GREEN		Norm (a)	–	1.35	1.35	1.35
	BLUE		Norm (a)	–	1.20	1.15	1.10
	YELLOW		Norm (a)	–	1.25	1.25	1.25
	GREEN + BLUE		3	25	1.85	2.05	1.90
	GREEN + YELLOW		3	30	2.50	2.35	2.40
	BLUE + YELLOW		3	10	1.75	1.95	1.85

(a) If “CONF 3” is used when “NORM” is indicated in the table, add 6 knots to the VREF and multiply the resulting landing distance by an additional factor of 1.10.

(b) The landing distance coefficients for wet or contaminated runways assume the use of maximum reverse thrust on all of the operative reversers. Apply these coefficients to the actual landing distance with reversers.

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A320 FAMILY	FAILURE	FLAPS LEVER POSITION FOR LDG	△ VREF APPR SPD INCREMENT	MULTIPLY LDG DIST (CONF FULL) BY		
				DRY	WET (b)	CONTA (b)
BRK	ANTI SKID	Norm (a)	–	1.60	1.30	1.10
	BRK RELEASED	Norm (a)	–	1.45	1.25	1.20
	ALTN L(R) RELEASED (IF NORM BRK FAULT)	Norm (a)	–	2.75	1.85	1.90
	ALTN L(R) RELEASED (if G SYS LO PR)	Norm (a)	–	3.00	2.30	2.70
	NORM BRK FAULT	Norm (a)	–	1.25	1.20	1.15
	NORM + ALTN BRK FAULT	Norm (a)	–	1.60	1.30	1.10
NAV	IR 1+2+3 FAULT	3	10	2.45	2.00	1.55
	UNRELIABLE SPEED INDICATION/ADR CHECK PROC	3	15	1.45*	1.4*	1.3*
	DUAL IR FAULT/DUAL ADR FAULT ADR 1+2+3 FAULT	3	10	1.35*	1.30*	1.25*
BLEED	WING ANTI ICE NOT AVAIL (if Ice accretion)	Norm (a)	10	1.30	1.30	1.20
ENG	REV UNLOCK with buffet	1**	55 (APPR) 40 (THRESHOLD)	2.15*	1.95*	1.95*
	REV UNLOCK with buffet	3**	10	1.35*	1.35*	1.35*

(a) If “CONF 3” is used when “NORM” is indicated in the table, add 6 knots to the VREF and multiply the resulting landing distance by an additional factor of 1.10.

(b) The landing distance coefficients for wet or contaminated runways assume the use of maximum reverse thrust on all of the operative reversers. Apply these coefficients to the actual landing distance with reversers.

* See below for multiple failures

** The applicable landing configuration (CONF 1 or CONF 3) is displayed on the ECAM STATUS page.

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LDG CONF/APPR SPD/LDG DIST FOLLOWING FAILURES

A320 FAMILY	FAILURE		FLAPS LEVER POSITION FOR LDG	△ VREF APPR SPD INCREMENT	MULTIPLY LDG DIST (CONF FULL) BY		
					DRY	WET (b)	CONTA (b)
ELEC	DC BUS 2		Norm (a)	–	1.30	1.35	1.30
	DC ESS BUS (if no Ice accretion)/AC BUS 1		Norm (a)	–	1.20	1.25	1.20
	DC ESS BUS (if Ice accretion)		Norm (a)	10	1.35	1.40	1.35
	DC EMER CONF		Norm (a)	–	3.00	2.40	2.15
	DC BUS 1+2 (if no Ice accretion)		Norm (a)	–	2.05	1.65	1.50
	DC BUS 1+2 (if Ice accretion)		Norm (a)	10	2.30	1.85	1.70
	EMER ELEC CONF		3	10	2.85	2.35	2.25
FTL CTL	ONE SPLR FAULT		Norm (a)	–	1.25	1.20	1.15
	TWO SPLR FAULT		Norm (a)	–	1.30	1.25	1.20
	THREE SPLR FAULT		Norm (a)	–	1.35	1.30	1.25
	ALL SPLR FAULT		Norm (a)	–	1.50	1.50	1.40
	SEC 1 or SEC 3 FAULT		Norm (a)	–	1.30	1.25	1.20
	SEC 2 FAULT		Norm (a)	–	1.20	1.20	1.15
	SEC 2+3 FAULT		Norm (a)	–	1.30	1.30	1.20
	SEC 1+3 FAULT		Norm (a)	–	1.40	1.45	1.40
	SEC 1+2 FAULT		Norm (a)	–	1.30	1.30	1.30
	SEC 1+2+3 FAULT		3	10	1.60	2.05	2.20
	L (R) ELEV FAULT		3	15	1.45*	1.40*	1.35*
	ALTN LAW/DIRECT LAW/ELAC 1+2/L+R ELEV FAULT/STAB JAM		3	10	1.35*	1.35*	1.30*
FLAPS/ SLATS	FLAPS and SLATS at zero		1	60 (APPR) 50 (THRESHOLD)	2.20*	2.15*	2.20*
	FLAPS <1	S<1	3	45	2.10*	2.05*	2.10*
		S≥1	3	25	1.65*	1.65*	1.60*
	1≤FLAPS<2	S<1	3	30	1.70*	1.70*	1.65*
		S≥1	3	15	1.45*	1.45*	1.40*
	2≤FLAPS<3	S<1	3	25	1.60*	1.60*	1.55*
		S≥1	3	10	1.40*	1.35*	1.30*
	FLAPS = 3	S<1	3	25	1.60*	1.60*	1.50*
		1≤S≤3	3	10	1.35*	1.35*	1.30*
		S>3	3	5	1.30*	1.25*	1.20*
	FLAPS > 3	S<1	NOT ALLOWED				
		1≤S≤3	FULL	10	1.35*	1.30*	1.25*
		S>3	FULL	5	1.25*	1.25*	1.15*
HYD	GREEN		Norm (a)	–	1.35	1.35	1.30
	BLUE		Norm (a)	–	1.20	1.20	1.15
	YELLOW		Norm (a)	–	1.25	1.30	1.25
	GREEN + BLUE		3	25	1.80	2.05	2.00
	GREEN + YELLOW		3	25	2.80	2.35	2.40
	BLUE + YELLOW		Norm (a)	–	1.75	1.90	1.85

(a) If “CONF 3” is used when “NORM” is indicated in the table, add 10 knots to the VREF and multiply the resulting landing distance by an additional factor of 1.15.

(b) The landing distance coefficients for wet or contaminated runways assume the use of maximum reverse thrust on all of the operative reversers. Apply these coefficients to the actual landing distance with reversers.

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A320 FAMILY	FAILURE	FLAPS LEVER POSITION FOR LDG	△ VREF APPR SPD INCREMENT	MULTIPLY LDG DIST (CONF FULL) BY		
				DRY	WET (b)	CONTA (b)
BRK	ANTI SKID	Norm (a)	–	1.80	1.30	1.15
	AUTO BRK FAULT	Norm (a)	–	1.40	1.30	1.25
NAV	IR 1+2+3 FAULT	3	10	2.55	1.95	1.55
	UNRELIABLE SPEED INDICATION/ADR CHECK PROC	3	15	1.5*	1.4*	1.35*
	DUAL IR FAULT/DUAL ADR FAULT ADR 1+2+3 FAULT	3	10	1.35*	1.35*	1.30*
BLEED	WING ANTI ICE NOT AVAIL (if Ice Accretion)	Norm (a)	10	1.35	1.30	1.25
ENG	REV UNLOCK with buffet	1**	55 (APPR) 40 (THRESHOLD)	1.90*	2.05*	2.10*
	REV UNLOCK with buffet	3**	10	1.35*	1.40*	1.40*

(a) If “CONF 3” is used when “NORM” is indicated in the table, add 10 knots to the VREF and multiply the resulting landing distance by an additional factor of 1.15.

(b) The landing distance coefficients for wet or contaminated runways assume the use of maximum reverse thrust on all of the operative reversers. Apply these coefficients to the actual landing distance with reversers.

* See below for multiple failures

** The applicable landing configuration (CONF 1 or CONF 3) is displayed on the ECAM STATUS page.

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LDG CONF/APPR SPD/LDG DIST FOLLOWING FAILURES

A320 FAMILY	FAILURE		FLAPS LEVER POSITION FOR LDG	△ VREF APPR SPD INCREMENT	MULTIPLY LDG DIST (CONF FULL) BY		
					DRY	WET (b)	CONTA (b)
ELEC	DC BUS 2		Norm (a)	–	1.30	1.35	1.30
	DC ESS BUS (if no Ice accretion)/AC BUS 1		Norm (a)	–	1.20	1.25	1.20
	DC ESS BUS (if Ice accretion)		Norm (a)	10	1.35	1.40	1.35
	DC EMER CONF		Norm (a)	–	3.00	2.40	2.15
	DC BUS 1+2 (if no Ice accretion)		Norm (a)	–	2.05	1.65	1.50
	DC BUS 1+2 (if Ice accretion)		Norm (a)	10	2.30	1.85	1.70
	EMER ELEC CONF		3	10	2.85	2.35	2.25
FTL CTL	ONE SPLR FAULT		Norm (a)	–	1.25	1.20	1.15
	TWO SPLR FAULT		Norm (a)	–	1.30	1.25	1.20
	THREE SPLR FAULT		Norm (a)	–	1.35	1.30	1.25
	ALL SPLR FAULT		Norm (a)	–	1.50	1.50	1.40
	SEC 1 or SEC 3 FAULT		Norm (a)	–	1.30	1.25	1.20
	SEC 2 FAULT		Norm (a)	–	1.20	1.20	1.15
	SEC 2+3 FAULT		Norm (a)	–	1.30	1.30	1.20
	SEC 1+3 FAULT		Norm (a)	–	1.40	1.45	1.40
	SEC 1+2 FAULT		Norm (a)	–	1.30	1.30	1.30
	SEC 1+2+3 FAULT		3	10	1.60	2.05	2.20
	L (R) ELEV FAULT		3	15	1.45*	1.40*	1.35*
	ALTN LAW/DIRECT LAW/ELAC 1+2/L+R ELEV FAULT/STAB JAM		3	10	1.35*	1.35*	1.30*
FLAPS/ SLATS	FLAPS and SLATS at zero		1	60 (APPR) 50 (THRESHOLD)	2.20*	2.15*	2.20*
	FLAPS <1	S<1	3	45	2.10*	2.05*	2.10*
		S≥1	3	25	1.65*	1.65*	1.60*
	1≤FLAPS<2	S<1	3	30	1.70*	1.70*	1.65*
		S≥1	3	15	1.45*	1.45*	1.40*
	2≤FLAPS<3	S<1	3	25	1.60*	1.60*	1.55*
		S≥1	3	10	1.40*	1.35*	1.30*
	FLAPS = 3	S<1	3	25	1.60*	1.60*	1.50*
		1≤S≤3	3	10	1.35*	1.35*	1.30*
		S>3	3	5	1.30*	1.25*	1.20*
	FLAPS > 3	S<1	NOT ALLOWED				
		1≤S≤3	FULL	10	1.35*	1.30*	1.25*
		S>3	FULL	5	1.25*	1.25*	1.15*
HYD	GREEN		Norm (a)	–	1.35	1.35	1.30
	BLUE		Norm (a)	–	1.20	1.20	1.15
	YELLOW		Norm (a)	–	1.25	1.30	1.25
	GREEN + BLUE		3	25	1.80	2.05	2.00
	GREEN + YELLOW		3	25	2.80	2.35	2.40
	BLUE + YELLOW		Norm (a)	–	1.75	1.90	1.85

(a) If "CONF 3" is used when "NORM" is indicated in the table, add 10 knots to the VREF and multiply the resulting landing distance by an additional factor of 1.15.

(b) The landing distance coefficients for wet or contaminated runways assume the use of maximum reverse thrust on all of the operative reversers. Apply these coefficients to the actual landing distance with reversers.

R

A320 FAMILY	FAILURE	FLAPS LEVER POSITION FOR LDG	△ VREF APPR SPD INCREMENT	MULTIPLY LDG DIST (CONF FULL) BY		
				DRY	WET (b)	CONTA (b)
BRK	ANTI SKID	Norm (a)	–	1.80	1.30	1.15
	BRK RELEASED	Norm (a)	–	1.40	1.30	1.25
	ALTN L(R) RELEASED (IF NORM BRK FAULT)	Norm (a)	–	2.30	1.85	1.90
	ALTN L(R) RELEASED (if G SYS LO PR)	Norm (a)	–	2.45	2.25	2.70
	NORM BRK FAULT	Norm (a)	–	1.25	1.20	1.15
	NORM + ALTN BRK FAULT	Norm (a)	–	1.80	1.30	1.15
NAV	IR 1+2+3 FAULT	3	10	2.55	1.95	1.55
	UNRELIABLE SPEED INDICATION/ADR CHECK PROC	3	15	1.5*	1.4*	1.35*
	DUAL IR FAULT/DUAL ADR FAULT ADR 1+2+3 FAULT	3	10	1.35*	1.35*	1.30*
BLEED	WING ANTI ICE NOT AVAIL (if Ice Accretion)	Norm (a)	10	1.35	1.30	1.25
ENG	REV UNLOCK with buffet	1**	55 (APPR) 40 (THRESHOLD)	1.90*	2.05*	2.10*
	REV UNLOCK with buffet	3**	10	1.35*	1.40*	1.40*

(a) If “CONF 3” is used when “NORM” is indicated in the table, add 10 knots to the VREF and multiply the resulting landing distance by an additional factor of 1.15.

(b) The landing distance coefficients for wet or contaminated runways assume the use of maximum reverse thrust on all of the operative reversers. Apply these coefficients to the actual landing distance with reversers.

* See below for multiple failures

** The applicable landing configuration (CONF 1 or CONF 3) is displayed on the ECAM STATUS page.

USE OF THE TABLE (PREVIOUS PAGES)

- *△ VREF values take into account the necessary corrections, due to failures and the required landing configuration. The △ VREF values are rounded off to take into account all possible weight ranges.*
  LDG DIST factors must be applied to the actual "LANDING DISTANCE WITHOUT AUTOBRAKE-CONFIGURATION FULL" (Refer to QRH 4.03).
- *For a single failure :*
  - *Determine the LDG CONF to be selected*
  - *Determine the △ VREF*
  - *VAPP = VREF + △ VREF + WIND CORRECTION (Refer to QRH 2.31).*
  - *Determine the LDG DIST factor.*
- *For multiple failures :*
  - *Only combine PRIMARY or SINGLE failures. In the case of a PRIMARY failure, the associated effects of SECONDARY(s) failure are taken into account by the △ VREF and LDG DIST factor computation.*
  - *Use the lowest LDG CONF*
  - *Use the highest △ VREF to compute the VAPP.*
  - *Multiply the applicable LDG DIST factors together, unless all values are marked with an asterisk (*). If all values are marked with an asterisk, use the highest LDG DIST factor.*
  - *Examples Applicable to Dry Runways :*

FLAPS FAULT (F < 3, S ≥ 1)	LDG CONF 3	△ VREF = 10 KT	LDG DIST × 1.40*
BRK ANTI SKID	NORM CONF (1)	△ VREF = 0	LDG DIST × 1.75
TOTAL	LDG CONF 3	△ VREF = 10 KT	LDG DIST × 2.45

VREF = 131 KT → VAPP = 131 + 10 + WIND (10 KT MAX)
= 141 KT + WIND (10 KT MAX)

ALTN LAW	LDG CONF 3	△ VREF = 10 KT	LDG DIST × 1.35*
FLAPS FAULT (F < 1, S ≥ 1)	LDG CONF 3	△ VREF = 25 KT	LDG DIST × 1.95*
TOTAL	LDG CONF 3	△ VREF = 25 KT	LDG DIST × 1.95

VREF = 140 KT → VAPP = 140 + 25 + 0 (No wind correction) = 165 KT

<u>USE OF THE TABLE (PREVIOUS PAGES)</u>

- *△ VREF values take into account the necessary corrections, due to failures and the required landing configuration. The △ VREF values are rounded off to take into account all possible weight ranges.*
  LDG DIST factors must be applied to the actual "LANDING DISTANCE WITHOUT AUTOBRAKE-CONFIGURATION FULL" (Refer to QRH 4.03).
- *For a single failure :*
  - *Determine the LDG CONF to be selected*
  - *Determine the △ VREF*
  - *VAPP = VREF + △ VREF + WIND CORRECTION (Refer to QRH 2.31).*
  - *Determine the LDG DIST factor.*
- *For multiple failures :*
  - *Only combine PRIMARY or SINGLE failures. In the case of a PRIMARY failure, the associated effects of SECONDARY(s) failure are taken into account by the △ VREF and LDG DIST factor computation.*
  - *Use the <u>lowest LDG CONF</u>*
  - *Use the <u>highest △ VREF</u> to compute the VAPP.*
  - *Multiply the applicable LDG DIST factors together, unless all values are marked with an asterisk (*). If all values are marked with an asterisk, use the highest LDG DIST factor.*
  - *<u>Examples Applicable to Dry Runways</u> :*

FLAPS FAULT (F < 3, S ≥ 1)	LDG CONF 3	△ VREF = 10 KT	LDG DIST × 1.40*
BRK ANTI SKID	NORM CONF (1)	△ VREF = 0	LDG DIST × 1.60
TOTAL	LDG CONF 3	△ VREF = 10 KT	LDG DIST × 2.24

VREF = 131 KT → VAPP = 131 + 10 + WIND (10 KT MAX)
= 141 KT + WIND (10 KT MAX)

ALTN LAW	LDG CONF 3	△ VREF = 10 KT	LDG DIST × 1.35*
FLAPS FAULT (F < 1, S ≥ 1)	LDG CONF 3	△ VREF = 30 KT	LDG DIST × 1.95*
TOTAL	LDG CONF 3	△ VREF = 30 KT	LDG DIST × 1.95

VREF = 140 KT → VAPP = 140 + 30 + 0 (No wind correction) = 170 KT

USE OF THE TABLE (PREVIOUS PAGES)

- *△ VREF values take into account the necessary corrections, due to failures and the required landing configuration. The △ VREF values are rounded off to take into account all possible weight ranges.*
  LDG DIST factors must be applied to the actual "LANDING DISTANCE WITHOUT AUTOBRAKE-CONFIGURATION FULL" (Refer to QRH 4.03).
- *For a single failure :*
  - *Determine the LDG CONF to be selected*
  - *Determine the △ VREF*
  - *VAPP = VREF + △ VREF + WIND CORRECTION (Refer to QRH 2.31).*
  - *Determine the LDG DIST factor.*
- *For multiple failures :*
  - *Only combine PRIMARY or SINGLE failures. In the case of a PRIMARY failure, the associated effects of SECONDARY(s) failure are taken into account by the △ VREF and LDG DIST factor computation.*
  - *Use the lowest LDG CONF*
  - *Use the highest △ VREF to compute the VAPP.*
  - *Multiply the applicable LDG DIST factors together, unless all values are marked with an asterisk (*). If all values are marked with an asterisk, use the highest LDG DIST factor.*
  - *Examples Applicable to Dry Runways :*

FLAPS FAULT (F < 3, S ≥ 1)	LDG CONF 3	△ VREF = 10 KT	LDG DIST × 1.40*
BRK ANTI SKID	NORM CONF (1)	△ VREF = 0	LDG DIST × 1.80
TOTAL	LDG CONF 3	△ VREF = 10 KT	LDG DIST × 2.52

VREF = 131 KT → VAPP = 131 + 10 + WIND (10 KT MAX)
= 141 KT + WIND (10 KT MAX)

ALTN LAW	LDG CONF 3	△ VREF = 10 KT	LDG DIST × 1.35*
FLAPS FAULT (F < 1, S ≥ 1)	LDG CONF 3	△ VREF = 25 KT	LDG DIST × 1.65*
TOTAL	LDG CONF 3	△ VREF = 25 KT	LDG DIST × 1.65

VREF = 140 KT → VAPP = 140 + 25 + 0 (No wind correction) = 165 KT

WINDSHEAR

A red flag "WINDSHEAR" is displayed on each PFD associated with an aural synthetic voice "WINDSHEAR" repeated three times.

If windshear is detected either by the system or by pilot observation, apply the following recovery technique:

■ At takeoff

● **If before V1**

The takeoff should be rejected only if significant airspeed variations occur below indicated V1 and the pilot decides that there is sufficient runway remaining to stop the airplane.

● **If after V1**

– THR LEVERS . . . . TOGA
– REACHING VR . . . . ROTATE
– SRS ORDERS . . . . FOLLOW

■ Airborne, initial climb or landing

– THR LEVERS AT TOGA . . . . SET OR CONFIRM
– AP (if engaged) . . . . KEEP
– SRS ORDERS . . . . FOLLOW

This includes the use of full back stick, if demanded.

Note : 1. If engaged, the autopilot disengages when α is greater than α prot.
R *2. If the FD bars are not available, use an initial pitch attitude up to 17.5° with*
R *full backstick, if necessary. If needed, to minimize the loss of height, increase this pitch attitude.*

– DO NOT CHANGE CONFIGURATION (SLATS/FLAPS, GEAR) UNTIL OUT OF SHEAR.
– CLOSELY MONITOR FLIGHT PATH AND SPEED.
– RECOVER SMOOTHLY TO NORMAL CLIMB OUT OF SHEAR.

WINDSHEAR AHEAD

The "W/S AHEAD" message is displayed on each PFD. The color of the message depends on the severity and location of the windshear.

W/S AHEAD red

■ Takeoff

Associated with an aural synthetic voice "WINDSHEAR AHEAD, WINDSHEAR AHEAD".

- **Before takeoff**
  - Delay takeoff, or select the most favorable runway.
- **During the takeoff run**
  - Reject takeoff.

    Note : Predictive windshear alerts are inhibited above 100 knots until 50 feet.
- **When airborne**
  - THR LEVERS . . . . TOGA

    As usual, the slat/flap configuration can be changed, provided the windshear is not entered.
  - SRS ORDERS . . . . FOLLOW

    Note : If engaged, the autopilot disengages when α is greater than α prot.

■ Landing

Associated with an aural synthetic voice "GO AROUND, WINDSHEAR AHEAD".

Note : If a positive verification is made that no hazard exists, the warning may be considered cautionary.

- THR LEVERS . . . . TOGA
- ANNOUNCE . . . . "GO AROUND-FLAPS"
- FLAPS . . . . RETRACT ONE STEP
- L/G UP . . . . SELECT

This includes the use of full backstick, if demanded.

Note : 1. If engaged, the autopilot disengages when α is greater than α prot.
2. If the FD is not available, use a pitch initial attitude up to 17.5°. If necessary to minimize the loss of height, increase this pitch attitude.

W/S AHEAD amber

Apply precautionary measures, as indicated in the SUPPLEMENTARY TECHNIQUES 3.04.91.

TAILSTRIKE

In the event of a tailstrike, apply the following procedure :

LAND ASAP

– MAX FL .... 100 or MSA

500 feet/minute should be targeted for the climb, to minimize pressure changes, and for passenger and crew comfort. Similarly, the rate of descent must be limited to about 1000 feet/minute, except for the final approach that must be performed normally.

Notify the ATC of the aircraft's rate of climb.

– RAM AIR .... ON

– PACK 1 and 2 .... OFF

GENERAL

A successful outcome for an emergency situation depends, first of all, upon each crew member's perfect knowledge and execution of the duties assigned to him.
The captain should check frequently that all crew members know exactly their assigned positions and their specific duties, as well as the duties of the other crew members, in case of an abnormal or an emergency condition.
Since it is not possible to cover all the situations that may occur, the captain will be responsible for adapting the following instructions to obtain the best coordination of the emergency operation. Should it be physically impossible for the captain to carry out his duties, another crew member will substitute for him according to the chain of command.
The procedures in this manual are AIRBUS INDUSTRIE procedures and should be considered to be a reference.

R **COCKPIT-ASSIGNED DUTIES FOR EVACUATION**

- If it is NOT POSSIBLE to reach the passenger cabin :
  The cockpit crew should evacuate the aircraft via the cockpit clearview windows, by using the escape ropes.
  On ground, each crewmember must help passengers, and direct them away from the aircraft.
- If it is POSSIBLE to reach the passenger cabin :

R

CAPT	– Is the last person to leave the cockpit : Proceeds to the cabin, and helps with passenger evacuation, as necessary. – Is the last person to leave the aircraft : Checks that all persons have evacuated the aircraft. – Evacuates the aircraft, via the rear door, or any other available exit, if he/she cannot reach the rear door. – On ground, he/she takes command of operations until rescue units arrive.
F/O	– Proceeds to the cabin, and takes the emergency equipment. – Evacuates the aircraft, using any available exit. – Helps passengers on ground, and directs them away from the aircraft.

CABIN CREW-ASSIGNED AREAS FOR EVACUATION

R

CABIN CREW DESIGNATION	ASSIGNED JUMPSEAT AND DOOR	ASSIGNED JUMPSEAT	ASSIGNED AREA
1 PURSER	DOOR 1 LH	FWD OUTBOARD	FWD/MID
1 CABIN CREW	DOOR 1 LH	FWD INBOARD	FWD/MID
1 CABIN CREW	DOOR 2 RH	AFT CENTER	MID/AFT
1 CABIN CREW	DOOR 2 LH	REARWARD	MID/AFT

R <u>Note</u> : *These procedures are established for the minimum required number of 4 cabin*
R *crews.*

GENERAL

A successful outcome for an emergency situation depends, first of all, upon each crew member's perfect knowledge and execution of the duties assigned to him.
The captain should check frequently that all crew members know exactly their assigned positions and their specific duties, as well as the duties of the other crew members, in case of an abnormal or an emergency condition.
Since it is not possible to cover all the situations that may occur, the captain will be responsible for adapting the following instructions to obtain the best coordination of the emergency operation. Should it be physically impossible for the captain to carry out his duties, another crew member will substitute for him according to the chain of command.
The procedures in this manual are AIRBUS INDUSTRIE procedures and should be considered to be a reference.

COCKPIT ASSIGNED DUTIES FOR EVACUATION

- If it is NOT POSSIBLE to reach the cabin :
  The cockpit crew should evacuate the aircraft via the cockpit clearview windows, by using the escape ropes.
  On ground, each crewmember must help passengers, and direct them away from the aircraft.
- If it is POSSIBLE to reach the cabin :

CAPT	– Is the last person to leave the cockpit : Proceeds to the cabin and helps with passenger evacuation, as necessary. – Is the last person to leave the aircraft : Checks that all persons have evacuated the aircraft. – Evacuates the aircraft, via the rear door, or any other available exit, if not possible to reach the rear door. – On ground, takes command of operations until rescue units arrive.
F/O	– Proceeds to the cabin and takes the emergency equipment. – Evacuates the aircraft, using any available exit. – Helps passengers on ground, and directs them away from the aircraft.

CABIN CREW ASSIGNED AREAS FOR EVACUATION

R

CABIN CREW DESIGNATION	ASSIGNED DOOR	ASSIGNED JUMPSEAT	ASSIGNED AREA
1 PURSER	DOOR 1 LH	FWD INBOARD	FWD/MID
1 CABIN CREW	FWD EMERGENCY EXIT	FWD/MID	FWD/MID
1 CABIN CREW	AFT EMERGENCY EXIT	AFT/MID	MID/AFT
1 CABIN CREW	DOOR 2 LH	AFT LH	MID/AFT
1 CABIN CREW	DOOR 2 RH	AFT RH	MID/AFT

R *Note : The above procedures are established for a minimum required number of 5 cabin*
R *crewmembers.*
R *For customized A321 seating configurations of 200 passengers or less, the*
R *minimum number of cabin crewmembers can be reduced to 4, in accordance with*
R *JAR-Ops (1.990). If this is the case, a cabin crewmember is not required at the AFT*
R *RH seat.*

GENERAL

A successful outcome for an emergency situation depends, first of all, upon each crew member's perfect knowledge and execution of the duties assigned to him.
The captain should check frequently that all crew members know exactly their assigned positions and their specific duties, as well as the duties of the other crew members, in case of an abnormal or an emergency condition.
Since it is not possible to cover all the situations that may occur, the captain will be responsible for adapting the following instructions to obtain the best coordination of the emergency operation. Should it be physically impossible for the captain to carry out his duties, another crew member will substitute for him according to the chain of command.
The procedures in this manual are AIRBUS INDUSTRIE procedures and should be considered to be a reference.

R **COCKPIT-ASSIGNED DUTIES FOR EVACUATION**

- If it is NOT POSSIBLE to reach the passenger cabin :
  The cockpit crew should evacuate the aircraft via the cockpit clearview windows, by using the escape ropes.
  On ground, each crewmember must help passengers, and direct them away from the aircraft.
- If it is POSSIBLE to reach the passenger cabin :

R

CAPT	– Is the last person to leave the cockpit : Proceeds to the cabin and helps with passenger evacuation, as necessary. – Is the last person to leave the aircraft : Checks that all persons have evacuated the aircraft. – Evacuates the aircraft, via the rear door, or any other available exit, if he/she cannot reach the rear door. – On ground, he/she takes command of operations until the rescue units arrive.
F/O	– Proceeds to the cabin, and takes the emergency equipment. – Evacuates the aircraft, using any available exit. – Helps passengers on ground, and directs them away from the aircraft.

CABIN CREW-ASSIGNED AREAS FOR EVACUATION

R

CABIN CREW DESIGNATION	ASSIGNED JUMPSEAT AND DOOR	ASSIGNED JUMPSEAT	ASSIGNED AREA
1 PURSER	DOOR 1 LH	FWD OUTBOARD	FWD/MID
1 CABIN CREW	DOOR 1 RH/LH	FWD INBOARD	FWD/MID
1 CABIN CREW	DOOR 2 RH/LH	AFT CENTER	MID/AFT

R *Note : These procedures are established for the minimum required number of 3 cabin*
R *crews.*

COMMUNICATIONS

1. EMERGENCY CALL			
FROM	TO	COMMUNICATION METHOD(S)	REMARKS
COCKPIT	CABIN	– Press "EMER" CALL pushbutton on the CALLS panel, or – Passenger Address (PA) System : "PURSER TO COCKPIT PLEASE!"	Purser must immediately go to the cockpit.
CABIN	COCKPIT	– Interphone : "PRIO CAPT"	Any cabin crewmember can make such a call. The cockpit crew must reply.

2. EMERGENCY ALERT			
FROM	TO	COMMUNICATION METHOD(S)	REMARKS
COCKPIT	CABIN	– PA System : "ATTENTION CREW! AT STATIONS !"	The cockpit crew makes a short and precise announcement to warn that an emergency evacuation may soon be required. Cabin crews must proceed to their emergency stations, and fasten their seatbelts.

R

3. NOTIFICATION TO PASSENGERS			
FROM	TO	COMMUNICATION METHOD(S)	REMARKS
COCKPIT	CABIN	– SIGNS ON – PA System	For psychological reasons, the cockpit crew should be the first to inform of an intended emergency landing.
PURSER	CABIN	– CABIN LIGHTS 100 % – PA System	Purser informs passengers that they have to pay special attention to these warnings : – "FINISH PREPARATION" – "BRACE FOR IMPACT" – "PASSENGERS EVACUATE"

R

4. FINISH PREPARATION			
FROM	TO	COMMUNICATION METHOD(S)	REMARKS
COCKPIT	CABIN	– Passenger Address (PA) System : "FINISH PREPARATION"	The cockpit crew gives this order a short time before an emergency landing.

R

5. BRACE FOR IMPACT			
FROM	TO	COMMUNICATION METHOD(S)	REMARKS
COCKPIT	CABIN	– PA System : "BRACE FOR IMPACT !"	The cockpit crew gives this order no later than 1 minute before impact.

R

6. INITIATE EVACUATION (RESTRICTED EXITS)			
FROM	TO	COMMUNICATION METHOD(S)	REMARKS
COCKPIT	CABIN	– PA System : "PASSENGERS EVACUATE" – Activate EVAC signals ◁	The cockpit crew orders an immediate evacuation, and the cabin crew directs passengers to all available exists.
CABIN	COCKPIT AND CABIN	– EVAC SIGNAL SYSTEM ◁ on FWD ATTND panel (FAP) – PA System or megaphone	Used by the cabin crew, if there is no signal or order from the cockpit, and if it is unmistakably clear that the aircraft must be evacuated.
CABIN	CABIN	– Verbal	The cabin crew stands up and shouts : – "SEATBELTS OFF!" – "LEAVE EVERYTHING!" – "GET OUT!" – "COME THIS WAY!"

R

7. EVACUATION NOT REQUIRED			
FROM	TO	COMMUNICATION METHOD(S)	REMARKS
COCKPIT	CABIN	– PA System : "CABIN CREW and PASSENGERS REMAIN SEATED !"	When the Captain decides that an evacuation is not required, the cockpit crew makes an immediate announcement to this effect.

ON GROUND EVACUATION

COCKPIT CREW PROCEDURES

- **The cockpit crew notifies the cabin crew of the nature of the emergency, and states intentions.**
- **The cockpit crew uses the Passenger Address system to make an appropriate announcement, such as : "PASSENGERS EVACUATE", and presses the EVAC COMMAND pushbutton.**

CABIN CREW PROCEDURES

When the cabin receives the order to evacuate, each cabin crewmember must proceed as follows :

- **STAND UP AND SHOUT . . . . "UNFASTEN SEATBELTS"**
- **OUTSIDE CONDITIONS . . . . CHECK**

● **If outside conditions are safe :**

  - **DOOR IN ARMED POSITION . . . . OPEN FIRMLY**
  - **SHOUT . . . . "COME THIS WAY"**

  ● **If the door does not open automatically :**

    - **DOOR . . . . PUSH AND OPEN MANUALLY**

R - **SLIDE (or SLIDERAFT) DEPLOYMENT . . . . CHECK FULL DEPLOYMENT**
R   It takes approximately four seconds for the slide (or slideraft) to deploy.

R ● **If the slide (or slideraft) does not automatically inflate :**

    - **RED, MANUAL INFLATION HANDLE . . . . PULL**
R   The red, manual inflation handle is located on the right-hand side of the slide (or slideraft) girt extension.

R - **ORDER . . . . "PASSENGERS EVACUATE"**
  - **PASSENGER EVACUATION . . . . EXPEDITE**

R ● **If the slide (or slideraft) becomes unserviceable :**

- **PASSENGER EVACUATION . . . . STOP**
- **PASSENGERS TO ANOTHER USABLE EXIT . . . . REDIRECT**

- **TOTAL ZONE EVACUATION . . . . CHECK**
- **CABIN CREW . . . . EVACUATE**
- **PASSENGERS AWAY FROM THE AIRCRAFT . . . . DIRECT**

● **If outside conditions are unsafe :**

- **EXIT DOOR . . . . BLOCK**
- R **PASSENGERS TO NEAREST USABLE EXIT . . . . REDIRECT**

COCKPIT EVACUATION THROUGH WINDOW

OPENING THE SLIDING WINDOW

- **HANDLE . . . . PUSH DOWN AND PULL BACK**
  Pulling the handle backwards, opens the sliding window.

COCKPIT EVACUATION WITH ESCAPE ROPE

- **ESCAPE ROPE STOWAGE . . . . OPEN**
  The escape rope stowage is located above the sliding window, on either side of the overhead panel.

- **ESCAPE ROPE . . . . UNROLL**
  Unroll the escape rope until the red flag appears, and throw it through the window.

- **SEAT . . . . STEP ON**

- **ESCAPE ROPE . . . . GRASP**
  Grasp the escape rope firmly with both hands, and slide down along the rope.

R **EVACUATION ON WATER**

CABIN CREW RESPONSIBLE FOR TYPE "I" DOORS

When the cabin receives the order to evacuate, each cabin crewmember must proceed as follows :

– **CHILDREN LIFEVESTS . . . . DISTRIBUTE**

– **STAND UP AND SHOUT . . "UNFASTEN SEATBELTS – PUT ON YOUR LIFEVEST"**
Inflate the lifevest, only once outside the aircraft.

R – **ORDER . . . . "REMOVE SHOES"**

● **If the Type I door is usable :**

– **DOOR IN ARMED POSITION . . . . OPEN**

– **SLIDE . . . . DEPLOY**

– **RED, MANUAL INFLATION HANDLE . . . . PULL**
Do not wait for automatic inflation of the slide.

■ **If the water level is close to the door sill :**
The slide inflates on the water.

– **SLIDE . . . . LEAVE ATTACHED TO CABIN FLOOR**

R – **PASSENGER LIFEVESTS . . . . INFLATE WHEN EVACUATING AIRCRAFT**

R – **PASSENGERS . . . . EVACUATE**
R Evacuate passengers into the water. The slide is used as a flotation device.

– **TOTAL ZONE EVACUATION . . . . CHECK**

– **LAST CREWMEMBER . . . . EVACUATE**

– **SLIDE . . . . SEPARATE FROM DOOR SILL**
The last crewmember must separate the slide from the door sill.

– **MOORING LINE . . . . CUT**

■ **<u>If the water level is too far away from the door sill :</u>**

– **SLIDE . . . . DISCONNECT FROM DOOR SILL**
The slide remains tied to the aircraft by a 6–meter (20 feet) mooring line.

– **MOORING LINE . . . . HOLD**
To keep the slide close to the exit, hold the mooring line.

R – **PASSENGER LIFEVESTS . . . . INFLATE WHEN EVACUATING AIRCRAFT**

– **PASSENGERS . . . . EVACUATE**
R Evacuate passengers into the water. The slide is used as a flotation device.

– **TOTAL ZONE EVACUATION . . . . CHECK**

– **LAST CREWMEMBER . . . . EVACUATE**

– **MOORING LINE . . . . CUT**

FOREWORD

The procedures contained in this Chapter are recommended by Airbus, and are consistent with the other Chapters of this manual.
The Authorities do not certificate Standard Operating Procedures. The manufacturer presents them herein as the best way to proceed, from a technical and operational standpoint. They are continually updated and the revisions take into account Operator input, as well as manufacturer experience.
In addition, Operators may amend them, as needed. However, the manufacturer recommends that Operators using the FCOM as onboard operational manual submit suggested changes to expedite publication, and maintain consistency of the manual.
The Operator should note that they may rewrite this Chapter, at their own responsibility ; this could, however, make it difficult to update the manual and keep it consistent with the other Chapters.
The following sections contain expanded information on normal procedures.
Standard Operating Procedures consist of inspections, preparations, and normal procedures. All items of a given procedure are listed in a sequence that follows a standardized scan of the cockpit panels, unless that sequence goes against the action priority logic, to ensure that all actions are performed in the most efficient way.
Standard Operating Procedures are divided into flight phases, and are performed by memory.
These procedures assume that all systems are operating normally, and that all automatic functions are used normally.
Some normal procedures, that are non-routine will be found in the SUPPLEMENTARY
R TECHNIQUES Chapter (3.04), and in the SPECIAL OPERATIONS Chapter (2.04).

TECHNICAL CONDITION OF THE AIRCRAFT

- The crew will verify the technical state of the aircraft (deferred defect list), with regard to airworthiness, acceptability of malfunctions (MEL), and influence on the flight plan.

WEATHER BRIEFING

- The crew will get a weather briefing.
- The briefing should include :
  - Actual and expected weather conditions, including runway conditions for takeoff and climb-out.
  - Significant weather enroute, including winds and temperatures.
  - Terminal forecasts for destination and alternate airports.
  - Actual weather for destination and alternates, for short range flights and recent past weather, if available.
  - Survey of the meteorological conditions at airports along the planned route.

Weather can affect the choice of routing (for example, influence which route is quickest) and the choice of flight level. The flight crew must also consider the possibility of runways being contaminated at the departure and destination airfields. The flight crew must also verify ISA deviations and enroute icing conditions, and must consider the possibility of holding due to weather at the destination.

NOTAMS

- The flight crew must examine NOTAMs for changes to routings, unserviceable navaids, availability of runways and approach aids etc, all of which may affect the final fuel requirement.
- In order to prevent the risks of projection of debris towards the trimmable horizontal stabilizer and the elevators, it is not recommended to takeoff from runways in bad condition (loose surface, under repair, covered with debris...).

FLIGHT PLAN AND OPERATIONAL REQUIREMENTS

- The crew will check the company flight plan for routing, altitudes, and flight time.
- The Captain will check the ATC flight plan and ensure that it :
  - R Is filled in and filed, in accordance with the prescribed procedures,
  - It agrees with the fuel flight plan routing.
- The crew will check the estimated load figures, and will calculate the maximum allowable takeoff and landing weights.

OPTIMUM FLIGHT LEVEL

The flight crew should choose a flight level that is as close to the optimum as possible. To obtain the optimum flight level, use the chart in the QRH or in the FCOM (Refer to FCOM
R 2.05.20).
As a general rule, an altitude that is 4000 feet below the optimum produces a significant penalty (approximately 5 % of fuel). Flight 8000 feet below the optimum altitude produces a penalty of more than 10 % against trip fuel. (The usual contingency allowance is 5 %).

FUEL REQUIREMENTS

COMPUTERIZED FLIGHT PLAN CHECK

In most cases the flight crew uses a computer-derived flight plan to obtain the correct fuel requirements. Although these computerized requirements are normally accurate, the flight crew must check them for gross errors.
The easiest way to do this is to use the "Quick Determination of F-PLN" tables in FCOM
R 2.05.40. Although the aircraft will fly at ECON MACH that is based on the cost index, the 0.78 Mach table is accurate enough to permit the crew to check for gross error.
Ensure that both the captain and the first officer have verified that the fuel calculations and required fuel on board are correct and that the figure complies with the applicable regulations.

FUEL TRANSPORTATION

The flight crew must check the policy covering the "tankering" of fuel on sectors where there is a favourable fuel price differential or operational requirement.
Remember that carrying unnecessary extra fuel increases the fuel consumption for that sector and therefore reduces the economy of the operation (lower flex temperature, more tire and brake wear, more time in climb phase, lower optimum flight level etc).

SAFETY EXTERIOR INSPECTION

Items marked by (*) are the only steps to be completed during a transit stop.
This inspection ensures that the aircraft and its surroundings are safe for operations.
On arriving at the aircraft, check for obstructions in the vicinity, engineering activity, refueling, etc.

*– **WHEEL CHOCKS . . . . CHECK IN PLACE**

*– **LANDING GEAR DOORS . . . . CHECK POSITION**

WARNING

Do not pressurize the green hydraulic system without clearance from ground personnel, if any gear door is open. Remember that the green hydraulic system is pressurized if the yellow system is pressurized and the PTU is on auto.

*– **APU AREA . . . . CHECK**

Observe that the APU inlet and outlet are clear.

PRELIMINARY COCKPIT PREPARATION

Items marked by asterisks (*) are the only steps to be completed during a transit stop.
The following procedure, performed by the PNF ensures that all required checks are performed before the application of electrical power to avoid inadvertent operation of systems and danger to the aircraft and personnel.
Included is APU starting and the establishment of electrical and pneumatic power.

ENG

– **MASTER 1 and 2 . . . . OFF**

– **MODE selector . . . . NORM**

L/G

– **L/G lever . . . . Check DOWN position**

WIPERS

– **WIPERS . . . . OFF**

ELEC

■ **If the aircraft has not been electrically supplied for 6 hours or more, perform the following check :**

– **BAT 1 and 2 . . . . CHECK OFF**

– **BAT 1 and 2 VOLTAGE . . . . CHECK ABOVE 25.5 V**
Battery voltage above 25.5 V ensures a charge above 50 %.

● **If battery voltage is below 25.5 V :**
a charging cycle of about 20 minutes is required.

– **BAT 1 and 2 . . . . AUTO**

– **EXT PWR . . . . ON**
Check on ECAM ELEC page, battery contactor closed and batteries charging.

● **after 20 minutes :**

– **BAT 1 + 2 . . . . OFF**

– **BAT 1 and 2 VOLTAGE . . . . CHECK ABOVE 25.5 V**

- **If battery voltage is above 25.5 V :**

  – **BAT 1 and 2 . . . . AUTO**
  If the APU is started on batteries only, it should be started within 30 minutes after the selection of batteries to AUTO (35 minutes after battery selection to AUTO, the battery charge is less than 25 % of maximum capacity).

■ **<u>If the aircraft has been electrically supplied during the last 6 hours :</u>**

– **BAT 1 and 2 . . . . AUTO**

– **EXT PWR (when AVAIL light is on) . . . . ON**
AVAIL light goes out.

<u>HYD</u>

WARNING

R Do not pressurize hydraulic systems without clearance from ground crew.

<u>APU FIRE</u>

– **APU FIRE pushbutton . . . . IN and GUARDED**

– **AGENT light . . . . OUT**
If the APU is already running, ensure that the following check has already been completed. If not, perform it.

– **APU FIRE TEST pushbutton . . . . PRESS**
Check :
· APU FIRE warning on ECAM + CRC + MASTER WARN light (if AC Power available).
· APU FIRE pushbutton lighted red.
· SQUIB and DISCH lights on

APU START

■ If EXT PWR ON light is on :

– **APU MASTER switch . . . . ON**
ON light comes on.
APU page appears on ECAM.

R – **APU START . . . . ON**
FLAP OPEN indication appears on ECAM APU page.
On ECAM APU page, N and EGT rise.
When N = 95 % :
. On ECAM APU page, AVAIL indication appears.
. On APU panel : START ON light goes out.
AVAIL light comes on.
10 seconds later :
. ECAM DOOR page replaces ECAM APU page.

– **EXT PWR . . . . AS RQRD**

■ if EXT PWR ON light is out:

– **APU MASTER switch . . . . ON**
ON light comes on.

– **APU START . . . . ON**
At 95% RPM :
· START ON light goes out.
· AVAIL light comes on.
· APU GEN comes on line.
· ECAM APU page appears after 10 seconds.
If required, adjust brightness on ECAM control panel.
10 seconds later :
· ECAM DOOR page replaces ECAM APU page.

COCKPIT LIGHTS

*– **COCKPIT LIGHTS . . . . AS RQRD**
· Set OVHD INTEG LT, STBY COMPASS, DOME, ANN LT switches as required.
· Set FLOOD LT, and INTEG LT as required.
DOME light should be on because it is the only lighting source in the EMER ELEC configuration. The DIM position is recommended for takeoff.

* PARKING BRAKE

*– **PARKING BRAKE . . . . ON**

*– **ACCU PRESS & BRAKES PRESS indicators . . . . CHECK**
– Check for normal indications.
– The ACCU PRESS indication must be in the green band. If required use the electric pump on yellow hydraulic system to recharge the brake accumulator.

WARNING
Yellow and green hydraulic systems are pressurized from yellow electric pump. Get ground crew clearance before using the electric pump.

ALTERNATE BRAKING SYSTEM

Note : *The purpose of this check is to verify, before the first flight of the day, the efficiency of the alternate braking system (absence of "spongy pedals").*

– **Y ELEC PUMP . . . . CHECK OFF**

– **CHOCKS . . . . CHECK IN PLACE**

– **PARKING BRAKE . . . . OFF**

– **BRAKE PEDALS . . . . PRESS**
Apply maximum pressure on both pedals.

– **BRAKE PRESSURE (on BRAKE press indicator) . . . . CHECK**
Pressure must build up without delay symmetrically on left and right sides for the same application simultaneously applied on left and right pedals. With full pedal deflection, the
R pressure must be between 2000 and 2700 psi.

– **BRAKE PEDALS . . . . RELEASE**

– **PARKING BRAKE . . . . ON**
The parking brake must be on during the exterior inspection to allow the flight crew to check brake wear indicators.

APU START

■ If EXT PWR ON light is on :

– **APU MASTER switch** . . . . **ON**
ON light comes on.
APU page appears on ECAM.

R – **APU START** . . . . **ON**
FLAP OPEN indication appears on ECAM APU page.
On ECAM APU page, N and EGT rise.
When N = 95 % :
. On ECAM APU page, AVAIL indication appears.
. On APU panel : START ON light goes out.
AVAIL light comes on.
10 seconds later :
. ECAM DOOR page replaces ECAM APU page.

– **EXT PWR** . . . . **AS RQRD**

■ if EXT PWR ON light is out:

– **APU MASTER switch** . . . . **ON**
ON light comes on.

– **APU START** . . . . **ON**
At 95% RPM :
· START ON light goes out.
· AVAIL light comes on.
· APU GEN comes on line.
· ECAM APU page appears after 10 seconds.
If required, adjust brightness on ECAM control panel.
10 seconds later :
· ECAM DOOR page replaces ECAM APU page.

COCKPIT LIGHTS

*– **COCKPIT LIGHTS . . . . AS RQRD**
· Set OVHD INTEG LT, STBY COMPASS, DOME, ANN LT switches as required.
· Set FLOOD LT, and INTEG LT as required.
DOME light should be on because it is the only lighting source in the EMER ELEC configuration. The DIM position is recommended for takeoff.

* PARKING BRAKE

*– **PARKING BRAKE . . . . ON**

*– **ACCU PRESS & BRAKES PRESS indicators . . . . CHECK**
– Check for normal indications.
– The ACCU PRESS indication must be in the green band. If required use the electric pump on yellow hydraulic system to recharge the brake accumulator.

WARNING
Yellow and green hydraulic systems are pressurized from yellow electric pump. Get ground crew clearance before using the electric pump.

F/CTL

– **FLAPS . . . . CHECK POSITION**
Check the upper ECAM display to confirm that the FLAPS position agrees with the handle position.

R *– **SPEEDBRAKE lever . . . . CHECK RETRACTED and DISARMED**

WARNING
If flight control surface positions do not agree with the control handle positions, check with the maintenance crew before applying hydraulic power.

PROBE/WINDOW HEAT

– **PROBE/WINDOW HEAT . . . . CHECK AUTO**

AIR COND

– **APU BLEED . . . . ON**
R Do not use APU BLEED, if ground personnel confirms that ground air unit is connected.
R Pilots should also check the ECAM BLEED page to determine whether an HP ground air
R unit is connected (pressure in the bleed system).

– **ALL WHITE LIGHTS . . . . OFF**

– **X BLEED . . . . AUTO**

– **Zone temperature selectors . . . . AS RQRD**
Full range temperature 24 ± 6° C (75 ± 11° F).

CARGO HEAT ◁

– **SELECTORS . . . . AS RQRD**
Set temperature selectors, as required.

ELEC

– **Scan and check that there are no amber lights, except GEN FAULT lights.**

VENT

– **Check all lights off.**

INTENTIONALLY LEFT BLANK

* ECAM

*– **RECALL** . . . . **PRESS**
- Press the RECALL pushbutton for at least 3 seconds, to recall all warnings that have been cleared or canceled.
- If applicable, check warnings are compatible with the MEL, then CLEAR or CANCEL them.
  If any action is required, call maintenance personnel as soon as possible.

*– **DOOR** . . . . **PRESS**

R If the oxygen pressure is half boxed in amber, check the "MIN FLT CREW OXY CHART" to verify if the pressure is sufficient for the scheduled flight (Refer to 3.01.35).

*– **HYD** . . . . **PRESS**

Check that the quantity indexes are in the normal filling range.

*– **ENG** . . . . **PRESS**

Check that the oil quantity is at, or above, 9.5 qts + estimated consumption (maximum average estimated consumption ~ 0.5 qt/h).

EMERGENCY EQUIPMENT

— **Check the following equipment :**
· Life jackets stowed
· Axe stowed
· Smoke hoods ⊲ or portable oxygen equipment and full face masks ⊲ stowed and serviceable
· Portable fire extinguisher lockwired and pressure in the green area
· Smoke goggles stowed (smoke hoods if installed)
· Oxygen masks stowed
· Flashlights stowed
· Escape ropes stowed

RAIN REPELLENT

— **Pressure and quantity indicators . . . . CHECK**

CAUTION
Never use rain repellent to wash the windshield and never use it on a dry windshield.

REAR and OVERHEAD CIRCUIT BREAKERS panels

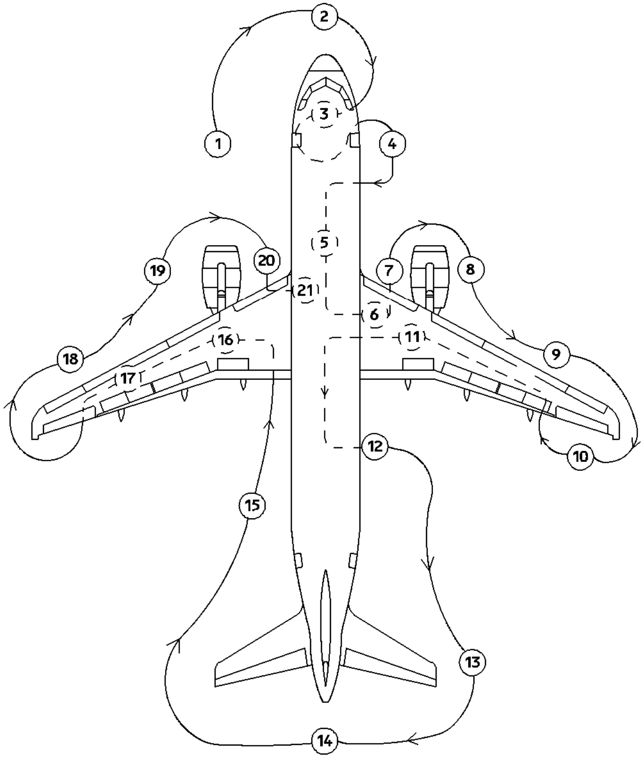
— **REAR and OVERHEAD CIRCUIT BREAKERS panels . . . . CHECK**
Check that all circuit breakers are set. Reset as necessary.

GENERAL

The exterior inspection ensures that the overall condition of the aircraft and its visible components and equipment are safe for the flight.
Complete inspection is normally performed by maintenance personnel or in the absence of maintenance personnel by a flight crew member before each originating flight.
Items marked by asteriks (*) must be performed again by a flight crew member before each flight.
The parking brake must be on during the exterior inspection to allow the flight crew to check brake wear indicators.
· Check structure for impact damage
R · Check that there is no evident fuel, oil or hydraulic leaks.

WARNING
If a landing gear door is open, contact the maintenance crew before applying hydraulic power.

EXTERIOR WALK-AROUND



(1) LH FWD FUSELAGE

*– AOA probes . . . . CONDITION
– F/O and CAPT static ports . . . . CLEAR
– Avionics equipment vent air inlet valve . . . . CONDITION
– Oxygen bay . . . . CLOSED
– Oxygen overboard discharge indicator . . . . GREEN
*– Toilet servicing door (if installed) . . . . CLOSED

(2) NOSE SECTION

*– Pitot probes . . . . CONDITION
– STBY static ports . . . . CLEAR
*– TAT probes . . . . CONDITION
*– Radome and latches . . . . CONDITION/LATCHED
– Forward avionics compartment door . . . . CLOSED
– Ground electrical power door (if not required.) . . . . CLOSED

(3) NOSE L/G

*– Nose wheel chocks . . . . IN PLACE
*– Wheels and tires . . . . CONDITION
– Nose gear structure . . . . CONDITION
– Taxi, TO, turn-off lights . . . . CONDITION
– Hydraulic lines and electrical wires . . . . CONDITION
– Wheel well . . . . CHECK
– Safety pin . . . . REMOVED

(4) RH FWD FUSELAGE

– RH + AFT avionic compartment doors . . . . CLOSED
– Avionic equipment vent air outlet valve . . . . CONDITION
– F/O-CAPT static ports . . . . CLEAR
*– AOA probe . . . . CONDITION
– Forward cargo door and selector panel . . . . CHECK

(5) LOWER CENTER FUSELAGE

- Potable water drain panel . . . . CLOSED
- Antennas . . . . CONDITION
- Drain mast . . . . CONDITION
- RAM air inlet flap . . . . CONDITION
- LP and HP ground connection doors . . . . CLOSED
- Anticollision light . . . . CHECK
- CTR TK magnetic fuel level . . . . FLUSH
- Pack air intakes and outlets . . . . CLEAR

(6) RH CENTER WING

- Yellow hydraulic bay door . . . . CLOSED
- Fuel panel . . . . CLOSED
- Magnetic fuel level . . . . FLUSH
- Fuel water drain valve tank . . . . NO LEAK
- Landing light . . . . CONDITION

*– Slat 1 . . . . CONDITION

(7) ENG 2 LH SIDE

- Oil fill access door . . . . CLOSED
- Master magnetic chip detector access door (IAE only) . . . . CLOSED

*– Fan cowl doors . . . . CLOSED/LATCHED
*– Drain mast . . . . CONDITION/NO LEAK
*– Engine inlet and fan blades . . . . CHECK

(8) ENG 2 RH SIDE

- Vent inlet (CFM only) . . . . CLEAR
- Pressure-relief/Start-valve handle access door . . . . CLOSED
- Turbine exhaust (CFM only) . . . . CLEAR
- Pylon/access panel . . . . CONDITION/CLOSED

(9) RH WING LEADING EDGE

*– Slats 2, 3, 4, 5 . . . . CONDITION

- Magnetic fuel level . . . . FLUSH
- Fuel water drain valve . . . . NO LEAK
- Refuel coupling . . . . CLOSED
- Surge tank air inlet . . . . CLEAR

R *– Fuel ventilation overpressure disc . . . . INTACT

- Navigation . . . . CONDITION

*– Wing tip . . . . CONDITION

(10) RH WING TRAILING EDGE

- Static dischargers . . . . CHECK
*– Control surfaces . . . . CONDITION
*– Flaps and fairings . . . . CONDITION

(11) RH L/G AND FUSELAGE

*– Chocks . . . . REMOVED
*– Wheels and tires . . . . CONDITION
- Brakes and brake wear ind. . . . . CONDITION
- Torque link damper . . . . CONDITION
- Hydraulic lines . . . . CHECK
- Landing gear structure . . . . CHECK
- Downlock springs . . . . CHECK
- Safety pin . . . . REMOVED
- Ground hydraulic connection yellow . . . . CLOSED
- Water drain mast . . . . CONDITION
- Shroud fuel drain . . . . CONDITION/NO LEAK

(12) RH AFT FUSELAGE

- Cargo door and selector panel . . . . CHECK
- Bulk door ◁ . . . . CHECK
*– Toilet service access door . . . . CLOSED
- Outflow valve . . . . CONDITION
- Drain mast . . . . CONDITION
- Flight recorder access door . . . . CLOSED

(13) TAIL

*– Stabilizer, elevator, fin, and rudder . . . . CONDITION
- Static dischargers . . . . CHECK
*– Lower fuselage structure (tail impact on runway) . . . . CONDITION

(14) APU

- Access doors . . . . CLOSED
- Air intake . . . . CONDITION
- Drain . . . . CONDITION/NO LEAK
- Oil cooler air outlet . . . . CLEAR
- Exhaust . . . . CLEAR
- Navigation light . . . . CONDITION
- Fire extinguisher overpressure indication (red disc) . . . . IN PLACE

(5) LOWER CENTER FUSELAGE

- Potable water drain panel (if installed) . . . . CLOSED
- Antennas . . . . CONDITION
- Drain mast . . . . CONDITION
- RAM air inlet flap . . . . CONDITION
- LP and HP ground connection doors . . . . CLOSED
- Anticollision light . . . . CHECK
- CTR TK magnetic fuel level . . . . FLUSH
- Pack air intakes and outlets . . . . CLEAR

(6) RH CENTER WING

- Yellow hydraulic bay door . . . . CLOSED
- Fuel panel . . . . CLOSED
- Inner tank magnetic fuel . . . . FLUSH
- Fuel water drain valve inner tank . . . . NO LEAK
- Landing light . . . . CONDITION
- *– Slat 1 . . . . CONDITION

(7) ENG 2 LH SIDE

- Oil fill access door . . . . CLOSED
- Master magnetic chip detector access door (IAE only) . . . . CLOSED
- *– Fan cowl doors . . . . CLOSED/LATCHED
- *– Drain mast . . . . CONDITION/NO LEAK
- *– Engine inlet and fan blades . . . . CHECK

(8) ENG 2 RH SIDE

- Vent inlet (CFM only) . . . . CLEAR
- Pressure-relief/Start valve handle access door . . . . CLOSED
- Turbine exhaust (CFM only) . . . . CLEAR
- Pylon/access panel . . . . CONDITION/CLOSED

(9) RH WING LEADING EDGE

- *– Slats 2, 3, 4, 5 . . . . CONDITION
- Inner and outer cells magnetic fuel level . . . . FLUSH
- Fuel water drain valves (outer cell, surge tank) . . . . NO LEAK
- Refuel coupling . . . . CLOSED
- Surge tank air inlet . . . . CLEAR
- *– Fuel ventilation overpressure disc . . . . INTACT
- Navigation light . . . . CONDITION
- *– Wing tip . . . . CONDITION

(10) RH WING TRAILING EDGE

— Static dischargers . . . . CHECK
*— Control surfaces . . . . CONDITION
*— Flaps and fairings . . . . CONDITION

(11) RH L/G AND FUSELAGE

*— Chocks . . . . REMOVED
*— Wheels and tires . . . . CONDITION
— Brakes and brake wear ind. . . . . CONDITION
— Torque link damper ◁ . . . . CONDITION
— Hydraulic lines . . . . CHECK
— Landing gear structure . . . . CHECK
— Downlock springs . . . . CHECK
— Safety pin . . . . REMOVED
— Ground hydraulic connection yellow . . . . CLOSED
— Water drain mast ◁ . . . . CONDITION
— Shroud fuel drain . . . . CONDITION/NO LEAK

(12) RH AFT FUSELAGE

— Cargo door and selector panel . . . . CHECK
— Bulk door ◁ . . . . CHECK
*— Toilet service access door . . . . CLOSED
— Outflow valve . . . . CONDITION
— Drain mast . . . . CONDITION
— Flight recorder access door . . . . CLOSED

(13) TAIL

*— Stabilizer, elevator, fin, and rudder . . . . CONDITION
— Static dischargers . . . . CHECK
*— Lower fuselage structure (tail impact on runway) . . . . CONDITION

(14) APU

— Access doors . . . . CLOSED
— Air intake . . . . CONDITION
— Drain . . . . CONDITION/NO LEAK
— Oil cooler air outlet . . . . CLEAR
— Exhaust . . . . CLEAR
— Navigation light . . . . CONDITION
— Fire extinguisher overpressure indication (red disc) . . . . IN PLACE

(15) LH AFT FUSELAGE

*– Stabilizer, elevator, fin, and rudder . . . . CONDITION
*– Potable water service door . . . . CLOSED
– Ground hydraulic connection blue and green doors . . . . CLOSED
– Hydraulic reservoir filling door . . . . CLOSED

(16) LH LANDING GEAR

*– Chocks . . . . REMOVED
*– Wheels and tires . . . . CONDITION
– Brakes and brake wear indicator . . . . CONDITION
– Torque link damper ⊲ . . . . CONDITION
– Hydraulic lines . . . . CHECK
– Landing gear structure . . . . CHECK
– Downlock springs . . . . CHECK
– Safety pin . . . . REMOVED

(17) LH WING TRAILING EDGE

*– Flaps and fairing . . . . CONDITION
*– Control surfaces . . . . CONDITION
– Static dischargers . . . . CHECK

(18) LH WING LEADING EDGE

*– Wing tip . . . . CONDITION
– Navigation light . . . . CONDITION
– Surge tank air inlet . . . . CLEAR
R *– Fuel ventilation overpressure disc . . . . INTACT
– Fuel water drain valve . . . . NO LEAK
– Inner and outer cell magnetic fuel level . . . . FLUSH
*– Slats 2, 3, 4, 5 . . . . CONDITION

(19) ENG 1 LH SIDE

– Oil fill access door . . . . CLOSED
– Master magnetic chip detector access door (IAE only) . . . . CLOSED
*– Fan cowl doors . . . . CLOSED/LATCHED
*– Drain mast . . . . CONDITION/NO LEAK
*– Engine inlet and fan blades . . . . CHECK

(20) ENG 1 RH SIDE

– Vent inlet (CFM only) . . . . CLEAR
– Pressure relief/Start valve handle access door . . . . CLOSED
– Turbine exhaust (CFM only) . . . . CLEAR
– Pylon/access panel . . . . CONDITION/CLOSED

(21) LH CENTER WING

*– Slat 1 . . . . CONDITION
– Wing leading edge ventilation intake ◁ . . . . CLEAR
– Fuel water drain valves . . . . NO LEAK
R – Inner tank magnetic fuel . . . . FLUSH
– Landing lights . . . . CONDITION
– Hydraulic reservoir pressurization door . . . . CLOSED
– RAT doors . . . . CLOSED

(15) LH AFT FUSELAGE

*– Stabilizer, elevator, fin, and rudder . . . . CONDITION
*– Potable water service door . . . . CLOSED
– Ground hydraulic connection blue and green doors . . . . CLOSED
– Hydraulic reservoir filling door . . . . CLOSED

(16) LH LANDING GEAR

*– Chocks . . . . REMOVED
*– Wheels and tires . . . . CONDITION
– Brakes and brake wear indicator . . . . CONDITION
– Torque link damper . . . . CONDITION
– Hydraulic lines . . . . CHECK
– Landing gear structure . . . . CHECK
– Downlock springs . . . . CHECK
– Safety pin . . . . REMOVED

(17) LH WING TRAILING EDGE

*– Flaps and fairing . . . . CONDITION
*– Control surfaces . . . . CONDITION
– Static dischargers . . . . CHECK

(18) LH WING LEADING EDGE

*– Wing tip . . . . CONDITION
– Navigation light . . . . CONDITION
– Surge tank air inlet . . . . CLEAR
R *– Fuel ventilation overpressure disc . . . . INTACT
– Fuel water drain valve . . . . NO LEAK
– Magnetic fuel level . . . . FLUSH
*– Slats 2, 3, 4, 5 . . . . CONDITION

(19) ENG 1 LH SIDE

– Oil fill access door . . . . CLOSED
– Master magnetic chip detector access door (IAE only) . . . . CLOSED
*– Fan cowl doors . . . . CLOSED/LATCHED
*– Drain mast . . . . CONDITION/NO LEAK
*– Engine inlet and fan blades . . . . CHECK

(20) ENG 1 RH SIDE

- Vent inlet (CFM only) . . . . CLEAR
- Pressure relief/Start valve handle access door . . . . CLOSED
- Turbine exhaust (CFM only) . . . . CLEAR
- Pylon/access panel . . . . CONDITION/CLOSED

(21) LH CENTER WING

*– Slat 1 . . . . CONDITION
- Wing leading edge ventilation intake ⊲ . . . . CLEAR
- Fuel water drain valves . . . . NO LEAK
R – Magnetic fuel level . . . . FLUSH
- Landing lights . . . . CONDITION
- Hydraulic reservoir pressurization door . . . . CLOSED
- RAT doors . . . . CLOSED

INTRODUCTION

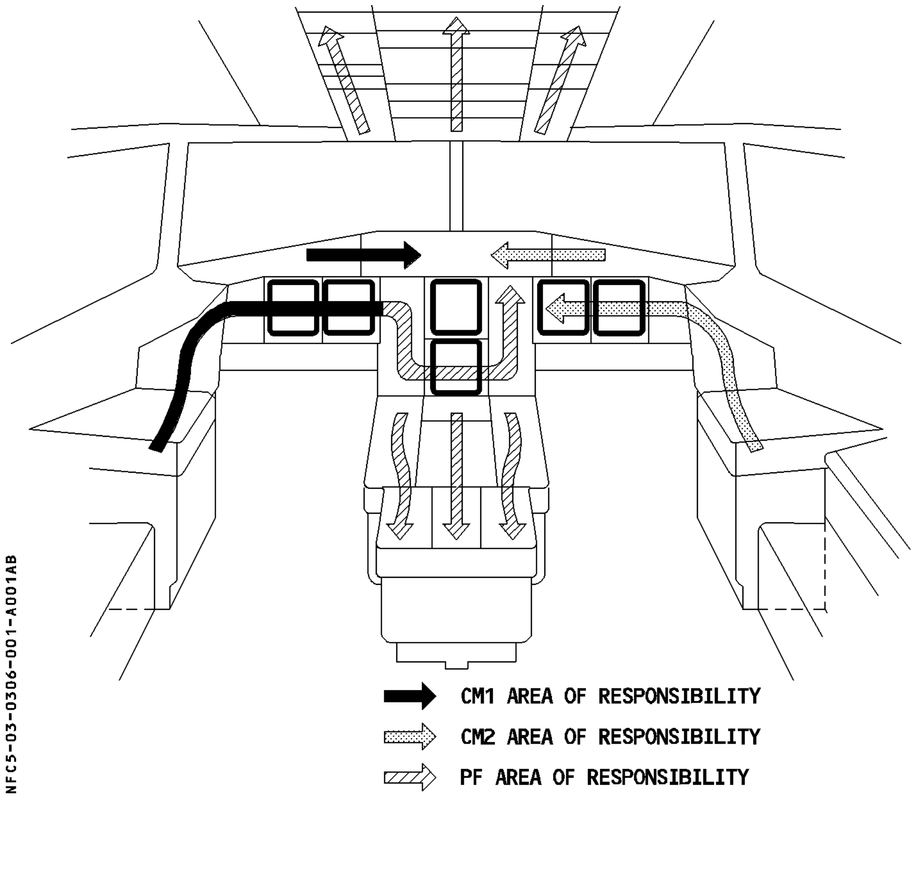
Items marked by (*) are the only steps to be completed during a transit stop.
The PF and PNF should perform the cockpit preparation according to the panel scan sequence, defined below, and the task sharing defined in the Quick Reference Handbook (QRH).

DOCUMENTATION AND MAINTENANCE

On entering the aircraft, obtain the technical (maintenance) log and verify that the certificate of maintenance and daily inspection (or similar) are up to date and signed. Check the deferred or carried-forward defects. If refueling has already been completed, check the uplift.

PANEL SCAN SEQUENCE

R



*– **GEAR PINS and COVERS . . . . CHECK**
Check that three are on board and stowed.

OVERHEAD PANEL

IT IS A GENERAL RULE TO TURN OFF ALL WHITE LIGHTS FOR ALL THE SYSTEMS DURING THE SCAN SEQUENCE. THEREFORE, THESE ACTIONS ARE NOT LISTED HERE.

RCDR

*– **RCDR GND CTL . . . . ON**

– **CVR TEST . . . . PRESS AND RELEASE**
Check low frequency signal through the loudspeakers.

Note : The parking brake must be ON to perform the CVR test.

R **EVAC**

– **CAPT and PURS/CAPT switch . . . . AS RQRD**
The usual position is CAPT.

*** ADIRS**

– **Mode selectors (3) . . . . NAV**
· The ADIRS outputs are used by many of the aircraft's systems : Set the selectors to NAV as soon as possible, to provide data to the related systems.
· Perform a complete alignment if :
∗ It is the first flight of the day
∗ The GPS is not available, and long segments in poor radio NAVAID coverage airspace are expected.
· For other flights, perform a fast alignment, if the residual ground speed is greater than 5 knots. The alignment is not necessary, if the residual ground speed is less than 5 knots.
· In case of ADIRS alignment, check that the ALIGN lights of the three ADIRS are on.
· For more information on ADIRS OPERATION, refer to SUPPLEMENTARY TECHNIQUES, 3.04.34.

EXT LT

– **EXTERIOR LIGHTS . . . . AS RQRD**
Set STROBE switch to AUTO, BEACON switch to OFF and remaining switches as required.

*** SIGNS**

*– **SEAT BELTS . . . . ON/AUTO**

*– **NO SMOKING . . . . AUTO**

*– **EMER EXIT LT . . . . ARM**

Note : If the CIDS has been programmed (option) for a non-smoking flight, NO SMOKING signs are permanently on, with the NO SMOKING switch at AUTO.

CABIN PRESS

– **LDG ELEV . . . . AUTO**

<u>* AIR COND</u>

*– **ECON FLOW pushbutton . . . . AS RQRD**
Select :
ON : Econ flow, if number of passengers is below 140.
Off : For normal flow.
If the APU is supplying, pack controllers select normal flow automatically, independent of the selector position.

<u>ELEC</u>

– **ECAM ELEC PAGE . . . . CALL**

– **BAT 1 + 2 . . . . OFF then ON**
R 10 seconds after selecting ON, check on the ECAM ELEC page that both battery charge currents are below 60 A and decreasing.

<u>ENG 1 – ENG 2 FIRE</u>

– **ENG 1 and 2 FIRE pushbuttons . . . . CHECK IN and GUARDED**

– **AGENT 1 and AGENT 2 lights . . . . CHECK OUT**

– **ENG 1 (2) TEST pushbutton . . . . PRESS**
Check :
· ENG 1 (2) FIRE warning on ECAM + CRC + MASTER WARN light.
· ENG FIRE pushbutton lighted red.
· SQUIB and DISCH lights on.
· FIRE light (on ENG panel) on.

*** ADIRS**

– **Mode selectors (3) . . . . NAV**

· The ADIRS outputs are used by many of the aircraft's systems : Set the selectors to NAV as soon as possible, to provide data to the related systems.

· Perform a complete alignment if :

∗ It is the first flight of the day

∗ The GPS is not available, and long segments in poor radio NAVAID coverage airspace are expected.

· For other flights, perform a fast alignment, if the residual ground speed is greater than 5 knots. The alignment is not necessary, if the residual ground speed is less than 5 knots.

· In case of ADIRS alignment, check that the ALIGN lights of the three ADIRS are on.

· For more information on ADIRS OPERATION, refer to SUPPLEMENTARY TECHNIQUES, 3.04.34.

EXT LT

– **EXTERIOR LIGHTS . . . . AS RQRD**

Set STROBE switch to AUTO, BEACON switch to OFF and remaining switches as required.

*** SIGNS**

*– **SEAT BELTS . . . . ON/AUTO**

*– **NO SMOKING . . . . AUTO**

*– **EMER EXIT LT . . . . ARM**

Note : If the CIDS has been programmed (option) for a non-smoking flight, NO SMOKING signs are permanently on, with the NO SMOKING switch at AUTO.

CABIN PRESS

– **LDG ELEV . . . . AUTO**

<u>* AIR COND</u>

*– **PACK FLOW . . . . AS RQRD**
Select :
LO : If the number of passengers is below 115.
HI : For abnormally hot and humid conditions.
NORM : For all other normal operating cases.
If the APU is supplying, pack controllers select HI flow automatically, independent of the selector position.

<u>ELEC</u>

– **ECAM ELEC PAGE . . . . CALL**

– **BAT 1 + 2 . . . . OFF then ON**
R 10 seconds after selecting ON, check on the ECAM ELEC page that both battery charge currents are below 60 A and decreasing.

<u>* FUEL</u>
Apply the following procedure, if your airline is affected by <u>FUEL</u> CTR TK PUMP LO PR warnings in flight when the center tank is empty :

● **If the center tank is empty for the flight :**

– **FUEL MODE SEL . . . . MAN**

– **CTR TK PUMP 1 and 2 . . . . OFF**

<u>ENG 1 – ENG 2 FIRE</u>

– **ENG 1 and 2 FIRE pushbuttons . . . . CHECK IN and GUARDED**

– **AGENT 1 and AGENT 2 lights . . . . CHECK OUT**

– **ENG 1 (2) TEST pushbutton . . . . PRESS**
Check :
· ENG 1 (2) FIRE warning on ECAM + CRC + MASTER WARN light.
· ENG FIRE pushbutton lighted red.
· SQUIB and DISCH lights on.
· FIRE light (on ENG panel) on.

AUDIO SWITCHING panel

— **AUDIO SWITCHING panel . . . . NORM**

THIRD OCCUPANT AUDIO CONTROL PANEL

— **PA reception knob . . . . Select reception**
· This allows cabin attendant announcements to be recorded on the CVR.
· For proper recording, set volume at or above medium range.

MAINTENANCE PANEL

— **Check all lights out. If not out, select associated pushbutton switch to off.**

RMP

— **RMP . . . . ON**

— **Green NAV light . . . . CHECK OFF**

— **SEL light . . . . CHECK OFF**

— **COM FREQUENCIES . . . . TUNE**
Use VHF 1 for ATC (only VHF1 is available in emergency electrical configuration), VHF2 for ATIS and company frequencies. VHF3 is normally devoted to ACARS.

*** AIRFIELD DATA**

Obtain data needed for initializing the system and preparing the cockpit. This should include, RUNWAY IN USE, ALTIMETER SETTING, and WEATHER DATA.

*** ATC CLEARANCE**

Obtain ATC clearance or use the probable clearance.

*** ACARS ◁**

R Initialize ACARS at that point or after FMGS INITIALIZATION, as per company policy.

*FMGS INITIALIZATION

At electrical power-up, the FMGSs and FCU run through various internal tests. Allow enough time (3 minutes) for tests' completion, and do not start to press pushbuttons until the tests are over. If the "PLEASE WAIT" message appears, do not press any MCDU key until the message clears.

*– **ENGINE & AIRCRAFT TYPE . . . . CHECK**

*– **FM database validity . . . . CHECK**
· Press the DATA key, and display the STATUS page (if not displayed).
· Check DATA BASE validity and stored WPT/NAVAIDS/RWY/ROUTES, if any.
If applicable, review the stored data for deletion decision.

*– **NAVAID DESELECTION . . . . AS RQRD**
If NOTAMs warn of any unreliable DME or VOR/DME, display DATA, then POSITION MONITOR. Access the SEL NAVAID page, and deselect the related navaid.

*– **FLIGHT PLAN INITIALIZATION . . . . COMPLETE**
· Press the INIT key.
· Insert CO RTE or city pair, and check FROM/TO.
· Check/modify ALTN/CO RTE.
· Enter flight number.

<u>Note</u> : *For ATC needs, the crew should enter exactly the entire flight number, as shown on the ICAO flight plan, without inserting any space, on the MCDU INIT page.*

· Enter (and/or check) cost index.
· Enter intended initial CRZ FL, or check if it was already supplied by the database.
Modify it, if necessary, taking into account ATC constraints or expected gross weight.
· Check and modify CRZ FL TEMP and tropopause level to agree with forecast.
· Check latitude/longitude.

R *– **ADIRS POSITION INITIALIZATION . . . . AS APPROPRIATE**
R · ADIRS position initialization involves setting the ADIRS navigation starting point. This
R is only necessary for a complete or fast alignment.
R · Press the ALIGN IRS prompt to send the coordinates displayed on the MCDU INIT
R page to the three ADIRS.
R · Use the defaulted departure airport reference point coordinates to initialize the ADIRS.
R · When flying without GPS on long segments without radio coverage, it is better to use
R the gate coordinates to initialize the ADIRS : To insert these coordinates, slew them
R on the MCDU, and then press the ALIGN IRS prompt.

*– **F-PLN A page . . . . COMPLETE AND CHECK**
If CO RTE has been inserted, the F-PLN should automatically include the preferential or probable takeoff runway, approach and landing runway, associated SIDs, STARs, transition and en-route waypoints. However some databases will only include departure and arrival airport idents and en-route waypoints.
The flight crew must check, modify, or insert (as applicable) the F-PLN in the following order, according to the data given by ATIS, ATC, or MET :
· Lateral revision at departure airport. Select RWY, then SID, then TRANS using scroll keys.
R · Lateral revision at WPT for ROUTE modification if needed. (Refer to FCOM 4.04,
R LATERAL FUNCTIONS).
· Vertical revision. Check or enter climb speed limit, constraints according to ATC clearance. Enter step altitude as appropriate.

*– **WINDS . . . . AS APPROPRIATE**
Choose between using TRIP WIND or forecast wind for CLB or CRZ phases.
R (Refer to FCOM 4.04, VERTICAL FUNCTIONS).

*– **F-PLN . . . . CHECK**
· Check the F-PLN using F-PLN page and ND PLAN mode versus the computer (paper) flight plan or navigation chart.
· Check DIST TO DEST along the F-PLN. Compare it with the total distance computed for the flight with the computer (paper) flight plan.

*– **SECONDARY FLIGHT PLAN . . . . AS APPROPRIATE**
This is routinely a copy of the active flight plan. However, consideration may be given to the following :
a) Copy the active F-PLN, but modify it at a suitable WPT for an immediate return to the departure airfield in the event of, for example, engine failure.
b) If weather is below landing minimums at the departure airfield, the secondary flight plan should be that required for a diversion immediately after takeoff.
c) If there is a chance of a change in runway or SID during taxi, prepare for it by copying the active flight plan and making the necessary modifications.

*– **RADIO NAV . . . . CHECK**
· Check the VOR, ILS and ADF tuned by the FMGC.
· Modify them if required, and check that the correct identifier is displayed on the ND and PFD (ILS). If unsatisfactory, go through the audio check.

* FMGS DATA INSERTION

GROSS WEIGHT INSERTION (INIT B page) :

*– **ZFCG/ZFW** . . . . **INSERT**

*– **BLOCK FUEL** . . . . **INSERT**

CAUTION
The characteristic speeds displayed on the MCDU (green dot, F, S, VLS) are computed from the ZFW and ZFCG entered by the crew on the MCDU. Therefore, this data must be carefully checked (Captain's responsibility).

· The flight crew should insert the weights after completing all other insertions. This is to avoid cycles of prediction computations at each change in flight plan, constraints, etc.
· If ZFCG and ZFW are unavailable, it is acceptable to enter the expected values in order to obtain predictions. Similarly, the flight crew may enter the expected fuel on board, if refueling has not been completed at that time.
· If ZFCG, ZFW, and BLOCK FUEL are inserted, the FM will provide all predictions, as well as the EXTRA fuel, if any.

TAKEOFF DATA INSERTION (PERF TAKEOFF page) :

*– **V1, VR, V2** . . . . **INSERT**

*– **FLX TO TEMP** . . . . **INSERT**

*– **THR RED/ACC altitude** . . . . **SET or CHECK**
R For noise abatement procedure, the crew must set the acceleration altitude at, or
R above, 3000 feet, and adjust the values according to local noise abatement regulations.

*– **ENG OUT ACC altitude** . . . . **SET or CHECK**

*– **FLAPS/THS reminder** . . . . **INSERT**

*– **TO SHIFT** . . . . **AS RQRD**
Enter the takeoff SHIFT distance, if takeoff is to be from an intersection. This is essential for position updating at takeoff and, consequently, for navigation accuracy.

CLIMB, CRUISE, DESCENT, SPEED PRESELECTION

*– **PRESET SPEEDS . . . . AS RQRD**

If the flight is cleared for a close-in turn or close-in altitude constraint, the flight crew may preselect green dot speed on the PERF CLB page. Once the CLB phase is active, the preselected speed will be displayed in the FCU speed window and on the PFD (blue symbol). Once the turn is completed or the altitude cleared, the pilot will resume the managed speed profile by pressing the SPD selector on the FCU.

Similarly the pilot may select a CRZ MACH number on the PERF CRZ page (constant CRZ Mach segment, for example). When the CRZ phase is active, the preselected CRZ MACH number will be displayed in the FCU speed window and on the PFD. When ECON MACH number may be resumed, the crew presses the FCU SPD selector.

In either of the above cases, the pilot may cancel the CLB or CRZ preselected SPD/MACH prior to activating the related phase, by selecting ECON on the PERF CLB or CRZ pages.

SPD LIM is defaulted to 250 knots below 10000 feet in the managed speed profile. This may be either cleared or modified on the VERT REV page at the origin (or a climb waypoint).

GLARESHIELD

– **Glareshield integral light and flood light . . . . AS RQRD**

*– **BARO REF . . . . SET**
· Set QNH (or QFE) on the EFIS control panel and on the standby altimeter
· Check barometer settings and altitude indications on the PFD and standby altimeter. (Tolerance limits are given in 3.04.34).

*– **FD . . . . CHECK ON**

*– **LS . . . . AS RQRD**

<u>Note</u> : Do not engage the autothrust on ground, as it may generate the AUTO FLT A/THR OFF warning at engine start.

* EFIS CONTROL PANEL

*– **ND mode and range . . . . AS RQRD**
MODE : Display the ARC mode on the ND, if the takeoff direction is approximately the departure direction ; or, the ROSE NAV mode, if the direction change is to be more than 70° after takeoff (to allow the ND to display the area behind the aircraft).
RANGE : Set the minimum range to display the first waypoint after departure, or as required for weather radar.

*– **VOR/ADF selector . . . . AS RQRD**
Display VOR and ADF needles, as needed.

* FCU

*– **SPD MACH window . . . . DASHED**

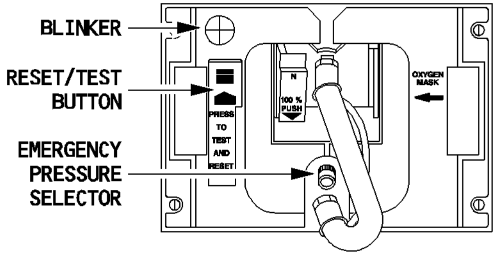
*– **HDG V/S-TRK FPA . . . . HDG V/S**

*– **ALT window . . . . INITIAL EXPECTED CLEARANCE ALT**

LATERAL CONSOLES

OXYGEN MASK TEST

NFC5-03-0306-011-A001AA



On the OXYGEN panel :

– **CREW SUPPLY . . . . CHECK ON**

On the glareshield :

– **LOUDSPEAKERS . . . . ON**

On the audio control panel :

– **INT reception knob . . . . PRESS OUT-ADJUST**

– **INT/RAD switch . . . . INT**

On the mask stowage box :

· Press and hold the reset/test button in the direction of the arrow.
  – Check that the blinker turns yellow for a short time, and then goes black.
· Hold the reset/test button down, and press the emergency pressure selector.
  – Check that the blinker turns yellow and remains yellow, as long as the emergency pressure selector is pressed.
  – Listen for oxygen flow through the loudspeakers. Warn any engineer, whose headset may be connected to the nose intercom, that a loud noise may be heard when performing this check.
· Check that the reset/test button returns to the up position and the N 100 % selector is in the 100 % position.
R · Press the emergency pressure selector again, and check that the blinker does not turn
R yellow. This ensures that the mask is not supplied.

On the ECAM DOOR/OXY page :

– **REGUL LO PR message . . . . CHECK OFF**
· The crew must perform this check after having checked all masks. It ensures that the LP valve is open, (due to residual pressure between the LP valve and the oxygen masks, an LP valve failed in the closed position may not be detected during the oxygen mask test).

CM 1/2 INSTRUMENT PANELS

– **PFD and ND brightness knob . . . . AS RQRD**
Check the ND outer ring to maximum range (radar display)

– **LOUDSPEAKER . . . . SET**
One o'clock position.

R *– **PFD . . . . CHECK**
– Check PFD/ND not transferred.
– Check for correct display when ATT and HDG are available.
– Check IAS, FMA, initial target ALT, altimeter readings, VSI, altimeter settings, heading and attitude display.

R *– **ND . . . . CHECK**
– Check for correct display.
– Crosscheck compass indication on the ND and DDRMI.
– Check ground speed less than 5 knots, heading, initial waypoint, VOR ADF indications.

CTR INSTRUMENT PANEL

R *– **STBY ASI . . . . CHECK**

R *– **STBY ALTI (and STBY ALTI in meter ◁) . . . . CHECK**

R *– **STBY HORIZON . . . . CHECK**
Check no flag – Erect if necessary.

R **<u>* CLOCK</u>**

– **Check time adjust if necessary ; elapsed time at zero, chrono at zero.**

<u>NOSEWHEEL STEERING</u>

R *– **A/SKID & N/W STRG . . . . ON**

PEDESTAL

ACP

– **INT knob . . . . PRESS OUT / VOLUME CHECK**
Make sure that INT volume is turned up to permit contact with the ground crew.

– **VHF . . . . CHECK**
Check transmission and reception.

– **HF (if required for flight) . . . . CHECK**
· Check transmission and reception.
· Do not transmit on HF during refueling.

* WEATHER RADAR

*– **Power supply switch . . . . CHECK OFF**

*– **WINDSHEAR switch (◁) . . . . CHECK OFF**

*– **GAIN . . . . AUTO**

*– **MODE . . . . AS RQRD**

SWITCHING panel

– **SWITCHING panel . . . . CHECK**
Check all selectors at NORM.

*** ECAM control panel**

*– **STS . . . . PRESS**
Check that INOP SYS display is compatible with MEL.
If a message is displayed in MAINTENANCE STATUS, see PARKING procedure (Refer to 3.03.25).

*– **PRESS . . . . PRESS**
Check that the CAB PRESS page displays LDG ELEV AUTO, to confirm the correct position of the LDG ELEV selector.

COCKPIT DOOR

If required by local Airworthiness Authorities :

– **ANN LT . . . . TEST**
· Check that the OPEN and FAULT lights (on the pedestal), and the three LED lights (on the overhead panel) come on.

– **ANN LT . . . . BRT**
· Check that all lights go off.

– **CKPIT DOOR . . . . CHECK CORRECT OPERATION**
· Set the toggle switch to the UNLOCK position. Check that the door opens, and that the OPEN light comes on.
· Then, with the door fully open, release the toggle switch (check that it returns to the NORM position). Close the door. Check that it is locked, and that the OPEN indication goes off.

– **CKPIT DOOR MECHANICAL OVERRIDE . . . . CHECK**
· Check that the door opens normally, and that it closes when the mechanical override is used.

***THRUST LEVERS**

*– **THRUST LEVERS . . . . CHECK IDLE**

*** ENG**

*– **ENG MASTER switch . . . . CHECK OFF**

*– **ENG MODE selector . . . . CHECK NORM**

*** PARKING BRK**

*– **PARKING BRAKE . . . . ON THEN OFF**
· Check pressure on the BRAKE PRESS indicator.
· If chocks are in place, release the parking brake to increase brake cooling.

GRAVITY GEAR EXTN

– **GRAVITY GEAR EXTN . . . . CHECK STOWED**

ATC

– **ATC . . . . SET FOR OPERATION**
R Perform the appropriate ATC selection to allow the ATC transponder to operate in mode
R S (refer to FCOM 1.34.50), TCAS is on standby. To prevent possible interference to radar
R surveillance systems, TCAS should not be selected before the holding point/lining up.

– **ALT RPTG . . . . ON**

– **System 1 . . . . SELECT**
Only system 1 is available, in emergency electrical configuration.

* FMGS DATA CONFIRMATION

*– **AIRFIELD DATA . . . . CONFIRM**

*– **ATC CLEARANCE . . . . OBTAIN**

*– **IRS ALIGN . . . . CHECK**
R On the POSITION MONITOR page, check that the IRS are in NAV mode, and check that
R the distance between each IRS and the FMS position is lower than 5 NM. Select ND
R in ROSE-NAV or ARC mode, and confirm that the aircraft position is consistent with the
R position of the airport, the SID and the surrounding NAVAIDs.

*– **GROSS WEIGHT INSERTION . . . . CHECK**
The PNF checks FMGS data.

*– **TO DATA . . . . CALCULATE/CHECK**
The PNF calculates and check takeoff data.

*– **F-PLN A and B pages . . . . CHECK**
· Select the EFIS CSTR pushbutton switch on.
· Ensure that the inserted F-PLN agrees with planned routes. (Refer to 4.05.10)
· If company policy requires it, use the scroll key to check the whole F-PLN thoroughly. Tracks and distances between waypoints are displayed on the second line from the top of the MCDU. Compare them with the navigation charts, if necessary.
Check correct stringing, using ND in PLAN mode.
SID and EOSID tracks and distances must be checked from the appropriate navigation charts.

* ATC

*– **ATC CODE . . . . SET**

* FUEL

*– **FUEL QTY . . . . CHECK**
· Check that ECAM fuel on board corresponds to the F-PLN.
· Check that fuel imbalance is within limits.

***TAKEOFF BRIEFING**

R *– **TAKEOFF BRIEFING . . . . PERFORM**

***PC DEDICATED TO MAINTENANCE ◁**

Check that the Personal Computer (PC) dedicated to maintenance use and located in front of lower stowage at RH rear corner is stowed.
Check that the light of its manual switch is off. If not, switch it off.
Check that its associated printer located in front of RH rear panel of the cockpit is stowed.

BEFORE PUSHBACK or START

- **LOADSHEET . . . . CHECK**
  The Captain should thoroughly check the Load and Trim Sheet (LTS), particularly for gross errors. Make sure that the loadsheet data is correct : Correct flight, correct aircraft, dry operating index, configuration, Fuel On Board, etc.
  Compare the ZFW/ZFCG with the previously-entered data, and adjust if necessary.
R Check that the takeoff CG is within the LTS operational limits.

- **TAKEOFF DATA . . . . PREPARE and CHECK/REVISE**
  When the loadsheet is checked :
  - The PNF checks or recalculates the takeoff speeds and flexible temperature, using the RTOW charts.
  - The PF independently calculates the takeoff speeds and flexible temperature, as a crosscheck.
    Take particular care in determining the takeoff configuration. (Refer to 2.02.20).
    Confirm any takeoff weight limitation.
  - The PF checks (or revises) the takeoff data in the INIT B and PERF pages of the MCDU.

- **SEATS, SEAT BELTS, HARNESSES, RUDDER PEDALS, ARMRESTS . . . . ADJUST**
  The seat is correctly adjusted, when the pilot's eyes are in line with the red and white balls.

- **MCDU . . . . IN TAKEOFF CONFIGURATION**
  It is recommended that the crew display F-PLN on the PNF side, and PERF TAKEOFF on the PF side.

- **EXT PWR . . . . CHECK OFF**
  Request that external power be removed.

- **BEFORE START CHECKLIST down to the line . . . . COMPLETE**

– **PUSHBACK/START UP CLEARANCE . . . . OBTAIN**
Obtain ATC pushback/startup clearance.
Obtain ground crew clearance.

– **NW STRG DISC . . . . CHECK AS RQRD**
In case of pushback (conventional or towbarless), the nosewheel steering selector bypass pin must be in the tow position. The ECAM's NW STRG DISC, or N WHEEL STEERG DISC memos indicate this to the flight crew.

CAUTION

If NW STRG DISC is not displayed on the ECAM, but the ground crew confirms that the steering selector bypass pin is in the towing position, then the pushback must not be performed. This is to avoid possible nose landing gear damage upon green hydraulic pressurization.
To dispatch the aircraft in such a case, refer to the MMEL.

In case of a powerpush by the main landing gear, the nosewheel steering selector should remain in the normal position to steer the aircraft (Refer to 3.04.80).

– **WINDOWS and DOORS . . . . CHECK CLOSED**
- Check that the cockpit windows are closed and locked.
- Check, on the ECAM lower display, that all the aircraft doors are closed.
- When required by local airworthines authorities, check that the cockpit door is closed and locked (no cockpit door open/fault indication).
  If entry is requested, identify the person requesting entry before unlocking the door. With the cockpit door selector on NORM, the cockpit door is closed and locked. If entry is requested from the cabin, and if no further action is performed by the pilot, the cabin crew will be able to unlock the door by using the emergency access procedure. Except for crew entry/exit, the cockpit door should remain closed until engine shutdown.

– **BEACON . . . . ON**

– **THR LEVERS . . . . IDLE**

CAUTION

Engines will start, regardless of the thrust lever position ; thrust will rapidly increase to the corresponding thrust lever position, causing a hazardous situation, if thrust levers are not at IDLE.

BEFORE PUSHBACK or START

– **LOADSHEET . . . . CHECK**
The Captain should thoroughly check the Load and Trim Sheet (LTS), particularly for gross errors. Make sure that the loadsheet data is correct : Correct flight, correct aircraft, dry operating index, configuration, Fuel On Board, etc.
Compare the ZFW/ZFCG with the previously-entered data, and adjust if necessary.
R Check that the takeoff CG is within the LTS operational limits.

– **TAKEOFF DATA . . . . PREPARE and CHECK/REVISE**
When the loadsheet is checked :
- The PNF checks or recalculates the takeoff speeds and flexible temperature, using the RTOW charts.
- The PF independently calculates the takeoff speeds and flexible temperature, as a crosscheck.
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- The PF checks (or revises) the takeoff data in the INIT B and PERF pages of the MCDU.

– **SEATS, SEAT BELTS, HARNESSES, RUDDER PEDALS, ARMRESTS . . . . ADJUST**
The seat is correctly adjusted, when the pilot's eyes are in line with the red and white balls.

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It is recommended that the crew display F-PLN on the PNF side, and PERF TAKEOFF on the PF side.

– **EXT PWR . . . . CHECK OFF**
Request that external power be removed.

– **BEFORE START CHECKLIST down to the line . . . . COMPLETE**

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CAUTION

If NW STRG DISC is not displayed on the ECAM, but the ground crew confirms that the steering selector bypass pin is in the towing position, then the pushback must not be performed. This is to avoid possible nose landing gear damage upon yellow hydraulic pressurization.
To dispatch the aircraft in such a case, refer to the MMEL.

In case of a powerpush by the main landing gear, the nosewheel steering selector should remain in the normal position to steer the aircraft (Refer to 3.04.80).

– **WINDOWS and DOORS . . . . CHECK CLOSED**
- Check that the cockpit windows are closed and locked.
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  If entry is requested, identify the person requesting entry before unlocking the door. With the cockpit door selector on NORM, the cockpit door is closed and locked. If entry is requested from the cabin, and if no further action is performed by the pilot, the cabin crew will be able to unlock the door by using the emergency access procedure. Except for crew entry/exit, the cockpit door should remain closed until engine shutdown.

– **BEACON . . . . ON**

– **THR LEVERS . . . . IDLE**

CAUTION

Engines will start, regardless of the thrust lever position ; thrust will rapidly increase to the corresponding thrust lever position, causing a hazardous situation, if thrust levers are not at IDLE.

R – **PARKING BRAKE ACCU PRESS . . . . CHECK**
R The ACCU PRESS indication must be in the green band.

– **PARKING BRAKE . . . . AS RQRD**

– If no pushback is required, check that the PARKING BRK handle is ON, and check the BRAKES PRESS indication.

CAUTION

If, during engine start with parking brake on, the aircraft starts to move due to a parking brake failure, immediately release the PARKING BRK handle to restore braking by pedals.

– If pushback is required, set the PARKING BRK to OFF.

CAUTION

Do not use brakes during pushback, unless required due to an emergency.

After pushback is completed, set the PARKING BRAKE to ON and inform the ground crew to allow towbar to be disconnected.

– **BEFORE START CHECKLIST below the line . . . . COMPLETE**

AUTOMATIC ENGINE START

Use the automatic engine start procedure in most circumstances. However, if the start aborts due to insufficient starter inlet air pressure (e.g. on high airfields or in the case of low pressure from an external pneumatic power group), it is recommended to proceed with the manual start procedure, rather than use the automatic one.
If, during the engine start, the ground crew reports a fuel leak from the engine drain mast, run the engine at idle for 5 minutes. If the leak disappears during these 5 minutes, the aircraft can be dispatched without maintenance action. If the leak is still present after 5 minutes, maintenance action may be required before the flight.

– **ENG MODE selector . . . . IGN/START**
  The lower ECAM displays the ENG page.

– **ANNOUNCE . . . . "STARTING ENGINE 2"**
  Engine 2 is usually started first. It powers the yellow hydraulic system, which pressurizes the parking brake.

– **MASTER switch 2 . . . . ON**
  Do not turn the MASTER switch ON before all amber crosses and messages have disappeared on the engine parameters (upper ECAM display).

R

ON ECAM UPPER DISPLAY	ON ECAM LOWER DISPLAY
N2 increases	Corresponding start valve in line. Bleed pressure indication green. Oil pressure increases.
At 16 % N2	Indication of the active igniter (A or B).
At 22 % N2 – FF increases 15 seconds (maximum) after fuel is on – EGT increases – N1 increases	
At 50 % N2	Start valve starts closing. (It is fully closed between 50 % and 56 % N2). Igniter indication off.

– Parameter callouts are not mandatory.
– In case the electrical power supply is interrupted during the start sequence (indicated by the loss of ECAM DUs), abort the start by switching OFF the MASTER switch. Then, perform a 30-second dry crank.

– **MAIN AND SECONDARY ENG. IDLE PARAMETERS . . . . CHECK NORMAL**
At ISA sea level : N1 about 19.5 %
N2 about 58.5 %
EGT about 390° C
FF about 275 kg/h (600 lb/h)
Grey background on N2 indication disappears.

– **ANNOUNCE . . . . "STARTING ENGINE 1"**

– **MASTER switch 1 . . . . ON**
Same procedure as for engine 2.
Both pack valves reopen with 30 second delay after the second engine N2 is above 50 %.

Note : A PTU FAULT is triggered, if the second engine is started within 40 seconds following the end of the cargo doors operation.

AUTOMATIC ENGINE START

Use the automatic engine start procedure in most circumstances. However, if the start aborts due to insufficient starter inlet air pressure (e.g. on high airfields or in the case of low pressure from an external pneumatic power group), it is recommended to proceed with the manual start procedure, rather than use the automatic one.
If, during the engine start, the ground crew reports a fuel leak from the engine drain mast, run the engine at idle for 5 minutes. If the leak disappears during these 5 minutes, the aircraft can be dispatched without maintenance action. If the leak is still present after 5 minutes, maintenance action may be required before the flight.

– **ENG MODE selector . . . . IGN/START**
  The lower ECAM displays the ENG page.

– **ANNOUNCE . . . . "STARTING ENGINE 2"**
  Engine 2 is usually started first. It powers the yellow hydraulic system, which pressurizes the parking brake.

– **MASTER switch 2 . . . . ON**
  Do not turn the MASTER switch ON before all amber crosses and messages have disappeared on the engine parameters (upper ECAM display).

R

ON ECAM UPPER DISPLAY	ON ECAM LOWER DISPLAY
N2 increases	Corresponding start valve in line. Bleed pressure indication green. Oil pressure increases.
At 16 % N2	Indication of the active igniter (A or B).
At 22 % N2 – FF increases (*) 15 seconds (maximum) after fuel is on – EGT increases – N1 increases	
At 50 % N2	Start valve starts closing. (It is fully closed between 50 % and 56 % N2) Igniter indication off.

(*) : With the current ECU standard, the FF indication may be crossed up to approximately 200 kg/h (440 lb/h).

– Parameter callouts are not mandatory.
– In case the electrical power supply is interrupted during the start sequence (indicated by the loss of ECAM DUs), abort the start by switching OFF the MASTER switch. Then, perform a 30-second dry crank.

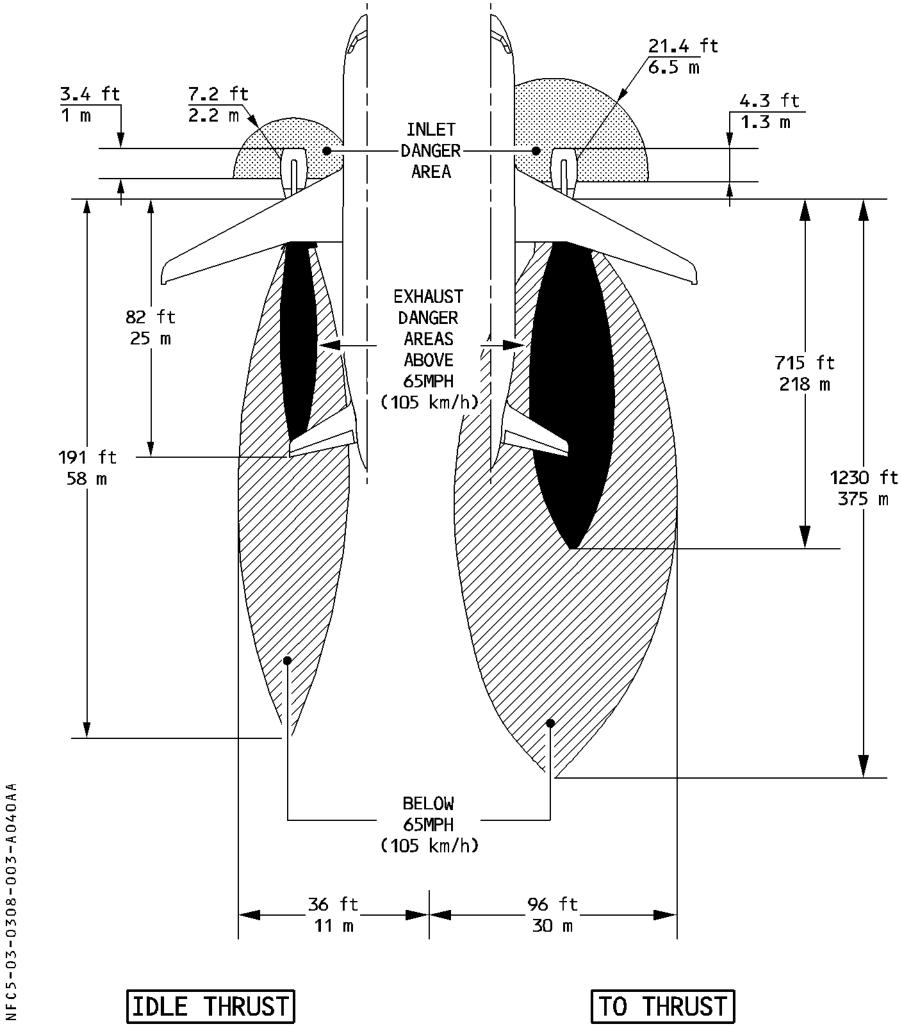
– **MAIN AND SECONDARY ENG. IDLE PARAMETERS . . . . CHECK NORMAL**
At ISA sea level : N1 about 19.5 %
N2 about 58.5 %
EGT about 390° C
FF about 275 kg/h (600 lb/h)
Grey background on N2 indication disappears.

– **ANNOUNCE . . . . "STARTING ENGINE 1"**

– **MASTER switch 1 . . . . ON**
Same procedure as for engine 2.
Both pack valves reopen with 30 second delay after the second engine N2 is above 50 %.

Note : A PTU FAULT is triggered, if the second engine is started within 40 seconds following the end of the cargo doors operation.

GROUND RUN UP – DANGER AREAS



AFTER START

– **ENG MODE selector . . . . NORM**
- Turning the ENG MODE selector to NORM indicates the end of the start sequence. AFTER START actions may be performed.
- On ECAM lower display the WHEEL page replaces the ENG page.
- Leaving the ENG MODE selector at the START/IGN position would prevent continuous relight selection on the ground (would be supplied at lift off). In addition, the ENG page would remain displayed. The selector must be cycled to recover normal control of ignition and to display WHEEL page.
- After start, to avoid thermal shock, the pilot should operate the engine at idle or near idle for at least 2 minutes before advancing the thrust lever to high power. Taxi time
R at idle may be included in the warm-up period.

– **APU BLEED . . . . OFF**
- Turn APU BLEED off just after engine start to avoid ingesting engine exhaust gases.
- APU BLEED valve closes, ENG BLEED valves open.

– **GROUND SPOILERS . . . . ARM**

– **RUD TRIM . . . . ZERO**
If RUD TRIM position indication is not at zero, press the RESET pushbutton.

– **FLAPS lever . . . . SET**
- Set flaps for takeoff.
- Check their position on the ECAM upper display.
- If taxiing in slush, keep the flaps retracted until reaching the holding point before takeoff.

– **PITCH TRIM . . . . SET**
Set takeoff CG on pitch trim wheel.

– **ECAM STATUS . . . . CHECK**
- Check that there is no status reminder (STS) on the ECAM upper display.
- If the status reminder is displayed, press the STS pushbutton.

– **ENG ANTI ICE . . . . AS RQRD**

· If icing conditions last longer than 30 minutes, or if significant engine vibration occurs, the engine should be accelerated to approximately 70 % N1 for 30 seconds before operating at higher thrust. (See also parking brake limitation 3.01.32). If airport surface conditions and congestion do not permit to accelerate the engine to 70 % N1, then power setting and dwell time should be as high as practical. This run up should also be performed just prior takeoff with particular attention to engine parameters to ensure normal engine operation.

R When operating in conditions of freezing rain, freezing drizzle, freezing fog or heavy
R snow, ice shedding may be enhanced, by additional run ups at intervals, to not exceed
R 10 minutes, advancing throttles to 70 % N1 momentarily (no hold time).

Note : Icing conditions may be expected when the OAT (on the ground and for take-off), or when TAT (in flight) is 10° C or below with visible moisture in the air or standing water, slush, ice or snow is present on the taxiways or runways.

– **WING ANTI ICE . . . . AS RQRD**

When wing ANTI ICE is switched on on the ground, the anti ice valves open for about 30 seconds (test sequence) then close as long as the aircraft is on ground.

– **APU MASTER switch (if APU not required) . . . . OFF**

· AVAIL light goes out after APU cooling period.

– **ECAM DOOR page . . . . SELECT**

· Check that all slides are armed
· Deselect the DOOR page after verifying the slides.

– **ANNOUNCE . . . . “CLEAR TO DISCONNECT”**

Request : Chocks removed
Nose wheel steering bypass pin removed (NW STRG DISC memo not displayed)
Interphone disconnect
Hand signal on the left/right side.

– **AFTER START CHECK LIST . . . . COMPLETE**

TAXI

– **TAXI clearance . . . . OBTAIN**

R – **NOSE light . . . . TAXI**
Turn on the nosewheel light to TAXI day and night.
R RWY TURN OFF lights may be switched ON, as required.

– **PARKING BRAKE . . . . OFF**
Check that brake pressure is zero (triple indicator). Slight residual pressure may be indicated for a short period of time.

– **ELAPSED TIME . . . . AS RQRD**
If ACARS is not installed, start ELAPSED TIME to record block time.

– **THRUST LEVERS . . . . AS RQRD**
· Little, if any, power above idle thrust will be needed to get the aircraft moving (40 % N1 maximum). Thrust should normally be used symmetrically. Once the aircraft starts to move, little thrust is required.
· Use of the engine anti-ice increases ground idle thrust, so the pilot must use care on slippery surfaces.
· The engines are close to the ground. Avoid positioning them over unconsolidated, or unprepared ground (beyond the edge of the taxiways, for example).
Avoid high thrust settings at low ground speeds, which increase the risk of ingestion (FOD), and the risk of projection of debris towards the trimmable horizontal stabilizer and towards the elevators.

– **BRAKES . . . . CHECK**
- Once the aircraft starts moving :
  - Check the brake efficiency of the normal braking system : The aircraft must slow down when pressing the brake pedals.

CAUTION

If the aircraft has been parked in wet conditions for a long period, the efficiency of the first brake application at low speed will be reduced.

  - Also check that green pressure has taken over yellow pressure : The yellow
R pressure on the brake pressure triple indicator should remain at 0 when pressing the
R brake pedals. Although green hydraulic power supplies the braking system, each
R time pedals are quickly pressed, a brief brake pressure indication may appear on the
R BRAKE PRESS indicator.
- If a "spongy" pedal is felt during taxi, this indicates a degraded performance of the alternate braking system.
- If an arc is displayed on the ECAM WHEEL page, above the brake temperature, set the brake fans on (if installed).

– **FLIGHT CONTROLS . . . . CHECK**

1. At a convenient stage, prior to or during taxi, and before arming the autobrake, the PF silently applies full longitudinal and lateral sidestick deflection.
R On the F/CTL page, the PNF checks full travel and the correct sense of all elevators and all ailerons, and the correct deflection and retraction of all spoilers.
   The PNF calls out "full up", "full down", "neutral", "full left", "full right", "neutral", as each full travel/neutral position is reached.
   The PF silently checks that the PNF calls are in accordance with the sidestick order.

   Note : In order to reach full travel, full sidestick must be held for a sufficient period of time.

2. The PF presses the PEDAL DISC pushbutton on the nosewheel tiller, and silently applies full left rudder, full right rudder, and neutral. The PNF calls out "full left", "full right", "neutral", as each full travel/neutral position is reached.
3. The PNF applies full longitudinal and lateral sidestick deflection, and silently checks full travel and the correct sense of all elevators and all ailerons, and the correct deflection and retraction of all spoilers, on the ECAM F/CTL page.

   Note : The F/CTL page is automatically displayed for 20 seconds.

TAXI

– **TAXI clearance . . . . OBTAIN**

R – **NOSE light . . . . TAXI**
Turn on the nosewheel light to TAXI day and night.
R RWY TURN OFF lights may be switched ON, as required.

– **PARKING BRAKE . . . . OFF**
Check that brake pressure is zero (triple indicator). Slight residual pressure may be indicated for a short period of time.

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- Use of the engine anti-ice increases ground idle thrust, so the pilot must use care on slippery surfaces.
- The engines are close to the ground. Avoid positioning them over unconsolidated, or unprepared ground (beyond the edge of the taxiways, for example).
  Avoid high thrust settings at low ground speeds, which increase the risk of ingestion (FOD), and the risk of projection of debris towards the trimmable horizontal stabilizer and towards the elevators.

– **BRAKES . . . . CHECK**
– Once the aircraft starts moving :
· Check the brake efficiency of the normal braking system : The aircraft must slow down when pressing the brake pedals.

CAUTION
If the aircraft has been parked in wet conditions for a long period, the efficiency of the first brake application at low speed will be reduced.

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1. At a convenient stage, prior to or during taxi, and before arming the autobrake, the PF silently applies full longitudinal and lateral sidestick deflection.
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3. The PNF applies full longitudinal and lateral sidestick deflection, and silently checks full travel and the correct sense of all elevators and all ailerons, and the correct deflection and retraction of all spoilers, on the ECAM F/CTL page.

Note : The F/CTL page is automatically displayed for 20 seconds.

INTENTIONALLY LEFT BLANK

– **ATC clearance . . . . CONFIRM**

TAKEOFF DATA/CONDITIONS

If takeoff data has changed, or in case of a runway change, prepare updated takeoff data, as appropriate :

– **F-PLN (Runway) . . . . REVISE**

– **FLAPS LEVER . . . . AS APPROPRIATE**
Select takeoff position.

– **V1, VR, V2 . . . . REINSERT**

– **FLX TO temperature . . . . REINSERT**

FMGS

– **F-PLN (SID,TRANS) . . . . REVISE or CHECK**
Carefully confirm that the ATC clearance agrees with the FMGS, if NAV mode is to be used.

– **INITIAL CLIMB SPEED AND SPEED LIMIT . . . . MODIFY or CHECK**
Use VERT REV at departure, or at a CLB waypoint.

– **CLEARED ALTITUDE ON FCU . . . . SET**

– **HDG ON FCU . . . . IF REQUIRED, PRESET**
· If a heading is required by the ATC after takeoff, in case of a radar vector departure, preset the heading on the FCU. NAV mode will be disarmed.
· RWY TRK mode will keep the aircraft on the runway track.

R – **FD . . . . CHECK BOTH SELECTED ON**

– **FMA . . . . CHECK**

– **FLIGHT INSTRUMENTS . . . . CHECK**

R – **RADAR (if required) . . . . ON**

– **PREDICTIVE WINDSHEAR SYSTEM ⊲ . . . . AUTO**

– **ATC code . . . . CONFIRM/SET**

– **TERR ON ND ⊲ . . . . AS RQRD**
· In mountainous areas, consider displaying terrain on ND.
· If use of radar is required, consider selecting the radar display on the PF side, and TERR ON ND on the PNF side only.

– **AUTO BRK . . . . MAX**
· ON light comes on.
· Autobrake may be armed, with the parking brake on.
· In the event of an aborted takeoff, selecting the MAX mode before takeoff improves safety.
If the takeoff must be aborted, the autobrake system applies maximum braking as soon as the thrust levers are set to idle, if the ground speed is above 72 knots.

R – **TAKEOFF BRIEFING . . . . CONFIRM**

– **CABIN REPORT . . . . RECEIVE**
Obtain cabin report from the purser, as a minimum : “CABIN SECURED FOR TAKEOFF”

– **TO CONFIG pushbutton . . . . PRESS**
Check that ECAM upper display shows “TO CONFIG NORMAL”.

– **TO MEMO . . . . CHECK NO BLUE LINE**

– **BEFORE TAKEOFF CHECKLIST down to the line . . . . COMPLETE**

– **FMA . . . . CHECK**

– **FLIGHT INSTRUMENTS . . . . CHECK**

– **RADAR (if required) . . . . ON**
To check the radar and the departure path, set the TILT toggle switch to MAN. The flight crew can then set the radar to the AUTO position.

– **PREDICTIVE WINDSHEAR SYSTEM ⊲ . . . . AUTO**

– **ATC code . . . . CONFIRM/SET**

– **TERR ON ND ⊲ . . . . AS RQRD**
· In mountainous areas, consider displaying terrain on ND.
· If use of radar is required, consider selecting the radar display on the PF side, and TERR ON ND on the PNF side only.

– **AUTO BRK . . . . MAX**
· ON light comes on.
· Autobrake may be armed, with the parking brake on.
· In the event of an aborted takeoff, selecting the MAX mode before takeoff improves safety.
If the takeoff must be aborted, the autobrake system applies maximum braking as soon as the thrust levers are set to idle, if the ground speed is above 72 knots.

– **TAKEOFF BRIEFING . . . . CONFIRM**

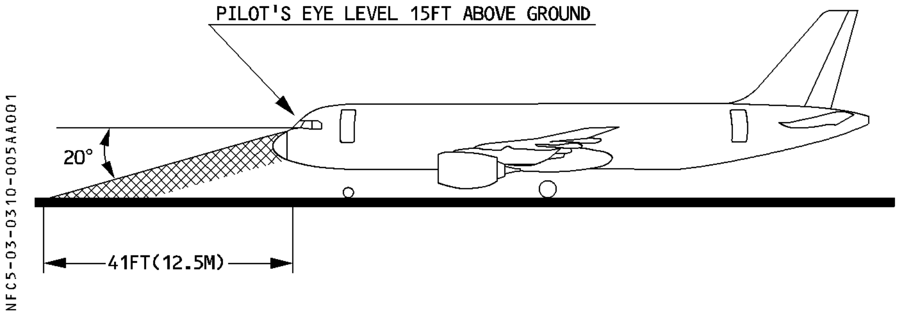
– **CABIN REPORT . . . . RECEIVE**
Obtain cabin report from the purser, as a minimum : "CABIN SECURED FOR TAKEOFF"

– **TO CONFIG pushbutton . . . . PRESS**
Check that ECAM upper display shows "TO CONFIG NORMAL".

– **TO MEMO . . . . CHECK NO BLUE LINE**

– **BEFORE TAKEOFF CHECKLIST down to the line . . . . COMPLETE**

VISUAL GROUND GEOMETRY



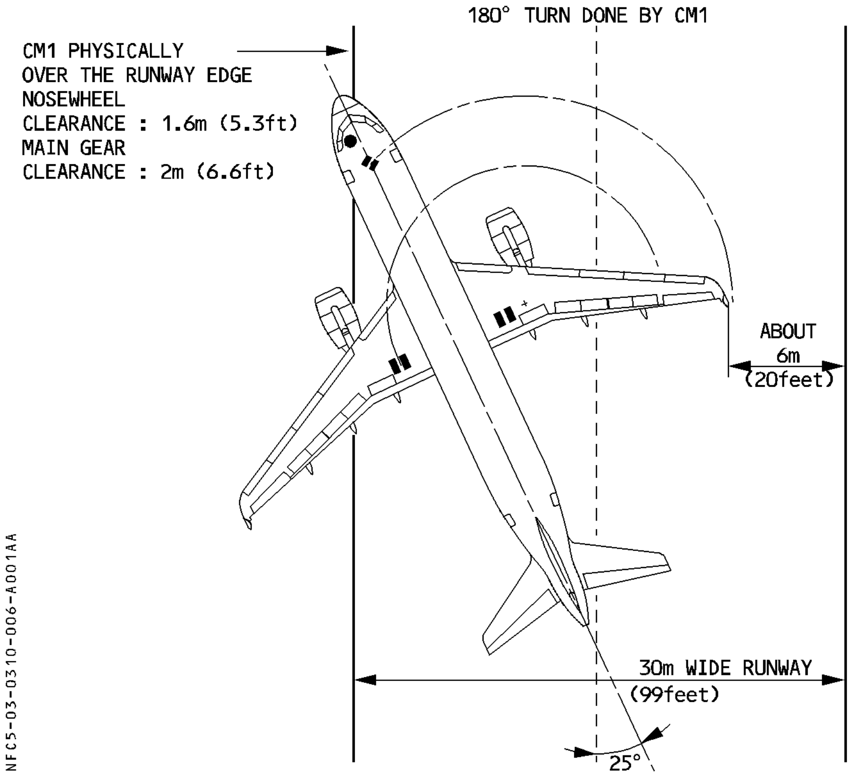
180° TURN ON RUNWAY

A standard runway is 45 meters wide. However, this aircraft only needs a pavement of 30 meters (99 feet) wide for a 180° turn.
The following procedure is recommended for making such a turn in the most efficient way.

- **FOR THE CM1**
  - Taxi on the right-hand side of the runway and turn left, maintaining 25° divergence from the runway axis. Maximum ground speed is 10 knots.
  - When the CM1 is physically over the runway edge, he turns the nosewheel full right and sets 50 % to 55 % N1 for CFM engines, or 1.05 EPR for IAE engines.
- **FOR THE CM2**

  The procedure is symmetrical. (Taxi on the left-hand side of the runway).

R



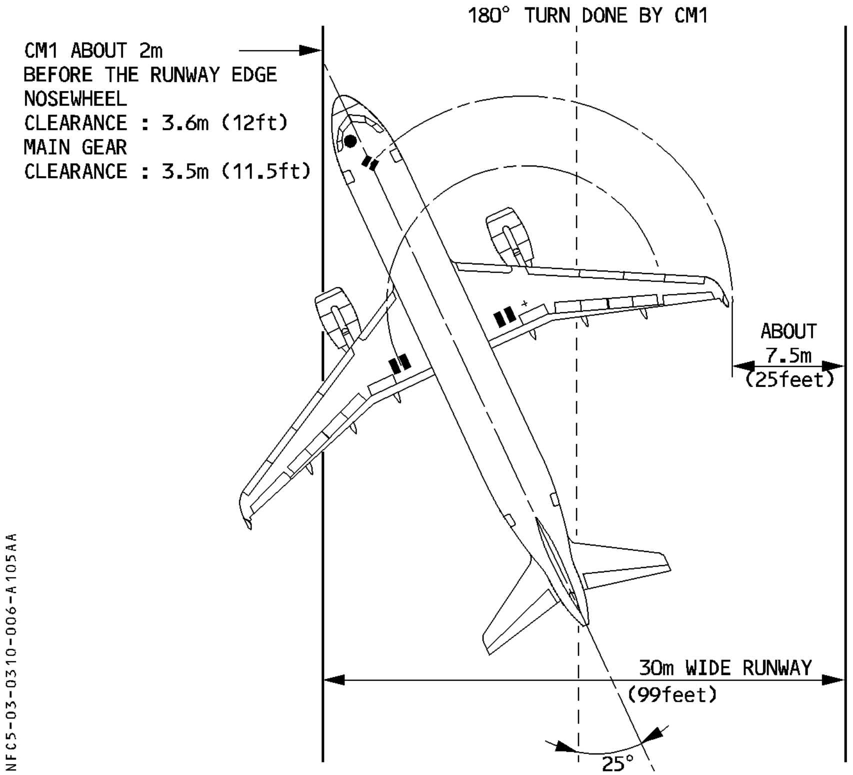
Note : To avoid skidding the nosewheel on a wet runway, perform the turn at very low speed, using asymmetric thrust and differential braking as necessary.

180° TURN ON RUNWAY

A standard runway is 45 meters wide. However, this aircraft only needs a pavement of 30 meters (99 feet) wide for a 180° turn.
The following procedure is recommended for making such a turn in the most efficient way.

- **FOR THE CM1**
  - Taxi on the right-hand side of the runway and turn left, maintaining 25° divergence from the runway axis. Maximum ground speed is 10 knots.
R - When the CM1 is at about 2 meters before the runway edge, he turns the nosewheel full right and sets 40 % to 43 % N1 for CFM engines, or 1.05 EPR for IAE engines.
- **FOR THE CM2**
  The procedure is symmetrical. (Taxi on the left-hand side of the runway).

R



Note : To avoid skidding the nosewheel on a wet runway, perform the turn at very low speed, using asymmetric thrust and differential braking as necessary.

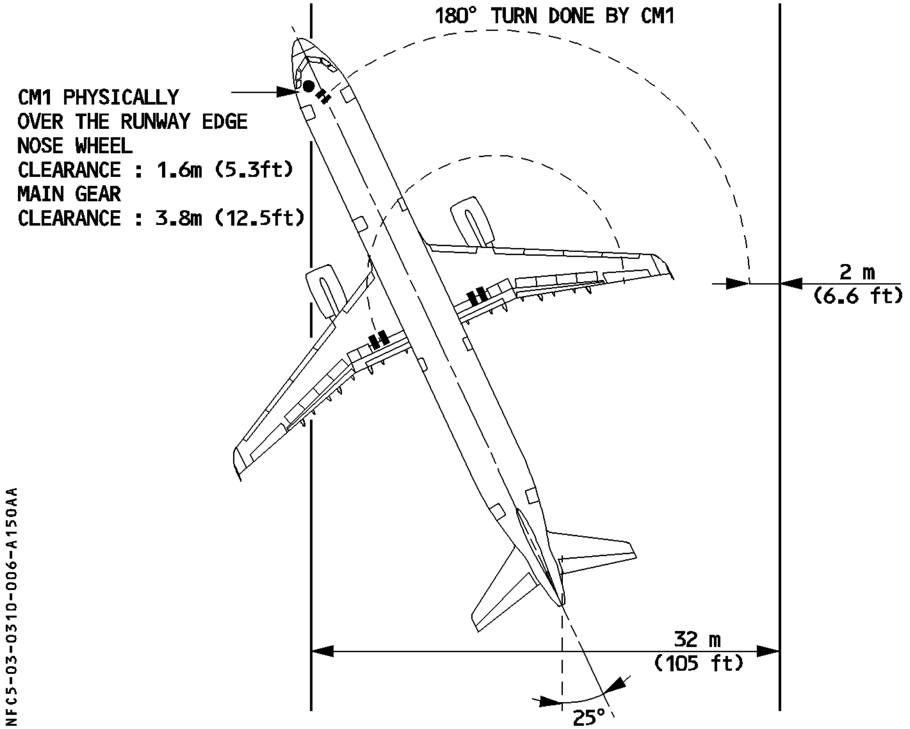
180° TURN ON RUNWAY

A standard runway is 45 meters wide. However, this aircraft needs a pavement only 32 meters (105 ft) wide for a 180° turn.
The following procedure is recommended for making such a turn in the most efficient way.

- **FOR THE CM1**
  - Taxi on the right hand side of the runway and turn left, maintaining 25° divergence from the runway axis. Maximum ground speed 10 knots.
  - When the CM1 is physically over the runway edge, he turns the nosewheel full right and sets 50 % to 55 % N1 for CFM engines or 1.05 EPR for IAE engines.
- **FOR THE CM2**

  The procedure is symmetrical. (Taxi on the left hand side of the runway).

R



Note : To avoid skidding the nose wheel on a wet runway, perform the turn at very low speed, using asymmetric thrust and differential braking as necessary.

BEFORE TAKEOFF

- **If the brake fans are running ◁ :**

  – **BRAKE TEMP . . . . CHECK**
  · If brake temperature is above 150° C, delay takeoff.
  · If brake temperature is below 150° C, select brake fans off.

– **TAKEOFF OR LINE UP CLEARANCE . . . . OBTAIN**

– **APPROACH PATH CLEAR OF TRAFFIC . . . . CHECK**

– **CABIN CREW . . . . ADVISE**

– **ENG MODE selector . . . . AS RQRD**
Select IGN, if :
· The runway has standing water.
· Heavy rain is falling.
· Heavy rain or severe turbulence is expected after takeoff.

– **TCAS (◁) Mode selector . . . . TA or TA/RA**
The FAA recommends selecting TA mode :
– In case of known nearby traffic, which is in visual contact.
– At particular airports and during particular procedures, identified by an Operator as having a significant potential for unwanted or inappropriate resolution advisories (closely-spaced parallel runways, converging runways...)

– **PACK 1 and 2 . . . . AS RQRD**
Consider selecting packs OFF, or APU bleed ON.
This will improve performance when using TOGA thrust.
In case of a FLEX takeoff, selecting packs OFF or APU bleed ON will reduce takeoff EGT, and thus reduce maintenance costs.
The use of flex thrust may reduce maintenance costs. The effect is particularly significant with the first degrees of FLEX.
Use of APU bleed is not authorized, if wing anti-ice is to be used.

– **EXTERIOR LIGHTS . . . . SET**
Set the RWY TURN OFF, LAND, and NOSE switches to ON/TO, in order to minimize bird strike hazard during takeoff.
Set the STROBE lights to ON, before entering the runway.

R – **SLIDING TABLE ◁ . . . . STOW**

– **BEFORE TAKEOFF CHECKLIST below the line . . . . COMPLETE**
Read the checklist below the line, when line up or takeoff clearance is received.

TAKEOFF

Rolling takeoff is permitted.

– **ANNOUNCE . . . . « TAKEOFF »**

– **BRAKES . . . . RELEASE**

● **If the crosswind is at or below 20 knots and there is no tailwind :**

– **THRUST LEVERS . . . . FLX or TOGA**
  – To counter the nose-up effect of setting engine takeoff thrust, apply half forward stick until the airspeed reaches 80 knots. Release the stick gradually to reach neutral at 100 knots.
R – PF progressively adjusts engine thrust in two steps :
  · from idle to about 50 % N1 (1.05 EPR).
  · from both engines at similar N1 to takeoff thrust.
    * Once the thrust is set, the captain keeps his hand on the thrust levers until the aircraft reaches V1.

● **In case of tailwind or if crosswind is greater than 20 knots :**

– **THRUST LEVERS . . . . FLX or TOGA**
R – PF applies full forward stick.
  – PF sets 50 % N1 (1.05 EPR) on both engines then rapidly increases thrust to about 70 % N1 (1.15 EPR) then progressively to reach takeoff thrust at 40 knots ground speed, while maintaining stick full forward up to 80 knots. Release stick gradually to reach neutral at 100 knots.
  – Once the thrust is set, the captain keeps his hand on the thrust levers until the aircraft reaches V1.

Note : ENG page replaces WHEEL page on the ECAM lower display.

– **DIRECTIONAL CONTROL . . . . USE RUDDER**
At 130 knots (wheel speed), the connection between nosewheel steering and the rudder pedals is removed. Therefore, in strong crosswinds, more rudder input will be required at this point to prevent the aircraft from turning into the wind.

– **CHRONO . . . . START**

– **PFD/ND . . . . SCAN**
· Check the Flight Mode Annunciator on the PFD :
R MAN TOGA (MAN FLX xx), SRS, RWY (or blank).
· Check the FMGS position (aircraft on runway centerline).

● **Before reaching 80 knots :**

– **TAKEOFF N1 . . . . CHECK**
Check that the actual N1 of the individual engines has reached the N1 rating limit, before the aircraft reaches 80 knots. Check EGT.

Note : If there is a discrepancy of more than 1 % of N1 between the engines, it should be entered in the logbook after the flight.

R – **ANNOUNCE . . . . THRUST SET**

– **PFD and ENG indications . . . . SCAN**
· Scan airspeed, N1, and EGT throughout the takeoff.

– **ANNOUNCE . . . . "ONE HUNDRED KNOTS"**
· The PF crosschecks the speed indicated on the PFD and announces "checked".
· Below 100 knots the Captain may decide to abort the takeoff, depending on the circumstances.
· Above 100 knots, rejecting the takeoff is a more serious matter.

– **ANNOUNCE . . . . "V1"**

– **ANNOUNCE . . . . "ROTATE"**

– **ROTATION . . . . PERFORM**

R · At VR, initiate the rotation to achieve a continuous rotation with a rate of about 3°/sec,
R towards a pitch attitude of 15° (12.5° if one engine is failed).
R · Minimize lateral inputs on ground and during the rotation, to avoid spoiler extension.
R · After lift-off, follow the SRS pitch command bar.

CAUTION

If a tailstrike occurs, avoid flying at an altitude requiring a pressurized cabin, and return to the originating airport for damage assessment.

– **ANNOUNCE . . . . "POSITIVE CLIMB"**

– **ORDER . . . . "GEAR UP"**

– **LDG GEAR . . . . SELECT UP**

– **GRND SPLRS . . . . DISARM**

– **EXTERIOR LIGHTS . . . . SET**

Set NOSE & RWY TURN OFF light switches to OFF.
LAND lights may be left ON, depending on the airline policy or regulatory recommendation.

– **AP . . . . AS RQRD**

Above 100 feet AGL, AP 1 or 2 may be engaged.

– **ANNOUNCE . . . . "FMA"**

– **ANNOUNCE . . . . "GEAR UP"**

● **At thrust reduction altitude (LVR CLB flashing on FMA)**

– **THRUST LEVERS . . . . CL**
Move the thrust levers promptly to the CL detent, when the flashing LVR CLB prompt appears on the FMA. A/THR is now active.
In manual flight, the pilot must anticipate the change in pitch attitude in order to prevent the speed from decaying when thrust is reduced.

– **PACK 1 and 2 (if applicable) . . . . ON**
· Select PACK 1 on after CLB thrust reduction.
· Select PACK 2 on after flap retraction.

<u>Note</u> : 1. Selecting pack on before reducing takeoff thrust would result in an EGT increase.
R *2. PACK 2 may be selected earlier, but not sooner than 10 seconds after PACK*
R *1 is selected on, for passenger comfort.*
3. If packs are not switched on after the takeoff phase, an ECAM caution will
R *be triggered.*

● **At acceleration altitude :**

– **ANNOUNCE FMA . . . . "THR CLB/OP CLB" or "THR CLB/CLB"**
Check the target speed change from V2 + 10 to the first CLB speed (either preselected or managed).

<u>Note</u> : 1. For most normal operations, thrust reduction and acceleration altitudes will be the same. So, the FMA will change from FLX/SRS/NAV to THR CLB/CLB/NAV.
2. If FCU-selected altitude is equal to or close to the acceleration altitude, then the FMA will switch from SRS to ALT.*

● **Above acceleration altitude (or once in climb phase) :**
The following procedure ensures that the aircraft is effectively accelerating toward climb speed.

• **At F speed**

– **ORDER . . . . "FLAPS 1"**

– **FLAPS 1 . . . . SELECT**

R – **CONFIRM/ANNOUNCE . . . . "FLAPS 1"**

Note : For takeoff in CONF 1 + F, "F" speed is not displayed.

• **At S speed**

– **ORDER . . . . "FLAPS ZERO"**

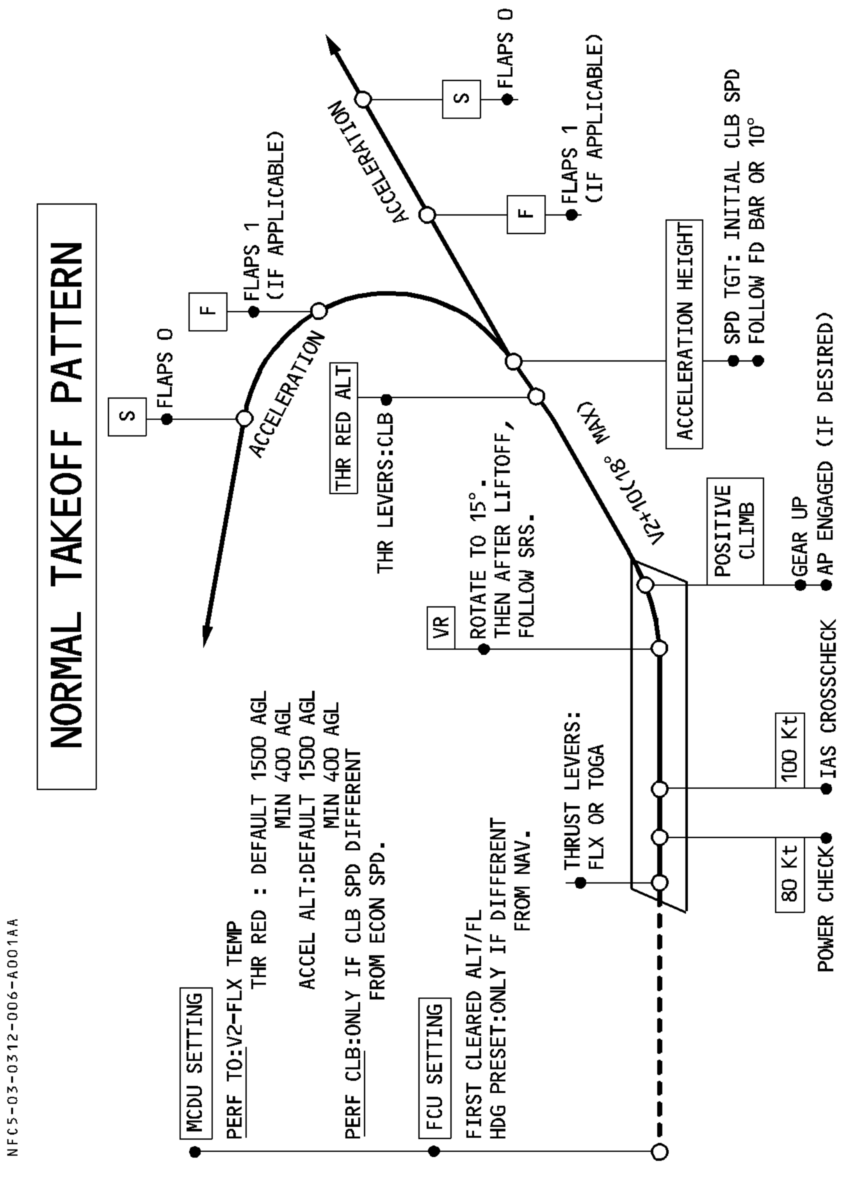
– **FLAPS ZERO . . . . SELECT**

R – **CONFIRM/ANNOUNCE . . . . "FLAPS ZERO"**

Note : CRUISE page replaces ECAM ENG page.

– **DERATED CLB OPS ◁ . . . . REFER TO 3.04**

R



NOTE: IN CASE OF AN IMMEDIATE LANDING, IF THE PATTERN IS MADE BELOW 1500 FEET, SELECT ECAM RECALL DURING THE DOWNWIND LEG

● **Above acceleration altitude (or once in climb phase) :**
The following procedure ensures that the aircraft is effectively accelerating toward climb speed.

• **At F speed**

– **ORDER . . . . "FLAPS 1"**

– **FLAPS 1 . . . . SELECT**

R – **CONFIRM/ANNOUNCE . . . . "FLAPS 1"**

Note : For takeoff in CONF 1 + F, "F" speed is not displayed.

• **At S speed**

Note : At heavy takeoff weight, the S speed on A321 may be higher than the MAX speed of configuration 1 + F (215 knots). Continue to accelerate and on reaching 210 knots the automatic flap retraction will occur and the MAX speed will move to 230 knots.

– **ORDER . . . . "FLAPS ZERO"**

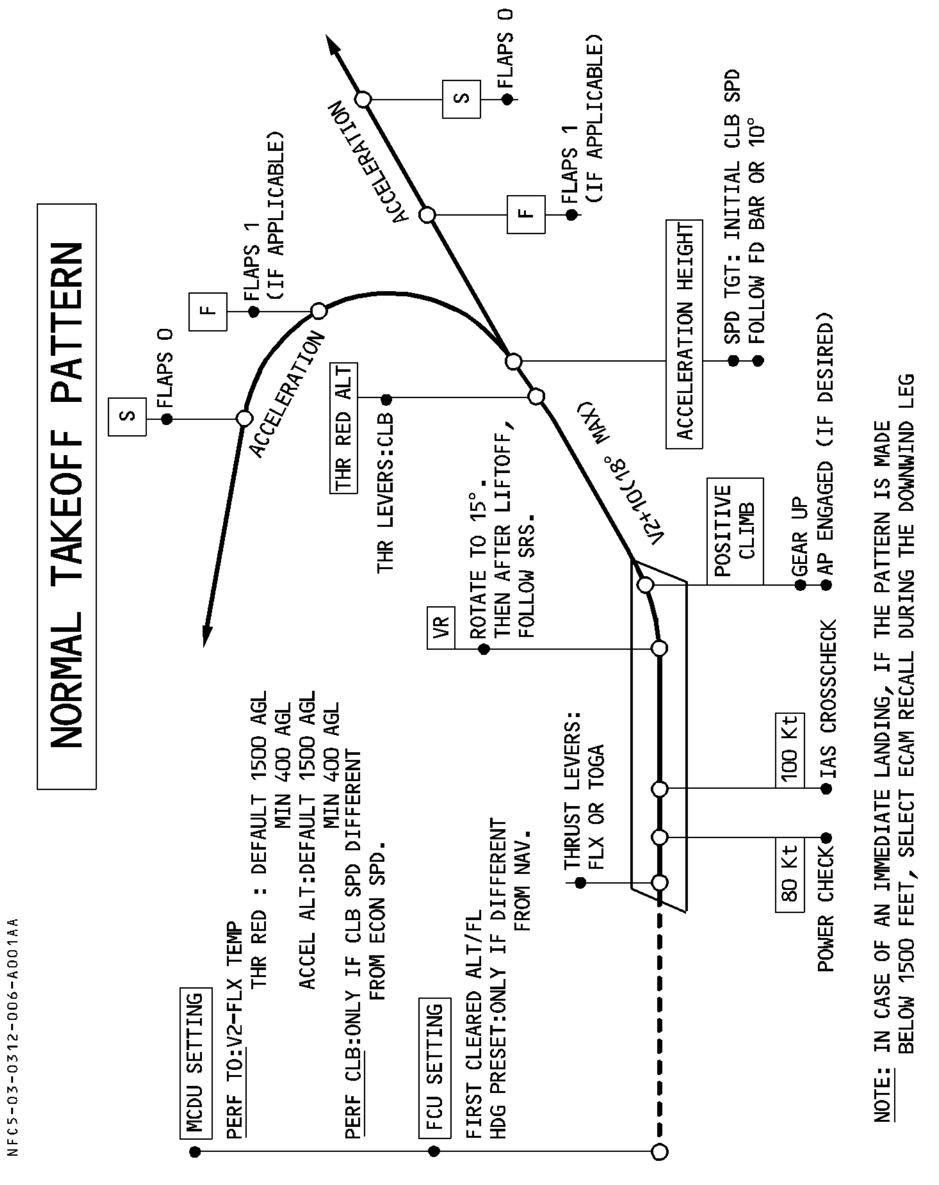
– **FLAPS ZERO . . . . SELECT**

R – **CONFIRM/ANNOUNCE . . . . "FLAPS ZERO"**

Note : CRUISE page replaces ECAM ENG page.

– **DERATED CLB OPS ◁ . . . . REFER TO 3.04**

R


NORMAL TAKEOFF PATTERN
MCDU SETTING
PERF TO:V2-FLX TEMP
THR RED : DEFAULT 1500 AGL
MIN 400 AGL
ACCEL ALT:DEFAULT 1500 AGL
MIN 400 AGL
PERF CLB:ONLY IF CLB SPD DIFFERENT FROM ECON SPD.
FCU SETTING
FIRST CLEARED ALT/FL
HDG PRESET:ONLY IF DIFFERENT FROM NAV.
THRUST LEVERS: FLX OR TOGA
80 Kt
POWER CHECK
100 Kt
IAS CROSSCHECK
VR
ROTATE TO 15°. THEN AFTER LIFTOFF, FOLLOW SRS.
POSITIVE CLIMB
GEAR UP
AP ENGAGED (IF DESIRED)
V2+10(18° MAX)
THR RED ALT
THR LEVERS:CLB
ACCELERATION HEIGHT
SPD TGT: INITIAL CLB SPD
FOLLOW FD BAR OR 10°
ACCELERATION
F
FLAPS 1 (IF APPLICABLE)
S
FLAPS 0
ACCELERATION
F
FLAPS 1 (IF APPLICABLE)
S
FLAPS 0
NOTE: IN CASE OF AN IMMEDIATE LANDING, IF THE PATTERN IS MADE BELOW 1500 FEET, SELECT ECAM RECALL DURING THE DOWNWIND LEG
NFC5-03-0312-006-A001AA

AFTER TAKEOFF

– **APU BLEED . . . . AS RQRD**
If the APU has been used to supply air conditioning during takeoff, set the APU BLEED to OFF. For use of the APU BLEED, refer to the APU LIMITATION Chapter (3.01.49).

– **APU MASTER switch . . . . AS RQRD**

– **ENG MODE selector . . . . AS RQRD**
Select IGN, if severe turbulence or heavy rain is encountered.

– **TCAS (◁) Mode selector . . . . TA/RA**
Select TA/RA, if the takeoff has been performed with TA only.

– **ANTI ICE PROTECTION . . . . AS RQRD**
ENG ANTI ICE should be ON, when icing conditions are expected, with a TAT at or below 10°C.

– **AFTER TAKEOFF/CLIMB CHECKLIST down to the line . . . . COMPLETE**

CLIMB

– **Normal vertical mode is CLB or OP CLB with managed speed active.**

R – **PF MCDU . . . . PERF CLB**
· PF MCDU should be showing the PERF CLB page (allowing PF to monitor when the aircraft will reach the FCU selected altitude) but he may select other pages such as F-PLN page as may be tactically necessary.
With the AP engaged, the PF will make any required flight plan revisions.
· The MCDU PROG page displays OPT FL and MAX REC FL. It is worth noting that this OPT FL is a function of the cost index.
· The displayed MAX REC FL gives the aircraft at least a 0.3 g buffet margin. The pilot may enter a cruise flight level above this level into the MCDU and the FMGS will accept it, provided that it does not exceed the level at which the margin is reduced to 0.2 g.

– **PNF MCDU . . . . F-PLN**
PNF MCDU should be showing the F-PLN page (allowing him to enter any ATC long-term revisions to the lateral or vertical flight plan).

– **CLIMB SPEED MODIFICATIONS :**

● **If ATC, turbulence or operational considerations lead to a speed change :**
Select the new speed with FCU SPD selection knob and pull. Speed target is now “selected”. To return to managed speed mode, push FCU SPD selection knob. The speed target is now “managed”.

<u>Note</u> : *The best speed (and rate of climb) for long-term situations lies between green dot speed and ECON speed. At high altitude, acceleration from green dot to ECON speed can take a long time.*

– **EXPEDITE CLIMB ⧏**

● **If ATC requires a rapid climb through a particular level :**
Push the EXP pushbutton on the FCU. The target speed is now green dot speed.
FMA : THR CLB/EXP CLB/NAV

<u>Note</u> : *Use EXP (⧏) only for short-term tactical situations. For the best overall economy fly at ECON IAS.*
To return to ECON CLB speed :
Push ALT selector knob.
Check FMA : THR CLB/CLB/NAV

– **BARO REF . . . . SET**
- At transition altitude (baro setting flashing on PFD) set STD on the EFIS control panel and STBY ALT.
- Cross-check baro settings and altitude readings.

– **CRZ FL . . . . SET AS RQRD**
- If ATC clears the aircraft to its intended CRZ FL or above, there is no need to modify the CRZ FL entered in the INIT A page during cockpit preparation. The FCU will automatically take into account a higher CRZ FL selected with the FCU ALT knob.
- If ATC limits CRZ FL to a lower level than the one entered in the INIT A page (or present on the PROG page) the flight crew must insert this lower CRZ FL in the PROG page. Otherwise there is no transition into CRZ phase : the managed speed targets and Mach are not modified, and SOFT ALT mode is not available. In that case FMA will display: MACH/ALT/NAV instead of MACH/ALT CRZ/NAV.

– **AFTER TAKEOFF/CLIMB CHECKLIST below the line . . . . COMPLETE**

– **ENG ANTI ICE . . . . AS RQRD**
ENG ANTI ICE should be ON when the aircraft encounters icing conditions, unless the SAT is below – 40° C.

– **RADAR TILT . . . . ADJUST**

● **At 10 000 ft :**

R – **LAND lights . . . . RETRACT**

– **SEAT BELTS . . . . AS RQRD**

– **EFIS option . . . . AS RQRD**
Select CSTR on one side, for grid MORA, and ARPT on the other side.

– **ECAM MEMO . . . . REVIEW**

– **RAD NAV page . . . . CHECK**
Clear manually tuned VORs from MCDU RAD NAV page.

– **SEC F-PLN page . . . . AS RQRD**
Recopy the active flight plan in the secondary if an immediate return flight plan has been constructed previously.

– **OPT/MAX ALT . . . . CHECK**

CLIMB

– **Normal vertical mode is CLB or OP CLB with managed speed active.**

R – **PF MCDU . . . . PERF CLB**
· PF MCDU should be showing the PERF CLB page (allowing PF to monitor when the aircraft will reach the FCU selected altitude) but he may select other pages such as F-PLN page as may be tactically necessary.
With the AP engaged, the PF will make any required flight plan revisions.
· The MCDU PROG page displays OPT FL and MAX REC FL. It is worth noting that this OPT FL is a function of the cost index.
· The displayed MAX REC FL gives the aircraft at least a 0.3 g buffet margin. The pilot may enter a cruise flight level above this level into the MCDU and the FMGS will accept it, provided that it does not exceed the level at which the margin is reduced to 0.2 g.

– **PNF MCDU . . . . F-PLN**
PNF MCDU should be showing the F-PLN page (allowing him to enter any ATC long-term revisions to the lateral or vertical flight plan).

– **CLIMB SPEED MODIFICATIONS :**

● **If ATC, turbulence or operational considerations lead to a speed change :**
Select the new speed with FCU SPD selection knob and pull. Speed target is now "selected". To return to managed speed mode, push FCU SPD selection knob. The speed target is now "managed".

Note : *The best speed (and rate of climb) for long-term situations lies between green dot speed and ECON speed. At high altitude, acceleration from green dot to ECON speed can take a long time.*

– **EXPEDITE CLIMB ⊲**

● **If ATC requires a rapid climb through a particular level :**
Push the EXP pushbutton on the FCU. The target speed is now green dot speed.
FMA : THR CLB/EXP CLB/NAV

Note : *Use EXP (⊲) only for short-term tactical situations. For the best overall economy fly at ECON IAS.*
To return to ECON CLB speed :
Push ALT selector knob.
Check FMA : THR CLB/CLB/NAV

– **BARO REF . . . . SET**
· At transition altitude (baro setting flashing on PFD) set STD on the EFIS control panel and STBY ALT.
· Cross-check baro settings and altitude readings.

– **CRZ FL . . . . SET AS RQRD**
· If ATC clears the aircraft to its intended CRZ FL or above, there is no need to modify the CRZ FL entered in the INIT A page during cockpit preparation. The FCU will automatically take into account a higher CRZ FL selected with the FCU ALT knob.
· If ATC limits CRZ FL to a lower level than the one entered in the INIT A page (or present on the PROG page) the flight crew must insert this lower CRZ FL in the PROG page. Otherwise there is no transition into CRZ phase : the managed speed targets and Mach are not modified, and SOFT ALT mode is not available. In that case FMA will display: MACH/ALT/NAV instead of MACH/ALT CRZ/NAV.

– **AFTER TAKEOFF/CLIMB CHECKLIST below the line . . . . COMPLETE**

– **ENG ANTI ICE . . . . AS RQRD**
ENG ANTI ICE should be ON when the aircraft encounters icing conditions, unless the SAT is below – 40° C.

– **RADAR . . . . AS APPROPRIATE**

● **At 10 000 ft :**

R – **LAND lights . . . . RETRACT**

– **SEAT BELTS . . . . AS RQRD**

– **EFIS option . . . . AS RQRD**
Select CSTR on one side, for grid MORA, and ARPT on the other side.

– **ECAM MEMO . . . . REVIEW**

– **RAD NAV page . . . . CHECK**
Clear manually tuned VORs from MCDU RAD NAV page.

– **SEC F-PLN page . . . . AS RQRD**
Recopy the active flight plan in the secondary if an immediate return flight plan has been constructed previously.

– **OPT/MAX ALT . . . . CHECK**

CRUISE

– **ECAM MEMO . . . . REVIEW**

– **ECAM SYS PAGES . . . . REVIEW**
Periodically review system display pages and, in particular :
ENG : Oil pressure and temperature
BLEED : BLEED parameters
ELEC : Parameters, GEN loads
HYD : A slight decrease in quantity is normal.
Fluid contraction during cold soak can be expected.
Green system is lower than on ground, following landing gear retraction.
FUEL : Fuel distribution.
COND : Duct temperature, compared with zone temperature.
Avoid large differences for passenger comfort.
FLT CTL : Note any unusual control surface position.

– **FLIGHT PROGRESS . . . . CHECK**
Monitor flight progress in the conventional way.
When overflying a waypoint :
· Check track and distance to the next waypoint.
R When overflying the waypoint, or every 30 minutes :
· Check FUEL : Check FOB (ECAM), and fuel prediction (FMGC), and compare with the computer flight plan or the in-cruise quick-check table (Refer to 3.05.20).
Check that the sum of the fuel on board and the fuel used is consistent with the fuel on board at departure. If the sum is unusually greater than the fuel on board at departure, suspect a frozen fuel quantity indication. Maintenance action is due before
R the next flight. If the sum is unusually smaller than the fuel on board at departure, or
R if it decreases, suspect a fuel leak.

CAUTION
This check must also be performed each time a FUEL IMBALANCE procedure is necessary. Perform the check before applying the FUEL IMBALANCE procedure.
If a fuel leak is confirmed, apply the FUEL LEAK procedure.

– **STEP FLIGHT LEVEL . . . . AS APPROPRIATE**
(Refer to 3.05.15).

– **NAVIGATION ACCURACY . . . . CHECK**
On aircraft equipped with GPS primary, no navigation accuracy check is required, as long as GPS PRIMARY is available.
Otherwise, navigation accuracy must be monitored, at all times but especially when any of the following occurs :
· IRS only navigation
· The PROG page displays LOW accuracy.
· "NAV ACCUR DOWNGRAD" appears on the MCDU.

R Methods for checking accuracy :
If the check is positive (error ≤ 3NM) : FM position is reliable.
– Use ND (ARC or NAV) and managed lateral guidance.
If the check is negative (error > 3NM) : FM position is not reliable.
– Use raw data for navigation and monitor it.
– If there is a significant mismatch between the display and the real position : Disengage MANAGED NAV mode and use raw data navigation (possibly switching to ROSE VOR, so as not to be misled by FM data).

R – **RADAR TILT . . . . ADJUST**

– **CABIN TEMP . . . . MONITOR**
Pay regular attention to the ECAM CRUISE page, in order to monitor passenger cabin temperatures and adjust them, as necessary.

● **If the oxygen mask has been used :**

– **OXYGEN MASK . . . . CHECK**
Check that the oxygen mask has been properly stowed, as indicated in the FCOM 1.35.20.

CRUISE

– **ECAM MEMO . . . . REVIEW**

– **ECAM SYS PAGES . . . . REVIEW**

Periodically review system display pages and, in particular :

ENG : Oil pressure and temperature
BLEED : BLEED parameters
ELEC : Parameters, GEN loads
HYD : A slight decrease in quantity is normal.
Fluid contraction during cold soak can be expected.
Green system is lower than on ground, following landing gear retraction.
FUEL : Fuel distribution.
COND : Duct temperature, compared with zone temperature.
Avoid large differences for passenger comfort.
FLT CTL : Note any unusual control surface position.

– **FLIGHT PROGRESS . . . . CHECK**

Monitor flight progress in the conventional way.
When overflying a waypoint :
· Check track and distance to the next waypoint.
R When overflying the waypoint, or every 30 minutes :
· Check FUEL : Check FOB (ECAM), and fuel prediction (FMGC), and compare with the computer flight plan or the in-cruise quick-check table (Refer to 3.05.20).
Check that the sum of the fuel on board and the fuel used is consistent with the fuel on board at departure. If the sum is unusually greater than the fuel on board at departure, suspect a frozen fuel quantity indication. Maintenance action is due before
R the next flight. If the sum is unusually smaller than the fuel on board at departure, or
R if it decreases, suspect a fuel leak.

CAUTION

This check must also be performed each time a FUEL IMBALANCE procedure is necessary. Perform the check before applying the FUEL IMBALANCE procedure. If a fuel leak is confirmed, apply the FUEL LEAK procedure.

– **STEP FLIGHT LEVEL . . . . AS APPROPRIATE**

(Refer to 3.05.15).

– **NAVIGATION ACCURACY . . . . CHECK**
On aircraft equipped with GPS primary, no navigation accuracy check is required, as long as GPS PRIMARY is available.
Otherwise, navigation accuracy must be monitored, at all times but especially when any of the following occurs :
· IRS only navigation
· The PROG page displays LOW accuracy.
· "NAV ACCUR DOWNGRAD" appears on the MCDU.
Methods for checking accuracy :
Refer to FCTM (Supplementary Information – Navigation Accuracy)
If the check is positive (error ≤ 3NM) : FM position is reliable.
– Use ND (ARC or NAV) and managed lateral guidance.
If the check is negative (error > 3NM) : FM position is not reliable.
– Use raw data for navigation and monitor it.
– If there is a significant mismatch between the display and the real position : Disengage MANAGED NAV mode and use raw data navigation (possibly switching to ROSE VOR, so as not to be misled by FM data).

– **RADAR . . . . AS APPROPRIATE**

– **CABIN TEMP . . . . MONITOR**
Pay regular attention to the ECAM CRUISE page, in order to monitor passenger cabin temperatures and adjust them, as necessary.

● **If the oxygen mask has been used :**

– **OXYGEN MASK . . . . CHECK**
Check that the oxygen mask has been properly stowed, as indicated in the FCOM 1.35.20.

DESCENT PREPARATION

Descent preparation and approach briefing can take approximately 10 minutes, so they should begin approximately 80 NM before top of descent.

– **LDG ELEV** . . . . **CHECK**
Check on ECAM CRUISE page that LDG ELEV AUTO is displayed.

– **WEATHER AND LANDING INFORMATION** . . . . **OBTAIN**
Check weather reports at ALTERNATE and DESTINATION airports. Airfield data should include runway in use for arrival.

<u>FMGS</u>

– **ARRIVAL page** . . . . **COMPLETE/CHECK**
Insert TRANS, APPR, STAR, and APPR VIA if applicable. (Access by lateral revision at destination.)

– **F-PLN A page** . . . . **CHECK**
Check speeds and altitude constraints.
Add new speed or altitude constraints if required.

– **DES WIND** . . . . **CHECK**
Enter winds for descent starting at cruise flight level.

– **PERF CRUISE page** . . . . **CHECK**
Modify the cabin descent rate if different pressure rate is required.

– **PERF DES page** . . . . **CHECK**
Prior to descent, access PERF DES page and check ECON MACH/SPD. If a speed other than ECON is required, insert that MACH or SPD into the ECON field. This new MACH or SPD is now the one for the descent path and TOD computation, and it will be used for the managed speed descent profile (instead of ECON).
A speed limit of 250 knots below 10000 feet is the defaulted speed, in the managed speed descent profile. The flight crew may delete or modify it if necessary on the VERT REV at DEST page.

– **PERF APPR page . . . . COMPLETE/CHECK**
  – Enter the QNH, temperature, and wind at destination.

  Note : *The entered wind should be the average wind given by the ATC or ATIS. Do not enter gust values. For example, if the wind is 150/20-25, insert the lower speed 150/20 (ground speed mini-function will cope with the gust).*

  – Insert the MDA (MDH, if QFE used), or DH, whichever applies.

  Note : *To avoid undershooting the published MDA (MDH) during go-around, due to aircraft inertia during pull-up, some Authorities may require Operators to add a specific number of feet to the published MDA (MDH).*

  CAUTION

  If the QNH altimeter setting is used for an aircraft with the QFE option, refer to 3.04.34.

  Note : *Changing the RWY or type of arrival (VOR, ILS) automatically erases the previous MDA/MDH or DH.*

  – Check or modify the landing configuration. Always select the landing configuration on the PERF APP page : CONF FULL in the normal landing configuration. CONF 3 should be considered, depending on the available runway length and go-around performance, or if windshear/severe turbulence is considered possible during
R approach.

– **GO-AROUND page . . . . CHECK/MODIFY**
  Check THR RED ALT and ACC ALT, and modify, if necessary.

– **RAD NAV page . . . . CHECK**
  Set navaids, as required, and check idents on the NDs (VOR-ADF) and PFDs (ILS). If a VOR/DME exists close to the airfield, select it and enter its ident in the BRG/DIST field of the PROG page, for NAV ACCY monitoring during descent.

– **SEC F-PLN page . . . . AS RQRD**
Before the top of descent, the SEC F-PLN should either be set to an alternate runway for destination, or to the landing runway in case of circling. In all cases, routing to the alternate should be available. If there is a last-minute runway change, then the flight crew only needs to activate the secondary F-PLN, without forgetting to set the new MDA or DH and navaids.

– **GPWS LDG FLAP 3 . . . . AS RQRD**
If the pilot plans on landing in FLAPS 3 configuration, the GPWS LDG FLAP 3 switch should be set to ON.

R – **APPROACH BRIEFING . . . . PERFORM**

– **AUTO BRK . . . . AS RQRD**
Use of autobrake is preferable.
Use of MAX mode is not recommended at landing.
On short or contaminated runways, use MED mode.
On long runways, LO mode is recommended.

Note : If, on very long runways, the flight crew anticipates that braking will not be needed, use of the autobrake is not necessary.

Firmly press the appropriate pushbutton, according to the runway length and condition, and check that the related ON light comes on.

– **DESCENT CLEARANCE . . . . OBTAIN**
When clearance is obtained, set the ATC-cleared altitude (FL) on the FCU (also considering what is the safe altitude).
If the lowest safe altitude is higher than the ATC-cleared altitude, check with the ATC that this constraint applies.
If it is confirmed, set the FCU altitude to the safe altitude, until it is safe to go to the ATC-cleared altitude.

– **ANTI ICE PROTECTION . . . . AS RQRD**
· During descent, ENG ANTI ICE must be ON when icing conditions are encountered. (Refer to 3.04.30 p. 1).
· With engine ANTI ICE ON, the FADEC selects a higher idle thrust which gives better protection against flame-out.
· ANTI ICE ON reduces the descent path angle (when the engines are at idle). The pilot can compensate for this by increasing the descent speed, or by extending up to half speedbrakes.

DESCENT INITIATION

– **DESCENT . . . . INITIATE**
The normal method of initiating the descent is to select DES mode at the FMGS calculated top of descent (TOD).

■ **<u>If ATC requires an early descent :</u>**
Use DES mode which will guide the aircraft down at a lower vertical speed in order to converge on the required descent path. (The pilot may use a V/S of – 1000 ft/mn).

■ **<u>If ATC delays the descent :</u>**
Beyond TOD, a DECELERATE message comes up on the PFD and MCDU. This suggests to the crew that it starts reducing speed towards green dot speed (with ATC permission). When cleared to descend, select DES mode with managed speed active.

DESCENT MONITORING

– **PF MCDU . . . . PROG/PERF DES**
PF MCDU should be set to PROG or PERF DES page :
· PROG page in order to get VDEV or RQD DIST TO LAND/DIRECT DIST TO DEST information.
· PERF DES in order to get predictions down to any inserted altitude in DES/OP DES modes and EXP mode (⊲).

R – **PNF MCDU . . . . F-PLN**

– **DESCENT . . . . MONITOR**
(Refer to FCOM 4 05.60)
- When flying in NAV mode, use DES mode.
  The aircraft descends along the descent flight path : the PFD and PROG page display VDEV, and so it can be monitored. All constraints of the flight plan are taken into account for the guidance.
- When the aircraft is flying in HDG or TRK mode, and thus out of the lateral F-PLN, DES mode is not available.
  However the PFD still displays VDEV, and this is useful whenever cross track error is small (up to 5 NM).
R The NDs show a level-off symbol ↳ along the flight path. Its position is based on the
R current active AP/FD and A/THR modes.
  The flight crew can use this symbol to monitor the descent.
  MCDU predictions assume a return to the lateral F-PLN and descent flight path.
  Note that whenever the lateral mode is changed from NAV to HDG/TRK the vertical mode reverts to V/S at the value pertaining at the time of the mode change.
- From time to time during stabilized descent, the flight crew may select FPA to check that the remaining distance to destination is approximately the altitude change required divided by the FPA in degrees.

  FPA (°) = △ FL/DIST (NM)

DESCENT ADJUSTMENT

To increase the rate of descent :
- Increase descent speed (by use of selected speed) if comfort and ATC permit. It is economically better (Time/Fuel) than the following procedures.
- Maintain high speed as long as possible. (SPD LIM may be suspended, subject to ATC clearance).
- If the aircraft is high and at high speed, it is more efficient to keep the high speed to ALT* and decelerate, rather than to mix descent and deceleration.
- If the aircraft goes below the desired profile, use SPEED and the V/S mode to adjust the rate of descent.

Note : EXPEDITE DESCENT.
If a high rate of descent is required, push the EXPED pushbutton ◁ on the FCU. The target speed for the descent now becomes Mach 0.8 or 340 knots, whichever is lower. The FMA will display THR IDLE/EXP DES/NAV.
To return to DES mode, push the FCU ALT knob.
To return to SPEED/V/S modes, pull the FCU V/S knob.
In all cases, monitor the FMA to ensure that the mode engages properly.

– **SPEEDBRAKES . . . . AS RQRD**
In OPEN DES : Use speedbrakes to increase the rate of descent. The pilot may use up to half speedbrakes to maintain the required rate of descent, when engine anti-ice is used.
In DES mode : If the aircraft is on, or below, the flight path and the ATC requires a higher rate of descent, do not use speedbrakes because the rate of descent is dictated by the planned flight path. Thus, the A/THR may increase thrust to compensate for the increase in drag. In this case, use OPEN DES with speedbrakes.

Note : 1. If speedbrakes are used above 315 knots/M.75 with the AP engaged, their rate of retraction is low (total time for retraction from full extension is approximately 25 seconds). The ECAM memo page displays SPD BRAKES in amber until retraction is complete.
2. In order to avoid overshooting the altitude, due to speedbrake retraction in ALT mode, retract the speedbrakes at least 2000 feet before the selected altitude.*

R – **RADAR . . . . ADJUST**

– **BARO REF . . . . SET**
· Set QNH (or QFE) on the EFIS control panel and on the standby altimeter, when approaching the transition level and when cleared for an altitude.
· Crosscheck baro settings and altitude readings.

Note : When operating in low OAT, altitude corrections, as defined in 3.05.05 page 6, should be considered.

– **TERR ON ND ◁ . . . . AS RQRD**
· In mountainous areas, consider displaying terrain on ND.
· If use of radar is required, consider selecting the radar display on the PF side, and TERR ON ND on the PNF side only.

– **ECAM STATUS . . . . CHECK**
· Check that there is no status reminder on the upper ECAM display.
· If there is a status reminder, check the aircraft STATUS.
· Check the ECAM status page before completing the approach checks. Take particular note of any degradation in landing capability, or any other aspect affecting the approach and landing.

● **At 10,000 feet :**

– **LAND lights . . . . ON**
LAND lights may be switched ON, according to the airline policy/regulatory recommendations.

– **SEATBELTS . . . . AS RQRD**

R – **EFIS option . . . . CSTR**
R Select CSTR on both sides.

– **LS pushbutton . . . . AS RQRD**
Select LS, if an ILS or LOC approach is intended.
The PFD displays the LOC and glide scales and deviation symbol, if there is a valid ILS signal.

– **RAD NAVAIDS . . . . SELECTED/IDENTIFIED**
Ensure that appropriate radio navaids are tuned and identified.
For NDB approaches, manually select the reference navaid.

– **NAV ACCURACY . . . . CHECK**
On aircraft equipped with GPS primary, no navigation accuracy check is required, as long as GPS PRIMARY function is available.
Otherwise, crosscheck NAV ACCURACY using the PROG page (BRG/DIST computed data), and the ND (VOR/DME raw data).
The navigation accuracy check determines which autopilot mode the flight crew should use for the approach, and the type of displays to be shown on the ND.

Note : EXPEDITE DESCENT.
If a high rate of descent is required, push the EXPED pushbutton ◁ on the FCU. The target speed for the descent now becomes Mach 0.8 or 340 knots, whichever is lower. The FMA will display THR IDLE/EXP DES/NAV.
To return to DES mode, push the FCU ALT knob.
To return to SPEED/V/S modes, pull the FCU V/S knob.
In all cases, monitor the FMA to ensure that the mode engages properly.

– **SPEEDBRAKES . . . . AS RQRD**
In OPEN DES : Use speedbrakes to increase the rate of descent. The pilot may use up to half speedbrakes to maintain the required rate of descent, when engine anti-ice is used.
In DES mode : If the aircraft is on, or below, the flight path and the ATC requires a higher rate of descent, do not use speedbrakes because the rate of descent is dictated by the planned flight path. Thus, the A/THR may increase thrust to compensate for the increase in drag. In this case, use OPEN DES with speedbrakes.

Note : 1. If speedbrakes are used above 315 knots/M.75 with the AP engaged, their rate of retraction is low (total time for retraction from full extension is approximately 25 seconds). The ECAM memo page displays SPD BRAKES in amber until retraction is complete.
2. In order to avoid overshooting the altitude, due to speedbrake retraction in ALT mode, retract the speedbrakes at least 2000 feet before the selected altitude.*

R – **RADAR . . . . AS APPROPRIATE**

– **BARO REF . . . . SET**
· Set QNH (or QFE) on the EFIS control panel and on the standby altimeter, when approaching the transition level and when cleared for an altitude.
· Crosscheck baro settings and altitude readings.

Note : When operating in low OAT, altitude corrections, as defined in 3.05.05 page 6, should be considered.

– **TERR ON ND ◁ . . . . AS RQRD**
· In mountainous areas, consider displaying terrain on ND.
· If use of radar is required, consider selecting the radar display on the PF side, and TERR ON ND on the PNF side only.

– **ECAM STATUS . . . . CHECK**
· Check that there is no status reminder on the upper ECAM display.
· If there is a status reminder, check the aircraft STATUS.
· Check the ECAM status page before completing the approach checks. Take particular note of any degradation in landing capability, or any other aspect affecting the approach and landing.

● **At 10,000 feet :**

– **LAND lights . . . . ON**
LAND lights may be switched ON, according to the airline policy/regulatory recommendations.

– **SEATBELTS . . . . AS RQRD**

R – **EFIS option . . . . CSTR**
R Select CSTR on both sides.

– **LS pushbutton . . . . AS RQRD**
Select LS, if an ILS or LOC approach is intended.
The PFD displays the LOC and glide scales and deviation symbol, if there is a valid ILS signal.

– **RAD NAVAIDS . . . . SELECTED/IDENTIFIED**
Ensure that appropriate radio navaids are tuned and identified.
For NDB approaches, manually select the reference navaid.

– **NAV ACCURACY . . . . CHECK**
On aircraft equipped with GPS primary, no navigation accuracy check is required, as long as GPS PRIMARY function is available.
Otherwise, crosscheck NAV ACCURACY using the PROG page (BRG/DIST computed data), and the ND (VOR/DME raw data).
The navigation accuracy check determines which autopilot mode the flight crew should use for the approach, and the type of displays to be shown on the ND.

GENERAL

For more information about precision approaches and how to use the FMGS see FMGS pilot's guide (Refer to 4.05.70). The approach procedures described here assume that the flight crew uses managed speed guidance which is recommended.

Note : If the forecasted tail wind at landing is greater than 10 knots, decelerated approach is not allowed, and the speed should be stabilized around VREF + 5 knots in final.

INITIAL APPROACH

– **ENG MODE selector . . . . AS RQRD**
Select IGN if the runway is covered with standing water, or if heavy rain or severe turbulence is expected during approach or go-around.

R – **SEAT BELTS . . . . ON/AUTO**

– **APPROACH PHASE . . . . CHECK/ACTIVATE**
· If the aircraft overflies the DECEL pseudo waypoint in NAV mode, the APPR phase activates automatically.
· If the aircraft is in HDG/TRK mode, approximately 15 NM from touchdown activate and
R confirm APPROACH phase on the MCDU.

– **POSITIONING . . . . MONITOR**
· In NAV mode, use VDEV information on the PFD and PROG page.
· In HDG or TRK mode, use the energy circle on ND representing the required distance to land.

– **MANAGED SPEED . . . . CHECK**
If ATC requires a particular speed, then use selected speed. When the ATC speed constraint ("maintain 170 knots to the outer marker", for example) no longer applies, return to managed speed.

– **SPEEDBRAKES . . . . AS RQRD**
If the pilot uses speedbrakes to increase the rate of deceleration, or to increase the rate of descent, it is important to note that VLS with speedbrakes fully extended, in the clean configuration, may be higher than green dot speed and possibly than VFE FLAP 1. The A/THR in speed mode, or the pitch demand in OPEN DES, will limit the speed to VLS. In this situation, the pilot should begin to retract speedbrakes upon reaching VLS + 5 knots and should select FLAP 1, as soon as speed is below VFE NEXT. The speedbrakes may then be extended, if necessary. The landing gear may always be extended out of sequence to facilitate deceleration.

– **NAV ACCURACY . . . . MONITOR**
When GPS PRIMARY is available, no NAV ACCURACY monitoring is required.
When GPS PRIMARY is lost, check the PROG page to verify that the required navigation accuracy is appropriate to the flight phase. Monitor NAV accuracy, and be prepared to change approach strategy. If NAV ACCURACY DOWNGRAD occurs, use raw data to check navigation accuracy.
Navigation accuracy determines which autopilot modes the flight crew should use, the type of displays to be shown on the ND, as well as the use of EGPWS.

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<tr><th rowspan="2">NAVIGATION ACCURACY</th><th colspan="2">ND</th><th rowspan="2">AP/FD mode</th><th rowspan="2">TERR pushbutton</th></tr>
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<tr><td>GPS PRIMARY</td><td colspan="2" rowspan="3">ARC or ROSE NAV with NAVAID raw data</td><td rowspan="3">NAV</td><td rowspan="3">ON</td></tr>
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R – **RADAR TILT . . . . ADJUST**

– **APPROACH CHECKLIST . . . . COMPLETE**

GENERAL

For more information about precision approaches and how to use the FMGS see FMGS pilot's guide (Refer to 4.05.70). The approach procedures described here assume that the flight crew uses managed speed guidance which is recommended.

Note : *If the forecasted tail wind at landing is greater than 10 knots, decelerated approach is not allowed, and the speed should be stabilized around VREF + 5 knots in final.*

INITIAL APPROACH

– **ENG MODE selector . . . . AS RQRD**
Select IGN if the runway is covered with standing water, or if heavy rain or severe turbulence is expected during approach or go-around.

R – **SEAT BELTS . . . . ON/AUTO**

– **APPROACH PHASE . . . . CHECK/ACTIVATE**
· If the aircraft overflies the DECEL pseudo waypoint in NAV mode, the APPR phase activates automatically.
· If the aircraft is in HDG/TRK mode, approximately 15 NM from touchdown activate and
R confirm APPROACH phase on the MCDU.

– **POSITIONING . . . . MONITOR**
· In NAV mode, use VDEV information on the PFD and PROG page.
· In HDG or TRK mode, use the energy circle on ND representing the required distance to land.

– **MANAGED SPEED . . . . CHECK**
If ATC requires a particular speed, then use selected speed. When the ATC speed constraint ("maintain 170 knots to the outer marker", for example) no longer applies, return to managed speed.

– **SPEEDBRAKES . . . . AS RQRD**
If the pilot uses speedbrakes to increase the rate of deceleration, or to increase the rate of descent, it is important to note that VLS with speedbrakes fully extended, in the clean configuration, may be higher than green dot speed and possibly than VFE FLAP 1. The A/THR in speed mode, or the pitch demand in OPEN DES, will limit the speed to VLS. In this situation, the pilot should begin to retract speedbrakes upon reaching VLS + 5 knots and should select FLAP 1, as soon as speed is below VFE NEXT. The speedbrakes may then be extended, if necessary. The landing gear may always be extended out of sequence to facilitate deceleration.

– **NAV ACCURACY . . . . MONITOR**
When GPS PRIMARY is available, no NAV ACCURACY monitoring is required.
When GPS PRIMARY is lost, check the PROG page to verify that the required navigation accuracy is appropriate to the flight phase. Monitor NAV accuracy, and be prepared to change approach strategy. If NAV ACCURACY DOWNGRAD occurs, use raw data to check navigation accuracy.
Navigation accuracy determines which autopilot modes the flight crew should use, the type of displays to be shown on the ND, as well as the use of EGPWS.

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– **RADAR . . . . AS APPROPRIATE**

– **APPROACH CHECKLIST . . . . COMPLETE**

GENERAL

For more information about precision approaches and how to use the FMGS see FMGS pilot's guide (Refer to 4.05.70). The approach procedures described here assume that the flight crew uses managed speed guidance which is recommended.

Note : If the forecasted tail wind at landing is greater than 10 knots, decelerated approach is not allowed, and the speed should be stabilized around VREF + 5 knots in final.

INITIAL APPROACH

– **ENG MODE selector . . . . AS RQRD**
Select IGN if the runway is covered with standing water, or if heavy rain or severe turbulence is expected during approach or go-around.

R – **SEAT BELTS . . . . ON/AUTO**

– **APPROACH PHASE . . . . CHECK/ACTIVATE**
· If the aircraft overflies the DECEL pseudo waypoint in NAV mode, the APPR phase activates automatically.
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– **SPEEDBRAKES . . . . AS RQRD**
If the pilot uses speedbrakes to increase the rate of deceleration, or to increase the rate of descent, it is important to note that VLS with speedbrakes fully extended, in the clean configuration, may be higher than green dot speed and possibly than VFE FLAP 1. The A/THR in speed mode, or the pitch demand in OPEN DES, will limit the speed to VLS. In this situation, the pilot should begin to retract speedbrakes upon reaching VLS + 5 knots and should select FLAP 1, as soon as speed is below VFE NEXT. The speedbrakes may then be extended, if necessary. The landing gear may always be extended out of sequence to facilitate deceleration.

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– **RADAR . . . . AS APPROPRIATE**

– **APPROACH CHECKLIST . . . . COMPLETE**

INTERMEDIATE/FINAL APPROACH (ILS approach entered in the F-PLN)

The objective is to be stabilized on the final descent path at VAPP, thrust above idle, in the
R landing configuration, at 1000 feet in instrument conditions, or at 500 feet in visual
R conditions, after continuous deceleration on the glideslope.

To be stabilized, all of the following conditions must be achieved prior to, or upon, reaching this stabilization height :

- The aircraft is on the correct lateral flight plan,
- The aircraft is in the desired landing configuration,
- The thrust is stabilized above idle, to maintain the target speed on the desired glide path,
- R No excessive flight parameter deviation.

If the aircraft is not stabilized on the approach path in landing configuration, at 1000 feet in instrument conditions, or at 500 feet in visual conditions, or as restricted by Operator policy/regulations, a go-around must be initiated.

- **APPR pushbutton on FCU . . . . PRESS**
  - Press the APPR pushbutton, only when ATC cleares the aircraft for the approach. This arms the LOC and G/S modes.
  - LOC and/or G/S capture modes will engage no sooner than 3 seconds after being armed.

- **Both APs . . . . ENGAGE**

  When APPR mode is selected, both autopilots should be engaged.

AT GREEN DOT SPEED

- **ORDER . . . . “FLAPS 1”**

- **FLAPS 1 . . . . SELECT**

– **CONFIRM/ANNOUNCE . . . . "FLAPS 1"**
– FLAPS 1 should be selected more than 3 NM before the FAF (Final Approach Fix).

Note : The ECAM automatically displays the STATUS page, if it is applicable, and if the flight crew has not already selected a system page manually.

– Check deceleration toward "S" speed.
– The aircraft must reach, or be established on, the glideslope with FLAPS 1 and S speed at, or above, 2 000 feet AGL.
– If the aircraft speed is significantly higher than S on the glideslope, or if the aircraft
R does not decelerate on the glideslope, extend the landing gear to slow it down. It is
R also possible to use speedbrakes. However, the flight crew should be aware that the
R use of speedbrakes causes an increase in VLS.

– **TCAS (◁) . . . . TA or TA/RA**
The FAA recommends selecting TA only mode :
– In case of known nearby traffic, which is in visual contact.
– At particular airports, and during particular procedures, identified by an Operator as having a significant potential for unwanted or inappropriate resolution advisories (closely-spaced parallel runways, converging runway, low terrain along the final approach...).

– **FMA . . . . CHECK**

– **LOC CAPTURE . . . . MONITOR**
The flight crew must always monitor the capture of LOC beam. During this evolution, the associated deviation indications on the PFD and ND must indicate movement towards the center of the scale.

– **ANNOUNCE . . . . "LOC*"**

– **G/S CAPTURE . . . . MONITOR**

● **If above the glideslope :**

– **V/S mode . . . . SELECT**

– **FCU ALTITUDE . . . . SET ABOVE A/C ALTITUDE**

Note : 1. When reaching VFE, the AP maintains VFE and reduces the V/S without MODE REVERSION.
2. If the aircraft intercepts the ILS above the radio altimeter validity range (no radio altitude indication available on the PFD), CAT 1 is displayed on the FMA. Check that the FMA displays the correct capability for the intended approach, when the aircraft is below 5 000 feet.

INTERMEDIATE/FINAL APPROACH (ILS approach entered in the F-PLN)

The objective is to be stabilized on the final descent path at VAPP, thrust above idle, in the
R landing configuration, at 1000 feet in instrument conditions, or at 500 feet in visual
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To be stabilized, all of the following conditions must be achieved prior to, or upon, reaching this stabilization height :
- The aircraft is on the correct lateral flight plan,
- The aircraft is in the desired landing configuration,
- The thrust is stabilized above idle, to maintain the target speed on the desired glide path,
R - No excessive flight parameter deviation.

If the aircraft is not stabilized on the approach path in landing configuration, at 1000 feet in instrument conditions, or at 500 feet in visual conditions, or as restricted by Operator policy/regulations, a go-around must be initiated.

- **APPR pushbutton on FCU . . . . PRESS**
  - Press the APPR pushbutton only when ATC cleares the aircraft for the approach. This arms the LOC and G/S modes.
  - LOC and/or G/S capture modes will engage no sooner than 3 seconds after being armed.

- **Both APs . . . . ENGAGE**
  When APPR mode is selected, both autopilots should be engaged.

<u>AT GREEN DOT SPEED</u>

- **ORDER . . . . "FLAPS 1"**
  At high weights, if the green dot speed is close to VFE NEXT, the crew may select a lower speed.

- **FLAPS 1 . . . . SELECT**

– **CONFIRM/ANNOUNCE . . . . "FLAPS 1"**
  – FLAPS 1 should be selected more than 3 NM before the FAF (Final Approach Fix).

  <u>Note</u> : The ECAM automatically displays the STATUS page, if it is applicable, and if the flight crew has not already selected a system page manually.

  – Check deceleration toward "S" speed.
  – The aircraft must reach, or be established on, the glideslope with FLAPS 1 and S speed at, or above, 2 000 feet AGL.
  – If the aircraft speed is significantly higher than S on the glideslope, or if the aircraft
R does not decelerate on the glideslope, extend the landing gear to slow it down. It is
R also possible to use speedbrakes. However, the flight crew should be aware that the
R use of speedbrakes causes an increase in VLS.

– **TCAS (◁) . . . . TA or TA/RA**
The FAA recommends selecting TA only mode :
  – In case of known nearby traffic, which is in visual contact.
  – At particular airports, and during particular procedures, identified by an Operator as having a significant potential for unwanted or inappropriate resolution advisories (closely-spaced parallel runways, converging runway, low terrain along the final approach...).

– **FMA . . . . CHECK**

– **LOC CAPTURE . . . . MONITOR**
The flight crew must always monitor the capture of LOC beam. During this evolution, the associated deviation indications on the PFD and ND must indicate movement towards the center of the scale.

– **ANNOUNCE . . . . "LOC*"**

– **G/S CAPTURE . . . . MONITOR**

● **If above the glideslope :**

  – **V/S mode . . . . SELECT**

  – **FCU ALTITUDE . . . . SET ABOVE A/C ALTITUDE**

<u>Note</u> : 1. When reaching VFE, the AP maintains VFE and reduces the V/S without MODE REVERSION.
2. If the aircraft intercepts the ILS above the radio altimeter validity range (no radio altitude indication available on the PFD), CAT 1 is displayed on the FMA. Check that the FMA displays the correct capability for the intended approach, when the aircraft is below 5 000 feet.

– **ANNOUNCE** . . . . **"G/S*"**

– **GO-AROUND ALT** . . . . **SET**
Set the go around altitude on the FCU.

AT 2000 FT AGL (minimum)

– **ORDER** . . . . **"FLAPS 2"**

– **FLAPS 2** . . . . **SELECT**

R – **CONFIRM/ANNOUNCE** . . . . **"FLAPS 2"**
· Check deceleration toward F speed.
· If the aircraft intercepts the ILS glideslope below 2000 feet AGL, select FLAPS 2 at one dot below the glideslope.
· If the aircraft speed is significantly higher than S on the glide slope, or the aircraft does not decelerate on the glide slope, extend the landing gear in order to slow down the aircraft. The use of speedbrakes is not recommended.
· When the speedbrakes are deployed, extending the flaps beyond FLAPS 1 may induce a slight roll movement, and in calm conditions a small lateral control asymmetry may remain until disturbed by a control input or by an atmospheric disturbance.

WHEN FLAPS ARE AT 2

– **ORDER . . . . "GEAR DOWN"**

– **L/G DOWN . . . . SELECT**

– **GROUND SPOILERS . . . . ARM**

R – **AUTO BRK . . . . CONFIRM**
R If the runway conditions have changed from the approach briefing, consider another
R braking mode.

– **CONFIRM/ANNOUNCE . . . . "GEAR DOWN"**

WHEN LANDING GEAR IS DOWN

– **ORDER** . . . . **"FLAPS 3"**

– **FLAPS 3** . . . . **SELECT**
Select FLAPS 3 below VFE.

– **CONFIRM/ANNOUNCE** . . . . **"FLAPS 3"**

– **ECAM WHEEL page** . . . . **CHECK**
· ECAM WHEEL page appears below 800 feet, or at landing gear extension.
· Check for three landing gear green indications.

● **If residual pressure is indicated on the triple indicator :**

– **RESIDUAL BRAKING PROC** . . . . **APPLY**

– **ORDER** . . . . **"FLAPS FULL"**

– **FLAPS FULL** . . . . **SELECT**
R · Select FLAPS FULL below VFE.
· Retract the speedbrakes before selecting FLAPS FULL to avoid an unexpected pitch down, when the speedbrakes retract automatically.

– **CONFIRM/ANNOUNCE** . . . . **"FLAPS FULL"**
Check deceleration towards VAPP.

- **A/THR . . . . CHECK IN SPEED MODE OR OFF**

- **WING ANTI ICE . . . . OFF**
  Only switch the WING ANTI ICE to ON, in severe icing conditions.

- **EXTERIOR LIGHTS . . . . SET**
  Set : The NOSE switch to TAXI
  The RWY TURN OFF switch to ON
  The LAND switch to ON.

- **SLIDING TABLE ◁ . . . . STOW**

- **LDG MEMO . . . . CHECK NO BLUE LINE**

- **CABIN REPORT . . . . OBTAIN**

- **CABIN CREW . . . . ADVISE**

- **LANDING CHECKLIST . . . . COMPLETE**

- **FLIGHT PARAMETERS . . . . CHECK**
  The PF announces any FMA modification.
  The PNF calls out, if :
  - The speed becomes less than the speed target – 5 knots, or greater than the speed target + 10 knots.
  - The pitch attitude becomes less than – 2.5°, or greater than 10° nose up.
  - The bank angle becomes greater than 7°.
  - The descent rate becomes greater than 1000 feet/min.
  - Excessive LOC or GLIDE deviation occurs.
R 1/4 dot LOC ; 1 dot GS

<u>AT DH + 100 FT (or MDA/MDH + 100 FT) :</u>

- **MONITOR (or ANNOUNCE) . . . . "ONE HUNDRED ABOVE"**

<u>AT DH (or MDA/MDH)</u>

- **MONITOR (or ANNOUNCE) . . . . "MINIMUM"**

R - **ANNOUNCE . . . . "CONTINUE" or "GO AROUND/FLAPS"**
  Do not duck under the glideslope. Maintain a stabilized flight path down to the flare.
R At 50 feet, one dot below the glideslope is 7 feet below the glideslope.

WHEN LANDING GEAR IS DOWN

– **ORDER** . . . . **"FLAPS 3"**

– **FLAPS 3** . . . . **SELECT**
· Select FLAPS 3 below VFE.
· Retract the speedbrakes before selecting FLAPS 3 to avoid an unexpected pitch down, when the speedbrakes retract automatically.

– **CONFIRM/ANNOUNCE** . . . . **"FLAPS 3"**

– **ECAM WHEEL page** . . . . **CHECK**
· ECAM WHEEL page appears below 800 feet, or at landing gear extension.
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– **RESIDUAL BRAKING PROC** . . . . **APPLY**

– **ORDER** . . . . **"FLAPS FULL"**

– **FLAPS FULL** . . . . **SELECT**
R Select FLAPS FULL below VFE.

– **CONFIRM/ANNOUNCE** . . . . **"FLAPS FULL"**
Check deceleration towards VAPP.

– **A/THR . . . . CHECK IN SPEED MODE OR OFF**

– **WING ANTI ICE . . . . OFF**
Only switch the WING ANTI ICE to ON, in severe icing conditions.

– **EXTERIOR LIGHTS . . . . SET**
Set : The NOSE switch to TAXI
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– **FLIGHT PARAMETERS . . . . CHECK**
The PF announces any FMA modification.
The PNF calls out, if :
– The speed becomes less than the speed target minus 5 knots, or greater than the speed target plus 10 knots.
– The pitch attitude becomes less than minus 2.5°, or greater than plus 7.5° nose up.
– The bank angle becomes greater than 7°.
– The descent rate becomes greater than 1 000 feet/min.
– Excessive LOC or GLIDE deviation occurs.
R 1/4 dot LOC ; 1 dot GS

<u>AT DH + 100 FT (or MDA/MDH + 100 FT) :</u>

– **MONITOR (or ANNOUNCE) . . . . "ONE HUNDRED ABOVE"**

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– **MONITOR (or ANNOUNCE) . . . . "MINIMUM"**

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Do not go under the glideslope. Maintain a stabilized flight path down to the flare.
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WHEN LANDING GEAR IS DOWN

– **ORDER . . . . “FLAPS 3”**

– **FLAPS 3 . . . . SELECT**
Select FLAPS 3 below VFE.

– **CONFIRM/ANNOUNCE . . . . “FLAPS 3”**

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· Check for three landing gear green indications.

● **If residual pressure is indicated on the triple indicator :**

– **RESIDUAL BRAKING PROC . . . . APPLY**

Note : Due to the accomplishment of the alternate braking functional test after the landing is downlocked, brief brake pressure indications may be observed on BRAKE PRESS indicator.

– **ORDER . . . . “FLAPS FULL”**

– **FLAPS FULL . . . . SELECT**
R · Select FLAPS FULL below VFE.
· Retract the speedbrakes before selecting FLAPS FULL to avoid an unexpected pitch down, when the speedbrakes retract automatically.

– **CONFIRM/ANNOUNCE . . . . “FLAPS FULL”**
Check deceleration towards VAPP.

– **A/THR . . . . CHECK IN SPEED MODE OR OFF**

– **WING ANTI ICE . . . . OFF**
Only switch the WING ANTI ICE to ON, in severe icing conditions.

– **EXTERIOR LIGHTS . . . . SET**
Set : The NOSE switch to TAXI
The RWY TURN OFF switch to ON
The LAND switch to ON.

– **SLIDING TABLE ◁ . . . . STOW**

– **LDG MEMO . . . . CHECK NO BLUE LINE**

– **CABIN REPORT . . . . OBTAIN**

– **CABIN CREW . . . . ADVISE**

– **LANDING CHECKLIST . . . . COMPLETE**

– **FLIGHT PARAMETERS . . . . CHECK**
The PF announces any FMA modification.
The PNF calls out, if :
- The speed becomes less than the speed target – 5 knots, or greater than the speed target + 10 knots.
- The pitch attitude becomes less than – 2.5°, or greater than 10° nose up.
- The bank angle becomes greater than 7°.
- The descent rate becomes greater than 1000 feet/min.
- Excessive LOC or GLIDE deviation occurs.

R 1/4 dot LOC ; 1 dot GS

<u>AT DH + 100 FT (or MDA/MDH + 100 FT) :</u>

– **MONITOR (or ANNOUNCE) . . . . "ONE HUNDRED ABOVE"**

<u>AT DH (or MDA/MDH)</u>

– **MONITOR (or ANNOUNCE) . . . . "MINIMUM"**

R – **ANNOUNCE . . . . "CONTINUE" or "GO AROUND/FLAPS"**
Do not duck under the glideslope. Maintain a stabilized flight path down to the flare.
R At 50 feet, one dot below the glideslope is 7 feet below the glideslope.

WHEN LANDING GEAR IS DOWN

– **ORDER** . . . . **"FLAPS 3"**

– **FLAPS 3** . . . . **SELECT**
· Select FLAPS 3 below VFE.
· Retract the speedbrakes before selecting FLAPS 3 to avoid an unexpected pitch down, when the speedbrakes retract automatically.

– **CONFIRM/ANNOUNCE** . . . . **"FLAPS 3"**

– **ECAM WHEEL page** . . . . **CHECK**
· ECAM WHEEL page appears below 800 feet, or at landing gear extension.
· Check for three landing gear green indications.

● **If residual pressure is indicated on the triple indicator :**

– **RESIDUAL BRAKING PROC** . . . . **APPLY**

Note : Due to the accomplishment of the alternate braking functional test after the landing is downlocked, brief brake pressure indications may be observed on BRAKE PRESS indicator.

– **ORDER** . . . . **"FLAPS FULL"**

– **FLAPS FULL** . . . . **SELECT**
R Select FLAPS FULL below VFE.

– **CONFIRM/ANNOUNCE** . . . . **"FLAPS FULL"**
Check deceleration towards VAPP.

– **A/THR . . . . CHECK IN SPEED MODE OR OFF**

– **WING ANTI ICE . . . . OFF**
Only switch the WING ANTI ICE to ON, in severe icing conditions.

– **EXTERIOR LIGHTS . . . . SET**
Set : The NOSE switch to TAXI
The RWY TURN OFF switch to ON
The LAND switch to ON.

– **SLIDING TABLE ◁ . . . . STOW**

– **LDG MEMO . . . . CHECK NO BLUE LINE**

– **CABIN REPORT . . . . OBTAIN**

– **CABIN CREW . . . . ADVISE**

– **LANDING CHECKLIST . . . . COMPLETE**

– **FLIGHT PARAMETERS . . . . CHECK**
The PF announces any FMA modification.
The PNF calls out, if :
- The speed becomes less than the speed target minus 5 knots, or greater than the speed target plus 10 knots.
- The pitch attitude becomes less than minus 2.5°, or greater than plus 7.5° nose up.
- The bank angle becomes greater than 7°.
- The descent rate becomes greater than 1 000 feet/min.
- Excessive LOC or GLIDE deviation occurs.

R 1/4 dot LOC ; 1 dot GS

<u>**AT DH + 100 FT (or MDA/MDH + 100 FT) :**</u>

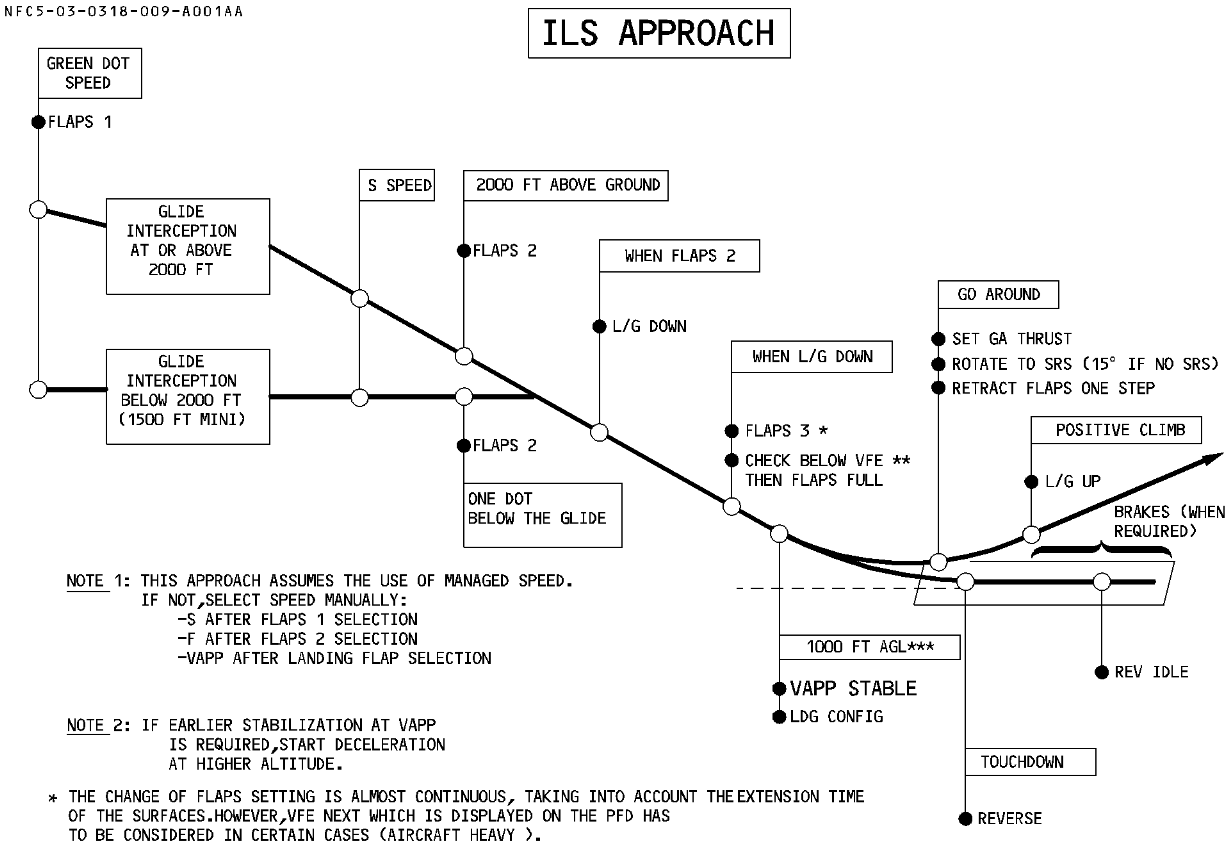
– **MONITOR (or ANNOUNCE) . . . . "ONE HUNDRED ABOVE"**

<u>**AT DH (or MDA/MDH)**</u>

– **MONITOR (or ANNOUNCE) . . . . "MINIMUM"**

R – **ANNOUNCE . . . . "CONTINUE" or "GO AROUND/FLAPS"**
Do not go under the glideslope. Maintain a stabilized flight path down to the flare.
R At 50 feet, one dot below the glideslope is 7 feet below the glideslope.

ILS APPROACH



NOTE 1: THIS APPROACH ASSUMES THE USE OF MANAGED SPEED.
IF NOT,SELECT SPEED MANUALLY:
-S AFTER FLAPS 1 SELECTION
-F AFTER FLAPS 2 SELECTION
-VAPP AFTER LANDING FLAP SELECTION

NOTE 2: IF EARLIER STABILIZATION AT VAPP IS REQUIRED,START DECELERATION AT HIGHER ALTITUDE.

* THE CHANGE OF FLAPS SETTING IS ALMOST CONTINUOUS, TAKING INTO ACCOUNT THE EXTENSION TIME OF THE SURFACES.HOWEVER,VFE NEXT WHICH IS DISPLAYED ON THE PFD HAS TO BE CONSIDERED IN CERTAIN CASES (AIRCRAFT HEAVY).

** TO MINIMIZE FLAPS WEAR,EXTEND FLAPS AT VFE-15 Kt WHEN POSSIBLE.

*** 1000Ft AGL MINIMUM IMC,
500Ft AGL MINIMUM VMC OR AS RESTRICTED BY AIRLINE POLICY/REGULATIONS.

INTRODUCTION

APPROACH GUIDANCE FOR NON PRECISION APPROACHES OTHER THAN LOC, LOC B/C AND RNAV NON PRECISION APPROACHES

Three different approach strategies are available to perform non-precision approaches :

1. Lateral and vertical guidance, selected by the crew : TRK-FPA (or HDG-V/S) modes.
2. Lateral guidance, managed by the FM, and vertical guidance selected by the crew : NAV-FPA (or NAV-V/S) modes.
3. Lateral and vertical guidance, managed by the FM : FINAL APP mode.

R For straight in approaches, the recommended flying reference is FPV, which should be selected during the initial approach.

— Approach procedures including a PI-CF leg (PROC-T indicated on the MCDU F-PLN) are not eligible for the use of NAV and FINAL APP modes.
— Lateral managed guidance (NAV) can be used, provided the approach is stored in the navigation database and the final approach is laterally and vertically monitored, using the adequate raw data (reference navaid, altimeter).
— Lateral and vertical managed guidance (FINAL APP) in IMC conditions can be used, provided the following conditions are met :
  - R · The approach stored in the navigation database has been produced by approved suppliers compliant with ED76/DO200A requirements, or has been validated and approved by the operator.
  - R · The effect of low OAT on obstacle clearance needs to be evaluated. A minimum OAT, below which selected vertical guidance should be used, may have to be defined.
  - · The final approach (FAF to runway or MAP), as extracted from the navigation database and inserted in the primary F-PLN including altitude constraints, is not revised by the crew.
  - · Before starting the approach, the crew must check the lateral and the vertical FM F-PLN against the published approach chart, using the MCDU and ND.
  - · The approach trajectory is laterally and vertically intercepted, before the FAF, or equivalent waypoint in the FM F-PLN, so that the aircraft is correctly established on the final approach course before starting the descent.
  - R · Conventional radio navaids must be available and monitored during the approach, and must be considered with altitude as the primary means of navigation.

<u>Note</u> : *For additional information on recommended flight crew procedures, and on navigation database vertical flight path validation, refer to the dedicated FCOM Bulletin "Use of managed guidance in approach and NAV database validation" and the FMGS Pilot's Guide (4.05.70).*

If the FM/GPS POS DISAGREE ECAM caution is triggered during the approach, use selected guidance to continue the approach with radio navaid raw data.
If GPS PRIMARY is lost, NAV and FINAL APP mode can be used to continue the approach, provided the radio navaid raw date indicates the correct navigation.

APPROACH GUIDANCE FOR RNAV APPROACH

Two different approach strategies are available to perform RNAV approaches :

1. Lateral guidance, managed by the FM, and vertical guidance selected by the crew : NAV-FPA (or NAV-V/S) modes.
   This strategy applies, when LNAV ONLY (Lateral Navigation only) RNAV approach is intended.
2. Lateral and vertical guidance, managed by the FM : FINAL APP mode.
   This strategy applies, when LNAV/VNAV (Lateral and Vertical Navigation) RNAV approach is intended.
   For straight in approaches, the recommended flying reference is FPV, which should be selected during the initial approach.
   Approach procedures including a Pi-CF leg (PROC-T indicated on the MCDU F-PLN) are not eligible for the use of NAV and FINAL APP modes.
   R Before starting a RNAV (GPS) approach, two navigation systems must be operative : 2
   R FMS and 2 GPS.

RNAV approach can be performed in NAV-FPA (or NAV-V/S) modes provided :

- The approach stored in the navigation database has been produced by approved suppliers compliant with ED76/DO200A requirements, or has been validated and is approved by the operator.
- Before starting the approach, the crew must check the lateral FM F-PLN against the published approach chart using MCDU and ND.
- The final approach is laterally and vertically monitored, using the appropriate data : the distance to the runway or to the MAP versus altitude is the primary means of vertical navigation, the deviation on the PFD may be unreliable.

RNAV approach can be performed in FINAL APP mode provided :

- The approach stored in the navigation database has been produced by approved suppliers compliant with ED76/DO200A requirements, and the vertical flight path has been validated by the operator, or, the lateral and vertical flight path has been validated and approved by the operator.
- The RNAV approaches with the MAP before the runway threshold are not eligible for the use of FINAL APP mode.

Note : *RNP SAAAR approaches coded in the navigation database must be fully validated by the operator.*

If no minimum OAT is published on the approach chart, the effect of low OAT on obstacle clearance needs to be evaluated.

- The final approach (FAF to runway or MAP), as extracted from the navigation database and inserted in the primary F-PLN including altitude constraints, is not revised by the crew.
- Before starting the approach, the crew must check the lateral and the vertical FM F-PLN against the published approach chart, using the MCDU and ND.

CAUTION

R Do not use the FINAL APP mode if the MAP is located before the runway threshold. In
R this case, the approach can be flown using NAV-FPA (or NAV-V/S), the VDEV on the PFD
R must be disregarded since it will be incorrect.

- The approach trajectory is laterally and vertically intercepted, before the FAF, or equivalent waypoint in the FM F-PLN, so that the aircraft is correctly established on the final approach course before starting the descent.
- The final approach is laterally and vertically monitored, using the VDEV and appropriate raw data (distance to the runway, altitude, FPV).
- The VDEV indication on the PFD must be disregarded since it may be incorrect if the MAP is located before the runway threshold.

Note : For additional information on recommended flight crew procedures, and on navigation database flight path validation, refer to the FCOM Bulletin "Use of managed guidance in approach and NAV database validation" and the FMGS Pilot's guide (4.02.20 and 4.05.70).

For RNAV approach with GPS PRIMARY

An instrument approach procedure, not requiring GPS PRIMARY, must be available at destination or destination alternate (and at required takeoff alternate, and en route alternate). Check RAIM availability, using the PREDICTIVE GPS MCDU page. Before starting the approach, check that GPS PRIMARY is available on both MCDUs.
If the GPS PRIMARY LOST indication appears on the ND during the approach, discontinue the approach, unless :

R – GPS is not required and navigation accuracy is confirmed against the radio navaid raw
R data, or
– For RNAV approach not requiring GPS, HIGH accuracy appears on the MCDU with the appropriate RNP value.
– If GPS PRIMARY is lost on only one FMGC, the approach can be continued, using the AP/FD associated to the other FMGC.

If the FM/GPS POS DISAGREE ECAM caution is triggered during the approach, discontinue
R the approach, unless radio navaid raw data is available and indicates correct navigation to
R continue the approach using selected FMGS modes.

For RNAV approach without GPS PRIMARY

Before starting the approach, check the FM position accuracy with radio NAVAID raw data.
Check, in addition, that HIGH accuracy appears on the MCDU with the specified RNP value.
If HIGH accuracy is lost on one FMGC, the approach can be continued with the AP/FD associated to the other FMGC.
If HIGH accuracy is lost on both FMGCs, discontinue the approach.

APPROACH GUIDANCE FOR LOC AND LOC B/C NON PRECISION APPROACHES

The Standard Operating Procedure of this section can be used for flying LOC or LOC B/C approaches, provided the following approach guidance items are observed.
The FM NAV mode can be used down to LOC or LOC B/C interception.
For LOC or LOC B/C intermediate and final approach, use the LOC or LOC B/C AP/FD mode for lateral navigation, associated with the FPA (or V/S) for vertical navigation.
Vertical navigation must be monitored using raw data (altimeter, distance to the runway given by radio-navaid).
The VDEV indication on the PFD must be disregarded, since it may be incorrect if the MAP is located before the runway threshold.

APPROACH SPEED TECHNIQUE

In all cases, the crew should use managed speed.
The standard speed technique is to make a stabilized approach using AP/FD and A/THR :
The aircraft intercepts the final descent path in landing configuration, and at VAPP. For this purpose, the flight crew should insert VAPP as a speed constraint at the FAF.
If the operator adopts a decelerated approach technique and the crew uses managed guidance, the aircraft should intercept the final descent path at S speed in CONF 1.
The objective is to be stabilized on the final descent path thrust above idle, in the landing configuration at 1000 feet.
To be stabilized, all of the following conditions must be achieved prior to, or upon, reaching this stabilization height :

- The aircraft is on the correct lateral flight plan,
- The aircraft is in the desired landing configuration,
- The thrust is stabilized above idle, to maintain the target speed on the desired descent path,
- No excessive flight parameter deviation.

If the aircraft is not stabilized on the approach and in landing configuration, at 1000 feet in instrument conditions, or at 500 feet in visual conditions, or as restricted by airline policy/regulations, a go-around must be initiated.
R If the forecasted tailwind at landing is greater than 10 knots, a decelerated approach is not
R allowed, and the speed should be stabilized around VREF + 5 knots in final.

For RNAV Approach with GPS PRIMARY

Unless an instrument approach procedure, not requiring GPS PRIMARY, is available at destination or destination alternate (and at required takeoff alternate, and enroute alternate), the GPS PRIMARY availability must be verified before flight.
RAIM is available worldwide, if 24 or more GPS satellites are operative.
If the number of GPS satellites is 23 or less, check RAIM availability, using the approved version of the Honeywell ground-based prediction software.
If the GPS PRIMARY availability cannot be verified before flight, RAIM availability can be checked in flight, using the PREDICTIVE GPS MCDU page.
Before starting the approach, check that GPS PRIMARY is available on both MCDUs.
If the GPS PRIMARY LOST indication appears on the ND during the approach, discontinue the approach, unless :
- GPS is not required and navigation accuracy is confirmed against the radio NAVAID raw data, or
- For RNAV approach not requiring GPS, HIGH accuracy appears on the MCDU, with the appropriate RNP value.
- If GPS PRIMARY is lost on only one FMGC, the approach can be continued, using the AP/FD associated to the other FMGC.

If the FM/GPS POS DISAGREE ECAM caution is triggered during the approach, discontinue the approach, unless radio NAVAID raw data is available and indicates correct navigation to continue the approach using selected FMGS modes.

For RNAV approach without GPS PRIMARY

Before starting the approach, check FM position accuracy with radio NAVAID raw data.
Check, in addition, that HIGH accuracy appears on the MCDU, with the specified RNP value.
If HIGH accuracy is lost on one FMGC, the approach can be continued with the AP/FD associated to the other FMGC.
If HIGH accuracy is lost on both FMGCs, discontinue the approach.

APPROACH GUIDANCE FOR LOC AND LOC B/C NON PRECISION APPROACHES

The Standard Operating Procedure of this section can be used for flying LOC or LOC B/C approaches, provided the following approach guidance items are observed.
The FM NAV mode can be used down to LOC or LOC B/C interception.
For LOC or LOC B/C intermediate and final approach, use the LOC or LOC B/C AP/FD mode for lateral navigation, associated with the FPA (or V/S) for vertical navigation.
Vertical navigation must be monitored using raw data (altimeter, distance to the runway given by radio-navaid).
The VDEV indication on the PFD must be disregarded, since it may be incorrect if the MAP is located before the runway threshold.

APPROACH SPEED TECHNIQUE

In all cases, the crew should use managed speed.
The standard speed technique is to make a stabilized approach using AP/FD and A/THR :
The aircraft intercepts the final descent path in landing configuration, and at VAPP. For this purpose, the flight crew should insert VAPP as a speed constraint at the FAF.
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If the aircraft is not stabilized on the approach and in landing configuration, at 1000 feet in instrument conditions, or at 500 feet in visual conditions, or as restricted by airline policy/regulations, a go-around must be initiated.
R If the forecasted tailwind at landing is greater than 10 knots, a decelerated approach is not
R allowed, and the speed should be stabilized around VREF + 5 knots in final.

INITIAL APPROACH

– **ENG START selector . . . . AS RQRD**
Select IGN if the runway is covered with standing water, or heavy rain, or if severe turbulence is expected in the approach or go-around area.

– **SEATBELTS . . . . ON/AUTO**

– **APPROACH PHASE . . . . ACTIVATE**
· In NAV mode, the APPR phase automatically activates at the DECEL pseudo waypoint.
· In HDG or TRK mode, manually activate the APPR phase on the PERF APPR page, when the distance to land is approximately 15 NM.

– **POSITIONING . . . . MONITOR**
· In NAV mode, use VDEV information on the PFD and PROG page.
· In HDG or TRK mode, use the energy circle displayed on ND representing the required distance to land.

– **MANAGED SPEED . . . . CHECK**
If the ATC requires a particular speed, use selected speed. When the ATC speed constraint no longer applies, return to managed speed.

– **SPEEDBRAKES . . . . AS RQRD**

– **NAVIGATION ACCURACY . . . . MONITOR**

· When GPS PRIMARY is available, no accuracy check is required.

· When GPS PRIMARY is lost, check the PROG page to ensure that the required navigation accuracy is appropriate to the phase of flight. Perform a navigation accuracy check (as described in 3.03.15).

If the approach is stored in the navigation database, determine the strategy to be used for the final approach, according to the table below :

<table>
<tr><th rowspan="2">NAVIGATION ACCURACY</th><th rowspan="2">Approach guidance</th><th colspan="2">ND</th><th rowspan="2">AP/FD mode</th><th rowspan="2">TERR pushbutton</th></tr>
<tr><th>PF</th><th>PNF</th></tr>
<tr><td>GPS PRIMARY</td><td rowspan="3">Managed***</td><td colspan="2" rowspan="3">ARC or ROSE NAV * With NAVAID raw data</td><td rowspan="3">NAV-FPA or APP-NAV/ FINAL ***</td><td rowspan="3">ON</td></tr>
<tr><td>NAV ACCUR HIGH</td></tr>
<tr><td>NAV ACCUR LOW and NAV ACCURACY check ≤ 1NM</td></tr>
<tr><td>GPS PRIMARY LOST and NAV ACCUR LOW and NAV ACCURACY check > 1 NM</td><td rowspan="2">Selected</td><td rowspan="2">ROSE VOR **</td><td rowspan="2">ARC or ROSE NAV or ROSE VOR ** With NAVAID raw data</td><td rowspan="2">TRK-PFA</td><td rowspan="2">OFF</td></tr>
<tr><td>GPS PRIMARY LOST and aircraft flying within unreliable radio NAVAID area</td></tr>
</table>

(*) For VOR approaches, one pilot may select ROSE VOR.
(**) For LOC approaches, select ROSE ILS.
(***) Managed vertical guidance can be used, provided the approach coding in the navigation database has been validated.

__Note__ : 1. During approach in overlay to a conventional radio navaid procedure, monitor raw data. If raw data indicates unsatisfactory managed guidance, revert to selected guidance.

2. The pilot can continue to fly a managed approach, after receiving a NAV ACCUR DOWNGRADED message, if raw data indicates that the guidance is satisfactory.

R – **RADAR TILT . . . . ADJUST**

– **APPROACH CHECKLIST . . . . PERFORM**

INITIAL APPROACH

– **ENG START selector . . . . AS RQRD**
Select IGN if the runway is covered with standing water, or heavy rain, or if severe turbulence is expected in the approach or go-around area.

– **SEATBELTS . . . . ON/AUTO**

– **APPROACH PHASE . . . . ACTIVATE**
· In NAV mode, the APPR phase automatically activates at the DECEL pseudo waypoint.
· In HDG or TRK mode, manually activate the APPR phase on the PERF APPR page, when the distance to land is approximately 15 NM.

– **POSITIONING . . . . MONITOR**
· In NAV mode, use VDEV information on the PFD and PROG page.
· In HDG or TRK mode, use the energy circle displayed on ND representing the required distance to land.

– **MANAGED SPEED . . . . CHECK**
If the ATC requires a particular speed, use selected speed. When the ATC speed constraint no longer applies, return to managed speed.

– **SPEEDBRAKES . . . . AS RQRD**

– **NAVIGATION ACCURACY . . . . MONITOR**

· When GPS PRIMARY is available, no accuracy check is required.

· When GPS PRIMARY is lost, check the PROG page to ensure that the required navigation accuracy is appropriate to the phase of flight. Perform a navigation accuracy check (as described in 3.03.15).

If the approach is stored in the navigation database, determine the strategy to be used for the final approach, according to the table below :

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<tr><th rowspan="2">NAVIGATION ACCURACY</th><th rowspan="2">Approach guidance</th><th colspan="2">ND</th><th rowspan="2">AP/FD mode</th><th rowspan="2">TERR pushbutton</th></tr>
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<tr><td>GPS PRIMARY LOST and aircraft flying within unreliable radio NAVAID area</td></tr>
</table>

(*) For VOR approaches, one pilot may select ROSE VOR.
(**) For LOC approaches, select ROSE ILS.
(***) Managed vertical guidance can be used, provided the approach coding in the navigation database has been validated.

<u>Note</u> : *1. During approach in overlay to a conventional radio navaid procedure, monitor raw data. If raw data indicates unsatisfactory managed guidance, revert to selected guidance.*

2. The pilot can continue to fly a managed approach, after receiving a NAV ACCUR DOWNGRADED message, if raw data indicates that the guidance is satisfactory.

– **RADAR . . . . AS APPROPRIATE**

– **APPROACH CHECKLIST . . . . PERFORM**

INITIAL APPROACH

– **ENG START selector . . . . AS RQRD**
Select IGN if the runway is covered with standing water, or heavy rain, or if severe turbulence is expected in the approach or go-around area.

– **SEATBELTS . . . . ON/AUTO**

– **APPROACH PHASE . . . . ACTIVATE**
· In NAV mode, the APPR phase automatically activates at the DECEL pseudo waypoint.
· In HDG or TRK mode, manually activate the APPR phase on the PERF APPR page, when the distance to land is approximately 15 NM.

– **POSITIONING . . . . MONITOR**
· In NAV mode, use VDEV information on the PFD and PROG page.
· In HDG or TRK mode, use the energy circle displayed on ND representing the required distance to land.

– **MANAGED SPEED . . . . CHECK**
If the ATC requires a particular speed, use selected speed. When the ATC speed constraint no longer applies, return to managed speed.

– **SPEEDBRAKES . . . . AS RQRD**

– **NAVIGATION ACCURACY . . . . MONITOR**

· When GPS PRIMARY is available, no accuracy check is required.

· When GPS PRIMARY is lost, check the PROG page to ensure that the required navigation accuracy is appropriate to the phase of flight. Perform a navigation accuracy check (as described in 3.03.15).

If the approach is stored in the navigation database, determine the strategy to be used for the final approach, according to the table below :

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</table>

(*) For VOR approaches, one pilot may select ROSE VOR.
(**) For LOC approaches, select ROSE ILS.
(***) Managed vertical guidance can be used, provided the approach coding in the navigation database has been validated.

Note : *1. During approach in overlay to a conventional radio navaid procedure, monitor raw data. If raw data indicates unsatisfactory managed guidance, revert to selected guidance.*
2. The pilot can continue to fly a managed approach, after receiving a NAV ACCUR DOWNGRADED message, if raw data indicates that the guidance is satisfactory.

– **RADAR . . . . AS APPROPRIATE**

– **APPROACH CHECKLIST . . . . PERFORM**

INTERMEDIATE/FINAL APPROACH

R ● **For RNAV approach :**

R – **GPS 1+2 on GPS MONITOR page . . . . CHECK BOTH IN NAV**

R – **GPS PRIMARY on PROG page . . . . CHECK AVAILABLE**

R ● **If GPS PRIMARY is not available**

R – **RNP for approach . . . . CHECK/ENTER**

R – **HIGH accuracy . . . . CHECK**

R *Note : RNAV approach without GPS is subject to a specific operational approval.*

● **For approach in managed vertical guidance :**

– **APPR pushbutton on FCU . . . . PRESS**
Once cleared for the approach, press the pushbutton when flying towards the FAF. Check that APPR NAV is engaged, FINAL is armed, and the VDEV scale is on the PFD.

Note : For instructions for switching from a non ILS to an ILS approach, see the FMGS pilot's guide. (Refer to 4.05.70)

AT GREEN DOT SPEED

– **ORDER . . . . "FLAPS 1"**

– **FLAPS 1 . . . . SELECT**

– **CONFIRM/ANNOUNCE . . . . "FLAPS 1"**

– **TCAS Mode Selector . . . . TA OR TA/RA**
· See ILS approach (Refer to 3.03.18)

– **ND DISPLAY . . . . SELECT RANGE/MODE**

AT S SPEED

– **ORDER . . . . "FLAPS 2"**

– **FLAPS 2 . . . . SELECT**

– **CONFIRM/ANNOUNCE . . . . "FLAPS 2"**

WHEN FLAPS ARE AT 2

– **ORDER . . . . "GEAR DOWN"**

– **L/G DOWN . . . . SELECT**

– **GROUND SPOILERS . . . . ARM**

R – **AUTO BRK . . . . CONFIRM**
R If the runway conditions have changed from the approach briefing, consider another
R braking mode.

– **CONFIRM/ANNOUNCE . . . . "GEAR DOWN"**

WHEN LANDING GEAR DOWN :

– **ORDER . . . . "FLAPS 3"**

– **FLAPS 3 . . . . SELECT**
· Select FLAPS 3 below VFE.

– **CONFIRM/ANNOUNCE . . . . "FLAPS 3"**

– **ECAM WHEEL page . . . . CHECK**
· The ECAM WHEEL page appears below 800 feet, or at landing gear extension.
· Check the three landing gear green indications.

● **If residual pressure is indicated on the triple indicator :**

– **RESIDUAL BRAKING PROC . . . . APPLY**

INTERMEDIATE/FINAL APPROACH

R ● **For RNAV approach :**

R – **GPS 1+2 on GPS MONITOR page . . . . CHECK BOTH IN NAV**

R – **GPS PRIMARY on PROG page . . . . CHECK AVAILABLE**

R ● **If GPS PRIMARY is not available**

R – **RNP for approach . . . . CHECK/ENTER**

R – **HIGH accuracy . . . . CHECK**

R *Note : RNAV approach without GPS is subject to a specific operational approval.*

● **For approach in managed vertical guidance :**

– **APPR pushbutton on FCU . . . . PRESS**
Once cleared for the approach, press the pushbutton when flying towards the FAF. Check that APPR NAV is engaged, FINAL is armed, and the VDEV scale is on the PFD.

Note : For instructions for switching from a non ILS to an ILS approach, see the FMGS pilot's guide. (Refer to 4.05.70)

AT GREEN DOT SPEED

– **ORDER . . . . "FLAPS 1"**

– **FLAPS 1 . . . . SELECT**

– **CONFIRM/ANNOUNCE . . . . "FLAPS 1"**

– **TCAS Mode Selector . . . . TA OR TA/RA**
· See ILS approach (Refer to 3.03.18)

– **ND DISPLAY . . . . SELECT RANGE/MODE**

AT S SPEED

– **ORDER . . . . "FLAPS 2"**

– **FLAPS 2 . . . . SELECT**

– **CONFIRM/ANNOUNCE . . . . "FLAPS 2"**

WHEN FLAPS ARE AT 2

– **ORDER . . . . "GEAR DOWN"**

– **L/G DOWN . . . . SELECT**

– **GROUND SPOILERS . . . . ARM**

R – **AUTO BRK . . . . CONFIRM**
R If the runway conditions have changed from the approach briefing, consider another
R braking mode.

– **CONFIRM/ANNOUNCE . . . . "GEAR DOWN"**

WHEN LANDING GEAR DOWN :

– **ORDER . . . . "FLAPS 3"**

– **FLAPS 3 . . . . SELECT**
· Select FLAPS 3 below VFE.

– **CONFIRM/ANNOUNCE . . . . "FLAPS 3"**

– **ECAM WHEEL page . . . . CHECK**
· The ECAM WHEEL page appears below 800 feet, or at landing gear extension.
· Check the three landing gear green indications.

● **If residual pressure is indicated on the triple indicator :**

– **RESIDUAL BRAKING PROC . . . . APPLY**

Note : *Due to the accomplishment of the alternate braking functional test after the landing gear is downlocked, brief brake pressure indications may be observed on BRAKE PRESS indicator.*

– **ORDER** . . . . **"FLAPS FULL"**

– **FLAPS FULL** . . . . **SELECT**

R · Select FLAPS FULL below VFE.

· Retract the speedbrakes before selecting FLAPS FULL to avoid an unexpected pitch down when the speedbrakes automatically retract.

– **CONFIRM/ANNOUNCE** . . . . **"FLAPS FULL"**

· Check deceleration towards VAPP.

· Check correct TO waypoint on the ND.

MANAGED VERTICAL GUIDANCE	SELECTED VERTICAL OR SELECTED LATERAL AND VERTICAL GUIDANCE
. After the FAF : **– FINAL APP . . . . CHECK** Check FINAL APP green on the FMA. **– GO AROUND ALTITUDE . . . . SET** Set, when below the go-around altitude.	**. At FAF :** **– FPA for final approach . . . . SET** **. After the FAF :** **– GO AROUND ALTITUDE . . . . SET** Set, when below the go-around altitude.
– POSITION/FLIGHT PATH . . . . MONITOR **· For approach in overlay to a conventional radio navaid procedure :** Use radio navaid raw data and altitude to monitor the lateral and vertical navigation. If the navigation is unsatisfactory, revert to selected guidance. In particular, monitor the vertical guidance, using altitude indication versus radio navaid position, and be prepared to revert to NAV-FPA, if the vertical guidance is unsatisfactory. **· For RNAV approach :** Monitor VDEV and FPV (on the PFD) and XTK error (on the ND). Use altitude indication versus distance to the runway to monitor the vertical navigation. If the vertical guidance is unsatisfactory, revert to NAV/FPA or consider the go-around. If the lateral guidance is unsatisfactory, perform a go-around.	**– POSITION/FLIGHT PATH . . MONITOR/ADJUST** **· For approach in overlay to a conventional radio navaid procedure :** Use radio navaid raw data to monitor the lateral navigation. Using altitude indication versus radio navaid position, adjust the FPA, as necessary, to follow the published descent profile, taking into account the minimum altitudes. Do not use the FMGC VDEV on the PFD. If the lateral navigation is unsatisfactory, revert to TRK/FPA. **· For RNAV approach :** Monitor XTK error on ND. Using altitude indication versus distance to the runway, adjust the FPA as necessary to follow the published descent profile, taking into account the minimum altitudes. If the lateral guidance is unsatisfactory, perform a go-around.

– **A/THR . . . . CHECK IN SPEED MODE OR OFF**

– **WING ANTI ICE . . . . OFF**
Switch WING ANTI ICE ON in severe icing conditions only.

– **EXTERIOR LIGHTS . . . . SET**
Set NOSE switch to TAXI, set RWY TURN OFF switch to ON, and set LAND switch to ON.

– **SLIDING TABLE . . . . STOW**

– **LDG MEMO . . . . CHECK NO BLUE LINE**

– **CABIN REPORT . . . . OBTAIN**

– **CABIN CREW . . . . ADVISE**

– **LANDING CHECKLIST . . . . COMPLETE**

– **FLIGHT PARAMETERS . . . . CHECK**
PF announces any FMA modification.
PNF calls out :
– "SPEED", when the speed goes below V target – 5, or goes above the speed target + 10
– "SINK RATE", when V/S is greater than – 1000 feet/minute.
– "BANK", when the bank angle goes above 7 degrees.
– "PITCH", when the pitch attitude goes below – 2.5 degrees, or goes above + 10 degrees.
R – "COURSE", when the course deviation is greater than 1/2 dot or 2.5 degrees (VOR),
R or 5 degrees (ADF).
– "_ FT HIGH (LOW)" at altitude checkpoints.

– **ORDER** . . . . **"FLAPS FULL"**

– **FLAPS FULL** . . . . **SELECT**

R · Select FLAPS FULL below VFE.

– **CONFIRM/ANNOUNCE** . . . . **"FLAPS FULL"**
· Check deceleration towards VAPP.
· Check correct TO waypoint on the ND.

MANAGED VERTICAL GUIDANCE	SELECTED VERTICAL OR SELECTED LATERAL AND VERTICAL GUIDANCE
. After the FAF : **– FINAL APP . . . . CHECK** Check FINAL APP green on the FMA. **– GO AROUND ALTITUDE . . . . SET** Set, when below the go-around altitude.	**. At FAF :** **– FPA for final approach . . . . SET** **. After the FAF :** **– GO AROUND ALTITUDE . . . . SET** Set, when below the go-around altitude.
– POSITION/FLIGHT PATH . . . . MONITOR **· For approach in overlay to a conventional radio navaid procedure :** Use radio navaid raw data and altitude to monitor the lateral and vertical navigation. If the navigation is unsatisfactory, revert to selected guidance. In particular, monitor the vertical guidance, using altitude indication versus radio navaid position, and be prepared to revert to NAV-FPA, if the vertical guidance is unsatisfactory. **· For RNAV approach :** Monitor VDEV and FPV (on the PFD) and XTK error (on the ND). Use altitude indication versus distance to the runway to monitor the vertical navigation. If the vertical guidance is unsatisfactory, revert to NAV/FPA or consider the go-around. If the lateral guidance is unsatisfactory, perform a go-around.	**– POSITION/FLIGHT PATH . . MONITOR/ADJUST** **· For approach in overlay to a conventional radio navaid procedure :** Use radio navaid raw data to monitor the lateral navigation. Using altitude indication versus radio navaid position, adjust the FPA, as necessary, to follow the published descent profile, taking into account the minimum altitudes. Do not use the FMGC VDEV on the PFD. If the lateral navigation is unsatisfactory, revert to TRK/FPA. **· For RNAV approach :** Monitor XTK error on ND. Using altitude indication versus distance to the runway, adjust the FPA as necessary to follow the published descent profile, taking into account the minimum altitudes. If the lateral guidance is unsatisfactory, perform a go-around.

– **A/THR . . . . CHECK IN SPEED MODE OR OFF**

– **WING ANTI ICE . . . . OFF**
Switch WING ANTI ICE ON in severe icing conditions only.

– **EXTERIOR LIGHTS . . . . SET**
Set NOSE switch to TAXI, set RWY TURN OFF switch to ON, and set LAND switch to ON.

– **SLIDING TABLE . . . . STOW**

– **LDG MEMO . . . . CHECK NO BLUE LINE**

– **CABIN REPORT . . . . OBTAIN**

– **CABIN CREW . . . . ADVISE**

– **LANDING CHECKLIST . . . . COMPLETE**

– **FLIGHT PARAMETERS . . . . CHECK**
PF announces any FMA modification.
PNF calls out :
- "SPEED", when the speed goes below V target – 5, or goes above the speed target + 10
- "SINK RATE", when V/S is greater than – 1000 feet/minute.
- "BANK", when the bank angle goes above 7 degrees.
- "PITCH", when the pitch attitude goes below – 2.5 degrees, or goes above + 7.5 degrees.
- R "COURSE", when the course deviation is greater than 1/2 dot or 2.5 degrees (VOR),
  R or 5 degrees (ADF).
- "_ FT HIGH (LOW)" at altitude checkpoints.

- **AT ENTERED MDA/MDH + 100 FT :**

  – **MONITOR or ANNOUNCE . . . . "ONE HUNDRED ABOVE"**

- **At ENTERED MDA or MDH**

  – **MONITOR or ANNOUNCE . . . . "MINIMUM"**

  - **If ground references are visible :**

R – **ANNOUNCE . . . . "CONTINUE"**

– **AP . . . . OFF**
Continue, as with a visual approach (Refer to 3.03.20).

  - **If ground references are not visible :**

– **ANNOUNCE . . . . "GO AROUND/FLAPS"**
Begin a go-around.

<u>Note</u> : *1. In managed guidance (FINAL APP mode engaged), when the aircraft reaches MDA (MDH) – 50 or 400 feet (if no MDA/MDH entered), the autopilot automatically disengages.*
2. In selected guidance, if ground references are not visible when the aircraft reaches MDA, the pilot should make an immediate go-around. However, if the distance to the runway is not properly assessed, a step descent approach may be considered and a level-off at MDA may be performed while searching for visual references. If the pilot has no visual reference at MAP, at the latest, he must begin a go-around.

CIRCLING APPROACH

For a circling approach, the flight crew should prepare the flight plan as follows :
Primary flight plan : Introduce the instrument approach
Secondary flight plan : – Copy the ACTIVE F-PLN
– Revise the Landing runway
The aircraft should circle in CONF 3 at F speed.
Upon reaching MDA :
– Push the V/S/FPA knob to level off.
– Search for visual reference.

● **If the flight crew finds no visual reference :**

- **AT MAP : Initiate go-around**

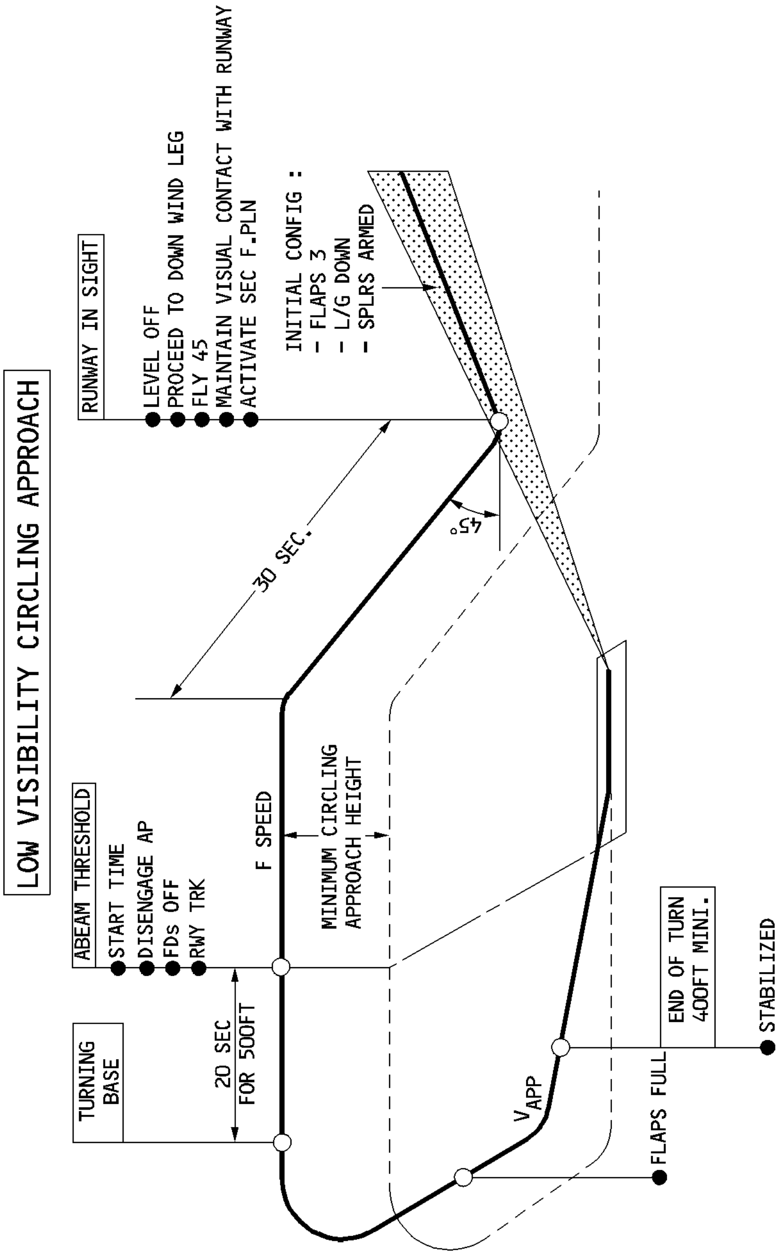
● **If the flight crew finds sufficient visual references :**

- **Select TRK for downwind**
- **Early on downwind : Activate SEC F-PLN**

> CAUTION
> The PNF should activate the SEC F-PLN.
> The PF should maintain visual contact during all the circling.

- **Disengage autopilot before reaching the base leg.**

R – **Select both FDs OFF.**



NFC5-03-0319-013-A001AA

OBJECTIVE

Perform the approach on a nominal 3 degree glideslope using visual references. Approach to be stabilized by 500 feet AGL on the correct approach path, in the landing configuration, at VAPP.
Method :
- The autopilot is not used.
- Both FDs are off.
- FPV use is recommended.
- A/THR use is recommended with managed speed.

R Bear in mind the possible risk of optical illusions due to hindered night vision.

Note : If the forecasted tailwind at landing is greater than 10 knots, decelerated approach is not allowed, and the speed should be stabilized around VREF + 5 knots in final.

VISUAL CIRCUIT

INITIAL/INTERMEDIATE APPROACH

The flight plan selected on the MCDU should include the selection of the landing runway. The downwind leg may also be part of the flight plan. This may be a useful indication of the aircraft position in the circuit on the ND.
However, visual references must be used.
Therefore, at the beginning of the downwind leg :

- **Manually ACTIVATE APPR phase.**

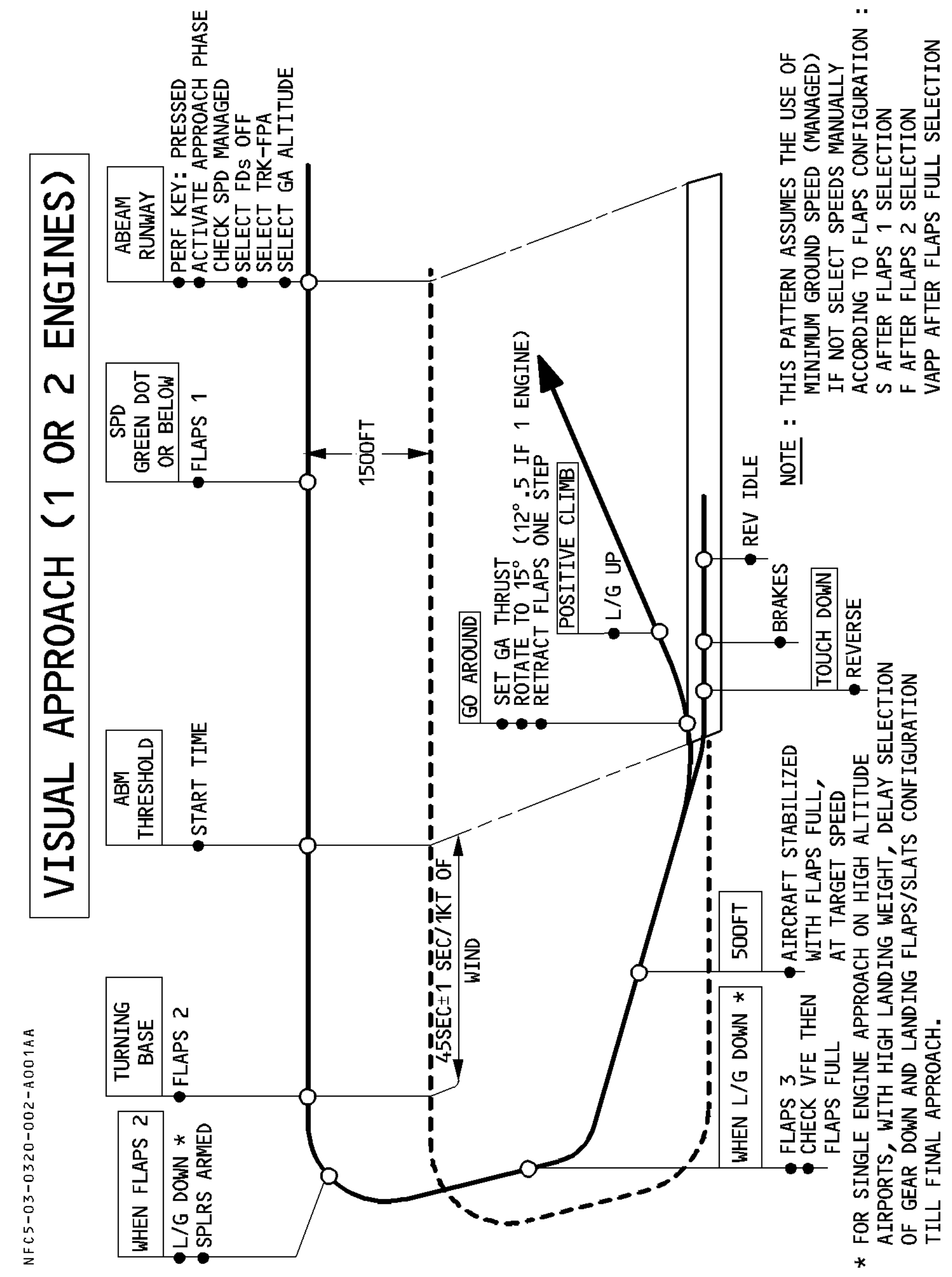
- **Select FDs to OFF. Select TRK-FPA to have FPV displayed.**

- **Check A/THR active.**
  Extend the downwind leg to 45 seconds (± wind correction). Turn into base leg with a maximum of 30° of bank. Descent with approximate FPA, in FLAPS 2, at F speed.

FINAL APPROACH

- The speed trend arrow and FPV help the flight crew make timely and correct thrust settings (if in manual thrust), and approach path corrections. Avoid descending through the correct approach path with idle thrust. (Late recognition of this situation without a prompt thrust increase may lead to considerable speed decay and altitude loss).
- Have the aircraft stabilized by 500 feet AGL, on the correct approach path at VAPP (or ground speed mini) with the appropriate thrust applied. If not stabilized, a go-around should be considered.
- Avoid any tendency to “duck under” in the late stages of the approach.
- Avoid destabilizing the approach in the last 100 feet, in order to have the best chance of performing a good touchdown at the desired position.

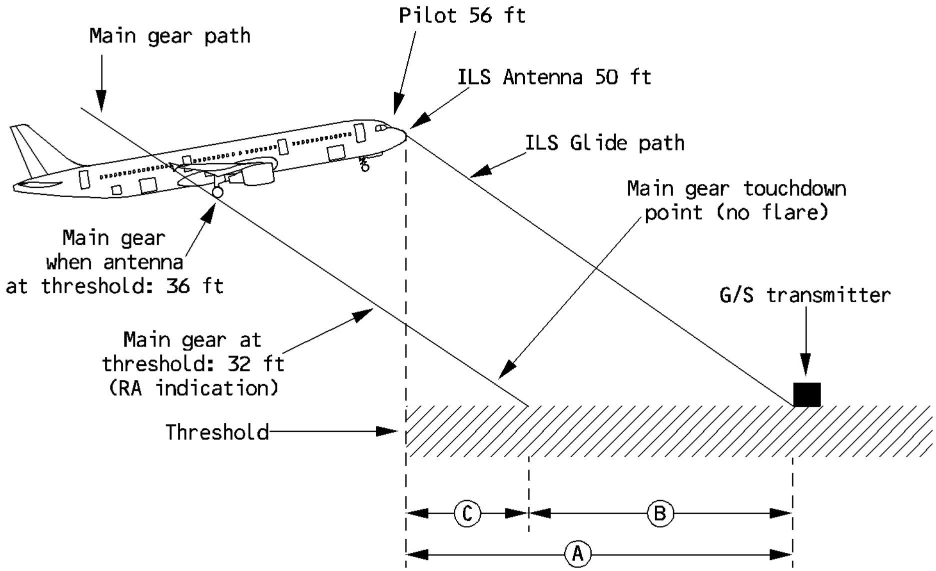
R


VISUAL APPROACH (1 OR 2 ENGINES)
ABEAM RUNWAY
PERF KEY: PRESSED
ACTIVATE APPROACH PHASE
CHECK SPD MANAGED
SELECT FDs OFF
SELECT TRK-FPA
SELECT GA ALTITUDE
SPD GREEN DOT OR BELOW
FLAPS 1
1500FT
ABM THRESHOLD
START TIME
TURNING BASE
FLAPS 2
45SEC±1 SEC/1KT OF WIND
WHEN FLAPS 2
L/G DOWN *
SPLRS ARMED
GO AROUND
SET GA THRUST
ROTATE TO 15° (12°.5 IF 1 ENGINE)
RETRACT FLAPS ONE STEP
POSITIVE CLIMB
L/G UP
REV IDLE
BRAKES
TOUCH DOWN
REVERSE
500FT
AIRCRAFT STABILIZED WITH FLAPS FULL, AT TARGET SPEED
WHEN L/G DOWN *
FLAPS 3
CHECK VFE THEN
FLAPS FULL
NOTE : THIS PATTERN ASSUMES THE USE OF MINIMUM GROUND SPEED (MANAGED)
IF NOT SELECT SPEEDS MANUALLY ACCORDING TO FLAPS CONFIGURATION :
S AFTER FLAPS 1 SELECTION
F AFTER FLAPS 2 SELECTION
VAPP AFTER FLAPS FULL SELECTION
* FOR SINGLE ENGINE APPROACH ON HIGH ALTITUDE AIRPORTS, WITH HIGH LANDING WEIGHT, DELAY SELECTION OF GEAR DOWN AND LANDING FLAPS/SLATS CONFIGURATION TILL FINAL APPROACH.
NFC5-03-0320-002-A001AA

PRECISION APPROACH

R (Refer to FCOM 4.05.70).

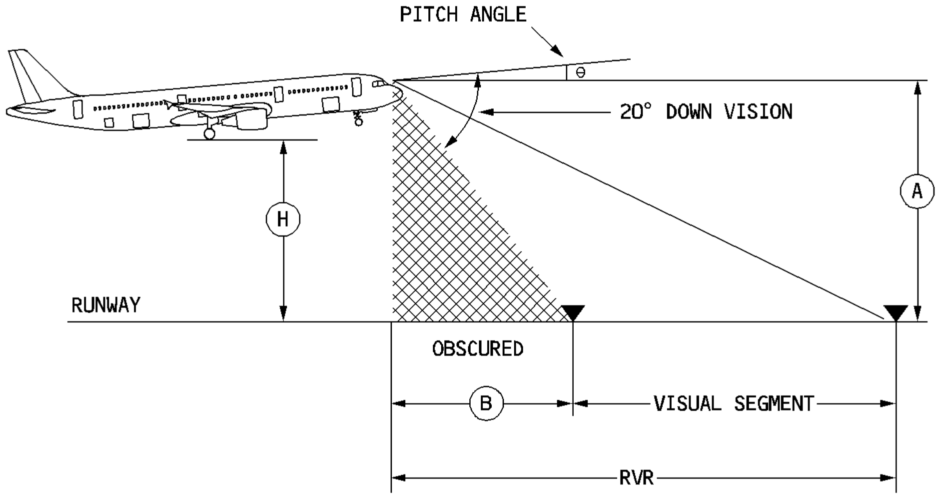
ILS FINAL APPROACH AND LANDING GEOMETRY



CONDITIONS :	PITCH ANGLE	GLIDE PATH (°)	A	B	TOUCHDOWN POINT C
- FLAPS FULL - ILS ANTENNA AT 50 ft AT THRESHOLD	3°5	2°5	349 m 1145 ft	119 m 389 ft	230 m 756 ft
- NO FLARE	3°9	3°	291 m 954 ft	105 m 345 ft	186 m 609 ft

NFC5-03-0322-001-A020AA

MINIMUM VISUAL GROUND SEGMENTS (Flare phase)

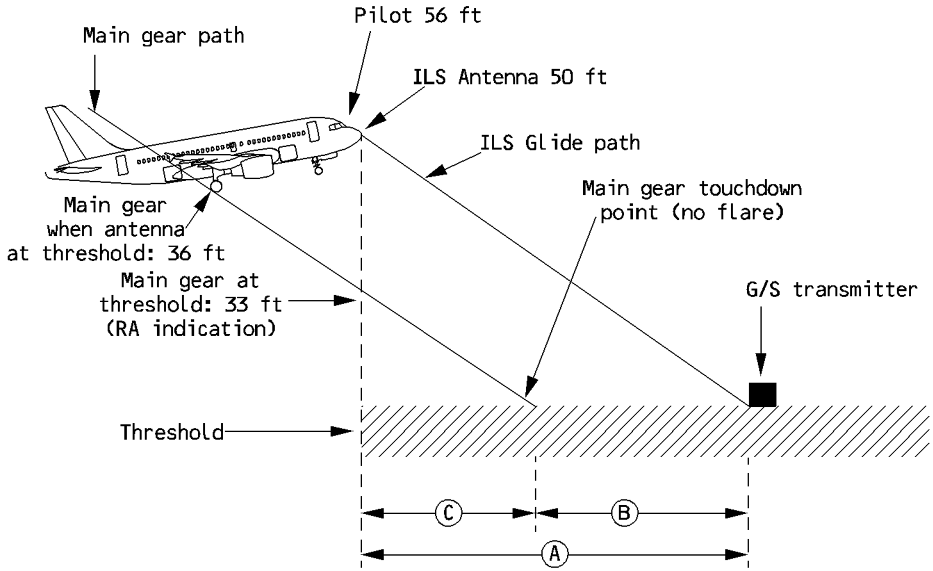


	CAT III		CAT II
H	15 ft (θ = 4.5°)	50 ft (θ = 4.1)	100 ft (θ = 4.1°)
VISUAL SEGMENT	60 m (197 ft)		120 m (394 ft)
A	36 ft	71 ft	121 ft
OBSCURED B	40 m (132 ft)	76 m (249 ft)	130 m (425 ft)
MINIMUM RVR	100 m (329 ft)	136 m (446 ft)	250 m (819 ft)

NFC5-03-0322-002-A020AA

Note : This drawing shows that, for a CAT III landing (60 meters minimum visual segment), the minimum RVR is 100 meters at 15 feet.

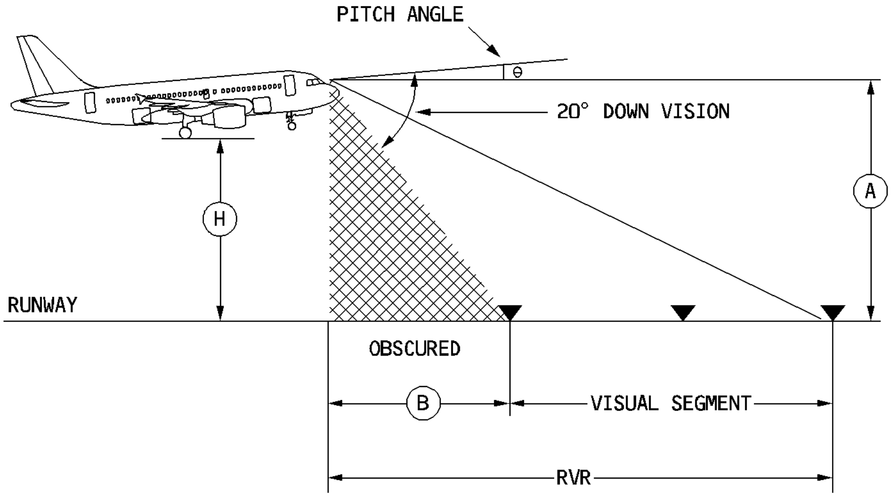
ILS FINAL APPROACH AND LANDING GEOMETRY



CONDITIONS :	PITCH ANGLE	GLIDE PATH (°)	A	B	TOUCHDOWN POINT C
- FLAPS FULL - ILS ANTENNA AT 50 ft AT THRESHOLD	4°8	2°5	349 m 1145 ft	114 m 375 ft	235 m 771 ft
- NO FLARE	5°3	3°	291 m 954 ft	100 m 329 ft	191 m 625 ft

NFC5-03-0322-001-A035AA

MINIMUM VISUAL GROUND SEGMENTS (Flare phase)



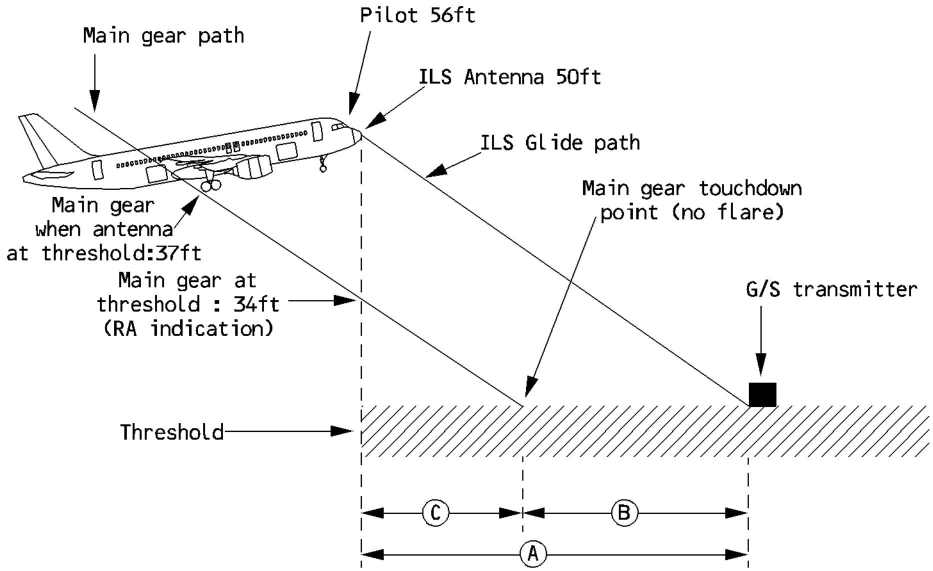
	CAT III		CAT II
H	15 ft (θ = 4.9°)	50 ft (θ = 5.3°)	100 ft (θ = 5.3°)
VISUAL SEGMENT	60 m (197 ft)		120 m (394 ft)
A	35 ft	71 ft	121 ft
OBSCURED B	40 m (131 ft)	82 m (269 ft)	140 m (460 ft)
MINIMUM RVR	100 m (328 ft)	142 m (466 ft)	260 m (854 ft)

NFC5-03-0322-002-A035AA

Note : This drawing shows that, for a CAT III landing (60 meters minimum visual segment), the minimum RVR is 100 meters at 15 feet.

ILS FINAL APPROACH AND LANDING GEOMETRY

R

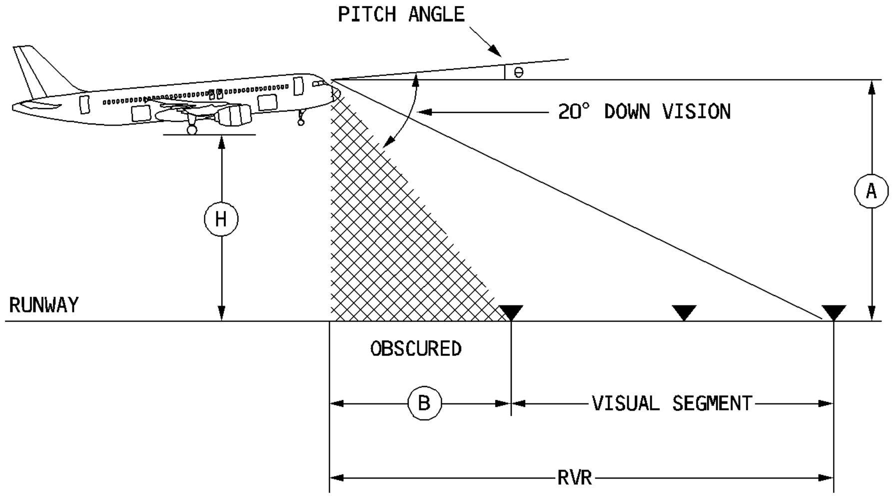


CONDITIONS :	GLIDE PATH (°)	(A)	(B)	TOUCHDOWN POINT (C)
- FLAPS FULL - ILS ANTENNA AT 50 ft AT THRESHOLD	2°5	348 m 1145 ft	112 m 366 ft	236 m 779 ft
- NO FLARE - PITCH ANGLE : 4°	3°	291 m 954 ft	93 m 306 ft	198 m 648 ft

NFC5-03-0322-001-A040AA

MINIMUM VISUAL GROUND SEGMENTS (Flare phase)

R



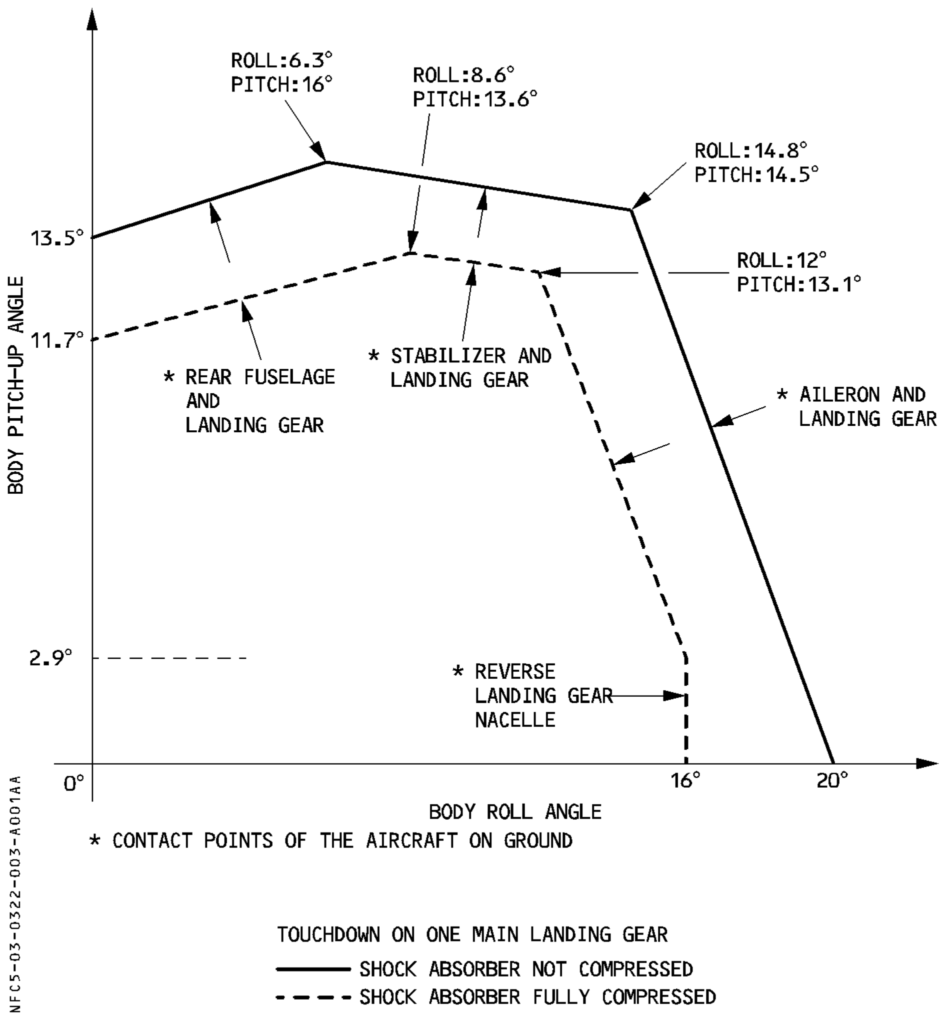
	CAT III		CAT II
H	15 ft (θ = 5.4°)	50 ft (θ = 4.7°)	100 ft (θ = 4.7°)
VISUAL SEGMENT	60 m (197 ft)		120 m (394 ft)
A	36 ft	71 ft	121 ft
OBSCURED B	43 m (140 ft)	79 m (259 ft)	134 m (442 ft)
MINIMUM RVR	103 m (337 ft)	139 m (456 ft)	254 m (836 ft)

NFC5-03-0322-002-A040AA

R *Note : This drawing shows that, for a CAT III landing (60 meters minimum visual segment),*
R *the minimum RVR is 103 meters at 15 feet.*

GROUND CLEARANCE DIAGRAM

R



LANDING

The cockpit cut-off angle is 20 degrees.

● **From stabilized approach conditions, the flare height is about 30 feet :**

– **FLARE . . . . PERFORM**

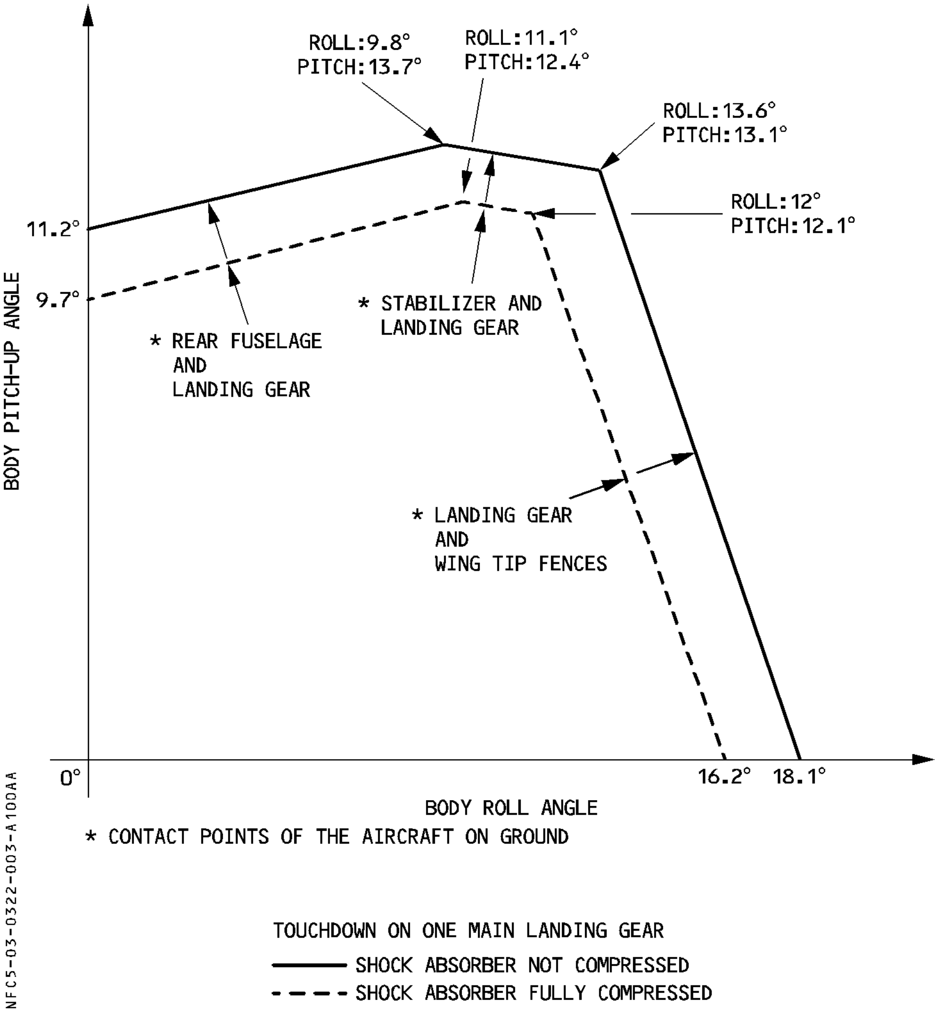
– **ATTITUDE . . . . MONITOR**
The PNF should monitor the attitude, and call out :
– "PITCH, PITCH", if the pitch angle reaches 10 degrees.
– "BANK, BANK", if the bank angle reaches 7 degrees.

– **THRUST levers . . . . IDLE**
In manual landing conditions, the "RETARD" callout is generated at 20 feet RA, as a
R reminder.

Ground clearance
· Avoid flaring high.
· A tailstrike occurs, if the pitch attitude exceeds 13.5 degrees (11 degrees with the landing gear compressed).
A wingtip or engine scrape occurs, if the roll angle exceeds 20 degrees (16 degrees with the landing gear compressed).
· Be aware of the pitch-up tendency, with ground spoiler extension.

GROUND CLEARANCE DIAGRAM

R



LANDING

The cockpit cut-off angle is 20 degrees.

● **From stabilized approach conditions, the flare height is about 30 feet :**

– **FLARE . . . . PERFORM**

– **ATTITUDE . . . . MONITOR**
The PNF should monitor the attitude, and call out :
– “PITCH, PITCH”, if the pitch angle reaches 7.5 degrees.
– “BANK, BANK”, if the bank angle reaches 7 degrees.

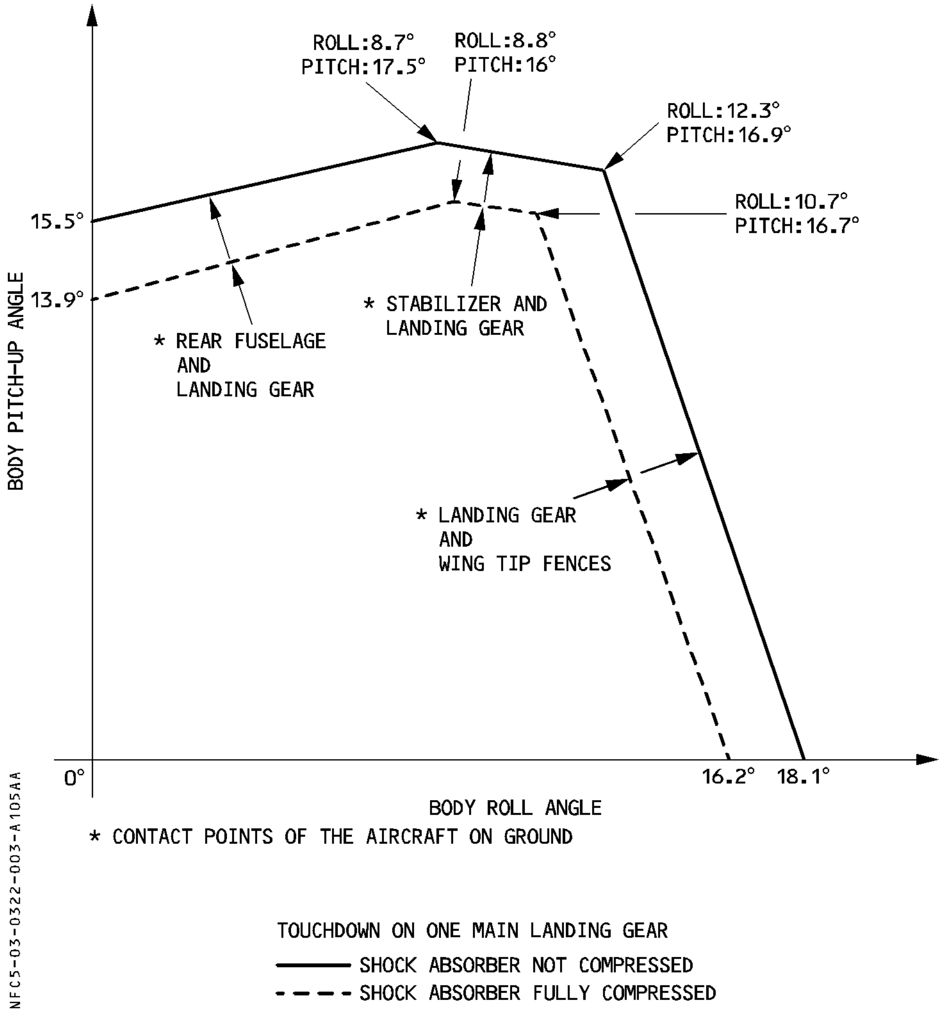
– **THRUST levers . . . . IDLE**
In manual landing conditions, the “RETARD” callout is generated at 20 feet RA, as a
R reminder.

Ground clearance

· Avoid flaring high.
· A tailstrike occurs, if the pitch attitude exceeds 11 degrees (9.5 degrees with the landing gear compressed).
A wingtip or engine scrape occurs, if the roll angle exceeds 18 degrees (16 degrees with the landing gear compressed).
· Be aware of the pitch-up tendency, with ground spoiler extension.

GROUND CLEARANCE DIAGRAM

R



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  The PNF should monitor the attitude, and call out :
  – "PITCH, PITCH", if the pitch angle reaches 10 degrees.
  – "BANK, BANK", if the bank angle reaches 7 degrees.

  – **THRUST levers . . . . IDLE**
  In manual landing conditions, the "RETARD" callout is generated at 20 feet RA, as a
R reminder.

Ground clearance
· Avoid flaring high.
· A tailstrike occurs, if the pitch attitude exceeds 15.5 degrees (13.5 degrees with the landing gear compressed).
A wingtip or engine scrape occurs, if the roll angle exceeds 18 degrees (16 degrees with the landing gear compressed).
· Be aware of the pitch-up tendency, with ground spoiler extension.

● **At touchdown :**

– **REV . . . . MAX**
· Select MAX REV immediately after the main landing gear touches down.
If the airport regulations restrict the use of reversers, select and maintain reverse idle until taxi speed is reached.
A slight pitch-up, easily controlled by the flight crew, may appear when the thrust reversers are deployed before the nose landing gear touches down.
R Lower the nosewheel without undue delay.
R · The PNF continues to monitor the attitude.
· In case of engine failure, the use of the remaining reverser is recommended.
· Braking may begin before nosewheel is down, if required for performance reasons. However, when comfort is the priority, braking should be delayed until the nosewheel has touched down.
During roll out, sidestick inputs (either lateral or longitudinal) should be avoided.
If directional control problems are encountered, reduce thrust to reverse idle until directional control is satisfactory.
· After reverse thrust is initiated, a full stop landing must be performed.

– **GROUND SPOILERS . . . . CHECK**
Check that the ECAM WHEEL page shows the ground spoilers fully deployed after touchdown. Announce “Ground spoilers”, then “Reverse green”.

– **DIRECTIONAL CONTROL . . . . ENSURE**
· Use rudder pedals for directional control.
· Do not use the nosewheel steering control handle before reaching taxi speed.

– **BRAKES . . . . AS RQRD**
· Monitor the autobrake, if it is on. When required, brake with the pedals.
· Although the green hydraulic system supplies the braking system, if pedals are pressed quickly a brief brake pressure indication appears on the BRAKE PRESS indicator.

● **At 70 knots :**

– **THRUST levers . . . . REV IDLE**
70 knots is the minimum recommended speed, with full reverse thrust.

CAUTION
Avoid using high levels of reverse thrust at low airspeed, because gases re-entering the compressor can cause engine stalls, that may result in excessive EGT.

- **At taxi speed :**

  – **THRUST levers . . . . FWD IDLE**
  · Deselect the REV position upon reaching taxi speed and before leaving the runway. On snow-covered grounds, reversers should be stowed when the aircraft speed reaches 25 knots. When deselecting REV, be careful not to apply forward thrust by moving the thrust levers beyond the FWD IDLE position.

  CAUTION

  On taxiways, the use of reversers, even when restricted to idle thrust, may have the following effects :
  – The engines may ingest fine sand and debris that may be detrimental to both the engines and the airframe systems.
  – On snow covered areas, snow will recirculate into the air inlet, which may result in engine flame-out or roll back.Except in an emergency, do not use reverse thrust to control aircraft speed while taxiing.

- **Before 20 knots :**

  – **AUTO BRK . . . . DISENGAGE**
  Disengage the autobrake to avoid some brake jerks at low speed.

GO AROUND

Apply the following three actions simultaneously :

– **THRUST LEVERS . . . . TOGA**

– **ANNOUNCE . . . . "GO AROUND – FLAPS"**

– **ROTATION . . . . PERFORM**
  · Rotate the aircraft to get a positive rate of climb, and establish the required pitch attitude, as directed by the SRS pitch command bar.
  · Check and announce the FMA : MAN TOGA, SRS, GA TRK.

– **FLAPS . . . . RETRACT ONE STEP**
  Announce "FLAPS..." when indicated.

– **ANNOUNCE . . . . "POSITIVE CLIMB"**

– **ORDER . . . . "GEAR UP"**

– **L/G UP . . . . SELECT**

– **CONFIRM/ANNOUNCE . . . . "GEAR UP–FLAPS"**

  <u>Note</u> : Consider retarding to CL detent, if TOGA thrust is not required.

– **NAV or HDG mode . . . . SELECT**
  Reselect NAV or HDG, as required (minimum height 100 feet).

  <u>Note</u> : Go-around may be flown with both autopilots engaged. Whenever any other mode engages, AP 2 disengages.

● **At go-around thrust reduction altitude (LVR CLB flashing on FMA) :**

R – **THRUST LEVERS . . . . CL**

- **At go-around acceleration altitude :**

  – **Monitor that the target speed increases to green dot.**

  - **If the target speed does not increase to green dot :**

    – **FCU ALT . . . . CHECK and PULL**

  – **Retract flaps on schedule.**

  Note : Consider the next step :
  – Engage NAV mode, to follow the published missed approach procedure, or
  – Prepare for a second approach by selecting the ACTIVATE APP PHASE, and CONFIRM on the PERF page.

GO-AROUND FROM AN INTERMEDIATE APPROACH ALTITUDE

To interrupt the approach, or to perform a go-around, from an intermediate altitude in the approach, and if TOGA thrust is not required, proceed as follows :

– **SET the thrust levers to TOGA detent, then retard the thrust levers as required.** This enables to engage the GO-AROUND phase, with associated AP/FD modes.

– **SELECT the applicable AP/FD and A/THR modes on the FCU.**

Note : If the thrust levers are not set briefly to TOGA detent, the FMS does not engage the GO AROUND phase, and flying over, or close to the airport (less than 7 NM) will sequence the Destination waypoint in the F-PLN.

INTENTIONALLY LEFT BLANK

INTENTIONALLY LEFT BLANK

AFTER LANDING

– **LAND lights . . . . RETRACT**
Retract landing lights, unless they are needed.
Set the STROBE lights to AUTO, when leaving the runway.

– **GROUND SPOILERS . . . . DISARM**

R – **RADAR . . . . OFF/STBY**

R – **PREDICTIVE WINDSHEAR SYSTEM ◁ . . . . OFF**
Switching the radar and predictive windshear system OFF after landing avoids risk of radiating persons at the gate area.

R – **ENG MODE selector . . . . NORM**

R – **FLAPS . . . . RETRACT**
· Set the FLAP lever to position 0.
· If the approach was made in icing conditions, or if the runway was contaminated with slush or snow, do not retract the flaps and slats until after engine shutdown and after the ground crew has confirmed that flaps and slats are clear of obstructing ice.
· On ground, hot weather conditions may cause overheating to be detected around the bleed ducts in the wings, resulting in "AIR L(R) WING LEAK" warnings. Such warnings may be avoided during transit by keeping the slats in Configuration 1 when the OAT is above 30°C.

R – **TCAS . . . . SET on standby**

R – **ATC . . . . AS RQRD**
R Depending on local regulation, ATC transponder may be operated in mode S (Refer to
R FCOM 1.34.50).

R – **APU . . . . START**
APU START may be delayed until just prior to engine shutdown.

R – **ANTI ICE . . . . AS RQRD**
If engine anti-ice is used, take care to control taxi speed, especially on wet or slippery surfaces. (N1 ground idle is increased).

– **BRAKE TEMPERATURE . . . . CHECK**
· Check brake temperature on the ECAM WHEEL page for discrepancies and high temperature.
· If brake fans are installed (◁) :
R Brake fans selection should be delayed for a minimum of about 5 minutes, or done just
R before stopping at the gate (whichever occurs first), to allow thermal equalization and stabilization and thus avoid oxidation of brake surface hot spots.
However, when turnaround times are short, or brake temperatures are likely to exceed 500°C, use the brake fans, disregarding possible oxidation phenomenon.
· Refer to 3.04.32 for the brake temperature limitations requiring maintenance actions.

– **AFTER LANDING CHECKLIST . . . . COMPLETE**
Ensure that the after-landing checks are completed, once the aircraft has cleared the runway.

PARKING

Prior to performing this check, consider “GROUND OPERATIONS IN HEAVY RAIN” (Refer to 3.04.30).

– **PARKING BRAKE ACCU PRESS . . . . CHECK**
The ACCU PRESS indication must be in the green band. In case of low accumulator pressure, chocks are required before engine 1 shutdown.

– **PARKING BRK . . . . ON**
R · When one brake temperature is above 500°C (or 350°C with brake fans ON ◁), avoid applying the parking brake, unless operationally necessary.
R · Check the brake pressure on the Triple Indicator for the left and right brakes.

CAUTION
R If the aircraft starts to move with the parking brake ON : Immediately release the
R PARKING BRK handle, to restore braking with the pedals.

– **ANTI-ICE . . . . OFF**

– **APU BLEED . . . . ON**
Select APU bleed ON, just before engine shutdown, to prevent engine exhaust fumes from entering the air conditioning.

– **ENG MASTER switch 1 and 2 . . . . OFF**

CAUTION
If JP4 fuel is used at ambient temperatures higher than 10°C, dry motor the engines for 2 minutes after engine shutdown. This dry motor period should start approximately 90 seconds after the master lever is selected OFF.

· Following high thrust operation, such as maximum reverse thrust during landing : Operate the engine at idle for 3 minutes prior to shutdown, to thermally stabilize the engine’s hot section. This 3-minute period includes operating time at idle, such as taxiing. If operational requirements dictate, the engine may be shut down after a one-minute cooling period.
· If APU is not available, set EXT PWR to ON, then set ENG MASTERS to OFF.
· Check that engine parameters decrease.

<u>Note</u> : If the engine fails to shut down, switch the corresponding master lever to ON, then to OFF. If the engine still fails to shut down, press the corresponding ENG FIRE pushbutton (The engine will shut down after approx. 1 minute, during which time it uses the fuel between the LP valve and the nozzles).

· The DOOR page is displayed on the lower ECAM display.

– **GROUND CONTACT . . . . ESTABLISH**
· Establish ground communication.
· Check chocks in place.

– **SLIDE DISARMED . . . . CHECK**
Check slides disarmed on the ECAM DOOR page. Warn the cabin crew, if any slide is not disarmed.

– **EXTERIOR LIGHTS . . . . AS RQRD**
Switch off the BEACON switch, when all engines have obviously spooled down.

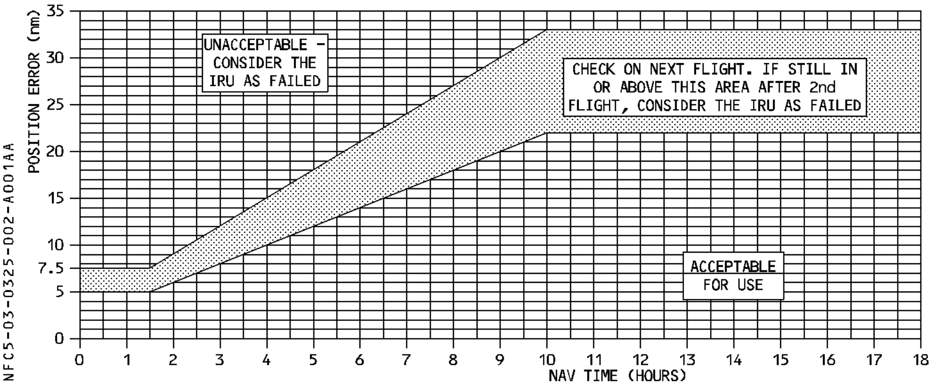
– **SEAT BELTS . . . . OFF**

– **ELAPSED TIME (◁) . . . . STOP**

– **FUEL PUMPS . . . . OFF**

R – **ATC . . . . SET on standby**

– **IRS PERFORMANCE . . . . CHECK**
· Drift check
– Call up the POSITION MONITOR page. Check that the drift does not exceed the following:



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  Check slides disarmed on the ECAM DOOR page. Warn the cabin crew, if any slide is not disarmed.

- **EXTERIOR LIGHTS . . . . AS RQRD**
  Switch off the BEACON switch, when all engines have obviously spooled down.

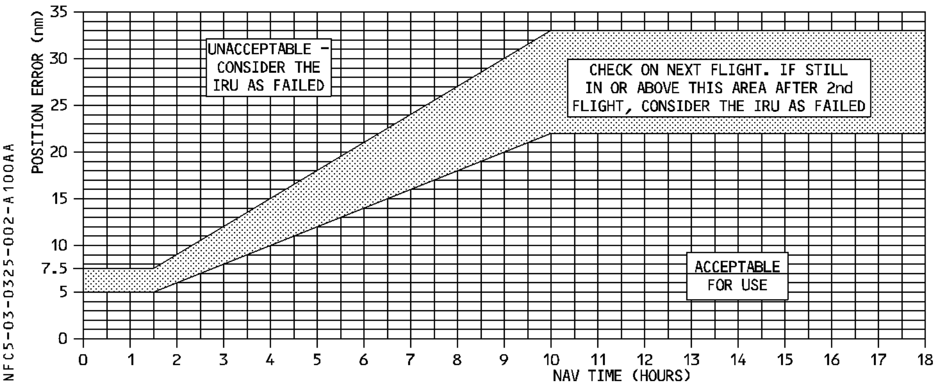
- **SEAT BELTS . . . . OFF**

- **ELAPSED TIME (⧏) . . . . STOP**

- **FUEL PUMPS . . . . OFF**
  Switch off the wing tank pumps and the center tank transfer valves.

R - **ATC . . . . SET on standby**

- **IRS PERFORMANCE . . . . CHECK**
  · Drift check
  - Call up the POSITION MONITOR page. Check that the drift does not exceed the following:



· Residual ground speed check :
  – CAPT and F/O NDs display the IRS 1 and 2 residual ground speeds respectively. The IRS 3 residual ground speed can be read on the CAPT ND by switching the ATT HDG selector to CAPT ON 3.
    · If ground speed ≥ 15 knots : Report (The IR part of the ADIRU must be considered as failed, if the excessive deviation occurs after two consecutive flights).
    · If ground speed ≥ 21 knots : Report (The IR part of the ADIRU must be considered as failed).

    Note : *On aircraft equipped with LITTON IRS, the ground speed check must be performed within the 2 minutes following aircraft stop. (Ground speed reset to 0 after 2 minutes).*

– **FUEL QUANTITY . . . . CHECK**
Check that the sum of the fuel on board and the fuel used is consistent with the fuel on board at departure. If an unusual discrepancy is found, maintenance action is due.

– **STATUS (ECAM Control panel) . . . . PRESS**
  – Check the STATUS page.
    If maintenance status messages are displayed :
    · At transit : Disregard, unless AIR BLEED maintenance status.
    · At main base, or at an airport where repairs can easily be made (at the end of the last flight of the day) : Report for maintenance analysis.

– **BRAKE FAN (⊲) . . . . OFF**
Switch off, when not required.

– **PARKING BRAKE . . . . AS RQRD**
  · The parking brake should be released after chocks are in place, if one brake temperature is above 300°C (or above 150°C with brake fans ON ⊲).
    Releasing the parking brake prevents the critical structures from being exposed to high temperature levels for an extended time. However, if operational conditions dictate (e.g. slippery tarmac), the parking brake may remain applied.
  · When parking with a flat tire on the nose gear, keep the parking brake on, to avoid aircraft yawing at parking brake release.

– **DUs . . . . DIM**
Dim EFIS, ECAM and MCDU display units.

– **PARKING CHECKLIST . . . . COMPLETE**

– **REPORT SEVERE ICING CONDITIONS**
Report severe icing conditions in the log book, requiring inspection of the fan accoustic panels of the engines during the walkaround.

SECURING THE AIRCRAFT

Prior to performing this check, COLD WEATHER should be taken into account (Refer to 3.04.91).

– **PARKING BRAKE . . . . CHECK ON**
To reduce hydraulic leak rate in the brake accumulator, keep the parking brake on.

– **OXYGEN CREW SUPPLY . . . . OFF**

– **ADIRS (1 + 2 + 3) . . . . OFF**
ADIRS should not be switched off during transits at latitudes above 70°N, to avoid their requiring excessive alignment time.
After having switched off the ADIRS, wait at least 10 seconds before switching off the electrical supply to ensure that the ADIRS memorize the latest data.

– **EXTERIOR LIGHTS . . . . OFF**

– **MAINT BUS switch . . . . AS RQRD**
Should electrical power be required for the crew or servicing personnel, consider setting the overhead MAINT BUS switch (in the forward cabin) to the ON position, prior to setting aircraft power to off.

– **APU BLEED . . . . OFF**

– **APU MASTER switch . . . . OFF**
Switch off the APU after the passengers have disembarked.

– **EMER EXIT LT . . . . OFF**

– **NO SMOKING . . . . OFF**

– **EXT PWR . . . . AS RQRD**

– **BAT 1 and 2 . . . . OFF**
Wait until the APU flap is fully closed (about 2 minutes after the APU AVAIL light goes out), before switching off the batteries. Switching the batteries off before the APU flap is closed may cause smoke in the cabin during the next flight.
If the batteries are off while the APU is running, APU fire extinguishing is not available.

– **SECURING THE AIRCRAFT CHECKLIST . . . . COMPLETE**

SECURING THE AIRCRAFT

Prior to performing this check consideration should be given to COLD WEATHER (Refer to 3.04.91).

- **PARKING BRAKE . . . . CHECK ON**
  Keep the parking brake on to reduce hydraulic leak rate in the brake accumulator.

- **OXYGEN CREW SUPPLY . . . . OFF**

- **ADIRS (1 + 2 + 3) . . . . OFF**
  ADIRS should not be switched off during transits at latitudes above 82°N, in order to avoid their requiring excessive alignment time.
  After having switched off the ADIRS, wait at least 10 seconds before switching off the electrical supply to ensure that the ADIRS memorize the last data.

- **EXTERIOR LIGHTS . . . . OFF**

- **MAINT BUS switch . . . . AS RQRD**
  Should electrical power be required for crew or servicing personnel consider selecting the MAINT BUS switch (overhead in the forward cabin) to the ON position prior to selecting aircraft power off.

- **APU BLEED . . . . OFF**

- **APU MASTER switch . . . . OFF**
  Switch off the APU after the passengers have disembarked.

- **EMER EXIT LT . . . . OFF**

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- **SECURING THE AIRCRAFT CHECKLIST . . . . COMPLETE**

COMMUNICATIONS AND STANDARD TERMS

Standard phraseology is essential to ensure effective crew communication. The
R phraseology should be concise and exact. The following Chapter lists the callouts that should be used as standard. They supplement the callouts identified in the SOP.
These standard Airbus callouts are also designed to promote situational awareness, and to ensure crew understanding of systems and their use in line operation.

CHECKLIST CALLOUTS

- "CHECK" : A command for the other pilot to check an item.
- "CHECKED" : A response that an item has been checked.
R – "CROSSCHECKED" : A callout verifying information from both pilot stations.

If a checklist needs to be interrupted, announce : "HOLD CHECKLIST AT ___" and "RESUME CHECKLIST AT ___" for the continuation.
Upon completion of a checklist announce : "__CHECKLIST COMPLETE".

ACTIONS COMMANDED BY PF

The following commands do not necessarily initiate a guidance mode change, eg : selected to managed/managed to selected. The intent is to ensure clear, consistent, standard communication between crewmembers.
R All actions performed on the FCU and MCDU must be checked on the PFD and ND (eg :
R "FL 350 blue", "FL 200 magenta). Ensure that the correct FCU knob is used, then verify
R indications on the PFD/ND.

SET

The "SET" command means using an FCU knob to set a value, but not to change a mode.
SET is accomplished by only rotating the appropriate selection knob. Example :
- "SET GO AROUND ALTITUDE__"
- "SET QNH __"
- "SET FL __"
- "SET HDG __"

MANAGE/PULL

The "MANAGE" command means pushing an FCU knob to engage, or arm, a managed
R mode or target.

R The "PULL" command means pulling an FCU knob to engage a selected mode or target.
Example :

R – "PULL HDG 090"	(Heading knob is pulled and turned).
– "MANAGE NAV"	(Heading knob is pushed).
– "FL 190 PULL"	(Altitude knob is turned and pulled).
– "FL 190 MANAGE"	(Altitude knob is turned and pushed).
R – "PULL SPEED 250 KNOTS"	(Speed knob is pulled and turned).
– "MANAGE SPEED"	(Speed knob is pushed).

Note : If the value was previously set, there is no requirement to repeat the figure.
R *Simply call e.g. PULL HDG : PULL SPEED : FL PULL*

The VS/FPA selector knob has no managed function. The standard callouts for the use of this knob are as follows :
V/S Plus (or Minus) 700 PULL or
FPA Minus 3° PULL (V/S (FPA) knob is turned and pulled)
PUSH TO LEVEL OFF (V/S (FPA) knob is pushed)

ARM

The "ARM __" command means arming a system by pushing the specified FCU button.
e.g. : "ARM APPROACH"
e.g. : "ARM LOC."

ON/OFF

The simple ON or OFF command is used for the autopilot, flight directors, autothrust and the bird (flight path vector).
R e.g. : BIRD ON (The HDG-V/S/TRK-FPA pushbutton is pushed.)

FMA

Unless listed otherwise (eg CAT II & III task sharing), all FMA changes will be normally
R called out by the PF and checked by the PNF :
R – All armed modes are announced by calling out their associated color (blue, magenta)
R e.g. : "G/S blue", "LOC blue".
R – All active modes are announced without calling out the color (green, white)
R e.g. : "NAV", "ALT".

ALTITUDE

R The PNF calls out "one thousand to go" when passing 1000 feet before the cleared altitude
R or FL, and the PF calls out "checked".

FLAPS OR GEAR CONFIGURATION

FLAPS' CALLOUTS

FLAPS' CONFIGURATION	CALLOUT
1	"FLAPS ONE"
1 + F	"FLAPS ONE"
0	"FLAPS ZERO"

The reply will be given when selecting the new flap position.
e.g. :

	CALLOUT	REMARK
PF	"FLAPS ONE"	
PNF	"SPEED CHECKED" "FLAPS ONE"	PNF checks the speed : – Above the S or F speed and accelerating (Takeoff) – Below Vfe next and decelerating (Approach) PNF selects the flaps lever position and replies after checking the blue number on the ECAM flaps indicator to confirm the correct selection has been made.

GEAR CALLOUTS

	CALLOUT	REMARK
PF	"GEAR UP (DOWN)"	
PNF	"GEAR UP (DOWN)"	The PNF selects the gear lever position and replies after checking the red lights on the landing gear indicator to confirm gear operation.

FLIGHT PARAMETERS

PNF will make callouts for the following conditions during final approach. Attitude callouts also to be made through to landing.
- "SPEED" when speed becomes less than Vapp – 5 or more than speed target + 10.
- "SINK RATE" when V/S is greater than – 1000 ft/min.
- "BANK" when bank angle becomes greater than 7°.
- "PITCH" when pitch attitude becomes lower than – 2.5° or higher than + 10°.
- 'LOC" or "GLIDE" when either localizer or glide slope deviation is :

R · 1/4 dot LOC ; 1 dot GS

R – "COURSE" when greater than 1/2 dot or 2.5 degrees (VOR) or 5 degrees (ADF).
- "__ FT HIGH (LOW)" at altitude checks points.

PF/PNF DUTIES TRANSFER

To tranfer control, flight crewmembers must use the following callouts :

R To give control : The pilot calls out "YOU HAVE CONTROL". The other pilot accepts this transfer by calling out "I HAVE CONTROL", before assuming PF duties.

R To take control : The pilot calls out "I HAVE CONTROL". The other pilot accepts this transfer by calling out "YOU HAVE CONTROL", before assuming PNF duties.

ABNORMAL AND EMERGENCY CALL OUTS

ECAM Procedures

1. "ECAM ACTION" is commanded by PF when required.
2. "CLEAR __ (title of the system) ?" is asked by the PNF for confirmation by the PF, that all actions have been taken/reviewed on the present ECAM WARNING/CAUTION or SYSTEM PAGE. e.g. : CLEAR HYDRAULIC ?
3. R "CLEAR __ (title of the system)" is the command by the PF that the action and review is confirmed. For status page ; REMOVE STATUS will be used.
4. "ECAM ACTIONS COMPLETE" is the announcement by the PNF that all APPLICABLE ACTIONS have been completed.
5. Should the PF require an action from the PNF during ECAM procedures, the order "STOP ECAM" will be used. When ready to resume the ECAM the order "CONTINUE ECAM" will be used.

R MEMORY ITEMS

R The aim of such callouts is to callout the appropriate procedure by calling out, in most cases, the title of the procedure. This will allow the crew to be aware of the situation and be prepared to properly react (crew coordination, task sharing and communication).

R GPWS
R As soon as avoidance manoeuver is envisaged.
R "PULL UP TOGA"
R WINDSHEAR
R "WINDSHEAR TOGA"
R UNRELIABLE SPEED INDICATION
R "UNRELIABLE SPEED"
R TCAS
R As soon as "TRAFFIC" warning is triggered
R "TCAS, I have control"
R EMERGENCY DESCENT
R "EMERGENCY DESCENT"
R LOSS OF BRAKING
R "LOSS OF BRAKING"

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PNF	"SPEED CHECKED"	PNF checks the speed : – Above the S or F speed and accelerating (Takeoff) – Below Vfe next and decelerating (Approach)
	"FLAPS ONE"	PNF selects the flaps lever position and replies after checking the blue number on the ECAM flaps indicator to confirm the correct selection has been made.

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R ”WINDSHEAR TOGA”
R UNRELIABLE SPEED INDICATION
R ”UNRELIABLE SPEED”
R TCAS
R As soon as “TRAFFIC” warning is triggered
R ”TCAS, I have control”
R EMERGENCY DESCENT
R ”EMERGENCY DESCENT”
R LOSS OF BRAKING
R ”LOSS OF BRAKING”

SUMMARY FOR EACH PHASE

TO REMOVE GROUND SUPPLY		
EVENT	**PF or PNF**	**GND Mech**
Initial ground contact	GROUND (from) COCKPIT	COCKPIT (from) GROUND
External __ disconnection	REMOVE EXTERNAL __	EXTERNAL__ REMOVED

R

BEFORE ENGINE START/PUSH BACK		
EVENT	**PF**	**PNF**
Before start up clearance received	BEFORE START C/L DOWN TO THE LINE	BEFORE START C/L DOWN TO THE LINE COMPLETE
After start up clearance received	BEFORE START C/L BELOW THE LINE	BEFORE START C/L COMPLETE

PUSH BACK/ENGINE START		
EVENT	**PF**	**GND Mech.**
When ready for pushback, and pushback clearance received from ATC	GROUND (from) COCKPIT, CLEARED FOR PUSH	COCKPIT (from) GROUND, RELEASE BRAKES
Start of push	BRAKES RELEASED READY TO PUSH	
When ready to start engines	CLEAR TO START ? STARTING ENG(S)—	CLEAR TO START
When pushback complete	BRAKES SET	SET BRAKES
When ready to disconnect (after engine started, and parameters are stabilized)	CLEAR TO DISCONNECT (hand signals on left/right)	DISCONNECTING (hand signals on left/right)

AFTER ENGINE START		
EVENT	**PF**	**PNF**
All engines started and stabilized and GND is disconnected	AFTER START C/L	AFTER START C/L COMPLETE

TAXI		
EVENT	**PF**	**PNF**
When taxi clearance obtained	CLEAR LEFT (RIGHT) SIDE	CLEAR RIGHT (LEFT) SIDE
Brake transfer check	BRAKE CHECK	PRESSURE ZERO
Flight control check in following sequence (can be done before start of taxi)	FLIGHT CONTROL CHECK	
1. Elevators		FULL UP, FULL DOWN, NEUTRAL
2. Ailerons/Spoilers		FULL LEFT, FULL RIGHT, NEUTRAL
3. Rudder *	RUDDER	FULL LEFT, FULL RIGHT, NEUTRAL
During taxi	BEFORE TAKEOFF C/L DOWN TO THE LINE	BEFORE TAKEOFF C/L DOWN TO THE LINE COMPLETE
Lining up on the runway	BEFORE TAKEOFF C/L BELOW THE LINE	BEFORE TAKEOFF C/L COMPLETE

*Note : * The PNF should follow pedal movement with his/her feet*

R

TAKEOFF		
EVENT	**PF**	**PNF**
Setting thrust levers to initial stabilisation value	TAKEOFF	
Before passing 80 kts		THRUST SET
At 100 kts	CHECKED	ONE HUNDRED
At V1		V1
At VR		ROTATE
Gear retraction	GEAR UP	POSITIVE CLIMB GEAR UP
If AP is engaged by PNF	AP 1(2) ON	
Check List	AFTER TAKEOFF/CLIMB C/L DOWN TO THE LINE	AFTER TAKEOFF/CLIMB C/L DOWN TO THE LINE COMPLETE
At transition altitude	AFTER TAKEOFF/CLIMB C/L BELOW THE LINE	AFTER TAKEOFF/CLIMB C/L COMPLETE

R

REJECTED TAKEOFF		
EVENT	**CAPT**	**F/O**
RTO decision REV green on EWD	STOP	 REVERSE GREEN*
Deceleration		DECEL**

R In case of failure or no positive deceleration :
R * NO REVERSE ENGINE__or NO REVERSE
R ** NO DECEL
R DECEL callout means that the deceleration is felt by the crew, and confirmed by the speed
R trend on the PFD. It can also be confirmed by the DECEL light.

R

ALTIMETER SETTING CHANGES TO/FROM QNH/QFE-STD		
EVENT	**PF**	**PNF**
Barometric setting change and subsequent altimeter cross-check	SET STANDARD (SET QNH/QFE) CHECKED	 STANDARD CROSS-CHECKED (QNH/QFE) PASSING FL__(__FT) NOW

APPROACH AND LANDING		
EVENT	**PF**	**PNF**
Approach check list	APPROACH C/L	APPROACH C/L COMPLETE
Activation of approach Phase	ACTIVATE APPROACH PHASE	APPROACH PHASE ACTIVATED
RA alive	CHECKED	RADIO ALTIMETER ALIVE (see Note 4 and 5 below)
At “GS*” or below GO altitude for NPA	SET GA ALTITUDE __FT	GA ALTITUDE — SET,
FAF	CHECKED	PASSING__(Fix Name),__FT,
Landing check list	LANDING C/L	LANDING C/L COMPLETE
1000 feet RA	CHECKED	ONE THOUSAND (see Note 5 below)
100 feet above MDA/DH	CHECKED	ONE HUNDRED ABOVE
MDA/DH visual reference	CONTINUE	MINIMUM
MDA/DH no visual reference	GO AROUND-FLAPS	MINIMUM
		ONE HUNDRED FIFTY (see Note 5 below)
After touchdown Ground spoilers extended REV green on EWD		SPOILERS (see Note 6 below), REVERSE GREEN, (See note 7 below)
Deceleration		DECEL (See Note 8 below)
At 70 knots	CHECKED	SEVENTY KNOTS

Note 4 : Crew awareness, crew should now keep RA in scan to landing
Note 5 : PNF monitors pin-programmed auto callout, or announces if inoperative.
Note 6 : If the spoilers are not extended, call NO SPOILER
Note 7 : If reverse deployment is not as expected, call NO REVERSE ENGINE__ or NO REVERSE, as appropriate.
Note 8 : DECEL Callout means that the deceleration is felt by the crew, and confirmed by the speed trend on the PFD. It can also be confirmed by the DECEL light. If no positive deceleration, call NO DECEL.

GO AROUND		
EVENT	**PF**	**PNF**
GO AROUND decision	GO AROUND – FLAPS	
Flaps retraction		FLAPS—
Gear retraction	GEAR UP	POSITIVE CLIMB GEAR UP
Check list	AFTER TAKEOFF/CLIMB C/L DOWN TO THE LINE	AFTER TAKEOFF/CLIMB C/L DOWN TO THE LINE COMPLETE
At transition altitude	AFTER TAKEOFF/CLIMB C/L BELOW THE LINE	AFTER TAKEOFF/CLIMB C/L COMPLETE

AFTER LANDING		
EVENT	**PF**	**PNF**
Check list	AFTER LANDING C/L	AFTER LANDING C/L COMPLETE

PARKING		
EVENT	**PF**	**PNF**
Check list	PARKING C/L	PARKING C/L COMPLETE

SECURING THE AIRCRAFT		
EVENT	**PF**	**PNF**
Check list	SECURINT THE AIRCRAFT C/L	SECURING THE AIRCRAFT C/L COMPLETE

04.00 CONTENTS

GENERAL

This chapter shows the symbology and definition of speeds.
Source of computation is also given when applicable.

CHARACTERISTIC SPEEDS

The characteristic speeds displayed on the PFD are computed by the FAC (Flight Augmentation Computer) according to aerodynamic data.
VLS (of normal landing configuration : CONF 3 or FULL), F, S and Green Dot speeds are also displayed on the MCDU TAKEOFF and/or APPR pages.
These values are computed by the FMGC, based on the aircraft gross weight (which is computed according to the entered ZFW and the FOB) or predicted grossweight (for approach or go around).

VS : Stalling speed.
Not displayed.
For a conventional aircraft, the reference stall speed, VSmin, is based on a load factor that is less than 1g. This gives a stall speed that is lower than the stall speed at 1g. All operating speeds are expressed as functions of this speed (for example, VREF = 1.3 VSmin).
Because aircraft of the A320 family have a low-speed protection feature (alpha limit) that the flight crew cannot override, the airworthiness authorities have reconsidered the definition of stall speed for these aircraft.
All the operating speeds must be referenced to a speed that can be demonstrated by flight test. This speed is designated VS1g.
Airworthiness authorities have agreed that a factor of 0.94 represents the relationship between VS1g for aircraft of the A320 family and VSmin for conventional aircraft types. As a result the authorities allow aircraft of the A320 family to use the following factors :
V2 = 1.2 × 0.94 VS1g = 1.13 VS1g
VREF = 1.3 × 0.94 VS1g = 1.23 VS1g
These speeds are identical to those that the conventional 94 % rule would have defined for these aircraft. The A319, A320 and A321 have exactly the same maneuver margin that a conventional aircraft would have at its reference speeds.
The FCOM uses VS for VS1g.

VLS : Lowest Selectable speed.
Represented by the top of an amber strip along the airspeed scale on the PFD.
Computed by the FAC based on aerodynamic data, corresponds to 1.13 VS during takeoff or following a touch and go.
Becomes 1.23 VS after retraction of one step of flaps.
R Becomes 1.28 VS when in clean configuration.

Note : If in CONF 0 VLS were 1.23 VS (instead of 1.28 VS), the alpha protection strip would hit the VLS strip on the PFD.

Above 20000 feet, VLS is corrected for Mach effect to maintain a 0.2g buffet margin.

F : Minimum speed at which the flaps may be retracted at takeoff.
In approach, used as a target speed when the aircraft is in CONF 2 or CONF 3.
Represented by "F" on the PFD speed scale. Equal to about 1.18 VS to 1.22 VS of CONF 1 + F.

S : Minimum speed at which the slats may be retracted at takeoff.
In approach, used as a target speed when the aircraft is in CONF 1.
Represented by "S" on the PFD airspeed scale.
Equal to about 1.22 VS to 1.25 VS of clean configuration.

0 : Green dot speed.
Engine out operating speed in clean configuration.
(Best lift to drag ratio speed).
Corresponds also to the final takeoff speed.
Represented by a green dot on the PFD scale.
Below 20000 feet equal to 2 × weight (tonnes) + 85
Above 20000 feet add 1 knot per 1000 feet

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(Best lift to drag ratio speed).
Corresponds also to the final takeoff speed.
Represented by a green dot on the PFD scale.
Below 20000 feet equal to $1.5 \times$ weight (tonnes) + 110
Above 20000 feet add 1 knot per 1000 feet

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In addition, VLS is increased, when the speedbrakes are extended.
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Equal to about 1.23 VS of clean configuration.

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Engine-out operating speed in clean configuration.
(Best lift-to-drag ratio speed).
Also corresponds to the final takeoff speed.
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Below 20000 feet, equal to 1.5 × weight (tons) + 110
Above 20000 feet, add 1 knot per 1000 feet

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Computed by the FAC based on FMS weight data, and on aerodynamic data as a backup, and corresponds to 1.13 VS during takeoff or following a touch and go.
Becomes 1.23 VS, after retraction of one step of flaps.
Becomes 1.28 VS, when in clean configuration.

Note : If in CONF 0 VLS were 1.23 VS (instead of 1.28 VS), the alpha protection strip would hit the VLS strip on the PFD.

Above 20000 feet, VLS is corrected for Mach effect to maintain a 0.2g buffet margin.
In addition, VLS is increased, when the speedbrakes are extended.
The VMC is taken into ccount for VLS computation, as follows :
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  - 1.05 VMCA maximum certified.
- In all the other phases, it is equal to or greater than, VMCL.

F : Minimum speed at which the flaps may be retracted at takeoff.
In approach, used as a target speed when the aircraft is in CONF 2 or CONF 3.
Represented by "F" on the PFD speed scale. Equal to about 1.26 VS of CONF 1 + F.

S : Minimum speed at which the slats may be retracted at takeoff.
In approach, used as a target speed when the aircraft is in CONF 1.
Represented by "S" on the PFD airspeed scale.
Equal to about 1.23 VS of clean configuration.

O : Green dot speed.
Engine-out operating speed in clean configuration.
(Best lift-to-drag ratio speed).
Also corresponds to the final takeoff speed.
Represented by a green dot on the PFD scale.
Below 20000 feet equal to 2 × weight (tons) + 85
Above 20000 feet, add 1 knot per 1000 feet

PROTECTION SPEEDS

Vα PROT, Vα MAX and VSW are computed by the FAC, based on aerodynamic data. They are only used for display on the PFD, and not for flight control protection (the activation of the protections is computed by the ELAC).

Vα PROT : Angle of attack protection speed.
Corresponds to the angle of attack at which the angle of attack protection becomes active.
Represented by the top of a black and amber strip along the PFD speed scale, in normal law.

Vα MAX : Maximum angle of attack speed.
Corresponds to the maximum angle of attack that may be reached in pitch normal law.
Represented by the top of a red strip along the PFD speed scale, in normal law.

VSW : Stall warning speed.
Represented by a red and black strip along the speed scale when the flight control normal law is inoperative.

VMAX : Represented by the bottom of a red and black strip along the speed scale.
Determined by the FAC according to the aircraft configuration.
Is equal to VMO (or speed corresponding to MMO), VLE or VFE.

LIMIT SPEEDS

R VA : Maximum design maneuvering speed. This corresponds to the
R maximum structural speed permitted for full control deflection, if
R alternate or direct law is active.

VMCG : Minimum speed, on the ground during takeoff, at which the aircraft can be controlled by only using the primary flight controls, after a sudden failure of the critical engine, the other engine remaining at takeoff power.

VMCA : Minimum control speed in flight at which the aircraft can be controlled with a maximum bank of 5°, if one engine fails, the other engine remaining at takeoff power (takeoff flap setting, gear retracted).

VMCL : Minimum control speed in flight, at which the aircraft can be controlled with a maximum bank of 5°, if one engine fails, the other engine remaining at takeoff power (approach flap setting).

VFE : Maximum speed for each flap configuration.

VLE : Maximum speed with landing gear extended.

VLO : Maximum speed for landing gear operation.

VMO : Maximum speed.

VFE NEXT : Maximum speed for the next (further extended) flap lever position.

OTHER SPEEDS

V1 : The highest speed, during takeoff, at which the flight crew has a choice between continuing the takeoff or stopping the aircraft.
Represented by "1" on the airspeed scale (or the V1 value when it is off the airspeed scale).
Inserted manually through the MCDU by the crew.
Displayed on the MCDU TAKEOFF page.

VR : The speed at which the pilot rotates in order to reach V2 at an altitude of 35 feet at the latest after an engine failure.
Inserted manually through the MCDU by the crew.
Displayed on the MCDU TAKEOFF page.

V2 : Takeoff safety speed that the aircraft attains at the latest at an altitude of 35 feet with one engine failed and maintains during the second segment of the takeoff.
Represented by the SPEED SELECT symbol on the speed scale.
Minimum value equal to 1.13 VS for the corresponding configuration.
Inserted manually through the MCDU by the crew.
Displayed on the MCDU TAKEOFF page.

VREF : Reference speed used for normal final approach.
Equal to 1.23 × VS of configuration FULL.
Displayed on the MCDU APPR page if landing is planned in CONF FULL (VLS CONF FULL).

VAPP : Final approach speed.
Displayed on MCDU APPR page.
Calculated by the FMGCs.
Represents : VAPP = VLS + wind correction.
The wind correction is limited to a minimum of 5 knots and a maximum of 15 knots.
The flight crew may modify VAPP through the MCDU.
- During autoland or when A/THR is on or in case of ice accretion or gusty crosswind greater than 20 knots, VAPP must not be lower than VLS + 5 knots.
  For landing in configuration 3 with ice accretion VAPP must not be lower than VLS + 10 knots.

VAPP TARGET : Represented by a magenta triangle.
Calculated by the FMGCs
Gives efficient speed guidance in approach during various windy conditions.
Represents :
VAPP TARGET = GS mini + actual headwind (measured by ADIRS)
GS mini = VAPP – TOWER WIND (headwind component along runway axis calculated by FMGC from tower wind entered on MCDU).

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Vα PROT, Vα MAX and VSW are computed by the FAC, based on aerodynamic data. They are only used for display on the PFD, and not for flight control protection (the activation of the protections is computed by the ELAC).

Vα PROT	:	Angle of attack protection speed. Corresponds to the angle of attack at which the angle of attack protection becomes active. Represented by the top of a black and amber strip along the PFD speed scale, in normal law.
Vα MAX	:	Maximum angle of attack speed. Corresponds to the maximum angle of attack that may be reached in pitch normal law. Represented by the top of a red strip along the PFD speed scale, in normal law.
VSW	:	Stall warning speed. Represented by a red and black strip along the speed scale when the flight control normal law is inoperative.
VMAX	:	Represented by the bottom of a red and black strip along the speed scale. Determined by the FAC according to the aircraft configuration. Is equal to VMO (or speed corresponding to MMO), VLE or VFE.

LIMIT SPEEDS

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	VMCG	:	Minimum speed, on the ground during takeoff, at which the aircraft can be controlled by only using the primary flight controls, after a sudden failure of the critical engine, the other engine remaining at takeoff power.
	VMCA	:	Minimum control speed in flight at which the aircraft can be controlled with a maximum bank of 5°, if one engine fails, the other engine remaining at takeoff power (takeoff flap setting, gear retracted).
	VMCL	:	Minimum control speed in flight, at which the aircraft can be controlled with a maximum bank of 5°, if one engine fails, the other engine remaining at takeoff power (approach flap setting).
	VFE	:	Maximum speed for each flap configuration.
	VLE	:	Maximum speed with landing gear extended.
	VLO	:	Maximum speed for landing gear operation.
	VMO	:	Maximum speed.
	VFE NEXT	:	Maximum speed for the next (further extended) flap lever position.

OTHER SPEEDS

V1	:	The highest speed, during takeoff, at which the flight crew has a choice between continuing the takeoff or stopping the aircraft. Represented by “1” on the airspeed scale (or the V1 value when it is off the airspeed scale). Inserted manually through the MCDU by the crew at the latest. Displayed on the MCDU TAKEOFF page.
VR	:	The speed at which the pilot rotates in order to reach V2 at an altitude of 35 feet at the latest after an engine failure. Inserted manually through the MCDU by the crew. Displayed on the MCDU TAKEOFF page.
V2	:	Takeoff safety speed that the aircraft attains at the latest at an altitude of 35 feet with one engine failed and maintains during the second segment of the takeoff. Represented by the SPEED SELECT symbol on the speed scale. Minimum value equal to 1.13 VS for the corresponding configuration. Inserted manually through the MCDU by the crew. Displayed on the MCDU TAKEOFF page.
VREF	:	Reference speed used for normal final approach. Equal to 1.23 × VS of configuration FULL. Displayed on the MCDU APPR page if landing is planned in CONF FULL (VLS CONF FULL).
VAPP	:	Final approach speed. Displayed on MCDU APPR page. Calculated by the FMGCs. Represents : VAPP = VLS + wind correction. The wind correction is limited to a minimum of 5 knots and a maximum of 15 knots. The flight crew may modify VAPP through the MCDU. – During autoland or when A/THR is on or in case of ice accretion or gusty crosswind greater than 20 knots, VAPP must not be lower than VLS + 5 knots.
VAPP TARGET	:	Represented by a magenta triangle. Calculated by the FMGCs Gives efficient speed guidance in approach during various windy conditions. Represents : VAPP TARGET = GS mini + actual headwind (measured by ADIRS) GS mini = VAPP – TOWER WIND (headwind component along runway axis calculated by FMGC from tower wind entered on MCDU).

AIR CONDITIONING

R An external HP source may be used for air conditioning, provided the air supply is
R confirmed to be free from oil contamination.

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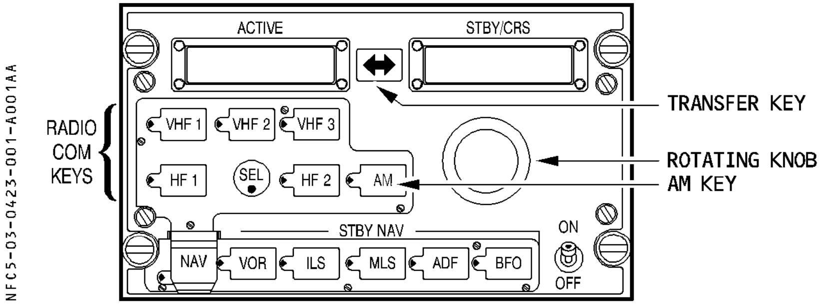
VHF, HF UTILIZATION

R *Note : 1. Reception of some frequencies could be noisy, on one or more VHFs. In such*
R *cases, try selecting an unaffected one.*

2. If two frequencies are closer than 2 MHz (between VHF1 and 2, or between VHF3 and 2), or closer than 6 MHz (between VHF1 and 3), some interference may occur.

TUNING

The pilot should normally use his onside RMP to tune any one of the VHF or HF radios. If the SEL lights come on, when tuning the radio, the pilot should turn them off by selecting the appropriate radio system dedicated to his RMP.



– **ON/OFF switch . . . . CHECK ON**

– **VHF or HF key . . . . PRESS**
The green light comes on.
ACTIVE and STBY/CRS windows display active and preset frequencies, respectively.

Note : When an RMP tunes a transceiver that is normally associated with another RMP, the SEL lights on both RMPs come on.

To change frequency :

– **Rotating knob . . . . TURN**
Make the STBY/CRS window display the new frequency.
Outer knob is for units, inner knob for decimals.

– **Transfer key . . . . PRESS**
This interchanges the ACTIVE and STBY frequencies.
The receiver is now tuned to the new ACTIVE frequency.

– **AM key (if necessary) . . . . PRESS**
Green light comes on.

– **SEL light . . . . CHECK OFF**
If the SEL light is on, select the appropriate radio systems dedicated to the onside RMP.

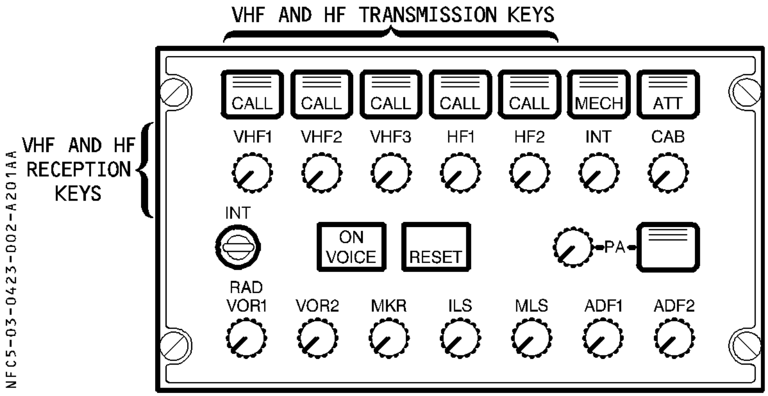
Failure cases :

When an RMP fails :
– The affected RMP no longer controls the selected receiver.
– The frequency displays disappear and the green VHF or HF lights go out.

– **Affected RMP . . . . SWITCH OFF**
One RMP can control all receivers. If RMP1 fails tune VHF1 through RMP3. If RMP2 fails, tune VHF2 through RMP3. If RMP3 fails, tune HF1 (if installed) through RMP1, HF2 (if installed) through RMP2. If two RMPs fail, tune all receivers through the remaining RMP.

TRANSMISSION AND RECEPTION

Note : If the VHF3 VOICE DIRECTORY page is customized with user frequencies :
– Use it as a pure directory.
– Do not press the key adjacent to the desired frequency for direct turning.
– VHF3 in VOICE mode should either be tuned using the MANUAL FREQ field, or using the RMP.



– **VHF or HF transmission key . . . . PRESS**
Green bars on the selected system key light up.
Microphones and PTT command are connected to the selected system.

– **VHF or HF reception key . . . . PRESS**
The integrated white light comes on. The receiver brings in the selected system. To adjust the volume, turn the key.

Note : Do not use VHF 3 for communications with ATC, if ACARS is installed, unless VHF 1 and 2 are inoperative.

CAPT-ATT CALL

PROCEDURE FOR CALLING ATT STATION WHEN PREVIOUS CALL HAS NOT BEEN RESET

If, after a call from cockpit to the attendant's station, the attendant does not press the RESET key on the attendant's panel, the pilot must use the following procedure to call the station :

– **CAB transmission key (on audio control panel) . . . . PRESS**
  Green lines light up.

– **INT/RAD (on ACP) . . . . MAINTAIN IN RAD POSITION for 2 seconds.**
  Wait 60 seconds for automatic cancellation of previous CAPT-ATT calls, then :

– **CAB transmission key . . . . PRESS**

Note : This procedure will no longer be necessary after the introduction of CIDS Mark II standard, which includes a function to reset the system automatically after 60 seconds if no one has pressed the RESET key.

TRIPPED C/B REENGAGEMENT

R In flight, do not reengage a circuit breaker (C/B) that has tripped by itself, unless the Captain judges it necessary to do so for the safe continuation of the flight. This procedure should be adopted only as a last resort, and only one reengagement should be attempted. On ground, do not reengage the C/B of the fuel pump(s) of any tank. For all other C/Bs, if the flight crew coordinates the action with maintenance, the flight crew may reengage a tripped C/B, provided that the cause of the tripped C/B is identified.

COMPUTER RESET

The normal purpose of a circuit breaker (C/B) is to protect wiring against short circuits, and to isolate equipment for maintenance.
Another C/B function involves digital computers : The reset function. When a digital computer behaves abnormally due to an electrical transient, for example, the abnormal behavior can be stopped by briefly interrupting the power supply to its processor.
The flight crew can reset most of this aircraft's computers with a normal cockpit control (selector or pushbutton). However, for some systems, the only way to cut off electrical power is to pull the associated C/B.

PROCEDURE

To perform a computer reset :
- Set the related normal cockpit control to OFF, or pull the corresponding reset pushbutton or circuit breaker
- Wait 3 seconds if normal cockpit control is used, or 5 seconds if a circuit breaker is used (unless a different time is indicated)
- Set the related normal cockpit control to ON, or push the corresponding reset pushbutton or circuit breaker
- Wait 3 seconds for the end of the reset.

WARNING
Do not reset more than one computer at the same time, unless instructed to do so.

R *Note : Due to the many customization possibilities of the C/B panel :*
Before taking any action on the C/B panel, the flight crew must crosscheck that the C/B label corresponds to the affected system.

R **COMPUTER RESET TABLE**

R The computers that are most prone to reset are listed in the table of the next pages with
R the associated reset procedure, or FCOM reference when applicable.
R Specific reset procedures, included in OEB or Temporary revisions, are normally not
R referenced in this table and, when issued, superseed this table.

R *Note : Repetitive resets have to be reported to maintenance.*

R — On ground, almost all computers can be reset, and are not limited to the ones indicated
R in the table.
R Following computers are not allowed to be reset in all circumstances :
R · ECU (Engine Control Unit on CFM engines) or EEC (Electronic Engine Control on IAE
R engines) and EIU (Engine Interface Unit) while the engine is running.
R · BSCU (Brake Steering Control Unit) if the aircraft is not stopped. (Refer to 3.04.32).
R — In flight, as a general rule, the crew must restrict computer resets to those listed in the
R table, or to those in applicable TRs or OEBs. Before taking any action on other computer
R the flight crew must consider and fully understand the consequences.

CAUTION

R Do not pull the following circuit breakers :
R — SFCC (could lead to SLATS/FLAPS locked)
R — ECU or EEC, EIU.

R *Note : In the table's "reset" column, the "if applicable" note signifies that, depending on*
R *the computer standard, the reset procedure may no longer be necessary. If this is*
R *the case, the reset procedure is removed from the applicable FCOM section.*

R

ATA	System malfunction or ECAM warning/caution	Affected system	Reset
21	VENT AVNCS SYS FAULT	AEVC	On ground only : – Pull C/B Y 17 on 122VU. – Wait 1 second before pushing the C/B.
22	AUTO FLT FCU 1(2) FAULT	FCU	In flight: – Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. – Push it after 5 seconds. – CHECK the displayed targets and the barometer reference, and correct them if necessary. On ground: – Pull the C/B B05 on 49VU for FCU1, or M21 on 121VU for FCU2. – Push it after 5 seconds. – If FCU1(2) FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) – If FCU1(2) FAULT remains, pull both C/B B05 on 49VU and M21 on 121VU – Push them after 7 minutes, with a delay of less than 5 seconds between side 1 and 2 – Wait at least 30 seconds for FCU1 and FCU2 safety tests completion – CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful)

ATA	System malfunction or ECAM warning/caution	Affected system	Reset
22	AUTO FLT FCU 1 + 2 FAULT	FCU	In flight: – Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. – Push them after 5 seconds. – CHECK the displayed targets and the barometer reference, and correct them if necessary. On ground: – Pull the C/B B05 on 49VU for FCU1, and then pull M21 on 121VU for FCU2. – Push the C/Bs after 5 seconds. – If FCU 1+2 FAULT disappears, CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) – If FCU 1+2 FAULT remains, pull again both C/B B05 on 49VU and M21 on 121VU – Push them after 7 minutes, with a delay of less than 5 seconds between side 1 and 2 – Wait at least 30 seconds for FCU1 and FCU2 safety tests completion – CHECK the displayed targets and barometer reference, and correct them if necessary (RESET successful) FCU targets are synchronized on current aircraft values and displayed as selected targets. – RE–ENTER the barometer altimeter setting value, if necessary.

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ATA	System Malfunction or ECAM Warning/Caution	Affected System	Reset
22	AUTO FLT YAW DAMPER 1(2) FAULT	FAC 1(2)	Refer to the FCOM 3.02.22, if applicable.
	WINDSHEAR DET FAULT or REAC W/S DET FAULT (◁)	FAC 1 + 2	
	One MCDU locked or blank Both MCDU locked or blank FMGC malfunction	MCDU FMGC FMGC	Refer to the FCOM 4.06.20
23	COM CIDS 1+2 FAULT	CIDS	On ground, or in flight : – Pull the C/Bs in the following order : G02 on 49VU, M05 on 121VU. – Wait 10 seconds, then : – Push the C/Bs in the following order : M05, G02. – After CIDS reset, wait approximately 4 minutes, before recovering normal operation.
	Uncommanded EVAC horn actuation	CIDS	On ground, or in flight : Press the EVAC HORN SHUT OFF pushbutton. · IF UNSUCCESSFUL : – Pull the C/Bs in the following order : G02 on 49VU, M05 on 121VU. – Wait 10 seconds, then : – Push the C/Bs in the following order : M05, G02. – After CIDS reset, wait approximately 4 minutes, before recovering normal operation.
	Frozen RMP	RMP	Refer to the FCOM 3.04.23.
	FAP freezing	FAP or Tape reproducer/PRAM	On ground or in flight : – Pull CB M14 (or Q14 ◁) of the FAP in the 121VU. – Wait 10 seconds before pushing the C/B. · IF UNSUCCESSFUL : – Pull the tape reproducer/PRAM C/B F07 on 2000 VU (cabin). – Wait 10 seconds, before pushing the C/B.

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ATA	System Malfunction or ECAM Warning/Caution	Affected System	Reset
22	AUTO FLT YAW DAMPER 1(2) FAULT	FAC 1(2)	Refer to the FCOM 3.02.22, if applicable.
	WINDSHEAR DET FAULT or REAC W/S DET FAULT (◁)	FAC 1 + 2	
	One MCDU locked or blank Both MCDU locked or blank FMGC malfunction	MCDU FMGC FMGC	Refer to the FCOM 4.06.20
23	COM CIDS 1+2 FAULT	CIDS	On ground, or in flight : – Pull the C/Bs in the following order : G01 on 49VU, M06 on 121VU, G02 on 49VU, M07 on 121VU. – Wait 10 seconds, then – Push the C/Bs in the following order : M06, M07, G01, G02. – After CIDS reset, wait approximately 4 minutes, before recovering normal operation.
	Uncommanded EVAC horn actuation	CIDS	On ground, or in flight : Press the EVAC HORN SHUT OFF pushbutton. · IF UNSUCCESSFUL : – Pull the C/Bs in the following order : G01 on 49VU, M06 on 121VU, G02 on 49VU, M07 on 121VU. – Wait 10 seconds, then – Push the C/Bs in the following order : M06, M07, G01, G02. – After CIDS reset, wait approximately 4 minutes, before recovering normal operation.
	Frozen RMP	RMP	Refer to the FCOM 3.04.23.
	FAP freezing	FAP or Tape reproducer/PRAM	On ground or in flight : – Pull CB M14 (or Q14 ◁) of the FAP in the 121VU. – Wait 10 seconds before pushing the C/B. · IF UNSUCCESSFUL : – Pull the tape reproducer/PRAM C/B F07 on 2000 VU (cabin). – Wait 10 seconds, before pushing the C/B.

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ATA	System Malfunction or ECAM Warning/Caution	Affected System	Reset
22	AUTO FLT YAW DAMPER 1(2) FAULT	FAC 1(2)	Refer to the FCOM 3.02.22, if applicable.
	WINDSHEAR DET FAULT or REAC W/S DET FAULT (◁)	FAC 1 + 2	
	One MCDU locked or blank Both MCDU locked or blank FMGC malfunction	MCDU FMGC FMGC	Refer to the FCOM 4.06.20
23	COM CIDS 1+2 FAULT	CIDS	On ground, or in flight : – Pull the C/Bs in the following order : G01 on 49VU, M05 on 121VU. G02 on 49VU, M06 on 121VU. – Wait 10 seconds, then : – Push the C/Bs in the following order : M05, M06, G01, G02. – After CIDS reset, wait approximately 4 minutes, before recovering normal operation.
	Uncommanded EVAC horn actuation	CIDS	On ground, or in flight : Press the EVAC HORN SHUT OFF pushbutton. · IF UNSUCCESSFUL : – Pull the C/Bs in the following order : G01 on 49VU, M05 on 121VU. G02 on 49VU, M06 on 121VU. – Wait 10 seconds, then : – Push the C/Bs in the following order : M05, M06, G01, G02. – After CIDS reset, wait approximately 4 minutes, before recovering normal operation.
	Frozen RMP	RMP	Refer to the FCOM 3.04.23.
	FAP freezing	FAP or Tape reproducer/PRAM	On ground or in flight : – Pull C/B M14 (or Q14 ◁) of the FAP in the 121VU. – Wait 10 seconds before pushing the C/B. · IF UNSUCCESSFUL : – Pull the tape reproducer/PRAM C/B F07 on 2000 VU (cabin). – Wait 10 seconds, before pushing the C/B.

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ATA	System Malfunction or ECAM Warning/Caution	Affected System	Reset
22	AUTO FLT YAW DAMPER 1(2) FAULT	FAC 1(2)	Refer to the FCOM 3.02.22, if applicable.
	WINDSHEAR DET FAULT or REAC W/S DET FAULT (◁)	FAC 1 + 2	
	One MCDU locked or blank Both MCDU locked or blank FMGC malfunction	MCDU FMGC FMGC	Refer to the FCOM 4.06.20
23	COM CIDS 1+2 FAULT	CIDS	On ground, or in flight : — Pull the C/Bs in the following order : P13◁ and P14◁ on 121VU M06 and M07 on 121VU, G01 and G02 on 49VU. — Wait 10 seconds, then — Push the C/Bs in the following order : G01, G02, M06, M07, P13◁, P14◁. — After CIDS reset, wait approximately 4 minutes, before recovering normal operation.
	Uncommanded EVAC horn actuation	CIDS	On ground, or in flight : Press the EVAC HORN SHUT OFF pushbutton. · IF UNSUCCESSFUL : — Pull the C/Bs in the following order : M06 and M07 on 121VU, G01 and G02 on 49VU. — Wait 10 seconds, then — Push the C/Bs in the following order : G01, G02, M06, M07. — After CIDS reset, wait approximately 4 minutes, before recovering normal operation.
	Frozen RMP	RMP	Refer to the FCOM 3.04.23.
	FAP freezing	FAP or Tape reproducer/PRAM	On ground or in flight : — Pull FAP C/Bs in the following order : H01 on 49VU, Q14 on 121VU. — Wait 10 seconds, then — Push the C/Bs in the following order : Q14, H01.

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ATA	System Malfunction or ECAM Warning/Caution	Affected System	Reset
22	AUTO FLT YAW DAMPER 1(2) FAULT	FAC 1(2)	Refer to the FCOM 3.02.22, if applicable.
	WINDSHEAR DET FAULT or REAC W/S DET FAULT (◁)	FAC 1 + 2	
	One MCDU locked or blank Both MCDU locked or blank FMGC malfunction	MCDU FMGC FMGC	Refer to the FCOM 4.06.20
23	COM CIDS 1+2 FAULT	CIDS	On ground, or in flight : — Pull the C/Bs in the following order : P13 ◁ and P14 ◁ on 121VU. M05 and M06 on 121VU, G01 and G02 on 49VU. — Wait 10 seconds, then : — Push the C/Bs in the following order : G01, G02, M05, M06. P13 ◁, P14 ◁. — After CIDS reset, wait approximately 4 minutes, before recovering normal operation.
	Uncommanded EVAC horn actuation	CIDS	On ground, or in flight : Press the EVAC HORN SHUT OFF pushbutton. · IF UNSUCCESSFUL : — Pull the C/Bs in the following order : M05 and M06 on 121VU, G01 and G02 on 49VU. — Wait 10 seconds, then : — Push the C/Bs in the following order : G01, G02, M05, M06. — After CIDS reset, wait approximately 4 minutes, before recovering normal operation.
	Frozen RMP	RMP	Refer to the FCOM 3.04.23.
	FAP freezing	FAP	On ground, or in flight : — Pull FAP C/Bs in the following order : H01 on 49VU, Q14 on 121VU. — Wait 10 seconds, then : — Push the C/Bs in the following order : Q14, H01.

ATA	System malfunction or ECAM warning/caution	Affected system	Reset
24	GPU cannot be connected to the aircraft	GAPCU	On ground only : The GPU cannot be connected to the electrical network of the aircraft (AVAIL light is OFF) : · If at least one power source (IDG 1 or 2, APU GEN or batteries) is connected to the electrical network of the aircraft. – Reset the EXT PWR pushbutton switch on 35VU (Press and release) · If no power source is connected to the electrical network of the aircraft. – Set the BAT 1+2 pushbutton switches to AUTO.
26	SMOKE LAV + CRG DET FAULT	SDCU	On ground only : – Pull C/B C06 on 49VU, and C/B T18 on 122VU. – Wait 10 seconds before pushing both C/Bs.
27	F/CTL ELAC 1(2) FAULT F/CTL ALTN LAW F/CTL ELAC 1(2) PITCH FAULT	ELAC	– Refer to the FCOM 3.02.27, if applicable.
	ELAC or SEC malfunction	ELAC or SEC	WARNING : Do not reset more than one computer at a time. · It is possible to reset flight control computers in flight, event if not requested by the ECAM, provided only one reset is performed at a time: For the ELAC only, in case of uncommanded maneuvers during the flight, it is not recommended to reset the ELAC. *Note : When an ELAC reset is performed on ground the crew must check the pitch trim position.*
28	Loss of fuel quantity indication	FQIC	On ground, or in flight : – Pull the C/B of the affected channel : · Channel 1 . . . . A13 on 49VU · Channel 2 . . . . M27 on 121VU – Wait 5 seconds, before pushing both C/B. *Note : The fuel quantity indication will be re-established within one minute.*

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ATA	System malfunction or ECAM warning/caution	Affected system	REMARKS
30	ANTI ICE L(R)/WINDSHIELD (WINDOW)	WHC	Refer to the FCOM 3.02.30, if applicable.
31	FWS FWC 1(2) FAULT	FWC	On ground, or in flight : Pull, then push, the C/B of the affected FWC : – FWC 1 . . . . F01 ON 49VU – FWC 2 . . . . Q7 ON 121VU
32	Braking malfunction	BSCU	Refer to 3.04.32 or OEB 50, if applicable.
	L/G LGCIU 1(2) FAULT	LGCIU 1(2)	On ground only : LGCIU 1 : Pull C/B Q34 on 121 VU, then C09 on 49VU. Then push C/B C09 and C/B Q34. LGCIU 2 : Pull, then push, C/B Q35 on 121 VU.
34	NAV TCAS FAULT	TCAS	On ground only : – Pull C/B K10 on 121VU. – Wait 5 seconds, then push the C/B.
38	Failure messages on the CIDS FAP in the cabin	Vacuum System Controller	On ground, or in flight : – Pull C/B 35 MG on 2001 VU, aft cabin, – Wait 30 seconds, then push the C/B.
46	ATSU malfunction	ATSU	An ATSU reset should be attempted, if : key selection has no effect on any of the MCDU ATSU DATALINK submenus. On ground, or in flight : – Pull the C/Bs in the following order : L16, L15 on 121VU. – Wait 5 seconds, then : – Push the C/Bs in the following order : L15, L16.
70	ENG IGN A+B FAULT	FADEC and EIU	Refer to the FCOM 3.02.70, if applicable.
	ENG 1(2) FADEC A(B) FAULT	FADEC	Refer to the FCOM 3.02.70, if applicable.

ATA	System malfunction or ECAM warning/caution	Affected system	Reset
24	GPU cannot be connected to the aircraft	GAPCU	On ground only : The GPU cannot be connected to the electrical network of the aircraft (AVAIL light is OFF) : · If at least one power source (IDG 1 or 2, APU GEN or batteries) is connected to the electrical network of the aircraft. – Reset the EXT PWR pushbutton switch on 35VU (Press and release) · If no power source is connected to the electrical network of the aircraft. – Set the BAT 1+2 pushbutton switches to AUTO.
26	SMOKE LAV + CRG DET FAULT	SDCU	On ground only : – Pull C/B C06 on 49VU, and C/B T18 on 122VU. – Wait 10 seconds before pushing both C/Bs.
27	F/CTL ELAC 1(2) FAULT F/CTL ALTN LAW F/CTL ELAC 1(2) PITCH FAULT	ELAC	– Refer to the FCOM 3.02.27, if applicable.
	ELAC or SEC malfunction	ELAC or SEC	WARNING : Do not reset more than one computer at a time. · It is possible to reset flight control computers in flight, event if not requested by the ECAM, provided only one reset is performed at a time: For the ELAC only, in case of uncommanded maneuvers during the flight, it is not recommended to reset the ELAC. *Note : When an ELAC reset is performed on ground the crew must check the pitch trim position.*
28	Loss of fuel quantity indication	FQIC	On ground, or in flight : – Pull the C/B of the affected channel : · Channel 1 . . . . A13 on 49VU · Channel 2 . . . . M27 on 121VU – Wait 5 seconds, before pushing both C/B. *Note : The fuel quantity indication will be re-established within one minute.*

ATA	System malfunction or ECAM warning/caution	Affected system	REMARKS
30	ANTI ICE L(R)/WINDSHIELD (WINDOW)	WHC	Refer to the FCOM 3.02.30, if applicable.
31	FWS FWC 1(2) FAULT	FWC	On ground, or in flight : Pull, then push, the C/B of the affected FWC : – FWC 1 . . . . F01 ON 49VU – FWC 2 . . . . Q7 ON 121VU
32	Braking malfunction	BSCU	Refer to 3.04.32 or OEB 50, if applicable.
	L/G LGCIU 1(2) FAULT	LGCIU 1(2)	On ground only : LGCIU 1 : Pull C/B Q34 on 121 VU, then C09 on 49VU. Then push C/B C09 and C/B Q34. LGCIU 2 : Pull, then push, C/B Q35 on 121 VU.
34	NAV TCAS FAULT	TCAS	On ground only : – Pull C/B K10 on 121VU. – Wait 5 seconds, then push the C/B.
38	Failure messages on the CIDS FAP in the cabin	Vacuum System Controller	On ground, or in flight : – Pull C/B 35 MG on 2001 VU, aft cabin, – Wait 30 seconds, then push the C/B.
46	ATSU malfunction	ATSU	An ATSU reset should be attempted, in case of : – Permanent display of “INVALID DATA” on the DCDU. – No key selection effect on the DCDU or MCDU ATC pages. On ground, or in flight : – Pull the C/Bs in the following order : L16, L15 on 121VU. – Wait 5 seconds, then : – Push the C/Bs in the following order : L15, L16.
70	ENG IGN A+B FAULT	FADEC and EIU	Refer to the FCOM 3.02.70, if applicable.
	ENG 1(2) FADEC A(B) FAULT	FADEC	Refer to the FCOM 3.02.70, if applicable.

ATA	System malfunction or ECAM warning/caution	Affected system	Reset
24	GPU cannot be connected to the aircraft	GAPCU	On ground only : The GPU cannot be connected to the electrical network of the aircraft (AVAIL light is OFF) : · If at least one power source (IDG 1 or 2, APU GEN or batteries) is connected to the electrical network of the aircraft. — Reset the EXT PWR pushbutton switch on 35VU (Press and release) · If no power source is connected to the electrical network of the aircraft. — Set the BAT 1+2 pushbutton switches to AUTO.
27	F/CTL ELAC 1(2) FAULT F/CTL ALTN LAW F/CTL ELAC 1(2) PITCH FAULT	ELAC	— Refer to the FCOM 3.02.27, if applicable.
	ELAC or SEC malfunction	ELAC or SEC	WARNING : Do not reset more than one computer at a time. · It is possible to reset flight control computers in flight, even if not requested by the ECAM, provided only one reset is performed at a time: For the ELAC only, in case of uncommanded maneuvers during the flight, it is not recommended to reset the ELAC. *Note : When an ELAC reset is performed on ground the crew must check the pitch trim position.*
28	Loss of fuel quantity indication	FQIC	On ground, or in flight : — Pull the C/B of the affected channel : · Channel 1 . . . . A13 on 49VU · Channel 2 . . . . M27 on 121VU — Wait 5 seconds, before pushing both C/B. *Note : The fuel quantity indication will be re-established within one minute.*

ATA	System malfunction or ECAM warning/caution	Affected system	REMARKS
30	ANTI ICE L(R)/WINDSHIELD (WINDOW)	WHC	Refer to the FCOM 3.02.30, if applicable.
31	FWS FWC 1(2) FAULT	FWC	On ground, or in flight : Pull, then push, the C/B of the affected FWC – FWC 1 . . . . F01 ON 49VU – FWC 2 . . . . Q7 ON 121VU
32	Braking malfunction	BSCU	Refer to 3.04.32 or OEB 50 if applicable.
	L/G LGCIU 1(2) FAULT	LGCIU 1(2)	On ground only : LGCIU 1 : Pull C/B Q34 on 121VU, then C09 on 49VU. Then push C/B C09 and C/B Q34. LGCIU 2 : Pull, then push, C/B Q35 on 121VU.
34	NAV TCAS FAULT	TCAS	On ground only : – Pull C/B Q34 on 121VU, then C09 on 49VU. – Wait 5 seconds, then push the C/B.
46	ATSU malfunction	ATSU	An ATSU reset should be attempted, if : key selection has no effect on any of the MCDU ATSU DATALINK submenus. On ground, or in flight : – Pull the C/Bs in the following order : L16, L15 on 121VU. – Wait 5 seconds, then : – Push the C/Bs in the following order : L15, L16.
70	ENG IGN A+B FAULT	FADEC and EIU	Refer to the FCOM 3.02.70, if applicable.
	ENG 1(2) FADEC A(B) FAULT	FADEC	Refer to the FCOM 3.02.70, if applicable.

ATA	System malfunction or ECAM warning/caution	Affected system	Reset
24	GPU cannot be connected to the aircraft	GAPCU	On ground only : The GPU cannot be connected to the electrical network of the aircraft (AVAIL light is OFF) : · If at least one power source (IDG 1 or 2, APU GEN or batteries) is connected to the electrical network of the aircraft. – Reset the EXT PWR pushbutton switch on 35VU (Press and release) · If no power source is connected to the electrical network of the aircraft. – Set the BAT 1+2 pushbutton switches to AUTO.
27	F/CTL ELAC 1(2) FAULT F/CTL ALTN LAW F/CTL ELAC 1(2) PITCH FAULT	ELAC	– Refer to the FCOM 3.02.27, if applicable.
	ELAC or SEC malfunction	ELAC or SEC	WARNING : Do not reset more than one computer at a time. · It is possible to reset flight control computers in flight, even if not requested by the ECAM, provided only one reset is performed at a time: For the ELAC only, in case of uncommanded maneuvers during the flight, it is not recommended to reset the ELAC. *Note : When an ELAC reset is performed on ground the crew must check the pitch trim position.*
28	Loss of fuel quantity indication	FQIC	On ground, or in flight : – Pull the C/B of the affected channel : · Channel 1 . . . . A13 on 49VU · Channel 2 . . . . M27 on 121VU – Wait 5 seconds, before pushing both C/B. *Note : The fuel quantity indication will be re-established within one minute.*

ATA	System malfunction or ECAM warning/caution	Affected system	Reset
30	ANTI ICE L(R)/WINDSHIELD (WINDOW)	WHC	Refer to the FCOM 3.02.30, if applicable.
31	FWS FWC 1(2) FAULT	FWC	On ground, or in flight : Pull, then push, the C/B of the affected FWC : – FWC 1 . . . . F01 ON 49VU – FWC 2 . . . . Q7 ON 121VU
32	Braking malfunction	BSCU	Refer to 3.04.32 or OEB 50, if applicable.
	L/G LGCIU 1(2) FAULT	LGCIU 1(2)	On ground only : LGCIU 1 : Pull C/B Q34 on 121 VU, then C09 on 49VU. Then push C/B C09 and C/B Q34. LGCIU 2 : Pull, then push, C/B Q35 on 121 VU.
34	NAV TCAS FAULT	TCAS	On ground only : – Pull C/B K10 on 121VU. – Wait 5 seconds, then push the C/B.
46	ATSU malfunction	ATSU	An ATSU reset should be attempted, in case of : – Permanent display of "INVALID DATA" on the DCDU. – No key selection effect on the DCDU or MCDU ATC pages. On ground, or in flight : – Pull the C/Bs in the following order : L16, L15 on 121VU. – Wait 5 seconds, then : – Push the C/Bs in the following order : L15, L16.
70	ENG IGN A+B FAULT	FADEC and EIU	Refer to the FCOM 3.02.70, if applicable.
	ENG 1(2) FADEC A(B) FAULT	FADEC	Refer to the FCOM 3.02.70, if applicable.

R **GENERAL**

R The secured cockpit door operation is controlled by a toggle switch, located on the
R COCKPIT DOOR central pedestal.

R **DOOR OPENING FROM THE COCKPIT**

R To allow access the cockpit, the COCKPIT DOOR toggle switch has to be pulled and
R maintained in the UNLOCK position until the door is fully opened (once the door is fully
R opened it can be released to the NORM position).

R **DOOR CLOSING**

R Close the door and check that the OPEN indicator goes off. If the toggle switch is in the
R NORM position the door is locked and emergency access is possible for the cabin crew.
R If the toggle switch is in the LOCK position the door is locked and the emergency access,
R the buzzer and the keypad are inhibited for a preselected time (5 to 20 minutes).

R *Note : If the OPEN indicator is on with the door closed, the door may be unlocked. Repeat*
R *the above opening/closing sequence.*

COCKPIT DOOR OPERATION

This procedure should be applied, if local Airworthiness Authorities require that the cockpit door remain closed throughout the entire flight.

BEFORE PUSHBACK OR ENGINE START

R – **COCKPIT DOOR . . . . CLOSE**

AFTER ENGINE START

● **If ROUTINE ACCESS is requested from the cabin :**
The buzzer sounds in the cockpit for 1 to 9 seconds (3 seconds by default).
Prior to unlocking the door, the flight crew should identify the person requesting entry.

- **If entry is NOT authorized by the flight crew :**

R – **COCKPIT DOOR toggle switch . . . . LOCK**

- **If entry is authorized by the flight crew :**

R – **COCKPIT DOOR toggle switch . . . . UNLOCK**

<u>Note</u> : *If the flight crew does not take any action after a routine cabin request, the cabin crew will be able to open the door by using the emergency access procedure.*

- **If EMERGENCY ACCESS is initiated from the cabin :**
  The buzzer will sound continuously in the cockpit, and the OPEN light flashes on the center pedestal's cockpit door panel.

<u>Note</u> : *If the flight crew does not take any action, the door will unlock after a preselected time between 15 and 120 seconds.*

R – **COCKPIT DOOR toggle switch . . . . LOCK**
When the situation in the cockpit permits, the flight crew should identify the person requesting entry, prior to unlocking the door.

- **If entry is authorized by the flight crew :**

R – **COCKPIT DOOR toggle switch . . . . UNLOCK**

R **GENERAL**

R The secured cockpit door operation is controlled by a toggle switch, located on the
R COCKPIT DOOR central pedestal.

R **DOOR OPENING FROM THE COCKPIT**

R To allow access the cockpit, the COCKPIT DOOR toggle switch has to be pulled and
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R NORM position the door is locked and emergency access is possible for the cabin crew.
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R the buzzer and the keypad are inhibited for a preselected time (5 to 20 minutes).

R *Note : If the OPEN indicator is on with the door closed, the door may be unlocked. Repeat*
R *the above opening/closing sequence.*

COCKPIT DOOR OPERATION

This procedure should be applied, if local Airworthiness Authorities require that the cockpit door remain closed throughout the entire flight.

BEFORE PUSHBACK OR ENGINE START

R – **COCKPIT DOOR . . . . CLOSE**

AFTER ENGINE START

● **If ROUTINE ACCESS is requested from the cabin :**
The buzzer sounds in the cockpit for 1 to 9 seconds (3 seconds by default).

– **CAMERA 1 DISPLAY . . . . CHECK**
Camera 1 is automatically displayed upon entry request.

– **VIDEO CAMERA pushbutton . . . . PRESS**

– **CAMERA 2 and 3 DISPLAY . . . . CHECK**
Prior to unlocking the door, the flight crew should identify the person requesting entry.

- **If entry is NOT authorized by the flight crew :**

R — **COCKPIT DOOR toggle switch . . . . LOCK**

- **If entry is authorized by the flight crew :**

R — **COCKPIT DOOR toggle switch . . . . UNLOCK**

<u>Note</u> : *If the flight crew does not take any action after a routine cabin request, the cabin crew will be able to open the door by using the emergency access procedure.*

- **If EMERGENCY ACCESS is initiated from the cabin :**
  The buzzer will sound continuously in the cockpit, and the OPEN light flashes on the center pedestal's cockpit door panel.

<u>Note</u> : *If the flight crew does not take any action, the door will unlock after a preselected time between 15 and 120 seconds.*

R — **COCKPIT DOOR toggle switch . . . . LOCK**

— **CAMERA 1 DISPLAY . . . . CHECK**
Camera 1 is automatically displayed upon entry request.

— **VIDEO CAMERA pushbutton . . . . PRESS**

— **CAMERA 2 and 3 DISPLAY . . . . CHECK**
Prior to unlocking the door, the flight crew should identify the person requesting entry.

- **If entry is authorized by the flight crew :**

R — **COCKPIT DOOR toggle switch . . . . UNLOCK**

OPENING THE COCKPIT DOOR FROM THE CABIN

– **CABIN CREW ROUTINE ACCESS . . . . REQUEST ON KEYPAD**

– **CABIN CREW . . . . PRESS #, or N+#**
"N" represents an Operator-defined figure between 0 and 7 digits.

– **CABIN CREW . . . . STAND IN COCKPIT DOOR AXIS**
The cabin crew should stand in the axis of the ckpt door. A buzzer sounds in the ckpt.

● **If entry is NOT authorized by the flight crew :**

R – The flight crew locks the door via the COCKPIT DOOR toggle switch (LOCK position).
R – The keypad's red light comes on steady, and indicates that the door is locked.

● **If entry is authorized by the flight crew :**

– The flight crew unlocks the door via the COCKPIT DOOR toggle switch (UNLOCK
R position).
– The keypad's green light comes on steady, and indicates that the door is unlocked.

R – **CABIN CREW . . . . PUSH DOOR TO OPEN**

● **If there is no reaction from the flight crew :**

– **CABIN CREW SECOND ACCESS . . . . REQUEST ON KEYPAD**
Repeat the above procedure.

● **If there is no reaction from the flight crew, after a second request :**

– **CABIN CREW . . . . CALL THE COCKPIT**
To establish contact with the flight crew and request access to the cockpit.

● **If there is no reaction from the flight crew, after a cabin crew interphone call :**

– **CABIN CREW . . APPLY THE FOLLOWING EMERGENCY ACCESS PROCEDURE**

– **EMERGENCY ENTRY CODE . . . . ENTER and PRESS #**
The emergency entry code is an Operator-defined figure between 2 and 7 digits. A buzzer will sound continuously in the cockpit and the keypad's green light flashes. After a preselected time between 15 and 120 seconds, the keypad's green light comes on steady, and the cabin crew can then push the door open.

– **CABIN CREW . . . . PUSH DOOR TO OPEN**
The cockpit door unlocks for 5 seconds.
The buzzer stops and indicates that the door is unlocked.

GENERAL

The fly-by-wire system has been designed and certificated to make the new generation of aircraft more cost effective and safer and smoother to fly or ride in than a conventional aircraft.

NORMAL OPERATIONS

The pilot uses the sidestick to fly the aircraft in pitch and roll (and indirectly, through turn coordination, in yaw).
Except for the takeoff or the landing, the rudder pedals are not used during the flight in normal conditions.
The computers interpret the pilot's inputs and move the control surfaces as necessary.
However, regardless of the pilot's inputs the computers will prevent :

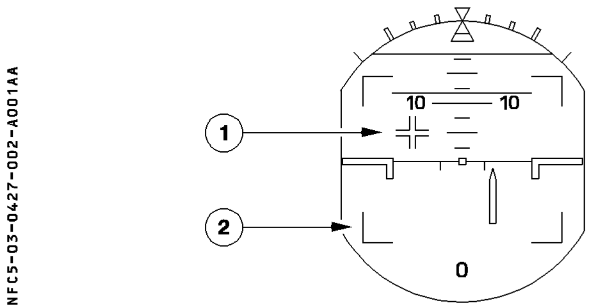
R — excessive load factor
— loss of control leading to excursions outside the safe flight envelope.

AIRCRAFT ON THE GROUND

At ground speeds below 70 knots, the sidesticks have full authority over the controls in pitch and roll to permit control checks.
At ground speeds above 70 knots, the authority in pitch is reduced from 30° up to 20° up.
In this ground mode, movements of the control surfaces in pitch and roll correspond directly to the stick inputs.
With the aircraft in the normal configuration and engines running on the ground :

- when the wheel brakes are released, the aircraft usually rolls with no added thrust.
- nose wheel steering is "fly.by.wire", with no mechanical connection between the nose wheel and the steering tiller. The control forces are light : the flight crew should be careful to move the tiller gently to avoid unnecessarily high-rate turns.

The aircraft can make very tight turns, but the flight crew should resist any tendency to overcontrol. When making tight turns at low ground speed, the crew should hold the selected tiller position, even if the turn radius is shorter than intended, so as to maintain a smooth turn.

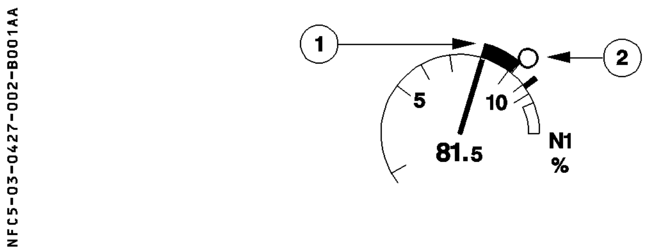


The PFD includes a symbol (1) that is the sum of sidestick positions given to the computers. It permits the PNF to check that the PF is making an appropriate control input
R during takeoff roll.
Small limit marks (2) indicate the limits of stick travel (± 16° in pitch, ± 20° in roll).
They are only displayed with the aircraft on ground. The flight crew must not use this display for control checks, because it does not necessarily indicate the control position in failure cases. The flight crew must use the ECAM flight controls page for making that check.

IN FLIGHT

TAKEOFF MODE

R



Thrust management is very easy. The pilot selects a FLX thrust by stopping the thrust levers in the FLX/MCT detent, and by checking that the resulting N1 (or EPR) (1) is compatible with N1 (or EPR) target (2). For maximum takeoff thrust, the pilot moves the thrust levers fully forward and performs the same thrust check (N1 or EPR).
To counter the nose-up effect of setting engine takeoff thrust, the pilot should apply half forward stick, until the airspeed reaches 80 knots. Then, he should release the stick
R gradually to reach neutral at 100 knots (Refer to SOP 3.03.12 for additional information).

Rotation is conventional. It takes about 1/3 to 1/2 back stick. The pilot continues the rotation to a typical all-engine attitude of about 15°. As the attitude changes and stabilizes, the control laws change to those for the flight mode in pitch, allowing the sidestick to return to the neutral position to maintain 1g at the chosen attitude. Pitch trim can begin to work at 50 feet.

R For crosswind takeoffs, routine use of into wind aileron is not recommended. In strong
R crosswind conditions, some lateral control may be used, but care should be taken to avoid
R using large deflections, resulting in excessive spoiler deployment which increases the
R tendency to turn into wind, reduces lift and increases drag. Spoiler deflection starts to
R become significant with more than one third sidestick deflection. As the aircraft lifts off,
R any lateral control applied will result in a roll rate demand.

FLIGHT MODE

Normally the sidestick is in the neutral position, with the aircraft stable in pitch and roll at the chosen altitude in straight or turning flight within certain limits. As a result, even in turbulence, the aircraft is flown best with little or no stick input.

Hands off, the system maintains 1g in pitch, corrected for pitch and roll attitude, and zero roll rate, within certain limits (+ 30°, – 15° in pitch and ± 33° roll). Hands off, within these limits the aircraft resists disturbance from the atmosphere and rides well even in heavy turbulence.

The system compensates almost 100% for changes of trim due to changes in speed and configuration. Changes of trim due to changes in thrust can be too large for the system to compensate, and the aircraft may respond to them in pitch in the conventional sense and then hold the new attitude at which it has stabilized after the trim change.

The pitch trim wheel moves as the control law compensates for these changes.

The control laws also make turning easier. They protect against overbanking, and at the chosen bank attitude (less than 33° of bank) the system maintains zero roll rate, stick free.

Steep turns can be made at up to 67° of bank. This is the steepest bank at which it is possible to maintain level flight at 2.5g.

Beyond 33° of bank, the pitch trim stops working and a lateral stability term is introduced. This term becomes progressively stronger as bank angle increases, so that it equals a full sidestick demand at 67° of bank, hence forming the limiting system.

The lack of pitch trim makes it necessary for the pilot to hold the nose up in a steep turn. If he releases the stick, the nose drops and the aircraft eases its roll angle to less than 33° of bank and stabilizes at the pitch and bank angles it achieves at less than 33° of bank.

During a normal entry into a turn, the pilot must make an intentional initial change to the pitch attitude in order to maintain level flight. Once he has done this, he can release the stick. The system then maintains a level turn.

In climb, cruise, descent, and approach all these basic rules remain in effect.

LANDING MODE

The system's landing mode gives the aircraft a stabilized flight path and makes a conventional flare and touchdown. It carries out the initial approach as this manual described earlier. At 50 feet, the system memorizes the attitude, usually 3° or 4° nose up. From 30 feet down, this value washes out over eight seconds to – 2°. The result is that the pilot has to exert a progressive pull to increase pitch gently in the flare. He should pull the thrust levers back at or above 20 feet, and the landing should occur without a long flare. Touchdown quality is better and more repeatable at fairly flat attitudes. An audible "RETARD" callout reminds the pilot if he has not pulled back the thrust levers when the aircraft has reached 20 feet.

R Crosswind landings are conventional. The preferred technique is to use the rudder to align
R the aircraft with the runway heading, during the flare, while using lateral control to maintain
R the aircraft on the runway centerline (Refer to SOP 3.03.22). The lateral control mode does not change until the wheels are on the ground, so there is no discontinuity in the control laws. The aircraft tends to roll gently in the conventional sense as drift decreases, and the pilot may have to use some normal cross control to maintain roll attitude.

Even during an approach in considerable turbulence, the control system resists the disturbances quite well without pilot inputs. In fact, the pilot should try to limit his control inputs to those necessary to correct the flight path trajectory and leave the task of countering air disturbances to the flight control system.

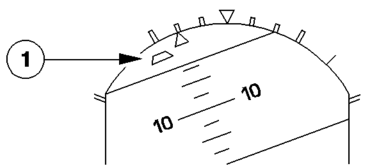
Derotation is conventional. The pilot releases the back pressure he was holding for the flare and the nose wheel comes down nicely.

Pitch trim then resets to zero.

ABNORMAL OPERATIONS

ENGINE FAILURE AT TAKEOFF

NFC5-03-0427-004-A001AA



On the ground the aircraft is conventional. The pilot uses rudder to maintain direction. He should rotate to about 12.5° of pitch and adjust as required. The sideslip indication (1) changes to the engine-out mode (blue). When it is centered, the aircraft is close to the zero aileron position (best drag condition). It is therefore important to zero the slip indication accurately.

Trim the rudder conventionally.

When time permits, the pilot should check the ECAM's FLT CTL page, and refine the rudder trim to give neutral lateral control, and also trim the rudder toward the spoilers that are up or toward the aileron that is farthest up to bring the lateral controls back to neutral.

ENGINE-OUT LANDING

The engine-out landing is basically a conventional landing. The pilot should trim to maintain the slip indication centered. It is yellow, as long as N1 is less than 80%. Between 100 and 50 feet, the pilot he can reset rudder trim to make the landing run easier, and to recover full rudder travel in both directions.

BOUNCE AT LANDING

In case of a light bounce, maintain the current pitch attitude and complete the landing, while maintaining the thrust at idle. In case of a strong bounce, initiate a go-around, initially maintaining the pitch attitude. Retract the flaps one step, and then the landing gear, once the aircraft is properly established on the go-around segment. In all cases, do not attempt to soften the (potential) second touchdown by increasing the pitch attitude.

TRAINING TOUCH-AND-GO

With the nosewheel on ground, pitch trim automatically resets to zero. The pilot should select CONF 2 and add thrust. He must always move the thrust levers to TOGA to bring up the speed reference system (SRS), and then reduce to a lower thrust (not less than CL), if he chooses. Takeoff may be a little out of trim, which may affect the rotation slightly, but once the aircraft is off the ground, the control law holds the “out of trim”, then retrims at 50 feet.

STALL WARNING

An aural "STALL", warning continuously sounds at low speeds in ALTN or DIRECT laws. However, spurious stall warning may sound in NORMAL law, if an Angle-Of-Attack (AoA) is damaged. In any case, upon hearing it, the pilot must return to the normal operating speed by taking conventional actions with the controls :

■ **At lift-off :**

THRUST LEVERS . . . . TOGA
At the same time :
PITCH ATTITUDE . . . . 12.5°
BANK ANGLE . . . . ROLL WINGS LEVEL
SPEEDBRAKES . . . . CHECK RETRACTED

Note : When a safe flight path and speed are achieved and maintained, if stall warning is still activated, consider a spurious stall warning

■ **During any other flight phases after lift-off :**

THRUST LEVERS . . . . TOGA
At the same time :
PITCH ATTITUDE . . . . REDUCE
BANK ANGLE . . . . ROLL WINGS LEVEL
SPEEDBRAKES . . . . CHECK RETRACTED

CAUTION

If a risk of ground contact exists, reduce pitch attitude no more than necessary to allow airspeed to increase

● **After initial recovery :**
Maintain the speed close to V Stall Warning speed (VSW), until it is safe to accelerate

● **If in clean configuration and below 20 000 feet :**
FLAP 1 . . . . SELECT

● **When out of stall and if no threat of ground contact :**
LANDING GEAR . . . . UP
– Recover normal speeds, and select flaps as required
– In case of one engine inoperative, use power and rudder with care

The aural stall warning may also sound at high altitude, where it warns that the aircraft is approaching the angle of attack for the onset of buffet. To recover, the pilot must relax the back pressure on the sidestick and reduce bank angle, if necessary. When the stall warning stops, the pilot can increase back pressure again, if necessary, to return to the planned trajectory.

ABNORMAL CONTROL LAWS - GENERAL

ALTERNATE LAW

Pitch alternate and roll direct is the first level of degraded control law, resulting from some double failures.
The autopilot may be available, depending on the cause and type of failure(s).

DIRECT LAW

The sidestick is directly coupled to the controls via the computers, but without any of the stabilization feedbacks. In effect, this law turns the aircraft into a conventional aircraft, but is compensated for configuration and CG. The pilot must use manual pitch trim, as is signaled on the PFD. The autopilot is not available.

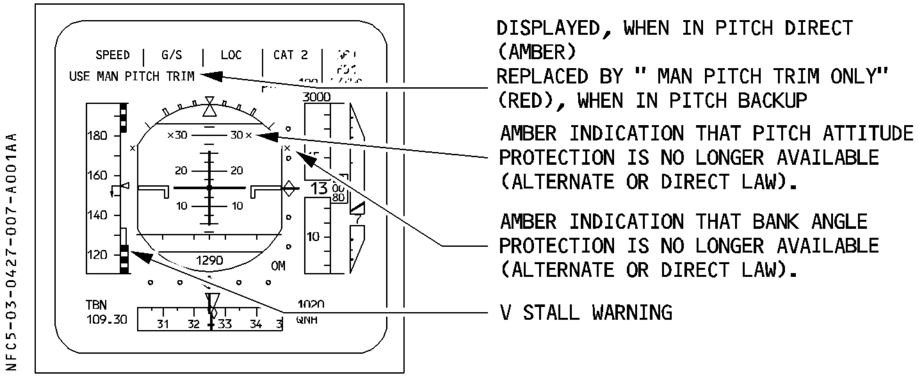
MECHANICAL BACKUP

The pilot can use the pitch trim and rudder to control the aircraft for short periods of total loss of fly-by-wire.

ABNORMAL CONTROL LAWS - IN DETAIL

ALTERNATE LAW

Pitch
Alternate law in pitch is almost the same (for the pilot) as the normal control laws.
However, alternate law does not maintain any of the protections, except for the load factor limitation. As a result, the pilot must fly the aircraft more attentively to avoid inadvertently exceeding the normal limits.
Alternate law reduces VMO to 320 knots to restore a normal aircraft speed margin in case of upset. This is not necessary in the Mach range, because the margin there is, in any case, conventional.



At low speed the change in the speed scale is very noticeable. VLS remains, but Vα PROT and Vα MAX disappear, replaced by a single black and red strip the top of which is stall warning speed. Unlike VLS which is stable, VSW is g sensitive so as to give additional margin in turns.
As mentioned above, ALTERNATE reverts to DIRECT law for landing when the flight crew lowers the landing gear.

Roll
Roll control is direct. The rate of roll is generally higher than with normal law and at first the aircraft appears to be very sensitive.
Bank stability and protections are no longer active and the flight crew should take care to stay within normal limits.

DIRECT LAW

Normally direct law in pitch is transitory, due to undetected failures of, for example, a second IRS. Once the flight crew has isolated the failed system, it can reset the ELACs to acquire alternate law in pitch.
When the system goes into direct law, “USE MAN PITCH TRIM” appears on the PFDs. This message flashes for 5 seconds, then becomes steady.
The pilot should use small control inputs when the aircraft is in direct law at high speed, because the controls are powerful. Good trimming in pitch is required.
The pilot should avoid using large thrust changes or sudden speedbrake movements, particularly if the center of gravity is aft. If the speedbrakes are out and the aircraft has been retrimmed, the pilot should retract the speedbrakes gently, giving time to retrim so as to avoid a large nose-down trim change.
The flight crew must fly the aircraft carefully at all times. Control is precise, but there are no protections.
The aural stall warning for alternate law also serves direct law, and the technique for recovery is the same.
Any tendency to roll stick free can be corrected by conventional use of rudder. Residual rudder forces can be trimmed out by using rudder trim in the direction of the applied force.

After trimming, the sideslip index will be slightly displaced from center. With some failure conditions the asymmetric rolling tendency may be increased. It will always be possible to trim the aircraft to fly straight, hands off. There may then be an asymmetry in roll response, but the roll rate achieved is always adequate.
Landing in direct law is like landing a conventional aircraft. Trim changes to compensate for configuration changes are small, as is the trim change with speed change. Trim change with a large thrust change is quite large, so the pilot should make smooth thrust changes. The flare height for landing is the same (20 feet), and the pilot uses conventional techniques. (The controls remain light and powerful).
Pilots have landed this aircraft in direct law in moderate to heavy turbulence with gusting winds without undue difficulty.
Direct law works with or without the yaw damper. The aircraft is always convergent in dutch roll, so if an oscillation begins it will stop itself if not excited. To stop dutch roll the pilot should use lateral inputs, not rudder.

THE PROTECTION SYSTEMS

GENERAL

The aircraft has a comprehensive flight envelope protection system.
This system increases safety if the pilot has to make an extreme maneuver or the aircraft enters a very violent meteorological situation.
In either of these situations, the pilot can make full sidestick inputs in normal laws at any speed. The rudder is not protected in this way, but is not normally used during symmetrical flight.
The pilot will never see any aspect of this envelope protection take effect as long as he flies the aircraft normally.

Note : *The normal flight envelope is not different from that of a conventional aircraft, and is defined as VLS to VMO. Pilots should not deliberately fly at a speed that is lower than VLS except for properly authorized training or testing.*

PITCH ATTITUDE PROTECTION

The system limits the aircraft to 67° of bank, which corresponds approximately to the bank angle needed for a level 2.5g turn.
The system limits pitch attitude to + 30° and – 15°. The + 30° limit decreases to 25° at low speed. If the aircraft attitude approaches these limits, the pitch and roll rates start to decrease 5° before the limit so that it will stop at the limit without overshooting.

LOAD FACTOR LIMITATION

The aircraft is structurally designed to the same limits as any other large aircraft. The 2.5g limit (2g with flaps extended) allows the aircraft to make an abrupt maneuver without structural risk if such a maneuver becomes necessary.
When this occurs (after a ground proximity warning, for example), the pilot should quickly apply full control and hold it until the flight path is safe. Response time is a vital factor in avoidance : the system allows maneuvers that the pilot would not normally be able to perform safely at any altitude, low or high.

EXCEEDING VMO/MMO

During climb, cruise or descent the aircraft may slightly exceed VMO/MMO with the autopilot (AP) engaged. This may occur when adverse conditions are encountered.
Using the following procedure prevents such an exceedance :
1. In case of turbulence, adapt speed or Mach target. If severe turbulence is known, or forecasted, consider the use of turbulence speed.
2. The current speed is close to the VMO (maximum operating speed) :
   - Monitor the speed trend symbol on the PFD :
     - If the speed trend reaches, or slightly exceeds, the VMO limit :
       - Use the FCU immediately to select a lower speed target.
     - If the speed trend significantly exceeds the VMO red band, without high speed protection activation :
       - Select a lower target speed on the FCU and, if the aircraft continues to accelerate, consider disconnecting the AP.
       - Before re-engaging the AP, smoothly establish a shallower pitch attitude.
3. If the aircraft accelerates above VMO with the AP engaged :
   The AP will disengage on reaching the high speed protection. The high speed protection will apply a nose-up order up to 1.75 g, in addition to pilot input during VMO recovery. Therefore :
   - Make a smooth pitch correction, to recover proper speed.

In all events :
R — Speedbrakes may be used if the aircraft exceeds VMO/MMO. However, use
R speedbrakes with caution when close to the ceiling.
- Check the AP engagement status and re-engage it when appropriate. It may have tripped, if VMO/MMO was significantly exceeded. The associated aural warning may have been superseded by the overspeed aural warning.

HIGH SPEED PROTECTION

The aircraft automatically recovers following a high speed upset. Depending on the flight conditions (high acceleration, low pitch attitude) the high speed protection is activated at/or above VMO/MMO.
When it is activated, the pitch trim is frozen, spiral static stability is introduced to 0° bank angle (instead of 33° in normal law), and the bank angle limit is reduced from 67° to 45°.

As the speed increases above VMO/MMO, the sidestick nose-down authority is progressively reduced, and a permanent nose-up order is applied to aid recovery to normal flight conditions.
The High Speed Protection is deactivated when the aircraft speed decreases below VMO/MMO, where the usual normal control laws are recovered.
The flight crew should never deliberately fly the aircraft beyond VMO/MMO, unless absolutely necessary for operational reasons, such as avoiding another aircraft.
The pilot should, as soon as possible, reduce resistance to the High Speed Protection and allow the aircraft to return to a speed below VMO/MMO, by smoothly relaxing the forward stick force to attain a comfortable nose-up pitch rate. It is not usually necessary to apply a pull force to recover. If a quicker recovery is required for operational reasons, the pilot should pull back smoothly and progressively, monitoring the g indication on the ECAM".

HIGH ANGLE OF ATTACK PROTECTION

The aircraft resists attempts by either a pilot or the atmosphere to stall it. If a pilot attempts a stall, he feels the aircraft trying to pitch down as speed approaches the amber and black strip. The pilot can resist this tendency until speed reaches the red band (alpha maximum), and then further nose-up control is not available. Between these two points, αfloor automatically sets go around thrust. The pilot can hold full back stick, if it is needed (see windshear), and the aircraft stabilizes at an angle of attack close to but short of the 1g stall.
WHEN FLYING AT αmax, THE PILOT CAN MAKE GENTLE TURNS, IF NECESSARY.
As the aircraft enters protection at the amber and black strip. (αprot), the system inhibits further nose-up trim beyond the point already reached. Nose-down trim remains available if the pilot pushes the stick forward.
The pilot should not deliberately fly the aircraft in αprot except for brief periods when maximum maneuvering is required. If the pilot enters αprot inadvertently, he should get out of it as quickly as possible by easing forward on the sidestick to reduce the angle of attack while simultaneously adding power (if αfloor has not already been activated or has been cancelled). The system will regain the normal load factor law if the stick is pushed forward of neutral, but it will re-enter αprot if the stick is released with the angle of attack still greater than the value set for αprot. Thus to exit αprot properly, the pilot should reduce angle attack to a value less than the value set for αprot.
The PFD shows this clearly, because the indicated speed is above the black and amber strip.
The pilot should now increase speed above VLS (clear of the amber strip) as soon as other considerations (ground clearance, for example) allow him to do so.
αfloor will usually be triggered just after αprot is entered, and go around thrust will automatically be applied. Thus, if the sidestick is held aft, either inadvertently or deliberately, the aircraft will start to climb at a relatively constant low airspeed. To recover to a normal flight condition, αprot should be exited by easing forward on the sidestick, as described above, and the αfloor should be cancelled by using the disconnect pushbutton on either thrust lever as soon as a safe speed is regained.

LOAD FACTOR LIMITATION

The aircraft is structurally designed according to the same limits as any other large aircraft. The 2.5g limit (2g with flaps extended) enables the aircraft to make an abrupt maneuver without structural risk, if such a maneuver becomes necessary.
When this occurs (after a ground proximity warning, for example), the pilot should quickly apply full control and hold it until the flight path is safe. Response time is a vital avoidance factor : The system allows maneuvers that the pilot would not normally be able to safely perform at any altitude, low or high.

EXCEEDING VMO/MMO

During climb, cruise or descent, the aircraft may slightly exceed VMO/MMO with the autopilot engaged. This may occur, when adverse conditions are encountered.
Using the following procedure prevents such an exceedance :
1. In case of turbulence, adapt speed or Mach target. If severe turbulence is known or forecasted, consider use of turbulence speed.
2. The current speed is close to VMO (maximum operating speed) :
   - Monitor the speed trend symbol on the PFD :
     - · If the speed trend reaches, or slightly exceeds, the VMO limit :
       - Use the FCU immediately to select a lower speed target.
     - · If the speed trend significantly exceeds the VMO red band, without high speed protection activation :
     - Select a lower target speed on the FCU and, if the aircraft continues to accelerate, consider disconnecting the AP.
     - Before re-engaging the autopilot, smoothly establish a shallower pitch attitude.
3. If the aircraft accelerates above VMO, with the AP engaged :
   The AP will disengage upon reaching the high speed protection. The high speed protection will apply a nose-up order, up to 1.75 g, in addition to pilot input during VMO recovery. Therefore :
   - Make a smooth pitch correction, to recover proper speed.

In all events :
R – Speedbrakes may be used if the aircraft exceeds VMO/MMO. However, use
R speedbrakes with caution when close to the ceiling.
- Check the AP engagement status and re-engage it when appropriate. It may have tripped, if VMO/MMO was significantly exceeded. The associated aural warning may have been superseded by the overspeed aural warning.

HIGH SPEED PROTECTION

The aircraft automatically recovers following a high speed upset. Depending on the flight conditions (high acceleration, low pitch attitude), the High Speed Protection is activated at, or above, VMO/MMO.
When it is activated, spiral static stability is introduced to 0° bank angle (instead of 33° in normal law), and the bank angle limit is reduced from 67° to 45°.

As the speed increases above VMO/MMO, the sidestick nose-down authority is progressively reduced, and a permanent nose-up order is applied to aid recovery to normal flight conditions.
The High Speed Protection is deactivated when the aircraft speed decreases below VMO/MMO, where the usual normal control laws are recovered.
The flight crew should never deliberately fly the aircraft beyond VMO/MMO, unless absolutely necessary for operational reasons, such as avoiding another aircraft.
The pilot should, as soon as possible, reduce resistance to the High Speed Protection and allow the aircraft to return to a speed below VMO/MMO, by smoothly relaxing the forward stick force to attain a comfortable nose-up pitch rate. It is not usually necessary to apply a pull force to recover. If a quicker recovery is required for operational reasons, the pilot should pull back smoothly and progressively, monitoring the g indication on the ECAM".

HIGH ANGLE OF ATTACK PROTECTION

The aircraft resists attempts by either a pilot or the atmosphere to stall it. If a pilot attempts a stall, he feels the aircraft trying to pitch down as speed approaches the amber and black strip. The pilot can resist this tendency until speed reaches the red band (alpha maximum), and then further nose-up control is not available. Between these two points, αfloor automatically sets go around thrust. The pilot can hold full back stick, if it is needed (see windshear), and the aircraft stabilizes at an angle of attack close to but short of the 1g stall.
WHEN FLYING AT αmax, THE PILOT CAN MAKE GENTLE TURNS, IF NECESSARY.
As the aircraft enters protection at the amber and black strip. (αprot), the system inhibits further nose-up trim beyond the point already reached. Nose-down trim remains available if the pilot pushes the stick forward.
The pilot should not deliberately fly the aircraft in αprot except for brief periods when maximum maneuvering is required. If the pilot enters αprot inadvertently, he should get out of it as quickly as possible by easing forward on the sidestick to reduce the angle of attack while simultaneously adding power (if αfloor has not already been activated or has been cancelled). The system will regain the normal load factor law if the stick is pushed forward of neutral, but it will re-enter αprot if the stick is released with the angle of attack still greater than the value set for αprot. Thus to exit αprot properly, the pilot should reduce angle attack to a value less than the value set for αprot.
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αfloor will usually be triggered just after αprot is entered, and go around thrust will automatically be applied. Thus, if the sidestick is held aft, either inadvertently or deliberately, the aircraft will start to climb at a relatively constant low airspeed. To recover to a normal flight condition, αprot should be exited by easing forward on the sidestick, as described above, and the αfloor should be cancelled by using the disconnect pushbutton on either thrust lever as soon as a safe speed is regained.

The aircraft can also enter αprot at a high level, where it protects the aircraft from the
R buffet boundary. As at low speed or low level, if the sidestick is merely released to neutral, the aircraft maintains the alpha for αprot. (However, this value of alpha is not the same as the value used at low speed : Alpha for αprot is reduced as a function of Mach, so that a typical cruise value is about 3.5° for the A318 and A321 aircraft, or 4.5° for the A319 and A320 aircraft). Therefore, the aircraft may climb, with the sidestick free, when leaving a turn after entering αprot. If the pilot has flown into αprot, he should leave it as soon as other considerations allow, by easing forward on the sidestick to reduce alpha below the value of αprot, while simultaneously increasing thrust or speed as appropriate.

WINDSHEAR

Most of the recommended techniques for flight in windshear also apply to the A320 aircraft family. But for these aircraft, the techniques are somewhat simpler.
The aircraft can only survive windshear, if it has enough energy to carry it through the loss-of-performance field. The aircraft can sustain this energy level in the following three ways :
- Carry extra speed. The aircraft does this automatically in some cases.
- Add maximum thrust. The aircraft does this automatically.
- Trade height energy for speed. Any aircraft can do this.

Proper pilot technique helps in this survival process. The pilot must follow orders from the Speed Reference System (SRS) or, if the FD is not available or is switched OFF for a visual approach, maintain 17.5° of pitch, even if he has to use full backstick in order to do so. At this stage, maintain full backstick until the shear is passed. The aircraft will automatically hold close to the maximum Angle-Of-Attack. The speed should stay near to the beginning of the red strip. However, in turbulence, the speed can be temporarily below the red strip without significant effect. As speed begins to recover, the pilot can reduce backstick, while still following SRS orders until well clear of the shear.

ABNORMAL CONFIGURATIONS

In some flight control failure cases, such as loss of control of both elevators, or loss of flaps or slats, the landing configuration is Configuration 3.
With the horizontal stabilizer jammed, control is much easier than it is on a conventional aircraft, because the integrator holds the elevator required to maintain the 1g flight path. The control laws remain normal to touchdown.

AIRCRAFT TRIMMING

When the aircraft is :
– In normal cruise range (around M.77),
– In straight flight,
– With the autopilot engaged,
– With symmetrical engine thrust, and
– With fuel in the wing tanks distributed symmetrically,
the rudder trim should stay between 1° right and 2.3° left.

Note : *This indication corresponds to a true rudder deflection within ± 1.5°, taking into account the permanent offset of rudder trim indication, when the aircraft is in cruise conditions. (average 0.5° right, 0.8° left).*
An indicated, rudder trim above 1° right or 2.3° left is acceptable, if maintenance personnel establishes that the corresponding real rudder position is within 1.5° left, and 1.5° right.

FQI IN DEGRADED MODE

If, on upper ECAM display the FOB indication is displayed with two dashes across the two least significant digits, the FQI is in degraded mode.
In this case, the ECAM FUEL page must be called on ECAM lower display to determine which tank is affected.
The loss of accuracy resulting from the loss of FQI normal mode is as follows :

wing outer cell affected	: + 20 kg (+ 45 lb), – 200 kg (– 440 lb)
wing inner cell affected	: ± 110 kg (240 lb).
center tank affected	: ± 130 kg (290 lb).
all tanks affected	: + 390 kg (+ 860 lb), – 750 kg (– 1660 lb).

FQI IN DEGRADED MODE

If, on upper ECAM display the FOB indication is displayed with two dashes across the two least significant digits, the FQI is in degraded mode.
In this case, the ECAM FUEL page must be called on ECAM lower display to determine which tank is affected.
The loss of accuracy resulting from the loss of FQI normal mode is as follows :

wing tank affected	: + 130 kg (+ 290 lb), – 310 kg (– 690 lb).
center tank affected	: ± 130 kg (290 lb).
all tanks affected	: + 390 kg (+ 860 lb), – 750 kg (– 1660 lb).

ICING CONDITIONS

Icing conditions may be expected when the OAT (on ground and for takeoff), or when the TAT (in flight) is at or below 10°C, and there is visible moisture in the air (such as clouds, fog with low visibility of one mile or less, rain, snow, sleet, ice crystals) or standing water, slush, ice or snow is present on the taxiways or runways.

WARNING

Pilots must turn on the engine anti-ice system, when temperature and visible moisture meet these criteria, and should not wait until they see ice building up.

OPERATIONS IN ICING CONDITIONS

Flight in icing conditions

- **Engine anti-ice**

  ENGINE ANTI ICE must be ON during all ground and flight operations, when icing conditions exist, or are anticipated, except during climb and cruise when the SAT is below – 40° C.

  ENGINE ANTI ICE must be ON before and during a descent in icing conditions, even if the SAT is below – 40° C.

- **Wing anti-ice**

  WING ANTI ICE may either be used to prevent ice formation, or to remove ice accumulation from the wing leading edges.

  WING ANTI ICE should be selected ON, whenever there is an indication that airframe icing exists. This can be evidenced by ice accumulation on the visual ice indicator (located between the two cockpit windshields), or on the windshield wipers.

CAUTION

1. Extended flight, in icing conditions with the slats extended, should be avoided.
2. If there is evidence of significant ice accretion and to take into account ice formation on non heated structure, the minimum speed should be :
   - In configuration full, VLS + 5 knots, and the landing distance must be multiplied by 1.1.
   - In configuration lower than FULL, VLS + 10 knots, and the landing distance in CONF 3 must be multiplied by 1.15.

R 3. If there is evidence of ice accretion on de-iced parts (WING ANTI ICE inoperative)
R of the airframe, the minimum speeds should be :
R – In clean configuration, VLS + 15 knots.
R – In CONF 1, 2, 3, FULL, VLS + 10 knots, refer to QRH part 2 or FCOM 3.02.80
R for landing distance determination.

R **RAIN REPELLENT** ◁

R If the rain repellent is operative, the flight crew should only use the rain repellent in
R moderate to heavy rain.

GROUND OPERATIONS IN HEAVY RAIN

When the aircraft is parked on the ground during heavy rain, it can take rainwater into the avionics ventilation system via the open skin air inlet valve.
To prevent this, the following procedure must be applied :

- **After landing :**

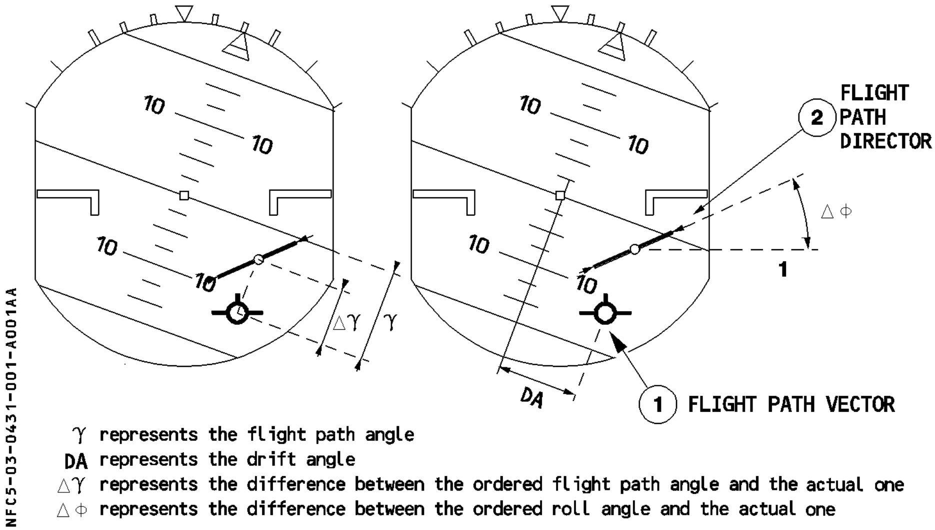
  – **EXTRACT** . . . . **OVRD**
  This closes the avionics ventilation system, preventing rainwater from entering.

  – **PACKS 1 and 2** . . . . **CHECK ON**
  This adds air from the air conditioning system to ventilation air. If bleed air is not available, the arrangement can function for a limited time, as follows :
  · OAT ≤ 39°C : no limit
  · 39°C ≤ OAT ≤ 45°C : 3 hours
  · OAT ≥ 45°C : 30 minutes

- **After takeoff :**

  – **EXTRACT** . . . . **AUTO**

USE OF FLIGHT PATH VECTOR



Υ represents the flight path angle
DA represents the drift angle
ΔΥ represents the difference between the ordered flight path angle and the actual one
ΔΦ represents the difference between the ordered roll angle and the actual one

The flight path vector (FPV) indicates performance and does not direct or command. Because there is always a slight lag between an attitude change and the change in flight path that results from it, when the pilot uses the FPV he should make an attitude change first, then use the FPV to check the resulting flight path.
Vertically the FPV indicates the aircraft's flight path angle.
The FPV is particularly useful when the aircraft is doing visual circuits. For example, when the aircraft is flying downwind the pilot simply adjusts the aircraft attitude to put the FPV symbol on the horizon. This establishes the aircraft in level flight. On the final approach, the pilot puts the FPV three degrees below the horizon to establish the aircraft at a normal angle of descent. If this results in the aircraft going below the chosen approach path (undershooting the touchdown point), the pilot can reduce the angle of descent by raising the FPV. As soon as the aircraft regains the correct descent path, he should bring the FPV back to –3°.
Laterally, the FPV indicates the aircraft's track and its drift angle. It has the same displacement as the drift diamond on the heading scale and thus appears directly above it. It shows on the PFD the drift the aircraft is experiencing.
The pilot must take care when making a go-around with the FPV selected. There is inevitably some lag between the pilot's raising the nose to commence the go-around and the aircraft's responding by changing its trajectory. For the same reason the pilot does not use the FPV on takeoff: the primary parameter for rotation, either on takeoff or on go-around, is attitude.

The TRK-FPA Flight Director is particularly useful for guiding the aircraft during non-precision approaches, although it can also be used at other times. When using this mode of the FD, the pilot places the FPV symbol in the center of the flight path director (FPD) symbol. This is similar to using the FD in HDG-V/S, when the pilot puts the center of the fixed aircraft symbol at the center of the crossed bars of the FD. If the FCU is set on the correct track and flight path angle, and if the FPV and the FPD are aligned, they will guide the aircraft along a trajectory that is stabilized with respect to the ground, whereas when the pilot is using HDG-V/S the trajectory is stabilized with respect to the air. However, if the aircraft is disturbed from this ideal trajectory, merely following the FPD will result in its following a trajectory that is parallel to the intended trajectory. Thus, when the aircraft is disturbed from the original trajectory, the pilot must adjust either its track or its flight path angle or both in order to obtain guidance back to the original trajectory. Likewise, when the pilot uses the FPA to create a synthetic glide path, it will be positioned correctly only if it commences at the right point in space.

BSCU RESET

R A reset of the BSCU is only authorized :
R – On ground for :
R <u>BRAKES</u> SYS 1(2) FAULT or <u>BRAKES</u> BSCU CH 1(2) FAULT
R <u>WHEEL</u> N.W.STEER FAULT or <u>WHEEL</u> N/W STRG FAULT in order to go back to the gate
R for troubleshooting. Taxi with care, at a taxi speed of 10 kt.
R The BSCU reset should be performed on ground with aircraft stopped and parking brake
R applied, by switching the A/SKID&N/W STRG selector OFF then ON.
R After any BSCU reset on ground, check the braking efficiency of the normal braking
R system, as soon as the aircraft starts moving again (the aircraft must slow down when
R pressing the brake pedals).

R *<u>Note</u> : If a BRAKES BSCU CH 1(2) FAULT or SYS 1(2) FAULT cannot be cleared by using*
R *the A/SKID&N/W STRG selector, a further reset may be attempted by using the*
R *BSCU circuit breakers to clear the fault.*

R – <u>In flight for :</u>
R <u>BRAKES</u> SYS 1(2) FAULT or <u>BRAKES</u> BSCU CH 1(2) FAULT
R The BSCU reset should be performed with landing gear retracted, by switching the
R A/SKID&N/W STRG selector OFF then ON.
R If required, rearm the autobrake.
R After any BSCU reset, a record in the logbook is mandatory to ensure that troubleshooting
R is systematically done, in order to investigate the failure before the next flight.

BRAKING IN ALTERNATE MODE

Apply brakes with care, because initial pedal force or displacement produces more braking action in alternate mode than in normal mode. If antiskid is lost, modulate brake pressure at, or below, 1000 psi. If the nosewheel steering is lost, steer the aircraft with differential braking.

BRAKE TEMPERATURE LIMITATIONS REQUIRING MAINTENANCE ACTIONS

Maintenance action is required in the following cases :

- The temperature difference between the 2 brakes on the same gear is greater than 150°C, and the temperature of either one of the brakes is higher than or equal to 600°C, or
- The temperature difference between the 2 brakes on the same gear is greater than 150°C, and the temperature of one brake is lower than or equal to 60°C, or
- R The difference between the average temperature of the left gear brakes and the average
R temperature of the right gear brakes is 200°C or more, or
- A fuse plug has melted, or
- One brake's temperature exceeds 900°C.

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- R The difference between the average temperature of the left gear brakes and the average
R temperature of the right gear brakes is 200°C or more, or
- A fuse plug has melted, or
- One brake's temperature exceeds 800°C.

OPERATION WITH NOSEWHEEL STEERING OFFSET

GENERAL

During taxi, the crew may notice an aircraft veering tendency. This can be due to some external conditions (crosswind, slope....), or it can be due to the nosewheel steering system itself. The latter case is identifiable due to flight crews' consecutive reports of permanent aircraft veering tendency. Such reports enable maintenance to determine when corrective action or troubleshooting is required.
A veering aircraft may still be operated before corrective action is taken, provided nosewheel steering deviation is within the values specified in the following table.

NWS OFFSET OPERATIONAL LIMITATION

R

NWS Offset	Offset ≤ 0.5°	0.5° < Offset ≤ 1.5°	Offset > 1.5°
Rudder trim to taxi straight	Trim ≤ 3°	3° < Trim ≤ 8.8°	Trim > 8.8°
Dispatch	YES	YES	NO
Procedures	No operational limitation	Apply the following procedure : Autoland : – MAX X WIND 10KT	Immediate maintenance action is due

CAUTION

R The tolerance required by maintenance guidelines (± 0.5° NWS offset, corresponding to the ± 3° rudder trim necessary to taxi straight) remains valid. Operating the aircraft outside the maintenance tolerance is possible by using the applicable procedure. However, in such cases, the flight crew must accurately and systematically make logbook entries (indicating the rudder trim input value to taxi straight) to ensure that maintenance can take corrective action within the applicable timeframe.
When using rudder trim to taxi straight for NWS offset identification, takeoff must only be performed after a rudder trim reset.

TIRE PRESSURE

These charts present the various nominal tire pressures, depending on maximum taxi weight, tire type, and landing gear configuration (shock absorbers extended, or compressed).

	PRESSURE				PRESSURE			
	Unloaded		Loaded		Unloaded		Loaded	
	bar	psi	bar	psi	bar	psi	bar	psi

	DIMENSIONS							
MAXIMUM TAKEOFF WEIGHT	30 × 8.8 R 15 30 × 8.8 - 15				46 × 17 R 20 46 × 16 - 20			
67000 KG / 147708 LB 68000 KG / 149913 LB 70000 KG / 154322 LB	11.0	160	11.4	165	12.3	178	12.8	186
73500 KG / 162038 LB 75500 KG / 166447 LB	11.8	171	12.3	178	13.3	193	13.8	200
77000 KG / 169754 LB	11.8	171	12.3	178	13.8	200	14.4	209

	DIMENSIONS							
MAXIMUM TAKEOFF WEIGHT	49 × 17 - 20				49 × 19 - 20			
67000 KG / 147708 LB 68000 KG / 149913 LB 70000 KG / 154322 LB	10.2	148	10.6	154	9.2	133	9.6	139
73500 KG / 162038 LB 75500 KG / 166447 LB	11.0	160	11.4	165	9.9	144	10.3	149
77000 KG / 169754 LB	11.5	167	12.0	174	10.3	149	10.7	155

	DIMENSIONS							
MAXIMUM TAKEOFF WEIGHT	1270 × 455 R 22				915 × 300 R 16 36 × 11 - 16			
67000 KG / 147708 LB 68000 KG / 149913 LB 70000 KG / 154322 LB	10.5	152	10.9	158	-	-	-	-
73500 KG / 162038 LB	11.3	164	11.8	171	11.7	170	12.2	177
75500 KG / 166447 LB	11.3	164	11.8	171	-	-	-	-
77000 KG / 169754 LB	11.8	171	12.3	178	-	-	-	-

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GENERAL

During taxi, the crew may notice an aircraft veering tendency. This can be due to some external conditions (crosswind, slope....), or it can be due to the nosewheel steering system itself. The latter case is identifiable due to flight crews' consecutive reports of permanent aircraft veering tendency. Such reports enable maintenance to determine when corrective action or troubleshooting is required.
A veering aircraft may still be operated before corrective action is taken, provided nosewheel steering deviation is within the values specified in the following table.

NWS OFFSET OPERATIONAL LIMITATION

R

NWS Offset	Offset ≤ 0.5°	0.5° < Offset ≤ 1.5°	Offset > 1.5°
Rudder trim to taxi straight	Trim ≤ 3°	3° < Trim ≤ 8.8°	Trim > 8.8°
Dispatch	YES	YES	NO
Procedures	No operational limitation	Apply the following procedure : Autoland : – MAX X WIND 10KT	Immediate maintenance action is due

CAUTION

The tolerance required by maintenance guidelines (± 0.5° NWS offset, corresponding to
R the ± 3° rudder trim necessary to taxi straight) remains valid. Operating the aircraft outside the maintenance tolerance is possible by using the applicable procedure. However, in such cases, the flight crew must accurately and systematically make logbook entries (indicating the rudder trim input value to taxi straight) to ensure that maintenance can take corrective action within the applicable timeframe.
When using rudder trim to taxi straight for NWS offset identification, takeoff must only be performed after a rudder trim reset.

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	PRESSURE				PRESSURE			
	Unloaded		Loaded		Unloaded		Loaded	
MAXIMUM TAKEOFF WEIGHT	bar	psi	bar	psi	bar	psi	bar	psi
78000 KG / 171959 LB	9.7	141	10.1	146	12.3	178	12.8	186
80000 KG / 176368 LB 83000 KG / 182982 LB	10.4	151	10.8	157	13.1	190	13.6	197
85000 KG / 187391 LB	10.6	154	11.0	160	13.4	194	13.9	202
89000 KG / 196209 LB	11.2	162	11.6	168	14.0	203	14.6	212
93000 KG / 205028 LB 93500 KG / 206130 LB	11.2	162	11.6	168	14.4	209	15.0	218

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Procedures	No operational limitation	Apply the following procedure : Autoland : – MAX X WIND 10KT	Immediate maintenance action is due

CAUTION

R The tolerance required by maintenance guidelines (± 0.5° NWS offset, corresponding to the ± 3° rudder trim necessary to taxi straight) remains valid. Operating the aircraft outside the maintenance tolerance is possible by using the applicable procedure. However, in such cases, the flight crew must accurately and systematically make logbook entries (indicating the rudder trim input value to taxi straight) to ensure that maintenance can take corrective action within the applicable timeframe.
When using rudder trim to taxi straight for NWS offset identification, takeoff must only be performed after a rudder trim reset.

TIRE PRESSURE

These charts present the various nominal tire pressures, depending on maximum taxi weight, tire type, and landing gear configuration (shock absorbers extended, or compressed).

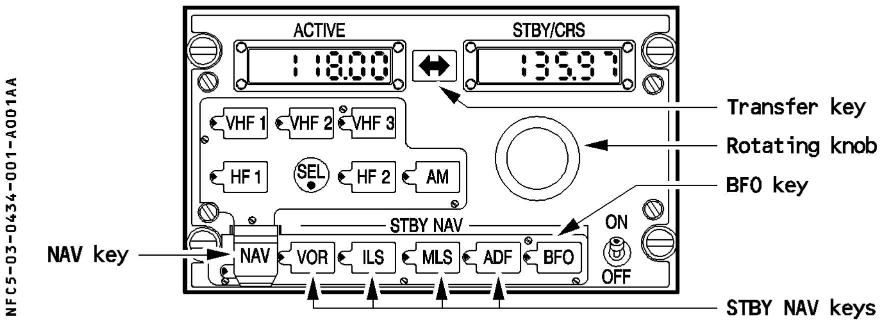
A319	DIMENSIONS							
	30 × 8.8 R 15 30 × 8.8 - 15				46 × 17 R 20 46 × 16 - 20			
	PRESSURE				PRESSURE			
	Unloaded		Loaded		Unloaded		Loaded	
MAXIMUM TAKEOFF WEIGHT	bar	psi	bar	psi	bar	psi	bar	psi
64000 KG / 141094 LB	11.0	160	11.4	165	11.4	165	11.9	173
68000 KG / 149913 LB	11.6	168	12.1	175	12.0	174	12.5	181
70000 KG / 154322 LB	12.0	174	12.5	181	12.4	180	12.9	187
74000 KG / 163140 LB 75500 KG / 166447 LB	12.7	184	13.2	191	13.3	193	13.8	200

A319 CJ	DIMENSIONS							
	30 × 8.8 R 15 30 × 8.8 - 15				46 × 17 R 20 46 × 16 - 20			
	PRESSURE				PRESSURE			
	Unloaded		Loaded		Unloaded		Loaded	
MAXIMUM TAKEOFF WEIGHT	bar	psi	bar	psi	bar	psi	bar	psi
75500 KG / 166447 LB	13.4	194	13.9	202	13.3	193	13.8	200

PROCEDURES FOR TUNING STANDBY NAVIGATION RADIOS

CAUTION

Pilots should use these procedures only when both FMGCs or both MCDUs are
R inoperative. When at least one FMGC is operative, the use of NAV key on RMP while
R the LOC update is active, may freeze the FM position during approach and must be
R avoided.
In this case they must press both RMP NAV keys (lighting the green lights).



FOR BOTH RMPs

– **ON/OFF Switch** . . . . **CHECK ON**

– **NAV key (guarded)** . . . . **PRESS**
Green light comes on.
A lighted STBY NAV key shows which system had been selected earlier in the radio-nav standby mode, and the windows show which frequencies had been used.

ON THE RMP ASSOCIATED WITH THE RECEIVER TO BE TUNED

Select a STBY NAV system :

● **ADF tuning :**

– **ADF key** . . . . **PRESS**
The green light comes on.
The windows show the previously selected frequencies.

– **Rotating knob** . . . . **TURN**
Watch the STBY/CRS window to set a frequency.
The outer knob changes units, inner knob decimals.

– **Transfer key . . . . PRESS**
This interchanges the ACTIVE and STBY frequencies. The ADF receiver is now tuned to the new ACTIVE frequency.

– **BFO key (if necessary) . . . . PRESS**
Green light comes on.

● **VOR (or ILS) tuning :**

– **VOR (or ILS) key . . . . PRESS**
Green light comes on.
Both windows display previously selected frequencies.

– **Rotating knob . . . . TURN**
Set the frequency in the STBY/CRS window.

– **Transfer key . . . . PRESS**
The ACTIVE window displays the selected frequency.
The STBY/CRS window displays the frequency that had been displayed in the ACTIVE window.

– **Rotating knob . . . . TURN**
Set the course in the STBY/CRS window.
The receiver is now tuned to the frequency of the new station, and the course is selected.
To select another station, press the transfer key (making both windows display the previously selected frequency) before retuning the VOR (or ILS).

Note : *When the radio-nav standby mode is active (NAV key ON) and VHF or HF tuning is required, select the VHF key or the HF key on the RMP (normal radio communications use). The NAV key, which has no effect on the selection of a radio communication frequency, must remain in the ON position in order to*
R *prevent radio navigation aid tuning from changing NAV receiver frequencies.*

AUTOMATIC IDENTIFICATION OF ADF/VOR/ILS

Although the navigation display automatically identifies the tuned ADF, VOR, or ILS station (auto ident decoded), the flight crew must, in the following cases, confirm the correct tuning of the desired station via the audio system :

— A station has either been autotuned or tuned manually by a crew member's entering the associated ident on the MCDU RAD NAV page, and the decoded ident appearing on the ND is the wrong one.
— A crew member has tuned the station manually on an RMP or by entering the frequency on the MCDU RAD NAV page.

WEATHER RADAR

INTRODUCTION

Airborne weather radar gives the flight crew an efficient tool for detecting bad weather during flight. The digital weather radar with its multicolor navigation display allows the crew to follow the best route to avoid weather problems.
To this end, some operational advice, based upon a general knowledge of the radar capabilities, is given in this chapter.

GENERAL

The radar is nothing more than a precipitation detector. How much weather it detects depends upon the raindrops, their size, composition and number.
The radar does not detect :
· clouds, fog or wind (too small droplets or no precipitation at all)
· clear air turbulence (no precipitation)
· windshear (no precipitation except in microburst)
· lightning.
The radar does detect :
· rainfall
· wet hail and wet turbulence
· ice crystals, dry hail and dry snow (above 30 000 feet) will only give small reflections.

OPERATIONAL FUNCTIONS

TILT, RANGE AND GAIN

The three things that the flight crew must understand in order to take full advantage of the weather radar are :
— antenna tilt, which causes the center of the radar beam to scan above or below the attitude reference plane
— range control which, in coordination with tilt governs the range of the navigation display
— gain control, which adjusts the sensitivity of the receiver (and should normally be set
R to AUTO). The sensitivity of the receiver may vary from one type of radar system to
R another.

COLOR CODE

A color code distinguishes areas according to their precipitation intensity :
- Black, for the lowest intensity (nothing appears on the ND)
- Green, amber, and red for progressively higher intensities.
- Magenta, for saturated areas, in the weather and turbulence mode (WX + T)

GROUND MAPPING AND GCS

Some radars have two additional modes :
- Ground mapping mode permits the radar to produce more returns from less reflective targets on the ground. The associated color codes are : Black for standing water (no returns), green for the ground, amber or red for cities and mountains (strong returns).
- Ground Clutter Suppression (GCS) erases up to 85 % of ground clutter return. The flight crew should only use this mode at shallow tilt angles (0 to 5°) and for short intervals, since it may incorrectly identify stationary weather targets. Steep tilt angles can make it difficult to distinguish between ground and weather targets.

OPERATIONAL USE

CAUTION

Before selecting WX, WX/T or MAP mode on the control unit, make certain that :
- No one is within a distance less than 5 meters from the antenna in movement, within an arc of plus or minus 135° on either side of the aircraft centerline.
- The aircraft is not directed towards any large metallic obstacle, such as a hangar, which is within 5 meters in an arc of plus or minus 90° on either side of the aircraft
R centerline.

DETECTION AND INTERPRETATION

General

1. The flight crew should monitor the weather at long range, as well as at shorter ranges, in order to be able to efficiently plan course changes, and to avoid weather-defined blind alleys and box canyons.
2. Ground returns usually appear smaller, sharper, more packed, better-defined, and more angular than weather targets, whereas the latter usually appear larger, have less definite shapes, and tend to remain relatively unchanged.
3. The line-of-sight distance to the horizon is :
   $D(NM) = 1{,}23 \sqrt{\text{(aircraft altitude (feet))}}$.

Red and magenta areas : thunderstorms, tornadoes, hail

The steeper the gradient of rainfall rate, the stronger the turbulence (magenta color) and the possibility of hail.

- To use the radar effectively for avoiding thunderstorms, the flight crew should select the following ranges on the NDs (if possible) :
  - 160 NM on the Pilot Non-Flying (PNF) ND
  - 80 NM on the Pilot Flying (PF) ND
- To avoid a large storm, the flight crew must make decisions while still 40 NM from it. Therefore the flight crew should :
  - Avoid magenta (WX+T mode) and red areas and fringes by at least 20 NM above the FL230 and by 5 to 10 NM below FL230.
  - Avoid single magenta areas of turbulence (not associated with heavy precipitation) by at least 5 NM.
- Flight crew should readjust the tilt frequently in order to monitor storm development and to get the best cell echo.
- Failure to tilt the antenna down periodically may cause a target to disappear.
- The following formula calculates the vertical distance between the top of the cell and the aircraft flight level :

$$\boxed{\Delta h \text{ (feet)} \sim d(\text{NM}) \times \text{Tilt (degrees)} \times 100.}$$

Example :
Cell at 40 NM disappearing at less than 3 degrees downtilt
$\Delta h \sim 40 \times 3 \times 100 = 12\ 000$ feet.

- The pilot should not attempt to penetrate a cell or clear its top by less than 5000 vertical feet, because otherwise the aircraft may encounter severe turbulence.

R If the top of cell is at or above 25000 feet, overflying should be avoided due to the
R possibility of encountering turbulence stronger than expected.

In the same way, the pilot should avoid flying under a thunderstorm because of possible windshear, microbursts, severe turbulence, or hail.

Turbulence mode :

- The turbulence detection mode is most effective when the ND is set on 40 NM and the antenna is tilted to avoid ground return.
- When examining areas of heavy rainfall in WX+T mode, the flight crew should adjust antenna tilt frequently, because turbulence areas vary with the altitude.
- Closely spaced (or thin lines between) color gradations are usually associated with severe turbulence.

FLIGHT INSTRUMENT TOLERANCES

The values below apply to aircraft in symmetrical flight (no sideslip), in clean configuration, and in straight and level flight.

ALTITUDE TOLERANCES

– PFD 1 or 2 at ground check : ± 25 feet (8 m)
– Standby altimeter at ground check : ± 300 feet (91 m)

Note : On ground, as the standby altimeter's vibrator is off, the standby altimeter's tolerance value is high. In flight, the vibrator is on and the value is lower.

MAXIMUM DIFFERENCES BETWEEN ALTITUDE INDICATIONS

FL/SPEED	ALTITUDE (ft) COMPARISON BETWEEN		
	ADR 1 and ADR 2 (on PFD)	ADR 3 and ADR 1 or ADR 3 and ADR 2 (on PFD)	STBY ALTI and any ADR 1 or 2 or 3
GND CHECK	20 (6 m)	20 (6 m)	*
FL50/250 kt	50 (15 m)	65 (20 m)	130 (40 m)
FL100/250 kt	55 (17 m)	80 (24 m)	185 (56 m)
FL200/300 kt	90 (27 m)	135 (41 m)	295 (90 m)
FL300/.78	130 (40 m)	195 (59 m)	390 (119 m)
FL390/.78	130 (40 m)	195 (59 m)	445 (136 m)

* On ground, the check is meaningless because the standby altimeter's vibrator is off.

AIRSPEED/MACH TOLERANCES

Maximum differences between Speed/Mach indications :

FL/SPEED	SPEED (kt) MACH COMPARISON BETWEEN					
	ADR 1 and ADR 2 (on PFD)		ADR 3 and ADR 1 or ADR 3 and ADR 2		STBY ASI and any ADR 1 or 2 or 3	
	SPEED	MACH	SPEED	MACH	SPEED	MACH
GND CHECK	6	0.008	6	0.008	6	–
FL50/250 kt	4	0.005	4	0.007	7	–
FL100/250 kt	4	0.005	5	0.008	8	–
FL200/300 kt	3	0.007	5	0.011	9	–
FL300/0.78	3	0.010	5	0.014	9	–
FL390/0.78	3	0.010	4	0.014	8	–

Red and magenta areas : thunderstorms, tornadoes, hail

The steeper the gradient of rainfall rate, the stronger the turbulence (magenta color) and the possibility of hail.

- To use the radar effectively for avoiding thunderstorms, the flight crew should select the following ranges on the NDs (if possible) :
  - 160 NM on the Pilot Non-Flying (PNF) ND
  - 80 NM on the Pilot Flying (PF) ND
- To avoid a large storm, the flight crew must make decisions while still 40 NM from it. Therefore the flight crew should :
  - Avoid magenta (WX+T mode) and red areas and fringes by at least 20 NM above the FL230 and by 5 to 10 NM below FL230.
  - Avoid single magenta areas of turbulence (not associated with heavy precipitation) by at least 5 NM.
- Flight crew should readjust the tilt frequently in order to monitor storm development and to get the best cell echo.
- Failure to tilt the antenna down periodically may cause a target to disappear.
- The following formula calculates the vertical distance between the top of the cell and the aircraft flight level :

  $\boxed{\Delta\mathbf{h\ (feet)} \sim \mathbf{d(NM)} \times \mathbf{Tilt\ (degrees)} \times \mathbf{100.}}$

  Example :
  Cell at 40 NM disappearing at less than 3 degrees downtilt
  $\Delta h \sim 40 \times 3 \times 100 = 12\ 000$ feet.
- The pilot should not attempt to penetrate a cell or clear its top by less than 5000 vertical feet, because otherwise the aircraft may encounter severe turbulence.
R If the top of cell is at or above 25000 feet, overflying should be avoided due to the
R possibility of encountering turbulence stronger than expected.
  In the same way, the pilot should avoid flying under a thunderstorm because of possible windshear, microbursts, severe turbulence, or hail.

Turbulence mode :

- The turbulence detection mode is most effective when the ND is set on 40 NM and the antenna is tilted to avoid ground return.
- When examining areas of heavy rainfall in WX+T mode, the flight crew should adjust antenna tilt frequently, because turbulence areas vary with the altitude.
- Closely spaced (or thin lines between) color gradations are usually associated with severe turbulence.

FLIGHT INSTRUMENT TOLERANCES

The values below apply to aircraft in symmetrical flight (no sideslip), in clean configuration, and in straight and level flight.

ALTITUDE TOLERANCES

– PFD 1 or 2 at ground check : plus or minus 25 feet (8 meters)

MAXIMUM DIFFERENCES BETWEEN ALTITUDE INDICATIONS

FL/SPEED	ALTITUDE (ft) COMPARISON BETWEEN		
	ADR 1 and ADR 2 (on PFD)	ADR 3 and ADR 1, or ADR 3 and ADR 2 (on PFD)	ISIS and any ADR 1, or 2, or 3
GND CHECK	20 (6 m)	20 (6 m)	100 (30 m)
FL50/250 kt	50 (15 m)	65 (20 m)	130 (40 m)
FL100/250 kt	55 (17 m)	80 (24 m)	185 (56 m)
FL200/300 kt	90 (27 m)	135 (41 m)	295 (90 m)
FL300/.78	130 (40 m)	195 (59 m)	390 (119 m)
FL390/.78	130 (40 m)	195 (59 m)	445 (136 m)

MAXIMUM DIFFERENCES BETWEEN SPEED/MACH INDICATIONS

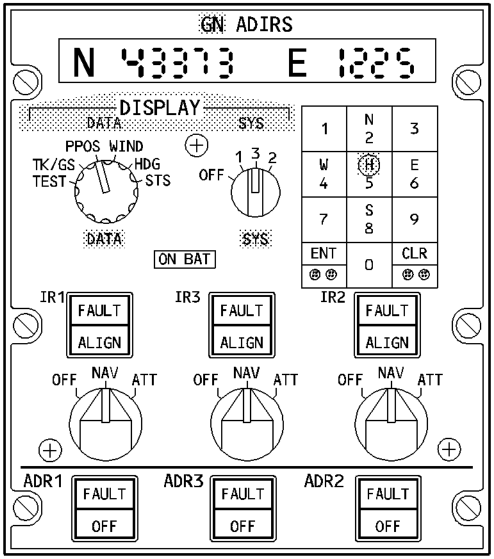
FL/SPEED	SPEED (kt) MACH COMPARISON BETWEEN					
	ADR 1 and ADR 2 (on PFD)		ADR 3 and ADR 1, or ADR 3 and ADR 2		ISIS and any ADR 1, or 2, or 3	
	SPEED	MACH	SPEED	MACH	SPEED	MACH
GND CHECK	6	0.008	6	0.008	6	–
FL50/250 kt	4	0.005	4	0.007	7	–
FL100/250 kt	4	0.005	5	0.008	8	0.032
FL200/300 kt	3	0.007	5	0.011	9	0.033
FL300/0.78	3	0.010	5	0.014	9	0.025
FL390/0.78	3	0.010	4	0.014	8	0.025

Mach values lower than M0.50 in climb, and M0.45 in descent, are not displayed on ISIS.

HEADING TOLERANCES

Maximum differences between magnetic heading indications on the NDs : 4 degrees.

R **ADIRS OPERATION**



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R The ADIRS must be aligned : This allows them to operate in NAV mode, to continuously
R provide the aircraft’s position. To complete the alignment, the ADIRS must be initialized to
R a navigation starting point, from which the ADIRS determine subsequent aircraft positions
R during flight.
R The pilot may check the ADIRS status, and the ADIRS drift, at any moment on the MCDU
R POSITION MONITOR page.

R **COMPLETE OR FAST ALIGNMENT**

R For alignment, the aircraft must be stationary on ground. Any aircraft motion will
R automatically restart the alignment. Avoid alignment during an engine start, or while the
R engines are running.
R The pilot may choose to perform a complete alignment (this takes about 10 minutes) or a
R fast alignment (this takes about 30 seconds). In both cases, the ADIRS must be initialized
R to a navigation starting point.
R During a complete alignment, the ADIRS uses gravity to determine the aircraft attitude. It
R then determines true heading, and estimates the present latitude.
R During a fast alignment, the ADIRS resets the ground speed to 0. Therefore, the ADIRS will
R start the position computation with an accurate initial speed. The ADIRS does not estimate
R the latitude.

R The procedure for ADIRS complete or fast alignment is the following :

R – **All 3 ADIRS Control Panel mode selectors . . . . OFF**
R The ALIGN light remains OFF.

R – **All 3 ADIRS Control Panel mode selectors . . . . NAV**
R If the mode selectors are set back to NAV within 5 seconds, the ADIRS perform a fast
R alignment.
R Otherwise, the ON BAT light comes ON for five seconds, and the ADIRS then start a
R complete alignment.
R The ALIGN light comes ON, and remains steady until the alignment is complete.

R **<u>POSITION INITIALIZATION</u>**

R The alignment phase is completed, when the ADIRS is initialized to an appropriate position.
R Perform this initialization as soon as possible, to prevent delays if an alignment error
R occurs.

R – **MCDU coordinates . . . . CHECK/MODIFY**
R When the pilot enters or modifies the origin airport (FROM) or the CO RTE, the MCDU
R INIT coordinates are reset to the airport reference point (extracted from the FMS
R database). The pilot may also manually modify these coordinates.
R If the MCDU coordinates change, when the ADIRS are already in NAV mode, the RESET
R IRS TO NAV message is triggered on the MCDU : Crosscheck the MCDU INIT
R coordinates against the IRS position on the MCDU POSITION MONITOR page.
R When the GPS is available, or for flights in good radio navigation coverage airspace,
R initialize the ADIRS to the airport reference point extracted from the FMS database. This
R reduces the risk of entering incorrect values.
R If the GPS is not available, and long segments in poor radio navaid coverage airspace
R are expected, initialize the ADIRS to the gate coordinates. This increases the accuracy
R of the ADIRS position computation.
R If the airport reference point is not stored in the FMS database, and the gate coordinates
R are not available, use the airport reference point coordinates from the airport chart.

R – **ALIGN IRS prompt . . . . PRESS**
R The MCDU INIT page coordinates are sent to the ADIRS, and their navigation starting
R point is set.

ALIGNMENT/INITIALIZATION ERROR

The ADIRS keeps a record of the last position it had the last time it was in NAV mode. It is also able to estimate the present latitude after a complete alignment. The ADIRS may use this information to detect coarse initialization errors.
If the ADIRS alignment or initialization is not correct, the ALIGN light will flash. If any of the 3 ADIRS indicates an alignment error, the prompt REALIGN IRS appears on the INIT page (instead of ALIGN IRS).

- **If the IR FAULT light flashes, the affected ADIRS can only be used in ATT mode.**
- **If the ALIGN light flashes before the alignment phase is completed :**

  – **DISPLAY DATA switch . . . . STS**
  If the CDU does not display any message, the position sent to the ADIRS disagrees with the last memorized position, or with the ADIRS estimated latitude. Check the initialization position, and reenter it.
  If the CDU displays a message, take the appropriate action.
- **If the ALIGN light flashes at the end of the alignment phase :**
  – Check the ALIGN IRS prompt on the MCDU. If it is present, press it to initialize the ADIRS.
  - **If the REALIGN IRS prompt is present :**
    The position sent to the ADIRS disagrees with the last memorized position, or with the ADIRS estimated latitude.

    – **ADIRS . . . . PERFORM FAST ALIGNMENT**

    – **POSITION INITIALIZATION . . . . CHECK & ENTER AGAIN**
    If the ALIGN light still flashes, perform a complete alignment of the affected ADIRS.

SHUTDOWN

– **Mode selectors . . . . OFF**
Pull and turn the 3 mode selectors to OFF.
The message screen displays REALN DESN 5 SEC (realign decision) for 5 seconds, then a 5 seconds countdown to off (OFF TIME 5 SEC displayed). Flight crew must not pull the circuit breakers until the final countdown is completed.

STATUS MESSAGES

Status messages appear, when the DISPLAY DATA switch is set to STS. If there is more than one condition calling for a message, the display scrolls to the next message every 2 seconds.

MESSAGE	DESCRIPTION
STS IR FAULT	Hard failure. Select ATT (if corresponding message is displayed) or refer to MMEL or remove ADIRU for maintenance.
STS-DELAY MAINT	Failure not affecting IR functioning. Service ADIRU when convenient.
STS-ENTER PPOS	Enter present position or check entered position is correct. Note : The confirmation of an erroneous longitude at the present position entry will create a wrong position of the aircraft symbol on the NDs.
STS-SELECT ATT	Hard IRU failure, select ATT mode.
STS-EXCESS MOTION	Excess motion detected during alignment. ADIRU will automatically restart alignment. Ensure aircraft is not moving.
STS-SWITCH ADR	ADR invalid.
STS-CHECK CK/BK	Check circuit breakers *
STS-CDU FAULT	Remove CDU for maintenance.
STS-ENT MAG HDG	Enter magnetic heading.

* If a corresponding FAULT light comes on, check BAT 1 load.

TCAS

For System Description, refer to 1. 34.
For Operational Procedures, refer to 3.02

CONFLICT RESOLUTION PRINCIPLES

– **Traffic Advisory (TA)**
If an intruder represents a potential collision threat, a visual and aural Traffic Advisory will be given. This advisory helps the crew to visually situate the intruder. It also prepares the crew for a possible Resolution Advisory. However, not every RA is preceded by a TA.

– **Resolution Advisory (RA)**
If the intruder is considered to be a real collision threat, an aural and visual Resolution Advisory is given.
TCAS determines the optimum vertical maneuver that ensures effective separation, with a minimum change in vertical speed.
Depending on each situation, TCAS generates a :
· Preventive Advisory (i.e. the actual vertical speed may be maintained). It displays the vertical speed range to be avoided.
· Corrective Advisory i.e. the actual vertical speed is within the range to be avoided and a recommended vertical speed (fly to) range is displayed.
· Modified Corrective Advisory, which changes already displayed RA (i.e if the intruder changes their vertical speed).

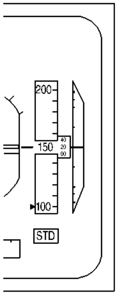
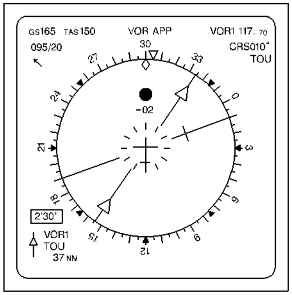
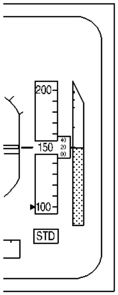
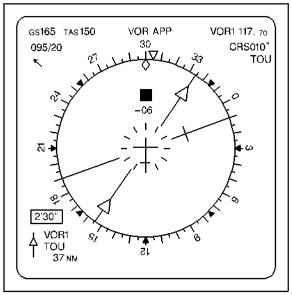
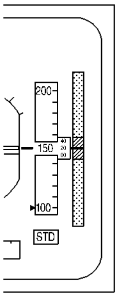
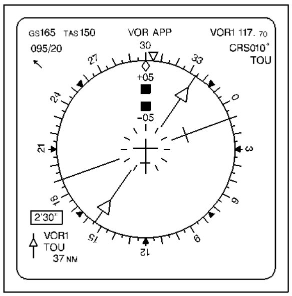
R **OPERATIONAL RECOMMENDATIONS**

● **Avoidance generalities :**
R Always follow the RAs orders, even if they lead to cross the altitude of the intruders,
R as they ensure the best global separation.

CAUTION
R If a pilot does not follow a RA, he should be aware that the intruder may be TCAS
R equipped and may be maneuvering toward his aircraft in response to a
R coordinated RA. This could compromize safe seperation.

Pilots should comply with the vertical speed limitations during the last 2000 feet of climb or descent. In particular, pilots should limit vertical speeds to 1500 feet/min during the last 2000 feet of a climb or descent, especially when they are aware of traffic that is converging in altitude and intending to level off 1000 feet above or below the pilot’s assigned altitude.

- **Select TA only mode in the following cases :**
  - Engine failure
  - Dispatch with landing gear down (if applicable)
  - In case of known nearby traffic which is in visual contact.
  - At particular airports and during particular procedures identified by an operator as having a significant potential for unwanted a inappropriate RAs (closely spaced parallel runways, converging runways, low terrain along the final approach...)

SCENARIO	AURAL WARNING and TYPICAL DISPLAY — PFD	AURAL WARNING and TYPICAL DISPLAY — ND	CREW RESPONSE
TRAFFIC ADVISORY - one intruder is ahead at 12:00 o'clock beyond 6 NM, 200 ft below your altitude	"TRAFFIC, TRAFFIC" 		- Do not maneuver on the traffic advisory symbol. - Attempt to visually acquire the intruder. - Be prepared to maneuver if the TA changes to an RA
RESOLUTION ADVISORY (PREVENTIVE) - One intruder is ahead at 12:00 o'clock, 600 ft below your altitude	"MONITOR VERTICAL SPEED" 		- Do not descend
RESOLUTION ADVISORY (CORRECTIVE) - Two intruders are ahead at 12:00 o'clock . one, at 500 ft above your altitude . the other, at 500 ft below your altitude	MAINTAIN VERTICAL SPEED MAINTAIN 		- Remain in level flight - Do not climb or descend

V/S scale color legend: (hatched) : green (dotted) : red

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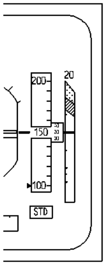
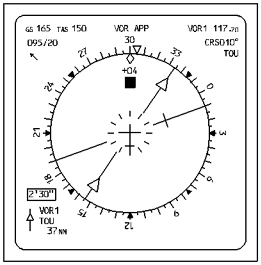
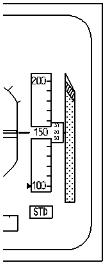
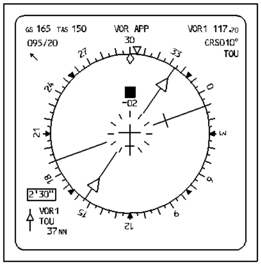
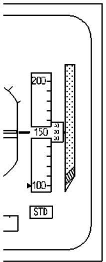
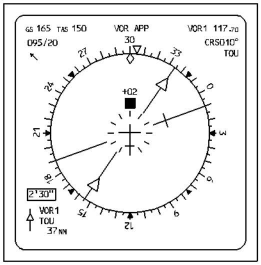
R

SCENARIO	AURAL WARNING and TYPICAL DISPLAY PFD	ND	CREW RESPONSE
RESOLUTION ADVISORY (CORRECTIVE) - The intruder is ahead at 12:00 o'clock, 400 ft above your altitude - You are already climbing at 2000 ft/mn	"ADJUST VERTICAL SPEED ADJUST" 		- Adjust vertical speed so as to be in the green area of the PFD's speed scale by reducing climb vertical speed as appropriate
- The intruder is ahead at 12:00 o'clock, 200 ft below your altitude	"CLIMB, CLIMB" 		- Promptly (within 5 seconds) smoothly establish a climb rate of 1 500 ft/mn
- The intruder is ahead at 12:00 o'clock, 200 ft above your altitude	"DESCEND, DESCEND" 		- Promptly (within 5 seconds) and smoothly establish a descent rate of 1 500 ft/mn

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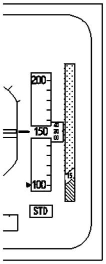
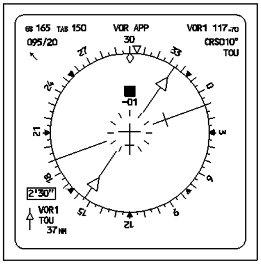
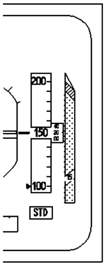
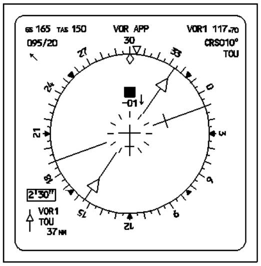
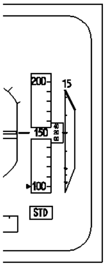
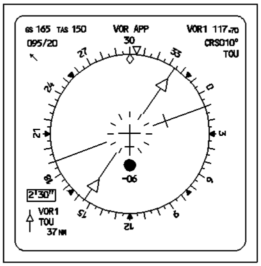
V/S scale color legend: : green : red

SCENARIO	AURAL WARNING and TYPICAL DISPLAY		CREW RESPONSE
	PFD	ND	
RESOLUTION ADVISORY (ADDITIONAL CORRECTIVE) - The intruder ahead has stopped its climb - It is now 100 ft below your altitude	"INCREASE DESCEND INCREASE DESCEND" 		- Immediately (within 2.5 seconds) and smoothly increase your descent rate to 2 500 ft/mn
- The intruder has changed from level flight to a rapid descent after TCAS issued a DESCEND RA - TCAS is now changing that to a CLIMB RA	"CLIMB, CLIMB, NOW CLIMB, CLIMB, NOW" 		- Initiate a change from a descent to a climb maneuver, within 2.5 seconds.
RA CLEARED - The intruder has passed behind and is now 600 ft below your altitude - It is no longer a threat	"CLEAR OF CONFLICT" 		- Return promptly to the previous ATC clearance.

NFC5-03-0434-015-A120AA

V/S scale color legend: : green : red

APPROACH ON PAPI

Eye to wheel height on approach is 25 feet and minimum recommended wheel clearance over the threshold is 20 feet. Do not follow Precision Approach Path Indicator (PAPI) guidance below 200 feet when PAPI Minimum Eye Height over Threshold (MEHT) is less than 45 feet.

QNH USE FOR TO/APPR/LDG ON QFE/QNH PIN-PROGRAMMED AIRCRAFT

The QNH option is the basic reference on the aircraft.
For Operators using QFE reference, switching from “QNH only” to QNH/QFE can be done by activating a specific pin program on the three following computers : FMGC, GPWC, FCU.
For various reasons, some Operators may use QNH reference for approach and landing on QNH/QFE pin programmed aircraft. The flight crew should be aware of the following consequences and should use the following procedures.

CONSEQUENCES

When the pin program is the QNH/QFE option, the 2R field of the MCDU PERF APPR page is named “MDH” independently of the baro setting reference selected by the flight crew.

PROCEDURES

No specific procedures are necessary for takeoff, climb, cruise, descent and go around phases.

Procedure for precision approaches (CAT 2 and CAT 3) :
· Insert the DH into the DH field of the PERF APPR page as usual.

Procedure for ILS approach (CAT 1) :
· Insert the DA into the MDH field of the PERF APPR page.

Procedure for Non-Precision Approaches (NPA) :
· Insert the MDA value into the MDH field of the PERF APPR page.

Note : If the MDA is greater than 5 000 feet, the value is not accepted and the message OUT OF RANGE is displayed on the MCDU. In such a case, the MDH field remains blank and the PNF should announce the callouts.

R · Do not use FINAL APP mode.
R · For NPAs other than LOC and LOC B/C :
R Use TRK/FPA or NAV/FPA modes, until visual references are met.
R · For LOC (or LOC B/C) approaches :
R Use LOC/FPA (or LOC B/C / FPA) modes, until visual references are met.
· At the correct altitude the color on the PFD altitude scale changes from green to amber.

QFE USE FOR TO/APPR/LDG ON AIRCRAFT WITH QNH ONLY PIN PROGRAMMING

The crew should not use QFE on aircraft with a “QNH only” pin programming (incorrect profile computation of the managed vertical modes CLB, DES and FINAL APPR, possible false GPWS warnings in mountainous areas).

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ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS)

The Flight Management System (FMS) provides aircraft position inputs to the EGPWS for enhanced function processing purpose.
The TERR pushbutton located on the overhead panel enables the activation or de-activation of the enhanced functions of the EGPWS.
During all flight phases, when the check of the navigation accuracy performed by the pilots (as described in volumes 3.03 and 4.05) is positive, the enhanced functions should be switched ON.
During climb, descent, approach, and go around phases, when GPS PRIMARY is not available (or not installed) and the FMS navigation accuracy check prevents the crew from using the NAV mode in a phase of flight, the TERR pushbutton must be switched OFF. When the TERR pushbutton is switched OFF, the ECAM message "NAV GPWS TERR DET FAULT" is displayed only the basic GPWS modes 1 to 5 remain operative.
If the TERR ON ND is not selected, and a terrain alert is generated, the terrain is automatically displayed on the ND.
The brightness of the terrain indication on the ND is controlled via the weather radar brightness control knob. If the weather radar brightness was set to low (due to bad weather) and a terrain alert occurs, then the terrain display brightness will also be low. Thus when a terrain alert occurs, the ND weather/terrain image brightness may need to be adjusted.

ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS)

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If the TERR ON ND is not selected, and a terrain alert is generated, the terrain is automatically displayed on the ND.
The brightness of the terrain indication on the ND is controlled via the weather radar brightness control knob. If the weather radar brightness was set to low (due to bad weather) and a terrain alert occurs, then the terrain display brightness will also be low. Thus when a terrain alert occurs, the ND weather/terrain image brightness may need to be adjusted.

ATSU INITIALIZATION

ATSU is automatically initialized, provided a list of Service Providers has been scanned, and the following four parameters have been received and validated by the ATSU :

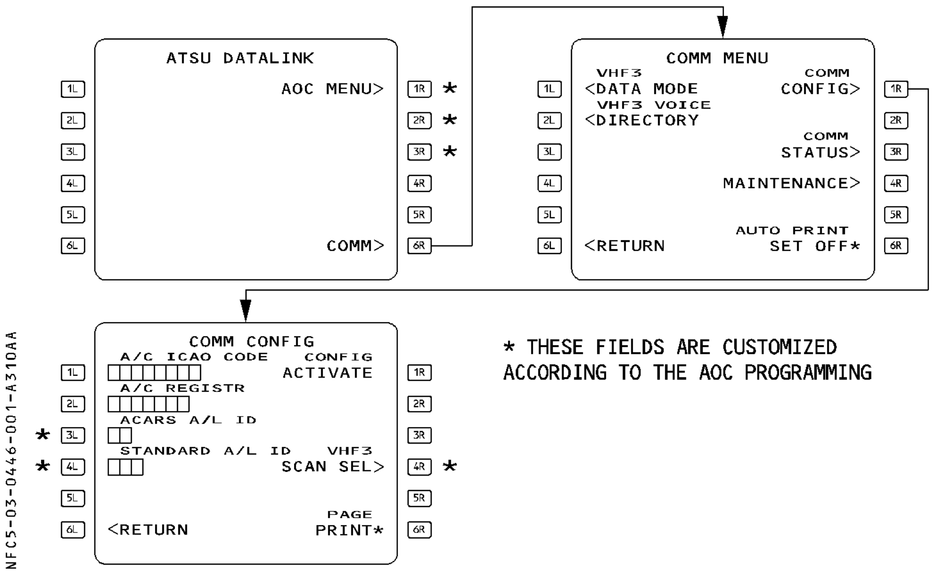
- Aircraft ICAO code (A/C ICAO CODE)
- Aircraft Registration Number (ARN)
- ACARS Airline Identity code (ACARS A/L ID)
- Standard Airline Identity code (STANDARD A/L ID)

If one of the above five conditions is not fulfilled, then ATSU is unavailable and :

- The ECAM displays “ATSU FAULT”, and
- The MCDU scratchpad displays a message requesting flight crew action.

A manual entry of the missing parameter followed by its activation, reinitializes the ATSU, and clears the ECAM and MCDU message.

R



<u>If the A/C ICAO CODE is invalid</u>

The MCDU scratchpad displays the “ENTER A/C ICAO CODE”.

After having cleared the scratchpad, the flight crew writes the A/C ICAO CODE (in octal encoding) on the scratchpad. Pressing the 1L key enters the A/C ICAO CODE on the
R scratchpad. The flight crew has to press the 1R key to activate it.

If ARN is not valid :

The MCDU scratchpad displays the "ENTER A/C REGISTER" message. After clearing the scratchpad, the crew writes the ARN on the scratchpad. Pressing the 2L key on the COMM CONFIG page enters the ARN in the 2L field. The flight crew has to press the 1R key to activate it.

If the A/L ID is not valid :

The MCDU scratchpad displays the "ENTER A/L IDENT" message. After clearing the scratchpad, enter the two-letter A/L ID code on the scratchpad. Press the 3L key to enter the A/L ID code in the 3L field. Repeat the same operation for the three-letter A/L ID code, by using the 4L key instead of the 3L key. The flight crew has to press the 1R key to activate it.

If the VHF3 SCAN SELECT menu can be accessed, and if no VHF Service Providers have been selected :

The MCDU scratchpad displays the "ENTER VHF3 SCAN SELECT" message.
On the VHF3 SCAN SELECT page, select a Service Providers' list, in the airline priority order, and activate the VHF SCAN SELECT function.
Example : To select Service Providers SITA 725 and ARINC :

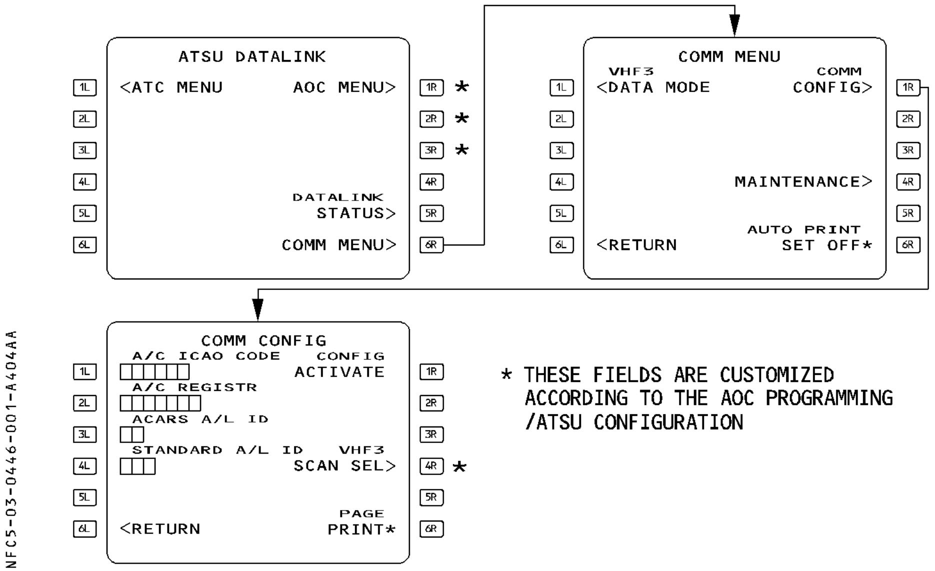
1. Press the 5L key : The star next to the ERASE indication disappears, then reappears.
2. Press the 1L key to select SITA 725 : The SELECT indication goes off, and the priority number of selection # 1 appears.
3. Press the 1R key to select ARINC : The SELECT indication goes off, and the priority number of selection # 2 appears.
4. Press the 5R key to activate the VHF SCAN SELECT function : The star next to the SCAN SELECT LOAD indication disappears, then reappears.

ATSU INITIALIZATION

ATSU initialization must be carefully completed, because successful datalink communications require that all information be correctly entered, in accordance with the ICAO flight plan.
ATSU is automatically initialized, provided a list of Service Providers has been scanned, and provided the following four parameters have been received and validated by the ATSU :
- Aircraft ICAO code
- Aircraft Registration Number (ARN)
- Airline two-letter Identity Code (A/L ID for datalink service providers)
- Airline three-letter Identity Code (A/L ID for ATC)

If one of the above five conditions is not fulfilled, then ATSU or datalink are not available:
- The ECAM displays an ATSU FAULT warning, with the ATSU INIT FAULT line procedure, and
- The DCDU displays the message COM NOT INIT in the information area.
- The MCDU scratchpad displays a message to request flight crew action.

A manual entry of the missing parameter reinitializes the ATSU, and clears the ECAM and MCDU message.



<u>If the A/C ICAO CODE is invalid :</u>
The MCDU scratchpad displays the “ENTER A/C ICAO CODE”.
After clearing the scratchpad, the flight crew writes the A/C ICAO CODE (in hexal encoding) on the scratchpad. Pressing the 1L key enters the A/C ICAO CODE on the 1L field. The flight crew has to press the 1R key to activate it.

<u>If ARN is not valid :</u>

The MCDU scratchpad displays the “ENTER A/C REGISTER” message. After clearing the scratchpad, the crew writes the ARN on the scratchpad. Pressing the 2L key on the COMM CONFIG page enters the ARN in the 2L field. The flight crew has to press the 1R key to activate it.

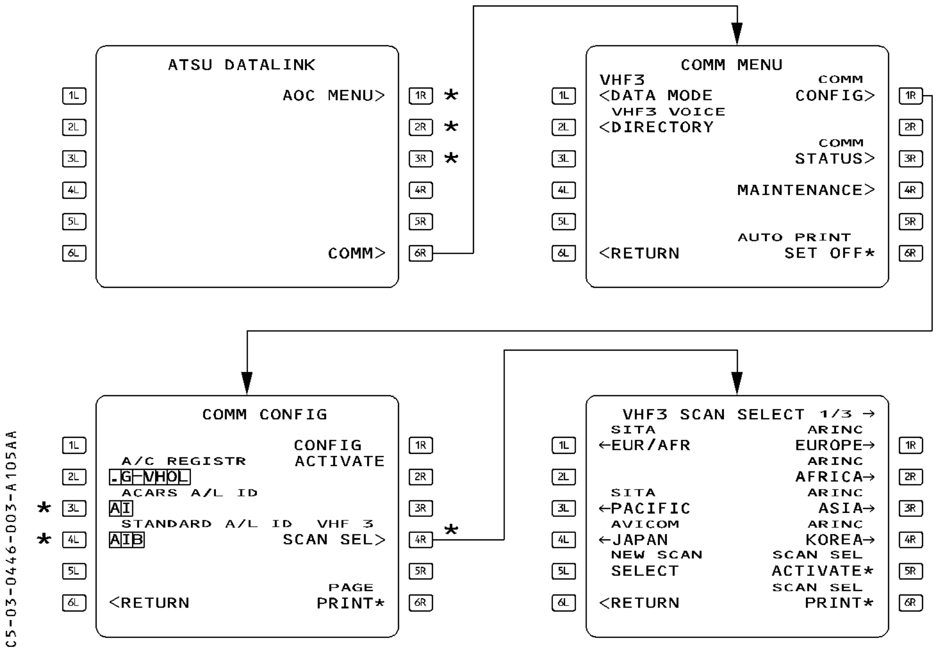
<u>If the A/L ID is not valid :</u>

The MCDU scratchpad displays the “ENTER A/L IDENT” message. After clearing the scratchpad, enter the two-letter A/L ID code on the scratchpad. Press the 3L key to enter the A/L ID code in the 3L field. Repeat the same operation for the three-letter A/L ID code, by using the 4L key instead of the 3L key. The flight crew has to press the 1R key to activate it.

<u>If the VHF3 SCAN SELECT menu can be accessed, and if no VHF Service Providers have been selected :</u>

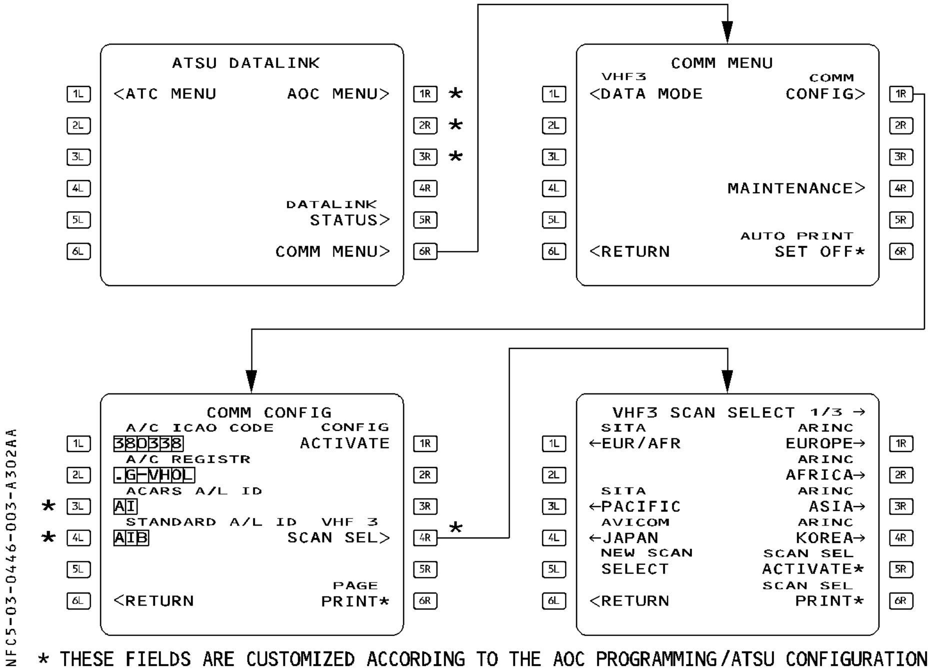
The MCDU scratchpad displays the “ENTER VHF3 SCAN SELECT” message.
On the VHF3 SCAN SELECT page, select a Service Providers’ list, in the airline priority order, and activate the VHF SCAN SELECT function.
Example : To select Service Providers SITA 725 and ARINC :

1. Press the 5L key : The star next to the ERASE indication disappears, then reappears.
2. Press the 1L key to select SITA 725 : The SELECT indication goes off, and the priority number of selection # 1 appears.
3. Press the 1R key to select ARINC : The SELECT indication goes off, and the priority number of selection # 2 appears.
4. Press the 5R key to activate the VHF SCAN SELECT function : The star next to the SCAN SELECT LOAD indication disappears, then reappears.



* THESE FIELDS ARE CUSTOMIZED ACCORDING TO THE AOC PROGRAMMING/ATSU CONFIGURATION

Note : Modification of the SCAN SELECT setting may result in the loss of air-ground VHF datalink communication. Therefore, the SCAN SELECT setting should not be modified by the flight crew, unless they have been instructed to do so.



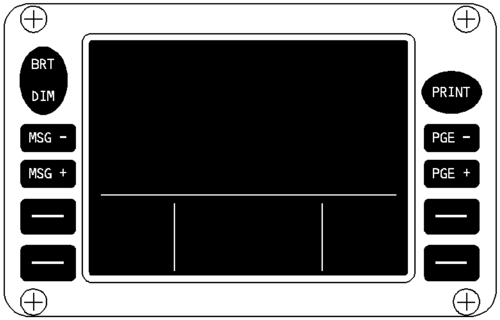
* THESE FIELDS ARE CUSTOMIZED ACCORDING TO THE AOC PROGRAMMING/ATSU CONFIGURATION

Note : Modification of the SCAN SELECT setting may result in the loss of air-ground VHF datalink communication. Therefore, the SCAN SELECT setting should not be modified by the flight crew, unless they have been instructed to do so.

NOTIFICATION PROCEDURE AND CONNECTION

Before connection, the DCDU screen appears as follows :

NFC5-03-0446-004-A100AA

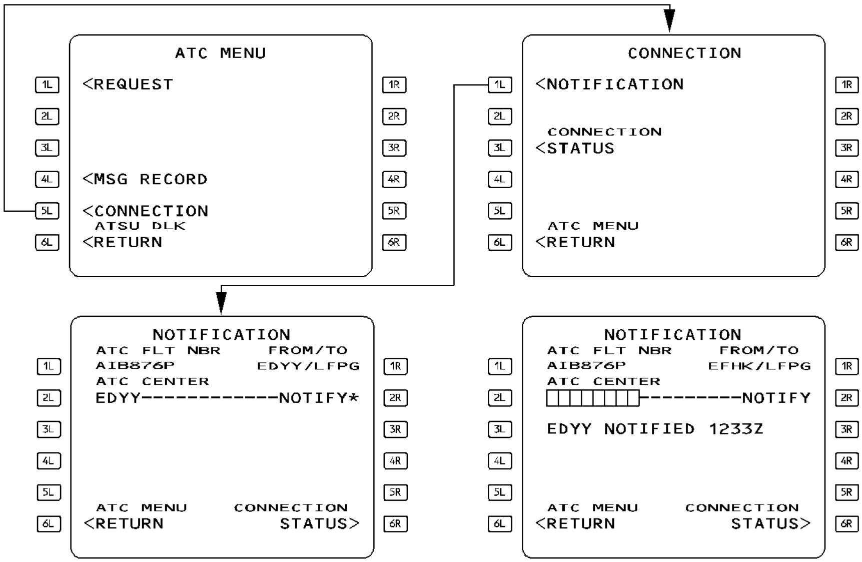


Note : If there is no ATN coverage, the information field will display NO ATC DLK.

NOTIFICATION PROCEDURE :

The notification must be done 15 to 45 minutes before entering the ATC area. Notification is made through the MCDU NOTIFICATION page :

NFC5-03-0446-004-B100AA



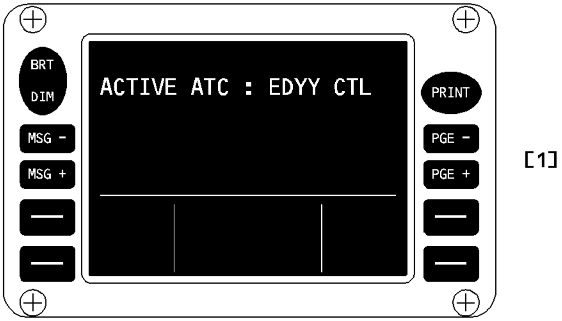
The FMGC provides the ATC FLT number. The notification procedure is used by the ATC to correlate the aircraft with the ICAO flight number.

Consequently, it is essential to enter exactly the same number, shown on ICAO flight plan (with the same number of letters), on the MCDU INIT page. The ATC CENTER field defaults to the center, that was connected during the previous flight. It can be changed, if applicable.

Note : *The ATC Center will initiate a CPDLC connection when the flight crew has sent notification (the MCDU NOTIFICATION Page will display "XXXX NOTIFIED HHMM Z"). Therefore, it is not necessary for the flight crew to send an additional notification to the ATC Center.*

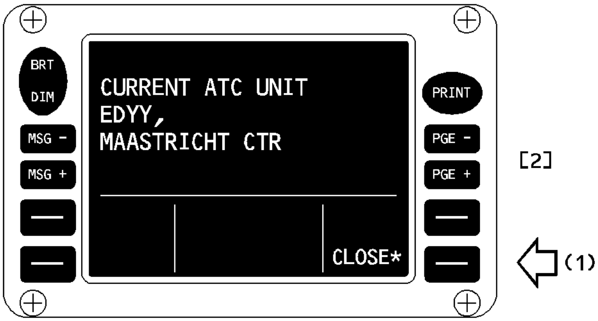
CONNECTION

When the ATC Center has received notification, the ATC Center will establish a CPDLC connection, and the DCDU will display the "ACTIVE ATC" message. The flight crew must verify that the appropriate ATC Center is connected. [1]



NFC5-03-0446-005-A100AA

The aircraft is not yet under the ATC Center's control (i.e. EDYY) until the flight crew receives the CURRENT ATC uplink message [2]. The transmission of this message may take a few minutes.
To access the previous ACTIVE ATC message [1] page, the flight crew must press the close key (1).



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DATALINK COMMUNICATION PROCEDURE : GENERAL RECOMMENDATIONS

GENERAL

This chapter gives only a few typical examples of the messages that can be exchanged between the crew and the ATC.

To avoid ambiguity :

- Avoid sending multiple clearance requests in the same message.
- Avoid duplicate messages. To this end :
  - Answer incoming messages before 100 seconds.
  - Do not re-send a message, when the ATC does not answer immediately.
- Close messages, when they are answered or sent. This clears the screen for additional messages.
- Before each flight, erase the MSG RECORD file by using the 5L key on the MSG RECORD page.
- Use the printer to retrieve information on the DCDU. Essential data must first be read on the DCDU. The messages displayed on the DCDU are the reference.
- Display all pages of each message on the DCDU before sending it. For this reason, the star is not available in front of the DCDU SEND soft key until all pages have been displayed.

CPDLC

VOICE READBACK

On aircraft with FANS B, some uplink messages related to the aircraft flight profile require voice/readback. ATC Centers that support FANS B provide a list of uplink messages that require voice readback.
The flight crew must perform the following actions when they receive one of these uplink messages :

- Perform a voice readback of the clearance received by the ATC Center
- Send a WILCO message to the ATC Center
- Perform the action related to the ATC clearance.

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CREW REQUEST TO ATC :

Example : REQUEST FOR DIRECT ROUTE

This is the example of a request that should be made by the crew to request a lateral flight plan deviation.

On the MCDU ATC MENU PAGE :

- **REQUEST . . . . SELECT (1)**
  The REQUEST page is displayed.

- **Fill in the DIR TO field (2)**

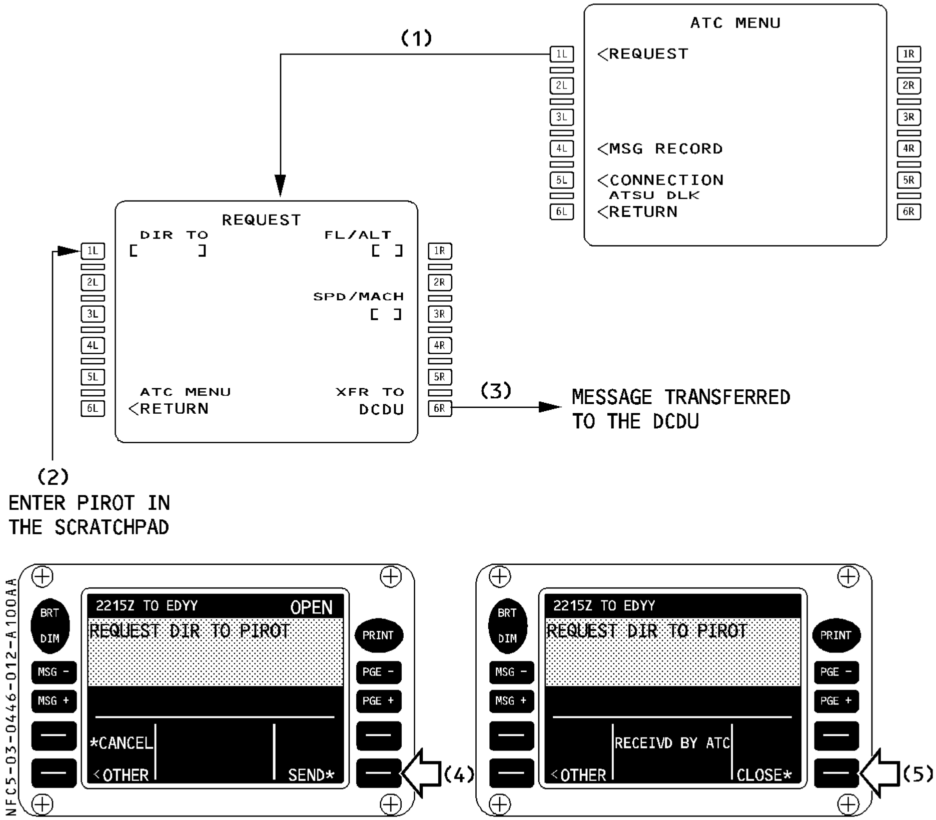
- **XFR TO DCDU . . . . SELECT (3)**
  The request is displayed on the DCDU with a blue background, and is ready to be sent.

On the DCDU :

- **SEND . . . . SELECT (4)**
  The message is displayed on a green background and the information field displays SENDING.
  After a few seconds, the DCDU information field will display the message RECEIVD BY ATC.

  Note : If the ATC Center is not equipped to support Logical Acknowledgement (LACK), the DCDU information field will display SENT, instead of RECEIVD BY ATC

- **CLOSE . . . . SELECT (5)**
  The message and its status are cleared from the screen.


ATC MENU
<REQUEST
<MSG RECORD
<CONNECTION
ATSU DLK
<RETURN
(1)
REQUEST
DIR TO
FL/ALT
SPD/MACH
ATC MENU
<RETURN
XFR TO
DCDU
(3)
MESSAGE TRANSFERRED
TO THE DCDU
(2)
ENTER PIROT IN
THE SCRATCHPAD
2215Z TO EDYY
OPEN
REQUEST DIR TO PIROT
*CANCEL
<OTHER
SEND*
(4)
2215Z TO EDYY
REQUEST DIR TO PIROT
RECEIVD BY ATC
<OTHER
CLOSE*
(5)
BRT
DIM
MSG -
MSG +
PRINT
PGE -
PGE +
NFC5-03-0446-012-A100AA

CLEARANCES FROM ATC AND PILOT RESPONSES

Example : IMMEDIATE CLEARANCE – DIRECT ROUTE (response to the Pilot's request)

The ATSU triggers visual (ATC MSG light) and aural alerts, and displays the message on the screen in white and blue letters. The message status is "OPEN" and in blue.

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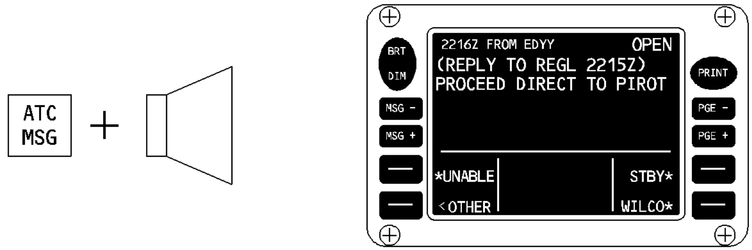


- **Pilot action:**

  – **ATC MSG . . . . PRESS**
  This will turn off the light, and stop the aural alert.

● **If LACK supported by ATC :**

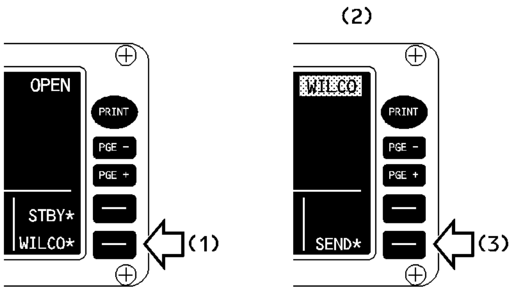
On the DCDU :

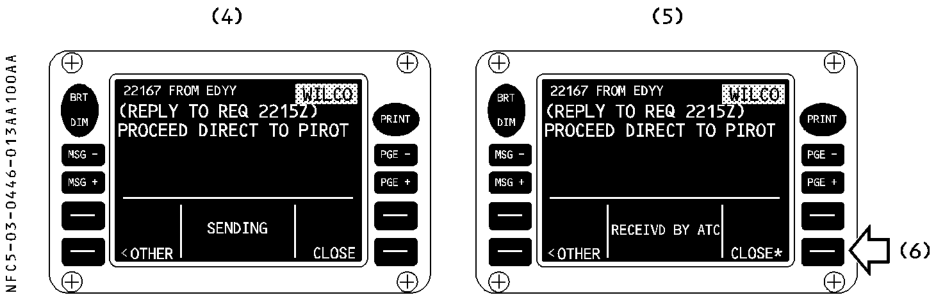
– **WILCO . . . . SELECT (1)**
The message status becomes "WILCO" on a blue background. (2)

– **SEND . . . . SELECT (3)**
The message is displayed in green letters, the WILCO status is on a green background, and the information area displays SENDING (4). After a few seconds the message RECEIVD BY ATC is displayed on the information area (5).

– **CLOSE . . . . SELECT (6)**
The message and its status are cleared from the screen.

NFC5-03-0446-013-B100AA





The flight crew must insert the direct to in the FMGS flight plan.

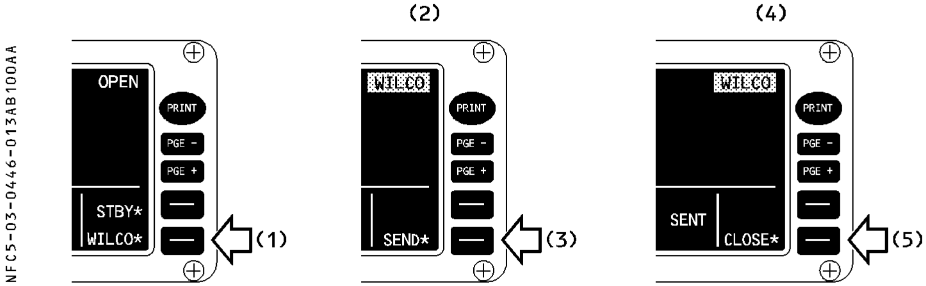
● **If LACK not supported by ATC :**

On the DCDU

– **WILCO . . . . SELECT (1)**
The message status becomes "WILCO" on a blue background. (2)

– **SEND . . . . SELECT (3)**
The message is displayed in green letters, the WILCO status is on a green background and the message SENT is displayed on the information field. (4)

– **CLOSE . . . . SELECT (5)**
The message and its status are cleared from the screen.

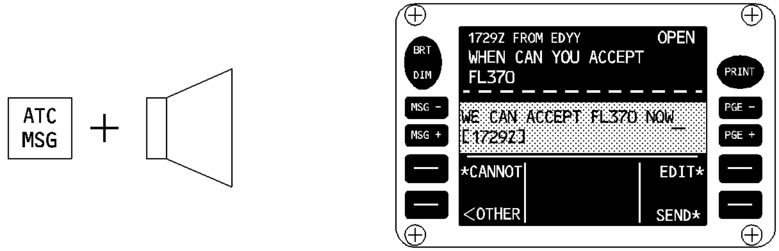


The crew must insert the direct to in the FMGS flight plan.

"WHEN CAN YOU" NEGOTIATION MESSAGE

The ATSU triggers visual (ATC MSG light) and aural alerts, and displays a default answer on the screen in white and blue letters. The message status is "OPEN" and in blue.

NFC5-03-0446-014-A100AA



- **Pilot action :**

  – **ATC MSG . . . . PRESS**
  This will turn off the light, and stop the aural alert.

● **If the crew can perform the default answer immediately :**

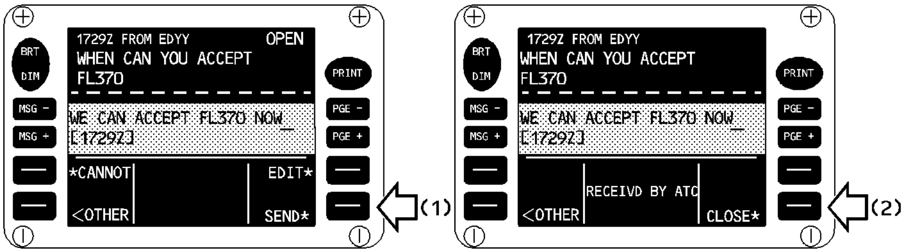
On the DCDU :

– **SEND . . . . SELECT (1)**
The message is displayed on a green background.

Note : If the ATC Center is not equipped to support Logical Acknowledgement (LACK), the DCDU information field will display SENT, instead of RECEIVD BY ATC.

– **CLOSE . . . . SELECT (2)**
The message and its status are cleared from the screen.

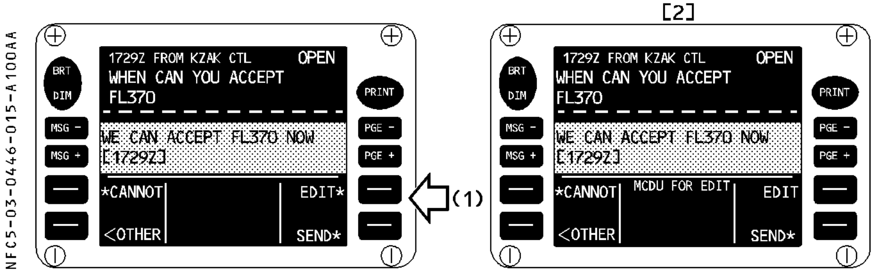
NFC5-03-0446-014-B100AA



● **If the flight crew can accept this action, but cannot perform it immediately :**

On the DCDU :

– **EDIT . . . . SELECT (1)**
MCDU FOR EDIT is displayed on the DCDU information area [2]. The EDIT page is automatically displayed on the MCDU [3], for the flight crew to specify when they can comply with the proposed action.
A default time value appears in the 2L field of the MCDU EDIT page. This value is the one displayed on the DCDU.

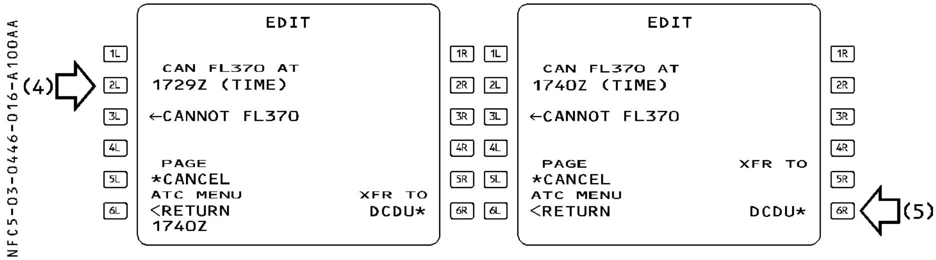


On the MCDU :

To modify the default time value, enter the new time value on the MCDU scratchpad, and select the 2L key to display it (4).

– **XFR TO DCDU . . . . SELECT (5)**
The message is displayed on the DCDU [6].

[3]



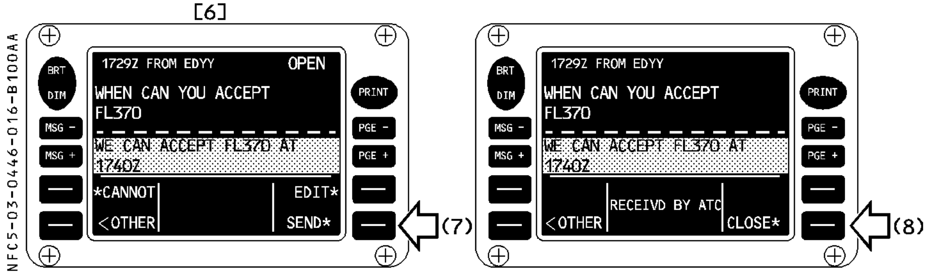
<u>On the DCDU :</u>

– **SEND . . . . SELECT (7)**
The message is displayed on a green background.

<u>Note</u> : If the ATC Center is not equipped to support Logical Acknowledgement (LACK), the DCDU information field will display SENT, instead of RECEIVD BY ATC.

– **CLOSE . . . . SELECT (8)**
The message and its status are cleared from the screen.

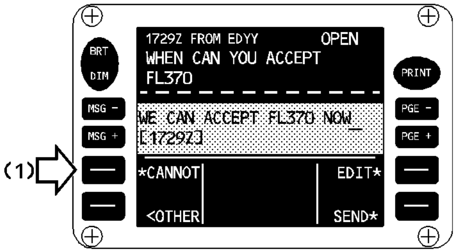
[6]



- **If the crew will never comply with the proposed action :**

On the DCDU :

– **CANNOT . . . . SELECT (1)**
Change the proposed positive message is a negative message. The negative message is displayed on a blue background. The message status remains OPEN [2].



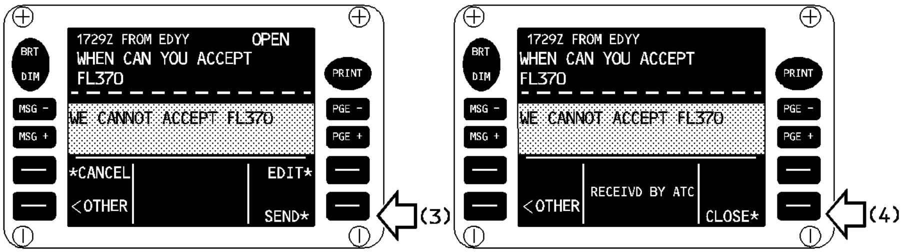
NFC5-03-0446-017-A100AA

– **SEND . . . . SELECT (3)**
The message is displayed on a green background.

<u>Note</u> : If the ATC Center is not equipped to support Logical Acknowledgement (LACK), the DCDU information field will display SENT, instead of RECEIVD BY ATC.

– **CLOSE . . . . SELECT (4)**
The message and its status are cleared from the screen.

[2]



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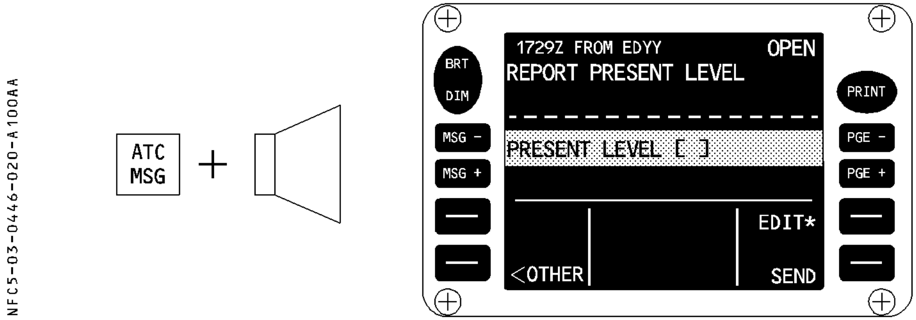
NAVIGATION PARAMETER REQUEST FROM ATC AND PILOT RESPONSE

When the ATC requests confirmation of a parameter, the ATSU triggers visual (ATC MSG light) and aural alerts, and displays the message on the screen in white letters. The message status is “OPEN” and in blue.

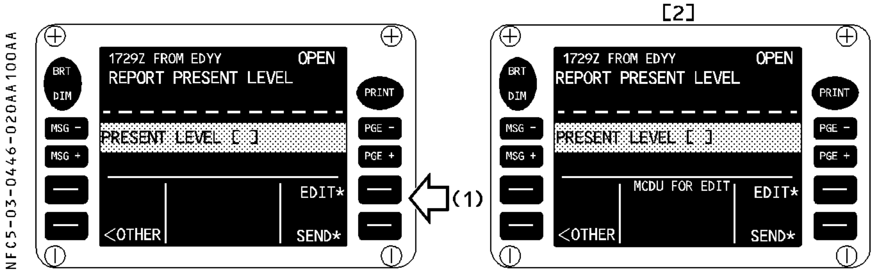


- **Pilot action :**

  – **ATC MSG . . . . PRESS**
  This will turn off the light, and stop the aural alert.

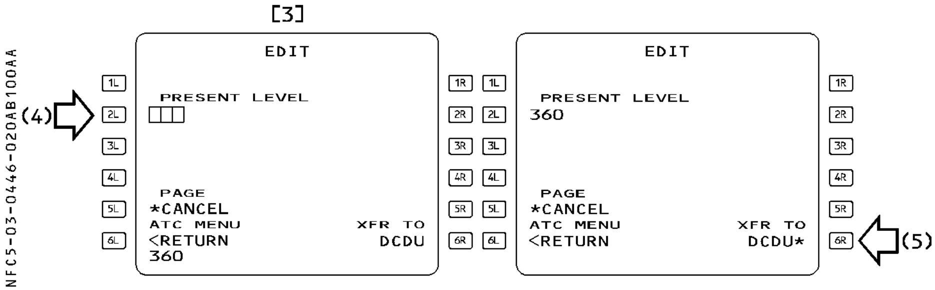
On the DCDU :

– **EDIT . . . . SELECT (1)**
MCDU FOR EDIT is displayed on the DCDU information area [2]. The EDIT page is automatically displayed on the MCDU [3], for the flight crew to specify the present level.
A default time value appears in the 2L field of the MCDU EDIT page. This value is the one displayed on the DCDU.



On the MCDU :
To enter the level value, enter the new parameter on the MCDU scratchpad, and select the 2L key to display it (4).

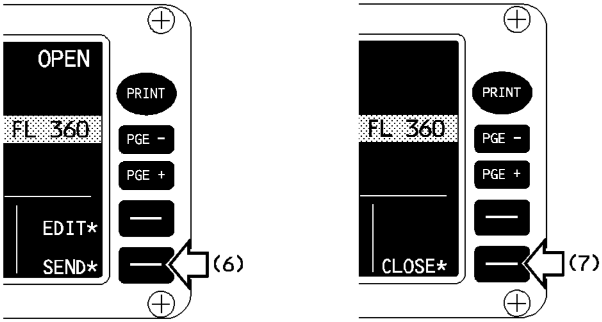
– **XFR TO DCDU . . . . SELECT (5)**
The message is displayed on the DCDU [6].



On the DCDU :

– **SEND . . . . SELECT (6)**
The message is displayed in green letters.

– **CLOSE . . . . SELECT (7)**
The message is cleared from the screen.



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AUTOMATIC TRANSFER TO NEXT ATC

The current ATC Center sends a NEXT ATC uplink message to the flight crew. The flight crew must press CLOSE [1] to close the message.

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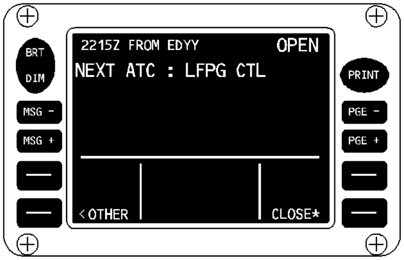
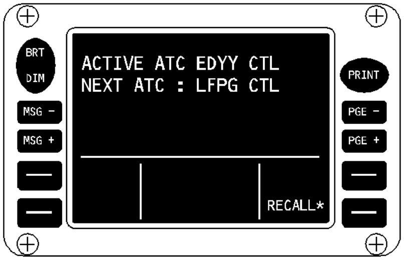


[1]

After the flight crew receives the NEXT ATC uplink message, the next ATC Center establishes a CPDLC connection with the aircraft. During this period of time in which the connection is not yet established, the aircraft remains under the ACTIVE ATC Center's control. [2]

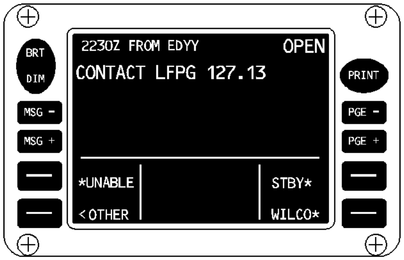
NFC5-03-0446-027-B100AA



[2]

When the contact is establised and the transfer to the next ATC Center occurs, the flight crew receives a CONTACT uplink message that also includes the frequency that they must use for voice backup. [3]

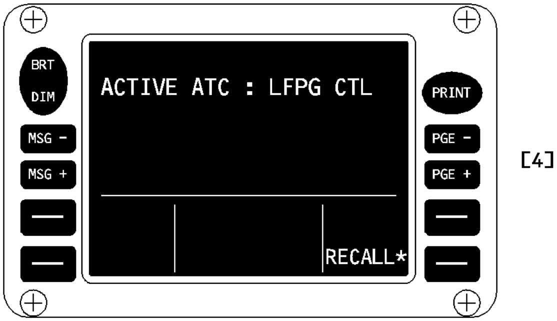
NFC5-03-0446-027-C100AA



[3]

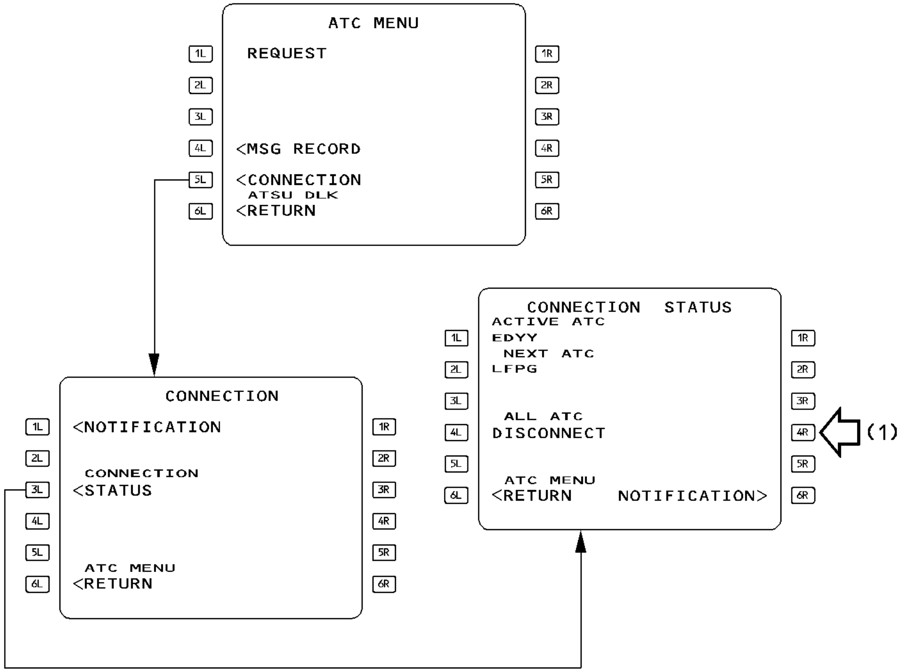
The flight crew must send a WILCO message to the ATC Center, and then press CLOSE on the DCDU. The DCDU will then display the active ATC Center. Next, the flight crew must manually set the voice frequency associated with the ATC Center. [4]

NFC5-03-0446-028-A100AA



The aircraft is now under control of the next ATC Center (datalink and voice frequency). The flight crew must wait to receive a message that indicates the detailed name of this ATC Center before they can send datalink messages to the ground.

<u>Note</u> : *If no "CONTACT" message is received, the crew must contact the ATC by voice, and manually disconnect from the current ATC center via the CONNECTION STATUS page (1). The crew must initiate a notification procedure to manually establish datalink communications with the next ATC center.*



NFC5-03-0446-028-B100AA

THRUST CONTROL

GENERAL

The flight crew uses console-mounted levers to control engine thrust. Each lever sends electrical signals to the FADEC of the engine it controls. The FADEC responds to the thrust lever position or an autothrust command by setting the engine thrust.
The thrust lever quadrant is the equivalent of a thrust rating panel. For each lever it has five detents. Moving the thrust lever to the forward stop of the quadrant always gives maximum takeoff or go-around thrust, as appropriate, and signals the AP/FD to go to takeoff or go-around, as appropriate. The FMA (Flight Mode Annunciator) in the left window of each PFD displays the status of the thrust system to the pilot.
The engine instrument display gives a read-out of the engine thrust mode (CL, MCT, etc.) and the appropriate engine limit. It displays the actual limit set, thrust lever position, FADEC command, and maximum engine rating limit continually.

MANUAL THRUST CONTROL

With A/THR disconnected, thrust control between full reverse (on the ground only) and maximum takeoff or go-around thrust is entirely conventional.
TLA (Thrust Lever Angle) determines the thrust demanded.
The rating limit selected by the pilot and the actual engine limit appear on the engine instrument display.
With the thrust lever short of the CL position on the quadrant, the engine instrument display shows CL continually. If one or both thrust levers are above CL, it shows MCT/FLEX. If one or both thrust levers are beyond the MCT detent, it shows TOGA. With the thrust levers positioned in a detent, the detent setting controls the engines to that limiting parameter.

AUTOTHRUST

When active A/THR controls either speed, thrust or retard as appropriate. The engine limit corresponds to the thrust lever position. If the thrust lever is below the CL detent then the TLA determines the engine power limit.
With the thrust lever above the CL detent, autothrust reverts to arm (A/THR blue on FMA) except if alpha-floor is active. CLB (or LVR CLB) flashes on the FMA.
If the thrust levers are not aligned, an asymmetric message (ASYM or LVR ASYM) appears on the FMA. If so, each engine is limited to its appropriate TLA.
This allows the use of autothrust to continue if one engine has to have its maximum RPM limited for some operational reasons such as excessive vibration.

Autothrust disconnection

Autothrust disconnection occurs when :
- The A/THR fails, or
- The FCU's A/THR pushbutton is pressed, or
- The thrust lever(s)' instinctive disconnect button is pressed, or
- Both thrust levers are set to IDLE.

R – When the radio altitude is below 100 ft and :
R · Both thrust levers above CL detent or
R · One thrust lever above MCT detent.

1. Disconnection, due to a failure or to the use of the FCU A/THR pushbutton.
   If the thrust levers are in the CL detent (both engines operating), or one thrust lever in the MCT (one engine operative), the thrust is locked at its actual value. The FMA displays "THR LK". A single chime sounds, and an amber ECAM caution appears, as long as thrust is locked. (For more details, refer to FCOM 1.22.30).
   Movement of the thrust lever(s) unlocks the thrust, and the engine then responds to TLA at the normal rate.
2. Disconnection, due to the use of instinctive disconnect button.
   When a pilot presses the instinctive disconnect button, the engines immediately develop thrust corresponding to the position of their thrust levers, whatever that might be.

Instinctive Disconnection procedure

To avoid any confusion for those pilots flying the A318/A319/A320/A321 with different modifications (with, and without, energy management), Airbus recommends that pilots use one procedure for disconnecting with the instinctive disconnect button.
- Set the thrust levers to the current thrust setting by adjusting the levers until the N1 (or EPR) TLA white circle is adjacent to the actual N1 (or EPR).
- Use the instinctive button to disconnect the A/THR.
- Check that "AUTO FLT A/THR" OFF is displayed on the, and that there is no annunciator in the first column of the FMA.
- Set the thrust manually.

Use of autothrust in approach

The pilot should use autothrust for approaches. On final approach, it usually gives more accurate speed control, although in turbulent conditions the actual airspeed may vary from the target speed, by as much as five knots. Although the changeover between auto and manual thrust is easy to make with a little practice, the pilot should, when using autothrust for the final approach, keep it engaged until he retards the thrust levers to idle for touchdown. If the pilot is going to make the landing using manual thrust, he should disconnect the A/THR by the time he has reached 1000 feet on the final approach.
If he makes a shallow flare, with A/THR engaged, it will increase thrust to maintain the approach speed until he pulls the thrust levers back to idle. Therefore he should avoid making a shallow flare, or should retard the thrust levers as soon as it is no longer necessary to carry thrust, and if necessary before he receives the "retard" reminder.

When using autothrust, the pilot can always change thrust by moving the thrust levers above the CL detent. The thrust then increases to what corresponds to the thrust lever position. However, autothrust stays armed, and immediately takes effect when the thrust levers are returned to the CL detent. Therefore, the pilot should normally put the thrust levers back to CL, as soon as the aircraft has made the change for which he increased thrust. This feature gives the pilot a means of advancing phase on the autothrust in very difficult environmental conditions. But, it should only be needed in exceptional circumstances.

Note : When below 100 feet, moving thrust levers above the CL detent, will result in A/THR disconnection.

Although use of the autothrust is recommended for the entire approach, this does not absolve the pilot from his responsibility to monitor its performance, and to disconnect it if it fails to maintain speed at the selected value. Such monitoring should include checking on whether or not the managed speed, calculated by the FMGC, is reasonable.
For more information concerning aircraft handling during final approach, refer to the FCOM
R Bulletin "Aircraft handling in final approach".

Engine failure

The pilot can continue to use autothrust after an engine failure, but some pilots feel that directional control is more difficult, when autothrust changes the thrust instead of the pilot making the thrust changes manually. The choice between using, or not using, autothrust after engine failure is a personal one. As far as speed control is concerned, autothrust is usually more accurate than a pilot.

MANUAL ENGINE START

Pilots normally use automatic starting to start an engine.
However, manual starting is recommended in the following cases :

- **After aborting a start, because of :**
  · Engine stall
  · Engine EGT overlimit
  · Low start air pressure

- **When expecting a start abort, because of :**
  · Degraded bleed performance, due to hot conditions, or at a high-altitude airfields.
  · An engine with a reduced EGT margin, in hot conditions, or at a high-altitude airfields.
  · Marginal performance of the external pneumatic power group.

MANUAL ENGINE START PROCEDURE

– **THR LEVERS . . . . IDLE**

CAUTION
The engine will start, regardless of the thrust lever position, and will rapidly accelerate to generate the thrust demanded by the TLA, causing a hazardous situation, if the thrust levers are not at idle.

– **ENG MODE selector . . . . NORM THEN IGN**
The lower ECAM displays the engine page.

– **ENG MAN START . . . . ON**
· Do not set the MAN START pushbutton to ON, before all amber crosses have disappeared on engine parameters (upper ECAM display).
· On the ECAM lower display, check that the START VALVE is inline
· On the ECAM displays, check that the OIL PRESS increases, and N2 increases.

R ● **When N2 reaches the maximum motoring speed :**
The maximum motoring speed is defined as the speed at which N2 acceleration is less than 1 % in approximately 5 seconds.

● **If N2 does not get up to 20 %, check that the pack valve autoclosure is functioning. If the autoclosure is functioning, shed APU loads as follows.**

– **GALLEY . . . . OFF**
If needed, shed also :

– **BLUE ELEC PUMP (ground only) . . . . OFF**

– **FUEL X FEED . . . . ON**

– **FUEL PUMPS except R TK PUMP 2 . . . . OFF**

– **BLOWER . . . . OVRD**

– **CAB FANS . . . . OFF**

R ● **When N2 gets above 20 % :**

– **MASTER switch . . . . ON**
The PNF starts the timing for monitoring the light-up delay.

– **ECAM displays** . . . . **CHECK**
Check : – Indication of igniters A and B
– Fuel flow increase
– EGT and N1 increase 15 seconds (maximum) after fuel is on.
If the electrical power supply is interrupted during the start sequence (indicated by loss of ECAM CRTs), abort the start by setting the MASTER switch to OFF. Then perform a 30 second dry crank.

● **When N2 reaches 50 %**

– **ECAM displays** . . . . **CHECK**
R Check : – START VALVE crossline (between 50 and 56 % N2)
– Igniter indication off
– Main and secondary engine idle parameters normal.
Gray background on N2 indication disappears.

Note : CFM Eng. 56-5-B1/B2 engines accelerate slowly from 50 % N2 to idle. Start abort is not required as long as N2 is increasing.

– **MAN START** . . . . **OFF**

– **ENG MODE selector** . . . . **NORM**

ENGINE START WITH EXTERNAL PNEUMATIC POWER

- **Before connecting external pneumatic power :**

  – **PACKS 1 and 2 . . . . OFF**
  (To prevent pack contamination).

- **Before start :**

  – **APU BLEED . . . . OFF**

  – **ENG BLEED (both engines) . . . . OFF**

  – **X BLEED . . . . OPEN**

- **Cleared to start :**

  – **Start Engine 2 first.**

  Note : As necessary, Engine 1 can also be started by using the external pneumatic power. If Engine 1 is started first, check the brake accu pressure prior to engine start.

  – **Use the normal engine start procedure.**
  The minimum recommended starter air supply pressure is 30 psi, when the start valve is open.
  Two external pneumatic power units may be used in parallel, if the pressure/flow relation is expected to be marginal.

- **After Engine 2 is started :**

R ■ **If external pneumatic power is used to start Engine 1 :**

R – **Start Engine 1**

R – **Request the removal of external pneumatic power unit.**

R – **ENG BLEED (Both engines) . . . . ON**

R – **PACKS 1 and 2 . . . . ON**

R ■ **If the crossbleed engine start procedure is used for Engine 1 :**

- **Request the removal of external pneumatic power unit**

R - **PACKS 1 and 2 . . . . ON**

- **CROSSBLEED ENGINE START PROC for Engine 1 . . . . APPLY**

CROSSBLEED ENGINE START

CAUTION
The use of engine bleed supply and external pneumatic power supply simultaneously is prohibited.

- **Before start :**

  - **APU BLEED . . . . OFF**
    The BLEED valve of the running engine reopens and the cross bleed valve closes.

  - **ENG BLEED (running engine) . . . . check ON**

  - **ENG BLEED (receiving engine) . . . . OFF**
    The bleed valve of engine to be started is closed to eliminate reverse flow leakage.

  - **X BLEED . . . . OPEN**

- **Cleared to start :**

  - **Confirm area is clear of obstacles.**
    Ensure increased power jet wake does not constitute any hazard to people or installation behind the aircraft.
    Adjust thrust of supplying engine to obtain 30 psi at start air valve before start initiation and at least 25 psi during start.
    Do not exceed 80 % N2 to limit jet wake.
    Apply the normal engine start procedure.

- **After start :**

  - **THRUST LEVER (supplying engine) . . . . IDLE**

  - **X BLEED . . . . AUTO**

  - **ENG BLEED (receiving engine) . . . . ON**

  - **PACKS . . . . Check ON**

START VALVE MANUAL OPERATION

Advise ground crew to prepare for manual start valve operation.

– **AUDIO CONTROL PANEL . . . . CAB**

● **When ground crew member is ready, order "START 1 or 2"**

– **ENG MODE SEL . . . . IGN**

– **ENG MASTER . . . . ON**

– **START VALVE . . . . "ORDER OPEN AND KEEP OPEN"**
If not maintained in OPEN position by the ground crew member, the start valve closes.

● **When N2 at 50 %**

– **START VALVE . . . . "ORDER CLOSE"**
Continue with normal procedure.

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PUSHBACK WITH POWER PUSH UNIT VIA THE MAIN LANDING GEAR

GENERAL

At several airports, the pushback is performed using a Power Push Unit (PPU), which pushes the aircraft via the main landing gear, while the flight crew provides steering via the green hydraulic system. Steering guidance will be given by ground personnel via interphone communication.
This section provides the flight crew with Airbus operational recommendations in performing such a pushback, and replaces the "BEFORE PUSHBACK or START" standard operating procedure.

PREPARATION

– **LOADSHEET . . . . CHECK**
The Captain should thoroughly check the load and trim sheet, particularly for gross errors, and ensure that the loadsheet data is correct : Correct flight, correct aircraft, dry operating index, configuration, fuel onboard, etc.
Compare ZFW/ZFCG with the previously-entered data and adjust, if necessary.

– **TAKEOFF DATA . . . . PREPARE and CHECK/REVISE**
Once the loadsheet is checked :
  – The PNF checks or recomputes the takeoff speeds and flexible temperature, using the RTOW charts.
  – The PF independently calculates the takeoff speeds and flexible temperature, as a crosscheck.
    Particular care should be taken to determine the takeoff configuration (refer to 2.02.20).
    Confirm any takeoff weight limitation.
R – The PF checks (or revises) the takeoff data on the MCDU's INIT B and PERF pages.

– **SEATS, SEAT BELTS, HARNESSES, RUDDER PEDALS, ARMRESTS . . . . ADJUST**
The seat is correctly adjusted when the pilot's eyes are in line with the red and white balls.

– **MCDU . . . . IN TAKEOFF CONFIGURATION**
It is recommended that the crew display F-PLN on the PNF side, and PERF TAKEOFF on the PF Side.

– **EXT PWR . . . . CHECK OFF**
Request that external power be removed.

– **BEFORE START CHECKLIST down to the line . . . . COMPLETE**

– **TOWING LEVER . . . . NORMAL POSITION**
To be confirmed by ground personnel, and no NW STRG DISC indication on the ECAM.

– **PUSHBACK/START UP CLEARANCE . . . . OBTAIN**
Obtain ATC pushback/start up clearance.
Obtain clearance from ground personnel. Due to the face-to-face position of the flight crew and ground personnel, it is necessary that the flight crew ensure they have clearly and correctly understood the ground personnel's directional phraseology.

– **WINDOWS and DOORS . . . . CHECK CLOSED**
  – Check that the cockpit windows are closed and locked (red circle on handle fully visible). Check, on the ECAM's lower display, that all doors are closed.
  – When required by local Airworthines Authorities, check that the cockpit door is closed and locked (no cockpit door open/fault indication). If entry is requested, identify the person requesting entry before unlocking the door. With the cockpit door selector on NORM, the cockpit door is closed and locked. If entry is requested from the cabin, and if no further action is performed by the pilot, the cabin crew will be able to unlock the door by using the emergency access procedure. Except for crew entry/exit, the cockpit door should remain closed until engine shutdown.

– **BEACON . . . . ON**

– **THR LEVERS . . . . IDLE**

CAUTION

Engine will start, regardless of the thrust lever position; thrust will rapidly increase to the corresponding thrust lever position, causing a hazardous situation, if thrust levers are not in idle.

– **ENG 2 . . . . START**
Engine 2 is usually started first, to pressurize the yellow hydraulic system to maintain parking brake pressure. Engine 1 must be started after the pushback is completed, to ensure that the Power Push Unit is able to push the aircraft.

CAUTION

If, during engine start with the parking brake ON, the aircraft starts to move due to a parking brake failure, immediately release the PARKING BRK handle to restore braking by pedals.

– **PTU . . . . CHECK AUTO**
The green hydraulic system must be pressurized, via the PTU, to ensure that nosewheel steering is available.

PUSHBACK WITH POWER PUSH UNIT VIA THE MAIN LANDING GEAR

GENERAL

At several airports, the pushback is performed using a Power Push Unit (PPU), which pushes the aircraft via the main landing gear, while the flight crew provides steering via the yellow hydraulic system. Steering guidance will be given by ground personnel via interphone communication.
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  The Captain should thoroughly check the load and trim sheet, particularly for gross errors, and ensure that the loadsheet data is correct : Correct flight, correct aircraft, dry operating index, configuration, fuel onboard, etc.
  Compare ZFW/ZFCG with the previously-entered data and adjust, if necessary.

- **TAKEOFF DATA . . . . PREPARE and CHECK/REVISE**
  Once the loadsheet is checked :
  - The PNF checks or recomputes the takeoff speeds and flexible temperature, using the RTOW charts.
  - The PF independently calculates the takeoff speeds and flexible temperature, as a crosscheck.
    Particular care should be taken to determine the takeoff configuration (refer to 2.02.20).
    Confirm any takeoff weight limitation.
  - The PF checks (or revises) the takeoff data on the MCDU's INIT B and PERF pages.

- **SEATS, SEAT BELTS, HARNESSES, RUDDER PEDALS, ARMRESTS . . . . ADJUST**
  The seat is correctly adjusted when the pilot's eyes are in line with the red and white balls.

- **MCDU . . . . IN TAKEOFF CONFIGURATION**
  It is recommended that the crew display F-PLN on the PNF side, and PERF TAKEOFF on the PF Side.

- **EXT PWR . . . . CHECK OFF**
  Request that external power be removed.

– **BEFORE START CHECKLIST down to the line . . . . COMPLETE**

– **TOWING LEVER . . . . NORMAL POSITION**
To be confirmed by ground personnel, and no NW STRG DISC indication on the ECAM.

– **PUSHBACK/START UP CLEARANCE . . . . OBTAIN**
Obtain ATC pushback/start up clearance.
Obtain clearance from ground personnel. Due to the face-to-face position of the flight crew and ground personnel, it is necessary that the flight crew ensure they have clearly and correctly understood the ground personnel's directional phraseology.

– **WINDOWS and DOORS . . . . CHECK CLOSED**
- Check that the cockpit windows are closed and locked (red circle on handle fully visible). Check, on the ECAM lower display, that all doors are closed.
- When required by local Airworthines Authorities, check that the cockpit door is closed and locked (no cockpit door open/fault indication).
  If entry is requested, identify the person requesting entry before unlocking the door. With the cockpit door selector on NORM, the cockpit door is closed and locked. If entry is requested from the cabin, and if no further action is performed by the pilot, the cabin crew will be able to unlock the door by using the emergency access procedure. Except for crew entry/exit, the cockpit door should remain closed until engine shutdown.

– **BEACON . . . . ON**

– **THR LEVERS . . . . IDLE**

> CAUTION
> Engine will start regardless of the thrust lever position; thrust will rapidly increase to the corresponding thrust lever position, causing a hazardous situation, if thrust levers are not in idle.

– **ENG 2 . . . . START**
Engine 2 is usually started first, to pressurize the yellow hydraulic system to power the nosewheel steering and maintain parking brake pressure. Engine 1 must be started after the pushback is completed, to ensure that the Power Push Unit is able to push the aircraft.

> CAUTION
> If, during engine start with the parking brake ON, the aircraft starts to move due to a parking brake failure, immediately release the PARKING BRK handle to restore braking by pedals.

PUSHBACK

– **PARKING BRK . . . . OFF**
Advise the ground personnel that the parking brake is OFF and that pushback can be started.

CAUTION
Do not use brakes during pushback unless required, due to an emergency.

R In case of an emergency, advise the ground personnel that the PPU should be removed
R and moved out of the evacuation area.

– **NW STRG . . . . AS RQRD**
Steer the aircraft following guidance from the ground personnel.

– **PARKING BRK . . . . ON**
After pushback is completed, set the PARKING BRK to ON and inform the ground personnel that the power-push unit can be removed.

– **ENG 1 . . . . START**

GENERAL

Except in some operational conditions, such as uphill slopes, slippery taxiways, or high gross weight, it may be advisable to taxi on one engine. The flight crew must exercise caution when taxiing on one engine to avoid generating excessive jet blast.

DEPARTURE

The flight crew should use the following procedures for taxiing out, if company policy and regulations permit.

– **BRAKE ACCU PRESS . . . . CHECK**
If necessary, use the Y ELEC PUMP to pressurize the brake accumulator.

– **ENGINE 1 . . . . START**
Use Engine 1 for taxiing because it pressurizes the green hydraulic system (nosewheel steering + normal braking), without using the PTU.

– **X BLEED . . . . OPEN**
This supplies both packs from Engine 1.

– **Apply the normal "AFTER START" procedures, but :**
  – Keep the APU running to avoid additional electrical transients and to allow the galley operation.
    APU BLEED should be switched off to avoid ingestion of engine exhaust gases in the air conditioning system.
R – After both engines have been started, perform the ECAM STATUS check, and then
R select and set the engine anti-icing and/or wing anti-icing as required.

• **Before releasing the parking brake :**

  – **Y ELEC PUMP . . . . ON**
  This pressurizes the yellow hydraulic system.

– **Apply the normal "TAXI" procedures, but :**
  · Perform the Flight Controls checks after both engines have been started.
  · Do not arm the Auto Brake system before the Flight Controls checks have been completed.

- **Before ENG 2 start :**

  – **Y ELEC PUMP . . . . OFF**
  Correct operation of the PTU will be checked during Engine 2 start.

  – **APU BLEED . . . . ON**

- **No less than 2 minutes before takeoff :**

  – **ENGINE 2 . . . . START**

  Note : *During engine start, a slight jerk forward may occur, if brakes are applied while the aircraft is moving.*

  – **APU . . . . AS RQRD**

  – **X BLEED . . . . AUTO**

  – **Continue with the "AFTER START" procedures :**
R After both engines have been started, perform the ECAM STATUS check, and then
R select and set the engine anti-icing and/or wing anti-icing as required.

  – **Proceed with the "AFTER START" checklist.**

  – **FLIGHT CONTROLS . . . . CHECK**

  – **AUTO BRK . . . . MAX**

GENERAL

Except in some operational conditions, such as uphill slopes, slippery taxiways, or high gross weight, it may be advisable to taxi on one engine. The flight crew must exercise caution when taxiing on one engine to avoid generating excessive jet blast.

DEPARTURE

The flight crew should use the following procedures for taxiing out, if company policy and regulations permit.

– **BRAKE ACCU PRESS . . . . CHECK**
  If necessary, use the Y ELEC PUMP to pressurize the brake accumulator.

– **ENGINE 1 . . . . START**
  Use Engine 1 for taxiing, because it pressurizes the green hydraulic system (normal braking).

– **X BLEED . . . . OPEN**
  This supplies both packs from Engine 1.

– **Apply the normal "AFTER START" procedures, but :**
  – Keep the APU running to avoid additional electrical transients and to allow the galley operation.
    APU BLEED should be switched off to avoid ingestion of engine exhaust gases in the air conditioning system.
R – After both engines have been started, perform the ECAM STATUS check, and then
R select and set the engine anti-icing and/or wing anti-icing as required.

• **<u>Before releasing the parking brake :</u>**

  – **Y ELEC PUMP . . . . ON**
    This pressurizes the yellow hydraulic system (nosewheel steering) without using the PTU.

– **Apply the normal "TAXI" procedures, but :**
  · Perform the Flight Controls checks after both engines have been started.
  · Do not arm the Auto Brake system before the Flight Controls checks have been completed.

- **Before ENG 2 start :**

  – **Y ELEC PUMP . . . . OFF**
  Correct operation of the PTU will be checked during Engine 2 start.

  – **APU BLEED . . . . ON**

- **No less than 2 minutes before takeoff :**

  – **ENGINE 2 . . . . START**

  Note : During engine start, a slight jerk forward may occur, if brakes are applied while the aircraft is moving.

  – **APU . . . . AS RQRD**

  – **X BLEED . . . . AUTO**

  – **Continue with the "AFTER START" procedures :**
R After both engines have been started, perform the ECAM STATUS check, and then
R select and set the engine anti-icing and/or wing anti-icing as required.

  – **Proceed with the "AFTER START" checklist.**

  – **FLIGHT CONTROLS . . . . CHECK**

  – **AUTO BRK . . . . MAX**

ARRIVAL

The flight crew may use the following procedure to taxi in :

– **APU . . . . START**
Start the APU before shutting down the engine, in order to avoid additional electrical transient.

• **No less than 3 minutes after high thrust operations, and when taxiing in a straight line :**

R – **ENG 2 . . . . SHUT DOWN**

R – **Y ELEC PUMP . . . . ON**
R This avoids running the PTU.

• **At parking :**

– **Y ELEC PUMP . . . . OFF**

– **ENG 1 . . . . SHUT DOWN**

SEVERE TURBULENCE

GENERAL

Whenever possible, avoid areas with known or forecasted severe turbulence. If turbulence is unavoidable, aim to keep the speed in the region of the target speed given in this section, so as to provide the best protection against the effect of gust on the structural limits, whilst maintaining an adequate margin above VLS.
Consider requesting a lower flight level to increase margin to buffet onset.
Sufficient buffet margin exists at optimum altitude.
R Severe turbulence is defined as turbulence that causes large, abrupt changes in altitude
R and/or attitude. It usually causes large variations in airspeed. Occupants are forced
R violently against their seat belts and loose objects will move around the aircraft.
R If severe turbulence occurs during a flight, the flight crew must make a logbook entry in
R order to initiate maintenance action.

R *Note : Recommendations for severe turbulence are also applicable to extreme turbulence.*

SIGNS

Before entering an area of known turbulence, the flight crew and the cabin crew must secure all loose equipment and switch the cabin SIGNS to ON.

AUTOPILOT/AUTOTHRUST

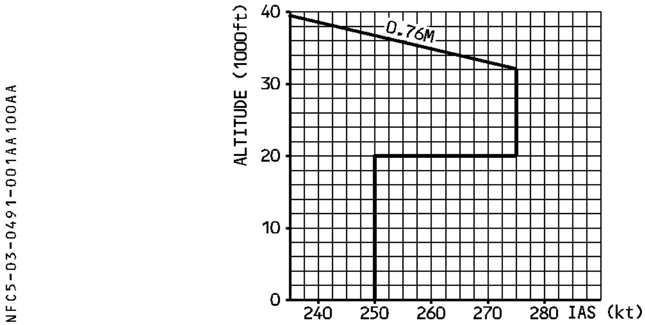
– **Keep the autopilot ON.**

– **When thrust changes become excessive : Disconnect Autothrust.**

– **For approach : Use A/THR for managed speed.**

THRUST AND AIRSPEED

Set the thrust to give the recommended speed (see table on next page). This thrust setting attempts to obtain, in stabilized conditions, the speed for turbulence penetration given in the graph below.
Only change thrust in case of an extreme variation in airspeed, and do not chase your Mach or airspeed.
A transient increase is preferable to a loss of speed, that decreases buffet margins and is difficult to recover.



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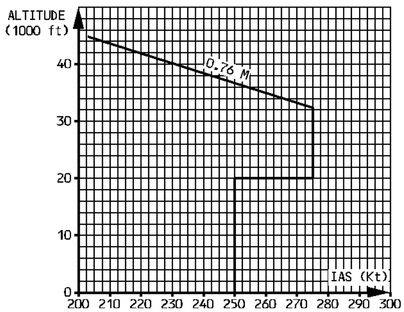

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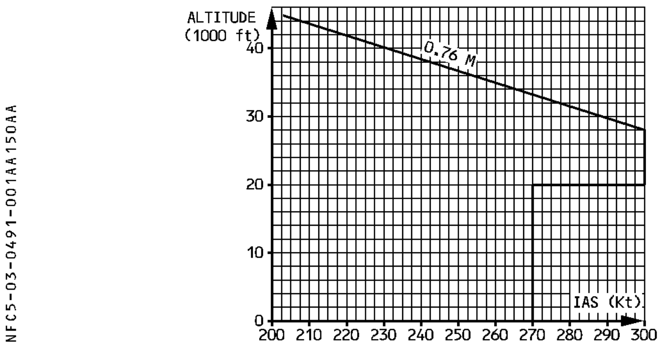

THRUST SETTING (N1) FOR RECOMMENDED SPEED

R

SEVERE TURBULENCE												
SPEED AND THRUST SETTING FOR RECOMMENDED TURBULENCE SPEED												
FL	SPD or Mach	GROSS WEIGHT (1000 kg)										
		54	58	62	66	70	74	78	82	86	90	94
		N1 %										
390	0.76	83.7	84.7	–	–	–	–	–	–	–	–	–
370	0.76	82.6	83.4	84.2	85.2	–	–	–	–	–	–	–
350	0.76	82.0	82.7	83.3	84.1	84.8	–	–	–	–	–	–
330	0.76	81.8	82.4	83.1	83.7	84.3	85.0	85.7	–	–	–	–
310	0.76	81.8	82.3	82.8	83.4	83.9	84.5	85.1	85.7	86.4	–	–
290	0.76	82.0	82.3	82.7	83.2	83.7	84.2	84.7	85.3	85.8	86.4	87.0
270	300	81.5	81.8	82.1	82.5	82.9	83.4	83.9	84.4	85.0	85.6	86.1
250	300	80.1	80.5	80.9	81.4	81.8	82.2	82.7	83.2	83.7	84.4	85.1
200	300	76.3	76.7	77.2	77.7	78.1	78.6	79.2	79.8	80.4	81.1	81.9
150	270	68.2	68.7	69.2	69.8	70.5	71.2	71.9	72.7	73.5	74.4	75.4
100	270	64.2	64.7	65.3	65.9	66.6	67.3	68.1	69.0	69.7	70.5	71.3
50	270	60.9	61.3	61.8	62.3	62.8	63.4	64.1	64.8	65.5	66.3	67.2

ALTITUDE

If the crew flies the aircraft manually :
– Expect large variations in altitude, but do not chase altitude.
– Maintain attitude and allow altitude to vary.

SPEEDBRAKES

Whenever speedbrakes are applied, keep a hand on the speedbrake handle, except while performing some other specific cockpit function (changing power, resetting altimeter, etc.).

LANDING

Configuration FULL, or 3, can be used.
However, Configuration 3 provides more energy and less drag.

THRUST SETTING (N1) FOR RECOMMENDED SPEED

R

SEVERE TURBULENCE										
SPEED AND THRUST SETTING FOR RECOMMENDED TURBULENCE SPEED										
FL	SPD or Mach	GROSS WEIGHT (1000 kg)								
		44	48	52	56	60	64	68	72	76
		N1 %								
390	0.76	80.0	81.0	82.0	83.1	–	–	–	–	–
370	0.76	79.1	79.8	80.7	81.6	82.6	83.6	–	–	–
350	0.76	78.8	79.3	80.0	80.7	81.5	82.4	83.3	84.3	–
330	0.76	78.8	79.3	79.8	80.4	81.0	81.8	82.6	83.4	84.2
310	275	78.1	78.6	79.2	79.8	80.3	80.9	81.5	82.3	83.1
290	275	76.6	77.1	77.6	78.2	78.9	79.6	80.3	81.0	81.7
270	275	75.1	75.6	76.1	76.7	77.3	78.0	78.7	79.6	80.5
250	275	73.5	74.0	74.5	75.1	75.8	76.5	77.2	77.9	78.8
200	275	69.9	70.3	70.7	71.2	71.8	72.4	73.0	73.7	74.4
150	250	61.9	62.6	63.3	64.0	64.9	65.9	66.9	68.0	68.9
100	250	58.3	59.0	59.6	60.2	61.0	61.8	62.6	63.5	64.5
50	250	54.3	54.9	55.6	56.3	57.1	58.0	59.0	60.0	60.8

ALTITUDE

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THRUST SETTING (N1) FOR RECOMMENDED SPEED

R

SEVERE TURBULENCE											
SPEED AND THRUST SETTING FOR RECOMMENDED TURBULENCE SPEED											
FL	SPD or Mach	GROSS WEIGHT (1000 kg)									
		40	44	48	52	56	60	64	68	72	76
		N1 %									
390	0.76	78.9	79.7	80.6	81.7	82.8	–	–	–	–	–
370	0.76	78.2	78.8	79.5	80.3	81.3	82.3	83.4	–	–	–
350	0.76	77.8	78.4	79.0	79.6	80.3	81.2	82.1	83.1	84.1	–
330	0.76	77.8	78.3	78.9	79.5	80.0	80.7	81.4	82.2	83.1	84.0
310	275	77.1	77.6	78.1	78.7	79.3	80.0	80.6	81.2	81.9	82.8
290	275	75.6	76.1	76.6	77.1	77.7	78.4	79.2	80.0	80.6	81.4
270	275	74.1	74.5	75.1	75.7	76.2	76.9	77.6	78.3	79.2	80.1
250	275	72.6	73.0	73.5	74.1	74.7	75.3	76.1	76.8	77.6	78.4
200	275	69.2	69.5	69.9	70.3	70.8	71.4	72.0	72.7	73.4	74.1
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100	250	58.0	58.5	59.1	59.7	60.3	61.0	61.7	62.6	63.5	64.5
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ALTITUDE

If the crew flies the aircraft manually :
— Expect large variations in altitude, but do not chase altitude.
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SPEEDBRAKES

Whenever speedbrakes are applied, keep a hand on the speedbrake handle, except while performing some other specific cockpit function (changing power, resetting altimeter, etc.).

LANDING

Configuration FULL, or 3, can be used.
However, Configuration 3 provides more energy and less drag.

OPERATIONS IN WINDSHEAR OR DOWNBURST CONDITIONS

PRECAUTIONS FOR SUSPECTED WINDSHEAR

- **Before TAKEOFF**

  – **Delay takeoff until conditions improve.**

  – **Evaluate takeoff conditions :**
  · Using observations and experience.
  · Checking weather conditions.

  – **Select the most favorable runway (considering location of the likely windshear).**

  – **Use the weather radar or the predictive windshear system (◁) before commencing takeoff to ensure that the flight path clears any potential problem areas.**

  – **Select TOGA thrust.**

  – **Monitor closely airspeed and airspeed trend during the takeoff run for early signs of windshear.**

- **During APPROACH**

  – **Delay landing or divert to another airport until conditions are more favorable.**

  – **Evaluate condition for a safe landing by :**
  · Using observations and experience.
  · Checking weather conditions.

  – **Use the weather radar.**

  – **Select the most favorable runway, considering also which has the most appropriate approach aid.**

  – **Select FLAPS 3.**

  – **Use managed speed in the approach phase.**

  – **Check both FDs engaged in ILS, FPA or V/S.**

– **Engage the autopilot, for a more accurate approach and earlier recognition of deviation from the beam, when ILS is available.**

Note : – *When it is using the GS mini-function, associated with managed speed, the system will carry extra speed in strong wind conditions.*
R – *If gusty wind is expected, increase the Vapp that is displayed on the*
R *MCDU to a maximum of VLS + 15 knots.*

RECOVERY TECHNIQUE AT TAKEOFF

- **Before V1 :**

  The takeoff should only be rejected if unacceptable airspeed variations occur below the indicated V1, and the pilot decides that there is sufficient runway remaining to stop the aircraft.

- **After V1 :**

  – **Set thrust levers to TOGA**

  – **Rotate normally.**

  – **Follow SRS orders.**

- **During initial climb :**

  – **Set or maintain TOGA.**

  – **If the autopilot is engaged, use it ; but, be aware that automatic disengagement may occur, if $\alpha > \alpha$ prot.**

  – **Follow SRS orders (including use of full backstick, if demanded).**

  Note : If SRS is not available, use pitch attitude up to 17.5°, with full backstick, if necessary.

  – **Do not change configuration (gear, flaps), until out of shear.**

  – **Closely monitor the flight path and speed.**

  – **Recover smoothly to a normal climb, when out of shear.**

RECOVERY TECHNIQUE AT LANDING

– **Set thrust levers to TOGA.**

– **If the autopilot is engaged, use it ; but, be aware that automatic disengagement may occur, if $\alpha > \alpha$ prot.**

– **Follow SRS orders.**

R *Note : If FD bars are unavailable, use an initial pitch attitude up to 17.5 degrees with*
R *full backstick, if necessary. If needed, to minimize the loss of height, increase this*
R *pitch attitude.*

– **Do not change configuration.**

– **Closely monitor the flight path and speed.**

– **Recover smoothly to a normal climb, when out of shear.**

COLD WEATHER

For flight operations in icing conditions, see the Ice and Rain Protection Chapter (3.04.30).
For ground operations on contaminated runways, see the FCOM Volume 2 (2.04.10).
The preparation and ground operation of the aircraft, after it has been sitting idle in very low temperatures, may present particular problems. In such cases, the flight crew should use the following procedures, which complement the normal operating procedures.
Ice accumulates on the aircraft when the air temperature approaches, or falls below, freezing (0°C) and there is precipitation or condensation. Ice may also build up when the aircraft is exposed to any form of moisture, after the surfaces have been cold-soaked during previous cruise flight at high altitudes, after the aircraft has been refueled with cold fuel, or after it has been exposed to low overnight air temperatures.

EXTERIOR INSPECTION

– **PRELIMINARY COCKPIT PREPARATION (normal procedures) . . . . COMPLETED**
APU is started and air conditioning is on.

– **PROBE/WINDOW HEAT . . . . ON**

– **SURFACES . . . . CHECKED FREE OF FROST, ICE AND SNOW**
All surfaces of the aircraft (critical surfaces : leading edges and upper surfaces of wings, vertical and horizontal stabilizers, all control surfaces, slats and flaps) must be clear of snow, frost and ice for takeoff.
Thin hoarfrost is acceptable on the upper surface of the fuselage.

Note : Thin hoarfrost is typically a white crystalline deposit which usually develops uniformly on exposed surfaces on cold and cloudless nights ; it is so thin that a person can distinguish surface features (lines or markings) beneath it.

On the underside of the wing tank area, a maximum layer of 3 mm (1/8 inch) of frost will not penalize takeoff performance.

– **FOLLOWING EQUIPMENT . . . . CHECKED FREE OF FROST, ICE AND SNOW**
- Landing gear assemblies (lever locks) and tires, landing gear doors.
- Engine inlets, inlet lips, fans (check for rotation), spinners, fan exhaust ducts, reverser assemblies.
- Drains, bleeds, probes (pitots, static ports, TAT sensors, angle of attack sensors).
- Fuel tank ventilation.
- Radome.
- Verify that the commercial water supplies are not frozen and have been refilled (these should have been emptied prior to the cold soak).

R ● **After first engine start**

R – **PROBE/WINDOW HEAT . . . . AUTO**
R Heating will continue to operate but under automatic control.

DEICING/ANTI-ICING PROCEDURE ON GROUND

R In all situations, it is the Captain's responsibility to decide if the ground crew must
R deice/anti-ice the aircraft, and/or if additional deicing/anti-icing treatment is required.
R Before starting the deicing/anti-icing procedure, the flight crew must establish
R communication with the ground crew that will be applying the procedure.

CAUTION

R — Make sure that the low or high-pressure ground connectors do not supply any
R external air to the aircraft.
R — If it is necessary for the ground grew to repeatedly anti-ice the aircraft, they must
R deice the surfaces with a hot fluid mixture before applying a new layer of anti-icing
R fluid.

R Make sure that the ground crew uses the correct de-icing/anti-icing fluids, in accordance
R with the applicable operator requirements and Aircraft Maintenance Manual (AMM)
R instructions.
R The aircraft can be deiced or anti-iced when the APU and engines are either stopped or
R running. However, do not start the engines when the ground crew is spraying fluid on the
R aircraft.

CAUTION

R — The ground crew should take care when spraying deicing fluid, and make sure that
R the engine and APU do not ingest any fluid.
R — Do not move flaps, slats, ailerons, spoilers, or elevators, if they are not free of ice.
R — Always ensure that both the left and right sides of the aircraft receive the same,
R complete, and symmetrical deicing/anti-icing treatment.

BEFORE SPRAYING FLUID :

— **CAB PRESS MODE SEL . . . . CHECK AUTO**

— **ENG BLEED 1 + 2 . . . . OFF**

— **APU BLEED . . . . OFF**

— **DITCHING pushbutton . . . . ON**
Outflow valve, pack valves, and avionic ventilation inlet and extract valves close.

This prevents de-icing fluid from entering the aircraft. Avionic ventilation is in a closed circuit with both fans running. In view of the low OAT, there is no time limit for this configuration.

Note : *If the "VENT AVNCS SYS FAULT" warning appears, reset the AEVC circuit breaker at the end of the aircraft de-icing procedure.*
AIR COND/AVNCS VENT/CTL D06 on 49VU.
AIR COND/AVNCS/VENT/MONG Y17 on 122 VU.

– **THRUST LEVERS . . . . CHECK IDLE**

– **"AIRCRAFT PREPARED FOR SPRAYING" . . . . INFORM GROUND CREW**

UPON COMPLETION OF THE SPRAYING OPERATION :

– **DITCHING pushbutton . . . . OFF**

R – **OUTFLOW VALVE . . . . CHECK OPEN**
R On the ECAM PRESS page, confirm that the outflow valve indication reaches the open
R green position to avoid any unexpected aircraft pressurization.

– **ENG BLEED 1 + 2 . . . . ON**

• **<u>At least 60 seconds after APU start, or on completion of spraying operation :</u>**

– **APU BLEED . . . . ON**

– **PITOTS and STATICS (ground crew) . . . . CHECK**

– **GROUND EQUIPMENT . . . . REMOVE**

– **DE-ICING/ANTI-ICING REPORT . . . . RECEIVED**
The information from ground personnel, who performed the de-icing and post-application check, must include (ANTI-ICING CODE) :
· Type of fluid used
· The mix ratio of fluid to water (for example 75/25)
· When the holdover time began.

– **NORMAL PROCEDURE . . . . RESUME**
Apply appropriate normal procedures. Pay special attention to the flight control check. In freezing precipitation, perform the appropriate checks to evaluate aircraft icing. Base the decision on whether to takeoff, or to re-protect the aircraft, on the amount of ice that has built up on the critical surfaces since the last de-icing, as revealed by a personal inspection from the inside and outside of the aircraft. Make this inspection before the holdover time expires, or just before takeoff.

Note : If the fuselage has been sprayed, there is a risk of de-icing fluid ingestion by the APU air intake, resulting in specific odors, or SMOKE warnings. Thus, consider APU BLEED OFF during takeoff.

R **SECURING THE AIRCRAFT FOR COLD SOAK**

R ● **After switching off all bleeds, and before switching off AC power :**

R – **DITCHING pushbutton . . . . ON**
R This closes the outflow valve, the pack valves, and the avionic ventilation inlet and
R extract valves.

R – **PARKING BRAKE . . . . OFF**
R Check chocks in place, and release the parking brake to prevent brakes from freezing.

R ● **After switching off the batteries :**

R – **DITCHING pushbutton . . . . OFF**

R – **PROTECTIVE COVERS . . . . INSTALL**
R Install protective covers and plugs to protect the aircraft and engines from snow and
R ice.

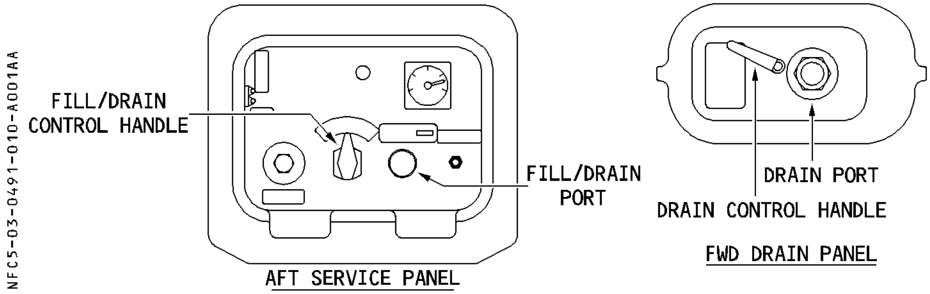
WATER SYSTEM DRAINING

Drain the water system, if the OAT requires it, as shown below :

<table>
<tr><th colspan="3">Configuration</th><th rowspan="2">Exposure time</th><th rowspan="2">Water tank drain</th></tr>
<tr><th>Air Conditioning</th><th>Cabin temperature</th><th>Outside Air Temperature</th></tr>
<tr><td rowspan="2">ON</td><td rowspan="2">Above 10° C (50° F)</td><td>Between 0° C and – 15° C (32° and 5° F)</td><td>None</td><td>Not required</td></tr>
<tr><td>Below – 15° C (5° F)</td><td>1 h 15 min</td><td rowspan="4">Required</td></tr>
<tr><td rowspan="3">OFF</td><td rowspan="3"></td><td>Between 0° C and – 7° C (32° and 19.4° F)</td><td>1 h 30 min</td></tr>
<tr><td>Between – 7° C and – 15° C (19.4° and 5° F)</td><td>0 h 30 min</td></tr>
<tr><td>Below – 15° C (5° F)</td><td>Any</td></tr>
</table>

R **FOR DRAINING WATER PROCEDURE**

R This procedure uses electrical power.
R



R – **ACCESS PLATFORM(S) . . . . PUT IN POSITION**

R – **SHUTOFF VALVE IN GALLEYS/TOILETS . . . . CHECK OPEN**

R – **FWD/AFT ACCESS PANEL DOORS . . . . OPEN**

R – **DRAIN PORT CAPS . . . . REMOVE**
R Remove drain port caps on forward drain and aft service panels.

R – **DRAIN HOSES . . . . CONNECT**
R Connect drain hoses to :
R · the drain port on the forward drain panel.
R · the full/drain port on the aft service panel.

R ■ **On the forward drain panel**

R – **DRAIN CONTROL HANDLE . . . . TURN LEFT**
R Turn the control handle to drain.

R ■ **On the aft service panel**

R – **FILL/DRAIN CONTROL HANDLE . . . . TURN TO “DRAIN” AND PULL**
R Turn the handle to the “DRAIN” position and pull it out to its mechanical stop to drain.
R The indicator light comes on.

R ■ **When the water system is drained**
R In freezing conditions, the drain valves must stay open to prevent damage to the
R system. Do not put on the caps and leave the access door open.

R – **DRAIN HOSES . . . . DISCONNECT**

R – **PANELS . . . . CLEAN AND DRY**

R — **ACCESS PLATFORM(S) . . . . REMOVE**

R **OPERATIONS IN VOLCANIC ASH**

R The following procedures are recommended for operators who fly routes that could take
R their aircraft through the material emerging from active volcanoes.
R Because volcanic ash is composed of very abrasive particles it can do serious damage to
R aircraft parts and impair the operation of aircraft systems significantly.
R Operators should avoid airports with volcanic ash deposits if possible. If operations at such
R airports are unavoidable, operators should heed the following recommendations.

R **GROUND OPERATIONS ON AIRPORTS COVERED WITH ASH OR DUST**

R **Preparation of the cockpit**

R — **APU . . . . DO NOT USE**
R Use the APU only to start the engines, and then only if ground power is not available.
R Request ground supply for air conditioning and for electricity.

R — **WINDSHIELD WIPERS . . . . DO NOT USE**
R Do not use windshield wipers to remove ash, or for anything else.

R **Exterior inspection**

R — **SURFACES AND EQUIPMENT . . . . CHECK FREE OF ASH DEPOSITS**
R Ground maintenance should remove ash that has settled on exposed lubricated surfaces
R and could penetrate seals or enter the engine gas path, air conditioning system, air data
R probes, and other orifices on the aircraft.

R — **ENGINE INLETS . . . . CHECK FREE OF ASH DEPOSITS**
R Inspect the inlets and order them cleaned of any volcanic ash. Have the area within 25
R feet of the engine inlet cleaned of volcanic ash (as much as practical).

R **Engine start**

R Use external pneumatic supply for starting the engines, if it is available. (Refer 3.04.70).

R — **ENGINE . . . . CRANK**
R Before starting the engines, ventilate them by dry cranking at maximum motoring speed
R for two minutes. This will blow out any ash that may have entered the booster area.

R **Taxi**

R After releasing the brakes :

R – **THRUST LEVERS .. ADVANCE SMOOTHLY THEN MOVE TO IDLE WHEN ROLLING**
R Advance the levers smoothly to the minimum required for breakaway.
R Avoid making sharp or high-speed turns.

R – **ENG 1, ENG 2 BLEED . . . . OFF**
R Keep bleed valves closed for taxiing.

R **Takeoff**

R – **Allow ash and dust (if present) to settle on runway before starting the takeoff roll.**

R – **Use the rolling takeoff technique if possible.**

R – **Adjust progressively engine power as for normal takeoff procedures.**

R **Landing**

R – **REVERSERS . . . . USE AS LIGHTLY AS FEASIBLE**
R If it appears that maximum reverse thrust will be needed, apply reverse thrust when the
R main landing gear touches down. Limit the use of reverse thrust as much as possible,
R because reverse flow may throw up ash and impair visibility.

R *Note : The abrasive effect of volcanic ash on windshields and landing lights may reduce*
R *the pilot's visibility for approach and landing significantly. Consider diverting to*
R *an airfield where it is possible to use AUTOLAND.*

R – **BRAKE PERFORMANCE . . . . CONSIDER PENALTY**
R A layer of ash on the runway may degrade braking efficiency. Treat landing performance
R as if it is similar to that on a wet runway (dry ash) or on slush (wet ash).

R **Securing the aircraft**

R If the aircraft is to be parked at an airport contaminated with volcanic ash, install engine
R inlet covers and other protective covers and plugs.
R In addition,

R ● **After switching off all bleeds and before switching off AC power :**

R – **DITCHING pushbutton . . . . ON**
R This closes the outflow valve, pack valves and avionic ventilation inlet and extract
R valves.

R ● **After switching off the batteries :**

R – **DITCHING pushbutton . . . . OFF**

R **FLIGHT OPERATIONS**

R Avoid flight into areas of known volcanic activity.
R If a volcanic eruption is reported while the aircraft is in flight, reroute the flight to remain
R well clear of the affected area (volcanic dust may spread over several hundred miles). If
R possible, stay on the upwind side of the volcano (at least 20 NM upwind of it if it is
R erupting).
R In hours of darkness or in meteorological conditions that obscure volcanic dust, one or
R several of the following phenomena indicate that the aircraft may be flying into ash cloud:
R · smoke or dust in the cockpit,
R · acrid odor similar to that of electrical smoke,
R · at night, the appearance of St. Elmo's fire and static discharges around the windshield,
R · bright white or orange glow appearing in the engine inlets,
R · sharp, distinct beams from the landing lights,
R · multiple engine malfunctions, such as rising EGT, decreasing power, stall, or flame out.

R ● **If the aircraft enters a volcanic ash cloud :**

R – **ESCAPE MANEUVER (terrain permitting) . . . . INITIATE**
R Because the lateral dimensions of ash cloud are not known, the pilot should if
R possible turn 180°.

R – **ATC . . . . NOTIFY**

R – **A/THR . . . . OFF**
R This will prevent thrust variations.

R – **THRUST (terrain permitting) . . . . DECREASE**
R This helps to maintain the engine stall margin by reducing the amount of ash
R ingestion and limiting the EGT. It also holds the accumulation of molten volcanic ash
R on turbine vanes to a minimum. Do not climb, since this increases EGT.

– **CREW OXYGEN . . . . ON/100 %**

– **CABIN CREW . . . . NOTIFY**

– **PASSENGER OXYGEN . . . . AS RQRD**
Depending on contamination.

– **ENG ANTI ICE . . . . ON**

– **WING ANTI ICE . . . . ON**

– **PACK FLOW . . . . HI**
Maximum airbleed gives the engines additional stall margin.

Note : *If the aircraft has a cargo ventilation system, switch off the CARGO ISOL valves to prevent a cargo smoke warning from being triggered.*

– **APU (if available) . . . . START**
This prepares the aircraft for a starter-assisted engine relight.

– **ENGINE PARAMETERS . . . . MONITOR**
Monitor the EGT carefully to see that it does not go over its limit.

Note : *To prevent the engines from exceeding EGT limits it may become necessary to use a precautionary engine shut-down.*
· Restart when clear of the volcanic ash cloud.
· Upon restart, the engine may accelerate very slowly. Do not misinterpret this as a failure to start.
· Consider that the compressor and turbine blades have been eroded and avoid sudden changes in thrust. Fuel flow and EGT may increase.

– **AIRSPEED INDICATIONS . . . . MONITOR**
Volcanic ash may clog the pitot probes. If the airspeed indication is lost or becomes
R unreliable, see the abnormal procedure “UNRELIABLE SPEED INDICATION/ADR
R CHECK PROC” (Refer to 3.02.34).

Note : *Electrostatic conditions may cause communication problems.*

R **Securing the aircraft**

R If the aircraft is to be parked at an airport contaminated with volcanic ash, install engine
R inlet covers and other protective covers and plugs.
R In addition,

R ● **After switching off all bleeds and before switching off AC power :**

R – **DITCHING pushbutton . . . . ON**
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R valves.

R ● **After switching off the batteries :**

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R Avoid flight into areas of known volcanic activity.
R If a volcanic eruption is reported while the aircraft is in flight, reroute the flight to remain
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R possible, stay on the upwind side of the volcano (at least 20 NM upwind of it if it is
R erupting).
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R several of the following phenomena indicate that the aircraft may be flying into ash cloud:
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– **CREW OXYGEN . . . . ON/100 %**

– **CABIN CREW . . . . NOTIFY**

– **PASSENGER OXYGEN . . . . AS RQRD**
Depending on contamination.

– **ENG ANTI ICE . . . . ON**

– **WING ANTI ICE . . . . ON**

– **ECON FLOW . . . . OFF**
Maximum airbleed gives the engines additional stall margin.

Note : If the aircraft has a cargo ventilation system, switch off the CARGO ISOL valves to prevent a cargo smoke warning from being triggered.

– **APU (if available) . . . . START**
This prepares the aircraft for a starter-assisted engine relight.

– **ENGINE PARAMETERS . . . . MONITOR**
Monitor the EGT carefully to see that it does not go over its limit.

Note : To prevent the engines from exceeding EGT limits it may become necessary to use a precautionary engine shut-down.
- *Restart when clear of the volcanic ash cloud.*
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Volcanic ash may clog the pitot probes. If the airspeed indication is lost or becomes
R unreliable, see the abnormal procedure "UNRELIABLE SPEED INDICATION/ADR
R CHECK PROC" (Refer to 3.02.34).

Note : Electrostatic conditions may cause communication problems.

R **Reporting**

R · Whenever operating in areas affected by volcanic activity, flight crews should be aware
R of volcanic reporting procedures and be familiar with the use of the ICAO Special Air
R Report of Volcanic Activity (Model VAR).
R · If the aircraft encounters a volcanic ash cloud, the flight crew should report the location,
R altitude, and direction of drift for the ash cloud to ATC, flight conditions and crew duties
R permitting.

INTRODUCTION

The Less Paper Cockpit (LPC) concept consists of a complete set of software tools, designed to :
- Improve access to pilot's operational information, and simplify some of their tasks.
- Reduce the quantity of paper documents in the cockpit, and replace them with electronic ones, enabling quicker and easier updates, while improving information retrieval.

The applicable areas include Performance and Weight and Balance computations, in addition to technical operational documentation (FCOM, MEL, Operations Policy Manual..).
This section addresses the procedures corresponding to the modules which are already available.
The various modules are linked via F.O.V.E. (Flight Operations Versatile Environment), which is designed to provide an interface between the various modules by enabling :
- Inter-module communication
- Software compatibility management
- Software version management
- Integrity control between data and the software versions
- Update management
- Context management

Each airline may choose to install one or several modules, each of which is able to work independently.

GENERAL

LPC PROGRAM AND REFERENCE VERSION NUMBER UPDATING

Each pilot should check that the version of F.O.V.E, installed on their PC, corresponds to the latest updated version provided by their airline's Flight Operations.

POWER SUPPLY

Check that each available PC is electrically-supplied.

PC STOWAGE DURING TAKEOFF AND LANDING

R Pilot PCs should be unplugged and stowed during takeoff and landing.

LPC TAKEOFF MODULE

The takeoff module is designed to provide aircraft takeoff performance, based on actual daily environmental conditions, just prior to flight. It allows straightforward computations, and provides the best takeoff performance for the given conditions.

TAKEOFF PERFORMANCE TASKSHARING

The tasksharing policy for data computation, and introduction in the MCDU is consistent with the currently applicable policy, as per the SOP :
One pilot performs the computation, then introduces the resulting data in the MCDU.
The other pilot checks the :
– Computation by using the PC to verify that the entered data is correct.
– Data entered in the MCDU.
Data entry and computation are generally done by the PF, and checked by the PNF. These tasks can be swapped, as per company policy, or as circumstances dictate. For instance, during taxi, data entry and computation should be done by the PNF, since the PF is busy taxiing the aircraft.
The PF will then have to perform the check, by stopping the aircraft or, if a stop is not possible, by transferring command to the other pilot.

COCKPIT PREPARATION

TAKEOFF DATA COMPUTATION

R The PF checks that the version of F.O.V.E, available on the PC, is the applicable one. (The applicable version is indicated on the computerized F-PLN, or other document, as per airline policy).
The PF enters the data, then shows the screen to the PNF for data confirmation.

R ● **If the Weight and Balance module is to be used :**

– **Use the pilot’s PC to compute the ZFCG and ZFW :**
The computed values will be automatically fed to the takeoff performance module.

– **Use the pilot’s PC to compute takeoff data :**
Any NOTAM affecting airport data should be considered at this stage, and taken into account in the “Modify runway” frame of the pilot interface. When the computation has been performed, a summary of the results is available in the “REMINDER”, which is equivalent to the MCDU PERF page. Only the values to be addressed are indicated.

FMGS DATA INSERTION (no change compared to current SOP)

The PF enters the data computed on the PC into the MCDU.

GROSS WEIGHT INSERTION (INIT B page)

– **ZFCG/ZFW . . . . INSERT**

– **BLOCK FUEL . . . . INSERT**

TAKEOFF DATA INSERTION (PERF TO page)

– **V1, VR, V2 . . . . INSERT**

– **FLEX TO TEMP/DERATE . . . . INSERT**

FMGS DATA CONFIRMATION

– **GROSS WEIGHT INSERTION . . . . CHECK**
The PNF checks FMGS data.
· If the Aircraft Loading module is used :
– Check on pilot PC that entered data are correct.
– Check that computed data have been correctly introduced in the MCDU.

– **TO DATA . . . . CALCULATE/CHECK**
The PNF checks on pilot PC that entered data are correct.
He checks that computed data have been correctly introduced in the MCDU.

R – **LPC/MCDU GREEN DOT . . . . COMPARE**
R The PNF compares Green Dot speed computed by the FMGS and Green Dot speed
R computed by the LPC. A discrepancy indicates a difference in the TOW used in both
R systems (LPC/FMGS).

BEFORE PUSHBACK or START

– **LOADING . . . . CHECK**

– **TAKEOFF DATA . . . . PREPARE and CHECK/REVISE**
Once the loading is checked :
– Check or re-enter the data entered on the takeoff module performance.
– Check or revise the takeoff data on the MCDU's INIT B and PERF pages.
Data to be crosschecked by the other pilot.

BEFORE TAKEOFF

R – **PILOT PC . . . . UNPLUGGED and STOWED**

ILS (or NON PRECISION) APPROACH

● **When the landing gear is down :**

R – **PILOT PC . . . . UNPLUGGED and STOWED**

LPC WEIGHT AND BALANCE MODULE

The Weight and Balance (W & B) module provides a computerized loadsheet and trim sheet. This facilitates computation of the ZFW/ZFCG and TOW/TOCG, and enables last-minute changes to the passenger/cargo/fuel distribution.
The following procedure applies to operators only using the W&B module. Operators using both the W&B module and the Takeoff module should refer to the LPC TAKEOFF MODULE section.

WEIGHT & BALANCE TASKSHARING

The tasksharing policy for data computation and introduction in the MCDU is consistent with the currently applicable policy, as per the SOP :
One pilot performs the computation, then introduces the resulting data in the MCDU.
The other pilot checks the :
– Computation by using the PC to verify that the entered data is correct.
– Data entered in the MCDU.
Data entry and computation are generally done by the PF, and checked by the PNF. These tasks can be swapped, as per company policy, or as circumstances dictate.

COCKPIT PREPARATION

TAKEOFF DATA COMPUTATION

The PF checks that the version of F.O.V.E., available on the PC, is the applicable one. (The applicable version is indicated on the computerized F-PLN, or other document, as per airline policy).
The PF enters the data, then shows the screen to the PNF for data confirmation.

– **Use the pilot's PC to compute the ZFCG and ZFW.**

– **Use RTOW to compute takeoff data.**

FMGS DATA INSERTION (no change compared to current SOP).

The PF enters the data, computed on the PC, into the MCDU.

GROSS WEIGHT INSERTION (INIT B page)

– **ZFCG/ZFW . . . . INSERT**

– **BLOCK FUEL . . . . INSERT**

TAKEOFF DATA INSERTION (PERF TO page)

– **V1, VR, V2 . . . . INSERT**

– **FLEX TO TEMP/DERATE . . . . INSERT**

FMGS DATA CONFIRMATION

– **GROSS WEIGHT INSERTION . . . . CHECK**
The PNF checks FMGS data.
– Check on the pilot's PC, that the entered data is correct.
– Check that the computed data has been correctly introduced in the MCDU.

– **TO DATA . . . . CALCULATE/CHECK**
The PNF calculates and checks the takeoff data.

BEFORE PUSHBACK or START

– **LOADING . . . . CHECK**

– **TAKEOFF DATA . . . . PREPARE and CHECK/REVISE**
Once the loading is checked :
- Check or recompute the takeoff speeds and the flexible temperature, using the RTOW charts.
- Check or revise the takeoff data on the MCDU's INIT B and PERF pages.
  Data to be crosschecked by the other pilot.

BEFORE TAKEOFF

R – **PILOT PC . . . . UNPLUGGED and STOWED**

ILS (or NON PRECISION) APPROACH

● **When the landing gear is down :**

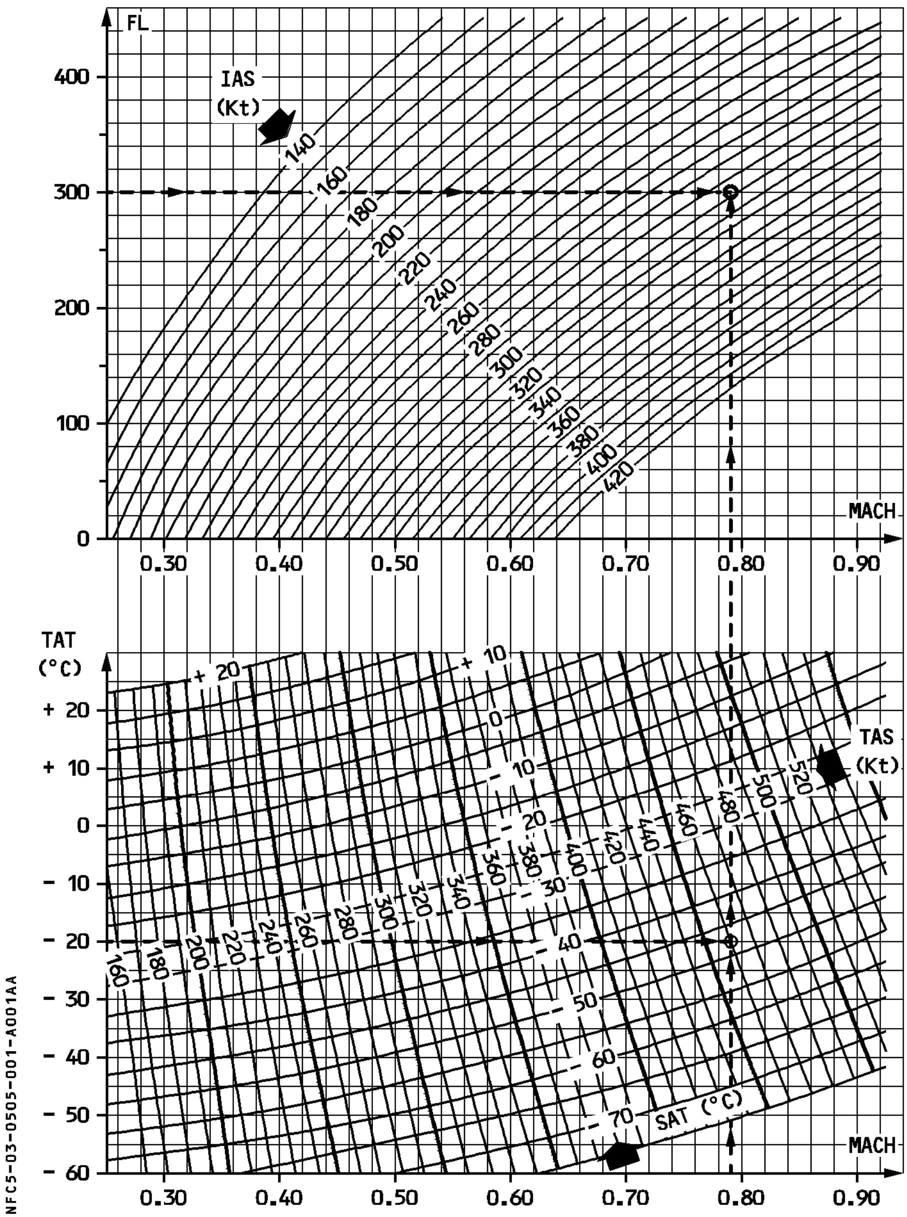
R – **PILOT PC . . . . UNPLUGGED and STOWED**

LPC MEL MODULE

TBD

05.00 CONTENTS

CONVERSIONS – IAS . MACH – TAS . MACH – SAT . TAT

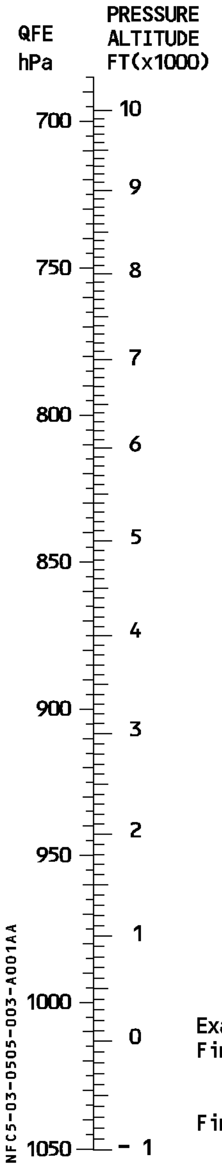


INTERNATIONAL STANDARD ATMOSPHERE (ISA)

R

ALTITUDE (Feet)	TEMP. (°C)	PRESSURE			PRESSURE RATIO $\delta = P / Po$	DENSITY $\sigma = \rho / \rho o$	SPEED OF SOUND (a) (kt)	ALTITUDE (meters)
		hPa	P.S.I.	in. Hg.				
40,000	– 56.5	188	2.72	5.54	0.1851	0.2462	573	12.192
39,000	– 56.5	197	2.85	5.81	0.1942	0.2583	573	11.887
38,000	– 56.5	206	2.99	6.10	0.2038	0.2710	573	11.582
37,000	– 56.5	217	3.14	6.40	0.2138	0.2844	573	11.278
36,000	– 56.3	227	3.30	6.71	0.2243	0.2981	573	10.973
35,000	– 54.3	238	3.46	7.04	0.2353	0.3099	576	10.668
34,000	– 52.4	250	3.63	7.38	0.2467	0.3220	579	10.363
33,000	– 50.4	262	3.80	7.74	0.2586	0.3345	581	10.058
32,000	– 48.4	274	3.98	8.11	0.2709	0.3473	584	9.754
31,000	– 46.4	287	4.17	8.49	0.2837	0.3605	586	9.449
30,000	– 44.4	301	4.36	8.89	0.2970	0.3741	589	9.144
29,000	– 42.5	315	4.57	9.30	0.3107	0.3881	591	8.839
28,000	– 40.5	329	4.78	9.73	0.3250	0.4025	594	8.534
27,000	– 38.5	344	4.99	10.17	0.3398	0.4173	597	8.230
26,000	– 36.5	360	5.22	10.63	0.3552	0.4325	599	7.925
25,000	– 34.5	376	5.45	11.10	0.3711	0.4481	602	7.620
24,000	– 32.5	393	5.70	11.60	0.3876	0.4642	604	7.315
23,000	– 30.6	410	5.95	12.11	0.4046	0.4806	607	7.010
22,000	– 28.6	428	6.21	12.64	0.4223	0.4976	609	6.706
21,000	– 26.6	446	6.47	13.18	0.4406	0.5150	611	6.401
20,000	– 24.6	466	6.75	13.75	0.4595	0.5328	614	6.096
19,000	– 22.6	485	7.04	14.34	0.4791	0.5511	616	5.791
18,000	– 20.7	506	7.34	14.94	0.4994	0.5699	619	5.406
17,000	– 18.7	527	7.65	15.57	0.5203	0.5892	621	5.182
16,000	– 16.7	549	7.97	16.22	0.5420	0.6090	624	4.877
15,000	– 14.7	572	8.29	16.89	0.5643	0.6292	626	4.572
14,000	– 12.7	595	8.63	17.58	0.5875	0.6500	628	4.267
13,000	– 10.8	619	8.99	18.29	0.6113	0.6713	631	3.962
12,000	– 8.8	644	9.35	19.03	0.6360	0.6932	633	3.658
11,000	– 6.8	670	9.72	19.79	0.6614	0.7156	636	3.353
10,000	– 4.8	697	10.10	20.58	0.6877	0.7385	638	3.048
9,000	– 2.8	724	10.51	21.39	0.7148	0.7620	640	2.743
8,000	– 0.8	753	10.92	22.22	0.7428	0.7860	643	2.438
7,000	+ 1.1	782	11.34	23.09	0.7716	0.8106	645	2.134
6,000	+ 3.1	812	11.78	23.98	0.8014	0.8359	647	1.829
5,000	+ 5.1	843	12.23	24.90	0.8320	0.8617	650	1.524
4,000	+ 7.1	875	12.69	25.84	0.8637	0.8881	652	1.219
3,000	+ 9.1	908	13.17	26.82	0.8962	0.9151	654	914
2,000	+ 11.0	942	13.67	27.82	0.9298	0.9428	656	610
1,000	+ 13.0	977	14.17	28.86	0.9644	0.9711	659	305
0	+ 15.0	1013	14.70	29.92	1.0000	1.0000	661	0
– 1.000	+ 17.0	1050	15.23	31.02	1.0366	1.0295	664	– 305

CONVERSIONS - QNH - QFE - PRESSURE ALTITUDE



QNH (hPa)	CORRECTION (ft)	QNH (in Hg)
949 – 951	+ 1900	28.01 – 28.10
952 – 955	+ 1800	28.11 – 28.20
956 – 958	+ 1700	28.21 – 28.30
959 – 961	+ 1600	28.31 – 28.40
962 – 964	+ 1500	28.41 – 28.45
965 – 968	+ 1400	28.46 – 28.56
969 – 971	+ 1300	28.57 – 28.66
972 – 974	+ 1200	28.68 – 28.77
975 – 978	+ 1100	28.78 – 28.86
979 – 981	+ 1000	28.87 – 28.95
982 – 984	+ 900	28.96 – 29.05
985 – 988	+ 800	29.06 – 29.15
989 – 991	+ 700	29.16 – 29.25
992 – 994	+ 600	29.26 – 29.35
995 – 997	+ 500	29.36 – 29.45
998 – 1001	+ 400	29.46 – 29.54
1002 – 1004	+ 300	29.55 – 29.64
1005 – 1007	+ 200	29.65 – 29.74
1008 – 1011	+ 100	29.75 – 29.84
1012 – 1014	0	29.85 – 29.94
1015 – 1018	– 100	29.95 – 30.04
1019 – 1021	– 200	30.05 – 30.14
1022 – 1025	– 300	30.15 – 30.24
1026 – 1028	– 400	30.25 – 30.34
1029 – 1031	– 500	30.35 – 30.44
1032 – 1035	– 600	30.45 – 30.54
1036 – 1038	– 700	30.55 – 30.65
1039 – 1042	– 800	30.66 – 30.75
1043 – 1045	– 900	30.76 – 30.85
1046 – 1050	–1000	30.86 – 30.95

Examples : 1) Elevation: 2500 ft QNH = 1020 hPa
Find : correction: -200 ft
Pressure altitude = 2300 ft QFE = 933 hPa
2) Elevation: 1500 ft QFE = 980 hPa
Find : Pressure altitude: 920 ft
Correction = - 580 ft QNH = 1032 hPa

CONVERSIONS QFE hPa – in. Hg – ft

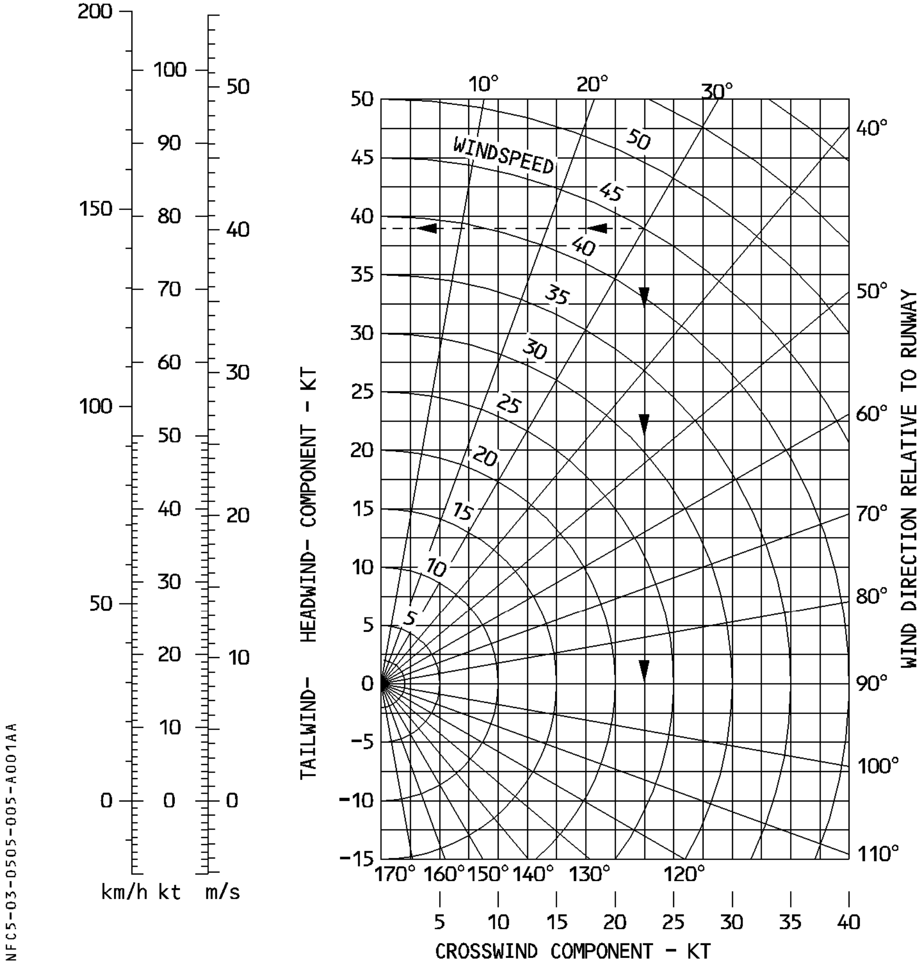
QFE hPa	in. Hg	PRESS. ALT. ft	QFE hPa	in. Hg	PRESS. ALT. ft	QFE hPa	in. Hg	PRESS. ALT. ft
1050	31.01	– 989	960	28.35	1486	870	25.69	4157
1048	30.95	– 936	958	28.29	1543	868	25.63	4219
1046	30.89	– 883	956	28.23	1601	866	25.57	4281
1044	30.83	– 830	954	28.17	1658	864	25.51	4343
1042	30.77	– 776	952	28.11	1715	862	25.45	4405
1040	30.71	– 723	950	28.05	1773	860	25.40	4468
1038	30.65	– 669	948	27.99	1831	858	25.34	4531
1036	30.59	– 615	946	27.94	1889	856	25.28	4593
1034	30.53	– 562	944	27.88	1947	854	25.22	4656
1032	30.47	– 508	942	27.82	2005	852	25.16	4718
1030	30.42	– 454	940	27.76	2062	850	25.10	4781
1028	30.36	– 400	938	27.70	2120	848	25.04	4844
1026	30.30	– 346	936	27.64	2178	846	24.98	4907
1024	30.24	– 292	934	27.58	2236	844	24.92	4970
1022	30.18	– 238	932	27.52	2294	842	24.86	5033
1020	30.12	– 184	930	27.46	2353	840	24.81	5097
1018	30.06	– 129	928	27.40	2412	838	24.75	5161
1016	30.00	– 74	926	27.34	2471	836	24.69	5225
1014	29.94	– 20	924	27.29	2530	834	24.63	5289
1012	29.88	34	922	27.23	2589	832	24.57	5353
1010	29.83	89	920	27.17	2647	830	24.51	5417
1008	29.77	144	918	27.11	2707	828	24.45	5481
1006	29.71	199	916	27.05	2767	826	24.39	5545
1004	29.65	254	914	26.99	2826	824	24.33	5610
1002	29.59	309	912	26.93	2885	822	24.27	5675
1000	29.53	364	910	26.87	2944	820	24.21	5740
998	29.47	419	908	26.81	3004	818	24.16	5805
996	29.41	475	906	26.75	3064	816	24.10	5870
994	29.35	530	904	26.70	3124	814	24.04	5935
992	29.29	586	902	26.64	3183	812	23.98	6000
990	29.23	641	900	26.58	3243	810	23.92	6065
988	29.18	697	898	26.52	3303	808	23.86	6131
986	29.12	753	896	26.46	3363	806	23.80	6197
984	29.06	809	894	26.40	3424	804	23.74	6263
982	29.00	865	892	26.34	3484	802	23.68	6329
980	28.94	921	890	26.28	3545	800	23.62	6394
978	28.88	977	888	26.22	3606	798	23.56	6461
976	28.82	1033	886	26.16	3667	796	23.51	6528
974	28.76	1089	884	26.10	3728	794	23.45	6595
972	28.70	1145	882	26.05	3789	792	23.39	6661
970	28.64	1202	880	25.99	3850	790	23.33	6727
968	28.59	1259	878	25.93	3911	788	23.27	6794
966	28.53	1316	876	25.87	3973	786	23.21	6861
964	28.47	1373	874	25.81	4034	784	23.15	6928
962	28.41	1430	872	25.75	4096	782	23.09	6995

WIND COMPONENTS (FOR TAKEOFF AND LANDING)

R

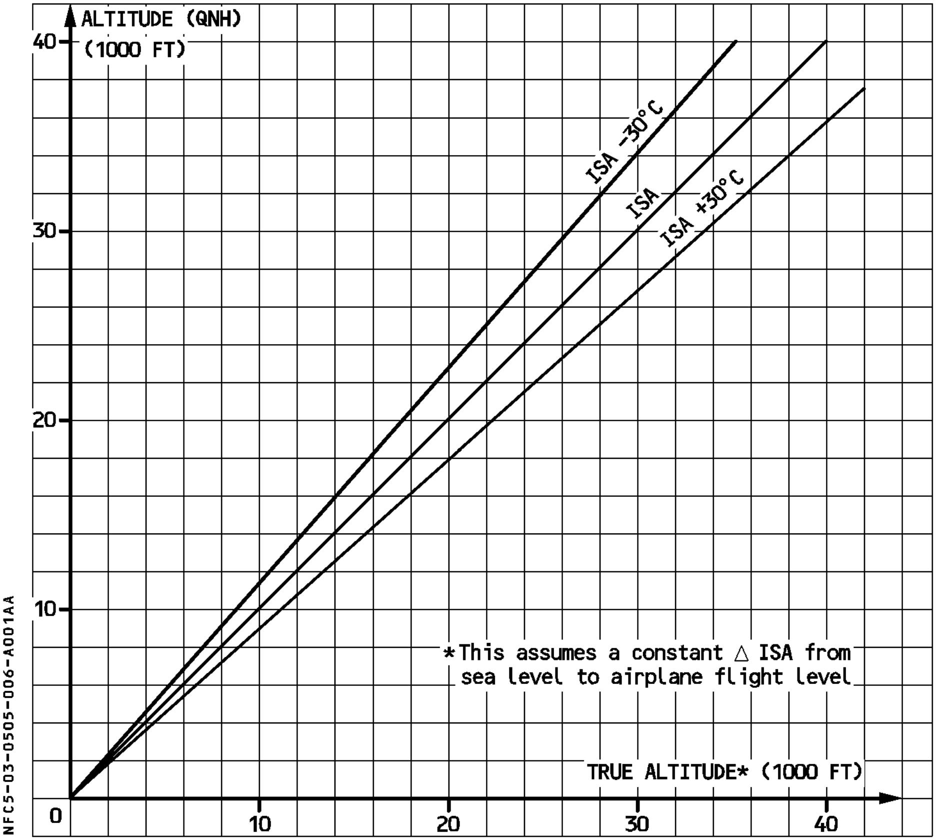
MULTIPLY	BY	TO GET
kt	1.852	km/h
kt	0.5144	m/s
m/s	3.6	km/h
m/s	1.9438	kt
km/h	0.5396	kt
km/h	0.2778	m/s

GIVEN	FIND
WIND DIRECTION RELATIVE TO RUNWAY HEADING=30 DEG WIND SPEED=45 KT	CROSS WIND COMPONENT=22.5 KT HEAD WIND COMPONENT=39.0 KT



ALTITUDE TEMPERATURE CORRECTION

FOR HIGH ALTITUDE USE



FOR LOW ALTITUDE USE

R Values to be added by the pilot to minimum promulgated heights/altitude (ft)

R

Airport Temperature °C	Height above the elevation of the altimeter setting source (feet)								
	200	300	400	500	1000	2000	3000	4000	5000
0	20	20	30	30	60	120	170	230	280
– 10	20	30	40	50	100	200	290	390	490
– 20	30	50	60	70	140	280	420	570	710
– 30	40	60	80	100	190	380	570	760	950
– 40	50	80	100	120	240	480	720	970	1210
– 50	60	90	120	150	300	590	890	1190	1500

THRUST RATINGS

The thrust rating charts have been established for :

- **Maximum takeoff**
  It is the maximum thrust certified for takeoff and is normally limited to five minutes. This time is extended to ten minutes for engine out contingency, as authorized by the approved AFM.

- **Maximum go around**
  It is the maximum permissible thrust during go-around.

- **Flexible takeoff**
  It is a reduced takeoff thrust as compared to the maximum permissible. The related N1 is calculated as a function of the flexible temperature entered in the FMGS MCDU. The flexible temperature is a function of the aircraft weight and environmental conditions. It guarantees that the regular performance requirements are met.

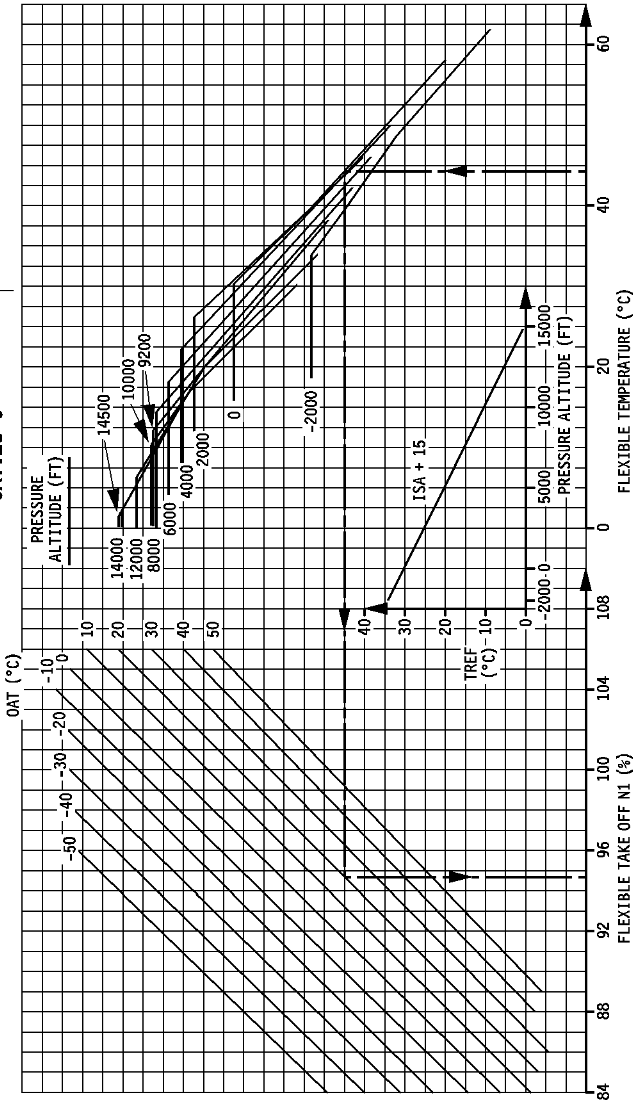
- **Maximum continuous**
  It is the maximum thrust certified for continuous use. This rating should be used, at the pilot's discretion, only when required to ensure safe flight (engine failure).

- **Maximum climb**
  It is the maximum thrust approved for normal climb.

- **Maximum cruise**
  It is the maximum thrust approved for normal cruise.
  There is no thrust lever position corresponding to this thrust rating.
  It is not displayed to the pilot, and the N1 limit which is displayed in cruise is the maximum climb N1.
  The FMGS uses the maximum cruise N1 to compute the aircraft maximum speed.
  In manual thrust setting, in cruise, the pilot should limit N1 to the maximum cruise N1
R that is equal to the displayed maximum climb N1 minus 1.5 % up to 27 000 feet, minus
R 3 % at 40 000 feet and linear interpolation between 27 000 feet and 40 000 feet.

FLEXIBLE TAKEOFF N1

EXAMPLE : PRESS ALT : 2000 FT OAT=20°C. FLX T=45°C.
- FLX TEMP 45°C > FLAT RATING TEMP(ISA+15=26°C)
PRESS ALT:2000 FT
OAT:20°C
→ N1 FLEX = 94.8%



CFM56-5B3	N1 CORRECTIONS FOR AIR BLEED	OAT
FLEX TAKEOFF N1 NO AIR BLEED MACH = .000	AIR CONDITIONING ON	- 0.7
	ENGINE ANTI ICE ON	0.0
	ENGINE AND WING ANTI ICE ON	0.0

NFC5-03-0506-002-A068AA

THRUST RATINGS

The thrust rating charts have been established for :

- **Maximum takeoff**
  It is the maximum thrust certified for takeoff and is normally limited to five minutes. This time is extended to ten minutes for engine out contingency, as authorized by the approved AFM.

- **Maximum go around**
  It is the maximum permissible thrust during go-around.

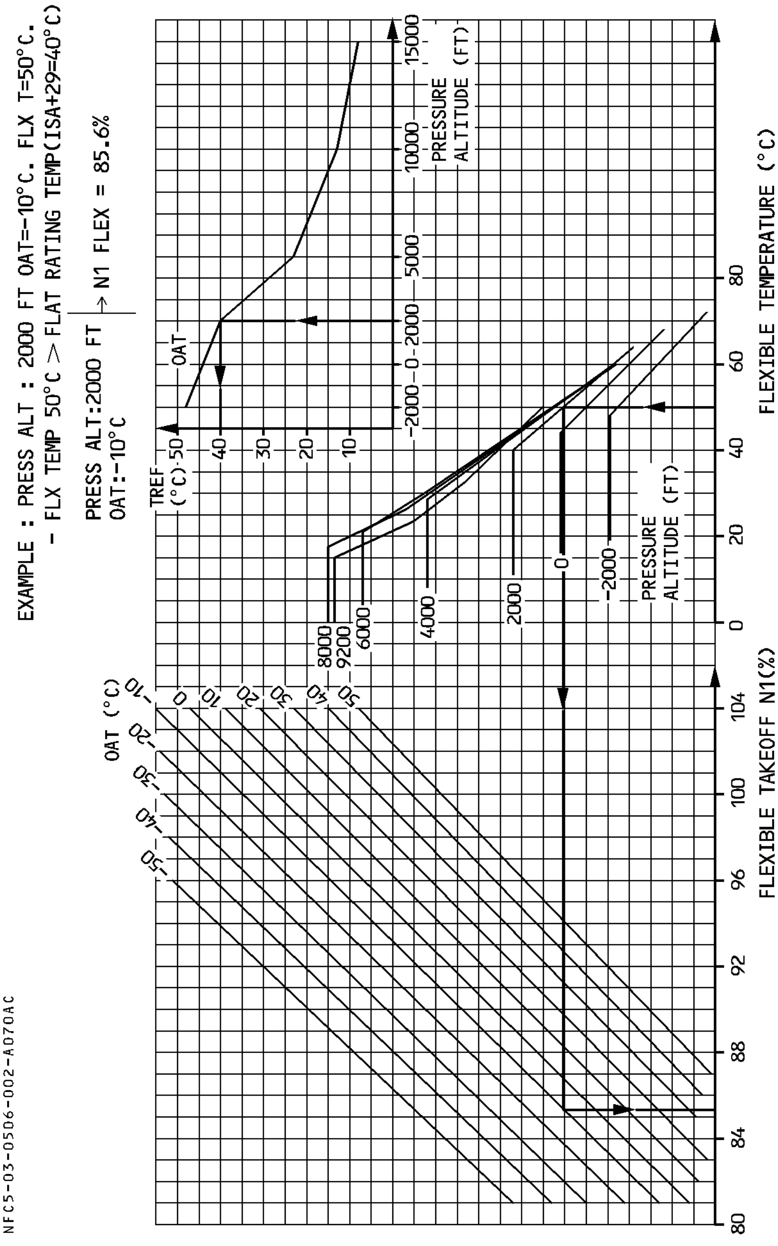
- **Flexible takeoff**
  It is a reduced takeoff thrust as compared to the maximum permissible. The related N1 is calculated as a function of the flexible temperature entered in the FMGS MCDU. The flexible temperature is a function of the aircraft weight and environmental conditions. It guarantees that the regular performance requirements are met.

- **Maximum continuous**
  It is the maximum thrust certified for continuous use. This rating should be used, at the pilot's discretion, only when required to ensure safe flight (engine failure).

- **Maximum climb**
  It is the maximum thrust approved for normal climb.

- **Maximum cruise**
  It is the maximum thrust approved for normal cruise.
  There is no thrust lever position corresponding to this thrust rating.
  It is not displayed to the pilot, and the N1 limit which is displayed in cruise is the maximum climb N1.
  The FMGS uses the maximum cruise N1 to compute the aircraft maximum speed.
  In manual thrust setting, in cruise, the pilot should limit N1 to the maximum cruise N1
  R that is equal to the displayed maximum climb N1 minus 1.9 %.

FLEXIBLE TAKEOFF N1



CFM56-5B4	N1 CORRECTIONS FOR AIR BLEED	
FLEX TAKEOFF N1	AIR CONDITIONING ON	- .7
	ENGINE ANTI ICE ON	0.0
MACH = .000	ENGINE AND WING ANTI ICE ON	0.0

THRUST RATINGS

The thrust rating charts have been established for :

- **Maximum takeoff**
  It is the maximum thrust certified for takeoff and is normally limited to five minutes. This time is extended to ten minutes for engine out contingency, as authorized by the approved AFM.

- **Maximum go around**
  It is the maximum permissible thrust during go-around.

- **Flexible takeoff**
  It is a reduced takeoff thrust as compared to the maximum permissible. The related N1 is calculated as a function of the flexible temperature entered in the FMGS MCDU. The flexible temperature is a function of the aircraft weight and environmental conditions. It guarantees that the regular performance requirements are met.

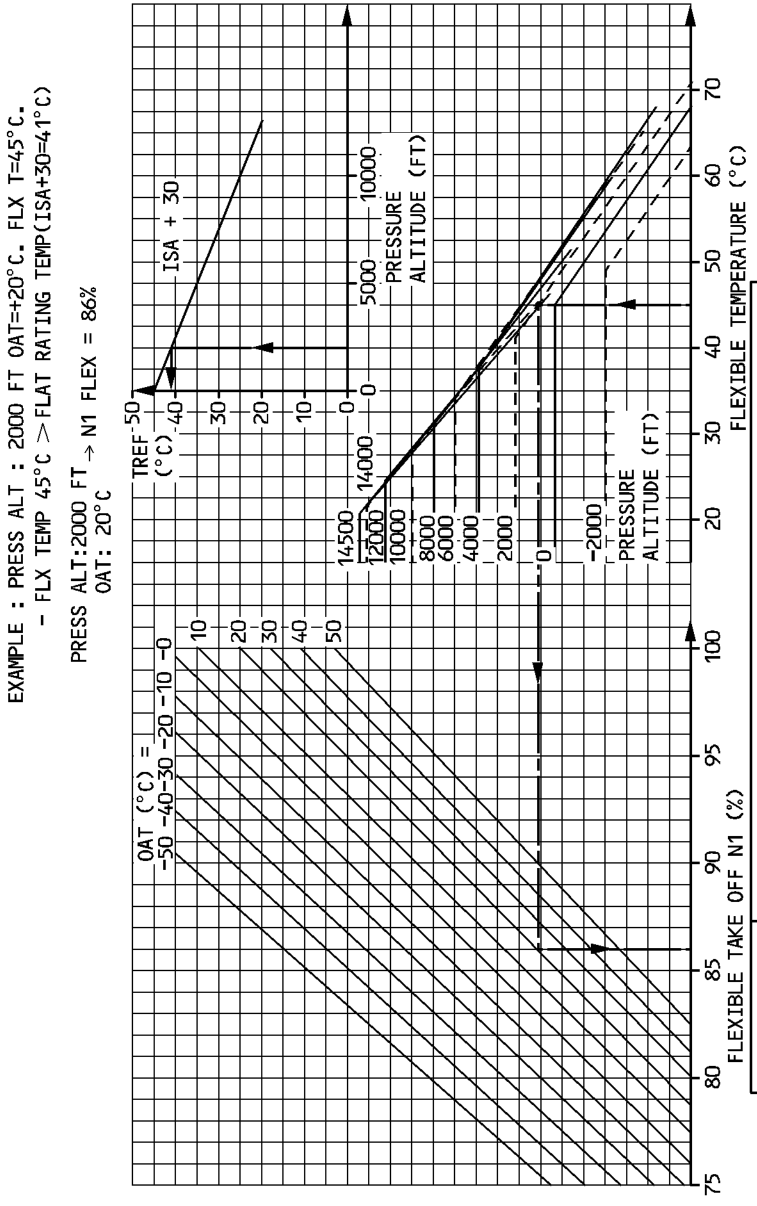
- **Maximum continuous**
  It is the maximum thrust certified for continuous use. This rating should be used, at the pilot's discretion, only when required to ensure safe flight (engine failure).

- **Maximum climb**
  It is the maximum thrust approved for normal climb.

- **Maximum cruise**
  It is the maximum thrust approved for normal cruise.
  There is no thrust lever position corresponding to this thrust rating.
  It is not displayed to the pilot, and the N1 limit which is displayed in cruise is the maximum climb N1.
  The FMGS uses the maximum cruise N1 to compute the aircraft maximum speed.
  In manual thrust setting, in cruise, the pilot should limit N1 to the maximum cruise N1
R that is equal to the displayed maximum climb N1 minus 1.9 %.

FLEXIBLE TAKEOFF N1

R



CFM56-5B5	N1 CORRECTIONS FOR AIR BLEED	
FLEX TAKEOFF N1 MACH = .000	AIR CONDITIONING ON	- 0.700
	NACELLE ANTI ICE ON	0.000
	NACELLE ANTI ICE AND WING ANTI ICE ON	0.000

TAKEOFF

CFM56-5B3 TAKE OFF N1 NO AIR BLEED MACH=.000	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 15	OAT ≥ ISA + 15
	AIR CONDITIONING ON	–.9	–.9
	ENGINE ANTI ICE ON	0.0	–1.1
	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–2.0

OAT (°C)	PRESSURE ALTITUDE (FT)											
	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.	9000.	9200.
–54.0	86.0	87.7	88.7	89.6	89.9	90.2	90.5	90.8	91.1	91.4	91.5	91.5
–50.0	86.7	88.5	89.4	90.4	90.7	90.9	91.2	91.5	91.8	92.1	92.2	92.3
–46.0	87.4	89.2	90.2	91.1	91.4	91.7	92.0	92.3	92.6	92.9	93.0	93.0
–42.0	88.2	89.9	90.9	91.8	92.2	92.4	92.7	93.0	93.3	93.6	93.7	93.8
–38.0	88.9	90.6	91.6	92.5	92.9	93.1	93.4	93.7	94.0	94.3	94.5	94.5
–34.0	89.5	91.3	92.3	93.3	93.6	93.9	94.1	94.4	94.7	95.0	95.2	95.2
–30.0	90.2	92.0	93.0	94.0	94.3	94.6	94.8	95.1	95.4	95.7	95.9	95.9
–26.0	90.9	92.7	93.7	94.7	95.0	95.3	95.5	95.9	96.2	96.4	96.6	96.6
–22.0	91.6	93.4	94.4	95.4	95.7	96.0	96.2	96.6	96.9	97.2	97.3	97.3
–18.0	92.3	94.1	95.1	96.1	96.4	96.7	97.0	97.3	97.6	97.9	98.0	98.0
–14.0	93.0	94.8	95.8	96.8	97.1	97.4	97.7	98.0	98.3	98.6	98.7	98.7
–10.0	93.6	95.4	96.4	97.4	97.7	98.0	98.3	98.6	98.9	99.2	99.4	99.4
–6.0	94.3	96.1	97.1	98.1	98.4	98.7	99.0	99.3	99.6	99.9	100.0	100.0
–2.0	94.9	96.7	97.8	98.7	99.0	99.4	99.6	100.0	100.3	100.6	100.7	100.7
2.0	95.6	97.4	98.4	99.4	99.7	100.0	100.3	100.6	100.9	101.2	101.4	101.4
6.0	96.2	98.1	99.1	100.1	100.4	100.7	101.0	101.3	101.6	101.9	102.0	102.0
10.0	96.9	98.7	99.7	100.7	101.0	101.3	101.6	101.9	102.3	102.5	102.7	102.7
14.0	97.5	99.4	100.4	101.4	101.7	102.0	102.3	102.6	102.9	103.2	*102.9*	*102.8*
18.0	98.1	100.0	101.0	102.0	102.3	102.6	102.9	103.2	*103.1*	*102.8*	*102.4*	*102.4*
22.0	98.7	100.6	101.6	102.6	103.0	103.3	*103.3*	*103.1*	*102.7*	*102.2*	*101.9*	*101.9*
26.0	99.4	101.2	102.3	103.3	*102.9*	*102.9*	*103.0*	*102.4*	*101.9*	*101.2*	*100.8*	*100.8*
30.0	100.0	*101.8*	*101.9*	*102.0*	*101.9*	*101.9*	*102.0*	*101.3*	*100.6*	*100.0*	*100.0*	*100.0*
34.0	*99.8*	*100.5*	*100.7*	*100.7*	*100.7*	*100.7*	*100.4*	*99.9*	*99.6*	*99.3*	*99.2*	*99.2*
38.0	*98.9*	*99.7*	*99.7*	*99.6*	*99.6*	*99.5*	*99.4*	*99.1*	*98.8*	*98.6*		
42.0	*98.3*	*99.0*	*98.9*	*98.8*	*98.8*	*98.7*	*98.6*	*98.3*				
46.0	*97.5*	*98.0*	*98.0*	*98.0*								
50.0	*96.6*	*97.1*	*97.1*	*97.1*								
54.0	*95.7*	*96.2*										

OAT < ISA + 15
OAT ≥ ISA + 15

INTENTIONALLY LEFT BLANK

TAKEOFF

R

CFM56-5B4	N1 CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT ≥ CORNER POINT
TAKE OFF N1 NO AIR BLEED MACH=.000	AIR CONDITIONING ON	–.7	–.7
	ENGINE ANTI ICE ON	0.0	–1.6
	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–2.4

OAT (°C)	PRESSURE ALTITUDE (FT) –2000.	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.	8000.	9000.	9200.
–54.0	76.2	77.2	78.2	79.2	80.3	82.3	84.0	85.8	86.7	87.6	88.2	88.0	88.0
–50.0	76.9	77.9	78.9	79.9	81.0	83.0	84.7	86.5	87.5	88.3	88.9	88.8	88.7
–46.0	77.5	78.6	79.6	80.6	81.7	83.7	85.4	87.3	88.2	89.0	89.7	89.5	89.5
–42.0	78.2	79.2	80.2	81.3	82.4	84.4	86.1	88.0	88.9	89.8	90.4	90.2	90.2
–38.0	78.8	79.9	80.9	82.0	83.0	85.1	86.8	88.7	89.6	90.5	91.1	90.9	90.9
–34.0	79.5	80.5	81.5	82.6	83.7	85.7	87.5	89.4	90.3	91.2	91.8	91.6	91.6
–30.0	80.1	81.2	82.2	83.3	84.3	86.4	88.2	90.1	91.0	91.9	92.5	92.3	92.3
–26.0	80.7	81.8	82.8	83.9	85.0	87.1	88.8	90.7	91.7	92.5	93.2	93.0	93.0
–22.0	81.4	82.4	83.5	84.6	85.6	87.7	89.5	91.4	92.4	93.2	93.9	93.7	93.7
–18.0	82.0	83.1	84.1	85.2	86.3	88.4	90.2	92.1	93.1	93.9	94.6	94.4	94.4
–14.0	82.6	83.7	84.8	85.9	87.0	89.1	90.9	92.8	93.8	94.6	95.3	95.1	95.1
–10.0	83.2	84.3	85.4	86.5	87.6	89.7	91.5	93.4	94.4	95.3	95.9	95.7	95.7
–6.0	83.8	84.9	86.0	87.1	88.2	90.3	92.2	94.1	95.1	95.9	96.6	96.4	96.4
–2.0	84.4	85.5	86.6	87.7	88.8	90.9	92.8	94.7	95.7	96.6	97.3	97.1	97.0
2.0	85.0	86.1	87.2	88.3	89.4	91.6	93.4	95.4	96.4	97.2	97.9	97.7	97.7
6.0	85.6	86.7	87.8	88.9	90.0	92.2	94.1	96.0	97.0	97.9	98.6	98.4	98.3
10.0	86.2	87.3	88.4	89.5	90.7	92.8	94.7	96.7	97.7	98.5	99.2	99.0	99.0
14.0	86.8	87.9	89.0	90.2	91.3	93.5	95.3	97.3	98.3	99.2	99.9	99.7	99.6
18.0	87.4	88.5	89.6	90.8	91.9	94.1	95.9	97.9	98.9	99.8	*100.1*	*99.1*	*98.8*
22.0	88.0	89.1	90.2	91.3	92.5	94.7	96.6	98.6	*99.3*	*99.4*	*99.1*	*97.9*	*97.7*
26.0	88.5	89.7	90.7	91.9	93.1	95.3	97.2	*98.3*	*98.5*	*98.5*	*98.0*	*96.8*	*96.6*
30.0	89.1	90.2	91.3	92.5	93.6	95.9	*97.4*	*97.6*	*97.7*	*97.6*	*97.3*	*96.5*	*96.4*
34.0	89.7	90.8	91.9	93.1	94.2	96.5	*96.8*	*97.0*	*97.1*	*97.1*	*97.0*	*96.2*	*96.1*
38.0	90.2	91.4	92.5	93.7	94.8	*96.1*	*96.3*	*96.4*	*96.6*	*96.7*	*96.6*		
42.0	90.8	91.9	93.1	94.2	*94.9*	*95.6*	*95.7*	*95.8*	*96.0*				
46.0	91.4	*92.5*	*93.2*	*93.9*	*94.5*								
50.0	*91.5*	*92.2*	*92.9*	*93.6*	*94.1*								
54.0	*91.2*	*92.0*	*92.7*										

OAT < CORNER POINT

OAT ≥ CORNER POINT

TAKEOFF

CFM56-5B4 TAKE OFF N1 NO AIR BLEED MACH=.000	N1 CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
	AIR CONDITIONING ON	–.7	–.7
	ENGINE ANTI-ICE ON	0.0	–1.6
	ENGINE ANTI-ICE AND WING ANTI-ICE ON	0.0	–2.4

OAT (C)	PRESSURE ALTITUDE (FT) 7000.	8000.	9000.	9200.	10000.	11000.	12000.	13000.	14000.	14500.
–54.0	87.6	88.2	88.0	88.0	87.8	88.2	88.4	88.6	88.6	88.5
–50.0	88.3	88.9	88.8	88.7	88.6	88.9	89.2	89.3	89.3	89.3
–46.0	89.0	89.7	89.5	89.5	89.3	89.7	89.9	90.1	90.1	90.0
–42.0	89.8	90.4	90.2	90.2	90.0	90.4	90.7	90.8	90.8	90.8
–38.0	90.5	91.1	90.9	90.9	90.7	91.1	91.4	91.5	91.5	91.5
–34.0	91.2	91.8	91.6	91.6	91.4	91.8	92.1	92.2	92.2	92.2
–30.0	91.9	92.5	92.3	92.3	92.1	92.5	92.8	92.9	92.9	92.9
–26.0	92.5	93.2	93.0	93.0	92.8	93.2	93.5	93.6	93.6	93.6
–22.0	93.2	93.9	93.7	93.7	93.5	93.9	94.1	94.3	94.3	94.3
–18.0	93.9	94.6	94.4	94.4	94.2	94.6	94.8	95.0	95.0	95.0
–14.0	94.6	95.3	95.1	95.1	94.9	95.3	95.5	95.7	95.7	95.7
–10.0	95.3	95.9	95.7	95.7	95.6	95.9	96.2	96.3	96.3	96.3
–6.0	95.9	96.6	96.4	96.4	96.2	96.6	96.9	97.0	97.0	97.0
–2.0	96.6	97.3	97.1	97.0	96.9	97.3	97.5	97.6	97.7	97.6
2.0	97.2	97.9	97.7	97.7	97.5	97.9	98.2	98.3	98.3	98.3
6.0	97.9	98.6	98.4	98.3	98.2	98.6	98.8	99.0	99.0	98.9
10.0	98.5	99.2	99.0	99.0	98.8	99.2	99.5	99.6	*99.2*	*98.8*
14.0	99.2	99.9	99.7	99.6	*99.1*	*99.0*	*98.6*	*98.0*	*97.1*	*96.6*
18.0	99.8	*100.1*	*99.1*	*98.8*	*97.9*	*97.6*	*97.0*	*96.1*	*95.7*	*95.6*
22.0	*99.4*	*99.1*	*97.9*	*97.7*	*96.7*	*96.2*	*95.9*	*95.7*	*95.4*	*95.2*
26.0	*98.5*	*98.0*	*96.8*	*96.6*	*96.0*	*95.9*	*95.6*	*95.3*	*95.0*	*94.8*
30.0	*97.6*	*97.3*	*96.5*	*96.4*	*95.8*	*95.7*	*95.4*			
34.0	*97.1*	*97.0*	*96.2*	*96.1*	*95.6*					
38.0	*96.7*	*96.6*								
42.0										
46.0										
50.0										
54.0										

OAT < CORNER POINT

OAT > CORNER POINT

TAKEOFF

CFM56-5B5 TAKE OFF N1 NO AIR BLEED MACH=.000	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 30	OAT ≥ ISA + 30
	AIR CONDITIONING ON	–.7	–.7
	ENGINE ANTI ICE ON	0.0	–1.4
	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–2.1

OAT (°C)	PRESSURE ALTITUDE (FT) –2000.	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
–54.0	71.7	72.8	73.8	74.6	75.5	76.5	77.0	77.6	78.1	78.5
–50.0	72.4	73.4	74.4	75.3	76.2	77.1	77.7	78.3	78.8	79.2
–46.0	73.0	74.1	75.1	76.0	76.8	77.8	78.4	79.0	79.5	79.9
–42.0	73.7	74.7	75.7	76.6	77.5	78.5	79.1	79.6	80.1	80.6
–38.0	74.3	75.3	76.3	77.2	78.1	79.1	79.7	80.3	80.8	81.2
–34.0	74.9	75.9	77.0	77.9	78.8	79.8	80.4	80.9	81.4	81.9
–30.0	75.5	76.5	77.6	78.5	79.4	80.4	81.0	81.6	82.1	82.5
–26.0	76.1	77.1	78.2	79.1	80.0	81.0	81.6	82.2	82.7	83.2
–22.0	76.7	77.8	78.8	79.7	80.6	81.7	82.3	82.9	83.4	83.8
–18.0	77.3	78.4	79.4	80.4	81.3	82.3	82.9	83.5	84.0	84.5
–14.0	77.9	79.0	80.1	81.0	81.9	82.9	83.5	84.1	84.7	85.1
–10.0	78.5	79.6	80.6	81.6	82.5	83.5	84.1	84.7	85.3	85.7
–6.0	79.0	80.1	81.2	82.2	83.1	84.1	84.7	85.3	85.9	86.3
–2.0	79.6	80.7	81.8	82.8	83.7	84.7	85.4	85.9	86.5	86.9
2.0	80.2	81.3	82.4	83.3	84.3	85.3	86.0	86.6	87.1	87.5
6.0	80.7	81.9	83.0	83.9	84.9	85.9	86.6	87.2	87.7	88.1
10.0	81.3	82.4	83.6	84.5	85.5	86.5	87.2	87.8	88.3	88.8
14.0	81.9	83.0	84.1	85.1	86.1	87.1	87.8	88.4	88.9	89.4
18.0	82.4	83.6	84.7	85.7	86.6	87.7	88.3	89.0	89.5	90.0
22.0	83.0	84.1	85.2	86.2	87.2	88.3	88.9	89.5	90.1	90.5
26.0	83.5	84.7	85.8	86.8	87.7	88.8	89.5	90.1	90.6	91.1
30.0	84.1	85.2	86.4	87.3	88.3	89.4	90.1	90.7	91.2	91.7
34.0	84.6	85.8	86.9	87.9	88.9	90.0	90.6	91.2	*91.5*	*91.5*
38.0	85.1	86.3	87.5	88.5	89.4	90.5	*90.9*	*91.0*	*91.0*	*90.9*
42.0	85.7	86.9	88.0	89.0	*89.7*	*90.3*	*90.4*	*90.5*	*90.4*	
46.0	86.2	87.4	*88.3*	*88.7*	*89.1*					
50.0	*86.4*	*87.1*	*87.7*	*88.1*	*88.5*					
54.0	*85.8*	*86.5*	*87.1*							

OAT < ISA + 30

OAT ≥ ISA + 30

TAKEOFF

CFM56-5B5 TAKE OFF N1 NO AIR BLEED MACH=.000	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 30	OAT > ISA + 30
	AIR CONDITIONING ON	–0.7	–0.7
	NACELLE ANTI-ICE ON	0.0	–1.4
	NACELLE ANTI-ICE AND WING ANTI-ICE ON	0.0	–2.1

OAT (°C)	PRESSURE ALTITUDE (FT) 7000.	8000.	9000.	9200.	10000.	11000.	12000.	13000.	14000.	14500.
–54.0	78.5	79.0	79.5	79.6	79.9	80.5	81.0	81.6	82.1	82.3
–50.0	79.2	79.7	80.2	80.3	80.6	81.2	81.7	82.3	82.8	83.0
–46.0	79.9	80.4	80.9	81.0	81.3	81.9	82.4	83.0	83.5	83.7
–42.0	80.6	81.1	81.6	81.6	82.0	82.6	83.1	83.7	84.2	84.4
–38.0	81.2	81.7	82.2	82.3	82.7	83.3	83.8	84.3	84.9	85.1
–34.0	81.9	82.4	82.9	83.0	83.3	83.9	84.5	85.0	85.5	85.8
–30.0	82.5	83.0	83.5	83.6	84.0	84.6	85.1	85.7	86.2	86.4
–26.0	83.2	83.7	84.2	84.3	84.6	85.2	85.8	86.3	86.9	87.1
–22.0	83.8	84.3	84.8	84.9	85.3	85.9	86.4	87.0	87.5	87.8
–18.0	84.5	85.0	85.5	85.6	85.9	86.5	87.1	87.7	88.2	88.4
–14.0	85.1	85.6	86.1	86.2	86.6	87.2	87.8	88.3	88.9	89.1
–10.0	85.7	86.2	86.7	86.8	87.2	87.8	88.4	88.9	89.5	89.7
–6.0	86.3	86.8	87.3	87.4	87.8	88.4	89.0	89.6	90.1	90.4
–2.0	86.9	87.5	88.0	88.1	88.5	89.1	89.6	90.2	90.7	91.0
2.0	87.5	88.1	88.6	88.7	89.1	89.7	90.3	90.8	91.4	91.6
6.0	88.1	88.7	89.2	89.3	89.7	90.3	90.9	91.4	92.0	92.3
10.0	88.8	89.3	89.8	89.9	90.3	90.9	91.5	92.1	92.6	92.9
14.0	89.4	89.9	90.4	90.5	90.9	91.5	92.1	92.7	93.3	93.5
18.0	90.0	90.5	91.0	91.1	91.5	92.1	92.7	93.3	*93.6*	*93.6*
22.0	90.5	91.1	91.6	91.7	92.1	92.7	*93.1*	*93.1*	*93.0*	*93.0*
26.0	91.1	91.7	92.2	92.3	*92.5*	*92.5*	*92.5*	*92.5*	*92.4*	*92.3*
30.0	91.7	*92.0*	*92.0*	*92.0*	*91.9*	*91.9*	*91.9*			
34.0	*91.5*	*91.4*	*91.4*	*91.4*	*91.4*					
38.0	*90.9*	*90.9*								
42.0										
46.0										
50.0										
54.0										

OAT < ISA + 30

OAT ≥ ISA + 30

GO AROUND

R

CFM56-5B3	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 15	OAT ≥ ISA + 15
GO AROUND N1 AIR CONDITIONING ON MACH=.225	AIR CONDITIONING OFF	.9	.9
	ENGINE ANTI ICE ON	0.0	–1.9
	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–2.7

TAT (°C)	PRESSURE ALTITUDE (FT) –2000.	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
–54.0	83.7	85.0	86.3	87.1	87.9	88.3	88.8	89.2	89.4	89.7
–50.0	84.4	85.7	87.0	87.8	88.6	89.1	89.5	89.9	90.2	90.4
–46.0	85.1	86.4	87.7	88.6	89.3	89.8	90.3	90.7	90.9	91.2
–42.0	85.8	87.2	88.5	89.3	90.1	90.5	91.0	91.4	91.7	91.9
–38.0	86.5	87.8	89.2	90.0	90.8	91.2	91.7	92.1	92.4	92.6
–34.0	87.2	88.5	89.9	90.7	91.5	91.9	92.4	92.8	93.1	93.3
–30.0	87.8	89.2	90.5	91.4	92.2	92.6	93.1	93.5	93.8	94.0
–26.0	88.5	89.9	91.2	92.1	92.8	93.3	93.8	94.2	94.5	94.7
–22.0	89.2	90.6	91.9	92.7	93.5	94.0	94.5	94.9	95.2	95.4
–18.0	89.9	91.3	92.6	93.4	94.2	94.7	95.2	95.6	95.9	96.1
–14.0	90.5	91.9	93.3	94.1	94.9	95.4	95.9	96.3	96.6	96.8
–10.0	91.2	92.6	93.9	94.8	95.6	96.1	96.5	97.0	97.2	97.5
–6.0	91.8	93.2	94.6	95.4	96.2	96.7	97.2	97.7	97.9	98.1
–2.0	92.4	93.9	95.2	96.1	96.9	97.4	97.9	98.3	98.6	98.8
2.0	93.1	94.5	95.9	96.7	97.5	98.0	98.5	99.0	99.2	99.5
6.0	93.7	95.1	96.5	97.4	98.2	98.7	99.2	99.6	99.9	100.1
10.0	94.3	95.8	97.2	98.0	98.9	99.3	99.8	100.3	100.5	100.8
14.0	95.0	96.4	97.8	98.7	99.5	100.0	100.5	100.9	101.2	101.4
18.0	95.6	97.0	98.5	99.3	100.1	100.6	101.1	101.6	101.8	102.1
22.0	96.2	97.6	99.1	99.9	100.8	101.3	101.7	102.2	*102.1*	*101.8*
26.0	96.8	98.3	99.7	100.5	101.4	101.9	*102.0*	*101.8*	*101.4*	*101.0*
30.0	97.4	98.9	100.3	101.2	*101.5*	*101.2*	*101.0*	*100.9*	*100.6*	*100.0*
34.0	98.0	99.5	*100.5*	*100.4*	*100.2*	*100.1*	*100.1*	*100.1*	*99.5*	*98.8*
38.0	*98.3*	*99.0*	*99.4*	*99.4*	*99.3*	*99.3*	*99.2*	*98.9*	*98.4*	*98.0*
42.0	*97.6*	*98.1*	*98.6*	*98.5*	*98.4*	*98.3*	*98.2*	*98.0*	*97.5*	*97.1*
46.0	*96.9*	*97.3*	*97.7*	*97.6*	*97.4*	*97.3*	*97.2*	*97.0*	*96.6*	
50.0	*96.1*	*96.5*	*96.7*	*96.6*	*96.5*	*96.3*	*96.2*			
54.0	*95.2*	*95.5*	*95.8*	*95.6*	*95.5*					
58.0	*94.3*	*94.6*	*94.8*							
62.0	*93.4*									

OAT < ISA + 15

OAT ≥ ISA + 15

GO AROUND

R

CFM56-5B3 GO AROUND N1 AIR CONDITIONING ON MACH=.225	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 15	OAT ≥ ISA + 15
	AIR CONDITIONING OFF	.9	.9
	ENGINE ANTI ICE ON	0.0	–1.9
	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–2.7

TAT (°C)	PRESSURE ALTITUDE (FT) 7000.	8000.	9000.	9200.	10000.	11000.	12000.	13000.	14000.	14500.
–54.0	89.7	89.8	89.9	89.9	90.0	90.3	90.6	90.9	91.3	91.5
–50.0	90.4	90.6	90.7	90.7	90.7	91.1	91.4	91.7	92.1	92.3
–46.0	91.2	91.3	91.4	91.4	91.5	91.8	92.1	92.5	92.8	93.0
–42.0	91.9	92.1	92.2	92.2	92.2	92.6	92.9	93.2	93.6	93.8
–38.0	92.6	92.8	92.9	92.9	92.9	93.3	93.6	93.9	94.3	94.5
–34.0	93.3	93.5	93.6	93.6	93.6	94.0	94.3	94.6	95.0	95.2
–30.0	94.0	94.2	94.3	94.3	94.3	94.7	95.0	95.3	95.7	95.9
–26.0	94.7	94.9	95.0	95.0	95.0	95.4	95.7	96.0	96.4	96.6
–22.0	95.4	95.6	95.7	95.7	95.7	96.1	96.4	96.7	97.1	97.3
–18.0	96.1	96.3	96.4	96.4	96.5	96.8	97.1	97.4	97.8	98.0
–14.0	96.8	97.0	97.1	97.1	97.2	97.5	97.8	98.1	98.5	98.7
–10.0	97.5	97.6	97.7	97.7	97.8	98.2	98.5	98.8	99.2	99.4
–6.0	98.1	98.3	98.4	98.4	98.5	98.8	99.1	99.5	99.8	100.0
–2.0	98.8	99.0	99.0	99.1	99.1	99.5	99.8	100.1	100.5	100.7
2.0	99.5	99.6	99.7	99.7	99.8	100.1	100.5	100.8	101.2	101.4
6.0	100.1	100.3	100.4	100.4	100.5	100.8	101.1	101.5	*101.5*	*101.2*
10.0	100.8	100.9	101.0	101.0	101.1	101.5	*101.4*	*101.0*	*100.5*	*100.3*
14.0	101.4	101.6	101.7	101.7	*101.5*	*101.1*	*100.6*	*100.1*	*99.6*	*99.3*
18.0	102.1	*101.9*	*101.4*	*101.2*	*100.8*	*100.3*	*99.8*	*99.2*	*98.6*	*98.3*
22.0	101.8	*101.2*	*100.6*	*100.5*	*100.0*	*99.5*	*98.8*	*98.1*	*97.8*	*97.6*
26.0	*101.0*	*100.3*	*99.7*	*99.6*	*99.1*	*98.5*	*98.0*	*97.6*	*97.2*	*97.0*
30.0	*100.0*	*99.2*	*98.7*	*98.6*	*98.4*	*98.0*	*97.5*	*97.0*	*96.6*	
34.0	*98.8*	*98.3*	*98.1*	*98.0*	*97.9*	*97.5*	*97.0*			
38.0	*98.0*	*97.6*	*97.5*	*97.5*	*97.4*					
42.0	*97.1*	*96.9*								
46.0										
50.0										
54.0										

OAT < ISA + 15

OAT ≥ ISA + 15

GO AROUND

R

CFM56-5B5	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 30	OAT ≥ ISA + 30
GO AROUND N1 AIR CONDITIONING ON MACH=.225	AIR CONDITIONING OFF	.6	.6
	ENGINE ANTI ICE ON	0.0	–1.3
	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–1.9

TAT (°C)	PRESSURE ALTITUDE (FT) –2000.	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
–54.0	73.0	74.0	74.8	75.5	76.1	76.6	77.3	78.0	78.6	79.0
–50.0	73.7	74.6	75.5	76.2	76.8	77.3	78.0	78.7	79.3	79.7
–46.0	74.3	75.3	76.2	76.8	77.5	77.9	78.7	79.4	80.0	80.3
–42.0	75.0	75.9	76.8	77.5	78.1	78.6	79.3	80.0	80.7	81.0
–38.0	75.6	76.5	77.5	78.1	78.8	79.3	80.0	80.7	81.3	81.7
–34.0	76.2	77.2	78.1	78.7	79.4	79.9	80.6	81.3	82.0	82.3
–30.0	76.8	77.8	78.7	79.4	80.0	80.5	81.3	82.0	82.6	83.0
–26.0	77.4	78.4	79.3	80.0	80.7	81.2	81.9	82.6	83.3	83.6
–22.0	78.1	79.0	80.0	80.6	81.3	81.8	82.5	83.3	83.9	84.3
–18.0	78.7	79.6	80.6	81.3	81.9	82.4	83.2	83.9	84.6	84.9
–14.0	79.3	80.3	81.2	81.9	82.6	83.1	83.8	84.6	85.2	85.6
–10.0	79.9	80.8	81.8	82.5	83.2	83.7	84.4	85.2	85.8	86.2
–6.0	80.4	81.4	82.4	83.1	83.8	84.3	85.0	85.8	86.4	86.8
–2.0	81.0	82.0	83.0	83.7	84.3	84.9	85.6	86.4	87.1	87.4
2.0	81.6	82.6	83.6	84.3	84.9	85.5	86.2	87.0	87.7	88.0
6.0	82.2	83.2	84.1	84.9	85.5	86.1	86.8	87.6	88.3	88.6
10.0	82.8	83.8	84.7	85.4	86.1	86.7	87.4	88.2	88.9	89.3
14.0	83.3	84.3	85.3	86.0	86.7	87.3	88.0	88.8	89.5	89.9
18.0	83.9	84.9	85.9	86.6	87.3	87.8	88.6	89.4	90.1	90.5
22.0	84.4	85.5	86.5	87.2	87.9	88.4	89.2	90.0	90.7	91.0
26.0	85.0	86.0	87.0	87.7	88.4	89.0	89.8	90.5	91.2	91.6
30.0	85.5	86.6	87.6	88.3	89.0	89.6	90.3	91.1	91.8	92.2
34.0	86.1	87.1	88.1	88.9	89.6	90.1	90.9	91.7	92.4	92.8
38.0	86.6	87.7	88.7	89.4	90.1	90.7	91.5	92.3	*92.4*	*92.2*
42.0	87.2	88.2	89.3	90.0	90.7	91.3	*91.6*	*91.7*	*91.6*	*91.5*
46.0	87.7	88.8	89.8	90.5	*90.8*	*90.8*	*91.0*	*91.0*	*90.9*	
50.0	*88.2*	*89.3*	*89.9*	*90.1*	*90.3*	*90.3*	*90.4*			
54.0	*88.3*	*88.8*	*89.3*	*89.5*	*89.8*					
58.0	*87.7*	*88.2*	*88.7*							
62.0	*87.1*									

OAT < ISA + 30

OAT ≥ ISA + 30

GO AROUND

R

CFM56-5B5	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 30	OAT ≥ ISA + 30
GO AROUND N1	AIR CONDITIONING OFF	.6	.6
AIR CONDITIONING ON	ENGINE ANTI ICE ON	0.0	–1.3
MACH=.225	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–1.9

TAT (°C)	PRESSURE ALTITUDE (FT) 7000.	8000.	9000.	9200.	10000.	11000.	12000.	13000.	14000.	14500.
–54.0	79.0	79.4	80.0	80.1	80.5	81.1	81.7	82.3	82.9	83.2
–50.0	79.7	80.1	80.7	80.8	81.2	81.8	82.4	83.0	83.6	83.9
–46.0	80.3	80.8	81.4	81.5	81.9	82.5	83.1	83.8	84.3	84.6
–42.0	81.0	81.5	82.1	82.2	82.6	83.2	83.8	84.5	85.0	85.3
–38.0	81.7	82.2	82.7	82.9	83.3	83.9	84.5	85.1	85.7	86.0
–34.0	82.3	82.8	83.4	83.5	83.9	84.5	85.2	85.8	86.4	86.7
–30.0	83.0	83.5	84.1	84.2	84.6	85.2	85.8	86.5	87.1	87.3
–26.0	83.6	84.1	84.7	84.8	85.3	85.9	86.5	87.1	87.7	88.0
–22.0	84.3	84.8	85.4	85.5	85.9	86.5	87.2	87.8	88.4	88.7
–18.0	84.9	85.4	86.0	86.1	86.6	87.2	87.8	88.5	89.1	89.4
–14.0	85.6	86.1	86.7	86.8	87.2	87.8	88.5	89.1	89.7	90.0
–10.0	86.2	86.7	87.3	87.4	87.9	88.5	89.1	89.8	90.4	90.7
–6.0	86.8	87.3	87.9	88.0	88.5	89.1	89.8	90.4	91.0	91.3
–2.0	87.4	87.9	88.5	88.6	89.1	89.7	90.4	91.0	91.6	91.9
2.0	88.0	88.6	89.1	89.3	89.7	90.3	91.0	91.6	92.3	92.6
6.0	88.6	89.2	89.8	89.9	90.3	91.0	91.6	92.3	92.9	93.2
10.0	89.3	89.8	90.4	90.5	91.0	91.6	92.3	92.9	93.5	93.8
14.0	89.9	90.4	91.0	91.1	91.6	92.2	92.9	93.5	94.2	94.5
18.0	90.5	91.0	91.6	91.7	92.2	92.8	93.5	94.1	94.8	95.1
22.0	91.0	91.6	92.2	92.3	92.8	93.4	94.1	94.7	*94.7*	*94.6*
26.0	91.6	92.2	92.8	92.9	93.4	94.0	*94.0*	*93.9*	*93.7*	*93.5*
30.0	92.2	92.7	93.4	*93.4*	*93.3*	*93.2*	*93.1*	*92.9*	*92.7*	
34.0	*92.8*	*92.8*	*92.7*	*92.7*	*92.6*	*92.4*	*92.2*			
38.0	*92.2*	*92.1*	*92.0*	*92.0*	*91.8*					
42.0	*91.5*	*91.4*								
46.0										
50.0										
54.0										
58.0										
62.0										

OAT < ISA + 30

OAT ≥ ISA + 30

GO AROUND

R

CFM56-5B4	N1 CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT ≥ CORNER POINT
GO AROUND N1 AIR CONDITIONING ON MACH=.225	AIR CONDITIONING OFF	0.7	0.7
	ENGINE ANTI ICE ON	0.0	–1.6
	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–2.4

TAT (°C)	PRESSURE ALTITUDE (FT) –2000.	–1000.	0.	1000.	2000.	3000.	4000.	5000.	6000.	7000.
–54.0	77.7	78.7	79.6	80.2	80.9	82.1	83.4	84.8	86.2	86.8
–50.0	78.4	79.4	80.3	80.9	81.6	82.8	84.2	85.5	86.9	87.6
–46.0	79.1	80.1	81.0	81.6	82.3	83.5	84.9	86.2	87.6	88.3
–42.0	79.8	80.7	81.7	82.3	83.0	84.2	85.6	87.0	88.4	89.0
–38.0	80.4	81.4	82.3	83.0	83.6	84.9	86.3	87.6	89.1	89.7
–34.0	81.1	82.0	83.0	83.6	84.3	85.5	86.9	88.3	89.7	90.4
–30.0	81.7	82.7	83.6	84.3	85.0	86.2	87.6	89.0	90.4	91.1
–26.0	82.4	83.3	84.3	85.0	85.6	86.9	88.3	89.7	91.1	91.8
–22.0	83.0	84.0	84.9	85.6	86.3	87.5	89.0	90.4	91.8	92.5
–18.0	83.7	84.6	85.6	86.3	86.9	88.2	89.6	91.1	92.5	93.2
–14.0	84.3	85.3	86.2	86.9	87.6	88.9	90.3	91.7	93.2	93.9
–10.0	84.9	85.9	86.8	87.5	88.2	89.5	90.9	92.4	93.8	94.5
–6.0	85.5	86.5	87.5	88.2	88.8	90.1	91.6	93.0	94.5	95.2
–2.0	86.1	87.1	88.1	88.8	89.5	90.8	92.2	93.7	95.1	95.8
2.0	86.7	87.7	88.7	89.4	90.1	91.4	92.9	94.3	95.8	96.5
6.0	87.3	88.3	89.3	90.0	90.7	92.0	93.5	94.9	96.4	97.1
10.0	87.9	88.9	89.9	90.6	91.3	92.6	94.1	95.6	97.1	97.8
14.0	88.5	89.6	90.5	91.3	91.9	93.3	94.8	96.2	97.7	98.4
18.0	89.1	90.1	91.1	91.8	92.5	93.9	95.4	96.8	98.3	99.0
22.0	89.7	90.7	91.7	92.4	93.1	94.5	96.0	97.4	*99.0*	*99.6*
26.0	90.3	91.3	92.3	93.0	93.7	95.1	96.6	*98.1*	*99.0*	*99.0*
30.0	90.8	91.9	92.9	93.6	94.3	95.7	97.2	97.7	98.5	98.4
34.0	91.4	92.5	93.5	94.2	94.9	96.3	*97.2*	*97.4*	*97.9*	*97.7*
38.0	92.0	93.0	94.0	94.8	95.5	*96.7*	*96.9*	*96.9*	*97.2*	*97.0*
42.0	92.6	93.6	94.6	95.4	*96.1*	*96.3*	*96.2*	*96.0*	*96.3*	*96.2*
46.0	93.1	*94.2*	*95.2*	*95.7*	*95.7*	*95.5*	*95.3*	*95.2*	*95.4*	
50.0	*93.7*	*94.5*	*94.8*	*94.8*	*94.8*	*94.6*	*94.4*			
54.0	*93.3*	*93.6*	*93.9*	*94.0*	*93.9*					
58.0	*92.4*	*92.8*	*93.1*							
62.0	*91.6*									

OAT < CORNER POINT

OAT ≥ CORNER POINT

GO AROUND

CFM56-5B4 GO AROUND N1 AIR CONDITIONING ON MACH=.225	N1 CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
	AIR CONDITIONING OFF	0.7	0.7
	ENGINE ANTI-ICE ON	0.0	–1.6
	ENGINE ANTI-ICE AND WING ANTI-ICE ON	0.0	–2.4

TAT (C)	PRESSURE ALTITUDE (FT) 7000.	8000.	9000.	9200.	10000.	11000.	12000.	13000.	14000.	14500.
–54.0	86.8	87.3	87.0	87.0	86.7	87.0	87.3	87.4	87.4	87.4
–50.0	87.6	88.1	87.8	87.7	87.5	87.8	88.0	88.1	88.2	88.2
–46.0	88.3	88.8	88.5	88.4	88.2	88.5	88.8	88.9	88.9	88.9
–42.0	89.0	89.6	89.2	89.2	88.9	89.3	89.5	89.6	89.7	89.6
–38.0	89.7	90.2	89.9	89.9	89.6	89.9	90.2	90.3	90.3	90.3
–34.0	90.4	90.9	90.6	90.6	90.3	90.6	90.9	91.0	91.0	91.0
–30.0	91.1	91.6	91.3	91.2	91.0	91.3	91.6	91.7	91.7	91.7
–26.0	91.8	92.3	92.0	91.9	91.7	92.0	92.3	92.4	92.4	92.4
–22.0	92.5	93.0	92.7	92.6	92.4	92.7	93.0	93.1	93.1	93.1
–18.0	93.2	93.7	93.4	93.3	93.1	93.4	93.6	93.8	93.8	93.8
–14.0	93.9	94.4	94.1	94.0	93.8	94.1	94.3	94.5	94.5	94.5
–10.0	94.5	95.1	94.7	94.7	94.4	94.7	95.0	95.1	95.2	95.1
–6.0	95.2	95.7	95.4	95.3	95.1	95.4	95.6	95.8	95.8	95.8
–2.0	95.8	96.4	96.0	96.0	95.7	96.0	96.3	96.4	96.5	96.4
2.0	96.5	97.0	96.7	96.6	96.4	96.7	96.9	97.1	97.1	97.1
6.0	97.1	97.7	97.3	97.3	97.0	97.3	97.6	97.7	97.8	97.7
10.0	97.8	98.3	98.0	97.9	97.7	98.0	98.2	98.4	*98.4*	*98.4*
14.0	98.4	99.0	98.6	98.6	*98.3*	*98.6*	*98.9*	*98.6*	*98.0*	*97.7*
18.0	99.0	*99.6*	*99.3*	*99.1*	*98.2*	*98.1*	*97.7*	*97.2*	*96.4*	*95.9*
22.0	*99.6*	*99.5*	*98.5*	*98.2*	*97.4*	*97.0*	*96.5*	*95.9*	*95.6*	*95.4*
26.0	*99.0*	*98.7*	*97.6*	*97.4*	*96.5*	*96.1*	*95.8*	*95.5*	*95.1*	*94.9*
30.0	*98.4*	*97.9*	*96.9*	*96.7*	*95.9*	*95.7*	*95.4*	*95.0*	*94.6*	
34.0	*97.7*	*97.3*	*96.3*	*96.2*	*95.5*	*95.3*	*95.0*			
38.0	*97.0*	*96.6*	*95.8*	*95.6*	*95.1*					
42.0	*96.2*	*95.9*								
46.0										
50.0										
54.0										

OAT < CORNER POINT

OAT > CORNER POINT

MAXIMUM CONTINUOUS

CFM56-5B3 MAXIMUM CONTINUOUS N1 AIR CONDITIONING ON* IAS=230 KT	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 10	OAT ≥ ISA + 10
	AIR CONDITIONING OFF	1.2	1.2
	NACELLE ANTI ICE ON	0.0	– 1.6
	NACELLE ANTI ICE AND WING ANTI ICE ON	0.0	– 2.9

TAT (°C)	PRESSURE ALTITUDE (FT) –1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.
–54.0	80.3	82.2	83.7	85.3	87.4	87.1	86.6	86.8	87.7	89.1	88.4
–50.0	81.0	82.9	84.4	86.0	88.1	87.8	87.3	87.5	88.5	89.8	89.1
–46.0	81.7	83.7	85.2	86.8	88.9	88.6	88.0	88.2	89.2	90.6	89.9
–42.0	82.4	84.4	85.9	87.5	89.6	89.3	88.8	89.0	89.9	91.3	90.6
–38.0	83.0	85.0	86.5	88.2	90.3	90.0	89.5	89.6	90.6	92.0	91.3
–34.0	83.7	85.7	87.2	88.9	91.0	90.7	90.2	90.3	91.3	92.7	92.0
–30.0	84.4	86.4	87.9	89.5	91.7	91.4	90.8	91.0	92.0	93.4	92.7
–26.0	85.0	87.0	88.6	90.2	92.4	92.1	91.5	91.7	92.7	94.1	93.4
–22.0	85.7	87.7	89.2	90.9	93.1	92.8	92.2	92.4	93.4	*94.5*	94.1
–18.0	86.3	88.4	89.9	91.6	93.8	93.5	92.9	93.1	94.1	*93.6*	*93.5*
–14.0	87.0	89.0	90.6	92.3	94.5	94.2	93.6	93.8	*93.5*	*92.7*	*92.6*
–10.0	87.6	89.7	91.2	92.9	95.1	94.8	94.3	*93.8*	*92.7*	*91.7*	*91.6*
–6.0	88.2	90.3	91.9	93.6	95.8	95.5	*94.9*	*93.0*	*91.9*	*90.8*	*90.9*
–2.0	88.8	90.9	92.5	94.2	96.4	96.1	*94.2*	*92.3*	*91.2*	*90.3*	*90.3*
2.0	89.5	91.5	93.1	94.9	97.1	*96.1*	*93.5*	*91.7*	*90.7*	*89.9*	*89.8*
6.0	90.1	92.2	93.8	95.5	97.7	*95.5*	*92.9*	*91.2*	*90.2*	*89.4*	*89.3*
10.0	90.7	92.8	94.4	96.1	*97.2*	*94.8*	*92.5*	*90.7*	*89.7*	*88.9*	*88.8*
14.0	91.3	93.4	95.1	*96.6*	*96.6*	*94.4*	*92.0*	*90.2*	*89.2*		
18.0	91.9	94.0	95.7	*96.2*	*95.9*	*94.0*	*91.6*	*89.8*			
22.0	92.5	94.6	*95.7*	*95.7*	*95.5*	*93.6*	*91.1*				
26.0	93.1	95.2	*95.3*	*95.1*	*95.0*	*93.2*					
30.0	93.7	*94.9*	*94.9*	*94.5*	*94.4*	*92.7*					
34.0	*94.3*	*94.4*	*94.1*	*94.0*	*93.9*						
38.0	*93.7*	*93.8*	*93.5*	*93.4*							
42.0	*93.1*	*93.1*	*93.0*	*92.8*							
46.0	*92.4*	*92.5*	*92.5*								
50.0	*91.8*	*92.0*	*91.9*								
54.0	*91.3*	*91.5*									

OAT < ISA + 10
OAT ≥ ISA + 10

* One engine inoperative – 1 pack operative on remaining engine.

MAXIMUM CLIMB

CFM56-5B3	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 10	OAT ≥ ISA + 10
MAXIMUM CLIMB N1 AIR CONDITIONING ON 250/300/.78	AIR CONDITIONING OFF	1.2	1.2
	ENGINE ANTI ICE ON	0.0	–1.4
	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–2.2

TAT (°C)	PRESSURE ALTITUDE (FT) –1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.
–54.0	75.7	77.6	79.0	79.7	81.2	82.3	83.3	84.1	85.3	88.4	88.4
–50.0	76.4	78.3	79.7	80.4	81.9	83.0	84.0	84.8	86.1	89.1	89.2
–46.0	77.1	79.0	80.4	81.1	82.6	83.8	84.7	85.6	86.8	89.9	89.9
–42.0	77.8	79.7	81.1	81.8	83.3	84.5	85.5	86.3	87.5	90.6	90.7
–38.0	78.4	80.3	81.8	82.4	83.9	85.1	86.1	87.0	88.2	91.3	91.4
–34.0	79.0	81.0	82.4	83.1	84.6	85.8	86.8	87.6	88.9	92.0	92.0
–30.0	79.6	81.6	83.1	83.8	85.2	86.5	87.5	88.3	89.6	92.7	92.7
–26.0	80.3	82.2	83.7	84.4	85.9	87.1	88.2	89.0	90.3	93.4	93.4
–22.0	80.9	82.9	84.4	85.1	86.6	87.8	88.8	89.7	90.9	94.1	94.1
–18.0	81.5	83.5	85.0	85.7	87.2	88.5	89.5	90.3	91.6	94.8	*94.5*
–14.0	82.2	84.2	85.7	86.4	87.9	89.1	90.2	91.0	92.3	*94.5*	*93.6*
–10.0	82.8	84.8	86.3	87.0	88.5	89.8	90.8	91.7	92.9	*93.7*	*92.6*
–6.0	83.4	85.4	86.9	87.6	89.1	90.4	91.4	92.3	*93.1*	*92.8*	*91.8*
–2.0	84.0	86.0	87.5	88.2	89.8	91.0	92.1	92.9	*92.6*	*92.1*	*91.2*
2.0	84.6	86.6	88.1	88.8	90.4	91.7	92.7	*92.6*	*92.0*	*91.4*	*90.7*
6.0	85.1	87.2	88.7	89.5	91.0	92.3	*92.7*	*92.2*	*91.5*	*91.0*	*90.2*
10.0	85.7	87.8	89.3	90.1	91.6	*92.6*	*92.3*	*91.7*	*91.0*	*90.5*	*89.7*
14.0	86.3	88.4	90.0	90.7	92.3	*92.2*	*91.9*	*91.3*	*90.6*	*90.1*	*89.2*
18.0	86.9	89.0	90.5	91.3	*91.9*	*91.7*	*91.4*	*90.8*	*90.1*		
22.0	87.5	89.6	*91.0*	*91.3*	*91.4*	*91.3*	*91.0*	*90.4*	*89.6*		
26.0	88.0	90.1	*90.4*	*90.8*	*91.0*	*90.8*	*90.5*	*89.9*	*89.1*		
30.0	88.6	*90.2*	*89.8*	*90.3*	*90.6*	*90.3*	*90.0*	*89.4*			
34.0	89.2	*89.6*	*89.2*	*89.7*	*90.1*	*89.8*	*89.6*				
38.0	*88.9*	*89.0*	*88.5*	*89.1*	*89.4*	*89.3*					
42.0	*88.3*	*88.3*	*87.8*	*88.5*	*88.8*						
46.0	*87.7*	*87.7*	*87.1*	*87.8*	*88.2*						
50.0	*87.0*	*87.0*	*86.4*	*87.1*							
54.0	*86.3*	*86.3*									

OAT < ISA + 10
OAT ≥ ISA + 10

MAXIMUM CONTINUOUS

R

CFM56-5B4	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 10	OAT ≥ ISA + 10
MAXIMUM CONTINUOUS N1 AIR CONDITIONING ON* IAS=230 KT	AIR CONDITIONING OFF	0.9	0.9
	ENGINE ANTI ICE ON	0.0	–1.4
	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–3.2

TAT (°C)	PRESSURE ALTITUDE (FT) –1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.
–54.0	75.6	77.6	79.2	81.1	85.2	87.3	87.0	83.2	84.3	85.1	84.1
–50.0	76.2	78.3	79.9	81.8	85.9	88.0	87.7	84.0	85.0	85.8	84.9
–46.0	76.9	79.0	80.6	82.6	86.6	88.8	88.5	84.7	85.7	86.6	85.6
–42.0	77.6	79.6	81.2	83.3	87.4	89.5	89.2	85.4	86.4	87.3	86.3
–38.0	78.2	80.3	81.9	83.9	88.0	90.2	89.9	86.1	87.1	88.0	87.0
–34.0	78.8	80.9	82.5	84.6	88.7	90.9	90.6	86.7	87.8	88.6	87.7
–30.0	79.5	81.6	83.2	85.2	89.4	91.6	91.3	87.4	88.5	89.3	88.3
–26.0	80.1	82.2	83.8	85.9	90.1	92.3	92.0	88.1	89.2	90.0	89.0
–22.0	80.7	82.8	84.5	86.6	90.8	93.0	92.7	88.7	89.8	*90.5*	89.7
–18.0	81.4	83.5	85.1	87.2	91.5	93.7	93.4	89.4	90.5	*90.3*	*89.6*
–14.0	82.0	84.1	85.8	87.9	92.1	94.3	94.0	90.1	*90.4*	*90.0*	*89.3*
–10.0	82.6	84.7	86.4	88.5	92.8	95.0	94.7	*90.3*	*90.1*	*89.6*	*89.0*
–6.0	83.2	85.3	87.0	89.1	93.4	95.6	*95.3*	*90.0*	*89.7*	*89.0*	*88.2*
–2.0	83.8	85.9	87.6	89.8	94.1	96.3	*94.6*	*89.7*	*89.0*	*88.4*	*87.5*
2.0	84.4	86.5	88.3	90.4	94.7	*96.3*	*93.9*	*89.0*	*88.4*	*87.7*	*86.9*
6.0	85.0	87.1	88.9	91.0	95.4	*95.6*	*93.3*	*88.4*	*87.8*	*87.0*	*86.3*
10.0	85.5	87.8	89.5	91.6	*94.8*	*94.8*	*92.8*	*87.8*	*87.2*	*86.2*	*85.7*
14.0	86.1	88.4	90.1	*92.0*	*94.0*	*94.2*	*92.4*	*87.1*	*86.5*		
18.0	86.7	88.9	90.7	*91.5*	*93.3*	*93.6*	*91.9*	*86.5*			
22.0	87.3	89.5	*90.7*	*91.0*	*92.8*	*93.1*	*91.3*				
26.0	87.8	90.1	*90.2*	*90.5*	*92.2*	*92.5*					
30.0	88.4	*89.8*	*89.7*	*90.0*	*91.5*	*92.0*					
34.0	*89.0*	*89.3*	*89.5*	*89.4*	*90.9*						
38.0	*88.5*	*88.9*	*89.1*	*88.8*							
42.0	*88.0*	*88.7*	*88.7*	*88.1*							
46.0	*87.4*	*88.3*	*88.2*								
50.0	*86.8*	*87.9*	*87.7*								
54.0	*86.2*	*87.5*									

OAT < ISA + 10

OAT ≥ ISA + 10

* One engine inoperative – 1 pack operative on remaining engine.

MAXIMUM CLIMB

R

CFM56-5B4	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 10	OAT ≥ ISA + 10
MAXIMUM CLIMB N1 AIR CONDITIONING ON 250/300/.78	AIR CONDITIONING OFF	.8	.8
	ENGINE ANTI ICE ON	0.0	–1.3
	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–2.4

TAT (°C)	PRESSURE ALTITUDE (FT)										
	–1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.
–54.0	73.5	75.4	77.0	77.8	78.8	79.8	80.7	81.5	82.5	83.9	83.9
–50.0	74.2	76.1	77.6	78.4	79.5	80.5	81.4	82.2	83.3	84.6	84.6
–46.0	74.8	76.8	78.3	79.1	80.2	81.2	82.1	82.9	84.0	85.3	85.3
–42.0	75.5	77.4	79.0	79.8	80.9	81.9	82.8	83.6	84.7	86.0	86.0
–38.0	76.1	78.1	79.6	80.5	81.5	82.5	83.5	84.3	85.3	86.7	86.7
–34.0	76.7	78.7	80.3	81.1	82.2	83.2	84.1	84.9	86.0	87.4	87.4
–30.0	77.3	79.3	80.9	81.7	82.8	83.8	84.8	85.6	86.7	88.1	88.1
–26.0	77.9	80.0	81.5	82.4	83.5	84.5	85.4	86.2	87.4	88.7	88.7
–22.0	78.6	80.6	82.2	83.0	84.1	85.1	86.1	86.9	88.0	89.4	89.4
–18.0	79.2	81.2	82.8	83.7	84.8	85.8	86.7	87.6	88.7	90.1	*89.9*
–14.0	79.8	81.8	83.5	84.3	85.4	86.4	87.4	88.2	89.4	*90.3*	*89.6*
–10.0	80.4	82.4	84.1	84.9	86.0	87.1	88.0	88.9	90.0	*90.1*	*89.4*
–6.0	81.0	83.0	84.7	85.5	86.6	87.7	88.7	89.5	*90.3*	*90.0*	*88.8*
–2.0	81.5	83.6	85.3	86.1	87.2	88.3	89.3	90.1	*90.1*	*89.5*	*88.0*
2.0	82.1	84.2	85.9	86.7	87.9	88.9	89.9	*90.1*	*90.0*	*88.8*	*87.4*
6.0	82.7	84.8	86.5	87.3	88.5	89.5	*90.0*	*89.9*	*89.6*	*88.2*	*86.8*
10.0	83.3	85.4	87.1	87.9	89.1	*89.8*	*89.8*	*89.7*	*89.0*	*87.5*	*86.2*
14.0	83.9	86.0	87.7	88.6	89.7	*89.6*	*89.7*	*89.2*	*88.4*	*86.8*	*85.6*
18.0	84.4	86.6	88.2	89.1	*89.4*	*89.3*	*89.2*	*88.6*	*87.7*		
22.0	85.0	87.1	*88.7*	*89.2*	*89.0*	*89.0*	*88.6*	*87.9*	*87.0*		
26.0	85.5	87.7	*88.3*	*88.9*	*88.7*	*88.5*	*88.0*	*87.2*	*86.3*		
30.0	86.1	*87.8*	*87.9*	*88.5*	*88.2*	*87.8*	*87.2*	*86.6*			
34.0	86.6	*87.4*	*87.3*	*87.8*	*87.5*	*87.1*	*86.5*				
38.0	*86.4*	*86.9*	*86.6*	*87.1*	*86.8*	*86.4*					
42.0	*85.9*	*86.2*	*85.9*	*86.4*	*86.0*						
46.0	*85.3*	*85.4*	*85.2*	*85.7*	*85.3*						
50.0	*84.5*	*84.7*	*84.4*	*85.0*							
54.0	*83.7*	*84.0*									

OAT < ISA + 10

OAT ≥ ISA + 10

MAXIMUM CONTINUOUS

R

CFM56-5B5/B6 MAXIMUM CONTINUOUS N1 AIR CONDITIONING ON* IAS=230 KT	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 10	OAT ≥ ISA + 10
	AIR CONDITIONING OFF	.8	.8
	ENGINE ANTI ICE ON	0.0	–1.1
	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–2.5

TAT (°C)	PRESSURE ALTITUDE (FT) –1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.
–54.0	73.4	76.1	78.4	80.4	81.8	81.4	82.2	83.2	84.3	85.1	84.1
–50.0	74.1	76.8	79.1	81.1	82.6	82.1	83.0	84.0	85.0	85.8	84.9
–46.0	74.7	77.4	79.8	81.8	83.3	82.8	83.7	84.7	85.7	86.6	85.6
–42.0	75.4	78.1	80.5	82.5	84.0	83.5	84.4	85.4	86.4	87.3	86.3
–38.0	76.0	78.7	81.1	83.1	84.6	84.2	85.0	86.1	87.1	88.0	87.0
–34.0	76.6	79.4	81.8	83.8	85.3	84.8	85.7	86.7	87.8	88.6	87.7
–30.0	77.2	80.0	82.4	84.5	86.0	85.5	86.4	87.4	88.5	89.3	88.3
–26.0	77.8	80.6	83.1	85.1	86.6	86.1	87.0	88.1	89.2	90.0	89.0
–22.0	78.5	81.3	83.7	85.8	87.3	86.8	87.7	88.7	89.8	*90.5*	89.7
–18.0	79.1	81.9	84.4	86.4	88.0	87.5	88.4	89.4	90.5	*90.3*	*89.6*
–14.0	79.7	82.5	85.0	87.1	88.6	88.1	89.0	90.1	*90.4*	*90.0*	*89.3*
–10.0	80.3	83.1	85.6	87.7	89.3	88.8	89.7	*90.3*	*90.1*	*89.6*	*89.0*
–6.0	80.8	83.7	86.2	88.3	89.9	89.4	*90.3*	*90.0*	*89.7*	*89.0*	*88.2*
–2.0	81.4	84.3	86.9	88.9	90.5	90.0	*90.0*	*89.7*	*89.0*	*88.4*	*87.5*
2.0	82.0	84.9	87.5	89.6	91.1	*90.2*	*89.7*	*89.0*	*88.4*	*87.7*	*86.9*
6.0	82.6	85.5	88.1	90.2	91.8	*89.9*	*89.3*	*88.4*	*87.8*	*87.0*	*86.3*
10.0	83.2	86.1	88.7	90.8	*91.5*	*89.5*	*88.6*	*87.8*	*87.2*	*86.2*	*85.7*
14.0	83.8	86.7	89.3	*91.2*	*91.1*	*89.0*	*87.9*	*87.1*	*86.5*		
18.0	84.3	87.3	89.9	*90.8*	*90.7*	*88.4*	*87.2*	*86.5*			
22.0	84.9	87.8	*90.0*	*90.4*	*90.3*	*87.6*	*86.5*				
26.0	85.4	88.4	*89.7*	*89.9*	*89.5*	*86.8*					
30.0	86.0	*88.5*	*89.5*	*89.3*	*88.8*	*86.0*					
34.0	*86.5*	*88.5*	*89.0*	*88.6*	*88.0*						
38.0	*86.7*	*88.4*	*88.4*	*87.9*							
42.0	*86.9*	*88.1*	*87.8*	*87.2*							
46.0	*87.0*	*87.5*	*87.1*								
50.0	*86.7*	*86.8*	*86.4*								
54.0	*86.0*	*86.2*									

OAT < ISA + 10
OAT ≥ ISA + 10

* One engine inoperative - 1 pack operative on remaining engine.

MAXIMUM CLIMB

CFM56-5B5/B6 MAXIMUM CLIMB N1 AIR CONDITIONING ON 250/300/.78	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA + 10	OAT ≥ ISA + 10
	AIR CONDITIONING OFF	.8	.8
	ENGINE ANTI ICE ON	0.0	–.8
	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–1.4

TAT (°C)	PRESSURE ALTITUDE (FT)										
	–1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.
–54.0	73.4	75.4	77.0	77.8	78.8	79.8	80.7	81.5	82.5	83.9	83.9
–50.0	74.1	76.1	77.6	78.4	79.5	80.5	81.4	82.2	83.3	84.6	84.6
–46.0	74.7	76.7	78.3	79.1	80.2	81.2	82.1	82.9	84.0	85.3	85.3
–42.0	75.4	77.4	79.0	79.8	80.9	81.9	82.8	83.6	84.7	86.0	86.0
–38.0	76.0	78.0	79.6	80.5	81.5	82.5	83.5	84.3	85.3	86.7	86.7
–34.0	76.6	78.7	80.3	81.1	82.2	83.2	84.1	84.9	86.0	87.4	87.4
–30.0	77.2	79.3	80.9	81.7	82.8	83.8	84.8	85.6	86.7	88.1	88.1
–26.0	77.8	79.9	81.5	82.4	83.5	84.5	85.4	86.2	87.4	88.7	88.7
–22.0	78.4	80.5	82.2	83.0	84.1	85.1	86.1	86.9	88.0	89.4	89.4
–18.0	79.1	81.2	82.8	83.7	84.8	85.8	86.7	87.6	88.7	90.1	*89.9*
–14.0	79.7	81.8	83.5	84.3	85.4	86.4	87.4	88.2	89.4	*90.3*	*89.6*
–10.0	80.3	82.4	84.1	84.9	86.0	87.1	88.0	88.9	90.0	*90.1*	*89.4*
–6.0	80.8	83.0	84.7	85.5	86.6	87.7	88.7	89.5	*90.3*	*90.0*	*88.8*
–2.0	81.4	83.6	85.3	86.1	87.2	88.3	89.3	90.1	*90.1*	*89.5*	*88.0*
2.0	82.0	84.2	85.9	86.7	87.9	88.9	89.9	*90.1*	*90.0*	*88.8*	*87.4*
6.0	82.6	84.8	86.5	87.3	88.5	89.5	*90.0*	*89.9*	*89.6*	*88.2*	*86.8*
10.0	83.2	85.4	87.1	87.9	89.1	*89.8*	*89.8*	*89.7*	*89.0*	*87.5*	*86.2*
14.0	83.7	85.9	87.7	88.6	89.7	*89.6*	*89.7*	*89.2*	*88.4*	*86.8*	*85.6*
18.0	84.3	86.5	88.2	89.1	*89.4*	*89.3*	*89.2*	*88.6*	*87.7*		
22.0	84.9	87.1	*88.7*	*89.2*	*89.0*	*89.0*	*88.6*	*87.9*	*87.0*		
26.0	85.4	87.6	*88.3*	*88.9*	*88.7*	*88.5*	*88.0*	*87.2*	*86.3*		
30.0	86.0	*87.8*	*87.9*	*88.5*	*88.2*	*87.8*	*87.2*	*86.6*			
34.0	86.5	*87.3*	*87.3*	*87.8*	*87.5*	*87.1*	*86.5*				
38.0	*86.4*	*86.8*	*86.6*	*87.1*	*86.8*	*86.4*					
42.0	*85.9*	*86.1*	*85.9*	*86.4*	*86.0*						
46.0	*85.3*	*85.4*	*85.2*	*85.7*	*85.3*						
50.0	*84.5*	*84.7*	*84.4*	*85.0*							
54.0	*83.7*	*83.9*									

OAT < ISA + 10

OAT ≥ ISA + 10

MAXIMUM CRUISE

R

CFM56-5B3 MAXIMUM CRUISE N1 AIR CONDITIONING ON 250/300/.78	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA+10	OAT ≥ ISA+10
	AIR CONDITIONING OFF	1.2	1.2
	NACELLE ANTI ICE ON	0.0	–1.4
	NACELLE ANTI ICE AND WING ANTI ICE ON	0.0	–2.2

TAT (°C)	PRESSURE ALTITUDE (FT) –1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.
–54.0	74.2	76.1	77.5	78.2	79.7	80.8	81.8	82.6	83.3	85.9	85.5
–50.0	74.9	76.8	78.2	78.9	80.4	81.5	82.5	83.3	84.0	86.6	86.3
–46.0	75.6	77.5	78.9	79.6	81.1	82.3	83.2	84.1	84.8	87.4	87.0
–42.0	76.3	78.2	79.6	80.3	81.8	83.0	84.0	84.8	85.5	88.1	87.7
–38.0	76.9	78.8	80.3	80.9	82.4	83.6	84.6	85.5	86.2	88.8	88.4
–34.0	77.5	79.5	80.9	81.6	83.1	84.3	85.3	86.1	86.8	89.5	89.1
–30.0	78.1	80.1	81.6	82.3	83.7	85.0	86.0	86.8	87.5	90.2	89.8
–26.0	78.8	80.7	82.2	82.9	84.4	85.6	86.7	87.5	88.2	90.9	90.5
–22.0	79.4	81.4	82.9	83.6	85.1	86.3	87.3	88.2	88.9	91.6	91.2
–18.0	80.0	82.0	83.5	84.2	85.7	87.0	88.0	88.8	89.6	92.3	*91.6*
–14.0	80.7	82.7	84.2	84.9	86.4	87.6	88.7	89.5	90.3	*92.0*	*90.7*
–10.0	81.3	83.3	84.8	85.5	87.0	88.3	89.3	90.2	90.9	*91.2*	*89.7*
–6.0	81.9	83.9	85.4	86.1	87.6	88.9	89.9	90.8	*91.1*	*90.3*	*88.9*
–2.0	82.5	84.5	86.0	86.7	88.3	89.5	90.6	91.4	*90.5*	*89.5*	*88.2*
2.0	83.1	85.1	86.6	87.3	88.9	90.2	91.2	*91.1*	*90.0*	*88.9*	*87.8*
6.0	83.6	85.7	87.2	88.0	89.5	90.8	*91.2*	*90.7*	*89.4*	*88.5*	*87.3*
10.0	84.2	86.3	87.8	88.6	90.1	*91.1*	*90.8*	*90.2*	*88.9*	*88.0*	*86.8*
14.0	84.8	86.9	88.5	89.2	90.8	*90.7*	*90.4*	*89.8*	*88.5*	*87.6*	*86.3*
18.0	85.4	87.5	89.0	89.8	*90.4*	*90.2*	*89.9*	*89.3*	*88.0*		
22.0	86.0	88.1	*89.5*	*89.8*	*89.9*	*89.8*	*89.5*	*88.9*	*87.6*		
26.0	86.5	88.6	*88.9*	*89.3*	*89.5*	*89.3*	*89.0*	*88.4*	*87.1*		
30.0	87.1	*88.7*	*88.3*	*88.8*	*89.1*	*88.8*	*88.5*	*87.9*			
34.0	87.7	*88.1*	*87.7*	*88.2*	*88.6*	*88.3*	*88.1*				
38.0	*87.4*	*87.5*	*87.0*	*87.6*	*87.9*	*87.8*					
42.0	*86.8*	*86.8*	*86.3*	*87.0*	*87.3*						
46.0	*86.2*	*86.2*	*85.6*	*86.3*	*86.7*						
50.0	*85.5*	*85.5*	*84.9*	*85.6*							
54.0	*84.8*	*84.8*									

OAT < ISA + 10

OAT ≥ ISA + 10

INTENTIONALLY LEFT BLANK

MAXIMUM CRUISE

R

CFM56-5B4 MAXIMUM CRUISE N1 AIR CONDITIONING ON 250/300/.78	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA+10	OAT ≥ ISA+10
	AIR CONDITIONING OFF	0.8	0.8
	NACELLE ANTI ICE ON	0.0	–1.3
	NACELLE ANTI ICE AND WING ANTI ICE ON	0.0	–2.4

TAT (°C)	PRESSURE ALTITUDE (FT) –1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.
–54.0	71.6	73.5	75.1	75.9	76.9	77.9	78.8	79.6	80.6	82.0	82.0
–50.0	72.3	74.2	75.7	76.5	77.6	78.6	79.5	80.3	81.4	82.7	82.7
–46.0	72.9	74.9	76.4	77.2	78.3	79.3	80.2	81.0	82.1	83.4	83.4
–42.0	73.6	75.5	77.1	77.9	79.0	80.0	80.9	81.7	82.8	84.1	84.1
–38.0	74.2	76.2	77.7	78.6	79.6	80.6	81.6	82.4	83.4	84.8	84.8
–34.0	74.8	76.8	78.4	79.2	80.3	81.3	82.2	83.0	84.1	85.5	85.5
–30.0	75.4	77.4	79.0	79.8	80.9	81.9	82.9	83.7	84.8	86.2	86.2
–26.0	76.0	78.1	79.6	80.5	81.6	82.6	83.5	84.3	85.5	86.8	86.8
–22.0	76.7	78.7	80.3	81.1	82.2	83.2	84.2	85.0	86.1	87.5	87.5
–18.0	77.3	79.3	80.9	81.8	82.9	83.9	84.8	85.7	86.8	88.2	*88.0*
–14.0	77.9	79.9	81.6	82.4	83.5	84.5	85.5	86.3	87.5	*88.4*	*87.7*
–10.0	78.5	80.5	82.2	83.0	84.1	85.2	86.1	87.0	88.1	*88.2*	*87.5*
–6.0	79.1	81.1	82.8	83.6	84.7	85.8	86.8	87.6	*88.4*	*88.1*	*86.9*
–2.0	79.6	81.7	83.4	84.2	85.3	86.4	87.4	88.2	*88.2*	*87.6*	*86.1*
2.0	80.2	82.3	84.0	84.8	86.0	87.0	88.0	*88.2*	*88.1*	*86.9*	*85.5*
6.0	80.8	82.9	84.6	85.4	86.6	87.6	*88.1*	*88.0*	*87.7*	*86.3*	*84.9*
10.0	81.4	83.5	85.2	86.0	87.2	*87.9*	*87.9*	*87.8*	*87.1*	*85.6*	*84.3*
14.0	82.0	84.1	85.8	86.7	87.8	*87.7*	*87.8*	*87.3*	*86.5*	*84.9*	*83.7*
18.0	82.5	84.7	86.3	87.2	*87.5*	*87.4*	*87.3*	*86.7*	*85.8*		
22.0	83.1	85.2	*86.8*	*87.3*	*87.1*	*87.1*	*86.7*	*86.0*	*85.1*		
26.0	83.6	85.8	*86.4*	*87.0*	*86.8*	*86.6*	*86.1*	*85.3*	*84.4*		
30.0	84.2	*85.9*	*86.0*	*86.6*	*86.3*	*85.9*	*85.3*	*84.7*			
34.0	84.7	*85.5*	*85.4*	*85.9*	*85.6*	*85.2*	*84.6*				
38.0	*84.5*	*85.0*	*84.7*	*85.2*	*84.9*	*84.5*					
42.0	*84.0*	*84.3*	*84.0*	*84.5*	*84.1*						
46.0	*83.4*	*83.5*	*83.3*	*83.8*	*83.4*						
50.0	*82.6*	*82.8*	*82.5*	*83.1*							
54.0	*81.8*	*82.1*									

OAT < ISA + 10

OAT ≥ ISA + 10

INTENTIONALLY LEFT BLANK

MAXIMUM CRUISE

R

CFM56-5B5/B6	N1 CORRECTIONS FOR AIR BLEED	OAT < ISA+10	OAT ≥ ISA+10
MAXIMUM CRUISE N1 AIR CONDITIONING ON 250/300/.78	AIR CONDITIONING OFF	0.8	0.8
	ENGINE ANTI ICE ON	0.0	–0.8
	ENGINE ANTI ICE AND WING ANTI ICE ON	0.0	–1.4

TAT (°C)	PRESSURE ALTITUDE (FT)										
	–1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.
–54.0	71.5	73.5	75.1	75.9	76.9	77.9	78.8	79.6	80.6	82.0	82.0
–50.0	72.2	74.2	75.7	76.5	77.6	78.6	79.5	80.3	81.4	82.7	82.7
–46.0	72.8	74.8	76.4	77.2	78.3	79.3	80.2	81.0	82.1	83.4	83.4
–42.0	73.5	75.5	77.1	77.9	79.0	80.0	80.9	81.7	82.8	84.1	84.1
–38.0	74.1	76.1	77.7	78.6	79.6	80.6	81.6	82.4	83.4	84.8	84.8
–34.0	74.7	76.8	78.4	79.2	80.3	81.3	82.2	83.0	84.1	85.5	85.5
–30.0	75.3	77.4	79.0	79.8	80.9	81.9	82.9	83.7	84.8	86.2	86.2
–26.0	75.9	78.0	79.6	80.5	81.6	82.6	83.5	84.3	85.5	86.8	86.8
–22.0	76.5	78.6	80.3	81.1	82.2	83.2	84.2	85.0	86.1	87.5	87.5
–18.0	77.2	79.3	80.9	81.8	82.9	83.9	84.8	85.7	86.8	88.2	*88.0*
–14.0	77.8	79.9	81.6	82.4	83.5	84.5	85.5	86.3	87.5	*88.4*	*87.7*
–10.0	78.4	80.5	82.2	83.0	84.1	85.2	86.1	87.0	88.1	*88.2*	*87.5*
–6.0	78.9	81.1	82.8	83.6	84.7	85.8	86.8	87.6	*88.4*	*88.1*	*86.9*
–2.0	79.5	81.7	83.4	84.2	85.3	86.4	87.4	88.2	*88.2*	*87.6*	*86.1*
2.0	80.1	82.3	84.0	84.8	86.0	87.0	88.0	*88.2*	*88.1*	*86.9*	*85.5*
6.0	80.7	82.9	84.6	85.4	86.6	87.6	*88.1*	*88.0*	*87.7*	*86.3*	*84.9*
10.0	81.3	83.5	85.2	86.0	87.2	*87.9*	*87.9*	*87.8*	*87.1*	*85.6*	*84.3*
14.0	81.8	84.0	85.8	86.7	87.8	*87.7*	*87.8*	*87.3*	*86.5*	*84.9*	*83.7*
18.0	82.4	84.6	86.3	87.2	*87.5*	*87.4*	*87.3*	*86.7*	*85.8*		
22.0	83.0	85.2	*86.8*	*87.3*	*87.1*	*87.1*	*86.7*	*86.0*	*85.1*		
26.0	83.5	85.7	*86.4*	*87.0*	*86.8*	*86.6*	*86.1*	*85.3*	*84.4*		
30.0	84.1	*85.9*	*86.0*	*86.6*	*86.3*	*85.9*	*85.3*	*84.7*			
34.0	84.6	*85.4*	*85.4*	*85.9*	*85.6*	*85.2*	*84.6*				
38.0	*84.5*	*84.9*	*84.7*	*85.2*	*84.9*	*84.5*					
42.0	*84.0*	*84.2*	*84.0*	*84.5*	*84.1*						
46.0	*83.4*	*83.5*	*83.3*	*83.8*	*83.4*						
50.0	*82.6*	*82.8*	*82.5*	*83.1*							
54.0	*81.8*	*82.0*									

OAT < ISA + 10

OAT ≥ ISA + 10

INTENTIONALLY LEFT BLANK

GENERAL

Climb tables are established at MAX CLIMB THRUST with air conditioning in normal mode and anti ice OFF.
The climb speed profile is :
- 250 kt from 1500 feet up to FL100
- acceleration from 250 kt to 300 kt
- climb at 300 kt then M.78 up to selected altitude.

All charts are established with a center of gravity corresponding to 33%.

R

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA	**FROM BRAKE RELEASE**
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN) FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM) TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG)								
	58	**60**	**62**	**64**	**66**	**68**	**70**	**72**	**74**
390	19 1544	20 1623	21 1707	22 1798	24 1898	25 2010	27 2137		
	123 389	130 390	138 391	146 392	156 393	167 395	181 397		
370	17 1442	18 1511	19 1584	20 1660	21 1740	22 1826	23 1918	24 2018	26 2128
	108 382	114 383	120 383	126 384	133 385	140 386	149 387	158 388	168 390
350	15 1359	16 1422	17 1487	18 1555	19 1626	20 1701	21 1780	22 1864	23 1954
	97 376	102 376	107 377	112 378	118 378	124 379	130 380	137 381	145 382
330	14 1284	15 1342	16 1401	16 1463	17 1527	18 1595	19 1666	20 1740	20 1819
	88 369	92 369	96 370	101 371	105 371	111 372	116 373	122 374	128 374
310	13 1210	14 1263	14 1317	15 1374	16 1433	16 1494	17 1558	18 1625	19 1695
	79 361	82 362	86 362	90 363	94 363	98 364	103 364	108 365	113 366
290	12 1130	12 1179	13 1228	13 1280	14 1333	15 1389	15 1446	16 1506	17 1569
	69 351	73 352	76 352	79 353	83 353	86 353	90 354	94 355	98 355
270	11 1035	11 1079	11 1124	12 1170	12 1217	13 1267	13 1318	14 1370	15 1425
	59 338	62 339	65 339	67 339	70 340	73 340	76 341	80 341	83 342
250	9 950	10 989	10 1030	11 1071	11 1114	11 1158	12 1204	12 1251	13 1300
	51 326	53 326	55 327	58 327	60 327	63 328	65 328	68 329	71 329
240	9 909	9 947	10 985	10 1025	10 1066	11 1108	11 1151	12 1196	12 1242
	47 320	49 320	51 321	53 321	56 321	58 322	60 322	63 322	65 323
220	8 833	8 867	9 902	9 937	9 974	10 1012	10 1051	10 1092	11 1133
	40 308	42 308	44 309	46 309	48 309	50 310	52 310	54 310	56 311
200	7 761	7 791	8 823	8 855	8 889	9 923	9 958	9 995	10 1032
	35 296	36 296	38 297	39 297	41 297	42 297	44 298	46 298	47 298
180	6 692	6 720	7 749	7 778	7 808	8 839	8 871	8 904	8 937
	29 284	31 284	32 284	33 285	35 285	36 285	37 285	39 286	40 286
160	6 627	6 652	6 678	6 704	6 731	7 759	7 788	7 817	7 847
	25 271	26 271	27 272	28 272	29 272	30 272	32 273	33 273	34 273
140	5 564	5 587	5 610	5 634	6 658	6 683	6 709	6 735	7 762
	21 257	22 258	23 258	23 258	24 259	25 259	26 259	27 260	28 260
120	4 504	4 524	5 545	5 566	5 587	5 610	5 632	6 656	6 680
	17 243	18 243	19 243	19 244	20 244	21 244	22 245	23 245	23 246
100	3 406	3 422	4 438	4 455	4 472	4 490	4 508	4 527	4 546
	12 215	12 216	13 216	13 216	14 217	14 217	15 218	16 218	16 219
50	2 270	2 280	2 291	2 302	2 313	2 324	3 336	3 348	3 360
	6 178	6 178	7 179	7 179	7 179	7 180	8 181	8 181	8 182
15	1 176	1 182	1 189	1 196	1 203	1 210	2 217	2 225	2 232
	3 126	3 126	3 126	3 127	3 127	3 128	3 129	3 130	4 130

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
ΔFUEL = – 0.3 %	ΔFUEL = + 3.5 %	ΔFUEL = + 6 %

11.0-08F0A321-211 CFM56-5B3/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 0 FCOM-N0-03-05-10-002-165

GENERAL

Climb tables are established at MAX CLIMB THRUST with air conditioning in normal mode and anti ice OFF.
The climb speed profile is :
– 250 kt from 1500 feet up to FL100
– acceleration from 250 kt to 300 kt
– climb at 300 kt then M.78 up to selected altitude.
All charts are established with a center of gravity corresponding to 33%.

R

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA	FROM BRAKE RELEASE	
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)**	**FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)**	**TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG)													
	52		**54**		**56**		**58**		**60**		**62**		**64**	
390	18	1326	19	1400	21	1478	22	1563	23	1657	25	1763	27	1884
	118	387	126	388	134	389	143	390	153	392	165	393	179	396
370	16	1240	17	1304	18	1371	19	1442	20	1517	21	1598	23	1685
	104	380	110	381	116	381	122	382	129	383	137	384	146	385
350	15	1168	16	1226	16	1287	17	1351	18	1417	19	1487	20	1560
	93	373	98	374	103	375	108	375	114	376	120	377	127	377
330	14	1102	14	1156	15	1212	16	1270	17	1331	17	1394	18	1459
	84	366	88	367	92	367	97	368	102	368	107	369	112	370
310	13	1038	13	1088	14	1140	14	1193	15	1249	16	1306	17	1366
	75	358	79	359	83	359	87	360	91	360	95	361	100	361
290	11	970	12	1016	13	1063	13	1112	14	1163	14	1215	15	1270
	66	348	70	349	73	349	77	350	80	350	84	351	88	351
270	10	887	11	928	11	971	12	1015	12	1060	13	1107	13	1155
	57	335	59	336	62	336	65	336	68	337	71	337	74	337
250	9	811	9	849	10	887	10	927	11	968	11	1010	12	1053
	48	322	51	323	53	323	56	323	58	324	61	324	63	324
240	9	776	9	811	9	848	10	886	10	925	11	965	11	1006
	45	316	47	316	49	317	51	317	54	317	56	318	58	318
220	8	709	8	741	8	774	9	808	9	843	9	879	10	916
	38	303	40	304	42	304	44	304	46	305	48	305	50	305
200	7	645	7	674	7	704	8	735	8	767	8	799	9	833
	33	291	34	291	36	291	37	292	39	292	41	292	42	292
180	6	585	6	611	7	638	7	666	7	695	7	724	8	754
	28	278	29	278	30	278	32	279	33	279	34	279	36	279
160	5	528	6	551	6	576	6	601	6	626	7	653	7	679
	23	264	24	264	25	265	27	265	28	265	29	265	30	266
140	5	473	5	494	5	516	5	538	6	561	6	585	6	609
	19	250	20	250	21	251	22	251	23	251	24	251	25	251
120	4	421	4	440	4	459	5	479	5	499	5	520	5	542
	16	234	17	235	17	235	18	236	19	236	20	236	21	236
100	3	336	3	351	3	367	4	383	4	399	4	416	4	433
	11	207	12	207	12	208	13	208	13	208	14	208	14	209
50	2	220	2	229	2	239	2	250	2	260	3	271	3	282
	6	169	6	169	6	169	7	170	7	170	7	170	8	171
15	1	138	1	144	1	150	2	156	2	163	2	170	2	177
	3	120	3	120	3	120	3	120	3	121	3	121	3	121

LOW AIR CONDITIONING	**HIGH AIR CONDITIONING**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
ΔFUEL = – 0.6 %	ΔFUEL = + 0.6 %	ΔFUEL = + 2.5 %	ΔFUEL = + 5 %

11.0-08F0A320-214 CFM56-5B4/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 0 FCOM-N0-03-05-10-002-170

GENERAL

Climb tables are established at MAX CLIMB THRUST with air conditioning in normal mode and anti ice OFF.

The climb speed profile is :

- 250 kt from 1500 feet up to FL100
- acceleration from 250 kt to 300 kt
- climb at 300 kt then M.78 up to selected altitude.

All charts are established with a center of gravity corresponding to 33%.

R

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA	FROM BRAKE RELEASE
NORMAL AIR CONDITIONING	CG=33.0%	TIME (MIN) FUEL (KG)
ANTI-ICING OFF		DISTANCE (NM) TAS (KT)

FL	WEIGHT AT BRAKE RELEASE (1000KG) 52		54		56		58		60		62		64	
390	18	1298	19	1368	20	1444	21	1526	23	1615	24	1716	26	1830
	115	386	122	386	129	388	138	389	148	390	159	392	172	394
370	16	1215	17	1277	18	1343	19	1411	20	1484	21	1561	22	1644
	101	378	106	379	112	380	119	381	125	382	133	383	141	384
350	15	1146	15	1203	16	1262	17	1324	18	1388	19	1455	20	1526
	90	372	95	372	100	373	105	374	111	374	117	375	123	376
330	13	1083	14	1136	15	1190	15	1247	16	1305	17	1367	18	1430
	81	365	86	365	90	366	94	366	99	367	104	368	109	368
310	12	1022	13	1070	14	1121	14	1173	15	1227	16	1283	16	1341
	73	357	77	357	81	358	85	358	89	359	93	359	97	360
290	11	956	12	1001	12	1048	13	1096	13	1145	14	1196	15	1249
	65	347	68	347	72	348	75	348	78	349	82	349	86	350
270	10	876	10	917	11	959	11	1002	12	1047	12	1092	13	1139
	56	334	58	334	61	335	64	335	67	336	70	336	73	336
250	9	803	9	840	10	878	10	917	11	957	11	998	12	1041
	48	321	50	322	52	322	55	322	57	323	60	323	62	323
240	8	769	9	804	9	840	10	877	10	915	10	954	11	995
	44	315	46	315	48	316	51	316	53	316	55	317	58	317
220	8	704	8	735	8	768	9	802	9	836	9	872	10	908
	38	303	40	303	42	303	43	304	45	304	47	304	49	304
200	7	642	7	671	7	700	8	731	8	762	8	794	9	826
	32	290	34	290	35	291	37	291	39	291	40	291	42	292
180	6	583	6	609	6	636	7	663	7	691	7	720	8	750
	28	277	29	277	30	278	31	278	33	278	34	278	36	279
160	5	527	6	550	6	574	6	599	6	624	7	650	7	677
	23	264	24	264	25	264	26	265	28	265	29	265	30	265
140	5	473	5	494	5	516	5	538	6	560	6	584	6	607
	19	250	20	250	21	250	22	251	23	251	24	251	25	251
120	4	421	4	440	4	459	5	479	5	499	5	520	5	541
	16	234	17	235	17	235	18	235	19	236	20	236	21	236
100	3	337	3	352	4	367	4	383	4	399	4	416	4	433
	11	207	12	207	12	208	13	208	13	208	14	208	14	209
50	2	220	2	230	2	239	2	250	2	260	3	271	3	282
	6	169	6	169	6	170	7	170	7	170	7	170	8	171
15	1	138	1	144	1	150	2	156	2	163	2	170	2	177
	3	120	3	120	3	120	3	120	3	121	3	121	3	121

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.4 %	△FUEL = + 0.4 %	△FUEL = + 1.5 %	△FUEL = + 2.5 %

11.0-08F0A319-112 CFM56-5B6/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 0 FCOM-N0-03-05-10-002-180

R

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**FROM BRAKE RELEASE** **TIME (MIN) FUEL (KG)** **DISTANCE (NM) TAS (KT)**

	WEIGHT AT BRAKE RELEASE (1000KG)								
FL	**76**	**78**	**80**	**82**	**84**	**86**	**88**	**90**	**92**
390									
370	28 2252 180 392	29 2392 193 394							
350	24 2051 153 383	25 2155 162 384	27 2269 172 386	28 2396 183 388	30 2540 197 389	33 2707 213 392			
330	21 1903 134 375	23 1991 141 376	24 2086 149 377	25 2189 157 379	26 2299 167 380	28 2420 177 382	30 2555 189 383	31 2708 202 385	34 2885 218 388
310	19 1769 118 367	20 1846 124 367	21 1929 130 368	22 2017 137 369	23 2110 144 370	24 2210 152 372	26 2318 160 373	27 2436 170 374	29 2566 180 376
290	17 1634 103 356	18 1702 107 356	19 1774 112 357	20 1850 118 358	21 1930 123 359	22 2014 129 359	23 2105 136 360	24 2202 143 362	25 2306 150 363
270	15 1483 87 342	16 1542 90 343	16 1605 94 343	17 1670 98 344	18 1738 103 344	19 1810 107 345	19 1885 112 346	20 1966 117 347	21 2051 123 347
250	13 1351 74 329	14 1404 77 330	15 1459 80 330	15 1517 83 331	16 1577 87 331	16 1639 90 332	17 1705 94 332	18 1774 98 333	18 1847 103 334
240	13 1290 68 323	13 1340 71 324	14 1392 74 324	14 1446 77 325	15 1503 80 325	15 1561 83 325	16 1623 87 326	17 1687 90 327	17 1755 94 327
220	11 1176 58 311	12 1221 60 311	12 1267 63 312	13 1316 65 312	13 1366 68 313	14 1418 70 313	14 1472 73 314	15 1528 76 314	15 1588 79 315
200	10 1071 49 299	10 1111 51 299	11 1152 53 300	11 1196 55 300	11 1240 58 300	12 1287 60 301	12 1335 62 301	13 1385 65 302	13 1437 67 302
180	9 972 42 286	9 1008 44 287	9 1045 45 287	10 1084 47 288	10 1124 49 288	11 1165 51 288	11 1208 53 289	11 1252 55 289	12 1299 57 290
160	8 879 35 274	8 911 37 274	8 944 38 275	9 979 40 275	9 1014 41 275	9 1051 43 276	10 1090 44 276	10 1129 46 277	10 1170 48 277
140	7 790 30 260	7 818 31 261	7 848 32 261	8 879 33 262	8 911 34 262	8 944 36 263	8 978 37 263	9 1013 38 263	9 1050 40 264
120	6 704 24 246	6 730 25 246	6 756 26 247	7 784 27 247	7 812 28 248	7 841 29 248	7 872 31 249	8 903 32 249	8 935 33 250
100	5 566 17 219	5 586 17 220	5 607 18 220	5 629 19 221	5 652 20 221	5 675 20 222	6 699 21 223	6 724 22 223	6 750 23 224
50	3 373 9 182	3 386 9 183	3 399 9 184	3 413 10 185	3 427 10 185	3 441 10 186	3 456 11 187	4 472 11 188	4 487 12 189
15	2 240 4 131	2 248 4 132	2 256 4 133	2 265 4 134	2 274 4 135	2 282 5 136	2 291 5 137	2 301 5 138	2 310 5 140

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.3 %	△FUEL = + 3.5 %	△FUEL = + 6 %

11.0-08F0A321-211 CFM56-5B3/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 0 FCOM-N0-03-05-10-003-165

R

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+10 CG=33.0%	**FROM BRAKE RELEASE** **TIME (MIN) FUEL (KG)** **DISTANCE (NM) TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG) 58	60	62	64	66	68	70	72	74
390	19 1623	21 1706	22 1795	23 1891	24 1996	26 2114	28 2249		
	129 397	137 398	145 399	154 400	164 402	176 403	190 405		
370	17 1515	18 1588	19 1664	20 1744	21 1830	22 1920	24 2018	25 2123	27 2240
	113 390	119 391	126 392	132 393	140 394	148 395	156 396	166 397	176 398
350	16 1427	17 1493	17 1561	18 1633	19 1708	20 1788	21 1871	22 1960	23 2055
	102 384	107 384	112 385	118 386	124 386	130 387	137 388	144 389	152 390
330	15 1347	15 1408	16 1471	17 1536	18 1604	18 1675	19 1750	20 1828	21 1912
	92 377	96 377	101 378	106 379	111 379	116 380	122 381	128 382	134 382
310	13 1268	14 1324	15 1382	15 1441	16 1504	17 1568	17 1636	18 1706	19 1780
	83 369	86 369	90 370	94 370	99 371	103 372	108 372	113 373	119 374
290	12 1184	13 1235	13 1288	14 1342	14 1398	15 1456	16 1517	16 1580	17 1646
	73 359	76 359	80 359	83 360	87 360	91 361	95 361	99 362	103 363
270	11 1084	11 1129	12 1177	12 1225	13 1275	13 1327	14 1380	14 1436	15 1494
	62 345	65 346	68 346	71 346	74 347	77 347	80 348	83 348	87 349
250	10 993	10 1035	10 1077	11 1121	11 1166	12 1212	12 1260	13 1310	13 1362
	53 333	56 333	58 333	60 334	63 334	65 334	68 335	71 335	74 336
240	9 950	9 990	10 1030	10 1072	11 1115	11 1159	12 1204	12 1251	12 1300
	49 326	51 327	54 327	56 327	58 328	60 328	63 328	66 329	68 329
220	8 870	8 906	9 942	9 980	9 1018	10 1058	10 1099	11 1142	11 1186
	42 314	44 314	46 315	48 315	50 315	52 316	54 316	56 316	58 317
200	7 794	7 826	8 860	8 894	8 929	9 965	9 1002	9 1040	10 1079
	36 302	38 302	39 302	41 303	42 303	44 303	46 304	48 304	50 304
180	6 722	7 752	7 782	7 812	7 844	8 876	8 910	8 944	9 979
	31 289	32 289	33 290	35 290	36 290	37 291	39 291	40 291	42 292
160	6 654	6 680	6 707	6 735	7 763	7 793	7 823	7 854	8 885
	26 276	27 276	28 277	29 277	30 277	32 278	33 278	34 278	35 279
140	5 588	5 612	5 636	6 661	6 687	6 713	6 740	6 767	7 796
	22 262	23 263	24 263	24 263	25 264	26 264	27 264	29 265	30 265
120	4 525	5 546	5 568	5 590	5 613	5 636	5 660	6 684	6 710
	18 247	19 248	19 248	20 248	21 249	22 249	23 249	24 250	24 250
100	3 422	3 439	4 456	4 474	4 492	4 511	4 530	4 550	5 570
	12 219	13 220	13 220	14 220	14 221	15 221	16 222	16 222	17 223
50	2 281	2 292	2 303	2 314	2 326	2 338	3 350	3 363	3 376
	6 181	6 182	7 182	7 182	7 183	8 183	8 184	8 185	9 185
15	1 182	1 189	1 196	1 203	1 211	2 218	2 226	2 234	2 242
	3 128	3 128	3 129	3 129	3 130	3 130	3 131	4 132	4 133

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
ΔFUEL = – 0.3 %	ΔFUEL = + 3.5 %	ΔFUEL = + 6 %

11.0-08F0A321-211 CFM56-5B3/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 10 FCOM-N0-03-05-10-004-165

R

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA	FROM BRAKE RELEASE	
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)**	**FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)**	**TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG) 66		68		70		72		74		76		78	
390														
370	24	1779	26	1884	27	2003								
	155	387	166	388	179	391								
350	21	1638	22	1721	24	1811	25	1910	27	2019	28	2142	30	2282
	134	378	141	380	150	381	159	383	170	384	183	387	197	389
330	19	1528	20	1600	21	1677	22	1759	23	1847	25	1942	26	2045
	118	371	124	371	131	373	138	374	146	375	154	377	164	378
310	17	1428	18	1492	19	1560	20	1632	21	1708	22	1788	23	1874
	105	362	110	363	115	364	121	365	127	366	134	367	141	368
290	16	1326	16	1384	17	1445	18	1509	19	1576	20	1646	20	1720
	92	352	96	352	101	353	106	354	111	355	116	356	122	357
270	14	1205	14	1256	15	1310	16	1365	16	1423	17	1484	18	1547
	78	338	81	339	85	339	89	340	93	341	97	342	101	343
250	12	1098	13	1143	13	1191	14	1240	14	1291	15	1344	16	1399
	66	325	69	325	72	326	75	327	78	327	82	328	85	329
240	11	1048	12	1091	12	1136	13	1182	13	1230	14	1280	15	1331
	61	318	64	319	66	319	69	320	72	321	75	322	78	322
220	10	954	11	993	11	1033	11	1074	12	1117	12	1161	13	1207
	52	306	54	306	56	307	59	307	61	308	64	309	66	309
200	9	866	9	901	10	937	10	974	11	1012	11	1052	11	1092
	44	293	46	293	48	294	50	294	52	295	54	296	56	296
180	8	784	8	816	9	848	9	881	9	915	10	950	10	986
	37	280	39	280	40	281	42	281	44	282	45	283	47	283
160	7	707	7	735	8	764	8	793	8	823	8	855	9	887
	31	266	33	267	34	267	35	268	37	268	38	269	40	270
140	6	633	6	658	7	684	7	710	7	737	7	765	8	794
	26	252	27	252	28	253	29	254	31	254	32	255	33	256
120	5	563	6	586	6	608	6	632	6	656	7	680	7	705
	22	237	22	237	23	238	24	239	25	239	26	240	27	241
100	4	450	4	468	5	486	5	505	5	524	5	544	5	564
	15	209	16	210	16	211	17	211	17	212	18	213	19	214
50	3	293	3	304	3	316	3	328	3	340	3	352	3	364
	8	171	8	172	8	173	9	174	9	174	9	176	10	177
15	2	184	2	191	2	198	2	205	2	212	2	219	2	227
	4	122	4	122	4	123	4	124	4	125	4	126	4	127

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 0.6 %	△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A320-214 CFM56-5B4/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 0 FCOM-N0-03-05-10-003-170

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CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+10	**FROM BRAKE RELEASE**	
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)**	**FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)**	**TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG)													
	52		**54**		**56**		**58**		**60**		**62**		**64**	
390	19	1392	20	1470	21	1552	23	1642	24	1742	26	1853		
	124	396	132	397	141	398	150	400	161	401	173	403		
370	17	1301	18	1369	19	1440	20	1514	21	1594	22	1679	23	1770
	109	389	115	390	122	391	129	392	136	392	144	393	153	395
350	15	1225	16	1287	17	1351	18	1418	19	1487	20	1561	21	1639
	98	382	103	383	108	384	114	384	120	385	126	386	133	387
330	14	1156	15	1213	15	1272	16	1333	17	1396	18	1462	19	1532
	88	375	92	376	97	376	102	377	107	378	113	378	118	379
310	13	1088	14	1140	14	1195	15	1251	16	1309	16	1370	17	1433
	79	367	83	368	87	368	91	369	96	369	100	370	105	370
290	12	1015	12	1063	13	1113	13	1165	14	1218	15	1273	15	1330
	70	357	73	357	77	358	80	358	84	359	88	359	92	360
270	10	927	11	971	11	1016	12	1062	12	1109	13	1158	14	1209
	59	343	62	344	65	344	68	345	71	345	75	345	78	346
250	9	847	10	887	10	927	11	969	11	1012	11	1056	12	1101
	51	330	53	331	56	331	58	332	61	332	64	332	66	332
240	9	810	9	847	10	886	10	925	10	966	11	1008	11	1051
	47	324	49	324	51	325	54	325	56	325	59	326	61	326
220	8	739	8	773	8	808	9	844	9	880	10	918	10	957
	40	311	42	312	44	312	46	312	48	313	50	313	52	313
200	7	673	7	703	8	735	8	767	8	800	9	834	9	869
	34	298	36	299	37	299	39	299	41	300	43	300	44	300
180	6	609	6	637	7	665	7	694	7	724	8	755	8	786
	29	285	30	285	32	286	33	286	34	286	36	287	37	287
160	5	549	6	574	6	600	6	626	6	652	7	680	7	708
	24	271	25	272	27	272	28	272	29	273	30	273	31	273
140	5	492	5	514	5	537	5	560	6	584	6	609	6	634
	20	257	21	257	22	258	23	258	24	258	25	259	26	259
120	4	437	4	457	5	477	5	498	5	519	5	541	5	564
	17	242	18	242	18	243	19	243	20	243	21	243	22	244
100	3	349	3	365	4	381	4	398	4	415	4	432	4	450
	12	214	12	214	13	215	13	215	14	216	14	216	15	216
50	2	227	2	237	2	248	2	259	2	270	3	281	3	293
	6	176	6	177	7	177	7	178	7	178	8	178	8	179
15	1	142	1	148	1	155	2	161	2	168	2	175	2	183
	3	128	3	128	3	129	3	129	3	130	4	130	4	130

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 0.6 %	△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A320-214 CFM56-5B4/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 10 FCOM-N0-03-05-10-004-170

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CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA	**FROM BRAKE RELEASE**
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)** **FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)** **TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG) 66	68	70	72	74	76	78
390							
370	23 1734	25 1834	27 1946	29 2075			
	150 385	160 387	172 389	186 391			
350	21 1601	22 1681	23 1767	24 1861	26 1964	27 2080	29 2211
	130 377	137 378	145 379	154 381	164 383	175 385	189 387
330	19 1496	20 1566	21 1639	22 1718	23 1802	24 1893	25 1991
	115 369	121 370	127 371	134 372	141 373	149 375	158 376
310	17 1401	18 1464	19 1529	19 1598	20 1672	21 1749	22 1831
	102 360	107 361	112 362	118 363	123 364	130 365	137 366
290	15 1304	16 1360	17 1419	18 1481	18 1546	19 1615	20 1686
	90 350	94 351	98 352	103 352	108 353	113 354	118 355
270	14 1188	14 1238	15 1290	15 1345	16 1401	17 1460	17 1522
	76 337	80 337	83 338	87 339	91 340	95 340	99 341
250	12 1084	13 1129	13 1176	14 1224	14 1274	15 1326	15 1380
	65 324	68 324	71 325	74 326	77 326	80 327	84 328
240	11 1036	12 1079	12 1122	13 1168	13 1215	14 1264	14 1315
	60 317	63 318	65 318	68 319	71 320	74 321	77 321
220	10 945	10 983	11 1023	11 1063	12 1105	12 1149	13 1194
	51 305	53 305	56 306	58 306	60 307	63 308	65 309
200	9 860	9 894	10 930	10 966	10 1004	11 1043	11 1083
	44 292	45 293	47 293	49 294	51 294	53 295	55 296
180	8 780	8 811	9 842	9 875	9 909	10 944	10 980
	37 279	38 280	40 280	42 281	43 281	45 282	47 283
160	7 704	7 732	8 760	8 789	8 819	8 851	9 883
	31 266	32 266	34 267	35 267	36 268	38 269	39 269
140	6 632	6 657	7 682	7 708	7 735	7 763	8 791
	26 252	27 252	28 253	29 253	30 254	32 255	33 255
120	5 562	6 585	6 607	6 630	6 654	7 679	7 704
	21 237	22 237	23 238	24 238	25 239	26 240	27 241
100	4 450	4 468	5 486	5 505	5 524	5 543	5 563
	15 209	16 210	16 211	17 211	17 212	18 213	19 214
50	3 293	3 304	3 316	3 328	3 339	3 352	3 364
	8 171	8 172	8 173	9 174	9 175	9 176	10 177
15	2 184	2 191	2 198	2 205	2 212	2 219	2 227
	4 122	4 122	4 123	4 124	4 125	4 126	4 127

LOW AIR CONDITIONING	**HIGH AIR CONDITIONING**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
ΔFUEL = – 0.4 %	ΔFUEL = + 0.4 %	ΔFUEL = + 1.5 %	ΔFUEL = + 2.5 %

11.0-08F0A319-112 CFM56-5B6/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 0 FCOM-N0-03-05-10-003-180

R

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+10 CG=33.0%	FROM BRAKE RELEASE TIME (MIN) FUEL (KG) DISTANCE (NM) TAS (KT)

FL	WEIGHT AT BRAKE RELEASE (1000KG)													
	52		54		56		58		60		62		64	
390	18	1362	19	1437	21	1516	22	1602	23	1697	25	1803	27	1924
	121	395	128	396	136	397	145	398	155	400	167	401	181	403
370	16	1275	17	1341	18	1409	19	1481	20	1558	21	1639	23	1727
	106	388	112	388	118	389	125	390	132	391	140	392	148	393
350	15	1202	16	1262	17	1324	17	1389	18	1457	19	1527	20	1602
	95	381	100	381	105	382	111	383	117	383	123	384	129	385
330	14	1135	14	1191	15	1248	16	1307	17	1369	17	1433	18	1501
	86	374	90	374	95	375	99	375	104	376	110	377	115	377
310	13	1070	13	1121	14	1174	15	1229	15	1286	16	1345	17	1406
	77	365	81	366	85	367	89	367	93	368	98	368	102	369
290	12	1000	12	1048	13	1097	13	1147	14	1199	14	1253	15	1308
	68	355	72	356	75	356	79	357	82	357	86	358	90	358
270	10	916	11	959	11	1003	12	1048	12	1095	13	1143	13	1192
	58	342	61	343	64	343	67	343	70	344	73	344	77	345
250	9	839	10	878	10	917	10	958	11	1000	11	1044	12	1088
	50	329	52	330	55	330	57	330	60	331	63	331	65	331
240	9	803	9	839	9	877	10	916	10	956	11	997	11	1039
	46	323	48	323	51	324	53	324	55	324	58	325	60	325
220	8	734	8	767	8	802	9	837	9	873	10	910	10	948
	40	310	42	311	43	311	45	311	47	312	49	312	52	312
200	7	669	7	699	7	730	8	762	8	795	8	828	9	862
	34	298	35	298	37	298	39	299	40	299	42	299	44	299
180	6	607	6	634	7	662	7	691	7	721	7	751	8	782
	29	284	30	285	31	285	33	286	34	286	36	286	37	286
160	5	548	6	573	6	598	6	624	6	650	7	677	7	705
	24	271	25	271	27	272	28	272	29	272	30	272	31	273
140	5	492	5	514	5	537	5	560	6	583	6	608	6	633
	20	257	21	257	22	258	23	258	24	258	25	258	26	259
120	4	438	4	457	5	477	5	498	5	519	5	541	5	563
	17	242	18	242	18	242	19	243	20	243	21	243	22	243
100	3	350	3	365	4	381	4	398	4	415	4	432	4	450
	12	214	12	214	13	215	13	215	14	216	14	216	15	216
50	2	228	2	238	2	248	2	259	2	270	3	281	3	293
	6	177	6	177	7	178	7	178	7	178	8	179	8	179
15	1	142	1	148	1	155	2	161	2	168	2	175	2	183
	3	128	3	128	3	129	3	129	3	130	4	130	4	130

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
ΔFUEL = – 0.4 %	ΔFUEL = + 0.4 %	ΔFUEL = + 1.5 %	ΔFUEL = + 2.5 %

11.0-08F0A319-112 CFM56-5B6/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 10 FCOM-N0-03-05-10-004-180

R

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+10 CG=33.0%	**FROM BRAKE RELEASE** **TIME (MIN)** **FUEL (KG)** **DISTANCE (NM)** **TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG)								
	76	**78**	**80**	**82**	**84**	**86**	**88**	**90**	**92**
390									
370	28 2370 189 400								
350	25 2157 161 392	26 2267 170 393	28 2388 181 394	29 2522 193 396	31 2674 207 398	34 2851 224 400			
330	22 2000 141 383	23 2094 149 385	24 2194 157 386	26 2303 166 387	27 2420 175 388	29 2548 186 390	30 2692 199 392	32 2854 213 394	35 3042 230 396
310	20 1858 124 374	21 1940 130 375	22 2027 137 376	23 2120 144 377	24 2219 151 378	25 2325 160 380	27 2440 169 381	28 2565 179 382	30 2702 190 384
290	18 1715 108 363	19 1787 113 364	19 1863 118 365	20 1943 123 365	21 2027 129 366	22 2116 136 367	23 2212 142 368	24 2314 150 369	26 2425 158 370
270	16 1554 91 349	16 1617 95 350	17 1683 99 350	18 1751 103 351	18 1823 107 352	19 1899 112 352	20 1978 117 353	21 2063 123 354	22 2153 129 355
250	14 1415 77 336	14 1471 80 337	15 1529 84 337	15 1589 87 338	16 1652 91 338	17 1718 95 339	17 1787 99 339	18 1860 103 340	19 1937 108 341
240	13 1351 71 330	13 1403 74 330	14 1458 77 331	15 1515 80 331	15 1574 83 332	16 1636 87 332	16 1700 91 333	17 1768 94 333	18 1839 98 334
220	11 1231 60 317	12 1278 63 318	12 1326 65 318	13 1377 68 318	13 1430 71 319	14 1484 74 319	14 1541 77 320	15 1601 80 320	16 1663 83 321
200	10 1120 51 305	11 1162 54 305	11 1205 56 305	11 1251 58 306	12 1298 60 306	12 1347 62 307	13 1397 65 307	13 1450 67 308	14 1505 70 308
180	9 1016 44 292	9 1054 45 292	10 1093 47 293	10 1133 49 293	10 1175 51 294	11 1219 53 294	11 1264 55 294	12 1311 57 295	12 1359 59 295
160	8 918 37 279	8 952 38 279	9 987 40 280	9 1023 41 280	9 1061 43 281	10 1099 45 281	10 1140 46 282	10 1181 48 282	11 1225 50 282
140	7 825 31 265	7 855 32 266	7 886 33 266	8 919 34 267	8 952 36 267	8 987 37 268	9 1023 39 268	9 1060 40 269	9 1098 42 269
120	6 735 25 251	6 762 26 251	7 790 27 252	7 819 28 252	7 849 30 253	7 880 31 253	8 911 32 254	8 944 33 254	8 979 34 255
100	5 590 17 223	5 612 18 224	5 634 19 224	5 657 20 225	5 681 20 226	6 706 21 226	6 731 22 227	6 758 23 228	6 785 24 228
50	3 389 9 186	3 403 9 187	3 417 10 187	3 431 10 188	3 446 10 189	3 461 11 190	4 477 11 191	4 493 12 192	4 510 12 193
15	2 251 4 134	2 259 4 135	2 268 4 136	2 277 4 137	2 286 5 138	2 296 5 139	2 305 5 140	2 315 5 141	2 325 5 143

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.3 %	△FUEL = + 3.5 %	△FUEL = + 6 %

11.0-08F0A321-211 CFM56-5B3/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 10 FCOM-N0-03-05-10-005-165

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CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+15	**FROM BRAKE RELEASE**
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)** **FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)** **TAS (KT)**

	WEIGHT AT BRAKE RELEASE (1000KG)								
FL	**58**	**60**	**62**	**64**	**66**	**68**	**70**	**72**	**74**
390	23 1782	24 1881	26 1988	27 2106	29 2238				
	154 406	164 407	175 408	187 409	202 411				
370	20 1656	21 1739	22 1828	24 1923	25 2024	27 2134	28 2254	30 2386	32 2535
	134 398	142 399	150 400	159 401	168 402	179 404	190 405	204 407	219 408
350	18 1556	19 1631	20 1710	21 1793	22 1881	24 1975	25 2076	26 2183	28 2300
	120 392	127 393	133 393	140 394	148 395	156 396	165 397	175 399	186 400
330	17 1465	18 1534	19 1605	19 1680	20 1759	21 1843	23 1931	24 2025	25 2125
	108 385	114 386	120 386	126 387	132 388	139 389	146 390	154 391	163 392
310	15 1375	16 1438	17 1504	18 1572	19 1643	19 1718	20 1796	21 1879	22 1967
	97 377	102 378	107 378	112 379	117 380	123 380	129 381	136 382	143 383
290	14 1276	15 1332	15 1391	16 1452	17 1515	17 1582	18 1651	19 1723	20 1799
	85 366	89 367	93 367	97 368	102 368	106 369	111 370	117 370	122 371
270	12 1159	13 1210	13 1261	14 1315	14 1370	15 1428	16 1488	16 1551	17 1616
	71 352	75 353	78 353	82 353	85 354	89 354	93 355	97 355	101 356
250	11 1057	11 1102	12 1149	12 1197	13 1246	13 1297	14 1351	14 1406	15 1463
	61 339	63 339	66 340	69 340	72 341	75 341	78 341	82 342	85 342
240	10 1010	11 1053	11 1097	11 1142	12 1189	12 1237	13 1288	13 1340	14 1394
	56 333	59 333	61 333	64 334	66 334	69 334	72 335	75 335	78 336
220	9 921	9 960	10 999	10 1040	11 1082	11 1126	11 1171	12 1217	12 1266
	48 320	50 320	52 321	54 321	57 321	59 322	61 322	64 323	67 323
200	8 839	8 873	9 909	9 946	9 984	10 1023	10 1063	11 1105	11 1148
	41 308	43 308	44 308	46 309	48 309	50 309	52 310	54 310	56 310
180	7 761	7 792	8 824	8 858	8 892	9 927	9 963	9 1000	10 1039
	35 295	36 295	38 296	39 296	41 296	42 296	44 297	46 297	48 298
160	6 687	6 716	7 744	7 774	7 805	8 836	8 869	8 902	8 936
	29 282	30 282	32 282	33 283	34 283	36 283	37 284	39 284	40 285
140	5 617	6 642	6 668	6 695	6 722	7 750	7 779	7 809	7 839
	24 268	25 268	26 269	27 269	29 269	30 270	31 270	32 270	34 271
120	5 549	5 571	5 594	5 618	6 642	6 667	6 693	6 719	6 746
	20 253	21 253	22 253	23 254	23 254	24 255	25 255	26 255	28 256
100	4 439	4 457	4 475	4 494	4 513	4 533	5 553	5 574	5 596
	14 224	14 225	15 225	15 225	16 226	17 226	17 227	18 227	19 228
50	2 291	2 302	2 314	2 326	3 338	3 351	3 364	3 377	3 391
	7 186	7 186	7 187	8 187	8 188	8 188	9 189	9 190	9 191
15	1 188	1 195	1 202	1 209	2 217	2 225	2 233	2 242	2 250
	3 132	3 132	3 133	3 134	3 134	4 135	4 136	4 137	4 138

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.3 %	△FUEL = + 3.5 %	△FUEL = + 6 %

11.0-08F0A321-211 CFM56-5B3/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 15 FCOM-N0-03-05-10-006-165

R

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+10	**FROM BRAKE RELEASE**
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)** **FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)** **TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG)						
	66	**68**	**70**	**72**	**74**	**76**	**78**
390							
370	25 1870 163 396	26 1981 175 398	28 2106 189 400				
350	22 1721 141 388	23 1809 149 389	24 1904 158 390	26 2008 168 392	27 2124 179 394	29 2254 192 396	31 2403 208 399
330	20 1604 124 380	21 1680 131 381	22 1761 138 382	23 1848 145 383	24 1941 153 384	25 2042 163 386	27 2152 173 388
310	18 1498 110 371	19 1566 116 372	20 1638 121 373	20 1714 127 374	21 1794 134 375	22 1879 141 376	24 1970 149 377
290	16 1389 97 360	17 1451 101 361	18 1515 106 362	18 1582 111 363	19 1653 116 364	20 1728 122 365	21 1806 128 366
270	14 1261 82 346	15 1315 85 347	15 1372 89 348	16 1430 93 348	17 1491 97 349	17 1555 102 350	18 1622 106 351
250	12 1148 69 333	13 1196 72 334	14 1246 75 334	14 1297 79 335	15 1351 82 336	15 1407 86 337	16 1465 89 337
240	12 1095 64 326	12 1140 67 327	13 1188 69 328	13 1236 72 328	14 1287 76 329	14 1339 79 330	15 1394 82 331
220	10 996 54 313	11 1037 57 314	11 1079 59 315	12 1123 61 315	12 1168 64 316	13 1214 67 317	13 1263 69 318
200	9 904 46 301	10 941 48 301	10 979 50 302	10 1018 52 302	11 1058 54 303	11 1099 56 304	12 1142 59 305
180	8 818 39 287	8 851 41 288	9 885 42 288	9 920 44 289	9 955 46 290	10 992 48 291	10 1031 49 291
160	7 737 33 274	7 766 34 274	8 797 36 275	8 828 37 275	8 860 38 276	9 893 40 277	9 927 41 278
140	6 660 27 259	7 686 28 260	7 713 30 261	7 741 31 261	7 769 32 262	8 799 33 263	8 829 35 264
120	6 586 23 244	6 610 23 245	6 634 24 246	6 659 25 246	6 684 26 247	7 710 27 248	7 737 28 249
100	4 468 16 217	5 487 16 218	5 506 17 218	5 526 18 219	5 546 18 220	5 567 19 221	5 588 20 222
50	3 304 8 180	3 316 9 180	3 328 9 182	3 341 9 183	3 354 10 184	3 367 10 185	3 380 10 186
15	2 190 4 131	2 198 4 132	2 205 4 133	2 213 4 134	2 221 4 136	2 229 5 137	2 237 5 139

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 0.6 %	△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A320-214 CFM56-5B4/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 10 FCOM-N0-03-05-10-005-170

R

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+15	**FROM BRAKE RELEASE**
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)** **FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)** **TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG)													
	52		**54**		**56**		**58**		**60**		**62**		**64**	
390	22	1518	23	1607	24	1704	26	1812	28	1933				
	145	404	155	405	165	406	178	408	193	410				
370	19	1412	20	1488	21	1569	23	1654	24	1746	25	1846	27	1956
	126	396	134	397	142	398	150	399	160	400	170	402	182	403
350	17	1326	18	1395	19	1467	20	1543	21	1623	23	1707	24	1797
	113	390	119	390	126	391	133	392	140	393	148	394	157	395
330	16	1248	17	1311	18	1377	18	1446	19	1518	20	1593	21	1673
	101	383	107	383	112	384	118	385	125	385	131	386	138	387
310	15	1170	15	1229	16	1289	17	1352	18	1417	18	1485	19	1557
	90	374	95	375	100	375	105	376	111	377	116	377	122	378
290	13	1087	14	1140	14	1195	15	1252	16	1311	17	1373	17	1437
	80	364	84	364	88	365	92	365	97	366	101	366	106	367
270	12	988	12	1035	13	1084	13	1135	14	1187	15	1241	15	1297
	67	350	71	350	74	351	78	351	81	352	85	352	89	352
250	10	899	11	942	11	986	12	1031	12	1077	13	1126	13	1175
	57	336	60	337	63	337	66	338	69	338	72	338	75	339
240	10	858	10	898	11	940	11	983	11	1027	12	1072	13	1119
	53	330	55	330	58	331	61	331	63	331	66	332	69	332
220	9	780	9	816	9	854	10	892	10	932	11	972	11	1014
	45	317	47	317	49	318	52	318	54	318	56	318	59	319
200	8	707	8	740	8	773	9	808	9	843	9	880	10	917
	38	303	40	304	42	304	44	305	46	305	48	305	50	305
180	7	639	7	668	7	698	8	729	8	761	8	793	9	827
	32	290	34	290	35	291	37	291	38	291	40	291	42	292
160	6	574	6	600	6	627	7	655	7	683	7	712	8	742
	27	276	28	276	29	276	31	277	32	277	33	277	35	278
140	5	513	5	536	6	560	6	585	6	610	6	636	7	663
	22	261	23	261	24	262	25	262	27	262	28	263	29	263
120	4	454	5	475	5	496	5	518	5	541	6	564	6	587
	18	245	19	246	20	246	21	246	22	247	23	247	24	247
100	3	361	4	378	4	395	4	412	4	430	4	448	4	467
	13	216	13	217	14	217	14	218	15	218	16	219	16	219
50	2	234	2	245	2	256	3	267	3	278	3	290	3	302
	7	178	7	179	7	179	8	180	8	180	8	180	9	181
15	1	146	1	152	2	159	2	166	2	173	2	180	2	188
	3	128	3	128	3	128	3	129	4	129	4	130	4	130

LOW AIR CONDITIONING	**HIGH AIR CONDITIONING**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.6 %	△FUEL = + 0.6 %	△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A320-214 CFM56-5B4/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 15 FCOM-N0-03-05-10-006-170

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CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+10	**FROM BRAKE RELEASE**
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)** **FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)** **TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG) 66	68	70	72	74	76	78
390							
370	24 1822 158 394	26 1928 169 396	27 2046 181 398				
350	21 1681 136 386	22 1765 144 387	24 1856 152 389	25 1956 162 390	26 2065 173 392	28 2188 185 394	30 2327 199 397
330	19 1571 121 378	20 1644 127 379	21 1722 133 380	22 1805 141 381	23 1894 148 383	25 1990 157 384	26 2094 166 386
310	17 1469 107 369	18 1535 112 370	19 1605 118 371	20 1678 124 372	21 1755 130 373	22 1837 137 374	23 1924 144 376
290	16 1366 94 359	16 1426 99 360	17 1488 103 360	18 1553 108 361	19 1622 113 362	20 1694 119 363	20 1770 124 364
270	14 1243 80 345	14 1296 84 346	15 1351 87 346	16 1408 91 347	16 1468 95 348	17 1530 100 349	18 1596 104 350
250	12 1134 68 332	13 1181 71 333	13 1230 74 333	14 1281 77 334	14 1333 81 335	15 1388 84 335	16 1445 88 336
240	12 1083 63 325	12 1127 66 326	13 1174 68 327	13 1221 71 327	14 1271 74 328	14 1323 77 329	15 1377 81 330
220	10 987 54 313	11 1027 56 313	11 1069 58 314	12 1111 61 314	12 1156 63 315	12 1202 66 316	13 1250 68 317
200	9 897 46 300	10 934 48 300	10 971 49 301	10 1009 51 302	11 1049 54 302	11 1090 56 303	11 1133 58 304
180	8 813 39 287	8 846 40 287	9 879 42 288	9 913 44 288	9 949 45 289	10 986 47 290	10 1024 49 291
160	7 734 33 273	7 763 34 274	8 793 35 274	8 824 37 275	8 855 38 276	9 888 40 277	9 922 41 277
140	6 658 27 259	7 684 28 260	7 711 29 260	7 738 31 261	7 767 32 262	8 796 33 263	8 826 34 264
120	6 586 23 244	6 609 23 245	6 633 24 245	6 657 25 246	6 682 26 247	7 708 27 248	7 735 28 249
100	4 468 16 217	5 487 16 218	5 506 17 218	5 526 18 219	5 546 18 220	5 567 19 221	5 588 20 222
50	3 304 8 180	3 316 9 181	3 328 9 182	3 341 9 183	3 354 10 184	3 367 10 185	3 380 10 187
15	2 190 4 131	2 198 4 132	2 205 4 133	2 213 4 134	2 221 4 136	2 229 5 137	2 237 5 139

LOW AIR CONDITIONING	**HIGH AIR CONDITIONING**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.4 %	△FUEL = + 0.4 %	△FUEL = + 1.5 %	△FUEL = + 2.5 %

11.0-08F0A319-112 CFM56-5B6/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 10 FCOM-N0-03-05-10-005-180

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CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+15	**FROM BRAKE RELEASE**	
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)**	**FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)**	**TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG)													
	52		**54**		**56**		**58**		**60**		**62**		**64**	
390	21	1479	22	1564	24	1656	25	1758	27	1873				
	140	402	149	403	159	405	171	406	184	408				
370	19	1378	20	1452	21	1529	22	1611	23	1699	25	1794	26	1897
	122	395	129	396	137	396	145	397	154	398	164	400	175	401
350	17	1296	18	1363	19	1433	20	1506	21	1582	22	1663	23	1749
	109	388	115	389	122	389	128	390	135	391	143	392	151	393
330	15	1222	16	1283	17	1347	18	1413	19	1483	20	1555	21	1632
	98	381	103	381	109	382	115	383	121	383	127	384	134	385
310	14	1148	15	1204	16	1263	16	1324	17	1387	18	1453	19	1522
	88	372	92	373	97	374	102	374	107	375	113	375	118	376
290	13	1069	13	1121	14	1174	15	1230	16	1287	16	1347	17	1409
	78	362	81	363	86	363	90	364	94	364	99	365	104	365
270	11	974	12	1020	12	1068	13	1118	14	1169	14	1222	15	1276
	66	348	69	349	73	349	76	350	80	350	83	351	87	351
250	10	889	11	930	11	974	12	1018	12	1064	13	1111	13	1159
	56	335	59	336	62	336	65	336	68	337	71	337	74	338
240	9	849	10	888	10	929	11	971	11	1015	12	1059	12	1105
	52	329	54	329	57	330	60	330	62	330	65	331	68	331
220	8	774	9	809	9	846	10	884	10	923	10	963	11	1004
	44	316	46	316	49	317	51	317	53	317	55	317	58	318
200	7	703	8	735	8	768	9	802	9	837	9	873	10	910
	38	303	39	303	41	303	43	304	45	304	47	304	49	305
180	7	636	7	665	7	695	8	725	8	757	8	789	9	822
	32	289	33	290	35	290	36	290	38	291	40	291	41	291
160	6	573	6	599	6	625	7	653	7	681	7	710	7	739
	27	275	28	276	29	276	30	276	32	277	33	277	35	277
140	5	512	5	536	6	560	6	584	6	609	6	635	7	661
	22	261	23	261	24	262	25	262	26	262	28	262	29	263
120	4	455	5	475	5	496	5	518	5	540	6	563	6	587
	18	245	19	245	20	246	21	246	22	246	23	247	24	247
100	3	362	4	378	4	395	4	412	4	430	4	448	4	467
	13	217	13	217	14	218	14	218	15	218	16	219	16	219
50	2	235	2	245	2	256	3	267	3	279	3	290	3	302
	7	178	7	179	7	179	8	180	8	180	8	181	9	181
15	1	146	1	152	2	159	2	166	2	173	2	180	2	188
	3	128	3	128	3	128	3	129	4	129	4	130	4	130

LOW AIR CONDITIONING	**HIGH AIR CONDITIONING**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
ΔFUEL = − 0.4 %	ΔFUEL = + 0.4 %	ΔFUEL = + 1.5 %	ΔFUEL = + 2.5 %

11.0-08F0A319-112 CFM56-5B6/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 15 FCOM-N0-03-05-10-006-180

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CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+15	**FROM BRAKE RELEASE**
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)** **FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)** **TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG)								
FL	**76**	**78**	**80**	**82**	**84**	**86**	**88**	**90**	**92**
390									
370									
350	30 2428	31 2569	34 2729	36 2913					
	198 401	212 403	227 405	246 407					
330	26 2233	28 2350	29 2478	31 2618	33 2774	36 2951			
	172 393	183 395	194 396	207 398	222 400	239 402			
310	24 2061	25 2161	26 2269	27 2386	29 2513	31 2653	33 2808		
	150 384	159 385	168 386	178 388	189 389	201 391	215 393		
290	21 1880	22 1965	23 2055	24 2151	25 2253	26 2363	28 2483	29 2614	
	128 372	135 373	141 374	149 375	157 376	165 377	175 378	185 380	
270	18 1685	19 1756	19 1832	20 1911	21 1995	22 2084	23 2179	24 2280	26 2390
	106 357	111 357	116 358	121 359	127 359	133 360	140 361	147 362	155 363
250	16 1523	16 1586	17 1651	18 1720	18 1792	19 1868	20 1948	21 2033	22 2123
	89 343	93 343	97 344	101 345	106 345	111 346	116 347	121 347	127 348
240	15 1450	15 1509	16 1570	16 1635	17 1702	18 1772	19 1847	19 1925	20 2008
	82 336	85 337	89 337	93 338	97 338	101 339	106 340	111 340	116 341
220	13 1316	13 1368	14 1422	14 1479	15 1538	16 1599	16 1664	17 1732	18 1803
	69 323	72 324	75 324	78 325	82 325	85 326	89 326	93 327	97 328
200	11 1193	12 1239	12 1287	13 1337	13 1390	14 1444	14 1501	15 1560	15 1623
	59 311	61 311	64 312	66 312	69 313	72 313	75 314	78 314	81 315
180	10 1079	10 1120	11 1163	11 1208	12 1254	12 1302	13 1353	13 1405	14 1460
	50 298	52 298	54 299	56 299	58 300	61 300	63 301	66 301	68 302
160	9 972	9 1009	9 1047	10 1087	10 1128	11 1171	11 1216	11 1262	12 1311
	42 285	43 285	45 286	47 286	49 287	51 287	53 288	55 288	57 289
140	8 871	8 904	8 938	9 973	9 1010	9 1048	10 1088	10 1129	10 1172
	35 271	36 272	38 272	39 273	41 273	42 274	44 274	46 275	48 275
120	7 774	7 803	7 833	7 865	8 897	8 931	8 966	9 1002	9 1040
	29 256	30 257	31 257	32 258	33 258	35 259	36 259	38 260	39 261
100	5 618	5 641	6 665	6 690	6 715	6 742	6 770	7 799	7 829
	19 229	20 229	21 230	22 230	23 231	24 232	25 233	26 233	27 234
50	3 405	3 419	3 434	3 449	4 465	4 482	4 499	4 516	4 534
	10 191	10 192	11 193	11 194	12 195	12 196	12 197	13 198	13 198
15	2 259	2 268	2 277	2 287	2 296	2 306	2 316	2 326	2 337
	4 139	4 140	5 141	5 142	5 144	5 145	5 146	6 147	6 149

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.3 %	△FUEL = + 3.5 %	△FUEL = + 6 %

11.0-08F0A321-211 CFM56-5B3/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 15 FCOM-N0-03-05-10-007-165

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CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+20	FROM BRAKE RELEASE
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)** **FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)** **TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG) 58	60	62	64	66	68	70	72	74
390	28 2029 194 415	30 2156 208 417							
370	24 1865 166 408	26 1968 177 409	28 2079 188 410	29 2200 201 412	31 2332 215 413	33 2478 231 415	36 2644 249 417		
350	22 1745 148 402	23 1837 157 403	25 1933 166 404	26 2037 176 405	28 2149 187 406	29 2270 199 407	31 2403 213 409	33 2550 228 411	36 2715 246 412
330	20 1636 133 395	21 1718 140 396	22 1805 148 397	24 1897 156 398	25 1995 165 399	26 2100 175 400	28 2214 186 401	29 2337 198 403	31 2473 211 404
310	18 1524 118 386	19 1598 124 387	20 1675 130 388	21 1757 137 389	22 1843 145 390	23 1935 153 391	25 2033 161 392	26 2137 171 393	28 2251 181 394
290	16 1399 101 375	17 1464 106 375	18 1531 111 376	19 1602 117 376	20 1676 123 377	20 1755 129 378	21 1837 136 379	23 1924 143 380	24 2018 150 381
270	14 1257 84 359	15 1314 88 360	15 1372 92 360	16 1433 96 361	17 1496 101 361	17 1562 105 362	18 1631 110 363	19 1703 116 363	20 1780 121 364
250	12 1138 71 346	13 1188 74 346	13 1240 77 346	14 1293 81 347	15 1349 84 347	15 1407 88 348	16 1467 92 348	17 1529 96 349	17 1595 101 349
240	12 1085 65 339	12 1132 68 339	13 1181 71 340	13 1231 74 340	14 1283 77 341	14 1337 81 341	15 1394 84 342	15 1453 88 342	16 1514 92 343
220	10 985 55 326	11 1027 58 327	11 1071 60 327	12 1116 63 327	12 1162 66 328	13 1210 68 328	13 1261 71 329	14 1312 74 329	14 1367 78 329
200	9 892 47 313	9 930 49 314	10 969 51 314	10 1009 53 314	11 1051 55 315	11 1094 58 315	11 1138 60 315	12 1184 63 316	12 1232 65 316
180	8 806 39 300	8 840 41 300	9 875 43 301	9 910 45 301	9 947 47 301	10 986 48 302	10 1025 51 302	10 1066 53 303	11 1109 55 303
160	7 725 33 287	7 755 34 287	7 787 36 287	8 819 37 288	8 852 39 288	8 886 41 288	9 921 42 289	9 957 44 289	9 995 46 290
140	6 649 27 272	6 675 29 273	7 703 30 273	7 732 31 273	7 761 32 274	7 791 34 274	8 823 35 275	8 855 37 275	8 888 38 276
120	5 575 22 257	5 599 23 257	6 623 24 258	6 648 25 258	6 674 26 258	6 701 27 259	7 729 29 259	7 757 30 260	7 786 31 260
100	4 457 15 228	4 476 16 228	4 495 16 229	4 515 17 229	5 536 18 230	5 557 19 230	5 578 19 231	5 601 20 231	5 624 21 232
50	2 300 8 189	3 312 8 190	3 325 8 190	3 337 9 191	3 350 9 192	3 364 9 192	3 377 10 193	3 391 10 194	3 406 11 194
15	1 193 3 135	1 200 3 135	2 207 3 136	2 215 4 137	2 223 4 137	2 232 4 138	2 240 4 139	2 249 4 140	2 258 5 142

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.3 %	△FUEL = + 3.5 %	△FUEL = + 6 %

11.0-08F0A321-211 CFM56-5B3/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 20 FCOM-N0-03-05-10-008-165

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CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+15	**FROM BRAKE RELEASE**	
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)**	**FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)**	**TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG) 66	68	70	72	74	76	78
390							
370	29 2077 195 405	31 2216 211 407					
350	25 1894 166 396	27 1999 177 397	28 2115 189 399	30 2245 202 401	32 2393 218 403		
330	23 1756 146 388	24 1846 154 389	25 1941 163 390	26 2045 173 392	28 2159 184 393	30 2285 196 395	32 2425 210 397
310	20 1631 128 379	21 1710 135 380	22 1793 142 381	24 1882 150 382	25 1978 158 383	26 2080 168 385	28 2191 178 386
290	18 1503 112 368	19 1573 117 368	20 1646 123 369	21 1724 129 370	22 1806 136 371	23 1893 143 373	24 1986 151 374
270	16 1355 93 353	17 1416 98 354	17 1479 102 354	18 1545 107 355	19 1614 112 356	20 1688 118 357	21 1765 124 358
250	14 1227 79 339	15 1280 82 340	15 1335 86 341	16 1393 90 341	16 1453 94 342	17 1516 98 343	18 1582 103 344
240	13 1167 72 333	14 1218 76 333	14 1270 79 334	15 1324 82 334	15 1380 86 335	16 1439 90 336	17 1500 94 337
220	12 1058 61 319	12 1102 64 320	12 1149 67 320	13 1196 70 321	14 1246 73 322	14 1298 76 322	15 1352 79 323
200	10 956 52 306	11 996 54 306	11 1037 56 307	11 1079 59 308	12 1123 61 308	12 1169 64 309	13 1217 66 310
180	9 861 43 292	9 897 45 293	10 934 47 293	10 971 49 294	10 1010 51 294	11 1051 53 295	11 1093 55 296
160	8 773 36 278	8 805 38 279	8 838 39 279	9 871 41 280	9 906 43 280	9 941 44 281	10 979 46 282
140	7 690 30 263	7 719 31 264	7 747 33 265	8 777 34 265	8 808 35 266	8 840 37 267	9 872 38 267
120	6 612 25 248	6 637 26 248	6 662 27 249	7 689 28 250	7 716 29 250	7 744 30 251	7 773 31 252
100	5 487 17 220	5 506 18 220	5 527 18 221	5 548 19 222	5 570 20 223	6 592 21 224	6 615 22 225
50	3 315 9 182	3 327 9 183	3 340 10 183	3 354 10 184	3 367 10 186	3 381 11 187	4 396 11 188
15	2 195 4 131	2 203 4 132	2 211 4 133	2 219 5 134	2 228 5 135	2 236 5 137	2 245 5 138

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
ΔFUEL = – 0.6 %	ΔFUEL = + 0.6 %	ΔFUEL = + 2.5 %	ΔFUEL = + 5 %

11.0-08F0A320-214 CFM56-5B4/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 15 FCOM-N0-03-05-10-007-170

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CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+20	FROM BRAKE RELEASE
NORMAL AIR CONDITIONING	CG=33.0%	TIME (MIN) FUEL (KG)
ANTI-ICING OFF		DISTANCE (NM) TAS (KT)

FL	WEIGHT AT BRAKE RELEASE (1000KG) 52		54		56		58		60		62		64	
390	25	1691	27	1799	29	1920								
	174	412	187	413	202	415								
370	22	1558	24	1648	25	1743	27	1845	28	1957	30	2081	33	2221
	150	404	159	405	169	406	181	407	193	408	207	410	224	412
350	20	1458	21	1538	22	1622	24	1711	25	1806	27	1907	28	2018
	133	397	141	398	149	399	158	400	168	401	178	402	190	403
330	18	1367	19	1440	20	1516	21	1596	23	1680	24	1769	25	1864
	119	390	126	391	133	391	140	392	148	393	157	394	166	395
310	17	1277	18	1343	18	1412	19	1484	20	1559	21	1639	23	1723
	106	381	112	382	118	383	124	383	131	384	138	385	145	386
290	15	1178	16	1238	17	1300	17	1364	18	1431	19	1502	20	1575
	92	370	97	371	102	371	107	372	113	373	119	373	125	374
270	13	1062	14	1115	14	1169	15	1226	16	1284	17	1345	17	1408
	77	355	81	356	85	356	89	357	94	357	99	358	103	358
250	11	962	12	1008	13	1057	13	1106	14	1158	14	1211	15	1267
	65	341	68	342	72	342	75	343	79	343	83	344	86	344
240	11	915	11	959	12	1005	12	1052	13	1100	13	1151	14	1202
	60	334	63	335	66	335	69	336	72	336	76	337	79	337
220	9	829	10	868	10	909	11	950	11	994	12	1038	12	1084
	51	321	53	321	56	322	58	322	61	322	64	323	67	323
200	8	748	9	783	9	819	10	856	10	895	10	934	11	975
	43	307	45	307	47	308	49	308	51	308	53	309	56	309
180	7	673	8	704	8	736	8	769	9	804	9	839	9	875
	36	293	37	293	39	293	41	294	43	294	44	294	46	295
160	6	602	7	630	7	659	7	689	8	719	8	750	8	783
	30	278	31	278	32	279	34	279	35	279	37	280	39	280
140	6	537	6	561	6	587	6	613	7	640	7	668	7	696
	24	263	26	263	27	263	28	264	29	264	31	264	32	265
120	5	474	5	496	5	518	6	542	6	565	6	590	6	615
	20	246	21	246	22	247	23	247	24	247	25	248	26	248
100	4	375	4	392	4	410	4	429	4	448	5	467	5	487
	14	216	14	217	15	217	16	217	16	218	17	218	18	219
50	2	243	3	254	3	265	3	277	3	289	3	302	3	314
	7	176	7	177	8	177	8	177	8	178	9	178	9	179
15	2	150	2	157	2	164	2	172	2	179	2	187	2	195
	3	123	3	124	3	124	4	124	4	125	4	125	4	126

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 0.6 %	△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A320-214 CFM56-5B4/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 20 FCOM-N0-03-05-10-008-170

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CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+15	**FROM BRAKE RELEASE**
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)** **FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)** **TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG) 66	68	70	72	74	76	78
390							
370	28 2012	30 2142					
	187 403	202 405					
350	24 1841	26 1941	27 2050	29 2171	31 2309	34 2468	
	160 394	170 395	181 397	193 399	208 401	226 404	
330	22 1712	23 1797	24 1888	26 1986	27 2093	29 2211	30 2342
	141 386	148 387	157 388	166 390	176 391	188 393	201 395
310	20 1594	21 1669	22 1749	23 1834	24 1925	25 2022	27 2127
	124 377	131 378	137 379	145 380	153 381	161 383	171 384
290	18 1473	19 1541	19 1611	20 1686	21 1765	22 1849	24 1937
	109 366	114 367	119 368	125 369	132 370	138 371	146 372
270	16 1333	16 1391	17 1453	18 1517	19 1584	19 1655	20 1730
	91 352	95 352	100 353	105 354	110 355	115 356	120 357
250	14 1209	14 1261	15 1315	16 1372	16 1431	17 1492	18 1557
	77 338	81 339	84 339	88 340	92 341	96 342	101 342
240	13 1152	13 1201	14 1252	15 1305	15 1361	16 1418	16 1479
	71 331	74 332	77 333	81 333	84 334	88 335	92 336
220	11 1046	12 1090	12 1135	13 1182	13 1231	14 1282	14 1335
	60 318	63 319	66 319	68 320	71 321	74 321	78 322
200	10 948	10 987	11 1027	11 1069	12 1113	12 1158	13 1205
	51 305	53 306	55 306	58 307	60 307	63 308	65 309
180	9 856	9 891	10 927	10 964	10 1003	11 1043	11 1084
	43 291	45 292	47 293	49 293	51 294	53 294	55 295
160	8 770	8 801	8 833	9 866	9 901	9 936	10 973
	36 278	37 278	39 279	41 279	42 280	44 281	46 281
140	7 688	7 716	7 745	8 774	8 805	8 837	9 869
	30 263	31 264	32 264	34 265	35 265	37 266	38 267
120	6 611	6 635	6 661	7 687	7 714	7 742	7 771
	25 248	26 248	27 249	28 249	29 250	30 251	31 252
100	5 486	5 506	5 527	5 547	5 569	6 591	6 614
	17 220	18 220	18 221	19 222	20 223	21 224	22 225
50	3 315	3 327	3 340	3 353	3 367	3 381	4 395
	9 182	9 183	10 183	10 184	10 186	11 187	11 188
15	2 195	2 203	2 211	2 219	2 228	2 236	2 245
	4 131	4 132	4 133	5 134	5 135	5 137	5 138

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.4 %	△FUEL = + 0.4 %	△FUEL = + 1.5 %	△FUEL = + 2.5 %

11.0-08F0A319-112 CFM56-5B6/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 15 FCOM-N0-03-05-10-007-180

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CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+20	**FROM BRAKE RELEASE**
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN)** **FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM)** **TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG)													
	52		**54**		**56**		**58**		**60**		**62**		**64**	
390	24	1637	26	1739	28	1852								
	167	410	179	411	193	413								
370	21	1513	23	1598	24	1689	26	1786	27	1891	29	2007	31	2136
	144	402	153	403	162	404	173	405	184	406	197	408	212	410
350	19	1419	21	1495	22	1575	23	1660	24	1750	26	1846	27	1950
	128	395	136	396	143	397	152	398	161	399	171	400	181	401
330	18	1332	19	1402	20	1475	21	1552	22	1632	23	1717	24	1807
	115	388	121	388	128	389	135	390	143	391	151	392	159	393
310	16	1247	17	1311	18	1377	19	1446	20	1519	21	1595	22	1675
	102	379	108	380	114	381	120	381	126	382	133	383	140	384
290	15	1154	15	1212	16	1272	17	1335	18	1399	19	1467	20	1538
	90	368	94	369	99	369	104	370	110	371	115	371	121	372
270	13	1045	13	1096	14	1149	15	1204	15	1261	16	1319	17	1380
	75	354	79	354	83	355	87	355	92	356	96	356	101	357
250	11	949	12	994	12	1041	13	1090	14	1140	14	1192	15	1246
	64	340	67	340	70	341	74	341	77	342	81	342	85	343
240	11	904	11	947	12	992	12	1038	13	1085	13	1134	14	1185
	59	333	62	334	65	334	68	334	71	335	74	335	78	336
220	9	821	10	859	10	899	11	940	11	982	12	1026	12	1071
	50	320	52	320	55	321	57	321	60	321	63	322	65	322
200	8	742	9	777	9	813	9	849	10	887	10	926	11	966
	42	306	44	306	46	307	48	307	50	307	53	308	55	308
180	7	669	8	700	8	732	8	765	9	798	9	833	9	869
	35	292	37	292	39	293	40	293	42	293	44	293	46	294
160	6	601	7	629	7	657	7	686	8	716	8	747	8	779
	29	277	31	278	32	278	34	278	35	279	37	279	38	279
140	6	536	6	561	6	586	6	612	7	639	7	666	7	694
	24	262	26	263	27	263	28	263	29	264	30	264	32	264
120	5	474	5	496	5	518	6	541	6	565	6	589	6	614
	20	246	21	246	22	247	23	247	24	247	25	248	26	248
100	4	376	4	393	4	411	4	429	4	448	5	467	5	487
	14	216	14	217	15	217	16	218	16	218	17	218	18	219
50	2	243	3	254	3	266	3	277	3	289	3	302	3	314
	7	176	7	177	8	177	8	178	8	178	9	178	9	179
15	2	150	2	157	2	164	2	172	2	179	2	187	2	195
	3	123	3	124	3	124	4	124	4	125	4	125	4	126

LOW AIR CONDITIONING	**HIGH AIR CONDITIONING**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.4 %	△FUEL = + 0.4 %	△FUEL = + 1.5 %	△FUEL = + 2.5 %

11.0-08F0A319-112 CFM56-5B6/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 20 FCOM-N0-03-05-10-008-180

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CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+20 CG=33.0%	**FROM BRAKE RELEASE** **TIME (MIN) FUEL (KG)** **DISTANCE (NM) TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG) 76	78	80	82	84	86	88	90	92
390									
370									
350	38 2903 266 415								
330	33 2625 226 406	36 2794 244 408	39 2988 264 410						
310	29 2375 192 396	31 2510 205 397	33 2661 220 399						
290	25 2117 159 382	26 2224 167 383	28 2339 177 384						
270	21 1861 127 365	22 1946 134 365	23 2037 140 366	24 2133 148 367	25 2236 156 368	27 2346 164 369	28 2466 174 370	30 2597 184 372	31 2742 196 373
250	18 1664 105 350	19 1737 110 351	20 1814 116 351	21 1894 121 352	22 1980 127 353	23 2070 133 354	24 2167 140 355	25 2271 147 355	26 2383 156 357
240	17 1579 96 343	18 1646 101 344	18 1717 105 344	19 1792 110 345	20 1871 116 346	21 1954 121 346	22 2043 127 347	23 2137 134 348	24 2238 140 349
220	15 1423 81 330	15 1482 85 331	16 1544 88 331	17 1610 92 332	17 1678 97 332	18 1749 101 333	19 1825 106 334	20 1905 111 334	21 1990 116 335
200	13 1282 68 317	13 1334 71 317	14 1389 74 318	15 1446 77 318	15 1505 81 319	16 1567 84 319	16 1633 88 320	17 1702 92 321	18 1774 96 321
180	11 1153 57 304	12 1199 59 304	12 1247 62 304	13 1297 65 305	13 1349 67 305	14 1404 70 306	14 1461 73 307	15 1520 76 307	16 1583 80 308
160	10 1034 48 290	10 1075 50 291	11 1117 52 291	11 1161 54 292	12 1207 56 292	12 1255 59 293	12 1305 61 293	13 1358 64 294	14 1412 66 294
140	9 923 40 276	9 958 41 277	9 996 43 277	10 1035 45 278	10 1076 47 278	10 1118 48 279	11 1162 51 279	11 1208 53 280	12 1256 55 280
120	7 817 32 261	8 848 34 261	8 881 35 262	8 915 36 262	9 951 38 263	9 988 40 264	9 1027 41 264	10 1067 43 265	10 1109 45 265
100	6 647 22 232	6 672 23 233	6 698 24 234	6 725 25 234	7 753 26 235	7 782 27 236	7 812 28 237	7 844 29 238	8 877 30 238
50	3 421 11 195	4 436 11 196	4 452 12 197	4 468 12 198	4 485 13 199	4 503 13 200	4 521 14 201	4 539 15 202	4 559 15 203
15	2 267 5 143	2 276 5 144	2 286 5 145	2 296 5 146	2 306 6 148	2 316 6 149	2 326 6 150	2 337 6 152	3 348 7 153

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.3 %	△FUEL = + 3.5 %	△FUEL = + 6 %

11.0-08F0A321-211 CFM56-5B3/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 20 FCOM-N0-03-05-10-009-165

R

CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+20	FROM BRAKE RELEASE	
NORMAL AIR CONDITIONING	CG=33.0%	TIME (MIN)	FUEL (KG)
ANTI-ICING OFF		DISTANCE (NM)	TAS (KT)

FL	WEIGHT AT BRAKE RELEASE (1000KG)													
	66		68		70		72		74		76		78	
390														
370														
350	30	2138	32	2271	34	2423								
	203	405	218	406	235	409								
330	27	1966	28	2075	30	2195	32	2328	34	2478	37	2650		
	176	396	187	398	199	399	213	401	229	403	248	405		
310	24	1811	25	1906	27	2007	28	2118	30	2238	32	2370	34	2517
	154	387	162	388	172	389	183	391	194	392	207	394	222	396
290	21	1653	22	1734	23	1821	25	1914	26	2014	27	2121	29	2237
	132	375	139	376	146	377	154	378	163	379	173	380	184	382
270	18	1474	19	1543	20	1616	21	1692	22	1774	23	1860	24	1952
	109	359	114	360	120	361	126	361	132	362	139	363	147	364
250	16	1324	16	1384	17	1447	18	1512	19	1581	20	1654	21	1731
	91	345	95	345	99	346	104	347	109	347	114	348	120	349
240	15	1256	15	1313	16	1371	17	1432	18	1496	18	1564	19	1635
	83	338	87	338	91	339	95	339	100	340	104	341	109	342
220	13	1132	13	1181	14	1233	15	1286	15	1342	16	1400	17	1461
	70	324	73	324	76	325	79	325	83	326	87	326	91	327
200	11	1017	12	1061	12	1106	13	1153	13	1202	14	1253	14	1306
	58	309	61	310	63	310	66	311	69	311	72	312	75	313
180	10	912	10	951	11	991	11	1033	12	1075	12	1120	13	1166
	48	295	51	295	53	296	55	296	57	297	60	297	62	298
160	9	816	9	850	9	886	10	922	10	960	11	999	11	1040
	40	280	42	281	44	281	46	282	47	282	49	283	52	283
140	8	726	8	756	8	788	8	820	9	853	9	888	10	924
	33	265	35	265	36	266	38	266	39	267	41	267	42	268
120	7	641	7	668	7	696	7	724	8	753	8	784	8	816
	27	249	28	249	29	250	31	250	32	251	33	251	35	252
100	5	508	5	529	5	551	6	574	6	597	6	621	6	646
	19	219	19	220	20	220	21	221	22	222	23	223	24	223
50	3	327	3	341	3	355	4	369	4	384	4	399	4	415
	10	179	10	180	10	181	11	182	11	182	12	183	12	184
15	2	203	2	211	2	220	2	229	2	238	2	247	2	257
	4	127	4	127	5	128	5	129	5	130	5	131	5	132

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 0.6 %	△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A320-214 CFM56-5B4/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 20 FCOM-N0-03-05-10-009-170

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CLIMB - 250KT/300KT/M.78

MAX. CLIMB THRUST	ISA+20	**FROM BRAKE RELEASE**
NORMAL AIR CONDITIONING	CG=33.0%	**TIME (MIN) FUEL (KG)**
ANTI-ICING OFF		**DISTANCE (NM) TAS (KT)**

FL	WEIGHT AT BRAKE RELEASE (1000KG)													
	66		**68**		**70**		**72**		**74**		**76**		**78**	
390														
370														
350	29	2062	31	2186	33	2326	35	2487						
	193	402	207	404	222	406	241	408						
330	26	1903	27	2006	29	2117	31	2241	33	2378	35	2534		
	169	394	179	395	190	397	203	398	217	400	234	402		
310	23	1760	24	1849	26	1945	27	2048	29	2161	30	2283	32	2418
	148	385	156	386	165	387	174	388	185	390	197	391	211	393
290	20	1612	21	1690	23	1773	24	1861	25	1956	26	2057	28	2166
	127	373	134	374	141	375	149	376	157	377	166	378	176	379
270	18	1444	19	1511	19	1581	20	1655	21	1733	22	1817	23	1905
	106	358	111	358	116	359	122	360	128	361	135	362	142	363
250	15	1302	16	1360	17	1421	18	1485	18	1552	19	1623	20	1697
	88	343	93	344	97	344	101	345	106	346	111	347	117	347
240	14	1237	15	1292	16	1349	16	1409	17	1471	18	1537	19	1606
	81	336	85	337	89	337	93	338	97	339	102	339	107	340
220	13	1117	13	1166	14	1216	14	1269	15	1323	16	1381	16	1441
	68	322	71	323	75	323	78	324	81	325	85	325	89	326
200	11	1007	12	1050	12	1094	13	1141	13	1189	14	1239	14	1291
	57	308	60	309	62	309	65	310	68	310	71	311	74	312
180	10	905	10	943	11	983	11	1024	11	1066	12	1110	12	1156
	48	294	50	295	52	295	54	296	57	296	59	297	62	297
160	9	811	9	845	9	880	10	916	10	954	10	993	11	1033
	40	280	42	280	43	281	45	281	47	282	49	282	51	283
140	7	723	8	753	8	784	8	816	9	850	9	884	9	920
	33	265	34	265	36	265	37	266	39	266	41	267	42	268
120	7	640	7	667	7	694	7	722	8	752	8	782	8	814
	27	248	28	249	29	249	31	250	32	250	33	251	35	252
100	5	508	5	529	5	551	6	573	6	596	6	621	6	646
	19	219	19	220	20	220	21	221	22	222	23	222	24	223
50	3	327	3	341	3	355	4	369	4	384	4	399	4	414
	10	180	10	180	10	181	11	182	11	182	12	183	12	184
15	2	203	2	211	2	220	2	229	2	238	2	247	2	257
	4	127	4	127	5	128	5	129	5	130	5	131	5	132

LOW AIR CONDITIONING	HIGH AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.4 %	△FUEL = + 0.4 %	△FUEL = + 1.5 %	△FUEL = + 2.5 %

11.0-08F0A319-112 CFM56-5B6/P SA21100000C5KG330 0 018590 0 0 2 1.0 500.0 300.00 1 03250.000300.000 .780 20 FCOM-N0-03-05-10-009-180

GENERAL

Cruise tables are established :
- for ISA, ISA + 10, ISA + 15 and ISA + 20
- with normal air conditioning and anti ice OFF
- from FL290 to FL390 at M.78
- from FL100 to FL390 at long range speed.
- with a 33 % center of gravity.

OPTIMUM MACH NUMBER

Seven tables give the optimum Mach number versus cost index, altitude and wind as calculated by the FMGC.

COST INDEX = 0 (MAXIMUM RANGE)

WEIGHT 1000kg	WIND kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
60	100	.613	.642	.675	.704	.729	.750
	50	.631	.658	.689	.714	.737	.755
	0	.654	.680	.706	.727	.745	.760
	–50	.674	.697	.719	.737	.753	.765
	–100	.696	.715	.732	.747	.760	.770
65	100	.638	.672	.700	.725	.746	.764
	50	.655	.686	.711	.733	.752	.767
	0	.677	.703	.724	.742	.758	.770
	–50	.695	.716	.734	.750	.763	.774
	–100	.712	.730	.745	.758	.768	.777
70	100	.665	.695	.720	.742	.760	
	50	.680	.706	.728	.748	.764	
	0	.698	.720	.738	.754	.768	
	–50	.712	.731	.747	.760	.771	
	–100	.727	.742	.755	.766	.775	
75	100	.688	.713	.736	.756	.772	
	50	.700	.723	.743	.760	.774	
	0	.715	.733	.750	.764	.776	
	–50	.726	.742	.757	.769	.778	
	–100	.738	.751	.763	.773	.781	
80	100	.707	.731	.751	.767		
	50	.717	.738	.755	.770		
	0	.728	.746	.761	.772		
	–50	.738	.753	.765	.775		
	–100	.748	.760	.770	.778		
85	100	.723	.743	.761			
	50	.731	.749	.764			
	0	.740	.755	.768			
	–50	.748	.761	.772			
	–100	.756	.767	.775			

COST INDEX = 10 kg/min

WEIGHT/WIND 1000kg	kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
60	**100**	.656	.683	.708	.729	.747	.762
	50	.672	.696	.719	.737	.753	.766
	0	.689	.710	.729	.745	.759	.770
	–50	.706	.724	.740	.754	.765	.774
	–100	.725	.739	.752	.762	.771	.778
65	**100**	.677	.703	.725	.743	.759	.771
	50	.691	.714	.733	.750	.763	.774
	0	.705	.725	.742	.756	.767	.776
	–50	.720	.737	.751	.762	.772	.779
	–100	.736	.749	.759	.769	.776	.782
70	**100**	.696	.720	.738	.755	.768	
	50	.708	.728	.745	.759	.771	
	0	.720	.737	.752	.764	.774	
	–50	.732	.747	.759	.769	.777	
	–100	.745	.756	.766	.774	.780	
75	**100**	.712	.732	.750	.764	.776	
	50	.722	.740	.755	.768	.778	
	0	.732	.747	.760	.771	.780	
	–50	.742	.755	.766	.775	.781	
	–100	.753	.763	.771	.778	.783	
80	**100**	.726	.744	.760	.772		
	50	.734	.750	.764	.774		
	0	.742	.756	.768	.777		
	–50	.751	.762	.772	.779		
	–100	.759	.768	.776	.782		
85	**100**	.737	.754	.767			
	50	.744	.759	.770			
	0	.751	.763	.773			
	–50	.758	.768	.776			
	–100	.765	.773	.779			

COST INDEX = 20 kg/min

WEIGHT/WIND 1000kg	kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
60	**100**	.684	.707	.727	.744	.758	.769
	50	.699	.718	.736	.751	.763	.773
	0	.713	.730	.746	.758	.768	.776
	–50	.729	.743	.755	.765	.773	.779
	–100	.748	.758	.766	.773	.779	.783
65	**100**	.701	.722	.740	.754	.767	.776
	50	.713	.732	.747	.760	.770	.778
	0	.725	.741	.754	.765	.774	.780
	–50	.739	.751	.762	.771	.778	.782
	–100	.753	.763	.770	.777	.782	.785
70	**100**	.716	.734	.750	.763	.773	
	50	.726	.742	.756	.767	.776	
	0	.736	.750	.761	.771	.778	
	–50	.747	.758	.767	.775	.781	
	–100	.759	.767	.774	.780	.784	
75	**100**	.728	.744	.758	.770	.779	
	50	.737	.751	.763	.773	.780	
	0	.745	.757	.768	.776	.782	
	–50	.754	.764	.772	.779	.784	
	–100	.764	.771	.777	.782	.785	
80	**100**	.739	.754	.766	.776		
	50	.746	.759	.770	.778		
	0	.753	.764	.773	.780		
	–50	.760	.769	.777	.782		
	–100	.768	.775	.780	.784		
85	**100**	.748	.761	.772			
	50	.754	.765	.774			
	0	.759	.769	.777			
	–50	.765	.773	.780			
	–100	.772	.778	.783			

GENERAL

Cruise tables are established :
- for ISA, ISA + 10, ISA + 15 and ISA + 20
- with normal air conditioning and anti ice OFF
- from FL290 to FL390 at M.78
- from FL100 to FL390 at long range speed.
- with a 33 % center of gravity.

OPTIMUM MACH NUMBER

Seven tables give the optimum Mach number versus cost index, altitude and wind as calculated by the FMGC.

COST INDEX = 0 (MAXIMUM RANGE)

WEIGHT/WIND		FLIGHT LEVEL					
1000kg	kt	290	310	330	350	370	390
50	100	.571	.597	.625	.653	.684	.716
	50	.586	.612	.637	.664	.694	.724
	0	.604	.631	.653	.678	.707	.734
	–50	.626	.650	.670	.695	.722	.745
	–100	.658	.675	.694	.717	.742	.759
55	100	.599	.626	.654	.684	.715	.735
	50	.613	.638	.665	.694	.723	.741
	0	.632	.654	.679	.707	.733	.749
	–50	.650	.671	.695	.722	.745	.758
	–100	.675	.694	.717	.742	.759	.770
60	100	.625	.652	.682	.713	.733	.746
	50	.637	.663	.692	.721	.740	.751
	0	.653	.677	.705	.731	.748	.758
	–50	.670	.693	.720	.743	.757	.767
	–100	.693	.715	.740	.758	.769	.776
65	100	.649	.677	.709	.730	.743	
	50	.660	.688	.717	.737	.749	
	0	.674	.701	.728	.745	.756	
	–50	.690	.716	.740	.755	.765	
	–100	.711	.736	.755	.768	.775	
70	100	.672	.704	.727	.741	.751	
	50	.683	.713	.733	.747	.756	
	0	.696	.724	.742	.754	.763	
	–50	.711	.736	.752	.763	.770	
	–100	.731	.752	.765	.774	.778	
75	100	.696	.722	.738	.749		
	50	.706	.729	.744	.754		
	0	.718	.738	.751	.761		
	–50	.730	.749	.760	.769		
	–100	.747	.762	.772	.777		

COST INDEX = 10 kg/min

WEIGHT 1000kg	WIND kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
50	100	.611	.638	.661	.687	.716	.741
	50	.629	.653	.675	.700	.728	.750
	0	.652	.672	.693	.717	.744	.762
	–50	.678	.695	.715	.738	.760	.773
	–100	.711	.729	.746	.760	.774	.781
55	100	.636	.658	.684	.713	.738	.753
	50	.651	.672	.697	.725	.748	.761
	0	.669	.689	.714	.740	.759	.771
	–50	.692	.711	.734	.757	.771	.778
	–100	.723	.742	.758	.772	.780	.783
60	100	.655	.680	.708	.734	.751	.761
	50	.668	.693	.721	.744	.759	.768
	0	.685	.709	.736	.756	.768	.775
	–50	.706	.729	.753	.769	.777	.780
	–100	.736	.754	.770	.778	.782	.783
65	100	.675	.703	.730	.747	.758	
	50	.687	.715	.739	.755	.765	
	0	.703	.730	.751	.765	.773	
	–50	.723	.747	.765	.775	.779	
	–100	.748	.767	.776	.781	.782	
70	100	.696	.724	.743	.755	.763	
	50	.708	.734	.751	.762	.769	
	0	.722	.746	.761	.771	.776	
	–50	.740	.760	.772	.778	.780	
	–100	.761	.774	.779	.782	.782	
75	100	.716	.738	.751	.760		
	50	.727	.746	.758	.767		
	0	.739	.756	.767	.774		
	–50	.754	.768	.776	.779		
	–100	.770	.778	.781	.782		

COST INDEX = 20 kg/min

WEIGHT 1000kg	WIND kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
50	100	.649	.671	.692	.718	.745	.763
	50	.671	.689	.710	.734	.758	.773
	0	.691	.711	.733	.754	.771	.779
	–50	.725	.740	.754	.768	.780	.784
	–100	.749	.762	.772	.780	.786	.788
55	100	.665	.687	.712	.740	.759	.771
	50	.684	.704	.728	.753	.770	.777
	0	.703	.725	.747	.768	.777	.781
	–50	.735	.749	.764	.777	.783	.785
	–100	.756	.769	.777	.784	.787	.787
60	100	.681	.706	.733	.754	.767	.775
	50	.698	.721	.747	.765	.775	.779
	0	.717	.740	.762	.775	.780	.782
	–50	.744	.759	.773	.781	.784	.784
	–100	.763	.775	.782	.786	.787	.786
65	100	.698	.726	.748	.763	.772	
	50	.714	.740	.759	.772	.778	
	0	.732	.755	.771	.778	.781	
	–50	.754	.770	.778	.782	.784	
	–100	.770	.780	.784	.786	.786	
70	100	.717	.742	.758	.768	.774	
	50	.731	.753	.767	.775	.778	
	0	.747	.766	.775	.780	.781	
	–50	.765	.776	.781	.783	.783	
	–100	.776	.783	.785	.785	.784	
75	100	.734	.752	.764	.772		
	50	.746	.762	.772	.777		
	0	.759	.772	.778	.780		
	–50	.772	.779	.782	.783		
	–100	.780	.784	.785	.785		

GENERAL

Cruise tables are established :
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- from FL100 to FL390 at long range speed
- with a 33 % center of gravity.

OPTIMUM MACH NUMBER

Seven tables give the optimum Mach number versus cost index, altitude and wind as calculated by the FMGC.

COST INDEX = 0 (MAXIMUM RANGE)

WEIGHT 1000kg	WIND kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
50	100	.571	.597	.625	.653	.684	.716
	50	.586	.612	.637	.664	.694	.724
	0	.604	.631	.653	.678	.707	.734
	–50	.626	.650	.670	.695	.722	.745
	–100	.658	.675	.694	.717	.742	.759
55	100	.599	.626	.654	.684	.715	.735
	50	.613	.638	.665	.694	.723	.741
	0	.632	.654	.679	.707	.733	.749
	–50	.650	.671	.695	.722	.745	.758
	–100	.675	.694	.717	.742	.759	.770
60	100	.625	.652	.682	.713	.733	.746
	50	.637	.663	.692	.721	.740	.751
	0	.653	.677	.705	.731	.748	.758
	–50	.670	.693	.720	.743	.757	.767
	–100	.693	.715	.740	.758	.769	.776
65	100	.649	.677	.709	.730	.743	
	50	.660	.688	.717	.737	.749	
	0	.674	.701	.728	.745	.756	
	–50	.690	.716	.740	.755	.765	
	–100	.711	.736	.755	.768	.775	
70	100	.672	.704	.727	.741	.751	
	50	.683	.713	.733	.747	.756	
	0	.696	.724	.742	.754	.763	
	–50	.711	.736	.752	.763	.770	
	–100	.731	.752	.765	.774	.778	
75	100	.696	.722	.738	.749		
	50	.706	.729	.744	.754		
	0	.718	.738	.751	.761		
	–50	.730	.749	.760	.769		
	–100	.747	.762	.772	.777		

COST INDEX = 10 kg/min

WEIGHT/WIND 1000kg	kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
50	100	.611	.638	.661	.687	.716	.741
	50	.629	.653	.675	.700	.728	.750
	0	.652	.672	.693	.717	.744	.762
	–50	.678	.695	.715	.738	.760	.773
	–100	.711	.729	.746	.760	.774	.781
55	100	.636	.658	.684	.713	.738	.753
	50	.651	.672	.697	.725	.748	.761
	0	.669	.689	.714	.740	.759	.771
	–50	.692	.711	.734	.757	.771	.778
	–100	.723	.742	.758	.772	.780	.783
60	100	.655	.680	.708	.734	.751	.761
	50	.668	.693	.721	.744	.759	.768
	0	.685	.709	.736	.756	.768	.775
	–50	.706	.729	.753	.769	.777	.780
	–100	.736	.754	.770	.778	.782	.783
65	100	.675	.703	.730	.747	.758	
	50	.687	.715	.739	.755	.765	
	0	.703	.730	.751	.765	.773	
	–50	.723	.747	.765	.775	.779	
	–100	.748	.767	.776	.781	.782	
70	100	.696	.724	.743	.755	.763	
	50	.708	.734	.751	.762	.769	
	0	.722	.746	.761	.771	.776	
	–50	.740	.760	.772	.778	.780	
	–100	.761	.774	.779	.782	.782	
75	100	.716	.738	.751	.760		
	50	.727	.746	.758	.767		
	0	.739	.756	.767	.774		
	–50	.754	.768	.776	.779		
	–100	.770	.778	.781	.782		

COST INDEX = 20 kg/min

WEIGHT/WIND 1000kg	kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
50	100	.649	.671	.692	.718	.745	.763
	50	.671	.689	.710	.734	.758	.773
	0	.691	.711	.733	.754	.771	.779
	–50	.725	.740	.754	.768	.780	.784
	–100	.749	.762	.772	.780	.786	.788
55	100	.665	.687	.712	.740	.759	.771
	50	.684	.704	.728	.753	.770	.777
	0	.703	.725	.747	.768	.777	.781
	–50	.735	.749	.764	.777	.783	.785
	–100	.756	.769	.777	.784	.787	.787
60	100	.681	.706	.733	.754	.767	.775
	50	.698	.721	.747	.765	.775	.779
	0	.717	.740	.762	.775	.780	.782
	–50	.744	.759	.773	.781	.784	.784
	–100	.763	.775	.782	.786	.787	.786
65	100	.698	.726	.748	.763	.772	
	50	.714	.740	.759	.772	.778	
	0	.732	.755	.771	.778	.781	
	–50	.754	.770	.778	.782	.784	
	–100	.770	.780	.784	.786	.786	
70	100	.717	.742	.758	.768	.774	
	50	.731	.753	.767	.775	.778	
	0	.747	.766	.775	.780	.781	
	–50	.765	.776	.781	.783	.783	
	–100	.776	.783	.785	.785	.784	
75	100	.734	.752	.764	.772		
	50	.746	.762	.772	.777		
	0	.759	.772	.778	.780		
	–50	.772	.779	.782	.783		
	–100	.780	.784	.785	.785		

COST INDEX = 40 kg/min

WEIGHT 1000kg	WIND kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
60	**100**	.722	.739	.752	.763	.772	.779
	50	.735	.749	.760	.769	.776	.781
	0	.750	.760	.768	.775	.780	.784
	–50	.764	.771	.776	.781	.785	.787
	–100	.775	.781	.785	.788	.789	.790
65	**100**	.732	.747	.759	.769	.776	.782
	50	.743	.755	.765	.773	.779	.784
	0	.755	.764	.772	.778	.782	.785
	–50	.766	.773	.778	.782	.785	.787
	–100	.777	.781	.785	.788	.789	.789
70	**100**	.741	.755	.765	.773	.780	
	50	.750	.761	.770	.777	.782	
	0	.759	.768	.775	.780	.784	
	–50	.769	.775	.780	.784	.786	
	–100	.778	.782	.786	.788	.789	
75	**100**	.749	.761	.770	.777	.783	
	50	.756	.766	.774	.780	.784	
	0	.764	.771	.778	.783	.786	
	–50	.771	.777	.782	.785	.787	
	–100	.779	.783	.786	.788	.788	
80	**100**	.756	.766	.775	.781		
	50	.761	.770	.777	.783		
	0	.768	.775	.780	.784		
	–50	.774	.779	.783	.786		
	–100	.780	.784	.787	.788		
85	**100**	.761	.771	.778			
	50	.766	.774	.780			
	0	.771	.778	.782			
	–50	.776	.781	.785			
	–100	.782	.785	.787			

COST INDEX = 60 kg/min

WEIGHT 1000kg	WIND kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
60	**100**	.751	.761	.770	.776	.781	.785
	50	.762	.771	.776	.781	.785	.787
	0	.772	.778	.783	.787	.788	.789
	–50	.781	.787	.790	.791	.792	.792
	–100	.790	.793	.796	.796	.795	.794
65	**100**	.755	.765	.773	.779	.783	.786
	50	.765	.772	.778	.782	.785	.787
	0	.774	.779	.783	.787	.788	.789
	–50	.782	.787	.789	.790	.791	.790
	–100	.790	.793	.795	.794	.793	.792
70	**100**	.760	.768	.775	.781	.784	
	50	.767	.774	.779	.783	.786	
	0	.775	.780	.784	.787	.788	
	–50	.783	.787	.789	.790	.790	
	–100	.790	.792	.793	.793	.792	
75	**100**	.764	.772	.778	.783	.786	
	50	.770	.776	.781	.785	.787	
	0	.776	.781	.785	.787	.788	
	–50	.783	.787	.788	.789	.789	
	–100	.790	.791	.792	.791	.791	
80	**100**	.767	.775	.780	.784		
	50	.773	.779	.783	.786		
	0	.778	.782	.785	.787		
	–50	.784	.786	.788	.789		
	–100	.789	.791	.791	.790		
85	**100**	.771	.777	.782			
	50	.775	.780	.784			
	0	.779	.783	.786			
	–50	.784	.787	.788			
	–100	.789	.790	.790			

COST INDEX = 80 kg/min

WEIGHT 1000kg	WIND kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
60	100	.770	.776	.782	.786	.788	.789
	50	.777	.783	.788	.790	.791	.791
	0	.786	.790	.792	.794	.794	.793
	–50	.792	.795	.797	.797	.797	.795
	–100	.798	.800	.800	.800	.800	.797
65	100	.772	.777	.782	.786	.788	.788
	50	.778	.784	.787	.789	.790	.790
	0	.786	.790	.792	.793	.792	.791
	–50	.792	.795	.796	.795	.794	.793
	–100	.798	.799	.799	.799	.797	.795
70	100	.773	.778	.783	.786	.788	
	50	.779	.784	.787	.788	.789	
	0	.786	.789	.791	.791	.791	
	–50	.792	.794	.794	.794	.793	
	–100	.797	.798	.798	.797	.795	
75	100	.775	.780	.784	.786	.788	
	50	.780	.784	.787	.788	.789	
	0	.786	.788	.790	.790	.790	
	–50	.791	.793	.793	.792	.791	
	–100	.796	.796	.796	.794	.793	
80	100	.776	.781	.784	.787		
	50	.781	.784	.787	.788		
	0	.786	.788	.789	.789		
	–50	.791	.792	.791	.791		
	–100	.795	.795	.794	.793		
85	100	.778	.782	.785			
	50	.782	.785	.787			
	0	.786	.788	.789			
	–50	.790	.791	.791			
	–100	.794	.793	.792			

COST INDEX = 100 kg/min

WEIGHT 1000kg	WIND kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
60	100	.781	.787	.790	.792	.793	.792
	50	.788	.792	.795	.795	.795	.794
	0	.793	.797	.798	.798	.798	.796
	–50	.799	.800	.800	.800	.800	.798
	–100	.800	.800	.800	.800	.800	.800
65	100	.782	.787	.790	.791	.791	.791
	50	.789	.791	.793	.794	.793	.792
	0	.794	.796	.797	.796	.795	.794
	–50	.798	.799	.800	.799	.797	.795
	–100	.800	.800	.800	.800	.799	.798
70	100	.783	.787	.789	.790	.790	
	50	.788	.791	.792	.792	.791	
	0	.793	.795	.795	.794	.793	
	–50	.798	.798	.798	.797	.795	
	–100	.800	.800	.800	.799	.797	
75	100	.783	.786	.788	.789	.789	
	50	.788	.790	.791	.791	.790	
	0	.792	.794	.793	.793	.791	
	–50	.797	.797	.796	.795	.793	
	–100	.800	.800	.799	.797	.795	
80	100	.783	.786	.788	.789		
	50	.788	.789	.790	.790		
	0	.792	.792	.792	.791		
	–50	.795	.795	.794	.793		
	–100	.799	.798	.796	.795		
85	100	.783	.786	.788			
	50	.787	.789	.789			
	0	.791	.791	.791			
	–50	.794	.794	.793			
	–100	.797	.796	.795			

COST INDEX = 40 kg/min

WEIGHT/WIND 1000kg	kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
50	100	.715	.736	.751	.767	.780	.784
	50	.735	.751	.766	.777	.784	.787
	0	.754	.766	.776	.784	.788	.790
	–50	.769	.778	.784	.789	.792	.792
	–100	.781	.787	.791	.794	.795	.795
55	100	.724	.745	.761	.775	.782	.784
	50	.744	.758	.772	.782	.785	.786
	0	.761	.771	.780	.786	.788	.788
	–50	.773	.781	.787	.790	.791	.790
	–100	.783	.789	.792	.794	.794	.793
60	100	.734	.755	.771	.780	.783	.784
	50	.751	.766	.778	.784	.785	.785
	0	.766	.776	.784	.787	.788	.787
	–50	.777	.784	.788	.790	.790	.788
	–100	.786	.790	.793	.793	.792	.791
65	100	.745	.766	.776	.781	.783	
	50	.759	.774	.781	.784	.785	
	0	.772	.781	.785	.787	.786	
	–50	.780	.787	.789	.789	.788	
	–100	.788	.791	.792	.791	.790	
70	100	.757	.773	.779	.782	.782	
	50	.768	.778	.783	.784	.783	
	0	.777	.783	.786	.786	.785	
	–50	.784	.787	.788	.788	.786	
	–100	.789	.791	.791	.790	.788	
75	100	.766	.776	.780	.782		
	50	.774	.780	.783	.783		
	0	.781	.784	.785	.785		
	–50	.785	.787	.787	.786		
	–100	.790	.790	.789	.788		

COST INDEX = 60 kg/min

WEIGHT/WIND 1000kg	kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
50	100	.758	.769	.778	.785	.790	.791
	50	.768	.778	.785	.790	.792	.793
	0	.778	.785	.790	.794	.795	.795
	–50	.786	.791	.795	.797	.797	.797
	–100	.793	.796	.799	.800	.800	.799
55	100	.764	.773	.782	.788	.789	.789
	50	.772	.781	.787	.791	.791	.791
	0	.781	.788	.791	.794	.793	.793
	–50	.788	.793	.795	.796	.796	.795
	–100	.794	.797	.799	.799	.798	.798
60	100	.768	.778	.785	.788	.788	.787
	50	.776	.784	.789	.790	.790	.788
	0	.784	.789	.792	.793	.792	.791
	–50	.790	.793	.795	.795	.794	.793
	–100	.795	.797	.797	.797	.797	.797
65	100	.773	.782	.786	.787	.787	
	50	.780	.786	.789	.789	.788	
	0	.786	.790	.791	.791	.790	
	–50	.791	.794	.794	.793	.792	
	–100	.795	.796	.796	.796	.796	
70	100	.778	.784	.786	.786	.785	
	50	.783	.787	.788	.788	.786	
	0	.788	.790	.790	.789	.787	
	–50	.792	.793	.792	.791	.788	
	–100	.795	.795	.795	.794	.788	
75	100	.781	.785	.785	.785		
	50	.785	.787	.787	.786		
	0	.788	.789	.789	.787		
	–50	.792	.792	.791	.790		
	–100	.795	.794	.793	.793		

COST INDEX = 80 kg/min

WEIGHT/WIND 1000kg	kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
50	100	.777	.784	.790	.793	.795	.794
	50	.784	.789	.794	.796	.797	.796
	0	.790	.794	.797	.799	.799	.798
	–50	.795	.798	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
55	100	.780	.786	.791	.793	.793	.792
	50	.786	.791	.794	.795	.795	.794
	0	.791	.795	.797	.797	.797	.797
	–50	.796	.799	.800	.800	.799	.799
	–100	.800	.800	.800	.800	.800	.800
60	100	.782	.788	.791	.792	.791	.790
	50	.788	.792	.794	.794	.793	.792
	0	.793	.795	.796	.796	.795	.795
	–50	.797	.798	.799	.798	.798	.797
	–100	.800	.800	.800	.800	.800	.800
65	100	.785	.789	.791	.791	.789	
	50	.789	.792	.793	.792	.791	
	0	.793	.795	.795	.794	.794	
	–50	.797	.797	.797	.797	.797	
	–100	.800	.800	.800	.799	.799	
70	100	.787	.789	.790	.789	.787	
	50	.790	.792	.792	.790	.788	
	0	.793	.794	.793	.793	.788	
	–50	.796	.796	.796	.796	.788	
	–100	.799	.799	.798	.798	.788	
75	100	.788	.789	.788	.787		
	50	.790	.791	.790	.789		
	0	.793	.793	.792	.791		
	–50	.795	.795	.794	.794		
	–100	.798	.797	.797	.795		

COST INDEX = 100 kg/min

WEIGHT/WIND 1000kg	kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
50	100	.787	.793	.796	.798	.798	.798
	50	.792	.796	.799	.800	.800	.800
	0	.796	.800	.800	.800	.800	.800
	–50	.800	.800	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
55	100	.789	.793	.796	.797	.796	.796
	50	.793	.797	.798	.799	.798	.798
	0	.797	.800	.800	.800	.800	.799
	–50	.800	.800	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
60	100	.791	.794	.795	.795	.795	.794
	50	.794	.796	.797	.797	.797	.796
	0	.798	.799	.799	.799	.799	.798
	–50	.800	.800	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
65	100	.791	.794	.794	.793	.793	
	50	.795	.796	.796	.795	.795	
	0	.797	.798	.798	.798	.797	
	–50	.800	.800	.800	.799	.799	
	–100	.800	.800	.800	.800	.800	
70	100	.792	.793	.792	.792	.788	
	50	.794	.795	.794	.794	.788	
	0	.797	.797	.796	.796	.788	
	–50	.799	.799	.799	.798	.788	
	–100	.800	.800	.800	.800	.788	
75	100	.792	.792	.791	.790		
	50	.794	.793	.793	.792		
	0	.796	.795	.795	.795		
	–50	.798	.798	.798	.795		
	–100	.800	.800	.800	.795		

COST INDEX = 40 kg/min

WEIGHT/WIND 1000kg	kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
50	**100**	.715	.736	.751	.767	.780	.784
	50	.735	.751	.766	.777	.784	.787
	0	.754	.766	.776	.784	.788	.790
	–50	.769	.778	.784	.789	.792	.792
	–100	.781	.787	.791	.794	.795	.795
55	**100**	.724	.745	.761	.775	.782	.784
	50	.744	.758	.772	.782	.785	.786
	0	.761	.771	.780	.786	.788	.788
	–50	.773	.781	.787	.790	.791	.790
	–100	.783	.789	.792	.794	.794	.793
60	**100**	.734	.755	.771	.780	.783	.784
	50	.751	.766	.778	.784	.785	.785
	0	.766	.776	.784	.787	.788	.787
	–50	.777	.784	.788	.790	.790	.788
	–100	.786	.790	.793	.793	.792	.791
65	**100**	.745	.766	.776	.781	.783	
	50	.759	.774	.781	.784	.785	
	0	.772	.781	.785	.787	.786	
	–50	.780	.787	.789	.789	.788	
	–100	.788	.791	.792	.791	.790	
70	**100**	.757	.773	.779	.782	.782	
	50	.768	.778	.783	.784	.783	
	0	.777	.783	.786	.786	.785	
	–50	.784	.787	.788	.788	.786	
	–100	.789	.791	.791	.790	.788	
75	**100**	.766	.776	.780	.782		
	50	.774	.780	.783	.783		
	0	.781	.784	.785	.785		
	–50	.785	.787	.787	.786		
	–100	.790	.790	.789	.788		

COST INDEX = 60 kg/min

WEIGHT/WIND 1000kg	kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
50	**100**	.758	.769	.778	.785	.790	.791
	50	.768	.778	.785	.790	.792	.793
	0	.778	.785	.790	.794	.795	.795
	–50	.786	.791	.795	.797	.797	.797
	–100	.793	.796	.799	.800	.800	.799
55	**100**	.764	.773	.782	.788	.789	.789
	50	.772	.781	.787	.791	.791	.791
	0	.781	.788	.791	.794	.793	.793
	–50	.788	.793	.795	.796	.796	.795
	–100	.794	.797	.799	.799	.798	.798
60	**100**	.768	.778	.785	.788	.788	.787
	50	.776	.784	.789	.790	.790	.788
	0	.784	.789	.792	.793	.792	.791
	–50	.790	.793	.795	.795	.794	.793
	–100	.795	.797	.797	.797	.797	.797
65	**100**	.773	.782	.786	.787	.787	
	50	.780	.786	.789	.789	.788	
	0	.786	.790	.791	.791	.790	
	–50	.791	.794	.794	.793	.792	
	–100	.795	.796	.796	.796	.796	
70	**100**	.778	.784	.786	.786	.785	
	50	.783	.787	.788	.788	.786	
	0	.788	.790	.790	.789	.787	
	–50	.792	.793	.792	.791	.790	
	–100	.795	.795	.795	.794	.792	
75	**100**	.781	.785	.785	.785		
	50	.785	.787	.787	.786		
	0	.788	.789	.789	.787		
	–50	.792	.792	.791	.790		
	–100	.795	.794	.793	.793		

COST INDEX = 80 kg/min

WEIGHT 1000kg	WIND kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
50	100	.777	.784	.790	.793	.795	.794
	50	.784	.789	.794	.796	.797	.796
	0	.790	.794	.797	.799	.799	.798
	–50	.795	.798	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
55	100	.780	.786	.791	.793	.793	.792
	50	.786	.791	.794	.795	.795	.794
	0	.791	.795	.797	.797	.797	.797
	–50	.796	.799	.800	.800	.799	.799
	–100	.800	.800	.800	.800	.800	.800
60	100	.782	.788	.791	.792	.791	.790
	50	.788	.792	.794	.794	.793	.792
	0	.793	.795	.796	.796	.795	.795
	–50	.797	.798	.799	.798	.798	.797
	–100	.800	.800	.800	.800	.800	.800
65	100	.785	.789	.791	.791	.789	
	50	.789	.792	.793	.792	.791	
	0	.793	.795	.795	.794	.794	
	–50	.797	.797	.797	.797	.797	
	–100	.800	.800	.800	.799	.799	
70	100	.787	.789	.790	.789	.787	
	50	.790	.792	.792	.790	.789	
	0	.793	.794	.793	.793	.792	
	–50	.796	.796	.796	.796	.792	
	–100	.799	.799	.798	.798	.792	
75	100	.788	.789	.788	.787		
	50	.790	.791	.790	.789		
	0	.793	.793	.792	.791		
	–50	.795	.795	.794	.794		
	–100	.798	.797	.797	.797		

COST INDEX = 100 kg/min

WEIGHT 1000kg	WIND kt	FL 290	FL 310	FL 330	FL 350	FL 370	FL 390
50	100	.787	.793	.796	.798	.798	.798
	50	.792	.796	.799	.800	.800	.800
	0	.796	.800	.800	.800	.800	.800
	–50	.800	.800	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
55	100	.789	.793	.796	.797	.796	.796
	50	.793	.797	.798	.799	.798	.798
	0	.797	.800	.800	.800	.800	.799
	–50	.800	.800	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
60	100	.791	.794	.795	.795	.795	.794
	50	.794	.796	.797	.797	.797	.796
	0	.798	.799	.799	.799	.799	.798
	–50	.800	.800	.800	.800	.800	.800
	–100	.800	.800	.800	.800	.800	.800
65	100	.791	.794	.794	.793	.793	
	50	.795	.796	.796	.795	.795	
	0	.797	.798	.798	.798	.797	
	–50	.800	.800	.800	.799	.799	
	–100	.800	.800	.800	.800	.800	
70	100	.792	.793	.792	.792	.790	
	50	.794	.795	.794	.794	.792	
	0	.797	.797	.796	.796	.792	
	–50	.799	.799	.799	.798	.792	
	–100	.800	.800	.800	.800	.792	
75	100	.792	.792	.791	.790		
	50	.794	.793	.793	.792		
	0	.796	.795	.795	.795		
	–50	.798	.798	.798	.797		
	–100	.800	.800	.800	.799		

OPTIMUM AND MAXIMUM ALTITUDES

DEFINITIONS

- Optimum altitude : the altitude at which the airplane covers the maximum distance per kilogram (pound) of fuel (best specific range). It depends on the actual weight and the deviation from ISA.
- Maximum altitude is defined as the lower of :
  - maximum altitude at maximum cruise thrust in level flight and
  - maximum altitude at maximum climb thrust with 300 feet/minute vertical speed.

R - maximum altitude at maximum climb thrust with 1% climb gradient.

Note : Definition of the maximum altitude in the FMGC is different (Refer to FCOM 4).

CRUISE LEVEL CHARTS

These charts have been established for a center of gravity at 33 % MAC.
Maximum and optimum altitudes are given for different temperatures at long range speed and M.78.

Note : The n = 1.3 g (n = 1.4 g) curve indicates the buffet margin.

OPTIMUM WEIGHT FOR 4000 FEET STEP CLIMB

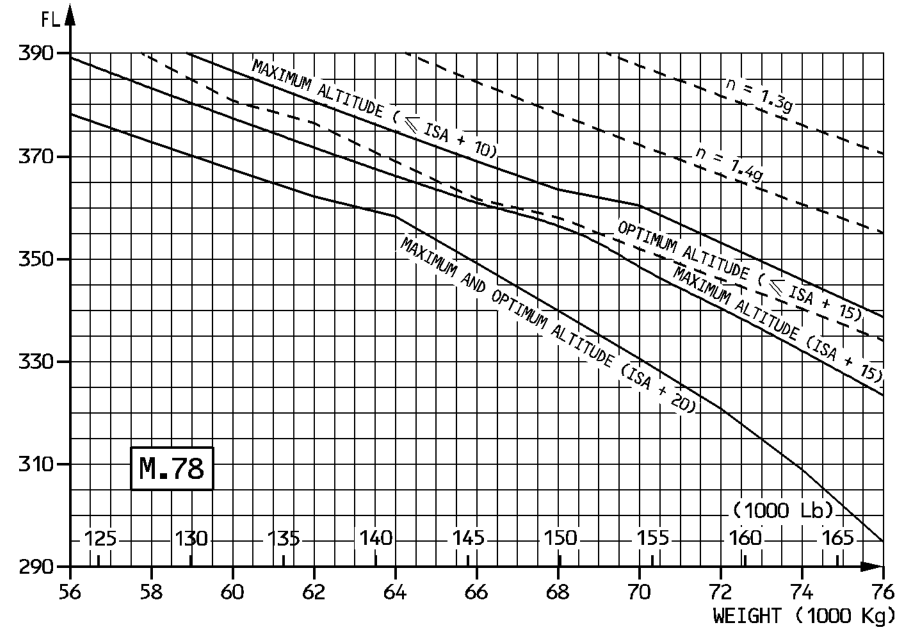
R

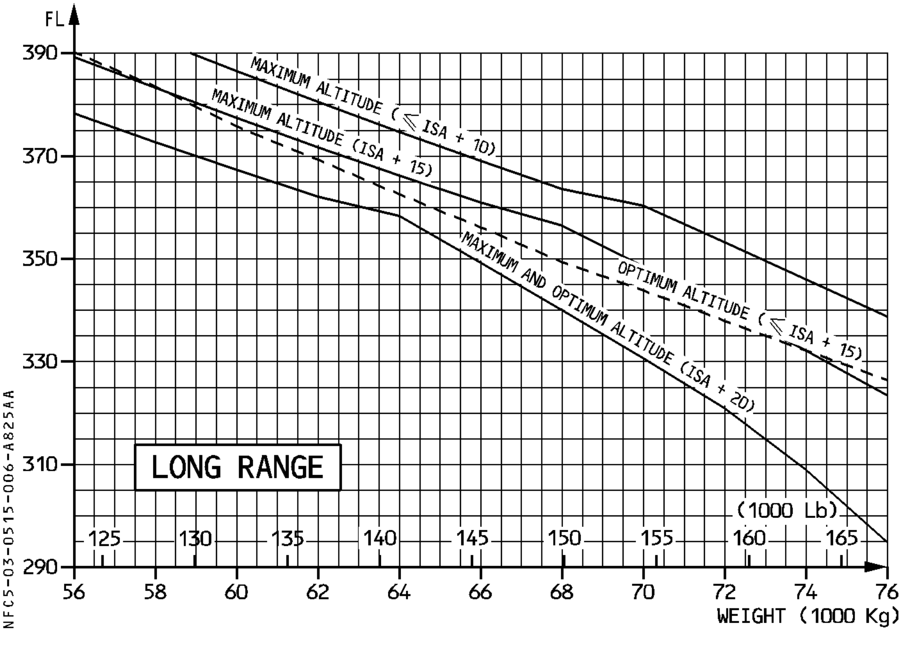
STEP CLIMB FROM/TO	WEIGHT (1000 kg)					
	≤ ISA + 10		ISA + 15		ISA + 20	
	LR	M.78	LR	M.78	LR	M.78
310/350	73	73	70	70	66	66
330/370	66	66	63	63	59	59
350/390	59	59	56	56	52	52

BLEED CORRECTIONS

	ENGINE ANTI ICE	TOTAL ANTI ICE
ISA	Max Alt. : – 200 ft Opt Alt. : – 200 ft	Max Alt. : – 500 ft Opt Alt. : – 300 ft
ISA + 10	Max Alt. : – 1500 ft Opt Alt. : – 400 ft	Max Alt. : – 4200 ft Opt Alt. : – 3100 ft
ISA + 15	Max Alt. : – 3500 ft Opt Alt. : – 3500 ft	Max. Alt. : – 4800 ft Opt Alt. : – 4300 ft
ISA + 20	Max Alt. : – 5300 ft Opt Alt. : – 3800 ft	Max Alt. : – 6500 ft Opt Alt. : – 6200 ft

R


FL
390
370
350
330
310
290
MAXIMUM ALTITUDE (≤ ISA + 10)
n = 1.3g
n = 1.4g
OPTIMUM ALTITUDE (≤ ISA + 15)
MAXIMUM ALTITUDE (ISA + 15)
MAXIMUM AND OPTIMUM ALTITUDE (ISA + 20)
M.78
(1000 Lb)
125 130 135 140 145 150 155 160 165
56 58 60 62 64 66 68 70 72 74 76
WEIGHT (1000 Kg)


FL
390
370
350
330
310
290
MAXIMUM ALTITUDE (≤ ISA + 10)
MAXIMUM ALTITUDE (ISA + 15)
OPTIMUM ALTITUDE (≤ ISA + 15)
MAXIMUM AND OPTIMUM ALTITUDE (ISA + 20)
LONG RANGE
(1000 Lb)
125 130 135 140 145 150 155 160 165
56 58 60 62 64 66 68 70 72 74 76
WEIGHT (1000 Kg)
NFC5-03-0515-006-A825AA

OPTIMUM AND MAXIMUM ALTITUDES

DEFINITIONS

- Optimum altitude : the altitude at which the airplane covers the maximum distance per kilogram (pound) of fuel (best specific range). It depends on the actual weight and the deviation from ISA.
- Maximum altitude is defined as the lower of :
  - maximum altitude at maximum cruise thrust in level flight and
  - maximum altitude at maximum climb thrust with 300 feet/minute vertical speed.

R — maximum altitude at maximum climb thrust with 1% climb gradient

Note : Definition of the maximum altitude in the FMGC is different (Refer to FCOM 4).

CRUISE LEVEL CHARTS

These charts have been established for a center of gravity at 33 % MAC.
Maximum and optimum altitudes are given for different temperatures at long range speed and M.78.

Note : The n = 1.3 g (n = 1.4 g) curve indicates the buffet margin.

OPTIMUM WEIGHT FOR 4000 FEET STEP CLIMB

R

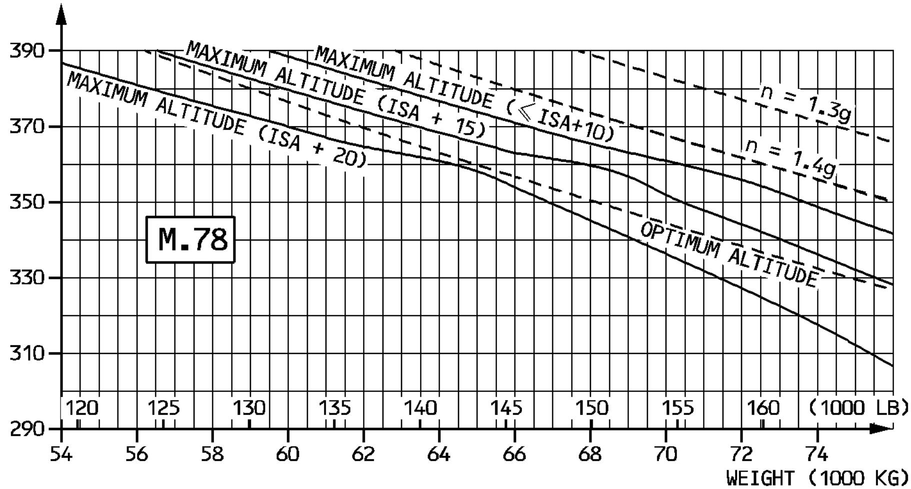
STEP CLIMB FROM/TO	WEIGHT (1000 kg/1000 lb)					
	< ISA + 10		ISA + 15		ISA + 20	
	LR	M.78	LR	M.78	LR	M.78
310/350	74/163	74/163	70/154	70/154	67/147	67/147
330/370	66/145	66/145	63/138	63/138	60/132	60/132
350/390	60/132	60/132	57/125	57/125	53/116	53/116

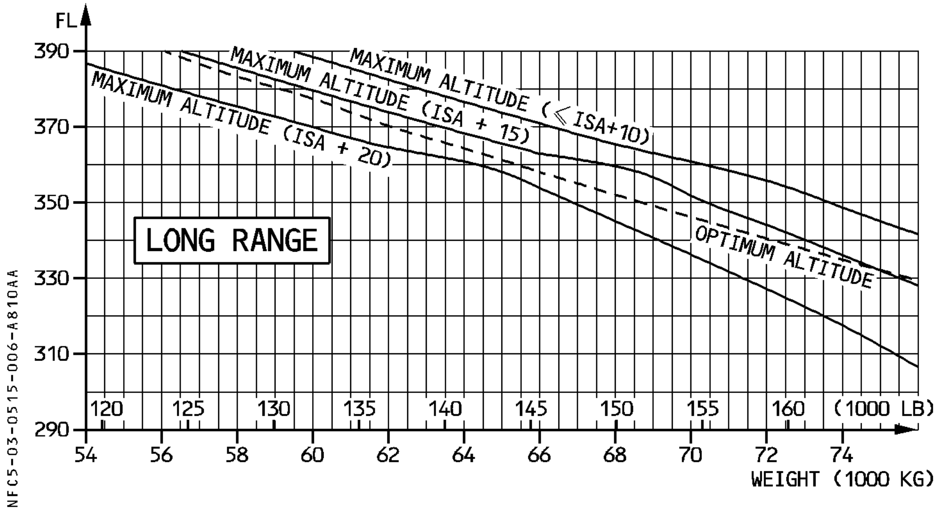
BLEED CORRECTIONS

R

	ENGINE ANTI ICE	TOTAL ANTI ICE
ISA	Max Alt. : – 200 ft Opt Alt. : – 200 ft	Max Alt. : – 500 ft Opt Alt. : – 200 ft
ISA + 10	Max Alt. : – 1400 ft Opt Alt. : – 200 ft	Max Alt. : – 2600 ft Opt Alt. : – 300 ft
ISA + 15	Max Alt. : – 1500 ft Opt Alt. : – 200 ft	Max. Alt. : – 4000 ft Opt Alt. – 1800 ft
ISA + 20	Max Alt. : – 3600 ft Opt Alt. : – 3200 ft	Max Alt. : – 6800 ft Opt Alt. : – 5700 ft

R


390
370
350
330
310
290
MAXIMUM ALTITUDE (≤ ISA+10)
MAXIMUM ALTITUDE (ISA + 15)
MAXIMUM ALTITUDE (ISA + 20)
n = 1.3g
n = 1.4g
OPTIMUM ALTITUDE
M.78
120
125
130
135
140
145
150
155
160
(1000 LB)
54
56
58
60
62
64
66
68
70
72
74
WEIGHT (1000 KG)


FL
390
370
350
330
310
290
MAXIMUM ALTITUDE (≤ ISA+10)
MAXIMUM ALTITUDE (ISA + 15)
MAXIMUM ALTITUDE (ISA + 20)
OPTIMUM ALTITUDE
LONG RANGE
120
125
130
135
140
145
150
155
160
(1000 LB)
54
56
58
60
62
64
66
68
70
72
74
WEIGHT (1000 KG)
NFC5-03-0515-006-A810AA

OPTIMUM AND MAXIMUM ALTITUDES

DEFINITIONS

- Optimum altitude : the altitude at which the airplane covers the maximum distance per kilogram (pound) of fuel (best specific range). It depends on the actual weight and the deviation from ISA.
- Maximum altitude is defined as the lower of :
  - maximum altitude at maximum cruise thrust in level flight and
  - maximum altitude at maximum climb thrust with 300 feet/minute vertical speed.
R - maximum altitude at maximum climb thrust with 1% climb gradient.

Note : Definition of the maximum altitude in the FMGC is different (Refer to FCOM 4).

CRUISE LEVEL CHARTS

These charts have been established for a center of gravity at 33 % MAC.
Maximum and optimum altitudes are given for different temperatures at long range speed and M.78.

Note : 1. Optimum and maximum altitudes curves do not cover for M.78 the whole weight range because above a given weight these Mach numbers cannot be maintained, whatever the altitude.
2. The n = 1.3 g (n = 1.4 g) curve indicates the buffet margin.

OPTIMUM WEIGHT FOR 4000 FEET STEP CLIMB

R

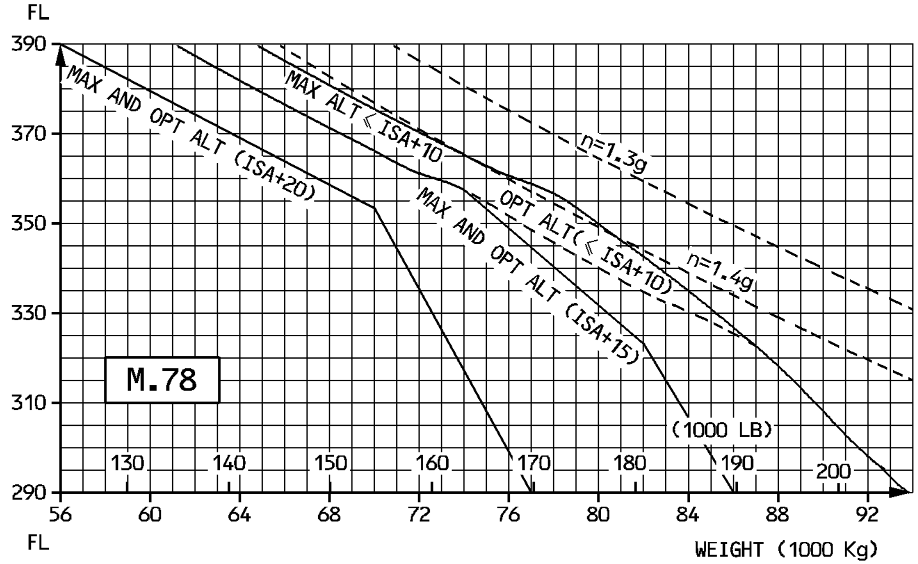
STEP CLIMB FROM/TO	WEIGHT (1000 kg/1000 lb)					
	≤ ISA + 10		ISA + 15		ISA + 20	
	LR	M.78	LR	M.78	LR	M.78
310/350	76/167	80/176	72/158	76/167	65/143	70/154
330/370	69/152	72/158	65/143	69/152	59/130	64/141
350/390	62/136	65/143	58/127	61/134	52/114	56/123

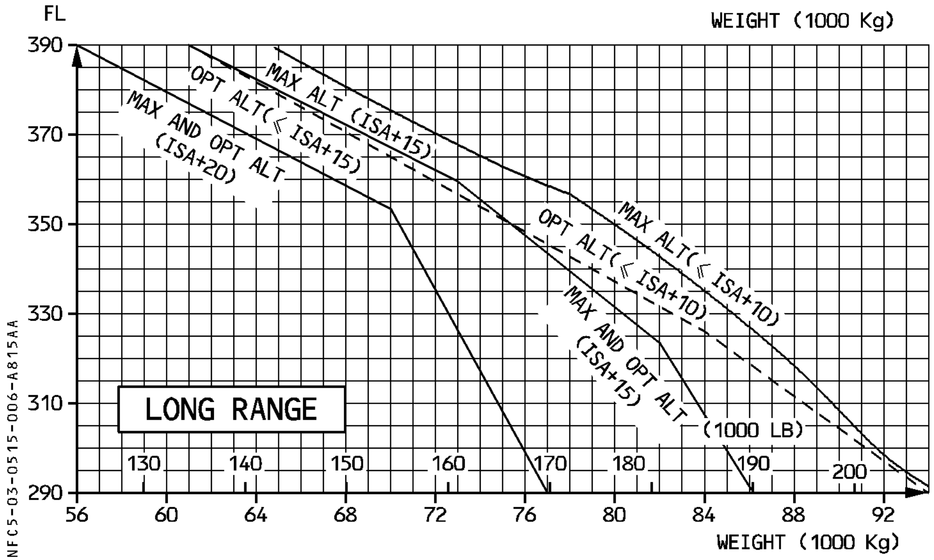
BLEED CORRECTIONS

R

	ENGINE ANTI ICE	TOTAL ANTI ICE
ISA	Max Alt. : – 400 ft Opt Alt. : – 400 ft	Max Alt. : – 900 ft Opt Alt. : – 400 ft
ISA + 10	Max Alt. : – 3200 ft Opt Alt. : – 1200 ft	Max Alt. : – 5000 ft Opt Alt. : – 2800 ft
ISA + 15	Max Alt. : – 5900 ft Opt Alt. : – 5900 ft	Max. Alt. : – 9900 ft Opt Alt. – 9400 ft
ISA + 20	Max Alt. : – 8200 ft Opt Alt. : – 8200 ft	Max Alt. : – 11000 ft Opt Alt. : – 11000 ft

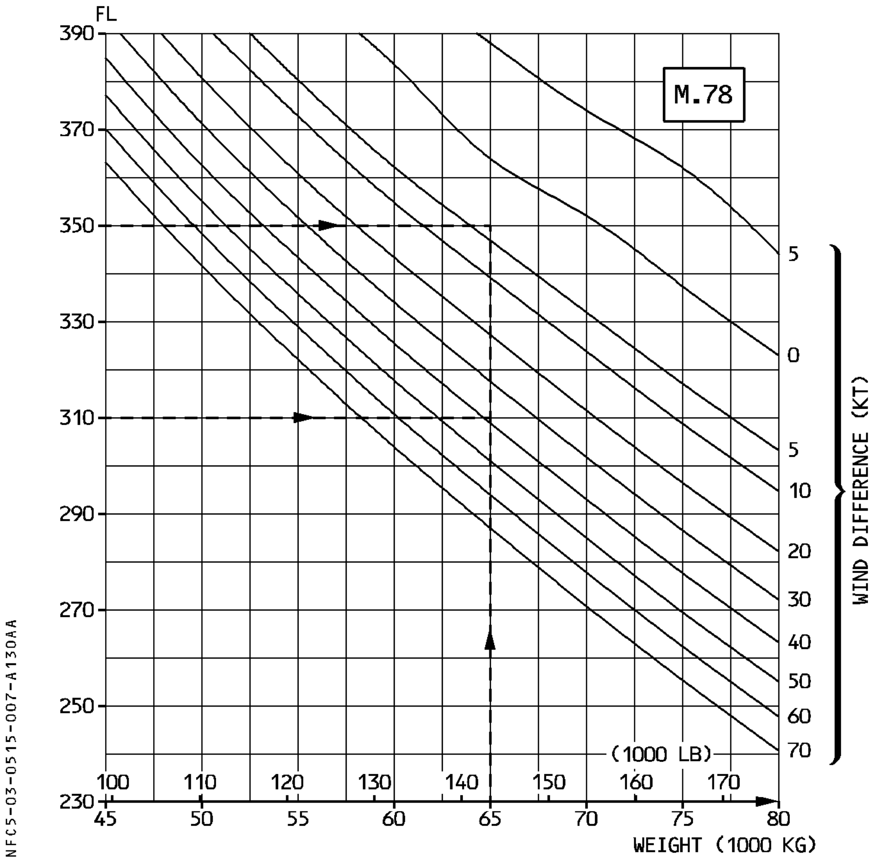
R


FL
390
370
350
330
310
290
MAX AND OPT ALT (ISA+20)
MAX ALT ≤ ISA+10
n=1.3g
OPT ALT(≤ ISA+10)
n=1.4g
MAX AND OPT ALT (ISA+15)
M.78
(1000 LB)
130
140
150
160
170
180
190
200
56
60
64
68
72
76
80
84
88
92
WEIGHT (1000 Kg)


FL
390
370
350
330
310
290
MAX ALT (ISA+15)
OPT ALT(≤ ISA+15)
MAX AND OPT ALT (ISA+20)
MAX ALT(≤ ISA+10)
OPT ALT(≤ ISA+10)
MAX AND OPT ALT (ISA+15)
LONG RANGE
(1000 LB)
130
140
150
160
170
180
190
200
56
60
64
68
72
76
80
84
88
92
WEIGHT (1000 Kg)
NFC5-03-0515-006-A815AA

WIND ALTITUDE TRADE FOR CONSTANT SPECIFIC RANGE

R



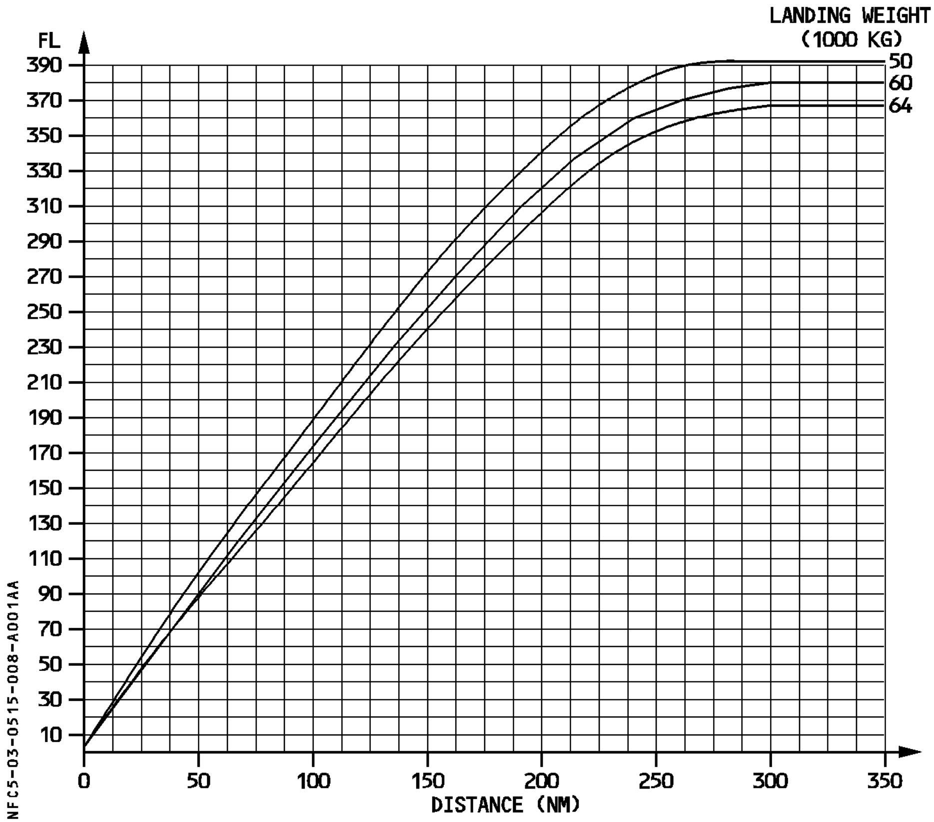
GIVEN	:	Weight : 65000 kg (143 300 lb)
R		Wind at FL350 : 10 kt head
R FIND	:	Minimum wind difference to descend to FL310 : (40 – 4)= 36 kt
R RESULTS	:	Descent to FL310 may be considered provided the tail wind at this altitude is more than (36 – 10) = 26 kt.

OPTIMUM ALTITUDE ON SHORT STAGE

According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.
It includes the following profiles:
- Takeoff
- Climb: 250kt/300kt/M.78
- Long range cruise (during at least 5 minutes)
- Descent: M.78/300kt/250kt
- Approach and landing

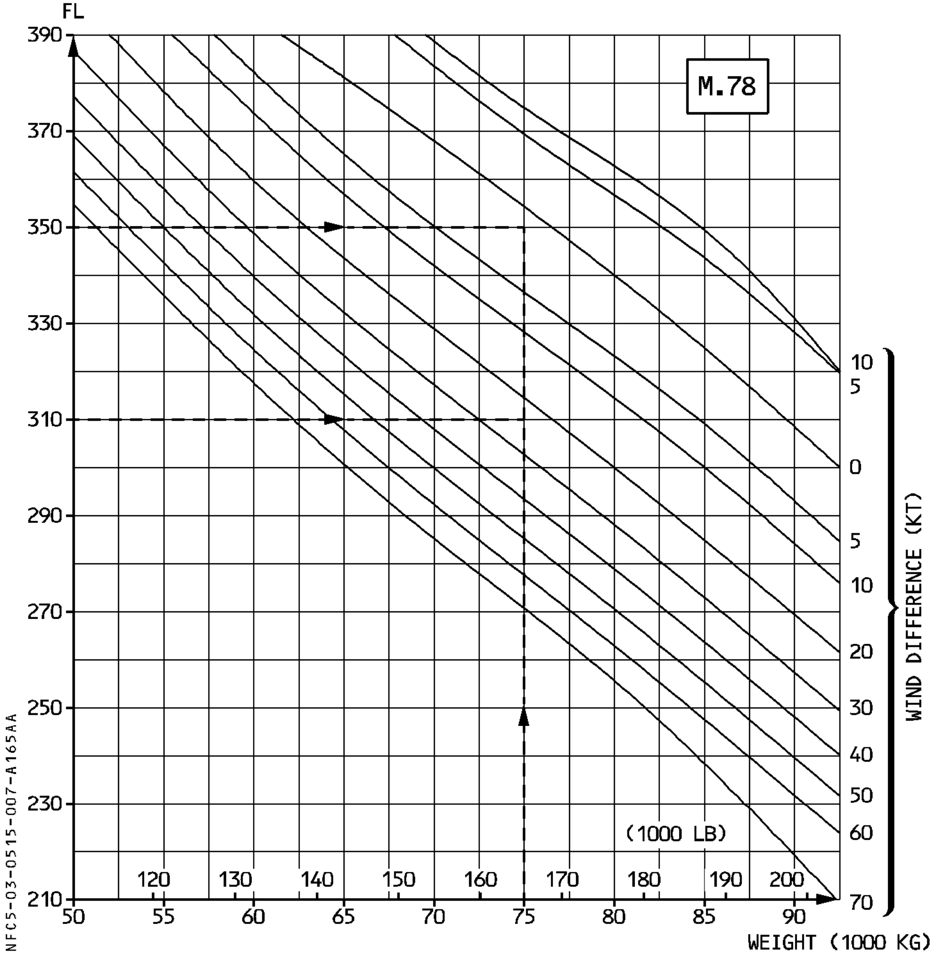
and it is established for:
- ISA
- CG = 33 %
R - Normal air conditioning
- Anti ice OFF

R



WIND ALTITUDE TRADE FOR CONSTANT SPECIFIC RANGE

R



GIVEN : Weight : 75000 kg (165 300 lb)
Wind at FL350 : 10 kt head

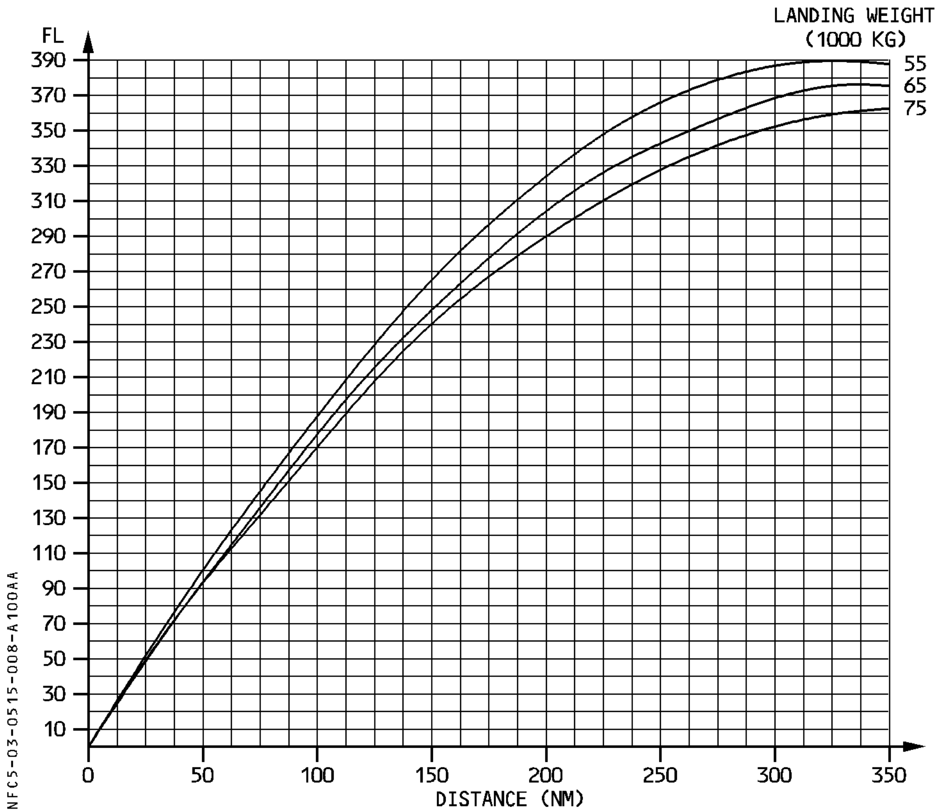
R FIND : Minimum wind difference to descend to FL310 : (24 – 1) = 23 kt

RESULTS : Descent to FL310 may be considered provided the tail wind at this

R altitude is more than (23 – 10) = 13 kt.

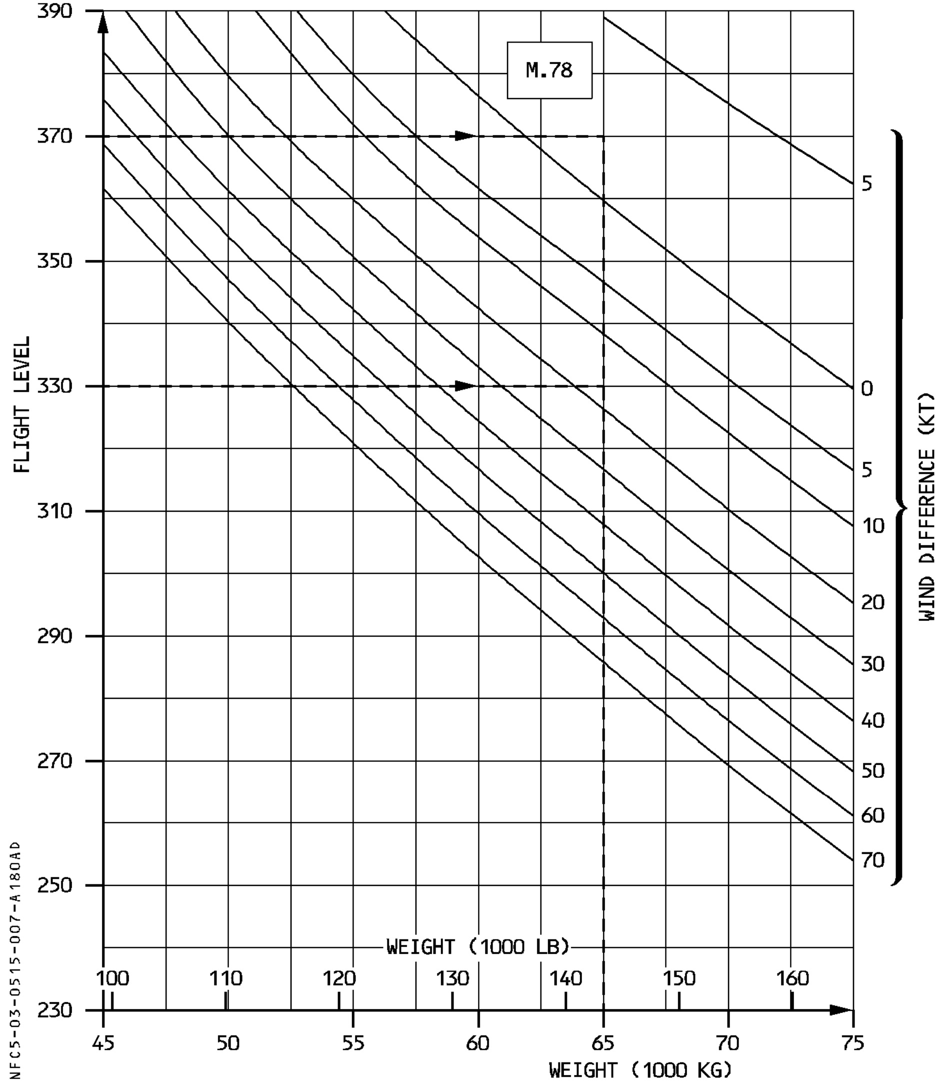
OPTIMUM ALTITUDE ON SHORT STAGE

According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.
It includes the following profiles:
– Takeoff
– Climb: 250kt/300kt/M.78
– Long range cruise (during at least 5 minutes)
– Descent: M.78/300kt/250kt
– Approach and landing
and it is established for:
– ISA
– CG = 33 %
– Normal air conditioning
R – Anti ice OFF
R



WIND ALTITUDE TRADE FOR CONSTANT SPECIFIC RANGE

R



GIVEN : Weight : 65000 kg (143 300 lb)
Wind at FL370 : 10 kt head

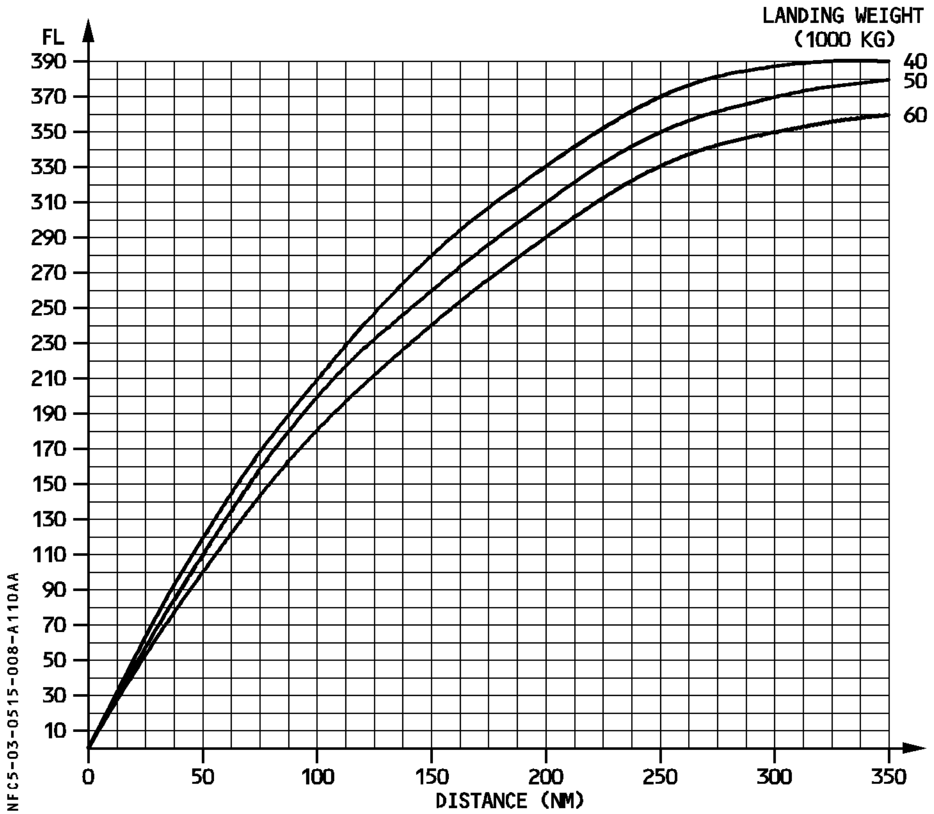
R FIND : Minimum wind difference to descend to FL330 : (17 – 2) = 15 kt

RESULTS : Descent to FL330 may be considered provided the tail wind at this
R altitude is more than (15 – 10) = 5 kt.

OPTIMUM ALTITUDE ON SHORT STAGE

According to the air distance (from brake release point to landing), the cruise flight level is limited by the distance required to perform climb and descent. The graph determines the optimum altitude.
It includes the following profiles:
- Takeoff
- Climb: 250KT/300KT/M.78
- Long range cruise (during at least 5 minutes)
- Descent: M.78/300KT/250KT
- Approach and landing

and it is established for:
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF



R

CRUISE - M.78

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

N1 (%) **MACH**
KG/H/ENG **IAS (KT)**
NM/1000KG **TAS (KT)**

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	80.8	.780	80.6	.780	80.4	.780	80.4	.780	80.9	.780	82.0	.780
	1305	302	1211	289	1127	277	1053	264	994	252	954	241
	176.9	462	188.9	458	201.3	454	213.5	450	225.0	447	234.6	447
52	80.9	.780	80.7	.780	80.6	.780	80.7	.780	81.3	.780	82.5	.780
	1315	302	1222	289	1139	277	1066	264	1011	252	975	241
	175.6	462	187.3	458	199.2	454	210.8	450	221.2	447	229.3	447
54	81.1	.780	80.9	.780	80.9	.780	81.0	.780	81.7	.780	82.9	.780
	1324	302	1232	289	1152	277	1082	264	1030	252	1000	241
	174.3	462	185.7	458	196.8	454	207.8	450	217.2	447	223.6	447
56	81.2	.780	81.1	.780	81.1	.780	81.3	.780	82.1	.780	83.5	.780
	1335	302	1244	289	1166	277	1098	264	1051	252	1030	241
	173.0	462	184.0	458	194.6	454	204.7	450	212.9	447	217.1	447
58	81.4	.780	81.3	.780	81.4	.780	81.7	.780	82.5	.780	84.1	.780
	1345	302	1257	289	1180	277	1116	264	1074	252	1063	241
	171.6	462	182.1	458	192.2	454	201.5	450	208.3	447	210.5	447
60	81.6	.780	81.6	.780	81.7	.780	82.1	.780	83.0	.780	84.7	.780
	1356	302	1271	289	1196	277	1135	264	1099	252	1097	241
	170.2	462	180.1	458	189.6	454	198.1	450	203.6	447	203.9	447
62	81.8	.780	81.8	.780	82.0	.780	82.5	.780	83.5	.780	85.4	.780
	1368	302	1284	289	1213	277	1157	264	1129	252	1133	241
	168.7	462	178.2	458	187.0	454	194.4	450	198.1	447	197.4	447
64	82.0	.780	82.0	.780	82.3	.780	82.9	.780	84.0	.780		
	1382	302	1299	289	1231	277	1180	264	1162	252		
	167.1	462	176.2	458	184.3	454	190.5	450	192.6	447		
66	82.2	.780	82.3	.780	82.7	.780	83.3	.780	84.6	.780		
	1396	302	1315	289	1250	277	1205	264	1196	252		
	165.4	462	174.0	458	181.4	454	186.5	450	187.1	447		
68	82.4	.780	82.6	.780	83.1	.780	83.7	.780	85.2	.780		
	1409	302	1332	289	1272	277	1235	264	1232	252		
	163.8	462	171.8	458	178.3	454	182.1	450	181.6	447		
70	82.6	.780	82.9	.780	83.4	.780	84.2	.780	85.9	.780		
	1424	302	1350	289	1296	277	1267	264	1269	252		
	162.1	462	169.5	458	175.1	454	177.4	450	176.3	447		
72	82.9	.780	83.2	.780	83.8	.780	84.7	.780				
	1441	302	1370	289	1321	277	1301	264				
	160.2	462	167.1	458	171.7	454	172.8	450				
74	83.1	.780	83.6	.780	84.2	.780	85.3	.780				
	1458	302	1391	289	1348	277	1337	264				
	158.4	462	164.5	458	168.2	454	168.2	450				
76	83.4	.780	83.9	.780	84.6	.780	85.9	.780				
	1475	302	1414	289	1380	277	1374	264				
	156.5	462	161.8	458	164.3	454	163.7	450				
78	83.7	.780	84.3	.780	85.1	.780	86.5	.780				
	1495	302	1439	289	1414	277	1411	264				
	154.4	462	159.0	458	160.5	454	159.3	450				

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = −0.5 %	△FUEL = +2.0 %	△FUEL = +4.5 %

R

CRUISE - M.78

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+10 CG=33.0%	N1 (%) KG/H/ENG NM/1000KG	MACH IAS (KT) TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	82.6	.780	82.4	.780	82.2	.780	82.2	.780	82.7	.780	83.9	.780
	1340	302	1244	289	1157	277	1082	264	1022	252	980	241
	176.0	472	187.9	468	200.4	464	212.5	460	223.9	458	233.5	458
52	82.7	.780	82.5	.780	82.4	.780	82.5	.780	83.1	.780	84.3	.780
	1350	302	1255	289	1170	277	1096	264	1039	252	1002	241
	174.7	472	186.4	468	198.2	464	209.8	460	220.2	458	228.2	458
54	82.9	.780	82.7	.780	82.7	.780	82.8	.780	83.6	.780	84.8	.780
	1360	302	1266	289	1183	277	1112	264	1058	252	1028	241
	173.4	472	184.7	468	195.9	464	206.8	460	216.2	458	222.5	458
56	83.0	.780	82.9	.780	82.9	.780	83.2	.780	84.0	.780	85.4	.780
	1370	302	1278	289	1197	277	1129	264	1080	252	1059	241
	172.0	472	183.0	468	193.7	464	203.7	460	211.9	458	216.0	458
58	83.2	.780	83.1	.780	83.2	.780	83.5	.780	84.4	.780	86.0	.780
	1381	302	1291	289	1212	277	1147	264	1103	252	1093	241
	170.7	472	181.1	468	191.3	464	200.5	460	207.4	458	209.4	458
60	83.4	.780	83.4	.780	83.5	.780	83.9	.780	84.9	.780	86.6	.780
	1393	302	1305	289	1229	277	1166	264	1130	252	1128	241
	169.3	472	179.1	468	188.7	464	197.1	460	202.5	458	202.9	458
62	83.5	.780	83.6	.780	83.8	.780	84.3	.780	85.4	.780	87.3	.780
	1405	302	1319	289	1246	277	1188	264	1161	252	1165	241
	167.8	472	177.3	468	186.1	464	193.4	460	197.1	458	196.3	458
64	83.8	.780	83.9	.780	84.2	.780	84.7	.780	85.9	.780		
	1419	302	1334	289	1264	277	1213	264	1194	252		
	166.2	472	175.2	468	183.4	464	189.6	460	191.6	458		
66	84.0	.780	84.1	.780	84.5	.780	85.1	.780	86.5	.780		
	1433	302	1351	289	1284	277	1239	264	1230	252		
	164.5	472	173.0	468	180.6	464	185.6	460	186.1	458		
68	84.2	.780	84.4	.780	84.9	.780	85.6	.780	87.1	.780		
	1447	302	1369	289	1307	277	1269	264	1267	252		
	162.9	472	170.8	468	177.4	464	181.1	460	180.6	458		
70	84.4	.780	84.7	.780	85.3	.780	86.1	.780	87.8	.780		
	1462	302	1387	289	1331	277	1303	264	1305	252		
	161.2	472	168.6	468	174.2	464	176.5	460	175.3	458		
72	84.7	.780	85.1	.780	85.7	.780	86.6	.780				
	1479	302	1407	289	1357	277	1338	264				
	159.4	472	166.2	468	170.9	464	171.9	460				
74	84.9	.780	85.4	.780	86.1	.780	87.2	.780				
	1497	302	1430	289	1386	277	1374	264				
	157.5	472	163.6	468	167.3	464	167.3	460				
76	85.2	.780	85.8	.780	86.5	.780	87.8	.780				
	1515	302	1453	289	1418	277	1412	264				
	155.6	472	160.9	468	163.5	464	162.8	460				
78	85.5	.780	86.1	.780	87.0	.780	88.4	.780				
	1535	302	1479	289	1453	277	1451	264				
	153.6	472	158.1	468	159.6	464	158.5	460				

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = −0.5 %	△FUEL = +2.0 %	△FUEL = +4.5 %

R

CRUISE - M.78

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

N1 (%) — MACH
KG/H/ENG — IAS (KT)
NM/1000KG — TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
64	83.9	.780	84.0	.780	84.1	.780	84.3	.780	85.1	.780	87.1	.780
	1466	302	1375	289	1297	277	1237	264	1197	252	1187	241
	157.4	462	166.4	458	174.9	454	181.7	450	186.9	447	188.4	447
66	84.2	.780	84.2	.780	84.3	.780	84.6	.780	85.6	.780	87.8	.780
	1480	302	1391	289	1316	277	1260	264	1223	252	1227	241
	156.0	462	164.6	458	172.4	454	178.4	450	182.8	447	182.3	447
68	84.4	.780	84.4	.780	84.6	.780	85.0	.780	86.2	.780	88.6	.780
	1494	302	1407	289	1337	277	1283	264	1253	252	1272	241
	154.5	462	162.7	458	169.7	454	175.2	450	178.5	447	175.9	447
70	84.6	.780	84.7	.780	84.9	.780	85.3	.780	86.8	.780		
	1509	302	1424	289	1359	277	1307	264	1287	252		
	153.0	462	160.7	458	166.9	454	171.9	450	173.9	447		
72	84.8	.780	84.9	.780	85.2	.780	85.8	.780	87.4	.780		
	1524	302	1442	289	1381	277	1334	264	1326	252		
	151.5	462	158.7	458	164.2	454	168.5	450	168.7	447		
74	85.0	.780	85.2	.780	85.5	.780	86.3	.780	88.1	.780		
	1540	302	1463	289	1405	277	1363	264	1368	252		
	149.9	462	156.4	458	161.5	454	165.0	450	163.5	447		
76	85.2	.780	85.4	.780	85.8	.780	86.8	.780	89.0	.780		
	1557	302	1485	289	1429	277	1394	264	1417	252		
	148.3	462	154.1	458	158.8	454	161.2	450	157.8	447		
78	85.5	.780	85.7	.780	86.2	.780	87.4	.780	90.2	.780		
	1574	302	1507	289	1454	277	1430	264	1475	252		
	146.6	462	151.8	458	156.0	454	157.2	450	151.6	447		
80	85.7	.780	86.0	.780	86.6	.780	88.0	.780				
	1594	302	1530	289	1482	277	1471	264				
	144.8	462	149.5	458	153.1	454	152.8	450				
82	85.9	.780	86.3	.780	87.1	.780	88.6	.780				
	1616	302	1554	289	1512	277	1515	264				
	142.8	462	147.2	458	150.0	454	148.4	450				
84	86.2	.780	86.6	.780	87.6	.780	89.5	.780				
	1638	302	1579	289	1545	277	1565	264				
	140.9	462	145.0	458	146.8	454	143.6	450				
86	86.4	.780	86.9	.780	88.1	.780						
	1661	302	1605	289	1581	277						
	139.0	462	142.6	458	143.4	454						
88	86.7	.780	87.3	.780	88.7	.780						
	1685	302	1633	289	1623	277						
	137.0	462	140.2	458	139.8	454						
90	86.9	.780	87.7	.780	89.3	.780						
	1709	302	1663	289	1667	277						
	135.1	462	137.6	458	136.1	454						
92	87.2	.780	88.2	.780	90.0	.780						
	1733	302	1696	289	1715	277						
	133.2	462	134.9	458	132.2	454						

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.6 %	△FUEL = + 3 %	△FUEL = + 5.5 %

R

CRUISE - M.78

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+10 CG=33.0%	**N1 (%) KG/H/ENG NM/1000KG**	**MACH IAS (KT) TAS (KT)**

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
64	85.8	.780	85.8	.780	85.9	.780	86.2	.780	87.0	.780	89.0	.780
	1506	302	1413	289	1333	277	1272	264	1230	252	1221	241
	156.6	472	165.5	468	174.0	464	180.7	460	185.9	458	187.3	458
66	86.0	.780	86.0	.780	86.2	.780	86.5	.780	87.6	.780	89.7	.780
	1520	302	1429	289	1352	277	1295	264	1258	252	1263	241
	155.1	472	163.6	468	171.5	464	177.5	460	181.9	458	181.2	458
68	86.2	.780	86.3	.780	86.5	.780	86.9	.780	88.1	.780	90.6	.780
	1535	302	1446	289	1374	277	1319	264	1289	252	1309	241
	153.6	472	161.7	468	168.8	464	174.3	460	177.5	458	174.8	458
70	86.4	.780	86.5	.780	86.8	.780	87.2	.780	88.7	.780		
	1550	302	1463	289	1396	277	1344	264	1324	252		
	152.1	472	159.8	468	166.0	464	171.0	460	172.8	458		
72	86.6	.780	86.8	.780	87.1	.780	87.7	.780	89.4	.780		
	1566	302	1482	289	1420	277	1372	264	1364	252		
	150.6	472	157.8	468	163.3	464	167.6	460	167.7	458		
74	86.8	.780	87.0	.780	87.4	.780	88.2	.780	90.1	.780		
	1582	302	1504	289	1444	277	1401	264	1408	252		
	149.0	472	155.5	468	160.6	464	164.0	460	162.5	458		
76	87.1	.780	87.3	.780	87.7	.780	88.7	.780	91.0	.780		
	1599	302	1526	289	1468	277	1434	264	1460	252		
	147.4	472	153.2	468	157.9	464	160.3	460	156.7	458		
78	87.3	.780	87.6	.780	88.1	.780	89.3	.780	92.3	.780		
	1618	302	1549	289	1495	277	1471	264	1520	252		
	145.8	472	150.9	468	155.1	464	156.2	460	150.5	458		
80	87.5	.780	87.8	.780	88.5	.780	89.9	.780				
	1638	302	1573	289	1523	277	1513	264				
	143.9	472	148.7	468	152.2	464	151.9	460				
82	87.8	.780	88.1	.780	89.0	.780	90.6	.780				
	1660	302	1598	289	1554	277	1559	264				
	142.0	472	146.4	468	149.2	464	147.5	460				
84	88.0	.780	88.4	.780	89.5	.780	91.5	.780				
	1683	302	1623	289	1588	277	1612	264				
	140.1	472	144.1	468	146.0	464	142.6	460				
86	88.2	.780	88.8	.780	90.0	.780						
	1707	302	1650	289	1626	277						
	138.1	472	141.7	468	142.6	464						
88	88.5	.780	89.2	.780	90.6	.780						
	1731	302	1679	289	1669	277						
	136.2	472	139.3	468	138.9	464						
90	88.8	.780	89.6	.780	91.2	.780						
	1756	302	1710	289	1715	277						
	134.3	472	136.7	468	135.2	464						
92	89.0	.780	90.1	.780	91.9	.780						
	1781	302	1744	289	1766	277						
	132.4	472	134.0	468	131.3	464						

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.6 %	△FUEL = + 3 %	△FUEL = + 5.5 %

R

CRUISE - M.78

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

N1 (%) / MACH
KG/H/ENG / IAS (KT)
NM/1000KG / TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	80.3 1280 180.3	.780 302 462	80.2 1188 192.6	.780 289 458	80.0 1106 205.1	.780 277 454	80.0 1035 217.2	.780 264 450	80.5 978 228.7	.780 252 447	81.7 939 238.3	.780 241 447
52	80.5 1290 179.0	.780 302 462	80.3 1199 190.9	.780 289 458	80.3 1119 202.8	.780 277 454	80.3 1048 214.4	.780 264 450	80.9 995 224.9	.780 252 447	82.2 961 232.8	.780 241 447
54	80.7 1299 177.7	.780 302 462	80.5 1209 189.2	.780 289 458	80.5 1132 200.3	.780 277 454	80.6 1064 211.3	.780 264 450	81.3 1013 220.7	.780 252 447	82.7 986 226.9	.780 241 447
56	80.9 1309 176.3	.780 302 462	80.7 1221 187.3	.780 289 458	80.8 1146 198.0	.780 277 454	80.9 1080 208.1	.780 264 450	81.8 1034 216.3	.780 252 447	83.2 1015 220.4	.780 241 447
58	81.0 1320 174.9	.780 302 462	81.0 1235 185.4	.780 289 458	81.0 1160 195.6	.780 277 454	81.3 1098 204.8	.780 264 450	82.2 1058 211.5	.780 252 447	83.8 1048 213.3	.780 241 447
60	81.2 1331 173.4	.780 302 462	81.2 1249 183.3	.780 289 458	81.3 1176 192.9	.780 277 454	81.7 1117 201.3	.780 264 450	82.7 1083 206.5	.780 252 447	84.5 1083 206.5	.780 241 447
62	81.4 1344 171.8	.780 302 462	81.4 1262 181.3	.780 289 458	81.6 1193 190.1	.780 277 454	82.1 1139 197.4	.780 264 450	83.2 1113 201.1	.780 252 447	85.1 1120 199.7	.780 241 447
64	81.6 1357 170.1	.780 302 462	81.7 1277 179.2	.780 289 458	82.0 1211 187.3	.780 277 454	82.6 1163 193.4	.780 264 450	83.8 1146 195.1	.780 252 447	85.9 1157 193.3	.780 241 447
66	81.8 1371 168.3	.780 302 462	81.9 1293 176.9	.780 289 458	82.3 1230 184.4	.780 277 454	83.0 1188 189.2	.780 264 450	84.3 1181 189.4	.780 252 447		
68	82.0 1385 166.7	.780 302 462	82.2 1310 174.7	.780 289 458	82.7 1252 181.2	.780 277 454	83.4 1216 184.8	.780 264 450	84.9 1217 183.7	.780 252 447		
70	82.2 1400 164.9	.780 302 462	82.5 1328 172.3	.780 289 458	83.2 1276 177.7	.780 277 454	83.9 1250 179.9	.780 264 450	85.6 1254 178.3	.780 252 447		
72	82.5 1416 163.0	.780 302 462	82.9 1348 169.8	.780 289 458	83.5 1302 174.3	.780 277 454	84.5 1285 175.0	.780 264 450	86.3 1292 173.1	.780 252 447		
74	82.8 1433 161.1	.780 302 462	83.2 1369 167.2	.780 289 458	83.9 1329 170.7	.780 277 454	85.0 1320 170.2	.780 264 450				
76	83.0 1451 159.1	.780 302 462	83.6 1392 164.4	.780 289 458	84.4 1360 166.7	.780 277 454	85.6 1358 165.6	.780 264 450				

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 4.5 %

R

CRUISE - M.78

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

N1 (%) — MACH
KG/H/ENG — IAS (KT)
NM/1000KG — TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	82.1	.780	82.0	.780	81.8	.780	81.9	.780	82.4	.780	83.6	.780
	1314	302	1221	289	1136	277	1063	264	1005	252	965	241
	179.4	472	191.6	468	204.1	464	216.2	460	227.7	458	237.2	458
52	82.3	.780	82.1	.780	82.1	.780	82.1	.780	82.8	.780	84.1	.780
	1324	302	1231	289	1149	277	1077	264	1022	252	987	241
	178.1	472	189.9	468	201.8	464	213.4	460	223.8	458	231.7	458
54	82.5	.780	82.3	.780	82.3	.780	82.5	.780	83.2	.780	84.5	.780
	1334	302	1242	289	1163	277	1093	264	1041	252	1013	241
	176.8	472	188.2	468	199.4	464	210.3	460	219.7	458	225.8	458
56	82.6	.780	82.5	.780	82.6	.780	82.8	.780	83.7	.780	85.1	.780
	1344	302	1255	289	1177	277	1110	264	1063	252	1044	241
	175.4	472	186.4	468	197.0	464	207.1	460	215.3	458	219.3	458
58	82.8	.780	82.8	.780	82.8	.780	83.2	.780	84.1	.780	85.7	.780
	1355	302	1268	289	1191	277	1128	264	1087	252	1078	241
	174.0	472	184.4	468	194.6	464	203.8	460	210.5	458	212.2	458
60	83.0	.780	83.0	.780	83.1	.780	83.6	.780	84.6	.780	86.4	.780
	1367	302	1283	289	1208	277	1148	264	1113	252	1114	241
	172.5	472	182.3	468	191.9	464	200.3	460	205.5	458	205.4	458
62	83.2	.780	83.2	.780	83.5	.780	84.0	.780	85.1	.780	87.1	.780
	1380	302	1297	289	1225	277	1170	264	1144	252	1152	241
	170.9	472	180.4	468	189.2	464	196.5	460	200.0	458	198.7	458
64	83.4	.780	83.5	.780	83.8	.780	84.4	.780	85.7	.780	87.8	.780
	1394	302	1312	289	1244	277	1195	264	1179	252	1190	241
	169.2	472	178.3	468	186.4	464	192.4	460	194.1	458	192.3	458
66	83.6	.780	83.8	.780	84.2	.780	84.9	.780	86.2	.780		
	1408	302	1329	289	1264	277	1221	264	1214	252		
	167.4	472	176.0	468	183.5	464	188.3	460	188.4	458		
68	83.8	.780	84.0	.780	84.6	.780	85.3	.780	86.9	.780		
	1422	302	1346	289	1286	277	1250	264	1252	252		
	165.8	472	173.7	468	180.3	464	183.8	460	182.8	458		
70	84.0	.780	84.4	.780	85.0	.780	85.8	.780	87.5	.780		
	1437	302	1364	289	1311	277	1285	264	1290	252		
	164.0	472	171.4	468	176.9	464	178.9	460	177.4	458		
72	84.3	.780	84.7	.780	85.4	.780	86.4	.780	88.2	.780		
	1454	302	1384	289	1337	277	1321	264	1329	252		
	162.1	472	168.9	468	173.4	464	174.1	460	172.2	458		
74	84.6	.780	85.1	.780	85.8	.780	86.9	.780				
	1472	302	1406	289	1365	277	1358	264				
	160.2	472	166.3	468	169.9	464	169.3	460				
76	84.8	.780	85.5	.780	86.2	.780	87.5	.780				
	1490	302	1430	289	1398	277	1396	264				
	158.2	472	163.5	468	165.8	464	164.7	460				

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 4.5 %

R

CRUISE - M.78

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+15 CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	83.4	.780	83.2	.780	83.1	.780	83.1	.780	83.7	.780	84.8	.780
	1358	302	1261	289	1173	277	1097	264	1035	252	993	241
	175.5	476	187.4	473	199.8	469	211.9	465	223.4	463	232.8	463
52	83.6	.780	83.4	.780	83.3	.780	83.4	.780	84.1	.780	85.3	.780
	1368	302	1272	289	1185	277	1110	264	1053	252	1016	241
	174.2	476	185.8	473	197.7	469	209.3	465	219.7	463	227.6	463
54	83.7	.780	83.6	.780	83.6	.780	83.7	.780	84.5	.780	85.8	.780
	1378	302	1283	289	1199	277	1127	264	1073	252	1043	241
	172.9	476	184.2	473	195.4	469	206.3	465	215.7	463	221.8	463
56	83.9	.780	83.8	.780	83.8	.780	84.1	.780	84.9	.780	86.3	.780
	1389	302	1295	289	1213	277	1144	264	1094	252	1074	241
	171.5	476	182.5	473	193.1	469	203.1	465	211.4	463	215.4	463
58	84.1	.780	84.0	.780	84.1	.780	84.5	.780	85.3	.780	86.9	.780
	1399	302	1308	289	1228	277	1162	264	1118	252	1108	241
	170.2	476	180.6	473	190.8	469	200.0	465	206.9	463	208.8	463
60	84.2	.780	84.3	.780	84.4	.780	84.9	.780	85.8	.780	87.6	.780
	1411	302	1323	289	1245	277	1182	264	1145	252	1144	241
	168.8	476	178.6	473	188.2	469	196.6	465	202.0	463	202.2	463
62	84.4	.780	84.5	.780	84.7	.780	85.3	.780	86.3	.780		
	1424	302	1337	289	1263	277	1205	264	1177	252		
	167.3	476	176.8	473	185.6	469	192.9	465	196.5	463		
64	84.6	.780	84.7	.780	85.1	.780	85.6	.780	86.8	.780		
	1438	302	1352	289	1281	277	1229	264	1211	252		
	165.7	476	174.7	473	182.9	469	189.1	465	191.0	463		
66	84.8	.780	85.0	.780	85.5	.780	86.1	.780	87.4	.780		
	1452	302	1369	289	1302	277	1255	264	1247	252		
	164.0	476	172.5	473	180.0	469	185.1	465	185.6	463		
68	85.1	.780	85.3	.780	85.8	.780	86.5	.780				
	1466	302	1387	289	1324	277	1287	264				
	162.5	476	170.3	473	176.9	469	180.6	465				
70	85.3	.780	85.6	.780	86.2	.780	87.0	.780				
	1482	302	1406	289	1349	277	1321	264				
	160.7	476	168.1	473	173.7	469	175.9	465				
72	85.6	.780	86.0	.780	86.6	.780	87.5	.780				
	1499	302	1426	289	1375	277	1356	264				
	158.9	476	165.7	473	170.4	469	171.4	465				
74	85.8	.780	86.3	.780	87.0	.780	88.1	.780				
	1517	302	1449	289	1405	277	1393	264				
	157.0	476	163.1	473	166.8	469	166.8	465				
76	86.1	.780	86.7	.780	87.4	.780						
	1535	302	1472	289	1438	277						
	155.2	476	160.5	473	163.0	469						
78	86.4	.780	87.0	.780	87.9	.780						
	1556	302	1499	289	1473	277						
	153.1	476	157.7	473	159.1	469						

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = –0.5 %	△FUEL = +2.0 %	△FUEL = +4.5 %

R

CRUISE - M.78

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+20 CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	84.3	.780	84.1	.780	84.0	.780	84.0	.780	84.6	.780	85.7	.780
	1376	302	1278	289	1188	277	1112	264	1049	252	1007	241
	174.9	481	186.8	477	199.3	474	211.3	470	222.8	468	232.2	468
52	84.4	.780	84.3	.780	84.2	.780	84.3	.780	85.0	.780	86.2	.780
	1386	302	1288	289	1201	277	1126	264	1067	252	1030	241
	173.6	481	185.3	477	197.1	474	208.7	470	219.1	468	227.0	468
54	84.6	.780	84.5	.780	84.5	.780	84.6	.780	85.4	.780	86.7	.780
	1396	302	1300	289	1216	277	1142	264	1087	252	1057	241
	172.3	481	183.7	477	194.8	474	205.6	470	215.1	468	221.1	468
56	84.8	.780	84.7	.780	84.7	.780	85.0	.780	85.8	.780	87.2	.780
	1407	302	1312	289	1230	277	1160	264	1109	252	1089	241
	171.0	481	181.9	477	192.6	474	202.5	470	210.8	468	214.7	468
58	84.9	.780	84.9	.780	85.0	.780	85.4	.780	86.2	.780		
	1418	302	1326	289	1245	277	1178	264	1133	252		
	169.7	481	180.0	477	190.2	474	199.4	470	206.3	468		
60	85.1	.780	85.1	.780	85.3	.780	85.8	.780	86.7	.780		
	1430	302	1340	289	1262	277	1198	264	1161	252		
	168.3	481	178.1	477	187.7	474	196.0	470	201.4	468		
62	85.3	.780	85.4	.780	85.6	.780	86.2	.780	87.2	.780		
	1443	302	1355	289	1280	277	1221	264	1193	252		
	166.8	481	176.2	477	185.0	474	192.3	470	196.0	468		
64	85.5	.780	85.6	.780	86.0	.780	86.5	.780				
	1457	302	1370	289	1299	277	1246	264				
	165.1	481	174.2	477	182.3	474	188.5	470				
66	85.7	.780	85.9	.780	86.4	.780	87.0	.780				
	1472	302	1388	289	1319	277	1273	264				
	163.5	481	172.0	477	179.5	474	184.5	470				
68	85.9	.780	86.2	.780	86.7	.780	87.4	.780				
	1486	302	1406	289	1342	277	1305	264				
	161.9	481	169.8	477	176.4	474	180.0	470				
70	86.2	.780	86.5	.780	87.1	.780	87.9	.780				
	1502	302	1425	289	1367	277	1339	264				
	160.2	481	167.6	477	173.2	474	175.4	470				
72	86.4	.780	86.9	.780	87.5	.780						
	1519	302	1445	289	1394	277						
	158.4	481	165.2	477	169.9	474						
74	86.7	.780	87.2	.780	87.9	.780						
	1537	302	1468	289	1424	277						
	156.5	481	162.6	477	166.3	474						
76	87.0	.780	87.6	.780								
	1556	302	1492	289								
	154.7	481	160.0	477								
78	87.3	.780	87.9	.780								
	1576	302	1519	289								
	152.6	481	157.2	477								

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = –0.5 %	△FUEL = +2.0 %	△FUEL = +4.5 %

R

CRUISE - M.78

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+15 CG=33.0%	**N1 (%) KG/H/ENG NM/1000KG**	**MACH IAS (KT) TAS (KT)**

WEIGHT (1000KG)	FL290	FL310	FL330	FL350	FL370	FL390
64	86.6 .780 1526 302 156.1 476	86.7 .780 1432 289 165.0 473	86.8 .780 1351 277 173.4 469	87.1 .780 1290 264 180.2 465	88.0 .780 1247 252 185.4 463	90.0 .780 1239 241 186.7 463
66	86.9 .780 1540 302 154.7 476	87.0 .780 1448 289 163.1 473	87.1 .780 1371 277 170.9 469	87.4 .780 1313 264 177.0 465	88.5 .780 1276 252 181.3 463	
68	87.1 .780 1555 302 153.2 476	87.2 .780 1465 289 161.3 473	87.4 .780 1393 277 168.2 469	87.8 .780 1337 264 173.7 465	89.1 .780 1307 252 177.0 463	
70	87.3 .780 1571 302 151.7 476	87.4 .780 1483 289 159.3 473	87.7 .780 1416 277 165.5 469	88.2 .780 1363 264 170.5 465	89.7 .780 1342 252 172.3 463	
72	87.5 .780 1587 302 150.1 476	87.7 .780 1502 289 157.3 473	88.0 .780 1439 277 162.8 469	88.6 .780 1391 264 167.1 465	90.4 .780 1384 252 167.2 463	
74	87.7 .780 1604 302 148.6 476	87.9 .780 1524 289 155.0 473	88.3 .780 1464 277 160.1 469	89.1 .780 1421 264 163.5 465	91.1 .780 1428 252 161.9 463	
76	88.0 .780 1621 302 147.0 476	88.2 .780 1547 289 152.7 473	88.6 .780 1489 277 157.4 469	89.7 .780 1454 264 159.8 465		
78	88.2 .780 1640 302 145.3 476	88.5 .780 1570 289 150.5 473	89.0 .780 1516 277 154.6 469	90.3 .780 1492 264 155.7 465		
80	88.4 .780 1661 302 143.4 476	88.7 .780 1595 289 148.2 473	89.4 .780 1544 277 151.8 469	90.9 .780 1535 264 151.4 465		
82	88.6 .780 1683 302 141.5 476	89.0 .780 1620 289 145.9 473	89.9 .780 1576 277 148.7 469			
84	88.9 .780 1706 302 139.6 476	89.3 .780 1645 289 143.6 473	90.4 .780 1610 277 145.5 469			
86	89.1 .780 1730 302 137.7 476	89.7 .780 1673 289 141.3 473	91.0 .780 1649 277 142.1 469			
88	89.4 .780 1755 302 135.8 476	90.1 .780 1702 289 138.8 473				
90	89.7 .780 1780 302 133.8 476					
92	90.0 .780 1806 302 131.9 476					

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.6 %	△FUEL = + 3 %	△FUEL = + 5.5 %

R

CRUISE - M.78

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+20 CG=33.0%	**N1 (%) KG/H/ENG NM/1000KG**	**MACH IAS (KT) TAS (KT)**

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390
64	87.5 1547 155.6	.780 302 481	87.6 1452 164.4	.780 289 477	87.7 1370 172.9	.780 277 474	88.0 1308 179.6	.780 264 470	88.9 1265 184.9	.780 252 468	
66	87.8 1561 154.1	.780 302 481	87.8 1468 162.6	.780 289 477	88.0 1390 170.4	.780 277 474	88.4 1331 176.4	.780 264 470	89.4 1293 180.8	.780 252 468	
68	88.0 1576 152.7	.780 302 481	88.1 1485 160.8	.780 289 477	88.3 1412 167.7	.780 277 474	88.7 1356 173.2	.780 264 470			
70	88.2 1592 151.2	.780 302 481	88.3 1503 158.8	.780 289 477	88.6 1435 165.0	.780 277 474	89.1 1382 169.9	.780 264 470			
72	88.4 1608 149.6	.780 302 481	88.6 1523 156.8	.780 289 477	88.9 1459 162.3	.780 277 474	89.6 1410 166.5	.780 264 470			
74	88.6 1625 148.1	.780 302 481	88.8 1545 154.5	.780 289 477	89.2 1484 159.6	.780 277 474	90.1 1441 163.0	.780 264 470			
76	88.9 1643 146.5	.780 302 481	89.1 1568 152.2	.780 289 477	89.5 1509 156.9	.780 277 474					
78	89.1 1662 144.8	.780 302 481	89.4 1592 150.0	.780 289 477	89.9 1537 154.1	.780 277 474					
80	89.3 1683 142.9	.780 302 481	89.6 1616 147.7	.780 289 477							
82	89.5 1706 141.0	.780 302 481									
84											
86											
88											
90											
92											

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.6 %	△FUEL = + 3 %	△FUEL = + 5.5 %

R

CRUISE - M.78

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+15 CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL290**		**FL310**		**FL330**		**FL350**		**FL370**		**FL390**	
50	83.0	.780	82.8	.780	82.7	.780	82.8	.780	83.3	.780	84.5	.780
	1331	302	1237	289	1151	277	1078	264	1018	252	978	241
	178.9	476	191.0	473	203.5	469	215.6	465	227.1	463	236.5	463
52	83.2	.780	83.0	.780	83.0	.780	83.0	.780	83.7	.780	85.0	.780
	1341	302	1248	289	1164	277	1092	264	1036	252	1001	241
	177.6	476	189.4	473	201.3	469	212.9	465	223.3	463	231.1	463
54	83.3	.780	83.2	.780	83.2	.780	83.4	.780	84.1	.780	85.5	.780
	1351	302	1259	289	1178	277	1108	264	1055	252	1027	241
	176.3	476	187.7	473	198.9	469	209.8	465	219.1	463	225.2	463
56	83.5	.780	83.4	.780	83.5	.780	83.7	.780	84.6	.780	86.0	.780
	1362	302	1272	289	1193	277	1125	264	1077	252	1058	241
	174.9	476	185.8	473	196.5	469	206.5	465	214.7	463	218.6	463
58	83.7	.780	83.6	.780	83.7	.780	84.1	.780	85.0	.780	86.7	.780
	1373	302	1285	289	1207	277	1143	264	1102	252	1093	241
	173.5	476	183.9	473	194.1	469	203.3	465	210.0	463	211.6	463
60	83.8	.780	83.9	.780	84.0	.780	84.5	.780	85.5	.780	87.3	.780
	1385	302	1300	289	1224	277	1163	264	1128	252	1130	241
	172.0	476	181.8	473	191.4	469	199.8	465	205.0	463	204.8	463
62	84.0	.780	84.1	.780	84.4	.780	84.9	.780	86.0	.780		
	1398	302	1314	289	1242	277	1186	264	1160	252		
	170.4	476	179.8	473	188.7	469	196.0	465	199.5	463		
64	84.2	.780	84.4	.780	84.7	.780	85.4	.780	86.6	.780		
	1412	302	1329	289	1260	277	1211	264	1195	252		
	168.7	476	177.8	473	185.9	469	191.9	465	193.6	463		
66	84.5	.780	84.6	.780	85.1	.780	85.8	.780	87.2	.780		
	1427	302	1346	289	1281	277	1238	264	1231	252		
	167.0	476	175.5	473	183.0	469	187.8	465	187.9	463		
68	84.7	.780	84.9	.780	85.5	.780	86.2	.780	87.8	.780		
	1441	302	1364	289	1303	277	1268	264	1269	252		
	165.3	476	173.2	473	179.8	469	183.3	465	182.3	463		
70	84.9	.780	85.2	.780	85.9	.780	86.8	.780				
	1457	302	1383	289	1328	277	1303	264				
	163.5	476	170.9	473	176.4	469	178.4	465				
72	85.2	.780	85.6	.780	86.3	.780	87.3	.780				
	1474	302	1403	289	1355	277	1339	264				
	161.6	476	168.4	473	172.9	469	173.6	465				
74	85.4	.780	86.0	.780	86.7	.780	87.8	.780				
	1492	302	1425	289	1383	277	1376	264				
	159.7	476	165.8	473	169.4	469	168.8	465				
76	85.7	.780	86.4	.780	87.1	.780						
	1510	302	1450	289	1417	277						
	157.8	476	163.0	473	165.3	469						

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
$\triangle$FUEL = – 0.5 %	$\triangle$FUEL = + 2 %	$\triangle$FUEL = + 4.5 %

R

CRUISE - M.78

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

N1 (%) / **MACH**
KG/H/ENG / **IAS (KT)**
NM/1000KG / **TAS (KT)**

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	83.8	.780	83.7	.780	83.6	.780	83.7	.780	84.2	.780	85.4	.780
	1349	302	1253	289	1167	277	1092	264	1032	252	991	241
	178.4	481	190.5	477	202.9	474	215.0	470	226.5	468	235.8	468
52	84.0	.780	83.9	.780	83.8	.780	83.9	.780	84.6	.780	85.9	.780
	1359	302	1264	289	1180	277	1107	264	1050	252	1015	241
	177.1	481	188.8	477	200.7	474	212.2	470	222.7	468	230.4	468
54	84.2	.780	84.1	.780	84.1	.780	84.3	.780	85.0	.780	86.4	.780
	1369	302	1276	289	1194	277	1123	264	1070	252	1041	241
	175.7	481	187.1	477	198.3	474	209.1	470	218.6	468	224.5	468
56	84.4	.780	84.3	.780	84.4	.780	84.6	.780	85.5	.780	87.0	.780
	1380	302	1288	289	1209	277	1140	264	1092	252	1073	241
	174.3	481	185.3	477	195.9	474	205.9	470	214.1	468	217.9	468
58	84.5	.780	84.5	.780	84.6	.780	85.0	.780	85.9	.780		
	1391	302	1302	289	1224	277	1159	264	1116	252		
	172.9	481	183.3	477	193.5	474	202.7	470	209.4	468		
60	84.7	.780	84.8	.780	84.9	.780	85.4	.780	86.4	.780		
	1404	302	1317	289	1241	277	1179	264	1144	252		
	171.4	481	181.3	477	190.9	474	199.2	470	204.4	468		
62	84.9	.780	85.0	.780	85.3	.780	85.8	.780	86.9	.780		
	1417	302	1331	289	1259	277	1202	264	1176	252		
	169.9	481	179.3	477	188.1	474	195.4	470	198.9	468		
64	85.1	.780	85.2	.780	85.6	.780	86.3	.780	87.5	.780		
	1431	302	1347	289	1277	277	1227	264	1211	252		
	168.1	481	177.2	477	185.4	474	191.4	470	193.0	468		
66	85.3	.780	85.5	.780	86.0	.780	86.7	.780				
	1446	302	1364	289	1298	277	1254	264				
	166.4	481	175.0	477	182.4	474	187.2	470				
68	85.6	.780	85.8	.780	86.4	.780	87.2	.780				
	1460	302	1382	289	1321	277	1285	264				
	164.8	481	172.7	477	179.2	474	182.7	470				
70	85.8	.780	86.1	.780	86.8	.780	87.7	.780				
	1476	302	1401	289	1346	277	1321	264				
	163.0	481	170.4	477	175.9	474	177.8	470				
72	86.0	.780	86.5	.780	87.2	.780						
	1494	302	1422	289	1373	277						
	161.1	481	167.9	477	172.4	474						
74	86.3	.780	86.8	.780	87.6	.780						
	1512	302	1444	289	1402	277						
	159.2	481	165.3	477	168.9	474						
76	86.6	.780	87.2	.780								
	1530	302	1469	289								
	157.3	481	162.5	477								

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 4.5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL150**		**FL200**		**FL230**		**FL250**		**FL270**	
50	58.3	.439	64.1	.513	67.8	.557	68.9	.571	70.3	.590	72.2	.620
	1028	242	1065	259	1014	255	964	246	951	244	957	247
	136.2	280	151.0	321	168.8	342	179.8	347	186.6	355	193.5	370
52	59.5	.450	65.0	.522	68.1	.558	69.7	.579	71.2	.600	73.6	.640
	1075	249	1099	263	1029	255	995	249	987	248	1007	255
	133.7	287	148.7	327	166.6	343	176.5	351	183.0	361	189.7	382
54	61.9	.482	66.4	.536	68.6	.561	70.6	.588	72.3	.615	75.0	.657
	1171	267	1145	270	1050	257	1029	253	1030	255	1055	262
	131.3	308	146.6	336	164.1	345	173.3	357	179.6	370	186.0	392
56	63.6	.502	67.7	.549	69.4	.568	71.5	.597	73.6	.633	75.7	.666
	1240	278	1189	277	1082	260	1065	258	1081	263	1086	266
	129.1	320	144.5	344	161.3	349	170.2	362	176.3	381	182.9	397
58	64.6	.513	68.5	.555	70.1	.575	72.4	.609	74.9	.650	76.2	.669
	1283	284	1219	280	1113	263	1105	263	1130	270	1110	267
	127.5	327	142.7	348	158.6	353	167.2	370	173.1	391	180.0	400
60	65.6	.521	68.8	.557	70.8	.582	73.5	.624	75.9	.663	76.6	.672
	1321	289	1236	281	1145	267	1152	270	1172	276	1131	268
	126.0	333	141.1	349	156.0	357	164.4	379	170.2	399	177.3	401
62	66.5	.530	69.1	.558	71.5	.590	74.7	.640	76.4	.667	77.3	.679
	1358	294	1252	282	1180	270	1202	277	1198	278	1164	272
	124.6	338	139.6	349	153.5	362	161.6	389	167.7	402	174.2	405
64	67.3	.538	69.4	.559	72.3	.598	75.8	.654	76.9	.670	78.0	.687
	1393	298	1268	282	1216	274	1249	284	1220	279	1199	275
	123.2	343	138.0	350	151.1	367	159.0	397	165.3	404	171.1	410
66	68.2	.545	69.7	.560	73.2	.610	76.6	.665	77.3	.673	78.7	.696
	1427	302	1285	283	1259	280	1288	289	1242	280	1235	279
	121.9	348	136.5	351	148.8	374	156.6	404	163.0	405	168.1	415
68	68.8	.550	70.3	.565	74.1	.623	77.1	.669	77.9	.680	79.4	.704
	1453	305	1315	285	1306	286	1314	290	1276	284	1273	282
	120.7	351	134.6	354	146.5	383	154.5	406	160.3	409	165.2	420
70	69.4	.554	70.9	.571	75.2	.637	77.5	.672	78.5	.688	80.1	.713
	1479	307	1347	288	1356	293	1337	292	1312	287	1312	286
	119.6	354	132.7	358	144.3	391	152.5	408	157.7	414	162.4	426
72	69.8	.557	71.5	.577	76.2	.650	77.9	.674	79.2	.695	80.8	.722
	1500	309	1381	292	1404	299	1359	293	1349	290	1350	290
	118.4	355	130.9	361	142.2	399	150.5	409	155.1	419	159.6	431
74	70.1	.558	72.1	.583	77.0	.661	78.4	.681	79.8	.703	81.2	.729
	1518	310	1413	295	1448	305	1394	296	1386	294	1386	293
	117.3	356	129.1	365	140.2	406	148.2	413	152.6	423	157.0	435
76	70.3	.559	72.7	.589	77.6	.667	79.0	.687	80.5	.712	81.7	.737
	1535	310	1449	298	1480	308	1428	299	1426	298	1424	296
	116.3	357	127.4	369	138.5	410	146.0	417	150.2	429	154.3	440
78	70.6	.560	73.4	.596	78.0	.671	79.6	.693	81.1	.720	82.2	.744
	1551	311	1485	302	1506	309	1463	302	1465	301	1463	299
	115.2	357	125.7	373	136.8	412	143.8	421	147.9	433	151.8	444

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = –0.5 %	△FUEL = +2.5 %	△FUEL = +5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL290**		**FL310**		**FL330**		**FL350**		**FL370**		**FL390**	
50	74.8	.662	75.5	.671	76.9	.694	78.4	.722	79.9	.749	81.8	.771
	976	253	941	246	933	244	932	243	935	242	939	238
	200.6	392	209.3	394	216.4	404	223.4	416	229.9	430	235.7	442
52	75.3	.666	76.3	.680	77.8	.706	79.1	.733	80.6	.759	82.4	.778
	1000	255	974	249	970	248	969	247	970	245	972	240
	197.2	394	204.9	399	211.6	410	218.1	423	224.3	435	229.5	446
54	75.8	.669	77.1	.690	78.7	.718	79.8	.745	81.3	.768	83.1	.783
	1022	256	1009	253	1009	253	1008	251	1007	248	1007	242
	193.9	396	200.6	405	207.0	418	213.0	429	218.7	441	222.9	449
56	76.5	.676	77.9	.699	79.3	.727	80.5	.754	82.0	.775	83.6	.783
	1051	259	1043	257	1044	256	1043	255	1041	251	1038	242
	190.4	400	196.5	410	202.6	423	208.3	434	213.4	445	216.3	449
58	77.2	.685	78.8	.710	80.0	.738	81.2	.763	82.5	.781	84.3	.786
	1086	263	1082	261	1083	260	1080	258	1075	253	1076	243
	186.6	406	192.6	417	198.2	429	203.6	440	208.2	448	209.3	451
60	78.0	.694	79.5	.721	80.6	.747	81.8	.771	83.1	.784	85.0	.788
	1122	266	1121	266	1119	264	1116	261	1109	254	1116	244
	183.0	411	188.7	423	194.1	434	199.0	444	202.8	450	202.5	452
62	78.7	.703	80.1	.730	81.2	.755	82.4	.777	83.6	.784	85.8	.789
	1158	270	1157	269	1155	267	1150	263	1140	254	1156	244
	179.6	416	185.0	428	190.1	439	194.7	448	197.2	450	195.8	453
64	79.5	.713	80.7	.739	81.8	.764	82.9	.781	84.2	.786	86.1	.780
	1197	274	1197	273	1194	270	1182	265	1179	255	1170	241
	176.3	422	181.3	434	186.1	444	190.3	450	191.4	451	191.1	447
66	80.2	.723	81.3	.748	82.5	.771	83.4	.784	84.9	.788		
	1235	278	1233	276	1231	273	1217	266	1218	255		
	173.1	428	177.9	439	182.2	449	185.8	452	185.6	452		
68	80.7	.730	81.8	.755	83.0	.776	83.9	.784	85.6	.789		
	1272	281	1270	279	1264	275	1247	266	1258	256		
	170.0	432	174.5	443	178.6	452	181.3	452	180.0	453		
70	81.3	.739	82.4	.764	83.5	.780	84.4	.786	86.2	.789		
	1311	285	1309	283	1296	277	1285	267	1296	256		
	166.8	437	171.1	448	175.0	454	176.3	453	174.7	453		
72	81.8	.747	83.0	.771	83.9	.783	85.0	.788	86.4	.772		
	1348	288	1346	285	1331	278	1324	267	1291	250		
	163.9	442	167.9	452	171.2	456	171.6	454	171.5	443		
74	82.3	.753	83.5	.776	84.4	.784	85.6	.789				
	1384	291	1382	288	1362	278	1363	268				
	161.1	446	164.8	455	167.5	456	166.8	455				
76	82.8	.761	84.0	.780	84.8	.785	86.2	.789				
	1423	294	1415	289	1398	279	1402	268				
	158.3	450	161.8	458	163.4	457	162.3	455				
78	83.4	.768	84.4	.782	85.4	.787	86.5	.782				
	1462	297	1446	290	1436	279	1417	265				
	155.5	455	158.7	459	159.4	458	159.0	451				

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = –0.5 %	△FUEL = +2.5 %	△FUEL = +5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

N1 (%) — MACH
KG/H/ENG — IAS (KT)
NM/1000KG — TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
64	68.8	.532	70.3	.549	74.1	.601	77.4	.647	78.6	.664	79.9	.685
	1471	295	1325	277	1289	276	1297	280	1271	277	1253	274
	115.5	340	129.7	344	143.2	369	151.3	393	157.3	400	163.2	409
66	69.3	.535	71.1	.559	75.1	.613	78.0	.652	79.2	.671	80.6	.693
	1492	297	1368	282	1335	282	1326	283	1304	280	1287	277
	114.5	342	127.9	350	141.1	377	149.2	396	154.9	404	160.6	413
68	69.6	.537	72.0	.570	76.2	.626	78.6	.658	79.9	.679	81.0	.699
	1511	298	1414	288	1382	288	1357	286	1338	283	1319	280
	113.5	343	126.1	357	139.1	384	147.2	400	152.6	408	158.0	417
70	69.9	.539	72.9	.580	77.3	.638	79.2	.665	80.5	.686	81.6	.707
	1529	299	1458	293	1428	293	1391	289	1372	286	1357	283
	112.4	344	124.5	363	137.1	392	145.1	404	150.4	413	155.5	422
72	70.3	.541	73.7	.589	78.0	.645	79.8	.672	81.1	.692	82.1	.716
	1549	300	1499	298	1464	297	1426	292	1405	289	1397	287
	111.4	345	123.0	369	135.2	396	143.0	408	148.2	416	152.9	427
74	70.6	.543	74.2	.593	78.6	.651	80.4	.679	81.6	.698	82.7	.725
	1570	301	1527	300	1498	300	1460	295	1440	292	1438	291
	110.4	346	121.6	371	133.5	400	141.0	412	146.0	420	150.5	433
76	71.0	.545	74.8	.597	79.0	.654	81.0	.685	82.0	.705	83.2	.734
	1590	302	1555	302	1524	302	1494	298	1475	295	1481	295
	109.3	348	120.2	374	131.9	402	139.1	416	143.8	424	148.0	438
78	71.4	.548	75.2	.600	79.5	.660	81.6	.691	82.6	.714	83.8	.743
	1615	304	1580	304	1556	304	1529	301	1517	299	1521	299
	108.3	350	119.0	376	130.3	405	137.2	419	141.6	430	145.7	443
80	72.0	.555	75.9	.607	80.1	.666	82.0	.697	83.1	.723	84.2	.748
	1654	308	1616	307	1591	307	1562	303	1559	303	1555	301
	107.1	354	117.6	380	128.6	409	135.3	423	139.5	435	143.6	446
82	72.8	.563	76.7	.617	80.6	.672	82.4	.702	83.6	.731	84.7	.752
	1700	313	1662	312	1625	310	1596	306	1601	306	1587	303
	105.8	360	116.2	386	127.0	413	133.5	426	137.4	440	141.5	449
84	73.5	.572	77.6	.626	81.2	.678	82.9	.709	84.1	.739	85.0	.756
	1746	318	1709	317	1660	313	1635	309	1643	310	1618	305
	104.6	365	114.8	392	125.4	416	131.7	431	135.4	445	139.4	451
86	74.3	.581	78.5	.637	81.7	.684	83.4	.717	84.5	.745	85.4	.758
	1790	322	1758	323	1696	316	1677	313	1678	312	1647	306
	103.5	371	113.4	399	123.9	420	129.8	435	133.5	448	137.4	453
88	75.0	.589	79.2	.643	82.2	.689	83.9	.725	85.0	.749	85.7	.761
	1835	327	1797	326	1730	318	1719	316	1712	315	1678	307
	102.4	376	112.2	403	122.4	423	128.0	440	131.7	451	135.4	454
90	75.4	.593	79.7	.649	82.7	.695	84.3	.733	85.3	.753	86.1	.764
	1864	329	1832	329	1766	321	1761	320	1743	316	1710	308
	101.5	378	110.9	406	120.9	427	126.3	445	130.0	453	133.3	456
92	75.8	.596	80.1	.653	83.1	.700	84.8	.740	85.7	.756	86.4	.766
	1892	331	1863	331	1801	324	1803	324	1775	318	1742	309
	100.5	380	109.8	409	119.4	430	124.6	449	128.2	455	131.3	457

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

11.0-08F0A321-211 CFM56-5B3/P SA12200000C5KG330 0 018590 0 0 1 1.0 .0 .00 0 01 .990 .000 .000 0 FCOM-N0-05-15-013-165

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
64	81.0	.707	82.2	.737	83.2	.755	83.9	.767	85.2	.781	87.4	.789
	1238	271	1243	272	1223	267	1201	259	1202	253	1213	244
	168.9	418	174.1	433	179.6	439	184.0	442	186.5	448	186.6	453
66	81.6	.717	82.8	.745	83.6	.759	84.4	.771	85.8	.784	88.2	.791
	1279	276	1279	275	1254	269	1237	261	1236	254	1259	245
	165.9	424	170.9	437	176.1	442	179.7	445	181.8	449	180.2	454
68	82.2	.728	83.3	.751	84.0	.763	84.9	.776	86.5	.786	89.1	.791
	1321	280	1312	277	1284	270	1274	263	1274	255	1304	245
	162.9	431	168.0	441	172.7	443	175.7	448	177.0	451	173.9	453
70	82.8	.737	83.8	.755	84.4	.765	85.4	.781	87.2	.789		
	1363	284	1342	279	1316	271	1311	265	1314	256		
	160.1	436	165.1	443	169.2	445	171.6	450	172.2	452		
72	83.3	.745	84.2	.759	84.9	.770	85.9	.783	87.9	.791		
	1399	287	1372	281	1353	273	1345	265	1359	256		
	157.5	441	162.2	445	165.6	448	167.7	451	166.8	453		
74	83.8	.750	84.6	.762	85.3	.774	86.5	.785	88.6	.791		
	1432	289	1404	282	1388	274	1382	266	1404	256		
	155.0	444	159.3	447	162.2	450	163.8	453	161.6	454		
76	84.3	.754	84.9	.764	85.8	.780	87.2	.788	89.6	.791		
	1463	291	1433	283	1429	277	1422	267	1453	256		
	152.5	446	156.5	448	158.7	454	159.7	454	156.0	453		
78	84.6	.757	85.3	.768	86.3	.782	87.8	.790	90.4	.783		
	1492	292	1469	284	1463	277	1464	268	1489	254		
	150.1	448	153.4	451	155.4	455	155.5	455	150.9	449		
80	85.0	.760	85.7	.772	86.8	.784	88.4	.791				
	1522	294	1505	286	1499	278	1509	268				
	147.7	450	150.5	453	152.1	456	151.1	456				
82	85.4	.763	86.2	.776	87.4	.786	89.1	.791				
	1555	295	1543	288	1537	279	1554	269				
	145.3	452	147.6	456	148.8	457	146.7	456				
84	85.7	.765	86.6	.781	88.0	.789	90.0	.790				
	1586	296	1582	290	1578	280	1605	268				
	142.8	453	144.8	458	145.4	459	142.0	456				
86	86.1	.769	87.0	.782	88.5	.790						
	1622	297	1616	290	1619	281						
	140.3	455	142.0	459	141.9	460						
88	86.5	.772	87.5	.784	89.1	.791						
	1658	299	1653	291	1664	281						
	137.9	457	139.2	460	138.2	460						
90	86.8	.777	88.0	.786	89.7	.791						
	1698	301	1691	292	1710	281						
	135.4	460	136.4	461	134.5	460						
92	87.2	.781	88.6	.789	90.1	.782						
	1737	302	1732	293	1724	278						
	133.0	462	133.6	463	131.9	455						

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

N1 (%) **MACH**
KG/H/ENG **IAS (KT)**
NM/1000KG **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
50	57.8	.431	64.5	.521	68.0	.564	69.2	.580	70.6	.602	72.5	.634
	1008	238	1081	263	1020	258	972	250	963	249	968	252
	136.4	275	150.9	326	169.6	346	181.0	352	188.2	362	195.4	378
52	58.8	.439	65.8	.534	68.3	.565	70.0	.589	71.6	.616	73.8	.650
	1047	243	1125	269	1036	259	1006	254	1004	255	1012	259
	133.9	280	148.8	335	167.5	347	177.8	358	184.6	371	191.7	388
54	61.3	.473	67.1	.548	68.8	.569	70.9	.599	72.7	.630	74.8	.663
	1147	262	1170	277	1059	261	1041	259	1046	262	1052	265
	131.5	302	146.8	343	165.0	350	174.7	364	181.3	379	188.2	396
56	63.5	.501	68.2	.559	69.5	.576	71.8	.612	73.8	.645	75.5	.672
	1237	277	1209	282	1091	264	1081	264	1089	268	1082	268
	129.2	320	144.9	350	162.4	354	171.7	371	178.1	388	185.2	401
58	65.2	.521	68.6	.562	70.3	.584	72.7	.624	74.9	.658	76.0	.675
	1306	289	1228	284	1123	268	1122	270	1131	274	1104	270
	127.3	333	143.3	352	159.8	359	168.8	379	175.0	396	182.4	403
60	66.2	.531	68.9	.563	71.0	.593	73.7	.637	75.6	.667	76.4	.676
	1346	294	1245	285	1158	272	1164	276	1164	278	1123	270
	126.0	339	141.8	353	157.3	364	166.0	386	172.4	401	179.7	404
62	67.1	.540	69.3	.565	71.8	.602	74.8	.650	76.3	.673	77.0	.682
	1383	300	1262	286	1193	276	1207	282	1193	281	1151	273
	124.6	345	140.3	354	154.8	370	163.3	394	169.9	405	176.7	407
64	67.9	.548	69.6	.566	72.7	.614	75.6	.661	76.7	.676	77.6	.689
	1417	304	1278	286	1236	282	1247	287	1214	282	1185	276
	123.4	350	138.8	355	152.4	377	160.8	401	167.5	407	173.6	411
66	68.6	.553	69.9	.568	73.5	.625	76.3	.669	77.1	.677	78.3	.698
	1445	307	1297	287	1278	287	1280	290	1234	282	1221	279
	122.2	353	137.2	356	150.2	384	158.6	406	165.3	408	170.5	417
68	69.2	.558	70.5	.574	74.3	.635	76.9	.675	77.6	.683	79.0	.707
	1470	310	1327	290	1319	292	1308	293	1264	285	1259	283
	121.1	356	135.4	360	148.0	390	156.5	409	162.7	411	167.6	422
70	69.7	.562	71.1	.580	75.3	.647	77.3	.677	78.2	.690	79.7	.717
	1495	312	1360	293	1363	298	1330	294	1297	288	1298	288
	120.0	359	133.6	364	145.8	397	154.5	411	160.1	415	164.7	428
72	70.0	.563	71.7	.587	76.1	.657	77.6	.678	78.8	.698	80.4	.725
	1512	313	1394	297	1405	303	1349	295	1334	291	1335	291
	119.0	360	131.9	368	143.8	404	152.6	412	157.4	420	162.0	433
74	70.3	.565	72.3	.594	76.8	.665	78.1	.683	79.5	.706	81.0	.731
	1529	314	1428	300	1439	307	1378	297	1372	295	1371	294
	117.9	361	130.2	372	142.0	409	150.4	415	154.9	425	159.3	437
76	70.5	.567	73.0	.601	77.4	.672	78.7	.689	80.2	.715	81.5	.739
	1548	315	1464	304	1471	310	1412	300	1412	299	1407	297
	116.9	362	128.5	376	140.3	413	148.2	418	152.5	430	156.7	441

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
ΔFUEL = – 0.5 %	ΔFUEL = + 2 %	ΔFUEL = + 4.5 %

11.0-08F0A319-112 CFM56-5B6/P SA12200000C5KG330 0 018590 0 0 1 1.0 .0 .00 0 01 .990 .000 .000 0 FCOM-N0-03-05-15-013-180

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	74.5	.666	75.3	.675	76.6	.696	78.2	.725	79.6	.751	81.5	.775
	970	255	934	247	922	244	922	244	923	242	930	239
	203.2	394	212.2	396	219.5	405	226.6	418	233.3	431	238.9	444
52	75.2	.672	76.0	.683	77.5	.708	78.9	.735	80.3	.761	82.2	.781
	996	257	964	250	959	249	958	248	960	246	963	241
	199.7	398	207.9	401	214.7	412	221.3	424	227.5	437	232.6	448
54	75.6	.675	76.8	.692	78.4	.721	79.6	.747	81.1	.772	82.8	.784
	1016	258	997	254	998	254	996	252	998	250	995	242
	196.5	399	203.6	406	210.0	419	216.2	430	221.8	443	226.0	450
56	76.2	.679	77.6	.701	79.1	.730	80.2	.755	81.8	.779	83.4	.784
	1041	260	1032	258	1033	257	1030	255	1032	252	1024	242
	193.1	402	199.4	411	205.5	424	211.4	435	216.4	447	219.4	450
58	76.9	.687	78.4	.713	79.7	.739	80.9	.766	82.3	.782	84.0	.785
	1074	263	1070	262	1069	261	1069	259	1062	253	1060	243
	189.4	407	195.3	418	201.1	430	206.5	442	211.1	448	212.2	450
60	77.6	.696	79.2	.724	80.3	.749	81.5	.775	82.9	.785	84.7	.785
	1109	267	1109	266	1105	265	1106	262	1095	254	1097	243
	185.7	412	191.5	425	197.0	435	201.8	446	205.5	450	205.2	450
62	78.4	.705	79.9	.732	80.9	.757	82.2	.780	83.4	.784	85.4	.786
	1145	271	1145	270	1141	268	1140	265	1124	254	1136	243
	182.3	418	187.7	430	192.9	440	197.4	450	200.0	450	198.3	451
64	79.2	.716	80.5	.741	81.6	.767	82.7	.783	84.0	.785	86.1	.785
	1184	275	1182	274	1182	272	1169	265	1161	254	1172	243
	178.9	424	184.0	435	188.8	446	192.9	451	194.0	450	192.1	450
66	79.9	.725	81.0	.749	82.2	.775	83.2	.785	84.6	.786	86.2	.757
	1222	279	1218	277	1219	275	1201	266	1197	255	1159	233
	175.6	429	180.5	440	184.9	451	188.4	452	188.2	451	187.2	434
68	80.5	.733	81.5	.757	82.7	.780	83.6	.785	85.2	.786		
	1258	282	1254	280	1253	277	1231	266	1236	255		
	172.4	434	177.1	444	181.1	454	183.8	452	182.4	451		
70	81.0	.741	82.1	.767	83.2	.782	84.1	.785	85.9	.787		
	1294	286	1296	284	1282	278	1265	266	1277	255		
	169.4	438	173.6	450	177.4	455	178.8	453	176.8	451		
72	81.5	.748	82.7	.775	83.7	.784	84.7	.786	86.3	.781		
	1331	289	1335	287	1313	278	1301	267	1296	253		
	166.4	443	170.3	455	173.6	456	174.0	453	172.9	448		
74	82.0	.755	83.2	.780	84.1	.786	85.2	.786	86.5	.742		
	1366	292	1369	289	1347	279	1340	267	1278	239		
	163.6	447	167.2	458	169.7	457	169.1	453	166.5	426		
76	82.6	.764	83.7	.782	84.6	.785	85.9	.787				
	1408	295	1399	290	1377	279	1380	267				
	160.6	452	164.0	459	165.8	457	164.3	453				

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 4.5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+10 CG=33.0%	N1 (%) / MACH KG/H/ENG / IAS (KT) NM/1000KG / TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
50	59.4	.439	66.3	.525	69.1	.555	70.3	.569	71.8	.588	73.6	.618
	1053	242	1116	265	1029	254	979	245	968	243	973	246
	135.4	285	150.1	335	169.0	348	180.0	352	186.7	361	193.5	377
52	61.1	.457	67.3	.535	69.5	.556	71.1	.577	72.7	.598	75.1	.637
	1119	253	1152	270	1045	254	1012	249	1003	247	1024	254
	132.9	297	148.1	341	166.7	348	176.6	357	183.1	367	189.6	388
54	63.9	.493	68.3	.543	70.0	.559	72.0	.586	73.7	.612	76.5	.654
	1227	273	1186	274	1068	256	1046	252	1046	253	1072	261
	130.5	320	146.2	347	164.2	351	173.3	363	179.6	376	185.9	399
56	65.7	.513	69.1	.549	70.7	.566	72.9	.594	75.0	.629	77.2	.663
	1299	284	1214	277	1100	259	1081	256	1096	261	1106	265
	128.5	334	144.5	351	161.3	355	170.2	368	176.2	386	182.7	404
58	66.5	.520	69.8	.554	71.5	.574	73.8	.606	76.4	.646	77.8	.667
	1331	288	1238	280	1134	263	1122	262	1148	269	1131	266
	127.1	338	142.8	354	158.6	360	167.2	375	173.0	397	179.8	407
60	67.3	.526	70.1	.555	72.2	.581	74.8	.621	77.5	.661	78.2	.670
	1361	292	1256	280	1167	266	1170	268	1194	275	1153	267
	125.7	342	141.2	354	155.9	364	164.3	384	170.0	406	177.0	408
62	68.0	.532	70.4	.557	73.0	.588	76.1	.637	78.0	.666	78.9	.678
	1390	295	1273	281	1201	270	1222	276	1222	277	1189	271
	124.5	346	139.6	355	153.5	369	161.4	395	167.4	409	173.8	413
64	68.7	.538	70.7	.557	73.8	.597	77.3	.651	78.5	.669	79.6	.686
	1419	298	1289	281	1238	274	1271	282	1246	279	1225	274
	123.2	349	138.0	356	151.0	374	158.8	403	165.0	411	170.6	418
66	69.4	.543	71.1	.559	74.5	.605	78.1	.662	78.9	.672	80.3	.694
	1447	301	1308	282	1276	278	1312	287	1270	280	1262	278
	121.9	353	136.4	357	148.7	379	156.3	410	162.5	413	167.6	423
68	70.0	.548	71.6	.564	75.5	.619	78.6	.666	79.5	.679	81.0	.701
	1475	304	1339	285	1325	284	1338	289	1305	283	1298	281
	120.7	356	134.5	360	146.3	388	154.2	413	159.8	417	164.7	427
70	70.7	.553	72.2	.570	76.5	.633	79.0	.669	80.2	.686	81.7	.711
	1502	306	1372	288	1376	291	1363	291	1341	286	1339	285
	119.6	359	132.6	364	144.1	397	152.1	414	157.2	422	161.8	433
72	71.1	.555	72.8	.575	77.6	.647	79.4	.672	80.8	.694	82.4	.720
	1524	308	1405	291	1427	298	1386	292	1379	290	1381	289
	118.4	361	130.8	367	142.0	405	150.1	416	154.6	426	159.0	439
74	71.4	.556	73.4	.581	78.5	.658	80.0	.678	81.5	.701	82.9	.727
	1542	309	1438	294	1474	303	1422	295	1415	293	1418	292
	117.3	362	129.0	371	139.9	412	147.8	420	152.1	431	156.4	443
76	71.6	.557	74.1	.587	79.2	.665	80.6	.685	82.1	.709	83.5	.736
	1559	309	1473	297	1509	307	1459	298	1456	297	1459	296
	116.2	362	127.3	375	138.1	417	145.5	425	149.7	436	153.7	448
78	71.9	.558	74.7	.594	79.6	.668	81.2	.692	82.8	.718	84.0	.743
	1577	310	1509	300	1535	308	1496	301	1496	300	1499	299
	115.1	363	125.6	379	136.4	419	143.3	429	147.3	441	151.1	453

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = –0.5 %	△FUEL = +2.5 %	△FUEL = +5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+10 CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL290**		**FL310**		**FL330**		**FL350**		**FL370**		**FL390**	
50	76.4	.660	77.1	.669	78.6	.692	80.2	.720	81.7	.748	83.7	.771
	994	252	959	245	952	243	953	242	957	241	963	238
	200.5	399	209.1	401	216.1	411	222.9	425	229.2	439	234.7	452
52	76.9	.665	78.0	.679	79.5	.704	80.9	.731	82.4	.758	84.3	.777
	1020	254	995	249	990	247	990	246	994	244	998	240
	196.9	402	204.6	407	211.2	418	217.6	431	223.5	444	228.4	456
54	77.4	.668	78.8	.688	80.4	.715	81.6	.743	83.2	.767	84.9	.782
	1042	255	1031	253	1029	252	1031	251	1032	248	1034	242
	193.6	404	200.2	413	206.5	425	212.4	438	217.9	450	221.9	459
56	78.1	.675	79.6	.699	81.1	.726	82.3	.752	83.8	.774	85.5	.783
	1074	258	1068	257	1068	256	1068	254	1068	250	1067	242
	190.0	408	196.0	419	202.0	431	207.6	443	212.6	454	215.3	459
58	78.9	.683	80.5	.709	81.8	.737	83.0	.762	84.4	.780	86.2	.785
	1109	262	1107	261	1109	260	1107	258	1103	252	1106	243
	186.3	413	192.0	425	197.5	438	202.8	449	207.4	458	208.3	461
60	79.6	.692	81.2	.719	82.4	.747	83.6	.770	85.0	.783	86.9	.788
	1145	265	1146	265	1148	264	1145	261	1138	254	1147	244
	182.7	418	188.1	431	193.3	444	198.2	454	201.9	459	201.4	462
62	80.4	.700	81.8	.728	83.0	.755	84.2	.776	85.5	.784	87.7	.789
	1181	269	1183	268	1185	267	1180	263	1171	254	1188	244
	179.2	423	184.4	436	189.3	449	193.8	457	196.3	460	194.7	463
64	81.2	.711	82.5	.738	83.6	.763	84.7	.780	86.1	.786	88.0	.778
	1222	273	1225	272	1224	270	1214	265	1210	255	1200	240
	175.8	430	180.6	442	185.3	454	189.5	460	190.5	461	190.2	456
66	81.9	.721	83.0	.747	84.3	.770	85.3	.784	86.8	.788		
	1263	277	1264	276	1261	273	1249	266	1251	255		
	172.5	436	177.1	448	181.5	458	184.9	462	184.7	462		
68	82.4	.729	83.6	.755	84.8	.775	85.7	.784	87.5	.789		
	1301	280	1302	279	1296	275	1281	266	1292	256		
	169.3	440	173.8	452	177.9	461	180.3	462	179.1	463		
70	83.0	.738	84.2	.762	85.3	.779	86.3	.786	88.2	.789		
	1342	284	1341	282	1330	276	1320	267	1331	256		
	166.1	446	170.4	457	174.3	463	175.4	463	173.8	463		
72	83.6	.746	84.8	.769	85.8	.783	86.9	.788	88.3	.770		
	1382	288	1380	285	1366	278	1360	267	1324	249		
	163.2	451	167.1	461	170.4	466	170.7	464	170.6	452		
74	84.1	.753	85.3	.775	86.2	.783	87.5	.789				
	1420	291	1416	287	1397	278	1401	268				
	160.4	455	164.1	464	166.7	466	165.9	465				
76	84.6	.761	85.7	.779	86.7	.785	88.1	.789				
	1460	294	1450	289	1434	279	1441	268				
	157.5	460	161.0	467	162.6	467	161.4	465				
78	85.1	.768	86.2	.782	87.2	.787	88.4	.781				
	1499	297	1484	290	1474	279	1455	265				
	154.7	464	157.9	469	158.6	468	158.3	460				

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = –0.5 %	△FUEL = +2.5 %	△FUEL = +5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

N1 (%) — MACH
KG/H/ENG — IAS (KT)
NM/1000KG — TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
64	70.1	.531	71.5	.546	75.5	.598	78.9	.644	80.2	.662	81.6	.683
	1494	294	1344	276	1310	274	1320	279	1296	276	1280	273
	115.5	345	129.8	349	143.1	375	151.1	399	157.0	407	162.7	416
66	70.5	.533	72.4	.557	76.5	.610	79.5	.650	80.8	.670	82.2	.690
	1514	296	1390	281	1355	280	1352	282	1332	279	1314	276
	114.5	347	127.9	355	140.9	382	148.9	403	154.5	412	160.1	421
68	70.9	.535	73.4	.567	77.5	.621	80.1	.656	81.5	.677	82.7	.697
	1534	297	1437	287	1402	286	1383	284	1366	282	1349	279
	113.5	348	126.1	362	138.9	389	146.8	406	152.2	416	157.5	425
70	71.2	.537	74.3	.578	78.7	.634	80.7	.663	82.2	.684	83.3	.705
	1551	298	1483	292	1451	292	1418	288	1402	285	1388	283
	112.4	349	124.4	369	136.9	397	144.7	410	149.9	420	154.9	430
72	71.5	.539	75.1	.586	79.4	.642	81.3	.669	82.8	.691	83.9	.715
	1572	299	1523	296	1490	295	1453	291	1438	288	1431	287
	111.4	350	122.9	374	135.0	402	142.6	414	147.6	424	152.3	436
74	71.9	.541	75.6	.590	80.1	.649	82.0	.676	83.2	.697	84.4	.725
	1593	300	1551	299	1526	299	1488	294	1472	291	1475	291
	110.3	351	121.5	377	133.1	406	140.6	418	145.4	428	149.8	442
76	72.2	.543	76.1	.594	80.6	.653	82.6	.682	83.7	.703	85.0	.734
	1615	301	1580	301	1555	301	1524	297	1509	294	1517	295
	109.3	353	120.1	379	131.5	409	138.6	423	143.2	432	147.4	447
78	72.7	.546	76.6	.597	81.1	.658	83.2	.689	84.3	.712	85.5	.742
	1640	303	1605	302	1588	303	1562	300	1551	298	1559	299
	108.2	355	118.8	381	129.8	412	136.7	427	141.0	438	145.0	452
80	73.3	.553	77.2	.603	81.7	.664	83.7	.695	84.8	.721	86.0	.747
	1682	307	1640	305	1623	306	1597	303	1595	302	1594	301
	106.9	360	117.4	385	128.2	416	134.8	431	138.9	443	142.9	455
82	74.1	.562	78.0	.613	82.2	.670	84.1	.701	85.3	.729	86.4	.751
	1728	312	1688	310	1659	309	1633	305	1638	306	1627	303
	105.7	365	115.9	391	126.5	420	132.9	434	136.8	448	140.8	458
84	74.9	.570	78.9	.623	82.7	.676	84.6	.708	85.8	.738	86.8	.755
	1775	317	1737	316	1694	312	1674	309	1682	309	1658	304
	104.4	371	114.5	398	125.0	423	131.1	439	134.8	453	138.7	460
86	75.6	.578	79.9	.633	83.3	.682	85.1	.717	86.3	.744	87.2	.758
	1819	321	1785	321	1732	315	1717	312	1721	312	1689	305
	103.3	376	113.2	404	123.4	427	129.2	444	132.8	457	136.7	462
88	76.3	.586	80.6	.641	83.8	.688	85.6	.724	86.7	.749	87.5	.761
	1864	326	1829	325	1768	318	1760	316	1756	314	1722	307
	102.3	381	111.8	409	121.8	431	127.4	449	131.0	460	134.7	464
90	76.8	.590	81.1	.646	84.4	.694	86.0	.732	87.1	.752	87.8	.763
	1895	328	1865	328	1806	321	1804	320	1789	316	1754	308
	101.3	384	110.6	413	120.3	435	125.7	453	129.2	462	132.6	465
92	77.2	.593	81.6	.651	84.7	.698	86.5	.740	87.5	.756	88.2	.766
	1923	330	1899	330	1840	323	1847	323	1820	317	1787	309
	100.3	386	109.4	415	118.9	438	124.0	458	127.5	464	130.5	467

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

11.0-08F0A321-211 CFM56-5B3/P SA12200000C5KG330 0 018590 0 0 1 1.0 .0 .00 0 01 .990 .000 .000 10 FCOM-N0-05-15-015-165

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+10 CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
64	82.7	.704	84.0	.736	85.0	.755	85.7	.766	87.1	.781	89.4	.789
	1265	270	1273	271	1255	267	1234	259	1235	253	1248	244
	168.3	426	173.4	441	178.8	449	183.0	452	185.6	458	185.5	463
66	83.3	.715	84.6	.744	85.5	.759	86.2	.771	87.7	.783	90.2	.791
	1308	275	1311	275	1287	269	1271	261	1270	254	1295	245
	165.3	432	170.2	446	175.3	451	178.8	454	180.9	460	179.1	464
68	83.9	.726	85.1	.750	85.9	.762	86.7	.776	88.4	.786	91.1	.791
	1352	279	1345	277	1318	270	1309	263	1309	255	1342	245
	162.3	439	167.2	450	171.9	453	174.8	457	176.1	461	172.8	464
70	84.6	.736	85.6	.754	86.3	.765	87.3	.781	89.1	.788		
	1395	284	1376	279	1352	271	1348	265	1350	255		
	159.5	445	164.3	452	168.3	455	170.7	460	171.3	462		
72	85.1	.744	86.0	.758	86.7	.770	87.8	.783	89.8	.791		
	1435	287	1408	280	1389	273	1383	265	1398	256		
	156.7	450	161.4	455	164.8	458	166.8	461	165.8	464		
74	85.6	.749	86.4	.761	87.2	.774	88.4	.785	90.6	.791		
	1469	289	1440	282	1425	274	1421	266	1444	256		
	154.2	453	158.6	457	161.4	460	162.9	463	160.6	464		
76	86.1	.754	86.8	.764	87.7	.780	89.1	.788	91.6	.790		
	1501	291	1471	283	1468	277	1462	267	1497	256		
	151.7	456	155.6	458	157.9	464	158.8	464	154.9	464		
78	86.4	.757	87.2	.768	88.2	.782	89.7	.790	92.4	.782		
	1532	292	1508	284	1503	277	1506	268	1529	253		
	149.4	458	152.6	460	154.6	465	154.6	466	150.0	459		
80	86.8	.760	87.6	.772	88.7	.784	90.4	.791				
	1564	294	1545	286	1539	278	1552	268				
	146.9	460	149.7	463	151.3	466	150.2	466				
82	87.2	.763	88.0	.776	89.3	.786	91.0	.791				
	1596	295	1585	288	1578	279	1599	269				
	144.5	461	146.8	465	148.0	467	145.8	466				
84	87.5	.765	88.5	.781	89.9	.788	92.0	.790				
	1629	296	1626	289	1621	280	1653	268				
	142.0	463	143.9	468	144.6	469	141.0	466				
86	87.9	.769	88.9	.782	90.4	.790						
	1667	297	1660	290	1665	281						
	139.5	465	141.2	469	141.1	470						
88	88.3	.772	89.4	.784	91.0	.791						
	1703	299	1697	291	1712	281						
	137.1	467	138.4	470	137.3	470						
90	88.7	.777	89.9	.786	91.7	.791						
	1744	301	1737	292	1759	281						
	134.6	469	135.6	471	133.6	470						
92	89.1	.781	90.4	.788	92.0	.781						
	1785	302	1779	293	1771	277						
	132.2	472	132.8	473	131.1	464						

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+10 CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
50	58.9	.431	66.9	.535	69.3	.562	70.5	.578	72.0	.599	73.9	.631
	1033	238	1137	270	1038	257	987	249	978	248	985	251
	135.6	280	150.1	341	169.8	352	181.2	358	188.2	368	195.4	385
52	60.0	.439	67.9	.544	69.7	.564	71.4	.587	73.0	.612	75.2	.647
	1073	243	1172	275	1054	258	1021	253	1019	254	1029	258
	133.1	285	148.2	348	167.6	353	177.9	363	184.7	376	191.6	394
54	63.3	.484	68.8	.552	70.2	.568	72.2	.596	74.0	.626	76.3	.660
	1205	268	1203	279	1077	260	1057	257	1060	260	1070	263
	130.7	315	146.5	353	165.1	356	174.7	369	181.3	384	188.1	402
56	65.9	.516	69.5	.558	70.9	.575	73.1	.608	75.2	.641	77.1	.669
	1306	286	1229	282	1110	264	1096	262	1107	266	1102	267
	128.5	336	144.9	356	162.4	360	171.7	376	178.0	394	185.0	408
58	67.0	.527	69.9	.560	71.7	.583	74.1	.621	76.3	.655	77.6	.672
	1349	292	1248	283	1143	267	1140	269	1150	272	1125	269
	127.0	343	143.3	358	159.7	365	168.7	385	174.9	402	182.1	410
60	67.7	.534	70.3	.562	72.4	.590	75.1	.634	77.2	.665	78.0	.675
	1380	296	1265	284	1177	271	1183	274	1188	277	1147	270
	125.8	347	141.8	359	157.2	370	165.9	393	172.1	409	179.4	411
62	68.4	.540	70.6	.564	73.2	.599	76.2	.647	77.8	.671	78.6	.680
	1410	300	1283	285	1213	275	1228	280	1216	280	1176	272
	124.6	351	140.3	360	154.7	375	163.2	401	169.6	413	176.3	415
64	69.1	.546	70.9	.565	74.1	.611	77.1	.659	78.3	.674	79.3	.688
	1439	303	1299	285	1256	280	1270	286	1239	281	1211	275
	123.4	355	138.8	361	152.3	383	160.6	408	167.2	414	173.2	419
66	69.8	.552	71.3	.567	74.9	.621	77.9	.667	78.7	.676	80.0	.696
	1467	306	1319	286	1297	286	1304	289	1260	282	1246	279
	122.2	359	137.2	362	150.0	389	158.3	413	164.8	416	170.1	424
68	70.4	.556	71.8	.572	75.8	.633	78.4	.672	79.2	.682	80.7	.704
	1492	309	1350	289	1341	291	1332	292	1291	284	1284	282
	121.1	362	135.3	365	147.8	396	156.2	416	162.2	419	167.1	429
70	71.0	.560	72.4	.578	76.7	.644	78.8	.675	79.8	.689	81.4	.714
	1518	311	1383	292	1386	297	1356	293	1326	287	1325	286
	120.0	364	133.5	369	145.6	404	154.1	418	159.5	423	164.2	435
72	71.3	.562	73.0	.585	77.6	.655	79.2	.676	80.5	.696	82.1	.723
	1535	312	1417	296	1430	302	1376	294	1362	290	1365	290
	118.9	365	131.7	373	143.5	410	152.2	419	156.9	427	161.4	441
74	71.5	.563	73.7	.591	78.3	.663	79.7	.681	81.1	.703	82.7	.730
	1554	313	1451	299	1467	306	1406	296	1399	294	1402	293
	117.9	366	130.0	377	141.6	416	150.0	422	154.4	432	158.7	445
76	71.8	.565	74.3	.598	78.9	.670	80.3	.688	81.8	.712	83.2	.738
	1571	313	1487	303	1500	309	1442	299	1439	298	1441	297
	116.8	367	128.3	382	139.9	420	147.7	426	151.9	437	156.0	450

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 4.5 %

11.0-08F0A319-112 CFM56-5B6/P SA12200000C5KG330 0 018590 0 0 1 1.0 .0 .00 0 01 .990 .000 .000 10 FCOM-N0-03-05-15-015-180

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+10 CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	76.1	.665	76.9	.673	78.2	.694	79.9	.723	81.4	.750	83.4	.774
	990	254	952	247	941	244	942	243	945	242	954	239
	203.0	402	211.9	404	219.2	413	226.2	426	232.6	440	238.0	454
52	76.8	.670	77.6	.681	79.2	.706	80.6	.733	82.1	.760	84.1	.781
	1016	256	984	250	979	248	979	247	983	245	989	241
	199.5	405	207.5	408	214.2	419	220.8	432	226.7	446	231.6	458
54	77.2	.673	78.4	.690	80.1	.719	81.3	.745	82.9	.770	84.7	.784
	1037	257	1019	253	1019	253	1018	251	1022	249	1022	242
	196.2	407	203.2	414	209.5	427	215.5	439	221.0	452	225.0	460
56	77.8	.678	79.3	.701	80.8	.728	82.0	.754	83.6	.777	85.2	.783
	1063	259	1056	257	1056	257	1054	255	1058	251	1052	242
	192.7	410	198.9	420	204.9	433	210.7	444	215.5	456	218.4	460
58	78.5	.685	80.1	.712	81.5	.739	82.7	.765	84.2	.781	85.9	.784
	1096	263	1096	262	1096	261	1095	259	1090	253	1090	243
	189.0	414	194.8	427	200.4	439	205.7	451	210.3	458	211.2	460
60	79.3	.694	81.0	.722	82.1	.748	83.4	.773	84.7	.785	86.6	.785
	1131	266	1134	266	1134	264	1134	262	1125	254	1128	243
	185.4	419	190.9	433	196.2	445	201.0	456	204.7	460	204.2	461
62	80.0	.703	81.6	.730	82.7	.756	84.0	.779	85.2	.784	87.3	.786
	1168	270	1170	269	1170	268	1169	264	1154	254	1169	243
	181.8	425	187.1	438	192.1	450	196.5	459	199.2	460	197.3	461
64	80.8	.714	82.2	.740	83.4	.766	84.5	.782	85.8	.785	88.0	.784
	1209	274	1210	273	1211	271	1200	265	1192	254	1203	242
	178.4	431	183.3	444	188.0	456	192.1	461	193.1	460	191.2	460
66	81.6	.723	82.7	.748	84.0	.774	85.0	.785	86.5	.785	88.2	.753
	1248	278	1247	276	1250	274	1233	266	1230	254	1188	232
	175.1	437	179.8	449	184.1	460	187.5	462	187.3	461	186.0	442
68	82.2	.731	83.3	.756	84.6	.779	85.5	.784	87.1	.786		
	1286	281	1285	280	1284	276	1264	266	1270	255		
	171.8	442	176.4	453	180.3	463	182.9	462	181.5	461		
70	82.7	.740	83.9	.765	85.1	.782	86.0	.785	87.9	.787		
	1326	285	1327	283	1315	277	1300	266	1312	255		
	168.6	447	172.9	459	176.6	465	177.9	463	175.9	461		
72	83.3	.748	84.5	.773	85.5	.784	86.6	.785	88.2	.780		
	1365	289	1366	286	1348	278	1338	266	1330	253		
	165.7	452	169.6	463	172.8	466	173.0	463	172.1	458		
74	83.8	.755	85.0	.779	86.0	.785	87.1	.786				
	1401	291	1403	289	1381	279	1377	267				
	162.8	456	166.4	467	169.0	467	168.2	463				
76	84.3	.764	85.5	.781	86.4	.784	87.8	.786				
	1444	295	1435	290	1413	278	1418	267				
	159.9	462	163.2	469	165.0	466	163.4	464				

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
ΔFUEL = – 0.5 %	ΔFUEL = + 2 %	ΔFUEL = + 4.5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+15 CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
50	60.0	.439	67.1	.528	69.8	.554	71.0	.568	72.5	.588	74.3	.616
	1067	243	1134	266	1038	254	988	245	978	243	980	245
	135.0	288	149.9	340	169.0	351	179.9	356	186.6	365	193.5	379
52	62.3	.467	68.1	.535	70.1	.555	71.8	.576	73.4	.597	75.8	.636
	1155	258	1165	270	1053	254	1021	248	1012	247	1033	253
	132.5	306	148.0	345	166.7	351	176.5	361	183.0	370	189.5	391
54	65.3	.503	68.9	.542	70.7	.559	72.7	.585	74.4	.611	77.2	.653
	1267	278	1194	273	1077	256	1055	252	1055	253	1082	260
	130.1	330	146.2	349	164.1	354	173.3	366	179.5	379	185.8	402
56	66.5	.515	69.7	.548	71.4	.566	73.6	.594	75.7	.628	78.0	.662
	1315	285	1222	277	1110	259	1091	256	1106	260	1116	264
	128.4	338	144.5	353	161.3	358	170.1	371	176.1	390	182.5	408
58	67.2	.520	70.4	.553	72.1	.573	74.4	.603	77.0	.645	78.5	.666
	1343	288	1247	279	1143	262	1127	260	1157	268	1141	266
	127.1	341	142.8	356	158.6	362	167.2	377	172.9	400	179.6	410
60	67.8	.525	70.7	.554	72.9	.580	75.5	.619	78.2	.659	79.0	.669
	1367	291	1265	280	1176	266	1179	268	1204	274	1165	267
	125.8	344	141.2	357	155.9	367	164.2	387	169.8	409	176.7	412
62	68.5	.531	71.0	.556	73.7	.588	76.8	.635	78.7	.664	79.7	.677
	1398	294	1283	281	1212	269	1231	275	1233	277	1200	270
	124.5	348	139.5	358	153.4	372	161.3	397	167.2	412	173.5	417
64	69.2	.536	71.4	.557	74.4	.595	78.0	.650	79.2	.668	80.4	.685
	1428	297	1300	281	1247	273	1282	282	1258	278	1237	274
	123.2	352	138.0	359	150.9	376	158.6	407	164.7	414	170.4	421
66	70.0	.542	71.7	.558	75.2	.604	78.9	.662	79.7	.671	81.1	.693
	1458	300	1319	282	1287	277	1325	287	1283	280	1275	277
	121.9	355	136.3	360	148.5	382	156.1	414	162.3	416	167.3	427
68	70.6	.547	72.3	.564	76.2	.617	79.4	.665	80.3	.678	81.8	.701
	1486	303	1351	285	1336	284	1352	289	1319	283	1313	281
	120.7	359	134.4	363	146.2	391	153.9	416	159.6	421	164.3	432
70	71.3	.552	72.9	.569	77.2	.631	79.8	.668	81.0	.686	82.6	.710
	1513	306	1384	288	1387	290	1375	290	1356	286	1355	285
	119.5	362	132.5	367	143.9	399	151.9	418	156.9	426	161.5	437
72	71.7	.554	73.5	.575	78.3	.645	80.2	.671	81.6	.693	83.3	.720
	1536	308	1417	290	1439	297	1400	291	1394	289	1396	289
	118.4	364	130.7	370	141.8	408	149.8	420	154.3	430	158.7	443
74	72.0	.556	74.1	.580	79.3	.657	80.8	.678	82.3	.700	83.8	.727
	1554	308	1451	293	1487	303	1437	294	1432	293	1435	292
	117.2	364	128.9	374	139.7	415	147.5	424	151.8	435	156.0	448
76	72.3	.557	74.8	.587	79.9	.664	81.4	.684	83.0	.709	84.3	.735
	1572	309	1487	297	1522	306	1474	297	1473	296	1477	296
	116.1	365	127.1	378	137.9	420	145.2	428	149.3	440	153.3	453
78	72.5	.558	75.4	.593	80.3	.667	82.0	.691	83.6	.717	84.8	.743
	1590	309	1523	300	1550	308	1512	301	1514	300	1518	299
	115.0	366	125.4	382	136.2	422	143.0	432	147.0	445	150.7	458

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
ΔFUEL = –0.5 %	ΔFUEL = +2.5 %	ΔFUEL = +5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

N1 (%) — MACH
KG/H/ENG — IAS (KT)
NM/1000KG — TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	77.1	.658	77.9	.668	79.4	.691	81.0	.719	82.6	.748	84.6	.770
	1003	252	969	245	962	242	962	242	970	241	975	238
	200.4	402	208.9	405	215.8	415	222.6	428	228.7	444	234.1	457
52	77.7	.664	78.8	.678	80.3	.702	81.7	.731	83.3	.758	85.2	.777
	1030	254	1006	249	1000	247	1002	246	1007	244	1011	240
	196.8	405	204.3	411	210.9	422	217.2	435	223.0	449	227.9	461
54	78.3	.667	79.6	.688	81.3	.714	82.5	.742	84.1	.767	85.8	.782
	1054	255	1042	252	1041	251	1044	250	1046	248	1048	242
	193.4	408	200.0	417	206.2	429	212.0	442	217.4	455	221.3	464
56	78.9	.674	80.4	.697	81.9	.724	83.2	.752	84.7	.774	86.4	.783
	1086	258	1078	256	1079	255	1081	254	1082	250	1081	242
	189.7	412	195.8	422	201.6	435	207.2	448	212.1	459	214.7	464
58	79.7	.683	81.3	.708	82.6	.736	83.9	.760	85.3	.780	87.1	.785
	1122	262	1118	260	1122	260	1119	257	1118	252	1121	243
	186.0	417	191.7	429	197.1	442	202.4	453	206.9	462	207.7	466
60	80.5	.692	82.1	.719	83.3	.746	84.5	.769	85.9	.783	87.7	.783
	1159	265	1160	265	1162	263	1158	260	1152	253	1153	242
	182.3	422	187.8	435	192.8	448	197.8	458	201.4	464	201.6	465
62	81.2	.699	82.7	.728	83.9	.755	85.1	.775	86.4	.783		
	1194	268	1198	268	1200	267	1194	263	1186	254		
	178.9	427	184.0	441	188.9	453	193.4	462	195.8	465		
64	82.0	.710	83.3	.738	84.6	.763	85.6	.780	87.0	.785		
	1235	273	1240	272	1240	270	1230	265	1226	254		
	175.5	433	180.2	447	184.9	458	189.0	465	190.0	466		
66	82.7	.720	83.9	.746	85.2	.770	86.2	.783	87.7	.787		
	1276	277	1279	276	1278	273	1265	266	1267	255		
	172.2	439	176.7	452	181.0	463	184.5	467	184.3	467		
68	83.3	.728	84.5	.754	85.7	.775	86.6	.783	88.0	.778		
	1316	280	1317	279	1313	275	1297	266	1280	252		
	168.9	445	173.4	457	177.4	466	179.9	467	180.2	461		
70	83.9	.737	85.1	.762	86.2	.779	87.2	.785	88.1	.742		
	1358	284	1357	282	1347	276	1337	266	1261	239		
	165.8	450	170.0	461	173.8	468	175.0	468	174.5	440		
72	84.4	.746	85.6	.769	86.7	.783	87.8	.788				
	1399	288	1397	285	1384	278	1379	267				
	162.8	455	166.7	466	170.0	471	170.2	469				
74	84.9	.753	86.2	.774	87.1	.783	88.2	.784				
	1437	291	1433	287	1416	278	1405	266				
	160.0	460	163.6	469	166.2	471	166.2	467				
76	85.5	.760	86.6	.778	87.6	.785	88.3	.760				
	1477	294	1467	288	1454	279	1392	257				
	157.1	464	160.6	471	162.1	472	162.8	453				
78	86.0	.767	87.1	.781	88.1	.787						
	1517	296	1503	290	1495	279						
	154.3	468	157.5	473	158.1	473						

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = –0.5 %	△FUEL = +2.5 %	△FUEL = +5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

N1 (%) — MACH
KG/H/ENG — IAS (KT)
NM/1000KG — TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
64	70.7	.530	72.2	.545	76.2	.597	79.6	.643	80.9	.661	82.4	.682
	1505	294	1352	275	1322	274	1332	278	1309	275	1292	273
	115.5	348	129.7	351	142.9	378	150.9	402	156.7	410	162.5	420
66	71.1	.532	73.1	.555	77.2	.608	80.3	.649	81.6	.668	83.0	.689
	1525	295	1400	280	1365	279	1365	281	1344	278	1328	276
	114.5	349	127.8	358	140.8	384	148.7	406	154.3	415	159.8	424
68	71.5	.534	74.0	.566	78.2	.620	80.9	.655	82.3	.676	83.5	.696
	1545	296	1448	286	1412	285	1398	284	1381	282	1364	279
	113.5	351	126.0	365	138.7	392	146.5	410	151.9	419	157.1	429
70	71.8	.536	75.0	.577	79.4	.632	81.5	.662	83.0	.683	84.1	.704
	1563	297	1495	292	1463	291	1433	287	1416	285	1403	282
	112.4	351	124.3	372	136.7	400	144.4	414	149.6	424	154.5	434
72	72.2	.537	75.7	.585	80.2	.640	82.1	.668	83.6	.690	84.7	.714
	1583	298	1535	296	1503	295	1469	290	1454	288	1447	287
	111.3	352	122.8	377	134.8	405	142.3	418	147.3	428	151.9	440
74	72.5	.540	76.3	.589	80.8	.647	82.8	.675	84.1	.696	85.3	.724
	1605	299	1565	298	1539	298	1504	293	1489	291	1492	291
	110.3	354	121.3	380	132.9	409	140.3	422	145.0	432	149.4	446
76	72.9	.542	76.8	.593	81.4	.652	83.4	.682	84.6	.703	85.8	.733
	1627	300	1593	300	1570	300	1542	296	1527	294	1536	295
	109.2	355	119.9	382	131.3	412	138.3	426	142.9	436	147.0	451
78	73.3	.545	77.3	.596	81.9	.657	84.0	.688	85.1	.712	86.4	.742
	1653	302	1619	302	1605	303	1579	299	1570	298	1578	298
	108.1	357	118.6	384	129.6	416	136.4	431	140.7	442	144.7	457
80	74.0	.553	77.9	.602	82.4	.663	84.5	.694	85.6	.720	86.9	.747
	1696	307	1655	305	1641	306	1615	302	1614	302	1614	301
	106.9	362	117.2	388	127.9	420	134.5	434	138.5	447	142.5	460
82	74.7	.561	78.7	.612	83.0	.670	84.9	.700	86.2	.729	87.3	.751
	1742	311	1702	310	1678	309	1651	305	1658	305	1648	303
	105.6	368	115.8	394	126.3	424	132.6	438	136.4	452	140.4	463
84	75.5	.570	79.6	.621	83.6	.676	85.4	.708	86.7	.737	87.7	.755
	1791	316	1749	315	1714	312	1692	308	1702	309	1680	304
	104.3	374	114.4	400	124.6	427	130.7	443	134.4	458	138.3	465
86	76.3	.578	80.5	.631	84.1	.681	85.9	.716	87.1	.744	88.0	.758
	1835	321	1799	320	1751	315	1737	312	1741	312	1711	305
	103.2	379	113.0	407	123.1	431	128.9	448	132.5	461	136.3	466
88	77.0	.585	81.3	.639	84.7	.687	86.4	.724	87.6	.748	88.4	.761
	1879	325	1845	324	1789	318	1781	316	1777	314	1744	307
	102.1	384	111.6	412	121.5	435	127.1	453	130.7	464	134.3	468
90	77.4	.589	81.9	.645	85.2	.693	86.9	.732	88.0	.752	88.7	.763
	1910	327	1883	327	1826	320	1825	319	1811	316	1777	308
	101.1	386	110.4	416	120.0	438	125.3	458	128.9	467	132.2	470
92	77.8	.592	82.4	.650	85.6	.698	87.3	.739	88.3	.755	89.0	.765
	1939	329	1918	330	1861	323	1869	323	1843	317	1810	309
	100.2	388	109.2	419	118.6	441	123.6	462	127.1	469	130.1	471

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

N1 (%) / MACH
KG/H/ENG / IAS (KT)
NM/1000KG / TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
64	83.5	.704	84.9	.736	85.9	.755	86.7	.766	88.0	.781	90.3	.789
	1280	270	1289	271	1271	267	1250	259	1251	253	1265	244
	168.0	430	173.0	446	178.3	453	182.6	456	185.1	463	184.9	468
66	84.2	.715	85.5	.744	86.4	.759	87.2	.771	88.7	.783	90.5	.762
	1323	275	1328	275	1304	268	1288	261	1288	254	1254	235
	164.9	436	169.8	451	174.8	456	178.3	459	180.4	465	180.3	452
68	84.8	.725	86.0	.750	86.8	.762	87.7	.776	89.4	.786		
	1367	279	1362	277	1335	270	1326	263	1327	255		
	161.9	443	166.8	454	171.4	458	174.3	462	175.6	466		
70	85.4	.735	86.4	.754	87.2	.765	88.2	.781	90.0	.788		
	1411	283	1393	279	1370	271	1366	265	1368	255		
	159.1	449	163.9	457	167.8	460	170.2	465	170.8	467		
72	86.0	.744	86.9	.758	87.7	.770	88.8	.783	90.8	.790		
	1453	287	1426	280	1408	273	1401	265	1418	256		
	156.3	454	161.0	459	164.3	462	166.4	466	165.3	469		
74	86.5	.749	87.3	.761	88.1	.774	89.4	.785	91.1	.782		
	1487	289	1458	282	1445	274	1440	266	1433	253		
	153.8	457	158.1	461	160.9	465	162.4	468	161.7	464		
76	86.9	.753	87.7	.764	88.6	.780	90.0	.788				
	1520	291	1490	283	1488	277	1482	267				
	151.3	460	155.2	463	157.4	469	158.4	469				
78	87.3	.756	88.1	.768	89.1	.782	90.7	.790				
	1551	292	1528	284	1523	277	1527	268				
	148.9	462	152.2	465	154.2	470	154.1	471				
80	87.7	.760	88.5	.771	89.6	.784	91.3	.791				
	1585	294	1566	286	1561	278	1574	268				
	146.5	464	149.2	467	150.9	471	149.7	471				
82	88.1	.763	88.9	.776	90.2	.786	91.4	.763				
	1617	295	1606	288	1599	279	1552	258				
	144.1	466	146.4	470	147.6	472	146.4	454				
84	88.4	.765	89.4	.780	90.8	.788						
	1650	296	1648	289	1642	280						
	141.6	467	143.5	473	144.2	474						
86	88.8	.769	89.8	.782	91.0	.781						
	1688	297	1683	290	1653	277						
	139.1	470	140.8	474	142.0	469						
88	89.2	.772	90.3	.784								
	1727	299	1721	291								
	136.6	472	138.0	475								
90	89.6	.777	90.5	.780								
	1768	301	1733	289								
	134.2	474	136.3	472								
92	90.0	.781	90.6	.761								
	1809	302	1722	281								
	131.8	477	133.9	461								

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

N1 (%) / MACH
KG/H/ENG / IAS (KT)
NM/1000KG / TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
50	59.5	.431	67.7	.536	70.0	.561	71.2	.577	72.7	.598	74.6	.630
	1046	238	1152	270	1046	257	996	249	986	248	993	251
	135.2	283	150.0	345	169.8	355	181.1	361	188.2	371	195.3	388
52	60.7	.441	68.6	.544	70.3	.563	72.0	.586	73.7	.611	76.0	.646
	1089	244	1182	274	1062	258	1029	252	1027	253	1039	258
	132.7	289	148.2	351	167.6	356	177.9	366	184.6	379	191.5	398
54	64.9	.497	69.4	.551	70.9	.567	72.9	.595	74.8	.625	77.1	.660
	1252	275	1211	278	1087	260	1064	257	1070	259	1081	263
	130.3	326	146.6	355	165.1	359	174.7	372	181.2	388	187.9	406
56	66.9	.521	70.2	.557	71.6	.574	73.8	.606	75.9	.640	77.8	.668
	1332	289	1238	281	1119	263	1104	262	1116	266	1112	267
	128.2	342	144.9	359	162.3	363	171.6	379	177.9	397	184.8	411
58	67.6	.527	70.6	.559	72.3	.582	74.8	.619	77.1	.653	78.3	.671
	1360	292	1258	283	1152	266	1148	268	1160	272	1136	268
	127.0	345	143.3	361	159.7	368	168.6	387	174.8	405	181.9	413
60	68.2	.532	70.9	.561	73.1	.590	75.8	.632	78.0	.664	78.8	.673
	1387	295	1275	283	1187	270	1192	274	1198	276	1157	269
	125.8	349	141.8	362	157.1	373	165.8	395	171.9	412	179.2	415
62	69.0	.539	71.2	.563	73.9	.598	76.9	.646	78.6	.670	79.4	.679
	1418	299	1294	284	1223	274	1239	280	1228	279	1188	272
	124.6	353	140.2	363	154.7	378	163.0	404	169.3	416	176.0	418
64	69.7	.545	71.6	.564	74.7	.608	77.9	.657	79.0	.673	80.1	.687
	1449	302	1310	285	1263	279	1282	285	1251	280	1223	275
	123.4	358	138.7	364	152.3	385	160.4	411	166.9	418	172.9	423
66	70.4	.551	71.9	.566	75.5	.619	78.6	.666	79.4	.675	80.8	.695
	1477	305	1330	286	1306	285	1317	289	1273	281	1259	278
	122.2	361	137.1	365	149.9	392	158.1	417	164.6	419	169.8	428
68	71.1	.556	72.5	.572	76.4	.631	79.2	.671	80.0	.681	81.5	.703
	1505	308	1362	289	1351	290	1346	292	1305	284	1297	282
	121.1	364	135.3	368	147.6	399	155.9	420	161.9	423	166.8	433
70	71.6	.560	73.1	.578	77.4	.643	79.6	.674	80.6	.688	82.2	.713
	1529	310	1395	292	1397	296	1369	293	1341	287	1339	286
	120.0	367	133.4	372	145.5	406	153.9	421	159.2	427	163.9	439
72	71.9	.561	73.7	.584	78.3	.654	80.0	.676	81.3	.695	82.9	.722
	1548	311	1429	295	1442	301	1391	293	1377	290	1381	290
	118.9	368	131.6	376	143.4	413	151.9	423	156.6	431	161.0	445
74	72.2	.562	74.3	.590	79.0	.662	80.5	.680	81.9	.703	83.5	.730
	1566	312	1464	299	1479	305	1421	296	1415	294	1420	293
	117.8	369	129.9	380	141.5	419	149.7	425	154.1	436	158.3	449
76	72.5	.564	75.0	.597	79.7	.670	81.1	.687	82.6	.711	84.0	.737
	1586	313	1500	302	1516	309	1457	299	1456	298	1459	297
	116.7	370	128.2	385	139.7	424	147.4	429	151.6	441	155.6	454

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.5 %	△FUEL = + 2 %	△FUEL = + 4.5 %

11.0-08F0A319-112 CFM56-5B6/P SA12200000C5KG330 0 018590 0 0 1 1.0 .0 .00 0 01 .990 .000 .000 15 FCOM-N0-03-05-15-017-180

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+15 CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	76.9	.664	77.7	.672	79.1	.693	80.8	.722	82.3	.750	84.3	.773
	999	254	962	246	951	243	952	243	958	242	965	239
	202.8	405	211.7	407	219.0	416	225.8	430	232.1	445	237.4	458
52	77.6	.670	78.5	.681	80.0	.705	81.5	.733	83.0	.760	85.0	.780
	1026	256	995	249	989	248	990	247	996	245	1001	241
	199.3	409	207.3	412	214.0	423	220.4	436	226.2	451	231.1	463
54	78.1	.672	79.3	.690	81.0	.717	82.2	.744	83.8	.770	85.6	.784
	1048	257	1030	253	1030	252	1030	251	1035	249	1036	242
	196.0	411	202.9	418	209.2	431	215.1	443	220.5	456	224.4	465
56	78.6	.677	80.1	.699	81.7	.727	82.9	.753	84.5	.777	86.2	.783
	1075	259	1066	257	1068	256	1067	254	1071	251	1066	242
	192.4	414	198.6	423	204.5	437	210.3	449	215.1	461	217.8	464
58	79.4	.685	81.0	.711	82.4	.738	83.6	.763	85.1	.781	86.8	.784
	1109	263	1107	261	1108	260	1107	258	1104	253	1104	242
	188.7	419	194.5	431	200.0	443	205.3	455	209.8	463	210.6	465
60	80.1	.693	81.8	.721	83.0	.748	84.3	.772	85.6	.784	87.5	.785
	1144	266	1147	266	1147	264	1147	261	1139	254	1143	243
	185.0	423	190.5	437	195.7	449	200.6	460	204.2	465	203.6	466
62	80.8	.701	82.4	.730	83.6	.756	84.9	.778	86.1	.783	87.7	.767
	1180	269	1185	269	1185	267	1183	264	1170	254	1145	237
	181.5	428	186.7	442	191.7	454	196.1	464	198.6	465	198.7	455
64	81.6	.712	83.1	.740	84.3	.766	85.4	.781	86.8	.784		
	1221	274	1225	273	1227	271	1215	265	1207	254		
	178.1	435	182.9	448	187.5	460	191.7	466	192.7	465		
66	82.4	.722	83.6	.748	84.9	.774	85.9	.784	87.4	.785		
	1262	278	1263	276	1266	274	1250	266	1246	254		
	174.7	441	179.4	453	183.6	465	187.0	467	186.8	466		
68	83.0	.730	84.2	.756	85.5	.779	86.4	.784	88.0	.784		
	1301	281	1301	279	1301	276	1280	266	1283	254		
	171.5	446	176.0	458	179.9	468	182.4	467	181.3	465		
70	83.6	.739	84.8	.765	86.0	.782	86.9	.785	88.1	.760		
	1342	285	1343	283	1333	277	1317	266	1270	245		
	168.2	452	172.5	463	176.2	470	177.5	467	177.5	451		
72	84.1	.747	85.4	.772	86.4	.784	87.5	.785				
	1381	288	1383	286	1366	278	1355	266				
	165.3	456	169.2	468	172.3	471	172.6	468				
74	84.6	.754	85.9	.777	86.9	.785	88.1	.786				
	1418	291	1419	288	1400	279	1396	267				
	162.4	461	166.0	471	168.5	472	167.7	468				
76	85.2	.763	86.4	.781	87.3	.785	88.3	.772				
	1460	295	1453	290	1433	278	1399	262				
	159.5	466	162.8	473	164.5	471	164.5	460				

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = − 0.5 %	△FUEL = + 2 %	△FUEL = + 4.5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

N1 (%) / MACH
KG/H/ENG / IAS (KT)
NM/1000KG / TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
50	60.7	.440	67.8	.528	70.4	.553	71.7	.568	73.2	.587	75.0	.614
	1083	243	1144	266	1045	253	998	245	985	243	987	244
	134.6	291	149.9	343	169.0	353	179.9	359	186.6	368	193.4	382
52	64.0	.482	68.7	.534	70.8	.554	72.6	.576	74.1	.596	76.5	.634
	1207	267	1173	269	1062	254	1031	248	1022	247	1041	252
	132.1	319	148.0	347	166.7	354	176.5	364	182.9	374	189.4	394
54	66.3	.508	69.5	.541	71.3	.558	73.4	.584	75.1	.610	78.0	.652
	1295	281	1203	273	1086	255	1065	252	1065	253	1092	260
	129.8	336	146.2	352	164.1	356	173.2	369	179.4	382	185.6	405
56	67.1	.514	70.4	.547	72.1	.565	74.3	.593	76.4	.627	78.8	.661
	1325	285	1232	276	1119	259	1101	256	1116	260	1128	264
	128.4	340	144.5	356	161.2	361	170.0	374	176.0	393	182.3	411
58	67.6	.518	71.0	.552	72.8	.572	75.1	.602	77.8	.643	79.3	.665
	1347	287	1256	278	1153	262	1138	260	1167	267	1154	266
	127.2	343	142.8	359	158.5	365	167.0	380	172.7	403	179.3	414
60	68.3	.523	71.3	.553	73.6	.579	76.2	.616	78.9	.658	79.8	.668
	1375	290	1274	279	1187	265	1187	266	1215	274	1177	267
	125.8	346	141.1	360	155.8	370	164.0	389	169.6	412	176.5	415
62	69.1	.530	71.7	.555	74.4	.587	77.4	.633	79.5	.663	80.5	.676
	1408	294	1293	280	1223	269	1240	274	1243	276	1213	270
	124.5	350	139.5	361	153.2	375	161.2	400	167.0	415	173.2	420
64	69.8	.535	72.0	.556	75.1	.594	78.7	.649	80.0	.666	81.2	.684
	1437	297	1311	281	1259	273	1292	281	1269	277	1250	273
	123.2	354	137.9	361	150.8	380	158.4	409	164.5	418	170.1	425
66	70.5	.541	72.4	.557	75.9	.603	79.6	.660	80.5	.670	81.9	.692
	1467	300	1330	281	1298	277	1336	286	1296	279	1289	277
	121.9	358	136.3	362	148.4	385	155.9	417	162.0	420	167.0	430
68	71.2	.546	73.0	.563	76.8	.616	80.1	.664	81.1	.677	82.6	.700
	1496	303	1363	284	1347	283	1365	288	1333	282	1328	281
	120.7	361	134.3	366	146.1	393	153.7	420	159.2	424	164.0	436
70	71.9	.551	73.6	.568	77.9	.631	80.5	.667	81.8	.685	83.4	.710
	1525	305	1396	287	1401	290	1390	290	1371	286	1370	285
	119.5	364	132.4	370	143.7	403	151.6	421	156.6	429	161.1	441
72	72.3	.554	74.2	.574	79.0	.643	81.0	.670	82.4	.692	84.1	.719
	1548	307	1431	290	1451	296	1416	291	1409	289	1412	289
	118.3	366	130.5	373	141.6	411	149.5	423	154.0	434	158.3	447
74	72.6	.555	74.8	.580	80.0	.656	81.6	.677	83.1	.700	84.6	.727
	1567	308	1464	293	1500	302	1453	294	1448	292	1452	292
	117.2	367	128.7	377	139.5	419	147.2	428	151.4	439	155.6	452
76	72.9	.556	75.4	.586	80.6	.663	82.2	.684	83.8	.708	85.1	.735
	1585	308	1500	296	1537	306	1491	297	1490	296	1494	295
	116.0	368	127.0	381	137.7	423	144.9	432	149.0	444	152.9	457
78	73.2	.557	76.1	.592	81.0	.666	82.8	.691	84.5	.717	85.7	.743
	1603	309	1538	300	1564	307	1529	300	1533	300	1537	299
	114.9	369	125.3	385	136.0	425	142.6	436	146.6	449	150.3	462

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = –0.5 %	△FUEL = +2.5 %	△FUEL = +5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+20 CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL290**		**FL310**		**FL330**		**FL350**		**FL370**		**FL390**	
50	77.9	.657	78.7	.667	80.3	.691	81.9	.719	83.5	.748	85.5	.769
	1012	251	979	244	973	242	974	242	982	241	987	237
	200.2	405	208.6	408	215.5	419	222.1	433	228.1	448	233.6	461
52	78.5	.662	79.6	.677	81.1	.700	82.6	.730	84.2	.757	86.1	.776
	1039	253	1016	248	1010	246	1015	246	1021	244	1023	240
	196.6	409	204.0	415	210.6	425	216.7	440	222.4	454	227.3	465
54	79.0	.666	80.4	.686	82.1	.713	83.4	.742	85.0	.766	86.7	.781
	1064	255	1052	252	1052	251	1057	250	1059	248	1061	242
	193.1	411	199.7	420	205.8	433	211.5	447	216.8	459	220.8	468
56	79.7	.673	81.3	.696	82.8	.724	84.1	.751	85.6	.774	87.3	.781
	1096	258	1090	256	1092	255	1095	254	1096	250	1093	242
	189.4	415	195.4	426	201.2	439	206.7	453	211.5	464	214.3	468
58	80.5	.682	82.1	.707	83.5	.735	84.7	.760	86.2	.780	87.3	.756
	1133	261	1130	260	1135	259	1134	257	1133	252	1082	233
	185.7	421	191.3	432	196.6	446	201.9	458	206.3	468	209.4	453
60	81.3	.691	82.9	.717	84.2	.745	85.4	.768	86.8	.782		
	1172	265	1172	264	1176	263	1173	260	1167	253		
	182.0	426	187.4	439	192.4	453	197.3	463	200.9	469		
62	82.1	.700	83.5	.727	84.8	.754	86.0	.774	87.3	.783		
	1209	268	1213	268	1215	267	1209	262	1203	254		
	178.5	432	183.5	445	188.4	458	192.9	466	195.2	470		
64	82.9	.709	84.2	.738	85.4	.762	86.5	.780	87.7	.778		
	1250	273	1256	272	1255	270	1245	264	1224	252		
	175.1	438	179.8	451	184.4	463	188.5	470	190.5	467		
66	83.6	.719	84.8	.746	86.0	.770	87.1	.783	87.8	.750		
	1292	277	1296	276	1294	273	1281	265	1210	242		
	171.8	444	176.3	457	180.6	467	184.0	471	185.6	449		
68	84.1	.727	85.4	.754	86.6	.775	87.6	.783				
	1331	280	1334	279	1330	275	1315	266				
	168.6	449	172.9	461	176.9	470	179.4	472				
70	84.7	.736	85.9	.761	87.1	.779	88.0	.782				
	1374	284	1375	282	1364	276	1346	265				
	165.4	454	169.5	466	173.3	473	175.0	471				
72	85.3	.745	86.5	.768	87.6	.783	88.1	.761				
	1415	287	1414	284	1403	278	1335	257				
	162.4	460	166.3	470	169.5	475	171.6	458				
74	85.8	.752	87.0	.773	88.0	.783						
	1454	290	1450	287	1435	278						
	159.6	464	163.2	473	165.7	475						
76	86.3	.759	87.5	.777	88.1	.768						
	1494	293	1484	288	1430	272						
	156.7	468	160.2	475	163.0	466						
78	86.9	.766	87.9	.781	88.1	.743						
	1535	296	1522	290	1419	262						
	153.9	473	157.1	478	159.1	451						

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = –0.5 %	△FUEL = +2.5 %	△FUEL = +5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+20 CG=33.0%	**N1 (%)** **KG/H/ENG** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL150**		**FL200**		**FL230**		**FL250**		**FL270**	
64	71.3	.529	72.8	.544	76.9	.596	80.3	.641	81.7	.659	83.2	.681
	1516	293	1363	274	1334	274	1343	278	1320	274	1305	272
	115.4	350	129.7	353	142.8	381	150.7	405	156.5	413	162.2	423
66	71.7	.531	73.7	.555	77.8	.606	81.1	.648	82.4	.667	83.8	.689
	1536	295	1411	280	1376	278	1379	281	1357	278	1343	276
	114.4	352	127.8	361	140.7	387	148.4	409	154.0	418	159.4	428
68	72.1	.533	74.7	.565	78.9	.618	81.7	.654	83.1	.674	84.4	.695
	1556	296	1459	285	1425	284	1412	284	1394	281	1379	278
	113.4	353	125.9	367	138.6	395	146.3	413	151.6	423	156.8	432
70	72.4	.535	75.6	.576	80.1	.631	82.3	.661	83.8	.682	84.9	.704
	1574	296	1507	291	1475	290	1448	287	1433	285	1419	282
	112.4	354	124.2	374	136.5	403	144.1	417	149.2	428	154.2	437
72	72.7	.536	76.4	.584	80.9	.639	82.9	.668	84.4	.689	85.5	.713
	1593	297	1548	295	1516	294	1484	290	1470	288	1464	286
	111.3	355	122.7	380	134.5	408	142.0	422	146.9	432	151.5	444
74	73.1	.538	77.0	.588	81.5	.646	83.6	.674	84.9	.695	86.1	.723
	1617	299	1579	298	1553	297	1521	293	1506	290	1509	290
	110.2	356	121.2	383	132.7	412	140.0	426	144.7	436	149.0	450
76	73.5	.540	77.5	.592	82.1	.650	84.2	.681	85.4	.702	86.7	.732
	1638	300	1607	300	1585	300	1559	296	1545	294	1553	294
	109.1	358	119.8	385	131.0	415	138.0	430	142.5	440	146.6	455
78	73.9	.544	77.9	.595	82.6	.656	84.8	.688	85.9	.711	87.2	.741
	1665	301	1634	301	1620	302	1597	299	1589	298	1598	298
	108.0	360	118.5	387	129.3	419	136.0	434	140.3	446	144.3	461
80	74.6	.551	78.5	.600	83.2	.663	85.3	.694	86.5	.720	87.7	.747
	1709	306	1668	304	1658	305	1633	302	1634	301	1634	301
	106.8	365	117.0	390	127.6	423	134.1	438	138.1	451	142.0	464
82	75.4	.560	79.4	.610	83.8	.669	85.7	.699	87.0	.728	88.2	.751
	1757	311	1716	309	1695	308	1669	304	1678	305	1669	303
	105.5	371	115.6	397	126.0	427	132.3	442	136.0	457	139.9	467
84	76.2	.569	80.3	.620	84.3	.675	86.2	.707	87.5	.737	88.5	.755
	1806	316	1765	314	1732	311	1711	308	1722	309	1701	304
	104.2	376	114.2	403	124.4	431	130.4	446	134.0	462	137.9	469
86	76.9	.577	81.2	.630	84.9	.681	86.7	.715	88.0	.743	88.9	.758
	1851	320	1815	319	1771	314	1756	312	1763	312	1734	305
	103.1	382	112.8	409	122.8	435	128.5	451	132.1	466	135.9	471
88	77.6	.584	82.0	.638	85.5	.687	87.2	.723	88.4	.748	89.3	.761
	1896	325	1862	324	1809	317	1801	315	1799	314	1767	307
	102.0	387	111.4	415	121.2	439	126.7	457	130.3	469	133.8	473
90	78.1	.588	82.6	.644	86.0	.692	87.7	.731	88.8	.752	89.6	.763
	1927	327	1900	327	1846	320	1846	319	1834	316	1800	308
	101.0	389	110.1	419	119.7	442	125.0	461	128.5	471	131.8	474
92	78.5	.591	83.1	.649	86.4	.697	88.2	.739	89.2	.755	89.9	.765
	1955	328	1938	330	1883	322	1892	323	1866	317	1834	309
	100.0	391	108.9	422	118.2	445	123.3	466	126.8	473	129.7	476

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

N1 (%)	MACH
KG/H/ENG	IAS (KT)
NM/1000KG	TAS (KT)

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
64	84.4	.704	85.7	.736	86.8	.754	87.5	.765	89.0	.781		
	1296	270	1305	271	1287	267	1265	259	1269	253		
	167.6	434	172.5	450	177.9	458	182.1	461	184.5	468		
66	85.0	.714	86.4	.744	87.3	.759	88.1	.770	89.6	.783		
	1340	275	1345	275	1321	268	1304	261	1305	254		
	164.5	441	169.3	455	174.3	461	177.8	464	179.8	469		
68	85.6	.724	86.9	.750	87.7	.761	88.6	.776	89.8	.769		
	1384	279	1380	277	1352	269	1344	263	1304	249		
	161.5	447	166.3	459	170.9	462	173.7	467	176.9	461		
70	86.3	.734	87.3	.754	88.1	.765	89.1	.781				
	1428	283	1411	279	1388	271	1385	265				
	158.7	453	163.5	461	167.3	464	169.7	470				
72	86.8	.743	87.8	.758	88.6	.770	89.7	.782				
	1470	286	1445	280	1426	273	1421	265				
	155.9	458	160.5	464	163.8	467	165.8	471				
74	87.4	.749	88.2	.761	89.0	.774	90.1	.781				
	1506	289	1477	281	1465	274	1446	265				
	153.4	462	157.7	466	160.4	470	162.7	470				
76	87.8	.753	88.5	.763	89.5	.780						
	1539	291	1510	282	1508	277						
	150.9	464	154.8	467	156.9	473						
78	88.2	.756	89.0	.767	90.0	.781						
	1571	292	1548	284	1541	277						
	148.5	467	151.7	470	153.9	474						
80	88.6	.760	89.4	.771	90.0	.765						
	1605	294	1586	286	1527	271						
	146.0	469	148.8	472	152.0	464						
82	88.9	.762	89.7	.774								
	1637	295	1620	287								
	143.6	470	146.1	473								
84	89.3	.765	89.8	.762								
	1672	296	1614	282								
	141.1	472	144.6	467								
86	89.7	.769	89.8	.736								
	1711	297	1600	271								
	138.6	474	140.8	450								
88	89.8	.763										
	1717	295										
	137.1	471										
90	89.8	.751										
	1712	290										
	135.3	463										
92	89.9	.725										
	1703	279										
	131.3	447										

ECON AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

N1 (%) — **MACH**
KG/H/ENG — **IAS (KT)**
NM/1000KG — **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL200		FL230		FL250		FL270	
50	60.1	.431	68.3	.535	70.6	.561	71.9	.576	73.4	.597	75.3	.628
	1059	238	1160	270	1054	256	1005	248	995	247	1000	250
	134.7	285	150.0	348	169.8	358	181.1	364	188.1	374	195.2	391
52	61.5	.445	69.2	.543	71.0	.562	72.8	.585	74.4	.610	76.7	.645
	1112	246	1191	274	1071	257	1040	252	1036	253	1048	257
	132.3	294	148.2	353	167.5	359	177.7	370	184.5	382	191.3	401
54	66.1	.506	70.0	.550	71.5	.566	73.6	.594	75.5	.624	77.8	.659
	1288	280	1219	277	1095	259	1075	256	1079	259	1092	263
	129.9	335	146.6	357	165.0	361	174.6	375	181.1	391	187.7	410
56	67.4	.519	70.8	.556	72.3	.573	74.5	.605	76.6	.637	78.6	.667
	1339	288	1246	280	1128	263	1113	261	1124	265	1124	266
	128.2	344	144.9	361	162.2	366	171.5	382	177.7	399	184.6	415
58	68.0	.524	71.2	.558	73.0	.580	75.4	.616	77.8	.652	79.1	.670
	1364	290	1267	282	1161	266	1154	266	1170	271	1147	268
	127.1	347	143.3	363	159.6	371	168.6	389	174.6	409	181.7	417
60	68.8	.531	71.5	.560	73.8	.588	76.5	.630	78.7	.663	79.6	.672
	1396	294	1285	283	1197	270	1201	273	1209	276	1169	269
	125.8	351	141.7	364	157.0	376	165.7	398	171.7	415	178.9	418
62	69.6	.538	71.9	.562	74.6	.597	77.6	.644	79.3	.669	80.2	.678
	1427	298	1304	284	1234	274	1249	279	1239	279	1200	271
	124.6	356	140.2	366	154.5	381	162.8	407	169.1	419	175.8	422
64	70.3	.544	72.2	.563	75.4	.607	78.6	.656	79.8	.672	80.9	.686
	1458	302	1321	285	1275	279	1294	285	1263	280	1236	274
	123.4	360	138.6	366	152.1	388	160.2	414	166.7	421	172.6	427
66	71.0	.549	72.6	.565	76.3	.619	79.4	.665	80.2	.674	81.6	.694
	1488	305	1341	286	1319	284	1330	289	1285	281	1273	278
	122.2	364	137.0	368	149.7	395	157.9	420	164.3	422	169.5	431
68	71.7	.554	73.1	.571	77.1	.630	80.0	.670	80.8	.680	82.3	.702
	1515	308	1373	288	1364	290	1359	291	1319	284	1312	281
	121.0	367	135.1	371	147.5	402	155.7	423	161.6	426	166.4	437
70	72.2	.559	73.8	.577	78.1	.641	80.4	.673	81.4	.687	83.0	.712
	1542	310	1407	292	1409	295	1383	292	1355	287	1354	286
	119.9	370	133.3	375	145.3	410	153.6	425	158.9	431	163.5	443
72	72.5	.560	74.4	.583	79.0	.652	80.8	.675	82.1	.694	83.8	.721
	1560	311	1441	295	1455	300	1405	293	1393	290	1396	290
	118.8	371	131.5	379	143.2	417	151.6	426	156.3	435	160.7	449
74	72.8	.562	75.0	.589	79.8	.661	81.3	.680	82.7	.702	84.3	.729
	1580	312	1476	298	1494	305	1437	295	1431	293	1436	293
	117.7	372	129.8	383	141.2	422	149.4	429	153.7	440	157.9	453
76	73.1	.563	75.6	.596	80.4	.668	81.8	.686	83.4	.711	84.9	.737
	1598	313	1513	302	1529	308	1473	298	1473	297	1476	296
	116.6	373	128.1	387	139.5	426	147.1	433	151.2	446	155.2	458

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 0.5 %	△FUEL = + 2 %	△FUEL = + 4.5 %

11.0-08F0A319-112 CFM56-5B6/P SA12200000C5KG330 0 018590 0 0 1 1.0 .0 .00 0 01 .990 .000 .000 20 FCOM-N0-03-05-15-019-180

R

LONG RANGE CRUISE

MAX. CRUISE THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+20 CG=33.0%	**N1 (%) KG/H/ENG NM/1000KG**	**MACH IAS (KT) TAS (KT)**

WEIGHT (1000KG)	FL290		FL310		FL330		FL350		FL370		FL390	
50	77.7	.662	78.5	.671	79.9	.692	81.6	.721	83.2	.749	85.2	.772
	1008	253	972	246	961	243	964	243	970	241	977	238
	202.6	409	211.5	411	218.7	420	225.4	434	231.5	449	236.8	463
52	78.3	.668	79.3	.680	80.8	.702	82.3	.732	83.9	.759	85.9	.779
	1036	256	1005	249	998	247	1003	247	1009	245	1013	241
	199.0	412	207.0	416	213.7	426	219.9	441	225.7	455	230.5	467
54	78.8	.671	80.1	.689	81.8	.715	83.1	.744	84.7	.770	86.5	.783
	1058	257	1040	253	1040	252	1043	251	1049	249	1049	242
	195.7	414	202.6	422	208.8	434	214.6	448	219.9	461	223.8	470
56	79.4	.676	80.9	.698	82.5	.726	83.8	.753	85.4	.777	87.1	.783
	1086	259	1078	256	1080	256	1081	254	1085	251	1081	242
	192.1	417	198.2	427	204.1	441	209.8	453	214.5	466	217.1	469
58	80.2	.684	81.8	.709	83.2	.737	84.5	.763	86.0	.781	87.3	.768
	1121	262	1117	261	1121	260	1122	258	1119	253	1087	237
	188.4	422	194.2	434	199.5	448	204.8	459	209.2	468	211.7	460
60	80.9	.693	82.6	.720	83.9	.747	85.2	.772	86.6	.784	87.4	.723
	1158	266	1160	265	1161	264	1162	261	1155	254	1071	222
	184.7	428	190.1	441	195.3	454	200.1	465	203.6	470	202.3	433
62	81.7	.702	83.3	.730	84.5	.756	85.8	.778	87.1	.784		
	1195	269	1199	269	1200	267	1197	264	1186	254		
	181.1	433	186.2	447	191.2	459	195.6	468	198.0	470		
64	82.5	.712	83.9	.740	85.1	.765	86.3	.781	87.7	.784		
	1236	273	1241	273	1242	271	1230	265	1224	254		
	177.7	439	182.4	453	187.1	465	191.2	470	192.1	470		
66	83.3	.722	84.5	.748	85.8	.773	86.8	.784	87.8	.764		
	1277	278	1279	276	1281	274	1266	266	1217	247		
	174.3	445	178.9	458	183.2	469	186.5	472	188.2	458		
68	83.9	.730	85.1	.756	86.3	.778	87.3	.784				
	1316	281	1318	279	1317	276	1297	266				
	171.0	450	175.5	463	179.4	473	181.9	472				
70	84.4	.738	85.6	.764	86.8	.781	87.8	.784				
	1357	285	1360	283	1350	277	1335	266				
	167.9	456	172.0	468	175.7	474	176.9	472				
72	85.0	.747	86.2	.772	87.3	.784	88.0	.772				
	1397	288	1400	286	1384	278	1341	261				
	164.8	461	168.7	472	171.8	476	173.4	465				
74	85.5	.753	86.8	.777	87.8	.785	88.1	.741				
	1435	291	1437	288	1418	279	1326	250				
	162.0	465	165.5	476	168.0	477	168.4	447				
76	86.0	.762	87.3	.781	88.0	.780						
	1478	294	1471	289	1437	277						
	159.0	470	162.4	478	164.8	473						

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 4.5 %

GENERAL

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and the time required to cover a given air distance from any moment in cruise to landing.

These tables are established for :

- Cruise Mach number : M.78/LR
- Descent profile : M.78/300KT/250KT
- Approach and landing : 120 kg or 270 lb – 6 minute IMC
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

Note : 1. *In the tables, the asterisk "*" means that a step climb of 4000 feet has been made to reach the corresponding flight level.*
2. *The flight level shown on the top of each column is the final flight level.*
3. *For each degree celsius above ISA apply a fuel correction of*
0.005 (kg/°C/NM) × △ISA (°C) × Air Distance (NM)
or 0.011 (lb/°C/NM) × △ISA (°C) × Air Distance (NM)

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The in cruise quick check tables are based on a reference initial weight.

The fuel consumption must be corrected when the actual weight is different from the reference initial weight.

If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1000 kg or 1000 lb below (or above) the reference weight.

EXAMPLE

In-cruise quick check with cruise at M.78
FL370
Actual cruise weight : 55000 kg
Remaining ground distance : 800 NM
ISA + 10
Average wind during flight : – 40 kt (head wind)

- Evaluation of air distance to be covered
  - Using the "Ground Distance/Air Distance" conversion table (see 3.05.50 P2), the corresponding air distance is : 880 NM
- Determination of the fuel consumption and time for the reference initial weight in cruise.
  - Enter table on 3.05.20 page 4 with an air distance of 880 NM and FL370 for ISA.

R Fuel consumption : 4053 kg
  Time needed : 2 h 07 min
- Correction due to real in cruise weight of 55000 kg
  △ fuel consumption : – 50 kg per 1000 kg below reference
  △ fuel : $-50 \times (60 - 55) = -250$ kg
- Temperature correction :
  △ fuel consumption : + 0.005 kg per 1° above ISA and per 1 NM Air distance
  △ fuel : $+0.005 \times 10 \times 880 = 44$ kg

Result :

R Fuel : $4053 - 250 + 44 = 3847$ kg
Time : 2 h 07 min

GENERAL

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and the time required to cover a given air distance from any moment in cruise to landing.
These tables are established for :
- Cruise Mach number : M.78/LR
- Descent profile : M.78/300KT/250KT
- Approach and landing : 140 kg or 310 lb – 6 minute IMC
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

Note : *1. In the tables, the asterisk "*" means that a step climb of 4000 feet has been made to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree celsius above ISA apply a fuel correction of
0.005 (kg/°C/NM) × △ISA (°C) × Air Distance (NM)
or 0.011 (lb/°C/NM) × △ISA (°C) × Air Distance (NM)

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The in cruise quick check tables are based on a reference initial weight.
The fuel consumption must be corrected when the actual weight is different from the reference initial weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1000 kg or 1000 lb below (or above) the reference weight.

EXAMPLE

In-cruise quick check with cruise at M.78
FL370
Actual cruise weight : 60000 kg
Remaining ground distance : 800 NM
ISA + 10
Average wind during flight : – 40 kt (head wind)

- Evaluation of air distance to be covered
  - Using the “Ground Distance/Air Distance” conversion table (see 3.05.50 P2), the corresponding air distance is : 880 NM
- Determination of the fuel consumption and time for the reference initial weight in cruise.
  - Enter table on 3.05.20 page 4 with an air distance of 880 NM and FL370 for ISA.

R Fuel consumption : 4553 kg
  Time needed : 2 h 07 min
- Correction due to real in cruise weight of 60000 kg
  △ fuel consumption : – 52 kg per 1000 kg below reference
  △ fuel : – 52 × (65 – 60) = – 260 kg
- Temperature correction :
  △ fuel consumption : + 0.005 kg per 1° above ISA and per 1 NM Air distance
  △ fuel : + 0.005 × 10 × 880 = 44 kg

Result :

R Fuel : 4453 – 260 + 44 = 4237 kg
Time : 2 h 07 min

GENERAL

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and the time required to cover a given air distance from any moment in cruise
R to landing.

These tables are established for :
- Cruise Mach number : M.78/LR
- Descent profile : M.78/300KT/250KT
- Approach and landing : 110 kg or 240 lb – 6 minute IMC
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

Note : *1. In the tables, the asterisk "*" means that a step climb of 4000 feet has been made to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree celsius above ISA apply a fuel correction of
0.005 (kg/°C/NM) × △ISA (°C) × Air Distance (NM)
or 0.011 (lb/°C/NM) × △ISA (°C) × Air Distance (NM)

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The in cruise quick check tables are based on a reference initial weight.
The fuel consumption must be corrected when the actual weight is different from the reference initial weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1000 kg or 1000 lb below (or above) the reference weight.

EXAMPLE

In-cruise quick check with cruise at M.78
FL370
Actual cruise weight : 55000 kg
Remaining ground distance : 800 NM
ISA + 10
Average wind during flight : – 40 kt (head wind)

— Evaluation of air distance to be covered
  · Using the "Ground Distance/Air Distance" conversion table (see 3.05.50 P2), the corresponding air distance is : 880 NM
— Determination of the fuel consumption and time for the reference initial weight in cruise.
  · Enter table on 3.05.20 page 4 with an air distance of 880 NM and FL370 for ISA.
R Fuel consumption : 3983 kg
  Time needed : 2 h 07 min
— Correction due to real in cruise weight of 55000 kg
R △ fuel consumption : – 41 kg per 1000 kg below reference
R △ fuel : – 41 × (60 – 55) = – 205 kg
— Temperature correction :
  △ fuel consumption : + 0.005 kg per 1° above ISA and per 1 NM Air distance
  △ fuel : + 0.005 × 10 × 880 = 44 kg

Result :

R Fuel : 3983 – 205 + 44 = 3822 kg
Time : 2 h 07 min

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
100	421 0.22	391 0.22	364 0.22	339 0.22	314 0.22	289 0.22	0	0	0
125	580 0.25	543 0.26	508 0.26	478 0.26	450 0.26	424 0.26	0	0	0
150	740 0.29	694 0.29	652 0.29	617 0.29	585 0.29	559 0.29	0	0	1
175	900 0.32	845 0.32	796 0.32	756 0.32	720 0.32	693 0.32	1	1	2
200	1060 0.35	996 0.35	940 0.35	894 0.36	855 0.36	828 0.36	2	2	4
225	1219 0.38	1147 0.39	1084 0.39	1033 0.39	990 0.39	962 0.39	1	3	5
250	1378 0.42	1298 0.42	1228 0.42	1171 0.42	1124 0.42	1095 0.42	2	4	7
275	1538 0.45	1449 0.45	1371 0.45	1309 0.46	1259 0.46	1229 0.46	3	5	9
300	1697 0.48	1599 0.48	1514 0.49	1447 0.49	1393 0.49	1362 0.49	3	6	10
325	1856 0.51	1750 0.52	1658 0.52	1585 0.52	1527 0.52	1495 0.52	4	7	12
350	2015 0.55	1900 0.55	1801 0.55	1723 0.56	1661 0.56	1627 0.56	5	8	13
375	2173 0.58	2050 0.58	1944 0.59	1860 0.59	1794 0.59	1760 0.59	6	9	15
400	2332 1.01	2200 1.02	2086 1.02	1997 1.02	1928 1.02	1892 1.02	6	11	17
425	2491 1.04	2350 1.05	2229 1.05	2134 1.06	2061 1.06	2023 1.06	7	12	18
450	2649 1.08	2500 1.08	2371 1.08	2271 1.09	2194 1.09	2155 1.09	8	13	20
475	2807 1.11	2650 1.11	2514 1.12	2408 1.12	2327 1.13	2286 1.13	9	14	21
500	2966 1.14	2800 1.15	2656 1.15	2545 1.16	2459 1.16	2417 1.16	9	15	23
525	3124 1.17	2949 1.18	2798 1.18	2681 1.19	2592 1.19	2547 1.19	10	16	24
550	3282 1.21	3098 1.21	2940 1.22	2817 1.22	2724 1.23	2678 1.23	11	17	25
575	3440 1.24	3248 1.24	3082 1.25	2954 1.26	2856 1.26	2808 1.26	12	18	27
600	3598 1.27	3397 1.28	3223 1.28	3090 1.29	2988 1.29	2938 1.29	12	19	35
625	3755 1.30	3546 1.31	3365 1.32	3225 1.32	3120 1.33	3067 1.33	13	20	36
650	3913 1.34	3695 1.34	3506 1.35	3361 1.36	3251 1.36	3196 1.36	14	21	38
675	4070 1.37	3844 1.38	3648 1.38	3497 1.39	3383 1.39	3325 1.39	14	22	39
700	4228 1.40	3993 1.41	3789 1.42	3632 1.42	3514 1.43	3454 1.43	15	23	41
725	4385 1.43	4141 1.44	3930 1.45	3767 1.46	3645 1.46	3583 1.46	16	24	42

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.6 %	△FUEL = + 3 %	△FUEL = + 5.5 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.000011 0250300 .7800 .00200 140 0300350 65 0 100100 40100 18590 FCOM-G0-03-05-20-003-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	**310**	**330**	**350**	**370**	**390**	**FL290 FL310**	**FL330 FL350**	**FL370 FL390**
725	4385 1.43	4141 1.44	3930 1.45	3767 1.46	3645 1.46	3583 1.46	16	24	42
750	4542 1.47	4290 1.47	4071 1.48	3902 1.49	3776 1.49	3711 1.49	16	25	44
775	4699 1.50	4438 1.51	4212 1.51	4037 1.52	3906 1.53	3839 1.53	17	26	45
800	4856 1.53	4586 1.54	4352 1.55	4172 1.56	4037 1.56	3967 1.56	18	27	47
825	5013 1.56	4734 1.57	4493 1.58	4306 1.59	4167 1.59	4094 1.59	19	28	48
850	5170 2.00	4882 2.00	4634 2.01	4441 2.02	4297 2.03	4221 2.03	19	29	50
875	5327 2.03	5030 2.04	4774 2.05	4575 2.06	4427 2.06	4349 2.06	20	30	51
900	5483 2.06	5178 2.07	4914 2.08	4709 2.09	4557 2.09	4476 2.09	21	31	53
925	5640 2.09	5326 2.10	5054 2.11	4843 2.12	4687 2.13	4603 2.13	21	32	54
950	5796 2.13	5473 2.14	5194 2.15	4977 2.16	4816 2.16	4730 2.16	22	33	56
975	5952 2.16	5621 2.17	5334 2.18	5110 2.19	4946 2.20	4857 2.20	23	34	57
1000	6108 2.19	5768 2.20	5474 2.21	5244 2.22	5075 2.23	4983 2.23	23	35	58
1025	6264 2.22	5916 2.23	5613 2.24	5377 2.26	5204 2.26	5109 2.26	24	36	60
1050	6420 2.25	6063 2.27	5753 2.28	5510 2.29	5333 2.30	5235 2.30	25	37	61
1075	6576 2.29	6210 2.30	5892 2.31	5643 2.32	5462 2.33	5361 2.33	25	37	62
1100	6732 2.32	6357 2.33	6031 2.34	5776 2.36	5590 2.36	5486 2.36	26	38	64
1125	6887 2.35	6503 2.36	6171 2.38	5909 2.39	5718 2.40	5612 2.40	27	39	65
1150	7043 2.38	6650 2.40	6310 2.41	6041 2.42	5847 2.43	5737 2.43	27	40	66
1175	7198 2.42	6797 2.43	6448 2.44	6174 2.46	5975 2.46	5862 2.46	28	41	68
1200	7354 2.45	6943 2.46	6587 2.48	6306 2.49	6103 2.50	5986 2.50	29	42	69
1225	7509 2.48	7089 2.50	6726 2.51	6438 2.52	6230 2.53	6111 2.53	29	43	70
1250	7664 2.51	7236 2.53	6864 2.54	6570 2.56	6358 2.56	6235 2.56	30	44	72
1275	7819 2.55	7382 2.56	7003 2.57	6702 2.59	6485 3.00	6359 3.00	30	45	73
1300	7974 2.58	7528 2.59	7141 3.01	6833 3.02	6612 3.03	6483 3.03	31	46	74
1325	8129 3.01	7674 3.03	7279 3.04	6965 3.06	6739 3.06	6607 3.06	32	46	76
1350	8284 3.04	7819 3.06	7417 3.07	7096 3.09	6866 3.10	6730 3.10	32	47	77

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.6 %	△FUEL = + 3 %	△FUEL = + 5.5 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.000011 0250300 .7800 .00200 140 0300350 65 0 100100 40100 18590 FCOM-G0-03-05-20-004-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
100	385 0.22	359 0.22	335 0.22	312 0.22	290 0.22		0	0	0
125	532 0.26	498 0.26	467 0.26	439 0.26	413 0.26	391 0.26	0	0	0
150	680 0.29	637 0.29	599 0.29	565 0.29	536 0.29	513 0.29	0	0	0
175	827 0.32	776 0.32	731 0.32	692 0.32	659 0.32	636 0.32	0	1	2
200	974 0.35	915 0.35	863 0.36	818 0.36	782 0.36	758 0.36	1	1	4
225	1121 0.39	1054 0.39	994 0.39	944 0.39	904 0.39	880 0.39	1	2	5
250	1268 0.42	1193 0.42	1126 0.42	1070 0.42	1027 0.43	1002 0.43	1	3	7
275	1414 0.45	1331 0.45	1258 0.46	1195 0.46	1149 0.46	1123 0.46	2	4	8
300	1561 0.48	1470 0.49	1389 0.49	1321 0.49	1271 0.49	1244 0.49	3	5	10
325	1708 0.52	1608 0.52	1520 0.52	1446 0.52	1392 0.53	1365 0.53	3	6	12
350	1854 0.55	1746 0.55	1651 0.55	1572 0.56	1514 0.56	1486 0.56	4	7	13
375	2000 0.58	1885 0.58	1782 0.59	1697 0.59	1635 0.59	1607 0.59	5	8	15
400	2147 1.01	2023 1.02	1913 1.02	1822 1.02	1756 1.03	1727 1.03	5	9	16
425	2293 1.05	2161 1.05	2044 1.05	1947 1.06	1878 1.06	1847 1.06	6	10	18
450	2439 1.08	2299 1.08	2175 1.09	2072 1.09	1998 1.09	1967 1.09	7	11	20
475	2585 1.11	2436 1.11	2305 1.12	2197 1.12	2119 1.13	2087 1.13	7	12	21
500	2731 1.14	2574 1.15	2436 1.15	2321 1.16	2240 1.16	2206 1.16	8	13	23
525	2877 1.18	2711 1.18	2566 1.19	2446 1.19	2360 1.19	2325 1.19	8	14	24
550	3023 1.21	2849 1.21	2697 1.22	2570 1.22	2480 1.23	2444 1.23	9	15	26
575	3169 1.24	2986 1.25	2827 1.25	2694 1.26	2601 1.26	2563 1.26	10	15	32
600	3315 1.27	3124 1.28	2957 1.28	2818 1.29	2720 1.29	2682 1.29	10	16	33
625	3460 1.30	3261 1.31	3087 1.32	2942 1.32	2840 1.33	2800 1.33	11	17	35
650	3606 1.34	3398 1.34	3216 1.35	3066 1.36	2960 1.36	2918 1.36	12	18	36
675	3751 1.37	3535 1.38	3346 1.38	3190 1.39	3079 1.39	3036 1.39	12	19	38
700	3896 1.40	3672 1.41	3476 1.42	3313 1.42	3199 1.43	3154 1.43	13	20	39
725	4042 1.43	3808 1.44	3605 1.45	3437 1.46	3318 1.46	3271 1.46	13	21	41

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.000011 0250300 .7800 .00200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-003-170

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
725	4042 1.43	3808 1.44	3605 1.45	3437 1.46	3318 1.46	3271 1.46	13	21	41
750	4187 1.47	3945 1.47	3735 1.48	3560 1.49	3437 1.50	3388 1.50	14	22	42
775	4332 1.50	4081 1.51	3864 1.52	3683 1.52	3555 1.53	3505 1.53	15	23	43
800	4477 1.53	4218 1.54	3993 1.55	3806 1.56	3674 1.56	3622 1.56	15	23	45
825	4622 1.56	4354 1.57	4122 1.58	3929 1.59	3793 2.00	3739 2.00	16	24	46
850	4767 2.00	4490 2.01	4251 2.01	4052 2.02	3911 2.03	3855 2.03	16	25	48
875	4911 2.03	4627 2.04	4380 2.05	4175 2.06	4029 2.06	3971 2.06	17	26	49
900	5056 2.06	4763 2.07	4509 2.08	4298 2.09	4147 2.10	4087 2.10	17	27	51
925	5201 2.09	4899 2.10	4637 2.11	4420 2.12	4265 2.13	4203 2.13	18	28	52
950	5345 2.13	5034 2.14	4766 2.15	4542 2.16	4383 2.16	4319 2.16	19	29	53
975	5490 2.16	5170 2.17	4894 2.18	4665 2.19	4500 2.20	4434 2.20	19	29	55
1000	5634 2.19	5306 2.20	5023 2.21	4787 2.22	4617 2.23	4549 2.23	20	30	56
1025	5778 2.22	5441 2.23	5151 2.25	4909 2.26	4735 2.26	4664 2.26	20	31	57
1050	5922 2.26	5577 2.27	5279 2.28	5030 2.29	4852 2.30	4779 2.30	21	32	59
1075	6066 2.29	5712 2.30	5407 2.31	5152 2.32	4969 2.33	4894 2.33	21	33	60
1100	6210 2.32	5847 2.33	5535 2.35	5274 2.36	5085 2.36	5008 2.36	22	33	61
1125	6354 2.35	5983 2.37	5663 2.38	5395 2.39	5202 2.40	5122 2.40	23	34	63
1150	6498 2.39	6118 2.40	5790 2.41	5517 2.42	5319 2.43	5236 2.43	23	35	64
1175	6642 2.42	6253 2.43	5918 2.44	5638 2.46	5435 2.46	5350 2.46	24	36	65
1200	6786 2.45	6387 2.46	6045 2.48	5759 2.49	5551 2.50	5463 2.50	24	37	67
1225	6929 2.48	6522 2.50	6173 2.51	5880 2.52	5667 2.53	5577 2.53	25	37	68
1250	7073 2.52	6657 2.53	6300 2.54	6001 2.56	5783 2.57	5690 2.57	25	38	69
1275	7216 2.55	6791 2.56	6427 2.58	6122 2.59	5899 3.00	5803 3.00	26	39	70
1300	7360 2.58	6926 2.59	6554 3.01	6242 3.02	6014 3.03	5916 3.03	27	40	72
1325	7503 3.01	7061 3.03	6681 3.04	6363 3.06	6130 3.07	6029 3.07	27	41	73
1350	7647 3.05	7195 3.06	6808 3.08	6483 3.09	6245 3.10	6141 3.10	28	41	74

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.000011 0250300 .7800 .00200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-004-170

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
100	369 0.22	344 0.22	320 0.22	298 0.22	276 0.22		0	0	0
125	514 0.26	480 0.26	450 0.26	422 0.26	397 0.26	375 0.26	0	0	0
150	658 0.29	617 0.29	580 0.29	547 0.29	519 0.29	496 0.29	0	0	0
175	803 0.32	753 0.32	709 0.32	671 0.32	640 0.32	617 0.32	0	1	2
200	947 0.35	890 0.35	839 0.36	795 0.36	761 0.36	738 0.36	1	1	3
225	1091 0.39	1026 0.39	968 0.39	919 0.39	881 0.39	858 0.39	1	2	5
250	1235 0.42	1162 0.42	1098 0.42	1043 0.42	1002 0.43	978 0.43	1	3	6
275	1379 0.45	1299 0.45	1227 0.46	1167 0.46	1122 0.46	1098 0.46	2	4	8
300	1523 0.48	1435 0.49	1356 0.49	1290 0.49	1242 0.49	1218 0.49	3	5	9
325	1667 0.52	1570 0.52	1485 0.52	1414 0.52	1362 0.53	1338 0.53	3	6	11
350	1811 0.55	1706 0.55	1614 0.55	1537 0.56	1482 0.56	1457 0.56	4	7	12
375	1954 0.58	1842 0.58	1743 0.59	1660 0.59	1602 0.59	1576 0.59	5	8	14
400	2098 1.01	1978 1.02	1872 1.02	1783 1.02	1721 1.03	1695 1.03	5	9	15
425	2242 1.05	2113 1.05	2000 1.05	1906 1.06	1840 1.06	1813 1.06	6	10	17
450	2385 1.08	2248 1.08	2129 1.09	2029 1.09	1960 1.09	1931 1.09	7	11	18
475	2528 1.11	2384 1.12	2257 1.12	2152 1.12	2079 1.13	2049 1.13	7	12	19
500	2672 1.14	2519 1.15	2385 1.15	2274 1.16	2197 1.16	2167 1.16	8	13	21
525	2815 1.18	2654 1.18	2513 1.19	2397 1.19	2316 1.19	2285 1.19	9	14	22
550	2958 1.21	2789 1.21	2641 1.22	2519 1.22	2434 1.23	2402 1.23	9	15	24
575	3101 1.24	2924 1.25	2769 1.25	2641 1.26	2553 1.26	2520 1.26	10	16	25
600	3244 1.27	3059 1.28	2897 1.28	2763 1.29	2671 1.29	2637 1.29	11	17	26
625	3386 1.31	3193 1.31	3025 1.32	2885 1.32	2789 1.33	2753 1.33	11	18	28
650	3529 1.34	3328 1.34	3152 1.35	3007 1.36	2907 1.36	2870 1.36	12	19	29
675	3672 1.37	3462 1.38	3280 1.38	3129 1.39	3024 1.39	2986 1.39	12	20	30
700	3814 1.40	3597 1.41	3407 1.42	3250 1.42	3142 1.43	3102 1.43	13	21	32
725	3957 1.43	3731 1.44	3534 1.45	3371 1.46	3259 1.46	3218 1.46	14	22	33

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23D A319-112 CFM56-5B6/P SA3610 03301.000011 0250300 .7800 .00200 110 0300350 60 0 *** 20 20 20 18590 FCOM-N0-03-05-20-003-180

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	**310**	**330**	**350**	**370**	**390**	**FL290 FL310**	**FL330 FL350**	**FL370 FL390**
725	3957 1.43	3731 1.44	3534 1.45	3371 1.46	3259 1.46	3218 1.46	14	22	33
750	4099 1.47	3865 1.48	3661 1.48	3493 1.49	3376 1.50	3334 1.50	14	23	34
775	4241 1.50	4000 1.51	3788 1.52	3614 1.52	3493 1.53	3449 1.53	15	23	36
800	4384 1.53	4134 1.54	3915 1.55	3735 1.56	3610 1.56	3565 1.56	15	24	37
825	4526 1.56	4268 1.57	4042 1.58	3856 1.59	3726 2.00	3680 2.00	16	25	38
850	4668 2.00	4402 2.01	4169 2.02	3977 2.02	3843 2.03	3794 2.03	17	26	40
875	4810 2.03	4535 2.04	4295 2.05	4097 2.06	3959 2.06	3909 2.06	17	27	41
900	4952 2.06	4669 2.07	4422 2.08	4218 2.09	4076 2.10	4024 2.10	18	28	42
925	5094 2.09	4803 2.10	4548 2.11	4338 2.12	4192 2.13	4138 2.13	18	29	43
950	5236 2.13	4936 2.14	4675 2.15	4459 2.16	4308 2.16	4252 2.16	19	30	45
975	5378 2.16	5070 2.17	4801 2.18	4579 2.19	4423 2.20	4366 2.20	20	30	46
1000	5519 2.19	5203 2.20	4927 2.21	4699 2.22	4539 2.23	4479 2.23	20	31	47
1025	5661 2.22	5336 2.24	5054 2.25	4819 2.26	4655 2.26	4593 2.26	21	32	48
1050	5802 2.26	5470 2.27	5180 2.28	4939 2.29	4770 2.30	4706 2.30	21	33	49
1075	5944 2.29	5603 2.30	5306 2.31	5059 2.32	4885 2.33	4819 2.33	22	34	51
1100	6085 2.32	5736 2.33	5432 2.35	5179 2.36	5001 2.36	4932 2.36	23	35	52
1125	6227 2.35	5869 2.37	5558 2.38	5299 2.39	5116 2.40	5045 2.40	23	35	53
1150	6368 2.39	6001 2.40	5683 2.41	5418 2.42	5231 2.43	5157 2.43	24	36	54
1175	6509 2.42	6134 2.43	5809 2.44	5538 2.46	5345 2.46	5269 2.46	24	37	55
1200	6650 2.45	6267 2.46	5935 2.48	5657 2.49	5460 2.50	5381 2.50	25	38	56
1225	6791 2.48	6399 2.50	6060 2.51	5776 2.52	5574 2.53	5493 2.53	25	39	57
1250	6932 2.52	6532 2.53	6186 2.54	5895 2.56	5689 2.57	5605 2.57	26	39	59
1275	7073 2.55	6664 2.56	6311 2.58	6014 2.59	5803 3.00	5716 3.00	27	40	60
1300	7213 2.58	6797 3.00	6436 3.01	6133 3.02	5917 3.03	5827 3.03	27	41	61
1325	7354 3.01	6929 3.03	6561 3.04	6252 3.06	6031 3.07	5938 3.07	28	42	62
1350	7495 3.05	7061 3.06	6686 3.08	6371 3.09	6145 3.10	6049 3.10	28	43	63

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23D A319-112 CFM56-5B6/P SA3610 03301.000011 0250300 .7800 .00200 110 0300350 60 0 *** 20 20 20 18590 FCOM-N0-03-05-20-004-180

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	**310**	**330**	**350**	**370**	**390**	**FL290 FL310**	**FL330 FL350**	**FL370 FL390**
1350	8284 3.04	7819 3.06	7417 3.07	7096 3.09	6866 3.10	6730 3.10	32	47	77
1375	8438 3.08	7965 3.09	7555 3.11	7227 3.12	6993 3.13	6853 3.13	33	48	78
1400	8593 3.11	8111 3.12	7693 3.14	7358 3.16	7120 3.16	6976 3.16	34	49	79
1425	8747 3.14	8256 3.16	7830 3.17	7489 3.19	7246 3.20	7099 3.20	34	50	81
1450	8902 3.17	8402 3.19	7968 3.21	7620 3.22	7372 3.23	7222 3.23	35	51	82
1475	9056 3.21	8547 3.22	8106 3.24	7751 3.26	7499 3.27	7344 3.27	35	52	83
1500	9210 3.24	8692 3.26	8243 3.27	7881 3.29	7625 3.30	7467 3.30	36	52	84
1525	9364 3.27	8837 3.29	8380 3.31	8012 3.32	7750 3.33	7589 3.33	37	53	85
1550	9518 3.30	8982 3.32	8518 3.34	8142 3.36	7876 3.37	7711 3.37	37	54	87
1575	9672 3.34	9127 3.35	8655 3.37	8272 3.39	8002 3.40	7832 3.40	38	55	88
1600	9826 3.37	9272 3.39	8792 3.40	8402 3.42	8127 3.43	7954 3.43	38	56	89
1625	9980 3.40	9417 3.42	8928 3.44	8532 3.46	8252 3.47	8076 3.47	39	56	90
1650	10133 3.43	9561 3.45	9065 3.47	8662 3.49	8377 3.50	8197 3.50	40	57	91
1675	10287 3.47	9706 3.48	9202 3.50	8791 3.52	8502 3.53	8319 3.53	40	58	92
1700	10440 3.50	9850 3.52	9338 3.54	8921 3.56	8627 3.57	8440 3.57	41	59	94
1725	10593 3.53	9994 3.55	9475 3.57	9050 3.59	8752 4.00	8561 4.00	41	60	95
1750	10747 3.56	10139 3.58	9611 4.00	9179 4.02	8876 4.03	8682 4.03	42	60	96
1775	10900 4.00	10283 4.02	9747 4.04	9308 4.06	9000 4.07	8802 4.07	43	61	97
1800	11053 4.03	10427 4.05	9883 4.07	9437 4.09	9125 4.10	8923 4.10	43	62	98
1825	11206 4.06	10570 4.08	10019 4.10	9566 4.12	9249 4.13	9043 4.13	44	63	99
1850	11358 4.09	10714 4.11	10155 4.13	9695 4.16	9372 4.17	9163 4.17	44	63	100
1875	11511 4.13	10858 4.15	10291 4.17	9823 4.19	9496 4.20	9283 4.20	45	64	101
1900	11664 4.16	11001 4.18	10426 4.20	9952 4.22	9620 4.23	9402 4.23	45	65	102
1925	11817 4.19	11145 4.21	10562 4.23	10080 4.26	9743 4.27	9522 4.27	46	66	103
1950	11969 4.22	11288 4.24	10697 4.27	10208 4.29	9867 4.30	9641 4.30	47	67	105
1975	12122 4.26	11431 4.28	10832 4.30	10336 4.32	9990 4.33	9761 4.34	47	67	106

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.6 %	△FUEL = + 3 %	△FUEL = + 5.5 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.000011 0250300 .7800 .00200 140 0300350 65 0 100100 40100 18590 FCOM-G0-03-05-20-005-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1975	12122 4.26	11431 4.28	10832 4.30	10336 4.32	9990 4.33	9761 4.33	47	67	106
2000	12274 4.29	11575 4.31	10968 4.33	10464 4.36	10113 4.37	9880 4.37	48	68	107
2025	12426 4.32	11718 4.34	11103 4.37	10592 4.39	10236 4.40	9998 4.40	48	69	108
2050	12578 4.35	11861 4.38	11238 4.40	10719 4.42	10358 4.44	10117 4.44	49	70	109
2075	12730 4.39	12004 4.41	11373 4.43	10847 4.46	10481 4.47	10236 4.47	49	70	110
2100	12883 4.42	12147 4.44	11507 4.46	10974 4.49	10603 4.50	10354 4.50	50	71	111
2125	13034 4.45	12290 4.47	11642 4.50	11101 4.52	10726 4.54	10472 4.54	51	72	112
2150	13186 4.48	12432 4.51	11777 4.53	11228 4.56	10848 4.57	10590 4.57	51	73	113
2175	13338 4.51	12575 4.54	11911 4.56	11355 4.59	10970 5.00	10708 5.00	52	73	114
2200	13490 4.55	12717 4.57	12046 5.00	11482 5.02	11092 5.04	10826 5.04	52	74	115
2225	13641 4.58	12860 5.00	12180 5.03	11609 5.06	11214 5.07	10943 5.07	53	75	116
2250	13793 5.01	13002 5.04	12315 5.06	11736 5.09	11335 5.10	11061 5.10	53	75	117
2275	13944 5.04	13145 5.07	12449 5.10	11863 5.12	11457 5.14	11178 5.14	54	76	118
2300	14096 5.08	13287 5.10	12583 5.13	11990 5.16	11578 5.17	11295 5.17	54	77	119
2325	14247 5.11	13429 5.14	12717 5.16	12117 5.19	11699 5.20	11412 5.20	55	78	120
2350	14398 5.14	13571 5.17	12851 5.19	12243 5.22	11820 5.24	11529 5.24	55	78	121
2375	14549 5.17	13713 5.20	12984 5.23	12369 5.26	11941 5.27	11646 5.27	56	79	122
2400	14700 5.21	13854 5.23	13118 5.26	12496 5.29	12062 5.30	11762 5.30	56	80	123
2425	14851 5.24	13996 5.27	13252 5.29	12622 5.32	12183 5.34	11879 5.34	57	80	124
2450	15002 5.27	14138 5.30	13385 5.33	12748 5.36	12303 5.37	11995 5.37	57	81	125
2475	15152 5.30	14279 5.33	13519 5.36	12874 5.39	12423 5.40	12112 5.40	58	82	126
2500	15303 5.34	14421 5.36	13652 5.39	12999 5.42	12544 5.44	12228 5.44	58	82	127
2525	15454 5.37	14562 5.40	13785 5.43	13125 5.46	12664 5.47	12344 5.47	59	83	128
2550	15604 5.40	14703 5.43	13918 5.46	13251 5.49	12784 5.51	12460 5.51	59	84	129
2575	15755 5.43	14844 5.46	14051 5.49	13376 5.52	12904 5.54	12575 5.54	60	84	130
2600	15905 5.47	14985 5.50	14184 5.52	13501 5.56	13024 5.57	12691 5.57	60	85	131

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.6 %	△FUEL = + 3 %	△FUEL = + 5.5 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.000011 0250300 .7800 .00200 140 0300350 65 0 100100 40100 18590 FCOM-G0-03-05-20-006-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	**310**	**330**	**350**	**370**	**390**	**FL290 FL310**	**FL330 FL350**	**FL370 FL390**
1350	7647 3.05	7195 3.06	6808 3.08	6483 3.09	6245 3.10	6141 3.10	28	41	74
1375	7790 3.08	7330 3.09	6935 3.11	6604 3.12	6360 3.13	6253 3.13	28	42	75
1400	7933 3.11	7464 3.13	7062 3.14	6724 3.16	6475 3.17	6365 3.17	29	43	77
1425	8076 3.14	7598 3.16	7189 3.17	6844 3.19	6590 3.20	6477 3.20	29	44	78
1450	8219 3.18	7733 3.19	7316 3.21	6964 3.22	6705 3.23	6589 3.23	30	44	79
1475	8362 3.21	7867 3.22	7442 3.24	7084 3.26	6819 3.27	6701 3.27	30	45	80
1500	8505 3.24	8001 3.26	7569 3.27	7204 3.29	6934 3.30	6812 3.30	31	46	81
1525	8648 3.27	8135 3.29	7695 3.31	7324 3.32	7048 3.33	6923 3.33	31	47	83
1550	8791 3.31	8269 3.32	7822 3.34	7444 3.36	7163 3.37	7034 3.37	32	47	84
1575	8933 3.34	8403 3.35	7948 3.37	7564 3.39	7277 3.40	7145 3.40	33	48	85
1600	9076 3.37	8537 3.39	8075 3.41	7683 3.42	7392 3.43	7256 3.43	33	49	86
1625	9218 3.40	8670 3.42	8201 3.44	7803 3.46	7506 3.47	7366 3.47	34	50	87
1650	9361 3.44	8804 3.45	8327 3.47	7922 3.49	7620 3.50	7477 3.50	34	50	88
1675	9503 3.47	8937 3.49	8453 3.50	8041 3.52	7734 3.53	7587 3.53	35	51	89
1700	9645 3.50	9071 3.52	8579 3.54	8160 3.56	7848 3.57	7697 3.57	35	52	91
1725	9788 3.53	9204 3.55	8704 3.57	8279 3.59	7961 4.00	7807 4.00	36	52	92
1750	9930 3.56	9337 3.58	8830 4.00	8398 4.02	8075 4.03	7916 4.04	36	53	93
1775	10072 4.00	9470 4.02	8956 4.04	8517 4.06	8188 4.07	8026 4.07	37	54	94
1800	10214 4.03	9604 4.05	9081 4.07	8636 4.09	8302 4.10	8135 4.10	37	54	95
1825	10356 4.06	9737 4.08	9207 4.10	8754 4.12	8415 4.14	8245 4.14	38	55	96
1850	10498 4.09	9869 4.11	9332 4.14	8873 4.16	8528 4.17	8354 4.17	38	56	97
1875	10639 4.13	10002 4.15	9458 4.17	8991 4.19	8641 4.20	8462 4.20	39	56	98
1900	10781 4.16	10135 4.18	9583 4.20	9110 4.22	8754 4.24	8571 4.24	39	57	99
1925	10923 4.19	10268 4.21	9708 4.23	9228 4.26	8866 4.27	8680 4.27	40	58	100
1950	11064 4.22	10400 4.25	9833 4.27	9346 4.29	8979 4.30	8788 4.30	40	58	101
1975	11206 4.26	10533 4.28	9958 4.30	9464 4.32	9091 4.34	8896 4.34	41	59	102

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.000011 0250300 .7800 .00200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-005-170

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	**310**	**330**	**350**	**370**	**390**	**FL290 FL310**	**FL330 FL350**	**FL370 FL390**
1975	11206 4.26	10533 4.28	9958 4.30	9464 4.32	9091 4.34	8896 4.34	41	59	102
2000	11347 4.29	10665 4.31	10083 4.33	9582 4.36	9203 4.37	9004 4.37	41	60	103
2025	11488 4.32	10797 4.34	10207 4.37	9700 4.39	9316 4.40	9112 4.40	42	60	104
2050	11629 4.35	10930 4.38	10332 4.40	9817 4.42	9428 4.44	9220 4.44	42	61	105
2075	11771 4.39	11062 4.41	10457 4.43	9935 4.46	9540 4.47	9327 4.47	43	62	106
2100	11912 4.42	11194 4.44	10581 4.47	10052 4.49	9652 4.50	9435 4.50	43	62	107
2125	12053 4.45	11326 4.47	10705 4.50	10170 4.52	9763 4.54	9542 4.54	44	63	108
2150	12194 4.48	11458 4.51	10830 4.53	10287 4.56	9875 4.57	9649 4.57	44	63	109
2175	12334 4.52	11590 4.54	10954 4.56	10404 4.59	9986 5.00	9756 5.00	45	64	110
2200	12475 4.55	11721 4.57	11078 5.00	10521 5.02	10098 5.04	9863 5.04	45	65	111
2225	12616 4.58	11853 5.01	11202 5.03	10638 5.06	10209 5.07	9969 5.07	46	65	112
2250	12757 5.01	11985 5.04	11326 5.06	10755 5.09	10320 5.10	10076 5.10	46	66	112
2275	12897 5.05	12116 5.07	11450 5.10	10872 5.12	10431 5.14	10182 5.14	46	67	113
2300	13038 5.08	12248 5.10	11574 5.13	10989 5.16	10542 5.17	10288 5.17	47	67	114
2325	13178 5.11	12380 5.14	11698 5.16	11105 5.19	10653 5.21	10394 5.21	47	68	115
2350	13318 5.14	12512 5.17	11821 5.20	11222 5.22	10763 5.24	10500 5.24	48	68	116
2375	13459 5.18	12643 5.20	11945 5.23	11338 5.26	10874 5.27	10606 5.27	48	69	117
2400	13599 5.21	12775 5.23	12068 5.26	11454 5.29	10984 5.31	10711 5.31	49	70	118
2425	13739 5.24	12906 5.27	12191 5.30	11571 5.32	11095 5.34	10816 5.34	49	70	119
2450	13879 5.27	13037 5.30	12315 5.33	11687 5.36	11205 5.37	10922 5.37	49	71	119
2475	14019 5.31	13169 5.33	12438 5.36	11803 5.39	11315 5.41	11027 5.41	50	71	120
2500	14159 5.34	13300 5.37	12561 5.39	11919 5.42	11425 5.44	11132 5.44	50	72	121
2525	14299 5.37	13431 5.40	12683 5.43	12034 5.46	11535 5.47	11236 5.47	51	73	122
2550	14439 5.40	13562 5.43	12806 5.46	12150 5.49	11644 5.51	11341 5.51	51	73	123
2575	14579 5.44	13693 5.46	12929 5.49	12266 5.52	11754 5.54	11445 5.54	52	74	124
2600	14718 5.47	13824 5.50	13052 5.53	12382 5.56	11863 5.57	11550 5.57	52	74	125

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.000011 0250300 .7800 .00200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-006-170

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1350	7495 3.05	7061 3.06	6686 3.08	6371 3.09	6145 3.10	6049 3.10	28	43	63
1375	7635 3.08	7193 3.09	6811 3.11	6489 3.12	6258 3.13	6160 3.13	29	43	71
1400	7775 3.11	7325 3.13	6936 3.14	6608 3.16	6372 3.17	6270 3.17	29	44	73
1425	7916 3.14	7457 3.16	7061 3.17	6726 3.19	6485 3.20	6381 3.20	30	45	74
1450	8056 3.18	7588 3.19	7185 3.21	6845 3.22	6599 3.23	6491 3.23	30	46	75
1475	8196 3.21	7720 3.22	7310 3.24	6963 3.26	6712 3.27	6601 3.27	31	46	76
1500	8336 3.24	7852 3.26	7434 3.27	7081 3.29	6825 3.30	6711 3.30	32	47	77
1525	8476 3.27	7983 3.29	7559 3.31	7199 3.32	6937 3.33	6820 3.33	32	48	79
1550	8616 3.31	8115 3.32	7683 3.34	7317 3.36	7050 3.37	6929 3.37	33	49	80
1575	8756 3.34	8246 3.36	7807 3.37	7434 3.39	7163 3.40	7039 3.40	33	49	81
1600	8896 3.37	8377 3.39	7931 3.41	7552 3.42	7275 3.43	7148 3.43	34	50	82
1625	9036 3.40	8508 3.42	8055 3.44	7669 3.46	7387 3.47	7257 3.47	34	51	83
1650	9175 3.44	8639 3.45	8179 3.47	7787 3.49	7500 3.50	7365 3.50	35	52	85
1675	9315 3.47	8770 3.49	8303 3.50	7904 3.52	7612 3.53	7474 3.53	35	52	86
1700	9454 3.50	8901 3.52	8427 3.54	8021 3.56	7723 3.57	7582 3.57	36	53	87
1725	9594 3.53	9032 3.55	8551 3.57	8138 3.59	7835 4.00	7690 4.00	36	54	88
1750	9733 3.56	9163 3.58	8674 4.00	8255 4.02	7947 4.03	7798 4.04	37	54	89
1775	9872 4.00	9293 4.02	8798 4.04	8372 4.06	8058 4.07	7906 4.07	37	55	90
1800	10012 4.03	9424 4.05	8921 4.07	8489 4.09	8170 4.10	8014 4.10	38	56	91
1825	10151 4.06	9554 4.08	9044 4.10	8606 4.12	8281 4.14	8121 4.14	38	57	92
1850	10290 4.09	9684 4.12	9168 4.14	8722 4.16	8392 4.17	8228 4.17	39	57	94
1875	10429 4.13	9815 4.15	9291 4.17	8839 4.19	8503 4.20	8335 4.20	39	58	95
1900	10568 4.16	9945 4.18	9414 4.20	8955 4.22	8614 4.24	8442 4.24	40	59	96
1925	10707 4.19	10075 4.21	9537 4.23	9071 4.26	8725 4.27	8549 4.27	40	59	97
1950	10846 4.22	10205 4.25	9660 4.27	9188 4.29	8835 4.30	8656 4.30	41	60	98
1975	10985 4.26	10335 4.28	9782 4.30	9304 4.32	8946 4.34	8762 4.34	41	61	99

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23D A319-112 CFM56-5B6/P SA3610 03301.000011 0250300 .7800 .00200 110 0300350 60 0 *** 20 20 20 18590 FCOM-N0-03-05-20-005-180

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1975	10985 4.26	10335 4.28	9782 4.30	9304 4.32	8946 4.34	8762 4.34	41	61	99
2000	11124 4.29	10465 4.31	9905 4.33	9420 4.36	9056 4.37	8868 4.37	42	61	100
2025	11262 4.32	10595 4.34	10028 4.37	9535 4.39	9166 4.40	8974 4.40	42	62	101
2050	11401 4.35	10725 4.38	10150 4.40	9651 4.42	9276 4.44	9080 4.44	42	63	102
2075	11540 4.39	10855 4.41	10273 4.43	9767 4.46	9386 4.47	9186 4.47	43	63	103
2100	11678 4.42	10985 4.44	10395 4.47	9882 4.49	9496 4.50	9292 4.50	43	64	104
2125	11817 4.45	11115 4.48	10517 4.50	9998 4.52	9606 4.54	9397 4.54	44	65	105
2150	11955 4.48	11244 4.51	10639 4.53	10113 4.56	9715 4.57	9503 4.57	44	65	106
2175	12093 4.52	11374 4.54	10761 4.57	10228 4.59	9825 5.00	9608 5.00	45	66	107
2200	12232 4.55	11503 4.57	10883 5.00	10344 5.02	9934 5.04	9713 5.04	45	67	108
2225	12370 4.58	11633 5.01	11005 5.03	10459 5.06	10043 5.07	9817 5.07	46	67	109
2250	12508 5.01	11762 5.04	11126 5.06	10574 5.09	10153 5.10	9922 5.10	46	68	110
2275	12646 5.05	11892 5.07	11248 5.10	10689 5.12	10262 5.14	10027 5.14	47	69	111
2300	12784 5.08	12021 5.10	11369 5.13	10804 5.16	10370 5.17	10131 5.17	47	69	112
2325	12922 5.11	12150 5.14	11491 5.16	10918 5.19	10480 5.21	10235 5.21	47	70	113
2350	13060 5.14	12279 5.17	11612 5.20	11033 5.22	10589 5.24	10339 5.24	48	70	114
2375	13198 5.18	12409 5.20	11733 5.23	11148 5.26	10698 5.27	10443 5.27	48	71	115
2400	13336 5.21	12538 5.23	11855 5.26	11262 5.29	10807 5.31	10548 5.31	49	72	116
2425	13473 5.24	12666 5.27	11976 5.30	11377 5.32	10916 5.34	10653 5.34	49	72	117
2450	13611 5.27	12795 5.30	12097 5.33	11491 5.36	11025 5.37	10757 5.37	50	73	118
2475	13749 5.31	12924 5.33	12218 5.36	11605 5.39	11134 5.41	10862 5.41	50	73	119
2500	13886 5.34	13053 5.37	12339 5.39	11719 5.42	11242 5.44	10966 5.44	50	74	120
2525	14023 5.37	13181 5.40	12459 5.43	11834 5.46	11351 5.47	11070 5.47	51	75	120
2550	14161 5.40	13310 5.43	12580 5.46	11948 5.49	11459 5.51	11174 5.51	51	75	121
2575	14298 5.44	13438 5.46	12701 5.49	12061 5.52	11568 5.54	11278 5.54	52	76	122
2600	14435 5.47	13567 5.50	12821 5.53	12175 5.56	11676 5.57	11382 5.57	52	76	123

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23D A319-112 CFM56-5B6/P SA3610 03301.000011 0250300 .7800 .00200 110 0300350 60 0 *** 20 20 20 18590 FCOM-N0-03-05-20-006-180

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2600	15905 5.47	14985 5.50	14184 5.52	13501 5.56	13024 5.57	12691 5.57	60	85	131
2625	16056 5.50	15126 5.53	14317 5.56	13627 5.59	13143 6.01	12806 6.01	61	85	132
2650	16206 5.53	15267 5.56	14449 5.59	13752 6.02	13263 6.04	12922 6.04	61	86	133
2675	16356 5.56	15408 5.59	14582 6.02	13877 6.06	13382 6.07	13037 6.07	62	87	134
2700	16506 6.00	15549 6.03	14714 6.06	14001 6.09	13501 6.11	13152 6.11	62	87	134
2725	16656 6.03	15690 6.06	14847 6.09	14126 6.12	13620 6.14	13267 6.14	63	88	135
2750	16806 6.06	15830 6.09	14979 6.12	14251 6.16	13739 6.17	13381 6.17	63	89	136
2775	16956 6.09	15971 6.12	15111 6.16	14375 6.19	13858 6.21	13496 6.21	64	89	137
2800	17105 6.13	16111 6.16	15244 6.19	14500 6.22	13977 6.24	13610 6.24	64	90	138
2825	17255 6.16	16251 6.19	15376 6.22	14624 6.26	14095 6.27	13724 6.27	65	91	139
2850	17405 6.19	16392 6.22	15508 6.26	14748 6.29	14214 6.31	13838 6.31	65	91	140
2875	17554 6.22	16532 6.26	15640 6.29	14872 6.32	14332 6.34	13952 6.34	65	92	141
2900	17703 6.26	16672 6.29	15771 6.32	14997 6.36	14450 6.37	14066 6.37	66	92	142
2925	17853 6.29	16812 6.32	15903 6.35	15121 6.39	14569 6.41	14180 6.41	66	93	143
2950	18002 6.32	16951 6.35	16035 6.39	15245 6.42	14686 6.44	14293 6.44	67	94	144
2975	18151 6.35	17091 6.39	16166 6.42	15369 6.46	14804 6.47	14407 6.47	67	94	144
3000	18300 6.39	17231 6.42	16298 6.45	15493 6.49	14922 6.51	14520 6.51	68	95	145
3025	18449 6.42	17370 6.45	16429 6.49	15617 6.52	15040 6.54	14633 6.54	68	95	146
3050	18598 6.45	17510 6.48	16560 6.52	15741 6.56	15157 6.57	14746 6.58	69	96	147
3075	18748 6.48	17649 6.52	16691 6.55	15865 6.59	15274 7.01	14859 7.01	69	97	148
3100	18897 6.51	17789 6.55	16822 6.59	15989 7.02	15392 7.04	14972 7.04	70	97	149

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.6 %	△FUEL = + 3 %	△FUEL = + 5.5 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.000011 0250300 .7800 .00200 140 0300350 65 0 100100 40100 18590 FCOM-G0-03-05-20-007-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
100	878 0.24	695 0.24	581 0.24	520 0.23	482 0.23	445 0.23	1	0	0
125	1095 0.28	889 0.29	757 0.28	687 0.27	642 0.27	600 0.26	3	1	0
150	1312 0.33	1082 0.33	932 0.32	853 0.31	802 0.30	754 0.30	4	2	1
175	1529 0.37	1275 0.37	1107 0.36	1019 0.34	962 0.34	908 0.34	5	3	2
200	1745 0.41	1468 0.42	1282 0.40	1185 0.38	1121 0.38	1062 0.37	6	5	4
225	1961 0.46	1661 0.46	1457 0.44	1351 0.42	1281 0.42	1216 0.41	7	6	5
250	2177 0.50	1853 0.51	1632 0.48	1516 0.46	1440 0.45	1369 0.45	8	7	6
275	2393 0.55	2045 0.55	1806 0.52	1681 0.50	1599 0.49	1522 0.48	9	8	7
300	2609 0.59	2237 0.59	1981 0.56	1846 0.54	1758 0.53	1676 0.52	10	9	8
325	2824 1.04	2428 1.04	2155 1.00	2011 0.57	1916 0.57	1828 0.56	11	11	10
350	3039 1.08	2619 1.08	2328 1.04	2176 1.01	2075 1.00	1981 0.59	12	12	11
375	3254 1.12	2810 1.13	2502 1.08	2340 1.05	2233 1.04	2134 1.03	13	13	12
400	3469 1.17	3001 1.17	2675 1.12	2504 1.09	2391 1.08	2286 1.07	14	14	13
425	3684 1.21	3192 1.22	2849 1.16	2668 1.13	2549 1.12	2438 1.10	15	15	14
450	3898 1.26	3382 1.26	3022 1.21	2832 1.17	2707 1.15	2590 1.14	16	17	16
475	4112 1.30	3572 1.30	3194 1.25	2995 1.20	2864 1.19	2742 1.18	18	18	17
500	4327 1.35	3762 1.35	3367 1.29	3159 1.24	3021 1.23	2893 1.22	19	19	18
525	4540 1.39	3951 1.39	3540 1.33	3322 1.28	3178 1.27	3045 1.25	20	20	19
550	4754 1.44	4140 1.44	3712 1.37	3485 1.32	3335 1.31	3196 1.29	21	21	20
575	4968 1.48	4330 1.48	3884 1.41	3648 1.36	3492 1.34	3347 1.33	22	23	22
600	5181 1.53	4519 1.53	4056 1.45	3810 1.40	3649 1.38	3498 1.36	23	24	23
625	5394 1.57	4708 1.57	4227 1.49	3973 1.44	3805 1.42	3649 1.40	24	25	24
650	5607 2.02	4897 2.02	4399 1.53	4135 1.48	3961 1.46	3799 1.44	25	26	25
675	5819 2.06	5086 2.06	4570 1.58	4297 1.51	4117 1.50	3950 1.48	26	27	26
700	6032 2.10	5275 2.10	4741 2.02	4458 1.55	4273 1.53	4100 1.51	27	28	27
725	6244 2.15	5463 2.15	4912 2.06	4620 1.59	4429 1.57	4250 1.55	28	30	29

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100100 40100 18590 FCOM-G0-03-05-20-008-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2600	14718 5.47	13824 5.50	13052 5.53	12382 5.56	11863 5.57	11550 5.57	52	74	125
2625	14858 5.50	13955 5.53	13174 5.56	12498 5.59	11973 6.01	11654 6.01	52	75	125
2650	14998 5.53	14085 5.56	13297 5.59	12613 6.02	12082 6.04	11758 6.04	53	75	126
2675	15137 5.56	14216 5.59	13419 6.03	12729 6.06	12192 6.07	11862 6.07	53	76	127
2700	15276 6.00	14347 6.03	13541 6.06	12844 6.09	12301 6.11	11965 6.11	54	77	128
2725	15416 6.03	14477 6.06	13663 6.09	12959 6.12	12411 6.14	12069 6.14	54	77	129
2750	15555 6.06	14608 6.09	13786 6.12	13075 6.16	12520 6.17	12173 6.17	55	78	130
2775	15694 6.09	14738 6.13	13908 6.16	13190 6.19	12629 6.21	12278 6.21	55	78	130
2800	15833 6.13	14869 6.16	14030 6.19	13305 6.22	12739 6.24	12382 6.24	55	79	131
2825	15972 6.16	14999 6.19	14151 6.22	13420 6.26	12848 6.27	12486 6.28	56	79	132
2850	16111 6.19	15129 6.22	14273 6.26	13534 6.29	12957 6.31	12590 6.31	56	80	133
2875	16250 6.22	15259 6.26	14395 6.29	13649 6.32	13065 6.34	12694 6.34	56	80	134
2900	16389 6.26	15390 6.29	14517 6.32	13764 6.36	13174 6.38	12798 6.38	57	81	134
2925	16528 6.29	15520 6.32	14638 6.36	13878 6.39	13283 6.41	12901 6.41	57	82	135
2950	16667 6.32	15650 6.35	14760 6.39	13993 6.42	13391 6.44	13005 6.44	58	82	136
2975	16805 6.35	15779 6.39	14881 6.42	14107 6.46	13500 6.48	13108 6.48	58	83	137
3000	16944 6.39	15909 6.42	15002 6.45	14222 6.49	13608 6.51	13211 6.51	58	83	137
3025	17082 6.42	16039 6.45	15124 6.49	14336 6.52	13716 6.54	13315 6.54	59	84	138
3050	17221 6.45	16169 6.49	15245 6.52	14450 6.56	13825 6.58	13418 6.58	59	84	139
3075	17359 6.48	16298 6.52	15366 6.55	14564 6.59	13933 7.01	13520 7.01	60	85	139
3100	17497 6.52	16428 6.55	15487 6.59	14678 7.02	14041 7.04	13623 7.04	60	85	140

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
ΔFUEL = – 0.5 %	ΔFUEL = + 3 %	ΔFUEL = + 6 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.000011 0250300 .7800 .00200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-007-170

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
100	791 0.24	628 0.24	526 0.24	473 0.23	440 0.23	407 0.23	2	0	0
125	988 0.29	805 0.29	686 0.28	625 0.27	587 0.27	548 0.27	3	1	0
150	1186 0.33	982 0.33	846 0.32	777 0.31	733 0.31	689 0.30	4	2	1
175	1383 0.38	1158 0.37	1005 0.37	929 0.35	880 0.34	830 0.34	5	4	2
200	1580 0.42	1335 0.42	1165 0.41	1080 0.39	1027 0.38	970 0.38	6	5	3
225	1777 0.47	1511 0.46	1324 0.45	1232 0.43	1173 0.42	1111 0.42	7	6	5
250	1974 0.52	1687 0.50	1483 0.49	1383 0.47	1319 0.46	1251 0.45	8	8	6
275	2170 0.56	1863 0.54	1642 0.53	1534 0.51	1465 0.49	1391 0.49	10	9	7
300	2367 1.01	2039 0.59	1801 0.58	1684 0.55	1611 0.53	1531 0.53	11	10	8
325	2562 1.05	2214 1.03	1959 1.02	1835 0.59	1757 0.57	1671 0.57	12	12	9
350	2758 1.10	2390 1.07	2117 1.06	1985 1.03	1902 1.01	1811 1.00	13	13	10
375	2954 1.15	2565 1.12	2275 1.10	2135 1.07	2047 1.05	1950 1.04	14	14	12
400	3149 1.19	2740 1.16	2433 1.15	2285 1.12	2192 1.09	2090 1.08	16	15	13
425	3344 1.24	2915 1.20	2591 1.19	2435 1.16	2337 1.12	2229 1.12	17	17	14
450	3539 1.29	3089 1.25	2748 1.23	2585 1.20	2481 1.16	2368 1.15	18	18	15
475	3733 1.33	3263 1.29	2905 1.27	2734 1.24	2626 1.20	2507 1.19	19	19	16
500	3928 1.38	3438 1.33	3062 1.32	2883 1.28	2770 1.24	2646 1.23	20	20	17
525	4122 1.43	3612 1.38	3219 1.36	3032 1.32	2914 1.28	2785 1.27	22	22	19
550	4316 1.47	3786 1.42	3375 1.40	3181 1.36	3058 1.32	2923 1.31	23	23	20
575	4509 1.52	3959 1.46	3531 1.45	3330 1.40	3202 1.36	3062 1.34	24	24	21
600	4703 1.57	4133 1.51	3688 1.49	3478 1.44	3345 1.39	3200 1.38	25	26	22
625	4896 2.01	4306 1.55	3843 1.53	3626 1.48	3488 1.43	3338 1.42	27	27	23
650	5089 2.06	4479 2.00	3999 1.57	3774 1.52	3632 1.47	3476 1.46	28	28	25
675	5282 2.11	4652 2.04	4155 2.02	3922 1.57	3775 1.51	3614 1.49	29	29	26
700	5474 2.15	4825 2.08	4310 2.06	4070 2.01	3917 1.55	3752 1.53	30	31	27
725	5667 2.20	4997 2.13	4465 2.10	4217 2.05	4060 1.59	3890 1.57	32	32	28

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.000011 0250300 .7801 .00200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-008-170

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : M.78 - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2600	14435 5.47	13567 5.50	12821 5.53	12175 5.56	11676 5.57	11382 5.57	52	76	123
2625	14572 5.50	13695 5.53	12942 5.56	12289 5.59	11784 6.01	11485 6.01	53	77	124
2650	14709 5.53	13823 5.56	13062 5.59	12403 6.02	11892 6.04	11589 6.04	53	78	125
2675	14846 5.56	13951 5.59	13182 6.03	12516 6.06	12000 6.07	11692 6.07	54	78	126
2700	14983 6.00	14079 6.03	13302 6.06	12629 6.09	12108 6.11	11795 6.11	54	79	127
2725	15120 6.03	14208 6.06	13423 6.09	12743 6.12	12216 6.14	11899 6.14	54	79	127
2750	15257 6.06	14335 6.09	13543 6.12	12856 6.16	12323 6.17	12001 6.17	55	80	128
2775	15394 6.09	14463 6.13	13662 6.16	12969 6.19	12431 6.21	12104 6.21	55	81	129
2800	15530 6.13	14591 6.16	13782 6.19	13082 6.22	12538 6.24	12207 6.24	56	81	130
2825	15667 6.16	14719 6.19	13902 6.22	13195 6.26	12646 6.28	12310 6.28	56	82	131
2850	15803 6.19	14846 6.22	14022 6.26	13308 6.29	12753 6.31	12412 6.31	56	82	132
2875	15940 6.22	14974 6.26	14141 6.29	13421 6.32	12860 6.34	12514 6.34	57	83	132
2900	16076 6.26	15102 6.29	14261 6.32	13534 6.36	12967 6.38	12617 6.38	57	83	133
2925	16213 6.29	15229 6.32	14380 6.36	13646 6.39	13074 6.41	12719 6.41	58	84	134
2950	16349 6.32	15356 6.35	14499 6.39	13759 6.42	13181 6.44	12821 6.44	58	85	135
2975	16485 6.35	15484 6.39	14619 6.42	13871 6.46	13287 6.48	12923 6.48	58	85	136
3000	16622 6.39	15611 6.42	14738 6.45	13984 6.49	13394 6.51	13024 6.51	59	86	136
3025	16758 6.42	15738 6.45	14857 6.49	14096 6.52	13500 6.54	13126 6.54	59	86	137
3050	16894 6.45	15865 6.49	14976 6.52	14208 6.56	13607 6.58	13227 6.58	60	87	138
3075	17030 6.48	15992 6.52	15095 6.55	14320 6.59	13713 7.01	13329 7.01	60	87	139
3100	17166 6.52	16119 6.55	15214 6.59	14432 7.02	13819 7.04	13430 7.04	60	88	140

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23D A319-112 CFM56-5B6/P SA3610 03301.000011 0250300 .7800 .00200 110 0300350 60 0 *** 20 20 20 18590 FCOM-N0-03-05-20-007-180

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
100	781 0.24	615 0.24	511 0.24	458 0.23	425 0.23	392 0.23	2	0	0
125	979 0.28	791 0.28	670 0.28	609 0.27	570 0.27	531 0.27	3	1	0
150	1177 0.33	967 0.33	829 0.32	759 0.31	715 0.30	670 0.30	4	2	1
175	1374 0.37	1143 0.37	987 0.36	910 0.35	859 0.34	809 0.34	5	3	2
200	1571 0.42	1319 0.41	1145 0.40	1060 0.39	1004 0.38	948 0.38	6	4	3
225	1768 0.46	1494 0.45	1303 0.45	1209 0.43	1148 0.42	1086 0.41	8	6	4
250	1965 0.51	1670 0.50	1461 0.49	1359 0.47	1293 0.45	1225 0.45	9	7	6
275	2162 0.55	1845 0.54	1618 0.53	1509 0.51	1437 0.49	1363 0.49	10	8	7
300	2358 1.00	2020 0.58	1776 0.57	1658 0.55	1581 0.53	1501 0.53	11	9	8
325	2554 1.04	2195 1.02	1933 1.01	1807 0.58	1725 0.57	1639 0.56	12	10	9
350	2750 1.09	2369 1.07	2090 1.05	1956 1.02	1868 1.01	1777 1.00	13	11	10
375	2946 1.14	2544 1.11	2246 1.10	2104 1.06	2012 1.04	1915 1.04	15	13	11
400	3142 1.18	2718 1.15	2403 1.14	2253 1.10	2155 1.08	2053 1.08	16	14	13
425	3337 1.23	2893 1.20	2559 1.18	2401 1.14	2299 1.12	2190 1.11	17	15	14
450	3532 1.27	3067 1.24	2716 1.22	2550 1.18	2442 1.16	2327 1.15	18	16	15
475	3727 1.32	3240 1.28	2872 1.26	2698 1.22	2585 1.20	2465 1.19	19	17	16
500	3922 1.36	3414 1.32	3027 1.31	2845 1.26	2727 1.23	2602 1.22	21	18	17
525	4117 1.41	3588 1.37	3183 1.35	2993 1.30	2870 1.27	2738 1.26	22	20	18
550	4311 1.46	3761 1.41	3339 1.39	3140 1.34	3012 1.31	2875 1.30	23	21	20
575	4506 1.50	3935 1.45	3494 1.43	3288 1.38	3155 1.35	3012 1.34	24	22	21
600	4699 1.55	4108 1.49	3649 1.48	3435 1.42	3297 1.39	3148 1.37	25	23	22
625	4892 2.00	4281 1.54	3804 1.52	3582 1.46	3439 1.42	3285 1.41	26	24	23
650	5084 2.04	4454 1.58	3959 1.56	3728 1.50	3581 1.46	3421 1.45	28	25	24
675	5276 2.09	4627 2.02	4113 2.00	3875 1.54	3722 1.50	3557 1.49	29	27	25
700	5468 2.14	4799 2.07	4268 2.05	4021 1.58	3864 1.54	3693 1.52	30	28	26
725	5660 2.19	4971 2.11	4422 2.09	4168 2.02	4005 1.58	3829 1.56	31	29	28

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23D A319-112 CFM56-5B6/P SA3610 03301.000011 0250300 .7801 .00200 110 0300350 60 0 *** 20 20 20 18590 FCOM-N0-03-05-20-008-180

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
725	6244 2.15	5463 2.15	4912 2.06	4620 1.59	4429 1.57	4250 1.55	28	30	29
750	6456 2.19	5651 2.19	5083 2.10	4781 2.03	4584 2.01	4400 1.59	29	31	30
775	6668 2.24	5839 2.24	5253 2.14	4942 2.07	4739 2.05	4550 2.03	30	32	31
800	6880 2.28	6027 2.28	5424 2.18	5103 2.11	4894 2.09	4699 2.06	31	33	32
825	7092 2.33	6215 2.33	5594 2.22	5264 2.15	5049 2.13	4849 2.10	32	34	33
850	7303 2.37	6402 2.37	5764 2.26	5424 2.19	5204 2.16	4998 2.14	33	36	35
875	7514 2.42	6589 2.42	5934 2.31	5584 2.23	5358 2.20	5147 2.17	34	37	36
900	7725 2.46	6776 2.46	6103 2.35	5744 2.27	5512 2.24	5296 2.21	35	38	37
925	7935 2.51	6963 2.50	6273 2.39	5904 2.31	5666 2.28	5445 2.25	36	39	38
950	8145 2.56	7150 2.55	6442 2.43	6064 2.35	5820 2.32	5593 2.29	37	41	39
975	8354 3.00	7336 2.59	6611 2.47	6223 2.39	5974 2.36	5742 2.32	38	42	40
1000	8563 3.05	7522 3.04	6780 2.51	6382 2.43	6128 2.39	5890 2.36	39	43	42
1025	8772 3.09	7708 3.08	6948 2.55	6541 2.47	6281 2.43	6038 2.40	40	44	43
1050	8981 3.14	7894 3.13	7117 3.00	6700 2.50	6434 2.47	6186 2.44	41	45	44
1075	9190 3.19	8080 3.17	7285 3.04	6859 2.54	6587 2.51	6334 2.47	42	46	45
1100	9398 3.23	8265 3.22	7453 3.08	7017 2.58	6740 2.55	6481 2.51	43	48	46
1125	9606 3.28	8451 3.26	7621 3.12	7175 3.02	6893 2.59	6629 2.55	44	49	47
1150	9814 3.32	8636 3.31	7789 3.16	7334 3.06	7045 3.03	6776 2.59	45	50	49
1175	10022 3.37	8821 3.35	7956 3.20	7491 3.10	7197 3.07	6923 3.02	46	51	50
1200	10229 3.42	9006 3.39	8123 3.25	7649 3.14	7349 3.10	7070 3.06	47	52	51
1225	10437 3.46	9190 3.44	8290 3.29	7806 3.18	7501 3.14	7217 3.10	48	54	52
1250	10644 3.51	9375 3.48	8456 3.33	7964 3.22	7653 3.18	7363 3.14	50	55	53
1275	10850 3.56	9559 3.53	8623 3.37	8121 3.26	7805 3.22	7510 3.18	51	56	55
1300	11057 4.00	9743 3.57	8789 3.41	8278 3.31	7957 3.26	7656 3.21	52	57	56
1325	11264 4.05	9927 4.02	8955 3.46	8435 3.35	8108 3.30	7802 3.25	53	58	57
1350	11471 4.10	10110 4.06	9121 3.50	8591 3.39	8260 3.34	7947 3.29	54	60	58

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
$\triangle$FUEL = – 0.5 %	$\triangle$FUEL = + 3 %	$\triangle$FUEL = + 4.5 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100100 40100 18590 FCOM-G0-03-05-20-009-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
1350	11471 4.10	10110 4.06	9121 3.50	8591 3.39	8260 3.34	7947 3.29	54	60	58
1375	11677 4.14	10294 4.11	9287 3.54	8747 3.43	8411 3.37	8093 3.33	55	61	59
1400	11884 4.19	10477 4.15	9452 3.58	8904 3.47	8562 3.41	8238 3.37	56	62	60
1425	12091 4.23	10660 4.20	9618 4.02	9060 3.51	8713 3.45	8383 3.40	57	63	62
1450	12297 4.28	10843 4.24	9783 4.07	9215 3.55	8864 3.49	8528 3.44	58	64	63
1475	12503 4.33	11026 4.29	9948 4.11	9371 3.59	9015 3.53	8673 3.48	59	65	64
1500	12709 4.37	11209 4.33	10112 4.15	9526 4.03	9166 3.57	8818 3.52	60	67	65
1525	12915 4.42	11391 4.38	10277 4.19	9682 4.07	9316 4.01	8962 3.56	61	68	66
1550	13120 4.47	11573 4.42	10441 4.24	9837 4.12	9466 4.05	9106 3.59	62	69	67
1575	13326 4.51	11755 4.47	10606 4.28	9992 4.16	9616 4.08	9250 4.03	63	70	68
1600	13531 4.56	11936 4.51	10770 4.32	10146 4.20	9766 4.12	9394 4.07	64	71	70
1625	13736 5.01	12118 4.56	10933 4.36	10301 4.24	9916 4.16	9538 4.11	65	73	71
1650	13941 5.05	12299 5.00	11097 4.41	10455 4.28	10066 4.20	9682 4.15	66	74	72
1675	14145 5.10	12480 5.05	11261 4.45	10609 4.32	10215 4.24	9825 4.19	67	75	73
1700	14350 5.15	12661 5.09	11424 4.49	10763 4.36	10364 4.28	9968 4.23	68	76	74
1725	14554 5.19	12842 5.14	11587 4.53	10917 4.41	10513 4.32	10111 4.26	69	77	75
1750	14758 5.24	13022 5.18	11750 4.57	11071 4.45	10662 4.36	10254 4.30	70	78	76
1775	14961 5.29	13203 5.23	11913 5.02	11224 4.49	10811 4.39	10397 4.34	71	80	77
1800	15163 5.33	13383 5.27	12075 5.06	11377 4.53	10960 4.43	10540 4.38	72	81	79
1825	15365 5.38	13563 5.32	12238 5.10	11530 4.57	11109 4.47	10682 4.42	73	82	80
1850	15567 5.43	13743 5.36	12400 5.14	11683 5.02	11257 4.51	10824 4.46	74	83	81
1875	15768 5.48	13922 5.41	12562 5.19	11835 5.06	11404 4.55	10967 4.50	75	84	82
1900	15969 5.53	14102 5.45	12724 5.23	11987 5.10	11551 4.59	11109 4.53	76	85	83
1925	16170 5.58	14281 5.50	12886 5.27	12139 5.14	11698 5.03	11250 4.57	77	87	84
1950	16371 6.02	14460 5.54	13047 5.32	12291 5.19	11845 5.07	11392 5.01	79	88	85
1975	16572 6.07	14639 5.59	13209 5.36	12443 5.23	11992 5.11	11533 5.05	80	89	86

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100100 40100 18590 FCOM-G0-03-05-20-010-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
725	5667 2.20	4997 2.13	4465 2.10	4217 2.05	4060 1.59	3890 1.57	32	32	28
750	5859 2.25	5170 2.17	4620 2.15	4365 2.09	4202 2.03	4027 2.01	33	33	29
775	6051 2.30	5342 2.21	4775 2.19	4512 2.13	4345 2.07	4164 2.04	34	34	30
800	6243 2.34	5514 2.26	4929 2.23	4659 2.17	4487 2.11	4302 2.08	36	35	32
825	6434 2.39	5686 2.30	5083 2.28	4806 2.21	4628 2.15	4439 2.12	37	37	33
850	6625 2.44	5857 2.35	5238 2.32	4952 2.26	4770 2.19	4576 2.16	38	38	34
875	6816 2.49	6029 2.39	5391 2.36	5099 2.30	4912 2.23	4712 2.20	40	39	35
900	7006 2.54	6200 2.43	5545 2.41	5245 2.34	5053 2.27	4849 2.23	41	40	36
925	7195 2.59	6371 2.48	5699 2.45	5391 2.38	5194 2.30	4985 2.27	42	42	38
950	7384 3.04	6542 2.52	5852 2.49	5537 2.42	5335 2.34	5122 2.31	44	43	39
975	7573 3.08	6713 2.57	6005 2.54	5683 2.47	5476 2.38	5258 2.35	45	44	40
1000	7761 3.13	6883 3.01	6158 2.58	5828 2.51	5617 2.42	5394 2.38	46	45	41
1025	7949 3.18	7053 3.05	6311 3.02	5974 2.55	5757 2.46	5530 2.42	48	47	42
1050	8137 3.23	7223 3.10	6463 3.07	6119 2.59	5898 2.50	5666 2.46	49	48	44
1075	8325 3.29	7393 3.14	6616 3.11	6264 3.03	6038 2.54	5802 2.50	50	49	45
1100	8512 3.34	7562 3.19	6768 3.16	6409 3.08	6178 2.58	5937 2.53	52	50	46
1125	8699 3.39	7732 3.23	6920 3.20	6553 3.12	6317 3.02	6073 2.57	53	51	47
1150	8886 3.44	7901 3.28	7072 3.24	6698 3.16	6457 3.06	6208 3.01	54	53	48
1175	9073 3.49	8070 3.32	7223 3.29	6842 3.20	6597 3.11	6343 3.05	56	54	49
1200	9259 3.54	8238 3.37	7375 3.33	6986 3.25	6736 3.15	6478 3.09	57	55	51
1225	9445 3.59	8407 3.42	7526 3.37	7129 3.29	6875 3.19	6613 3.12	59	56	52
1250	9631 4.04	8575 3.46	7677 3.42	7273 3.33	7014 3.23	6748 3.16	60	57	53
1275	9816 4.09	8743 3.51	7828 3.46	7416 3.37	7152 3.27	6883 3.20	62	58	54
1300	10001 4.15	8911 3.55	7979 3.51	7559 3.42	7291 3.31	7017 3.24	63	60	55
1325	10186 4.20	9079 4.00	8129 3.55	7702 3.46	7429 3.35	7151 3.28	64	61	56
1350	10371 4.25	9247 4.04	8280 3.59	7844 3.50	7567 3.39	7284 3.31	66	62	58

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.000011 0250300 .7801 .00200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-009-170

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
1350	10371 4.25	9247 4.04	8280 3.59	7844 3.50	7567 3.39	7284 3.31	66	62	58
1375	10555 4.30	9414 4.09	8430 4.04	7987 3.54	7705 3.43	7418 3.35	67	63	59
1400	10740 4.35	9581 4.14	8580 4.08	8129 3.59	7842 3.47	7552 3.39	69	64	60
1425	10924 4.41	9749 4.18	8730 4.13	8271 4.03	7980 3.51	7685 3.43	70	65	61
1450	11107 4.46	9915 4.23	8879 4.17	8413 4.07	8117 3.56	7818 3.47	72	66	62
1475	11291 4.51	10082 4.27	9029 4.21	8555 4.12	8254 4.00	7951 3.51	73	67	64
1500	11474 4.57	10249 4.32	9178 4.26	8696 4.16	8391 4.04	8084 3.55	75	69	65
1525	11657 5.02	10415 4.37	9327 4.30	8838 4.20	8528 4.08	8217 3.58	76	70	66
1550	11839 5.07	10581 4.41	9476 4.35	8979 4.24	8665 4.12	8349 4.02	77	71	67
1575	12021 5.13	10747 4.46	9625 4.39	9120 4.29	8801 4.16	8482 4.06	79	72	69
1600	12202 5.19	10913 4.51	9773 4.44	9260 4.33	8938 4.21	8614 4.10	80	73	70
1625	12382 5.24	11078 4.55	9922 4.48	9401 4.37	9074 4.25	8746 4.14	82	74	71
1650	12562 5.30	11244 5.00	10070 4.52	9542 4.42	9210 4.29	8878 4.18	83	75	72
1675	12742 5.36	11409 5.05	10218 4.57	9682 4.46	9346 4.33	9010 4.22	85	76	73
1700	12922 5.42	11574 5.09	10366 5.01	9822 4.50	9481 4.37	9142 4.25	86	77	75
1725	13101 5.48	11739 5.14	10513 5.06	9962 4.55	9617 4.42	9274 4.29	88	79	76
1750	13280 5.54	11903 5.19	10661 5.10	10102 4.59	9752 4.46	9405 4.33	89	80	77
1775	13459 5.59	12068 5.23	10808 5.15	10241 5.03	9887 4.50	9536 4.37	91	81	78
1800	13637 6.05	12231 5.28	10955 5.19	10381 5.08	10022 4.54	9668 4.41	92	82	80
1825	13815 6.11	12395 5.33	11102 5.24	10520 5.12	10157 4.59	9799 4.45	94	83	81
1850	13993 6.18	12558 5.38	11249 5.28	10659 5.17	10292 5.03	9930 4.49	95	84	82
1875	14171 6.24	12721 5.43	11396 5.33	10798 5.21	10426 5.07	10060 4.53	97	85	83
1900	14348 6.30	12884 5.48	11542 5.37	10936 5.25	10561 5.11	10191 4.57	98	86	84
1925	14525 6.36	13046 5.52	11689 5.41	11075 5.30	10695 5.16	10321 5.00	100	87	86
1950	14702 6.42	13209 5.57	11835 5.46	11213 5.34	10829 5.20	10452 5.04	101	88	87
1975	14879 6.48	13371 6.02	11981 5.50	11352 5.38	10963 5.24	10582 5.08	103	89	88

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.000011 0250300 .7801 .00200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-010-170

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	100	**150**	**200**	**230**	**250**	**270**	**FL100 FL150**	**FL200 FL230**	**FL250 FL270**
725	5660 2.19	4971 2.11	4422 2.09	4168 2.02	4005 1.58	3829 1.56	31	29	28
750	5851 2.24	5143 2.15	4576 2.13	4314 2.06	4147 2.02	3964 2.00	33	30	29
775	6042 2.29	5315 2.20	4730 2.17	4460 2.10	4288 2.05	4100 2.04	34	31	30
800	6233 2.33	5487 2.24	4883 2.22	4605 2.15	4429 2.09	4235 2.07	35	32	31
825	6424 2.38	5658 2.28	5037 2.26	4751 2.19	4570 2.13	4371 2.11	36	34	32
850	6614 2.43	5829 2.32	5190 2.30	4896 2.23	4710 2.17	4506 2.15	37	35	33
875	6804 2.48	6000 2.37	5343 2.34	5041 2.27	4851 2.21	4641 2.19	39	36	34
900	6994 2.53	6171 2.41	5496 2.39	5186 2.31	4990 2.25	4776 2.22	40	37	35
925	7183 2.58	6342 2.46	5649 2.43	5331 2.35	5130 2.29	4911 2.26	41	38	37
950	7372 3.03	6513 2.50	5801 2.47	5475 2.39	5270 2.33	5045 2.30	42	39	38
975	7561 3.08	6683 2.54	5954 2.51	5620 2.43	5409 2.36	5180 2.34	43	41	39
1000	7750 3.13	6854 2.59	6106 2.56	5764 2.47	5549 2.40	5314 2.37	45	42	40
1025	7938 3.18	7024 3.03	6258 3.00	5908 2.51	5688 2.44	5448 2.41	46	43	41
1050	8126 3.23	7194 3.07	6410 3.04	6052 2.55	5827 2.48	5582 2.45	47	44	42
1075	8314 3.28	7364 3.12	6561 3.09	6195 3.00	5965 2.52	5716 2.49	48	45	43
1100	8502 3.33	7533 3.16	6713 3.13	6339 3.04	6104 2.56	5850 2.52	50	46	44
1125	8689 3.38	7703 3.20	6864 3.17	6482 3.08	6242 3.00	5983 2.56	51	47	46
1150	8876 3.44	7872 3.25	7015 3.21	6625 3.12	6381 3.04	6117 3.00	52	49	47
1175	9063 3.49	8041 3.29	7166 3.26	6768 3.16	6519 3.08	6250 3.04	53	50	48
1200	9250 3.54	8210 3.33	7317 3.30	6911 3.20	6657 3.12	6384 3.08	55	51	49
1225	9436 3.59	8379 3.38	7468 3.34	7054 3.24	6794 3.16	6517 3.11	56	52	50
1250	9622 4.04	8548 3.42	7618 3.39	7196 3.29	6932 3.20	6650 3.15	57	53	51
1275	9808 4.10	8716 3.47	7768 3.43	7338 3.33	7069 3.24	6783 3.19	58	54	52
1300	9994 4.15	8885 3.51	7918 3.47	7480 3.37	7207 3.28	6915 3.23	60	55	53
1325	10179 4.20	9053 3.55	8068 3.52	7622 3.41	7344 3.32	7048 3.26	61	57	55
1350	10363 4.26	9221 4.00	8218 3.56	7764 3.45	7481 3.36	7180 3.30	62	58	56

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23D A319-112 CFM56-5B6/P SA3610 03301.000011 0250300 .7801 .00200 110 0300350 60 0 *** 20 20 20 18590 FCOM-N0-03-05-20-009-180

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
1350	10363 4.26	9221 4.00	8218 3.56	7764 3.45	7481 3.36	7180 3.30	62	58	56
1375	10546 4.31	9389 4.04	8368 4.00	7906 3.49	7617 3.40	7313 3.34	64	59	57
1400	10729 4.37	9556 4.09	8517 4.05	8047 3.54	7754 3.44	7445 3.38	65	60	58
1425	10911 4.43	9724 4.13	8666 4.09	8188 3.58	7890 3.48	7577 3.42	66	61	59
1450	11094 4.48	9891 4.17	8816 4.13	8329 4.02	8027 3.52	7709 3.45	68	62	60
1475	11275 4.54	10058 4.22	8964 4.18	8470 4.06	8163 3.56	7841 3.49	69	63	61
1500	11457 5.00	10226 4.26	9113 4.22	8611 4.10	8299 4.00	7972 3.53	70	65	62
1525	11638 5.06	10392 4.31	9262 4.26	8752 4.15	8435 4.04	8104 3.57	71	66	63
1550	11820 5.12	10558 4.35	9410 4.31	8892 4.19	8570 4.08	8235 4.01	73	67	65
1575	12000 5.18	10723 4.40	9558 4.35	9032 4.23	8706 4.12	8367 4.04	74	68	66
1600	12181 5.24	10889 4.45	9707 4.39	9172 4.27	8841 4.16	8498 4.08	75	69	67
1625	12361 5.30	11054 4.49	9854 4.44	9312 4.32	8976 4.20	8629 4.12	77	70	68
1650	12541 5.36	11219 4.54	10002 4.48	9452 4.36	9112 4.24	8760 4.16	78	71	69
1675	12721 5.42	11384 4.58	10150 4.52	9592 4.40	9246 4.28	8891 4.20	79	72	70
1700	12900 5.48	11549 5.03	10297 4.57	9731 4.44	9381 4.32	9021 4.23	81	74	71
1725	13079 5.55	11714 5.08	10444 5.01	9871 4.49	9516 4.36	9152 4.27	82	75	72
1750	13258 6.01	11878 5.12	10591 5.06	10010 4.53	9650 4.41	9282 4.31	83	76	74
1775	13436 6.07	12042 5.17	10738 5.10	10149 4.57	9784 4.45	9413 4.35	85	77	75
1800	13615 6.13	12207 5.22	10884 5.14	10287 5.02	9919 4.49	9543 4.39	86	78	76
1825	13792 6.20	12370 5.26	11031 5.19	10426 5.06	10053 4.53	9673 4.42	87	79	77
1850	13970 6.26	12534 5.31	11177 5.23	10564 5.10	10186 4.57	9803 4.46	89	80	78
1875	14148 6.33	12698 5.36	11323 5.28	10702 5.14	10320 5.01	9933 4.50	90	81	79
1900	14325 6.39	12861 5.40	11469 5.32	10840 5.19	10453 5.05	10062 4.54	91	83	80
1925	14502 6.46	13024 5.45	11614 5.36	10978 5.23	10586 5.09	10192 4.58	93	84	81
1950	14678 6.52	13188 5.50	11760 5.41	11116 5.27	10719 5.14	10321 5.02	94	85	82
1975	14854 6.59	13350 5.55	11905 5.45	11253 5.31	10852 5.18	10450 5.05	95	86	84

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23D A319-112 CFM56-5B6/P SA3610 03301.000011 0250300 .7801 .00200 110 0300350 60 0 *** 20 20 20 18590 FCOM-N0-03-05-20-010-180

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
1975	16572 6.07	14639 5.59	13209 5.36	12443 5.23	11992 5.11	11533 5.05	80	89	86
2000	16772 6.12	14818 6.03	13370 5.40	12594 5.27	12138 5.15	11674 5.09	81	90	87
2025	16973 6.17	14997 6.08	13531 5.44	12746 5.31	12284 5.19	11815 5.13	82	91	88
2050	17172 6.22	15177 6.12	13692 5.49	12897 5.36	12430 5.23	11956 5.17	84	92	89
2075	17372 6.27	15356 6.17	13852 5.53	13048 5.40	12576 5.27	12097 5.21	85	94	91
2100	17572 6.32	15535 6.21	14013 5.57	13199 5.44	12722 5.31	12237 5.25	86	95	92
2125	17771 6.37	15713 6.26	14173 6.02	13349 5.48	12867 5.35	12378 5.28	88	96	93
2150	17970 6.42	15892 6.30	14334 6.06	13500 5.53	13013 5.39	12518 5.32	89	97	94
2175	18169 6.47	16071 6.35	14494 6.10	13650 5.57	13158 5.43	12658 5.36	90	98	95
2200	18368 6.51	16249 6.39	14653 6.14	13800 6.01	13303 5.47	12798 5.40	91	100	96
2225	18565 6.57	16427 6.44	14813 6.19	13950 6.06	13448 5.51	12937 5.44	93	101	97
2250	18761 7.02	16605 6.48	14972 6.23	14100 6.10	13592 5.55	13077 5.48	94	102	99
2275	18957 7.07	16783 6.53	15131 6.28	14249 6.14	13737 5.59	13216 5.52	95	103	100
2300	19153 7.12	16961 6.57	15290 6.32	14399 6.19	13881 6.03	13356 5.56	97	104	101
2325	19349 7.18	17138 7.02	15448 6.36	14548 6.23	14026 6.07	13495 6.00	98	105	102
2350	19544 7.23	17316 7.06	15607 6.41	14697 6.27	14170 6.11	13634 6.04	99	107	103
2375	19740 7.28	17493 7.10	15765 6.45	14846 6.32	14314 6.15	13773 6.08	101	108	104
2400	19935 7.33	17670 7.15	15923 6.50	14994 6.36	14457 6.19	13911 6.12	102	109	106
2425	20129 7.39	17847 7.19	16081 6.54	15142 6.40	14601 6.23	14050 6.16	103	110	107
2450	20324 7.44	18024 7.24	16238 6.59	15290 6.45	14744 6.27	14188 6.20	105	111	108
2475	20518 7.49	18201 7.28	16396 7.03	15438 6.49	14887 6.31	14326 6.23	106	112	109
2500	20712 7.55	18377 7.33	16553 7.08	15585 6.54	15030 6.35	14464 6.27	100	113	110
2525	20906 8.00	18553 7.37	16710 7.12	15733 6.58	15172 6.40	14602 6.31	101	114	111
2550	21100 8.05	18728 7.42	16867 7.17	15880 7.02	15315 6.44	14740 6.35	103	116	112
2575	21293 8.11	18903 7.47	17024 7.22	16027 7.07	15457 6.48	14878 6.39	104	117	114
2600	21486 8.16	19078 7.51	17181 7.26	16173 7.11	15598 6.52	15015 6.43	105	118	115

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100100 40100 18590 FCOM-G0-03-05-20-011-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) **FL100 FL150**	**FL200 FL230**	**FL250 FL270**
2600	21486 8.16	19078 7.51	17181 7.26	16173 7.11	15599 6.52	15015 6.43	105	118	115
2625	21679 8.22	19253 7.56	17337 7.31	16320 7.16	15740 6.56	15152 6.47	107	119	116
2650	21872 8.27	19427 8.00	17493 7.35	16466 7.20	15882 7.00	15289 6.51	108	120	117
2675	22065 8.32	19601 8.05	17649 7.40	16613 7.25	16023 7.04	15426 6.55	109	121	118
2700	22259 8.38	19776 8.09	17805 7.44	16759 7.29	16164 7.08	15562 6.59	111	122	119
2725	22453 8.43	19950 8.14	17961 7.49	16905 7.34	16305 7.13	15699 7.03	112	123	121
2750	22647 8.48	20123 8.18	18117 7.53	17051 7.38	16446 7.17	15835 7.07	113	124	122
2775	22841 8.53	20297 8.23	18272 7.58	17196 7.42	16587 7.21	15971 7.11	115	125	123
2800	23034 8.59	20471 8.28	18428 8.03	17342 7.47	16728 7.25	16107 7.15	116	127	124
2825	23227 9.04	20644 8.32	18582 8.07	17487 7.51	16868 7.29	16243 7.19	115	128	125
2850	23420 9.09	20817 8.37	18735 8.12	17632 7.56	17008 7.33	16379 7.23	116	129	126
2875	23613 9.15	20990 8.41	18889 8.17	17777 8.00	17148 7.38	16514 7.27	117	130	128
2900	23805 9.20	21163 8.46	19042 8.21	17922 8.05	17288 7.42	16650 7.31	119	131	129
2925	23998 9.25	21336 8.51	19195 8.26	18066 8.09	17428 7.46	16785 7.35	120	132	130
2950	24190 9.31	21508 8.55	19348 8.31	18211 8.14	17568 7.50	16920 7.39	121	133	131
2975	24382 9.36	21681 9.00	19501 8.35	18355 8.19	17707 7.54	17055 7.43	110	134	132
3000	24574 9.41	21853 9.04	19654 8.40	18500 8.23	17847 7.58	17190 7.47	110	135	134
3025	24766 9.47	22025 9.09	19806 8.45	18645 8.27	17986 8.03	17325 7.51	111	136	135
3050	24957 9.52	22197 9.14	19958 8.50	18790 8.32	18125 8.07	17459 7.55	112	137	136
3075		22368 9.18	20111 8.54	18935 8.36	18264 8.11	17594 7.59	113	138	137
3100		22540 9.23	20262 8.59	19080 8.40	18402 8.15	17728 8.03	114	139	138

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100100 40100 18590 FCOM-G0-03-05-20-012-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
1975	14879 6.48	13371 6.02	11981 5.50	11352 5.38	10963 5.24	10582 5.08	103	89	88
2000	15055 6.54	13533 6.07	12127 5.55	11490 5.43	11097 5.29	10712 5.12	104	90	89
2025	15231 7.01	13695 6.12	12273 5.59	11627 5.47	11230 5.33	10842 5.16	106	91	90
2050	15407 7.07	13857 6.17	12419 6.04	11765 5.52	11363 5.37	10972 5.20	107	92	92
2075	15582 7.13	14018 6.22	12564 6.08	11903 5.56	11497 5.42	11102 5.24	109	93	93
2100	15758 7.20	14179 6.27	12710 6.13	12040 6.00	11630 5.46	11231 5.28	110	94	94
2125	15933 7.26	14341 6.32	12855 6.17	12177 6.05	11763 5.50	11360 5.32	112	95	95
2150	16107 7.33	14502 6.36	13000 6.22	12314 6.09	11895 5.55	11490 5.36	113	96	96
2175	16282 7.39	14662 6.41	13145 6.26	12451 6.14	12028 5.59	11619 5.40	115	98	98
2200	16456 7.46	14823 6.46	13290 6.30	12588 6.18	12160 6.03	11748 5.44	116	99	99
2225	16630 7.52	14983 6.51	13435 6.35	12724 6.22	12292 6.08	11877 5.47	118	100	100
2250	16804 7.59	15144 6.56	13579 6.39	12861 6.27	12424 6.12	12006 5.51	119	101	101
2275	16977 8.05	15304 7.01	13723 6.44	12997 6.31	12556 6.16	12133 5.55	120	102	102
2300	17150 8.12	15464 7.06	13868 6.48	13133 6.36	12688 6.21	12260 6.00	122	103	104
2325	17323 8.17	15623 7.11	14012 6.53	13269 6.40	12819 6.25	12388 6.04	123	104	105
2350	17495 8.23	15783 7.16	14156 6.57	13404 6.44	12950 6.29	12515 6.08	125	106	106
2375	17667 8.29	15942 7.21	14299 7.02	13540 6.49	13082 6.34	12641 6.12	126	107	107
2400	17839 8.34	16101 7.26	14443 7.06	13675 6.53	13213 6.38	12768 6.16	127	108	109
2425	18011 8.40	16260 7.31	14586 7.11	13810 6.58	13343 6.43	12895 6.20	129	109	110
2450	18182 8.46	16419 7.36	14730 7.15	13945 7.02	13474 6.47	13021 6.24	130	110	111
2475	18354 8.51	16578 7.42	14873 7.20	14080 7.07	13605 6.51	13147 6.29	131	111	112
2500	18524 8.57	16736 7.47	15016 7.24	14215 7.11	13735 6.56	13273 6.33	133	112	113
2525	18695 9.03	16895 7.52	15159 7.29	14350 7.16	13865 7.00	13399 6.37	134	114	115
2550	18866 9.09	17053 7.57	15302 7.33	14484 7.20	13995 7.05	13525 6.41	135	115	116
2575	19036 9.14	17211 8.02	15444 7.38	14619 7.24	14125 7.09	13651 6.45	137	116	117
2600	19206 9.20	17368 8.07	15587 7.42	14753 7.29	14255 7.13	13776 6.50	138	117	118

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.000011 0250300 .7801 .00200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-011-170

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
2600	19206 9.20	17368 8.07	15587 7.42	14753 7.29	14255 7.13	13776 6.50	138	117	118
2625	19375 9.26	17525 8.12	15729 7.47	14887 7.33	14385 7.18	13902 6.54	139	118	120
2650	19545 9.32	17682 8.17	15871 7.51	15021 7.38	14514 7.22	14027 6.58	140	119	121
2675	19714 9.37	17839 8.22	16013 7.56	15154 7.42	14644 7.27	14152 7.02	142	120	122
2700	19883 9.43	17995 8.27	16155 8.00	15288 7.47	14773 7.31	14277 7.06	143	121	123
2725	20052 9.49	18152 8.32	16297 8.05	15421 7.51	14902 7.36	14402 7.11	144	123	125
2750	20220 9.55	18308 8.37	16438 8.09	15554 7.56	15031 7.40	14527 7.15	146	124	126
2775	20388 10.00	18464 8.42	16579 8.14	15688 8.00	15160 7.44	14651 7.19	147	125	127
2800	20557 10.06	18620 8.47	16721 8.18	15821 8.05	15288 7.49	14776 7.23	149	126	128
2825	20724 10.12	18776 8.52	16862 8.23	15953 8.09	15417 7.53	14900 7.28	150	127	130
2850	20892 10.18	18931 8.57	17003 8.27	16086 8.14	15545 7.58	15024 7.32	151	128	131
2875	21059 10.24	19086 9.02	17144 8.32	16218 8.18	15673 8.02	15148 7.36	153	129	132
2900	21226 10.30	19242 9.07	17286 8.36	16351 8.23	15802 8.07	15272 7.41	154	130	133
2925	21393 10.35	19397 9.12	17427 8.40	16483 8.27	15929 8.11	15396 7.45	155	131	135
2950	21560 10.41	19552 9.17	17569 8.45	16615 8.32	16057 8.16	15519 7.49	157	132	136
2975	21726 10.47	19706 9.22	17711 8.49	16747 8.36	16185 8.20	15643 7.53	158	134	137
3000	21892 10.53	19861 9.27	17853 8.54	16879 8.41	16312 8.25	15766 7.58	159	135	138
3025	22058 10.59	20015 9.33	17994 8.58	17010 8.45	16440 8.29	15889 8.02	160	136	139
3050	22224 11.05	20169 9.38	18135 9.02	17142 8.50	16567 8.34	16012 8.06	162	137	141
3075	22389 11.11	20323 9.43	18276 9.07	17273 8.55	16694 8.39	16135 8.11	163	138	142
3100	22553 11.17	20477 9.48	18418 9.11	17404 8.59	16821 8.43	16258 8.15	164	139	143

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.000011 0250300 .7801 .00200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-012-170

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
1975	14854 6.59	13350 5.55	11905 5.45	11253 5.31	10852 5.18	10450 5.05	95	86	84
2000	15031 7.06	13513 5.59	12051 5.50	11390 5.36	10984 5.22	10578 5.09	97	87	85
2025	15206 7.12	13676 6.04	12196 5.54	11528 5.40	11117 5.26	10706 5.13	98	88	86
2050	15382 7.19	13838 6.09	12341 5.58	11665 5.44	11249 5.30	10834 5.17	100	89	87
2075	15557 7.26	14000 6.14	12485 6.03	11801 5.49	11381 5.34	10962 5.21	101	90	88
2100	15732 7.33	14162 6.18	12630 6.07	11938 5.53	11513 5.39	11090 5.25	102	91	89
2125	15907 7.40	14324 6.23	12774 6.12	12075 5.57	11645 5.43	11217 5.29	104	93	90
2150	16081 7.46	14486 6.28	12919 6.16	12211 6.02	11777 5.47	11345 5.33	105	94	91
2175	16254 7.51	14647 6.33	13063 6.21	12347 6.06	11908 5.51	11472 5.37	107	95	92
2200	16428 7.57	14809 6.38	13207 6.25	12483 6.10	12039 5.55	11599 5.41	108	96	93
2225	16601 8.03	14970 6.42	13351 6.29	12619 6.15	12171 6.00	11727 5.45	109	97	95
2250	16774 8.09	15131 6.47	13494 6.34	12755 6.19	12302 6.04	11854 5.49	111	98	96
2275	16946 8.14	15292 6.52	13638 6.38	12891 6.23	12433 6.08	11980 5.53	112	99	97
2300	17119 8.20	15452 6.57	13781 6.43	13026 6.28	12563 6.12	12107 5.57	114	100	98
2325	17291 8.26	15613 7.02	13924 6.47	13162 6.32	12694 6.16	12234 6.01	115	101	99
2350	17462 8.32	15773 7.07	14067 6.52	13297 6.36	12825 6.21	12360 6.05	116	102	100
2375	17634 8.38	15933 7.12	14210 6.56	13432 6.41	12955 6.25	12486 6.09	118	103	101
2400	17805 8.44	16093 7.16	14353 7.01	13567 6.45	13085 6.29	12613 6.13	119	104	102
2425	17976 8.49	16252 7.21	14495 7.05	13701 6.50	13215 6.33	12739 6.17	121	105	103
2450	18147 8.55	16411 7.26	14638 7.10	13836 6.54	13345 6.38	12864 6.21	122	106	104
2475	18317 9.01	16569 7.31	14780 7.14	13970 6.58	13475 6.42	12990 6.25	124	107	105
2500	18487 9.07	16728 7.36	14922 7.19	14104 7.03	13604 6.46	13116 6.29	125	108	107
2525	18657 9.13	16886 7.41	15064 7.23	14239 7.07	13734 6.51	13241 6.33	126	110	108
2550	18827 9.19	17044 7.46	15206 7.28	14373 7.12	13863 6.55	13367 6.37	128	111	109
2575	18997 9.25	17202 7.51	15348 7.32	14506 7.16	13992 6.59	13492 6.41	129	112	110
2600	19166 9.31	17360 7.56	15489 7.37	14640 7.20	14121 7.03	13617 6.45	131	113	111

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23D A319-112 CFM56-5B6/P SA3610 03301.000011 0250300 .7800 .00200 110 0300350 60 0 *** 20 20 20 18590 FCOM-N0-03-05-20-011-180

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	230	250	270	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL230	FL250 FL270
2600	19166 9.31	17360 7.56	15489 7.37	14640 7.20	14121 7.03	13617 6.45	131	113	111
2625	19335 9.37	17518 8.01	15630 7.41	14774 7.25	14250 7.08	13742 6.49	132	114	112
2650	19504 9.43	17675 8.06	15772 7.46	14907 7.29	14379 7.12	13867 6.53	134	115	113
2675	19672 9.48	17832 8.11	15913 7.50	15040 7.34	14508 7.16	13992 6.57	135	116	114
2700	19840 9.54	17990 8.16	16054 7.55	15173 7.38	14636 7.21	14116 7.01	136	117	115
2725	20008 10.00	18146 8.21	16197 7.59	15306 7.43	14764 7.25	14241 7.05	138	118	116
2750	20176 10.06	18303 8.26	16339 8.03	15439 7.47	14892 7.29	14365 7.10	139	119	117
2775	20344 10.12	18460 8.31	16482 8.08	15572 7.51	15021 7.34	14489 7.14	141	120	119
2800	20511 10.18	18616 8.36	16624 8.12	15704 7.56	15148 7.38	14613 7.18	142	121	120
2825	20678 10.24	18773 8.41	16766 8.16	15836 8.00	15276 7.42	14737 7.22	144	123	121
2850	20845 10.30	18929 8.47	16908 8.21	15969 8.05	15404 7.47	14861 7.26	145	124	122
2875	21011 10.36	19085 8.52	17049 8.25	16100 8.09	15531 7.51	14985 7.30	147	125	123
2900	21178 10.42	19240 8.57	17191 8.29	16232 8.14	15659 7.56	15108 7.34	148	126	124
2925	21344 10.48	19396 9.02	17333 8.34	16363 8.18	15786 8.00	15232 7.38	150	127	125
2950	21510 10.55	19552 9.07	17474 8.38	16494 8.23	15913 8.04	15355 7.42	151	128	126
2975	21676 11.01	19707 9.12	17615 8.42	16625 8.27	16040 8.09	15478 7.46	152	129	127
3000	21842 11.06	19862 9.17	17757 8.47	16756 8.31	16166 8.13	15601 7.50	154	130	128
3025	22008 11.12	20017 9.22	17898 8.51	16887 8.36	16292 8.18	15724 7.55	155	131	130
3050	22173 11.18	20172 9.28	18039 8.56	17018 8.40	16418 8.22	15847 7.59	157	132	131
3075	22339 11.24	20327 9.33	18179 9.00	17148 8.45	16544 8.26	15970 8.03	158	133	132
3100	22504 11.30	20481 9.38	18320 9.04	17278 8.49	16670 8.31	16092 8.07	160	134	133

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

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R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	**310**	**330**	**350**	**370**	**390**	**FL290 FL310**	**FL330 FL350**	**FL370 FL390**
100	411 0.23	386 0.22	362 0.22	338 0.22	314 0.22	289 0.22	0	0	0
125	561 0.26	531 0.26	502 0.26	476 0.26	450 0.26	425 0.26	0	0	0
150	710 0.30	676 0.29	643 0.29	613 0.29	586 0.29	562 0.29	1	1	1
175	859 0.33	821 0.33	783 0.33	751 0.32	721 0.32	698 0.32	2	2	3
200	1008 0.37	965 0.36	923 0.36	888 0.36	857 0.36	833 0.36	3	3	5
225	1157 0.40	1110 0.40	1064 0.39	1025 0.39	992 0.39	969 0.39	5	5	6
250	1305 0.44	1254 0.43	1203 0.43	1161 0.43	1127 0.42	1104 0.42	6	6	8
275	1453 0.48	1398 0.47	1343 0.46	1298 0.46	1261 0.46	1238 0.45	7	8	10
300	1602 0.51	1542 0.50	1482 0.50	1434 0.49	1396 0.49	1373 0.49	9	9	12
325	1749 0.55	1685 0.54	1622 0.53	1570 0.53	1530 0.52	1507 0.52	10	11	14
350	1897 0.58	1828 0.57	1761 0.56	1706 0.56	1664 0.56	1641 0.55	11	12	15
375	2045 1.02	1972 1.01	1900 1.00	1841 1.00	1797 0.59	1774 0.59	13	13	17
400	2192 1.06	2115 1.04	2038 1.03	1977 1.03	1931 1.02	1907 1.02	14	15	19
425	2339 1.09	2257 1.07	2177 1.07	2112 1.06	2064 1.06	2040 1.05	15	16	21
450	2486 1.13	2400 1.11	2315 1.10	2247 1.10	2197 1.09	2173 1.09	16	18	23
475	2632 1.16	2542 1.14	2453 1.14	2381 1.13	2330 1.12	2305 1.12	18	19	24
500	2779 1.20	2685 1.18	2591 1.17	2516 1.17	2463 1.16	2437 1.15	19	20	26
525	2925 1.24	2826 1.21	2729 1.20	2650 1.20	2595 1.19	2568 1.19	20	22	28
550	3071 1.27	2968 1.25	2867 1.24	2784 1.23	2728 1.23	2699 1.22	22	23	29
575	3217 1.31	3110 1.29	3004 1.27	2918 1.27	2860 1.26	2830 1.25	23	25	35
600	3363 1.35	3251 1.32	3142 1.31	3052 1.30	2991 1.29	2961 1.29	24	26	37
625	3509 1.38	3393 1.36	3279 1.34	3185 1.34	3123 1.33	3092 1.32	26	27	39
650	3654 1.42	3534 1.39	3416 1.38	3318 1.37	3255 1.36	3222 1.35	27	29	40
675	3799 1.46	3675 1.43	3553 1.41	3451 1.40	3386 1.39	3352 1.39	28	30	42
700	3944 1.49	3815 1.46	3689 1.44	3584 1.44	3517 1.43	3481 1.42	29	31	44
725	4089 1.53	3956 1.50	3826 1.48	3717 1.47	3648 1.46	3610 1.45	31	33	46

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

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R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL **290**	**310**	**330**	**350**	**370**	**390**	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) **FL290 FL310**	**FL330 FL350**	**FL370 FL390**
725	4089 1.53	3956 1.50	3826 1.48	3717 1.47	3648 1.46	3610 1.45	31	33	46
750	4234 1.57	4096 1.53	3962 1.51	3849 1.51	3778 1.49	3739 1.49	32	34	47
775	4378 2.00	4236 1.57	4098 1.55	3981 1.54	3909 1.53	3868 1.52	33	35	49
800	4523 2.04	4376 2.00	4234 1.58	4113 1.58	4039 1.56	3996 1.55	34	37	51
825	4667 2.08	4516 2.04	4369 2.02	4245 2.01	4169 1.59	4125 1.59	36	38	52
850	4811 2.11	4656 2.07	4505 2.05	4377 2.04	4299 2.03	4253 2.02	37	39	54
875	4955 2.15	4795 2.11	4640 2.09	4509 2.08	4428 2.06	4381 2.05	38	41	56
900	5098 2.19	4934 2.15	4775 2.12	4640 2.11	4557 2.10	4509 2.09	39	42	57
925	5242 2.22	5073 2.18	4910 2.15	4771 2.15	4686 2.13	4637 2.12	41	43	59
950	5385 2.26	5212 2.22	5045 2.19	4902 2.18	4815 2.16	4765 2.15	42	45	61
975	5528 2.30	5350 2.25	5180 2.22	5033 2.22	4943 2.20	4892 2.19	43	46	62
1000	5671 2.33	5489 2.29	5314 2.26	5163 2.25	5072 2.23	5019 2.22	44	47	64
1025	5814 2.37	5627 2.32	5449 2.29	5294 2.28	5200 2.26	5146 2.25	46	49	66
1050	5956 2.41	5765 2.36	5583 2.33	5424 2.32	5328 2.30	5273 2.29	47	50	67
1075	6099 2.44	5903 2.40	5717 2.36	5554 2.35	5455 2.33	5399 2.32	48	51	69
1100	6241 2.48	6041 2.43	5850 2.40	5684 2.39	5583 2.37	5525 2.35	49	53	70
1125	6383 2.52	6178 2.47	5984 2.43	5813 2.42	5710 2.40	5651 2.39	51	54	72
1150	6525 2.55	6315 2.50	6118 2.47	5943 2.46	5837 2.43	5777 2.42	52	55	74
1175	6667 2.59	6453 2.54	6251 2.50	6072 2.49	5964 2.47	5903 2.45	53	56	75
1200	6808 3.03	6590 2.58	6384 2.54	6201 2.52	6091 2.50	6028 2.49	54	58	77
1225	6950 3.06	6726 3.01	6517 2.57	6330 2.56	6217 2.54	6153 2.52	56	59	78
1250	7091 3.10	6863 3.05	6650 3.01	6459 2.59	6344 2.57	6278 2.55	57	60	80
1275	7232 3.14	6999 3.09	6782 3.04	6587 3.03	6470 3.00	6403 2.59	58	62	82
1300	7373 3.18	7136 3.12	6915 3.08	6715 3.06	6596 3.04	6527 3.02	59	63	83
1325	7513 3.21	7272 3.16	7047 3.11	6844 3.10	6721 3.07	6652 3.05	61	64	85
1350	7654 3.25	7408 3.19	7179 3.14	6972 3.13	6847 3.11	6776 3.09	62	65	86

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100100 40100 18590 FCOM-G0-03-05-20-014-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
100	377 0.23	354 0.23	333 0.22	312 0.22	290 0.22		0	0	0
125	514 0.26	487 0.26	462 0.26	438 0.26	414 0.26	391 0.26	0	0	0
150	650 0.30	619 0.30	591 0.29	563 0.29	537 0.29	515 0.29	1	0	0
175	787 0.34	752 0.33	720 0.33	689 0.33	660 0.32	638 0.32	2	2	2
200	923 0.37	884 0.37	848 0.36	814 0.36	784 0.36	761 0.36	3	3	4
225	1059 0.41	1016 0.40	977 0.40	940 0.39	906 0.39	883 0.39	5	4	6
250	1195 0.45	1147 0.44	1105 0.43	1065 0.43	1029 0.42	1006 0.42	6	6	7
275	1331 0.48	1279 0.48	1233 0.47	1190 0.46	1151 0.46	1128 0.46	7	7	9
300	1466 0.52	1410 0.51	1361 0.50	1314 0.49	1274 0.49	1250 0.49	9	9	11
325	1601 0.56	1542 0.55	1489 0.54	1439 0.53	1396 0.52	1372 0.52	10	10	13
350	1737 0.59	1673 0.58	1617 0.57	1563 0.56	1517 0.56	1493 0.56	11	11	14
375	1872 1.03	1804 1.02	1744 1.01	1687 1.00	1639 0.59	1614 0.59	12	13	16
400	2006 1.07	1934 1.05	1871 1.04	1811 1.03	1760 1.02	1735 1.02	14	14	18
425	2141 1.11	2065 1.09	1998 1.08	1935 1.06	1882 1.06	1856 1.06	15	15	19
450	2275 1.14	2195 1.13	2125 1.11	2059 1.10	2003 1.09	1977 1.09	16	17	21
475	2409 1.18	2325 1.16	2252 1.15	2182 1.13	2124 1.12	2097 1.12	18	18	23
500	2543 1.22	2455 1.20	2378 1.18	2306 1.17	2244 1.16	2217 1.16	19	19	24
525	2677 1.25	2585 1.23	2504 1.22	2429 1.20	2365 1.19	2337 1.19	20	21	26
550	2811 1.29	2715 1.27	2631 1.25	2552 1.23	2485 1.23	2456 1.22	21	22	28
575	2944 1.33	2845 1.31	2757 1.29	2674 1.27	2606 1.26	2575 1.26	23	23	29
600	3078 1.37	2974 1.34	2882 1.32	2797 1.30	2726 1.29	2694 1.29	24	25	31
625	3211 1.40	3103 1.38	3008 1.36	2919 1.34	2845 1.33	2813 1.32	25	26	32
650	3344 1.44	3232 1.42	3133 1.39	3041 1.37	2965 1.36	2932 1.36	26	27	34
675	3477 1.48	3361 1.45	3259 1.43	3163 1.41	3084 1.39	3050 1.39	28	29	36
700	3609 1.51	3490 1.49	3384 1.46	3285 1.44	3204 1.43	3168 1.42	29	30	37
725	3742 1.55	3618 1.52	3509 1.50	3407 1.47	3323 1.46	3286 1.46	30	31	39

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

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R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	**310**	**330**	**350**	**370**	**390**	**FL290 FL310**	**FL330 FL350**	**FL370 FL390**
725	3742 1.55	3618 1.52	3509 1.50	3407 1.47	3323 1.46	3286 1.46	30	31	39
750	3874 1.59	3747 1.56	3634 1.53	3529 1.51	3442 1.49	3404 1.49	31	33	40
775	4006 2.03	3875 2.00	3758 1.57	3650 1.54	3560 1.53	3521 1.52	33	34	46
800	4138 2.06	4003 2.03	3883 2.00	3771 1.58	3679 1.56	3639 1.56	34	35	48
825	4270 2.10	4131 2.07	4007 2.04	3892 2.01	3797 1.59	3756 1.59	35	37	49
850	4401 2.14	4259 2.11	4131 2.07	4013 2.05	3916 2.03	3873 2.02	36	38	51
875	4533 2.18	4386 2.14	4255 2.11	4134 2.08	4034 2.06	3989 2.06	37	39	53
900	4664 2.21	4514 2.18	4379 2.14	4254 2.12	4152 2.09	4106 2.09	39	41	54
925	4795 2.25	4641 2.22	4502 2.18	4374 2.15	4269 2.13	4222 2.12	40	42	56
950	4926 2.29	4768 2.25	4626 2.22	4495 2.18	4387 2.16	4338 2.16	41	43	57
975	5057 2.33	4895 2.29	4749 2.25	4615 2.22	4504 2.20	4454 2.19	42	44	59
1000	5187 2.37	5022 2.33	4872 2.29	4735 2.25	4621 2.23	4569 2.22	43	46	60
1025	5318 2.40	5148 2.36	4995 2.32	4854 2.29	4738 2.26	4684 2.26	45	47	62
1050	5448 2.44	5275 2.40	5118 2.36	4974 2.32	4855 2.30	4800 2.29	46	48	63
1075	5578 2.48	5401 2.44	5241 2.39	5093 2.36	4972 2.33	4914 2.32	47	50	65
1100	5708 2.52	5527 2.47	5363 2.43	5212 2.39	5088 2.36	5029 2.36	48	51	66
1125	5838 2.55	5653 2.51	5485 2.46	5331 2.43	5205 2.40	5144 2.39	49	52	68
1150	5967 2.59	5779 2.55	5608 2.50	5450 2.46	5321 2.43	5258 2.42	51	53	69
1175	6097 3.03	5905 2.58	5730 2.54	5569 2.50	5437 2.46	5372 2.46	52	55	71
1200	6226 3.07	6031 3.02	5851 2.57	5688 2.53	5553 2.50	5486 2.49	53	56	72
1225	6355 3.11	6156 3.06	5973 3.01	5806 2.57	5668 2.53	5600 2.52	54	57	74
1250	6484 3.15	6281 3.10	6095 3.04	5924 3.00	5784 2.57	5713 2.56	55	58	75
1275	6613 3.18	6406 3.13	6216 3.08	6043 3.04	5899 3.00	5826 2.59	57	60	77
1300	6741 3.22	6531 3.17	6337 3.12	6160 3.07	6015 3.03	5940 3.02	58	61	78
1325	6870 3.26	6656 3.21	6458 3.15	6278 3.10	6130 3.07	6052 3.06	59	62	79
1350	6998 3.30	6781 3.24	6579 3.19	6396 3.14	6245 3.10	6165 3.09	60	63	81

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.000011 0250300 .7801 .00200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-014-170

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	**310**	**330**	**350**	**370**	**390**	**FL290 FL310**	**FL330 FL350**	**FL370 FL390**
100	362 0.23	340 0.23	318 0.22	298 0.22	276 0.22		0	0	0
125	497 0.26	470 0.26	446 0.26	422 0.26	398 0.26	376 0.26	0	0	0
150	631 0.30	601 0.30	573 0.29	546 0.29	520 0.29	498 0.29	0	0	0
175	766 0.34	731 0.33	699 0.33	670 0.33	641 0.32	619 0.32	2	2	2
200	900 0.37	861 0.37	826 0.36	793 0.36	763 0.36	741 0.36	3	3	4
225	1034 0.41	991 0.40	953 0.40	917 0.39	884 0.39	862 0.39	4	4	5
250	1168 0.45	1121 0.44	1079 0.43	1040 0.43	1005 0.42	983 0.42	5	6	7
275	1301 0.48	1251 0.47	1205 0.47	1163 0.46	1126 0.46	1103 0.46	7	7	9
300	1435 0.52	1380 0.51	1331 0.50	1286 0.49	1246 0.49	1223 0.49	8	9	10
325	1568 0.56	1510 0.55	1457 0.54	1409 0.53	1366 0.52	1344 0.52	9	10	12
350	1701 0.59	1639 0.58	1583 0.57	1531 0.56	1487 0.56	1463 0.56	10	11	14
375	1834 1.03	1768 1.02	1708 1.01	1654 0.59	1607 0.59	1583 0.59	12	13	15
400	1967 1.07	1897 1.05	1833 1.04	1776 1.03	1726 1.02	1702 1.02	13	14	17
425	2100 1.10	2025 1.09	1959 1.07	1898 1.06	1846 1.06	1822 1.06	14	16	18
450	2232 1.14	2154 1.12	2084 1.11	2020 1.10	1965 1.09	1941 1.09	15	17	20
475	2364 1.18	2282 1.16	2209 1.14	2142 1.13	2085 1.12	2059 1.12	17	18	22
500	2496 1.21	2410 1.20	2333 1.18	2263 1.16	2204 1.16	2178 1.16	18	20	23
525	2628 1.25	2538 1.23	2458 1.21	2384 1.20	2322 1.19	2296 1.19	19	21	25
550	2760 1.29	2666 1.27	2582 1.25	2506 1.23	2441 1.22	2414 1.22	20	22	26
575	2892 1.33	2794 1.30	2706 1.28	2627 1.27	2560 1.26	2532 1.26	21	24	28
600	3023 1.36	2921 1.34	2830 1.32	2747 1.30	2678 1.29	2649 1.29	23	25	29
625	3154 1.40	3049 1.38	2954 1.35	2868 1.33	2796 1.32	2766 1.32	24	26	31
650	3285 1.44	3176 1.41	3078 1.39	2988 1.37	2914 1.36	2883 1.36	25	28	33
675	3416 1.47	3303 1.45	3202 1.42	3109 1.40	3032 1.39	3000 1.39	26	29	34
700	3547 1.51	3430 1.49	3325 1.46	3229 1.44	3149 1.43	3117 1.42	28	30	36
725	3678 1.55	3557 1.52	3449 1.49	3349 1.47	3266 1.46	3233 1.46	29	32	37

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23D A319-112 CFM56-5B6/P SA3610 03301.000011 0250300 .7801 .00200 110 0300350 60 0 *** 20 20 20 18590 FCOM-N0-03-05-20-013-180

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
725	3678 1.55	3557 1.52	3449 1.49	3349 1.47	3266 1.46	3233 1.46	29	32	37
750	3808 1.59	3683 1.56	3572 1.53	3469 1.50	3384 1.49	3349 1.49	30	33	39
775	3939 2.02	3810 1.59	3695 1.56	3588 1.54	3501 1.53	3465 1.52	31	34	40
800	4069 2.06	3936 2.03	3818 2.00	3708 1.57	3617 1.56	3581 1.56	32	36	42
825	4199 2.10	4062 2.07	3940 2.03	3827 2.01	3734 1.59	3697 1.59	33	37	43
850	4329 2.14	4188 2.10	4063 2.07	3946 2.04	3851 2.03	3812 2.02	35	38	45
875	4458 2.17	4314 2.14	4186 2.10	4066 2.08	3967 2.06	3927 2.06	36	40	46
900	4588 2.21	4440 2.18	4308 2.14	4184 2.11	4083 2.09	4042 2.09	37	41	47
925	4717 2.25	4565 2.21	4430 2.18	4303 2.14	4199 2.13	4157 2.12	38	42	49
950	4846 2.29	4690 2.25	4552 2.21	4422 2.18	4315 2.16	4271 2.16	39	44	50
975	4975 2.32	4816 2.29	4674 2.25	4540 2.21	4431 2.19	4386 2.19	40	45	52
1000	5104 2.36	4941 2.32	4795 2.28	4658 2.25	4546 2.23	4500 2.22	42	46	53
1025	5233 2.40	5065 2.36	4916 2.32	4777 2.28	4662 2.26	4613 2.26	43	47	55
1050	5361 2.44	5190 2.40	5038 2.35	4894 2.32	4777 2.29	4727 2.29	44	49	56
1075	5490 2.47	5315 2.43	5158 2.39	5012 2.35	4892 2.33	4841 2.32	45	50	57
1100	5618 2.51	5439 2.47	5279 2.42	5130 2.39	5007 2.36	4954 2.36	46	51	59
1125	5746 2.55	5563 2.51	5400 2.46	5247 2.42	5122 2.40	5067 2.39	47	53	60
1150	5874 2.59	5687 2.54	5520 2.49	5365 2.46	5237 2.43	5180 2.42	49	54	62
1175	6002 3.02	5811 2.58	5640 2.53	5482 2.49	5351 2.46	5293 2.46	50	55	63
1200	6130 3.06	5935 3.02	5761 2.57	5599 2.52	5465 2.50	5406 2.49	51	56	64
1225	6257 3.10	6058 3.05	5881 3.00	5716 2.56	5580 2.53	5518 2.52	52	58	66
1250	6384 3.14	6182 3.09	6000 3.04	5832 2.59	5694 2.56	5630 2.56	53	59	67
1275	6512 3.17	6305 3.13	6120 3.07	5949 3.03	5807 3.00	5742 2.59	54	60	69
1300	6639 3.21	6428 3.16	6239 3.11	6065 3.06	5921 3.03	5854 3.02	55	61	70
1325	6765 3.25	6551 3.20	6359 3.14	6181 3.10	6035 3.06	5966 3.06	56	63	71
1350	6892 3.29	6674 3.24	6478 3.18	6298 3.13	6148 3.10	6077 3.09	58	64	73

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

FLIP23D A319-112 CFM56-5B6/P SA3610 03301.000011 0250300 .7801 .00200 110 0300350 60 0 *** 20 20 20 18590 FCOM-N0-03-05-20-014-180

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1350	7654 3.25	7408 3.19	7179 3.14	6972 3.13	6847 3.11	6776 3.09	62	65	86
1375	7794 3.29	7543 3.23	7311 3.18	7099 3.16	6972 3.14	6900 3.12	63	67	88
1400	7934 3.32	7679 3.27	7443 3.21	7227 3.20	7097 3.17	7023 3.15	64	68	89
1425	8074 3.36	7814 3.30	7574 3.25	7354 3.23	7222 3.21	7147 3.19	65	69	91
1450	8214 3.40	7949 3.34	7706 3.28	7482 3.27	7347 3.24	7270 3.22	67	70	93
1475	8353 3.44	8084 3.38	7837 3.32	7609 3.30	7472 3.28	7393 3.25	68	72	94
1500	8493 3.47	8219 3.41	7969 3.35	7736 3.34	7596 3.31	7516 3.29	69	73	95
1525	8632 3.51	8354 3.45	8100 3.39	7863 3.37	7720 3.35	7638 3.32	70	74	97
1550	8771 3.55	8488 3.49	8231 3.42	7990 3.41	7844 3.38	7761 3.35	71	75	98
1575	8910 3.59	8623 3.52	8362 3.46	8116 3.44	7968 3.41	7883 3.39	73	77	100
1600	9048 4.02	8757 3.56	8492 3.49	8243 3.47	8092 3.45	8005 3.42	74	78	101
1625	9187 4.06	8891 4.00	8623 3.53	8370 3.51	8215 3.48	8127 3.45	75	79	103
1650	9325 4.10	9024 4.03	8753 3.56	8496 3.54	8339 3.52	8248 3.49	76	80	104
1675	9463 4.14	9158 4.07	8883 4.00	8622 3.58	8462 3.55	8370 3.52	77	81	105
1700	9601 4.17	9291 4.11	9014 4.03	8748 4.01	8585 3.59	8491 3.55	78	83	107
1725	9739 4.21	9425 4.14	9143 4.07	8874 4.05	8707 4.02	8612 3.59	80	84	108
1750	9877 4.25	9558 4.18	9273 4.10	8999 4.08	8830 4.05	8732 4.02	81	85	109
1775	10015 4.29	9691 4.22	9403 4.14	9125 4.12	8952 4.09	8853 4.05	82	86	111
1800	10152 4.32	9824 4.25	9532 4.17	9250 4.15	9075 4.12	8973 4.09	83	88	112
1825	10289 4.36	9956 4.29	9662 4.21	9375 4.19	9197 4.16	9094 4.12	84	89	113
1850	10426 4.40	10089 4.33	9791 4.25	9500 4.22	9319 4.19	9214 4.16	86	90	115
1875	10563 4.44	10221 4.37	9920 4.28	9625 4.25	9440 4.23	9333 4.19	87	91	116
1900	10700 4.47	10353 4.40	10049 4.32	9750 4.29	9562 4.26	9453 4.22	88	92	117
1925	10836 4.51	10485 4.44	10177 4.35	9875 4.32	9683 4.29	9572 4.26	89	94	119
1950	10973 4.55	10617 4.48	10306 4.39	9999 4.36	9805 4.33	9692 4.29	90	95	120
1975	11109 4.59	10748 4.52	10434 4.42	10123 4.39	9926 4.36	9811 4.32	91	96	121

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100100 40100 18590 FCOM-G0-03-05-20-015-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	**310**	**330**	**350**	**370**	**390**	**FL290 FL310**	**FL330 FL350**	**FL370 FL390**
1975	11109 4.59	10748 4.52	10434 4.42	10123 4.39	9926 4.36	9811 4.32	91	96	121
2000	11245 5.03	10880 4.55	10563 4.46	10247 4.43	10046 4.40	9929 4.36	92	97	122
2025	11381 5.06	11011 4.59	10691 4.49	10371 4.46	10167 4.43	10048 4.39	93	98	124
2050	11517 5.10	11142 5.03	10819 4.53	10495 4.50	10288 4.47	10167 4.42	94	99	125
2075	11652 5.14	11273 5.06	10947 4.56	10619 4.53	10408 4.50	10285 4.46	96	101	126
2100	11788 5.18	11404 5.10	11074 5.00	10742 4.57	10528 4.53	10403 4.49	97	102	128
2125	11923 5.22	11535 5.14	11202 5.03	10866 5.00	10648 4.57	10521 4.52	98	103	129
2150	12058 5.26	11665 5.18	11329 5.07	10989 5.04	10768 5.00	10639 4.56	99	104	130
2175	12193 5.29	11795 5.21	11455 5.11	11112 5.07	10888 5.04	10756 4.59	100	105	131
2200	12328 5.33	11925 5.25	11582 5.14	11235 5.10	11007 5.07	10874 5.03	101	106	133
2225	12462 5.37	12055 5.29	11707 5.18	11357 5.14	11127 5.11	10991 5.06	102	107	134
2250	12597 5.41	12185 5.33	11833 5.21	11480 5.17	11246 5.14	11108 5.09	103	109	135
2275	12731 5.45	12315 5.36	11959 5.25	11602 5.21	11365 5.18	11225 5.13	104	110	137
2300	12865 5.48	12444 5.40	12084 5.29	11724 5.24	11483 5.21	11341 5.16	105	111	138
2325	13000 5.52	12574 5.44	12209 5.32	11846 5.28	11602 5.25	11458 5.19	107	112	139
2350	13133 5.56	12703 5.48	12335 5.36	11968 5.31	11720 5.28	11574 5.23	108	113	141
2375	13267 6.00	12832 5.51	12460 5.40	12090 5.35	11838 5.31	11690 5.26	109	114	142
2400	13401 6.04	12961 5.55	12584 5.43	12211 5.38	11956 5.35	11806 5.29	110	115	143
2425	13534 6.08	13090 5.59	12709 5.47	12333 5.42	12073 5.38	11922 5.33	111	116	144
2450	13668 6.12	13218 6.03	12833 5.51	12454 5.45	12191 5.42	12038 5.36	112	118	146
2475	13801 6.15	13347 6.07	12958 5.54	12575 5.49	12308 5.45	12153 5.40	113	119	147
2500	13934 6.19	13475 6.10	13082 5.58	12696 5.52	12425 5.49	12268 5.43	114	120	148
2525	14067 6.23	13603 6.14	13206 6.02	12817 5.56	12542 5.52	12384 5.46	115	121	149
2550	14199 6.27	13731 6.18	13330 6.05	12938 5.59	12659 5.56	12499 5.50	116	122	151
2575	14332 6.31	13859 6.22	13454 6.09	13058 6.03	12776 5.59	12613 5.53	117	123	152
2600	14464 6.35	13987 6.26	13577 6.13	13179 6.06	12892 6.03	12728 5.56	119	124	153

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
ΔFUEL = – 0.5 %	ΔFUEL = + 3 %	ΔFUEL = + 4.5 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.000011 0250300 .7801 .00200 140 0300350 65 0 100100 40100 18590 FCOM-G0-03-05-20-016-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG / NORMAL AIR CONDITIONING / ANTI-ICING OFF — ISA, CG = 33.0 % — **FUEL CONSUMED (KG) / TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1350	6998 3.30	6781 3.24	6579 3.19	6396 3.14	6245 3.10	6165 3.09	60	63	81
1375	7126 3.34	6905 3.28	6700 3.22	6513 3.17	6359 3.13	6278 3.12	61	65	82
1400	7254 3.37	7029 3.32	6821 3.26	6631 3.21	6474 3.17	6390 3.16	62	66	84
1425	7382 3.41	7153 3.36	6941 3.30	6748 3.24	6588 3.20	6502 3.19	63	67	85
1450	7510 3.45	7277 3.39	7061 3.33	6865 3.28	6702 3.24	6614 3.22	64	68	86
1475	7638 3.49	7401 3.43	7181 3.37	6982 3.31	6817 3.27	6726 3.26	66	70	88
1500	7765 3.53	7524 3.47	7301 3.40	7099 3.35	6930 3.30	6837 3.29	67	71	89
1525	7893 3.56	7648 3.51	7421 3.44	7215 3.38	7044 3.34	6949 3.32	68	72	91
1550	8020 4.00	7771 3.54	7540 3.48	7332 3.42	7158 3.37	7060 3.36	69	73	92
1575	8147 4.04	7894 3.58	7659 3.51	7448 3.45	7271 3.41	7171 3.39	70	75	93
1600	8274 4.08	8017 4.02	7779 3.55	7564 3.49	7384 3.44	7282 3.42	71	76	95
1625	8400 4.12	8140 4.05	7898 3.59	7680 3.53	7497 3.47	7393 3.46	72	77	96
1650	8527 4.16	8262 4.09	8016 4.02	7796 3.56	7610 3.51	7503 3.49	74	78	97
1675	8653 4.20	8385 4.13	8135 4.06	7912 4.00	7723 3.54	7614 3.52	75	80	99
1700	8780 4.23	8507 4.17	8254 4.10	8028 4.03	7836 3.58	7724 3.56	76	81	100
1725	8906 4.27	8629 4.21	8372 4.13	8143 4.07	7948 4.01	7834 3.59	77	82	101
1750	9032 4.31	8751 4.24	8490 4.17	8258 4.10	8061 4.04	7944 4.02	78	83	103
1775	9158 4.35	8873 4.28	8608 4.20	8374 4.14	8173 4.08	8054 4.06	79	85	104
1800	9283 4.39	8995 4.32	8726 4.24	8489 4.17	8285 4.11	8163 4.09	80	86	105
1825	9409 4.43	9116 4.36	8844 4.28	8604 4.21	8397 4.15	8273 4.12	81	87	106
1850	9534 4.46	9237 4.39	8962 4.31	8718 4.24	8509 4.18	8382 4.16	82	88	108
1875	9660 4.50	9359 4.43	9079 4.35	8833 4.28	8620 4.22	8491 4.19	83	90	109
1900	9785 4.54	9480 4.47	9197 4.39	8947 4.31	8732 4.25	8600 4.23	85	91	110
1925	9910 4.58	9601 4.51	9314 4.42	9062 4.35	8843 4.29	8708 4.26	86	92	112
1950	10035 5.02	9722 4.54	9431 4.46	9176 4.38	8954 4.32	8817 4.29	87	93	113
1975	10159 5.06	9842 4.58	9548 4.50	9290 4.42	9065 4.35	8925 4.33	88	95	114

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.000011 0250300 .7801 .00200 120 0300350 60 0 100 20 20 20 18590 FCOM-N0-03-05-20-015-170

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1975	10159 5.06	9842 4.58	9548 4.50	9290 4.42	9065 4.35	8925 4.33	88	95	114
2000	10284 5.10	9963 5.02	9665 4.54	9404 4.46	9176 4.39	9033 4.36	89	96	115
2025	10408 5.14	10083 5.06	9781 4.57	9518 4.49	9287 4.42	9141 4.39	90	97	117
2050	10533 5.17	10203 5.10	9898 5.01	9631 4.53	9397 4.46	9249 4.43	91	98	118
2075	10657 5.21	10323 5.13	10014 5.05	9745 4.56	9508 4.49	9357 4.46	92	100	119
2100	10781 5.25	10443 5.17	10130 5.08	9858 5.00	9618 4.53	9464 4.49	93	101	120
2125	10904 5.29	10563 5.21	10246 5.12	9971 5.03	9728 4.56	9572 4.53	94	102	121
2150	11028 5.33	10683 5.25	10362 5.16	10084 5.07	9838 5.00	9679 4.56	95	103	123
2175	11152 5.37	10802 5.29	10478 5.19	10197 5.10	9948 5.03	9786 4.59	96	105	124
2200	11275 5.41	10922 5.33	10593 5.23	10310 5.14	10058 5.06	9893 5.03	97	106	125
2225	11398 5.45	11041 5.36	10709 5.27	10423 5.18	10168 5.10	10000 5.06	98	107	126
2250	11522 5.49	11160 5.40	10824 5.31	10535 5.21	10277 5.13	10106 5.09	99	108	127
2275	11645 5.53	11279 5.44	10939 5.34	10648 5.25	10386 5.17	10212 5.13	100	109	129
2300	11767 5.56	11398 5.48	11054 5.38	10760 5.28	10496 5.20	10319 5.16	101	111	130
2325	11890 6.00	11517 5.52	11169 5.42	10872 5.32	10605 5.24	10425 5.19	103	112	131
2350	12013 6.04	11635 5.56	11284 5.45	10984 5.36	10713 5.27	10531 5.23	104	113	132
2375	12136 6.08	11754 5.59	11399 5.49	11096 5.39	10822 5.31	10636 5.26	105	114	133
2400	12259 6.12	11872 6.03	11513 5.53	11208 5.43	10931 5.34	10742 5.29	106	115	134
2425	12383 6.16	11990 6.07	11628 5.57	11319 5.46	11039 5.38	10847 5.33	107	117	136
2450	12506 6.20	12108 6.11	11742 6.00	11431 5.50	11148 5.41	10953 5.36	108	118	137
2475	12629 6.23	12225 6.15	11856 6.04	11542 5.53	11256 5.45	11058 5.39	109	119	138
2500	12751 6.27	12342 6.19	11970 6.08	11654 5.57	11364 5.48	11163 5.43	110	120	139
2525	12874 6.31	12460 6.22	12084 6.12	11765 6.01	11472 5.52	11268 5.46	111	121	140
2550	12997 6.35	12577 6.26	12197 6.15	11876 6.04	11580 5.55	11372 5.49	112	122	141
2575	13119 6.39	12693 6.30	12311 6.19	11986 6.08	11688 5.59	11477 5.53	113	123	142
2600	13241 6.43	12810 6.34	12425 6.23	12097 6.11	11795 6.02	11581 5.56	114	125	144

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

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R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	**310**	**330**	**350**	**370**	**390**	**FL290 FL310**	**FL330 FL350**	**FL370 FL390**
1350	6892 3.29	6674 3.24	6478 3.18	6298 3.13	6148 3.10	6077 3.09	58	64	73
1375	7019 3.33	6797 3.27	6597 3.22	6413 3.17	6261 3.13	6188 3.12	59	65	74
1400	7145 3.36	6919 3.31	6716 3.25	6529 3.20	6375 3.17	6299 3.16	60	66	75
1425	7271 3.40	7042 3.35	6834 3.29	6645 3.24	6488 3.20	6410 3.19	61	68	77
1450	7397 3.44	7164 3.39	6953 3.32	6760 3.27	6600 3.23	6521 3.22	62	69	78
1475	7523 3.48	7286 3.42	7071 3.36	6876 3.31	6713 3.27	6632 3.26	63	70	79
1500	7649 3.52	7408 3.46	7190 3.40	6991 3.34	6825 3.30	6742 3.29	64	71	81
1525	7775 3.55	7530 3.50	7308 3.43	7106 3.38	6938 3.34	6852 3.32	65	73	82
1550	7900 3.59	7652 3.54	7426 3.47	7221 3.41	7050 3.37	6962 3.36	67	74	83
1575	8026 4.03	7773 3.57	7543 3.51	7336 3.45	7162 3.40	7072 3.39	68	75	85
1600	8151 4.07	7894 4.01	7661 3.54	7450 3.48	7274 3.44	7181 3.42	69	76	92
1625	8276 4.11	8016 4.05	7779 3.58	7565 3.52	7386 3.47	7291 3.45	70	77	93
1650	8401 4.15	8137 4.08	7896 4.01	7679 3.55	7497 3.50	7400 3.49	71	79	95
1675	8526 4.18	8258 4.12	8013 4.05	7793 3.59	7609 3.54	7509 3.52	72	80	96
1700	8651 4.22	8378 4.16	8130 4.09	7907 4.02	7720 3.57	7618 3.55	73	81	97
1725	8775 4.26	8499 4.20	8247 4.12	8021 4.06	7831 4.01	7727 3.59	74	82	99
1750	8900 4.30	8620 4.23	8364 4.16	8135 4.09	7942 4.04	7835 4.02	75	83	100
1775	9024 4.34	8740 4.27	8480 4.20	8248 4.13	8053 4.07	7944 4.05	77	85	101
1800	9148 4.37	8860 4.31	8597 4.23	8362 4.16	8164 4.11	8052 4.09	78	86	103
1825	9272 4.41	8980 4.35	8713 4.27	8475 4.20	8274 4.14	8160 4.12	79	87	104
1850	9396 4.45	9100 4.39	8829 4.30	8588 4.23	8385 4.18	8268 4.15	80	88	106
1875	9519 4.49	9220 4.42	8945 4.34	8701 4.27	8495 4.21	8376 4.19	81	89	107
1900	9643 4.53	9340 4.46	9061 4.38	8814 4.30	8605 4.24	8483 4.22	82	91	108
1925	9766 4.57	9459 4.50	9177 4.41	8927 4.34	8715 4.28	8590 4.25	83	92	110
1950	9889 5.01	9579 4.54	9293 4.45	9039 4.38	8825 4.31	8698 4.29	84	93	111
1975	10013 5.04	9698 4.57	9408 4.49	9152 4.41	8935 4.35	8805 4.32	85	94	112

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

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R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
1975	10013 5.04	9698 4.57	9408 4.49	9152 4.41	8935 4.35	8805 4.32	85	94	112
2000	10136 5.08	9817 5.01	9523 4.52	9264 4.45	9045 4.38	8912 4.35	86	95	114
2025	10258 5.12	9936 5.05	9639 4.56	9376 4.48	9154 4.41	9018 4.39	88	96	115
2050	10381 5.16	10055 5.09	9754 5.00	9488 4.52	9263 4.45	9125 4.42	89	98	116
2075	10505 5.20	10174 5.13	9869 5.03	9600 4.55	9372 4.48	9231 4.45	90	99	117
2100	10628 5.23	10292 5.16	9983 5.07	9712 4.59	9482 4.52	9337 4.49	91	100	119
2125	10751 5.27	10410 5.20	10098 5.11	9824 5.02	9590 4.55	9443 4.52	92	101	120
2150	10874 5.31	10528 5.24	10212 5.14	9935 5.06	9699 4.58	9549 4.55	93	102	121
2175	10997 5.35	10646 5.28	10327 5.18	10047 5.09	9808 5.02	9655 4.59	94	103	123
2200	11120 5.39	10764 5.32	10441 5.22	10158 5.13	9916 5.05	9761 5.02	95	104	124
2225	11243 5.42	10881 5.35	10555 5.26	10269 5.17	10025 5.09	9866 5.05	96	106	125
2250	11366 5.46	10998 5.39	10669 5.29	10380 5.20	10133 5.12	9971 5.09	97	107	126
2275	11488 5.50	11115 5.43	10783 5.33	10491 5.24	10241 5.15	10076 5.12	98	108	128
2300	11611 5.54	11232 5.47	10896 5.37	10601 5.27	10349 5.19	10181 5.15	99	109	129
2325	11733 5.58	11349 5.51	11010 5.40	10712 5.31	10456 5.22	10286 5.18	101	110	130
2350	11855 6.01	11466 5.54	11123 5.44	10822 5.35	10564 5.26	10391 5.22	102	111	131
2375	11978 6.05	11582 5.58	11236 5.48	10932 5.38	10671 5.29	10495 5.25	103	112	133
2400	12100 6.09	11699 6.02	11349 5.52	11042 5.42	10778 5.33	10600 5.28	104	113	134
2425	12222 6.13	11815 6.06	11462 5.55	11152 5.45	10885 5.36	10704 5.32	105	114	135
2450	12343 6.16	11931 6.10	11575 5.59	11261 5.49	10992 5.40	10808 5.35	106	116	136
2475	12465 6.20	12047 6.14	11688 6.03	11371 5.53	11098 5.43	10912 5.39	107	117	137
2500	12587 6.24	12163 6.17	11800 6.06	11481 5.56	11205 5.47	11016 5.42	108	118	139
2525	12708 6.28	12279 6.21	11913 6.10	11590 6.00	11311 5.50	11119 5.45	109	119	140
2550	12829 6.32	12395 6.25	12025 6.14	11699 6.03	11417 5.54	11223 5.49	110	120	141
2575	12951 6.35	12510 6.29	12137 6.18	11808 6.07	11523 5.57	11326 5.52	111	121	142
2600	13072 6.39	12626 6.33	12249 6.21	11917 6.11	11629 6.01	11430 5.55	112	122	143

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

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R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 65000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	290	**310**	**330**	**350**	**370**	**390**	**FL290 FL310**	**FL330 FL350**	**FL370 FL390**
2600	14464 6.35	13987 6.26	13577 6.13	13179 6.06	12892 6.03	12728 5.56	119	124	153
2625	14597 6.39	14114 6.29	13701 6.16	13299 6.10	13009 6.06	12842 6.00	120	125	154
2650	14729 6.43	14242 6.33	13824 6.20	13419 6.13	13125 6.10	12957 6.03	121	127	156
2675	14861 6.46	14369 6.37	13947 6.24	13539 6.17	13241 6.13	13071 6.07	122	128	157
2700	14993 6.50	14496 6.41	14070 6.27	13659 6.20	13357 6.17	13185 6.10	123	129	158
2725	15124 6.54	14623 6.45	14193 6.31	13779 6.24	13473 6.20	13299 6.13	124	130	159
2750	15255 6.58	14750 6.48	14316 6.35	13899 6.27	13588 6.23	13412 6.17	125	131	161
2775	15387 7.02	14877 6.52	14438 6.38	14018 6.31	13704 6.27	13526 6.20	126	132	162
2800	15518 7.06	15003 6.56	14561 6.42	14137 6.34	13819 6.30	13639 6.23	127	133	163
2825	15649 7.10	15129 7.00	14683 6.46	14257 6.38	13934 6.34	13752 6.27	128	134	164
2850	15779 7.14	15256 7.04	14805 6.49	14376 6.41	14049 6.37	13865 6.30	129	136	166
2875	15910 7.18	15382 7.07	14927 6.53	14495 6.45	14164 6.41	13978 6.33	130	137	167
2900	16041 7.22	15508 7.11	15049 6.57	14613 6.48	14278 6.44	14091 6.37	131	138	168
2925	16171 7.26	15633 7.15	15171 7.01	14732 6.52	14393 6.48	14204 6.40	132	139	169
2950	16301 7.29	15759 7.19	15292 7.04	14851 6.55	14507 6.51	14316 6.44	133	140	170
2975	16431 7.33	15884 7.23	15414 7.08	14969 6.59	14622 6.55	14428 6.47	134	141	171
3000	16561 7.37	16010 7.26	15535 7.12	15087 7.03	14736 6.58	14540 6.50	135	142	173
3025	16691 7.41	16135 7.30	15656 7.16	15204 7.06	14850 7.02	14652 6.54	137	143	174
3050	16821 7.45	16260 7.34	15777 7.19	15322 7.10	14963 7.05	14764 6.57	138	145	175
3075	16950 7.49	16385 7.38	15898 7.23	15440 7.13	15077 7.09	14876 7.01	139	146	176
3100	17079 7.53	16510 7.42	16019 7.27	15557 7.17	15190 7.12	14987 7.04	140	147	177

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 4.5 %

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R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2600	13241 6.43	12810 6.34	12425 6.23	12097 6.11	11795 6.02	11581 5.56	114	125	144
2625	13364 6.46	12927 6.38	12538 6.27	12207 6.15	11903 6.06	11685 5.59	115	126	145
2650	13486 6.50	13043 6.42	12651 6.30	12317 6.19	12010 6.09	11789 6.03	116	127	146
2675	13608 6.54	13160 6.46	12764 6.34	12426 6.22	12117 6.13	11893 6.06	117	128	147
2700	13730 6.58	13276 6.50	12877 6.38	12536 6.26	12224 6.16	11997 6.09	118	129	148
2725	13851 7.02	13392 6.54	12990 6.42	12645 6.30	12330 6.20	12101 6.13	119	130	149
2750	13973 7.06	13508 6.57	13103 6.46	12755 6.33	12437 6.23	12205 6.16	120	131	150
2775	14095 7.09	13623 7.01	13216 6.49	12864 6.37	12543 6.27	12308 6.20	121	133	151
2800	14216 7.13	13739 7.05	13328 6.53	12973 6.41	12649 6.30	12412 6.23	122	134	152
2825	14337 7.17	13855 7.09	13441 6.57	13082 6.44	12755 6.34	12516 6.26	123	135	154
2850	14459 7.21	13970 7.13	13553 7.01	13190 6.48	12861 6.37	12619 6.30	124	136	155
2875	14580 7.25	14085 7.17	13665 7.04	13299 6.52	12967 6.41	12722 6.33	125	137	156
2900	14701 7.29	14200 7.21	13777 7.08	13408 6.55	13072 6.44	12825 6.36	126	138	157
2925	14822 7.32	14315 7.25	13889 7.12	13516 6.59	13178 6.48	12928 6.40	127	139	158
2950	14943 7.36	14430 7.29	14001 7.16	13624 7.03	13283 6.51	13031 6.43	128	140	159
2975	15063 7.40	14545 7.33	14112 7.20	13732 7.07	13389 6.55	13134 6.47	129	142	160
3000	15184 7.44	14659 7.36	14224 7.23	13840 7.10	13494 6.58	13237 6.50	130	143	161
3025	15304 7.48	14774 7.40	14335 7.27	13948 7.14	13599 7.02	13339 6.53	131	144	162
3050	15425 7.52	14888 7.44	14446 7.31	14056 7.18	13704 7.06	13441 6.57	132	145	164
3075	15545 7.55	15002 7.48	14557 7.35	14164 7.21	13808 7.09	13544 7.00	133	146	165
3100	15665 7.59	15117 7.52	14669 7.39	14271 7.25	13913 7.13	13646 7.04	134	147	166

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 3 %	△FUEL = + 6 %

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R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 290	310	330	350	370	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL290 FL310	FL330 FL350	FL370 FL390
2600	13072 6.39	12626 6.33	12249 6.21	11917 6.11	11629 6.01	11430 5.55	112	122	143
2625	13193 6.43	12741 6.37	12361 6.25	12026 6.14	11735 6.04	11533 5.59	113	123	145
2650	13314 6.47	12856 6.41	12473 6.29	12135 6.18	11841 6.08	11636 6.02	114	124	146
2675	13434 6.51	12971 6.44	12585 6.33	12243 6.21	11947 6.11	11739 6.05	115	125	147
2700	13555 6.54	13086 6.48	12696 6.36	12352 6.25	12052 6.15	11841 6.09	116	127	148
2725	13676 6.58	13201 6.52	12808 6.40	12460 6.29	12157 6.18	11944 6.12	117	128	149
2750	13796 7.02	13315 6.56	12919 6.44	12569 6.32	12263 6.22	12046 6.16	118	129	150
2775	13917 7.06	13430 7.00	13030 6.48	12677 6.36	12368 6.25	12149 6.19	119	130	151
2800	14037 7.09	13544 7.04	13141 6.52	12785 6.40	12473 6.29	12251 6.22	120	131	153
2825	14157 7.13	13658 7.08	13252 6.55	12892 6.43	12577 6.32	12353 6.26	121	132	154
2850	14277 7.17	13772 7.11	13363 6.59	13000 6.47	12682 6.36	12455 6.29	122	133	155
2875	14397 7.21	13886 7.15	13474 7.03	13108 6.51	12787 6.39	12556 6.32	123	134	156
2900	14517 7.25	14000 7.19	13584 7.07	13215 6.54	12891 6.43	12658 6.36	124	135	157
2925	14636 7.28	14114 7.23	13695 7.10	13323 6.58	12995 6.46	12759 6.39	125	136	158
2950	14756 7.32	14227 7.27	13805 7.14	13430 7.02	13100 6.50	12861 6.43	126	137	159
2975	14875 7.36	14341 7.31	13915 7.18	13537 7.05	13204 6.53	12962 6.46	128	139	160
3000	14995 7.40	14454 7.35	14025 7.22	13644 7.09	13308 6.57	13063 6.49	129	140	162
3025	15114 7.44	14567 7.39	14135 7.26	13751 7.13	13411 7.00	13164 6.53	130	141	163
3050	15233 7.47	14680 7.43	14245 7.29	13858 7.16	13515 7.04	13265 6.56	131	142	164
3075	15352 7.51	14793 7.47	14354 7.33	13964 7.20	13619 7.07	13365 6.59	132	143	165
3100	15471 7.55	14906 7.50	14464 7.37	14071 7.24	13722 7.11	13466 7.03	133	144	166

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 0.5 %	△FUEL = + 2 %	△FUEL = + 5 %

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GENERAL

Holding tables contain information about the total fuel flow that allows the flight crew to plan holding and reserve fuel requirements.
They are established for flight in a race track holding pattern for two different configurations:
· clean configuration at 210 knots and green dot speed
· configuration 1 at 170 knots and S speed.
Green dot speed in clean configuration and S in CONF 1 are speeds between the minimum fuel speed and the minimum drag speed.
These charts are established with air conditioning in normal mode and the center of gravity at 33 %.

R

RACE TRACK HOLDING PATTERN - GREEN DOT SPEED

MAX. CRUISE THRUST LIMITS CLEAN CONFIGURATION NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		**N1 (%)** **FF (KG/H/ENG)**		
WEIGHT (1000KG)	**FL 15**	**FL 50**	**FL100**	**FL140**	**FL180**	**FL200**	**FL220**	**FL250**
58	51.6 1141	53.8 1112	57.9 1082	60.9 1064	64.3 1046	66.3 1039	68.0 1035	70.8 1025
60	52.3 1174	54.6 1146	58.8 1117	61.7 1098	65.3 1080	67.2 1074	68.9 1069	71.7 1059
62	53.0 1207	55.5 1179	59.6 1151	62.6 1131	66.3 1113	68.0 1109	69.8 1102	72.6 1093
64	53.7 1241	56.3 1213	60.3 1185	63.4 1163	67.2 1147	68.8 1144	70.6 1136	73.6 1127
66	54.4 1274	57.1 1248	61.0 1220	64.3 1197	67.9 1183	69.6 1178	71.5 1170	74.5 1162
68	55.2 1307	57.9 1282	61.7 1254	65.1 1231	68.7 1218	70.4 1211	72.3 1204	75.3 1197
70	55.9 1341	58.8 1317	62.5 1287	66.0 1264	69.5 1253	71.3 1245	73.2 1239	76.0 1234
72	56.6 1375	59.6 1353	63.2 1320	66.8 1298	70.2 1287	72.0 1280	74.0 1274	76.8 1272
74	57.3 1410	60.2 1387	63.9 1353	67.6 1331	71.0 1321	72.8 1315	74.8 1309	77.5 1309
76	58.1 1444	60.9 1421	64.7 1385	68.3 1367	71.7 1355	73.6 1350	75.6 1344	78.3 1350
78	58.8 1479	61.5 1455	65.4 1419	69.0 1403	72.5 1390	74.4 1385	76.3 1380	79.0 1391
80	59.6 1514	62.1 1488	66.1 1452	69.7 1439	73.2 1424	75.2 1420	77.0 1418	79.8 1434
82	60.3 1549	62.7 1521	66.9 1486	70.4 1473	73.9 1459	75.9 1455	77.6 1456	80.5 1479
84	60.9 1583	63.3 1555	67.6 1519	71.0 1507	74.7 1494	76.6 1491	78.3 1494	81.1 1526
86	61.5 1616	64.0 1588	68.4 1553	71.7 1542	75.4 1530	77.2 1528	78.9 1532	81.7 1572
88	62.0 1650	64.6 1621	69.0 1588	72.3 1576	76.1 1565	77.8 1566	79.6 1574	82.3 1619
90	62.6 1684	65.2 1652	69.6 1624	72.9 1610	76.7 1600	78.4 1604	80.3 1616	82.9 1668
92	63.1 1717	65.8 1683	70.2 1661	73.6 1645	77.3 1636	79.0 1642	81.0 1661	83.6 1718
94	63.7 1750	66.5 1717	70.8 1696	74.2 1680	77.9 1674	79.6 1681	81.6 1707	84.2 1769
ECON AIR CONDITIONING △FF = – 0.6 %	**ENGINE ANTI ICE ON** △FF = + 4.5 %		**TOTAL ANTI ICE ON** △FF = + 7 %		**PER 1° ABOVE ISA** △FF = + 0.25 %		**STRAIGHT LINE** △FF = – 5 %	

GENERAL

Holding tables contain information about the total fuel flow that allows the flight crew to plan holding and reserve fuel requirements.
They are established for flight in a race track holding pattern for two different configurations:
· clean configuration at 210 knots and green dot speed
· configuration 1 at 170 knots and S speed.
Green dot speed in clean configuration and S in CONF 1 are speeds between the minimum fuel speed and the minimum drag speed.
These charts are established with air conditioning in normal mode and the center of gravity at 33 %.

R

RACE TRACK HOLDING PATTERN - GREEN DOT SPEED

MAX. CRUISE THRUST LIMITS CLEAN CONFIGURATION NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **FF (KG/H/ENG)**

WEIGHT (1000KG)	**FL 15**	**FL 50**	**FL100**	**FL140**	**FL180**	**FL200**	**FL220**	**FL250**
46	45.6 890	47.9 873	51.1 839	54.0 813	57.5 794	58.9 789	60.6 787	63.5 784
48	46.5 926	48.9 908	52.1 871	55.1 844	58.4 828	59.9 823	61.7 821	64.7 818
50	47.4 962	49.8 940	53.0 901	56.2 876	59.4 861	61.0 859	62.8 855	65.8 851
52	48.3 997	50.6 971	53.9 931	57.3 908	60.3 896	62.0 892	63.9 889	66.7 884
54	49.2 1033	51.4 1002	54.9 963	58.3 942	61.3 931	63.0 926	65.0 924	67.7 916
56	50.1 1065	52.2 1033	55.8 994	59.1 975	62.2 964	64.0 960	66.1 955	68.6 949
58	50.8 1097	52.9 1063	56.8 1026	59.9 1008	63.2 997	65.1 994	66.9 988	69.5 982
60	51.5 1128	53.7 1094	57.7 1059	60.7 1043	64.1 1031	66.1 1026	67.7 1021	70.4 1016
62	52.2 1158	54.5 1125	58.7 1092	61.6 1078	65.1 1065	66.9 1058	68.6 1054	71.2 1049
64	52.9 1189	55.3 1156	59.4 1126	62.4 1110	66.0 1097	67.7 1091	69.4 1087	72.1 1084
66	53.6 1219	56.1 1188	60.1 1159	63.2 1143	67.0 1129	68.5 1124	70.3 1120	72.9 1119
68	54.3 1250	56.9 1221	60.9 1193	64.1 1176	67.7 1162	69.3 1157	71.1 1154	73.7 1155
70	55.0 1282	57.8 1254	61.6 1228	64.9 1210	68.4 1195	70.1 1191	71.8 1188	74.6 1192
72	55.8 1314	58.6 1287	62.3 1261	65.7 1243	69.2 1228	70.8 1224	72.5 1223	75.4 1230
74	56.5 1347	59.4 1321	63.1 1294	66.6 1275	69.9 1262	71.6 1258	73.3 1258	76.1 1269
76	57.2 1380	60.2 1355	63.8 1327	67.4 1307	70.6 1296	72.3 1292	74.0 1295	76.9 1309
78	58.0 1413	60.8 1389	64.5 1360	68.2 1339	71.3 1330	73.0 1328	74.8 1332	77.6 1350

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**	**STRAIGHT LINE**
△FF = – 0.3 %	△FF = + 5 %	△FF = + 9 %	△FF = + 0.3 %	△FF = – 5 %

GENERAL

Holding tables contain information about the total fuel flow that allows the flight crew to plan holding and reserve fuel requirements.
They are established for flight in a race track holding pattern for two different configurations:
· clean configuration at 210 knots and green dot speed
· configuration 1 at 170 knots and S speed.
Green dot speed in clean configuration and S in CONF 1 are speeds between the minimum fuel speed and the minimum drag speed.
These charts are established with air conditioning in normal mode and the center of gravity at 33 %.

R

RACE TRACK HOLDING PATTERN - GREEN DOT SPEED

MAX. CRUISE THRUST LIMITS
CLEAN CONFIGURATION
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA CG=33.0%

N1 (%)
FF (KG/H/ENG)

WEIGHT (1000KG)	FL 15	FL 50	FL100	FL140	FL180	FL200	FL220	FL250
44	44.7 854	46.8 836	50.2 806	52.9 781	56.3 760	57.8 753	59.5 750	62.2 749
46	45.6 888	47.8 871	51.1 837	54.0 811	57.4 792	58.9 787	60.6 785	63.5 783
48	46.5 923	48.8 906	52.0 868	55.1 842	58.4 826	59.9 821	61.7 819	64.7 816
50	47.3 959	49.8 938	52.9 898	56.1 874	59.3 859	60.9 856	62.8 853	65.7 848
52	48.2 994	50.5 968	53.9 929	57.3 906	60.3 894	61.9 890	63.9 887	66.6 880
54	49.1 1030	51.3 1000	54.8 960	58.2 939	61.2 929	63.0 923	65.0 921	67.5 912
56	50.0 1063	52.1 1031	55.8 992	59.0 972	62.2 961	64.0 957	66.0 952	68.5 944
58	50.8 1094	52.9 1061	56.7 1024	59.9 1006	63.1 995	65.0 992	66.8 984	69.4 976
60	51.5 1125	53.7 1091	57.7 1057	60.7 1041	64.1 1029	66.0 1023	67.7 1016	70.2 1008
62	52.2 1155	54.5 1122	58.7 1090	61.5 1075	65.0 1063	66.9 1055	68.5 1048	71.0 1041
64	52.9 1186	55.3 1154	59.4 1123	62.4 1108	66.0 1095	67.6 1087	69.3 1081	71.8 1075
66	53.6 1217	56.1 1186	60.1 1157	63.2 1141	66.9 1125	68.4 1119	70.1 1113	72.7 1109
68	54.3 1247	56.9 1218	60.8 1191	64.0 1173	67.6 1158	69.2 1151	70.9 1146	73.5 1144
70	55.0 1279	57.7 1251	61.6 1225	64.9 1208	68.4 1190	69.9 1184	71.6 1179	74.3 1180
72	55.7 1311	58.6 1285	62.3 1259	65.7 1241	69.1 1223	70.7 1216	72.3 1212	75.1 1217
74	56.5 1344	59.4 1319	63.1 1292	66.6 1272	69.8 1255	71.4 1249	73.1 1247	75.9 1256
76	57.2 1377	60.2 1352	63.8 1325	67.4 1303	70.5 1288	72.1 1283	73.8 1282	76.6 1295

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA	STRAIGHT LINE
ΔFF = – 0.3 %	ΔFF = + 5 %	ΔFF = + 9 %	ΔFF = + 0.3 %	ΔFF = – 5 %

R

RACE TRACK HOLDING PATTERN - 210KT

MAX. CRUISE THRUST LIMITS CLEAN CONFIGURATION NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=33.0%		**N1 (%) FF (KG/H/ENG)**	
WEIGHT (1000KG)	**FL 15**	**FL 50**	**FL100**	**FL140**	**FL180**	**FL200**	**FL220**	**FL250**
58	52.1 1160	54.4 1130	58.6 1104	61.4 1079	64.9 1057	66.8 1046	68.4 1038	71.0 1027
60	52.6 1187	55.0 1159	59.2 1132	62.1 1107	65.7 1086	67.4 1077	69.1 1069	71.8 1059
62	53.2 1215	55.7 1188	59.8 1160	62.8 1136	66.5 1116	68.2 1110	69.9 1102	72.7 1093
64	53.8 1245	56.4 1218	60.4 1190	63.5 1165	67.3 1149	68.9 1143	70.7 1136	73.6 1128
66	54.5 1275	57.1 1249	61.0 1221	64.3 1197	68.0 1183	69.6 1177	71.5 1170	74.5 1163
68	55.1 1306	57.9 1281	61.7 1252	65.1 1231	68.7 1218	70.4 1213	72.3 1207	75.3 1202
70	55.8 1338	58.6 1313	62.4 1284	65.9 1265	69.4 1254	71.2 1249	73.2 1245	76.1 1243
72	56.5 1370	59.4 1347	63.1 1317	66.7 1300	70.2 1292	72.0 1287	74.1 1283	77.0 1285
74	57.2 1404	60.1 1381	63.8 1351	67.5 1336	71.0 1330	72.9 1327	75.0 1323	77.8 1329
76	57.9 1438	60.7 1416	64.5 1387	68.2 1374	71.8 1370	73.8 1367	75.9 1366	78.7 1374
78	58.6 1474	61.3 1452	65.2 1425	68.9 1414	72.6 1411	74.6 1408	76.6 1410	79.4 1410
80	59.4 1510	61.9 1488	66.0 1464	69.7 1455	73.4 1453	75.6 1451	77.3 1447	80.0 1450
82	60.2 1548	62.6 1525	66.8 1503	70.4 1497	74.3 1496	76.3 1486	78.0 1484	80.6 1491
84	60.8 1586	63.2 1563	67.6 1544	71.2 1540	75.0 1528	76.9 1523	78.7 1521	81.2 1533
86	61.4 1625	63.9 1602	68.5 1585	72.0 1585	75.7 1564	77.6 1560	79.4 1559	81.8 1577
88	62.0 1665	64.6 1643	69.2 1629	72.6 1618	76.5 1599	78.2 1597	80.0 1598	82.5 1628
90	62.6 1706	65.3 1687	69.9 1675	73.2 1653	77.1 1636	78.8 1635	80.7 1637	83.2 1681
92	63.3 1748	66.1 1731	70.4 1709	73.9 1688	77.7 1673	79.4 1672	81.2 1678	83.8 1733
94	63.9 1791	66.8 1775	71.0 1745	74.5 1723	78.3 1711	80.1 1710	81.7 1720	84.4 1790
ECON AIR CONDITIONING △FF = – 0.6 %	**ENGINE ANTI ICE ON** △FF = + 4.5 %		**TOTAL ANTI ICE ON** △FF = + 7 %		**PER 1° ABOVE ISA** △FF = + 0.25 %		**STRAIGHT LINE** △FF = – 5 %	

R

RACE TRACK HOLDING PATTERN - S SPEED

MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **FF (KG/H/ENG)**

WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
58	53.3 1197	55.8 1172	59.7 1153	61.1 1149	62.7 1140	64.5 1135	66.5 1129	68.2 1127
60	54.1 1235	56.7 1211	60.5 1194	62.0 1187	63.7 1178	65.5 1173	67.4 1168	69.2 1167
62	54.9 1272	57.6 1250	61.3 1234	62.9 1224	64.6 1218	66.6 1211	68.3 1208	70.1 1206
64	55.7 1310	58.5 1290	62.1 1272	63.8 1262	65.6 1256	67.5 1250	69.2 1248	71.1 1245
66	56.5 1348	59.4 1330	62.9 1309	64.6 1301	66.5 1294	68.3 1290	70.1 1288	72.0 1285
68	57.3 1387	60.1 1371	63.8 1346	65.5 1340	67.5 1332	69.1 1330	71.0 1328	72.9 1325
70	58.1 1426	60.8 1412	64.6 1385	66.4 1378	68.2 1372	70.0 1370	71.8 1367	73.9 1365
72	58.9 1466	61.5 1451	65.4 1424	67.3 1416	69.0 1412	70.8 1411	72.7 1407	74.8 1405
74	59.7 1506	62.1 1489	66.2 1462	68.1 1454	69.8 1453	71.6 1450	73.6 1447	75.7 1445
76	60.5 1546	62.8 1526	67.0 1500	68.8 1495	70.6 1494	72.4 1490	74.4 1488	76.5 1488
78	61.1 1586	63.5 1564	67.8 1539	69.6 1535	71.3 1534	73.2 1531	75.3 1528	77.2 1530
80	61.7 1625	64.2 1601	68.6 1578	70.3 1576	72.1 1574	74.0 1571	76.1 1569	78.0 1571
82	62.3 1662	64.9 1638	69.3 1618	71.0 1617	72.8 1614	74.8 1612	76.9 1611	78.7 1613
84	62.9 1700	65.6 1676	70.0 1659	71.7 1658	73.6 1655	75.6 1653	77.6 1654	79.4 1654
86	63.5 1737	66.2 1715	70.6 1700	72.4 1698	74.3 1695	76.4 1693	78.3 1696	80.2 1696
88	64.1 1775	66.9 1753	71.3 1741	73.1 1738	75.1 1736	77.2 1735	78.9 1737	80.9 1739
90	64.7 1812	67.6 1792	72.0 1783	73.8 1779	75.8 1777	77.8 1778	79.6 1779	81.5 1784
92	65.3 1849	68.3 1831	72.6 1823	74.5 1820	76.6 1818	78.4 1820	80.3 1821	82.0 1828
94	65.9 1886	69.0 1869	73.3 1863	75.2 1861	77.3 1859	79.1 1861	81.0 1863	82.6 1873

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**	**STRAIGHT LINE**
△FF = – 0.6 %	△FF = + 4.5 %	△FF = + 7 %	△FF = + 0.25 %	△FF = – 5 %

R

RACE TRACK HOLDING PATTERN - 210KT

MAX. CRUISE THRUST LIMITS
CLEAN CONFIGURATION
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

N1 (%)
FF (KG/H/ENG)

WEIGHT (1000KG)	FL 15	FL 50	FL100	FL140	FL180	FL200	FL220	FL250
46	47.7 962	50.1 930	53.3 890	56.6 871	59.6 854	61.2 845	62.9 835	65.7 825
48	48.2 984	50.5 951	53.8 912	57.2 892	60.2 876	61.8 868	63.6 858	66.3 848
50	48.8 1006	51.0 972	54.4 934	57.9 915	60.8 899	62.5 891	64.3 882	66.9 873
52	49.4 1029	51.6 995	55.1 957	58.5 938	61.5 924	63.2 914	65.1 908	67.5 899
54	50.0 1054	52.1 1019	55.8 982	59.1 964	62.1 950	63.9 941	65.9 934	68.2 927
56	50.6 1079	52.7 1044	56.5 1008	59.7 990	62.8 976	64.7 969	66.5 962	68.9 955
58	51.1 1105	53.3 1070	57.2 1035	60.3 1018	63.5 1004	65.4 997	67.2 991	69.6 985
60	51.7 1131	53.9 1097	57.9 1063	60.9 1047	64.3 1034	66.3 1026	67.8 1022	70.4 1016
62	52.2 1159	54.5 1125	58.7 1093	61.6 1078	65.1 1065	67.0 1058	68.6 1053	71.2 1048
64	52.8 1187	55.2 1155	59.3 1124	62.3 1109	65.9 1097	67.6 1091	69.3 1086	71.9 1082
66	53.5 1217	56.0 1185	60.0 1156	63.1 1141	66.8 1129	68.4 1125	70.1 1121	72.7 1118
68	54.1 1248	56.7 1217	60.6 1189	63.8 1175	67.5 1164	69.1 1160	70.8 1156	73.6 1154
70	54.8 1279	57.5 1250	61.3 1223	64.6 1210	68.2 1200	69.8 1196	71.6 1193	74.4 1192
72	55.4 1312	58.2 1283	62.0 1258	65.4 1247	68.9 1238	70.6 1234	72.4 1231	75.2 1232
74	56.1 1345	59.0 1318	62.7 1293	66.3 1283	69.6 1276	71.4 1272	73.2 1271	76.0 1275
76	56.9 1381	59.8 1354	63.4 1330	67.1 1321	70.4 1315	72.2 1313	74.0 1312	76.8 1319
78	57.6 1416	60.4 1391	64.2 1369	67.9 1360	71.2 1356	73.0 1355	74.9 1354	77.5 1351

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**	**STRAIGHT LINE**
ΔFF = – 0.3 %	ΔFF = + 5 %	ΔFF = + 9 %	ΔFF = + 0.3 %	ΔFF = – 5 %

R

RACE TRACK HOLDING PATTERN - S SPEED

MAX. CRUISE THRUST LIMITS
CONFIGURATION 1
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA CG=33.0%

N1 (%)
FF (KG/H/ENG)

WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
46	47.1 936	49.6 914	52.6 885	54.1 874	55.8 864	57.5 858	58.9 854	60.5 850
48	48.1 972	50.4 950	53.6 921	55.2 909	57.0 901	58.5 897	59.9 891	61.6 888
50	49.1 1008	51.2 986	54.7 955	56.3 945	58.0 940	59.4 934	61.0 929	62.7 926
52	50.0 1045	52.1 1022	55.7 991	57.4 983	58.9 977	60.4 971	62.0 966	63.8 964
54	50.8 1081	52.9 1058	56.7 1028	58.4 1022	59.8 1014	61.3 1008	63.0 1004	65.0 1003
56	51.5 1118	53.8 1094	57.7 1066	59.2 1058	60.7 1052	62.3 1045	64.1 1043	66.1 1040
58	52.3 1154	54.6 1131	58.7 1104	60.0 1095	61.6 1088	63.2 1083	65.1 1081	67.0 1078
60	53.0 1190	55.5 1166	59.5 1140	60.9 1132	62.4 1125	64.2 1121	66.2 1118	67.8 1115
62	53.8 1227	56.3 1202	60.2 1177	61.7 1169	63.3 1162	65.2 1160	67.1 1156	68.7 1152
64	54.6 1264	57.2 1240	61.0 1214	62.5 1205	64.2 1200	66.2 1197	67.9 1193	69.5 1190
66	55.3 1300	58.1 1277	61.8 1250	63.4 1242	65.1 1238	67.1 1234	68.7 1231	70.4 1227
68	56.1 1336	58.9 1313	62.5 1286	64.2 1280	66.1 1275	67.9 1272	69.5 1268	71.2 1265
70	56.8 1373	59.7 1349	63.3 1322	65.0 1318	67.0 1313	68.6 1309	70.3 1306	72.0 1303
72	57.6 1410	60.4 1385	64.1 1359	65.9 1355	67.8 1351	69.3 1347	71.0 1343	72.8 1342
74	58.4 1447	61.0 1421	64.9 1397	66.7 1392	68.5 1389	70.1 1385	71.8 1382	73.6 1381
76	59.1 1482	61.7 1457	65.6 1435	67.6 1430	69.2 1427	70.8 1423	72.5 1421	74.4 1418
78	59.9 1517	62.3 1493	66.4 1472	68.3 1468	69.9 1465	71.5 1461	73.3 1460	75.1 1456

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA	STRAIGHT LINE
△FF = – 0.3 %	△FF = + 5 %	△FF = + 9 %	△FF = + 0.3 %	△FF = – 5 %

R

RACE TRACK HOLDING PATTERN - 210KT

MAX. CRUISE THRUST LIMITS CLEAN CONFIGURATION NORMAL AIR CONDITIONING ANTI-ICING OFF					ISA CG=33.0%		**N1 (%)** **FF (KG/H/ENG)**	
WEIGHT (1000KG)	**FL 15**	**FL 50**	**FL100**	**FL140**	**FL180**	**FL200**	**FL220**	**FL250**
44	47.1 938	49.6 909	52.7 868	55.9 850	59.0 833	60.5 821	62.2 811	65.0 799
46	47.6 959	50.0 928	53.2 889	56.5 870	59.6 853	61.1 843	62.8 832	65.6 820
48	48.2 982	50.5 949	53.8 910	57.2 891	60.1 875	61.7 866	63.5 855	66.2 844
50	48.7 1004	51.0 971	54.4 933	57.9 914	60.7 899	62.4 889	64.2 879	66.8 868
52	49.3 1028	51.5 993	55.0 956	58.4 937	61.4 923	63.1 913	65.0 905	67.4 894
54	50.0 1052	52.1 1017	55.7 981	59.0 962	62.1 949	63.8 939	65.8 930	68.1 921
56	50.6 1077	52.7 1042	56.4 1007	59.6 989	62.8 975	64.6 967	66.5 958	68.8 949
58	51.1 1103	53.3 1068	57.2 1033	60.3 1017	63.5 1002	65.4 995	67.1 987	69.5 978
60	51.6 1129	53.9 1095	57.9 1061	60.9 1046	64.3 1032	66.2 1023	67.8 1017	70.2 1008
62	52.2 1156	54.5 1123	58.7 1091	61.6 1076	65.1 1063	66.9 1054	68.4 1048	71.0 1040
64	52.8 1184	55.2 1152	59.3 1121	62.3 1106	65.9 1094	67.6 1087	69.2 1081	71.7 1074
66	53.4 1214	55.9 1182	59.9 1152	63.0 1138	66.7 1126	68.3 1121	69.9 1116	72.5 1110
68	54.0 1244	56.6 1213	60.6 1186	63.7 1171	67.4 1161	69.0 1157	70.7 1151	73.3 1147
70	54.7 1276	57.4 1246	61.2 1220	64.5 1207	68.1 1198	69.7 1193	71.4 1189	74.2 1185
72	55.3 1309	58.1 1280	61.9 1255	65.3 1244	68.8 1235	70.5 1231	72.2 1228	75.0 1226
74	56.0 1342	58.9 1315	62.6 1290	66.2 1281	69.6 1274	71.3 1270	73.1 1268	75.9 1269
76	56.8 1378	59.7 1351	63.4 1328	67.0 1319	70.3 1314	72.1 1312	73.9 1310	76.5 1304
LOW AIR CONDITIONING ΔFF = – 0.3 %	**ENGINE ANTI ICE ON** ΔFF = + 5 %		**TOTAL ANTI ICE ON** ΔFF = + 9 %		**PER 1° ABOVE ISA** ΔFF = + 0.3 %		**STRAIGHT LINE** ΔFF = – 5 %	

R

RACE TRACK HOLDING PATTERN - S SPEED

MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **FF (KG/H/ENG)**

WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
44	45.6 878	47.8 856	51.0 828	52.3 816	53.8 804	55.5 795	57.2 789	58.6 783
46	46.5 913	48.8 891	52.0 862	53.4 849	55.0 839	56.7 831	58.2 824	59.7 819
48	47.4 948	49.8 927	52.9 895	54.4 883	56.1 873	57.8 866	59.2 860	60.8 856
50	48.4 983	50.6 961	53.9 929	55.5 918	57.3 909	58.7 901	60.2 896	61.9 892
52	49.3 1019	51.4 996	54.9 963	56.6 953	58.2 944	59.6 937	61.2 933	63.0 929
54	50.2 1055	52.3 1031	55.9 998	57.6 988	59.1 979	60.6 973	62.2 968	64.1 967
56	50.9 1090	53.1 1066	56.9 1034	58.6 1023	59.9 1015	61.5 1009	63.2 1005	65.2 1004
58	51.7 1125	53.9 1099	57.9 1068	59.4 1058	60.8 1051	62.4 1045	64.2 1042	66.2 1039
60	52.4 1160	54.7 1133	58.8 1103	60.2 1093	61.7 1087	63.4 1081	65.3 1079	67.0 1074
62	53.1 1196	55.6 1168	59.5 1138	61.0 1130	62.5 1122	64.3 1118	66.3 1114	67.9 1110
64	53.9 1231	56.4 1203	60.3 1173	61.8 1165	63.4 1158	65.2 1155	67.1 1150	68.7 1146
66	54.6 1265	57.2 1238	61.0 1209	62.6 1200	64.3 1195	66.2 1191	67.9 1186	69.5 1182
68	55.3 1299	58.1 1272	61.8 1244	63.4 1235	65.2 1232	67.1 1226	68.6 1221	70.3 1218
70	56.1 1334	58.9 1306	62.5 1279	64.2 1271	66.0 1267	67.8 1262	69.4 1258	71.1 1254
72	56.8 1369	59.7 1340	63.3 1314	65.0 1308	66.9 1303	68.6 1298	70.2 1294	71.9 1291
74	57.6 1403	60.4 1375	64.0 1349	65.8 1344	67.8 1338	69.3 1334	70.9 1331	72.7 1327
76	58.3 1436	61.0 1410	64.8 1386	66.6 1380	68.4 1374	70.0 1370	71.7 1367	73.4 1363

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**	**STRAIGHT LINE**
△FF = – 0.3 %	△FF = + 5 %	△FF = + 9 %	△FF = + 0.3 %	△FF = – 5 %

R

RACE TRACK HOLDING PATTERN - 170KT

MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **FF (KG/H/ENG)**

WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
58	53.3 1193	55.7 1170	59.7 1152	61.1 1150	62.7 1147	64.5 1143	66.5 1137	68.2 1135
60	54.1 1232	56.7 1209	60.5 1196	62.0 1193	63.7 1193	65.6 1188	67.4 1183	69.2 1181
62	55.0 1272	57.7 1252	61.4 1242	63.0 1239	64.8 1241	66.7 1235	68.4 1232	70.3 1230
64	55.9 1315	58.8 1297	62.4 1289	64.0 1289	65.9 1290	67.7 1285	69.5 1283	71.5 1282
66	56.9 1359	59.7 1344	63.4 1339	65.1 1341	67.0 1342	68.7 1338	70.6 1337	72.7 1337
68	57.9 1407	60.6 1395	64.4 1393	66.2 1394	68.0 1396	69.8 1393	71.7 1393	73.9 1393
70	58.9 1457	61.4 1447	65.4 1447	67.3 1447	69.0 1451	70.9 1449	72.9 1449	75.2 1451
72	60.0 1508	62.3 1500	66.5 1501	68.4 1503	70.1 1508	72.0 1508	74.1 1507	76.3 1513
74	60.8 1561	63.3 1554	67.7 1558	69.4 1561	71.2 1570	73.2 1571	75.5 1574	77.5 1581
76	61.7 1617	64.3 1612	68.8 1621	70.5 1629	72.4 1640	74.5 1642	76.7 1648	78.7 1659
78	62.6 1676	65.3 1676	69.8 1691	71.6 1700	73.6 1713	75.8 1718	77.8 1724	80.0 1737
80	63.5 1741	66.3 1744	70.8 1759	72.7 1767	74.7 1778	77.0 1783	78.9 1793	80.9 1810
82	64.4 1807	67.4 1810	71.8 1823	73.8 1832	76.0 1846	78.0 1853	80.1 1866	81.9 1890
84	65.4 1868	68.4 1871	72.9 1889	75.0 1900	77.2 1920	79.1 1932	81.2 1948	82.9 1984
86	66.3 1931	69.5 1937	74.1 1964	76.3 1980	78.4 2003	80.4 2019	82.3 2045	84.1 2094
88	67.5 2004	70.7 2015	75.5 2046	77.7 2067	79.7 2095	81.7 2114	83.4 2153	85.2 2217
90	68.8 2082	71.8 2096	76.9 2133	78.9 2156	81.0 2189	82.8 2217	84.4 2250	85.7 2281
92	69.9 2159	72.9 2174	78.1 2216	80.0 2242	82.0 2279	83.5 2290	84.9 2311	86.3 2350
94	70.8 2234	73.8 2252	79.0 2300	80.9 2326	82.6 2335	84.1 2349	85.4 2373	86.8 2423

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**	**STRAIGHT LINE**
ΔFF = – 0.6 %	ΔFF = + 4.5 %	ΔFF = + 7 %	ΔFF = + 0.25 %	ΔFF = – 5 %

R

RACE TRACK HOLDING PATTERN - 170KT

MAX. CRUISE THRUST LIMITS
CONFIGURATION 1
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

N1 (%)
FF (KG/H/ENG)

WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
46	47.2 941	49.6 920	52.7 887	54.1 875	55.8 865	57.5 856	58.9 849	60.5 845
48	48.1 974	50.4 952	53.6 921	55.2 909	56.9 901	58.4 894	59.9 887	61.6 884
50	49.1 1009	51.2 986	54.6 955	56.3 945	58.0 940	59.4 933	60.9 928	62.7 925
52	50.1 1045	52.1 1021	55.7 992	57.5 984	58.9 980	60.4 975	62.0 969	63.9 968
54	50.9 1081	53.0 1058	56.8 1032	58.5 1025	59.9 1023	61.4 1017	63.1 1013	65.1 1012
56	51.7 1119	53.9 1096	58.0 1073	59.4 1068	60.9 1067	62.5 1061	64.3 1059	66.3 1056
58	52.6 1158	54.9 1136	59.0 1116	60.3 1113	61.9 1111	63.6 1108	65.5 1105	67.3 1102
60	53.4 1199	55.9 1177	59.9 1162	61.3 1159	62.9 1159	64.7 1156	66.7 1152	68.3 1150
62	54.4 1241	57.0 1221	60.8 1209	62.3 1206	64.0 1208	65.9 1205	67.7 1201	69.4 1199
64	55.3 1284	58.1 1267	61.8 1257	63.4 1256	65.2 1259	67.1 1254	68.7 1252	70.5 1251
66	56.3 1329	59.2 1314	62.8 1307	64.5 1310	66.4 1312	68.1 1309	69.8 1307	71.6 1308
68	57.3 1376	60.1 1364	63.8 1363	65.6 1365	67.5 1368	69.1 1366	70.9 1365	72.7 1367
70	58.4 1428	61.0 1419	64.9 1420	66.7 1421	68.5 1423	70.1 1421	72.0 1421	73.9 1422
72	59.4 1481	61.9 1473	66.0 1472	67.9 1472	69.4 1476	71.2 1475	73.1 1476	75.1 1479
74	60.4 1532	62.8 1524	67.1 1525	68.8 1527	70.5 1532	72.3 1533	74.2 1535	76.2 1542
76	61.3 1584	63.8 1577	68.3 1583	69.9 1589	71.6 1598	73.4 1600	75.5 1604	77.4 1613
78	62.2 1639	64.9 1638	69.3 1648	71.0 1655	72.8 1666	74.7 1668	76.7 1675	78.7 1685

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA	STRAIGHT LINE
△FF = – 0.3 %	△FF = + 5 %	△FF = + 9 %	△FF = + 0.3 %	△FF = – 5 %

R

RACE TRACK HOLDING PATTERN - 170KT

MAX. CRUISE THRUST LIMITS CONFIGURATION 1 NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA CG=33.0%		**N1 (%)** **FF (KG/H/ENG)**	
WEIGHT (1000KG)	**FL 15**	**FL 50**	**FL100**	**FL120**	**FL140**	**FL160**	**FL180**	**FL200**
44	45.9 891	48.2 871	51.3 839	52.7 825	54.2 814	55.9 803	57.6 793	59.0 787
46	46.7 920	49.1 900	52.1 867	53.6 854	55.2 844	57.0 833	58.4 826	59.9 820
48	47.5 951	49.9 930	53.0 897	54.5 884	56.2 875	57.8 866	59.2 859	60.8 856
50	48.4 982	50.6 960	53.9 928	55.5 917	57.3 909	58.7 902	60.2 896	61.9 893
52	49.3 1015	51.4 992	54.9 962	56.5 952	58.2 946	59.6 940	61.2 935	62.9 932
54	50.2 1049	52.2 1026	55.9 997	57.6 989	59.1 985	60.5 980	62.2 975	64.1 973
56	51.0 1084	53.1 1061	56.9 1035	58.6 1029	60.0 1026	61.5 1020	63.3 1017	65.2 1015
58	51.7 1120	54.0 1098	58.0 1074	59.4 1070	60.9 1068	62.5 1063	64.4 1060	66.3 1057
60	52.6 1158	54.9 1136	59.0 1116	60.3 1113	61.9 1111	63.6 1108	65.5 1105	67.3 1102
62	53.4 1197	55.9 1176	59.9 1160	61.3 1158	62.9 1157	64.7 1155	66.7 1150	68.3 1148
64	54.3 1238	56.9 1218	60.8 1206	62.3 1203	64.0 1205	65.9 1201	67.6 1197	69.3 1195
66	55.2 1280	58.0 1262	61.7 1252	63.3 1251	65.1 1254	67.0 1249	68.6 1246	70.4 1245
68	56.2 1323	59.1 1307	62.6 1300	64.3 1301	66.2 1303	67.9 1299	69.6 1296	71.5 1297
70	57.1 1368	60.0 1354	63.6 1349	65.4 1351	67.3 1353	68.9 1350	70.7 1349	72.5 1350
72	58.1 1414	60.8 1403	64.7 1401	66.5 1402	68.3 1405	69.9 1403	71.7 1403	73.7 1404
74	59.2 1462	61.7 1453	65.7 1454	67.6 1454	69.2 1459	70.9 1458	72.8 1459	74.8 1462
76	60.2 1511	62.5 1504	66.8 1507	68.6 1509	70.2 1515	72.0 1515	73.9 1517	75.9 1522

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**	**STRAIGHT LINE**
△FF = – 0.3 %	△FF = + 5 %	△FF = + 9 %	△FF = + 0.3 %	△FF = – 5 %

GENERAL

Descent tables are established for normal descent speed M.78/300kt/250kt and emergency descent at MMO/VMO with airbrakes extended, down to 1500 feet with :

- Normal air conditioning
- CG = 33 %
- Anti ice OFF

For normal descent, cabin vertical speed is limited to 350 feet/minute.

R

DESCENT - M.78/300KT/250KT									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%		**MAXIMUM CABIN RATE OF DESCENT 350FT/MIN**				
WEIGHT (1000KG)	**60**				**80**				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	IAS (KT)
390	16.1	163	99	72.3					241
370	14.6	131	88	IDLE	17.0	152	103	IDLE	252
350	14.0	127	83	IDLE	16.3	147	98	IDLE	264
330	13.4	123	79	IDLE	15.6	143	93	IDLE	277
310	12.9	119	75	IDLE	15.0	139	88	IDLE	289
290	12.3	115	71	IDLE	14.4	134	83	IDLE	300
270	11.6	111	66	IDLE	13.6	129	77	IDLE	300
250	11.0	106	61	IDLE	12.7	123	71	IDLE	300
240	10.6	103	58	IDLE	12.3	120	68	IDLE	300
220	9.9	98	53	IDLE	11.5	113	62	IDLE	300
200	9.2	93	48	IDLE	10.6	107	56	IDLE	300
180	8.5	87	44	IDLE	9.7	100	50	IDLE	300
160	7.7	79	39	IDLE	8.8	91	45	IDLE	300
140	7.0	70	34	IDLE	7.9	80	39	IDLE	300
120	6.2	61	29	IDLE	6.9	69	33	IDLE	300
100	5.4	51	25	IDLE	6.0	57	28	IDLE	300
50	1.9	16	8	IDLE	2.1	18	9	IDLE	250
15	.0	0	0	IDLE	.0	0	0	IDLE	250

CORRECTIONS	**ECON AIR CONDITIONING**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**
TIME	–	+ 1 min	+ 1 min	–
FUEL	– 1 %	+ 45 %	+ 60 %	+ 0.4 %
DISTANCE	–	+ 5.5 %	+ 7 %	+ 0.4 %

11.0-08F0A321-211 CFM56-5B3/P SA23100000C5KG330 0 018590 0 0-1-350.0 15.0 .00 0 03 .7803000.000250.000 0 FCOM-N0-03-05-30-002-165

GENERAL

Descent tables are established for normal descent speed M.78/300kt/250kt and emergency descent at MMO/VMO with airbrakes extended, down to 1500 feet with :
· Normal air conditioning
· CG = 33 %
· Anti ice OFF
For normal descent, cabin vertical speed is limited to 350 feet/minute.

R

DESCENT - M.78/300KT/250KT									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%		MAXIMUM CABIN RATE OF DESCENT 350FT/MIN				
WEIGHT (1000KG)	45				65				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	IAS (KT)
390	16.1	204	101	68.8	17.4	165	106	IDLE	241
370	14.6	174	89	69.9	16.7	160	100	IDLE	252
350	12.9	134	77	72.1	16.0	156	95	IDLE	264
330	12.0	119	70	IDLE	15.4	153	91	IDLE	277
310	11.6	117	67	IDLE	14.8	149	86	IDLE	289
290	11.1	114	64	IDLE	14.2	145	82	IDLE	300
270	10.6	110	59	IDLE	13.4	141	76	IDLE	300
250	10.0	107	55	IDLE	12.7	136	71	IDLE	300
240	9.7	105	53	IDLE	12.3	133	68	IDLE	300
220	9.1	100	49	IDLE	11.5	127	62	IDLE	300
200	8.5	94	45	IDLE	10.6	119	56	IDLE	300
180	7.8	86	40	IDLE	9.8	109	51	IDLE	300
160	7.1	78	36	IDLE	8.8	97	45	IDLE	300
140	6.3	67	31	IDLE	7.9	83	39	IDLE	300
120	5.6	57	27	IDLE	6.9	70	33	IDLE	300
100	4.9	48	23	IDLE	6.0	58	28	IDLE	300
50	1.7	15	7	IDLE	2.1	18	9	IDLE	250
15	.0	0	0	IDLE	.0	0	0	IDLE	250

CORRECTIONS	LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	–	+ 6 %	+ 6 %	–
FUEL	– 2 %	+ 28 %	+ 44 %	+ 0.2 %
DISTANCE	–	+ 3 %	+ 4 %	+ 0.3 %

11.0-08F0A320-214 CFM56-5B4/P SA23100000C5KG330 0 018590 0 0-1-350.0 15.0 .00 0 03 .780300.000250.000 0 FCOM-N0-03-05-30-002-170

GENERAL

Descent tables are established for normal descent speed M.78/300kt/250kt and emergency descent at MMO/VMO with airbrakes extended, down to 1500 feet with :
· Normal air conditioning
· CG = 33 %
· Anti ice OFF
For normal descent, cabin vertical speed is limited to 350 feet/minute.

R

DESCENT - M.78/300KT/250KT

IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**MAXIMUM CABIN RATE OF DESCENT 350 FT/MIN**

WEIGHT (1000KG)	**45**				**65**				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	IAS (KT)
390	14.7	156	91	68.2	17.6	167	107	IDLE	241
370	13.2	127	79	IDLE	16.9	162	102	IDLE	252
350	12.6	124	75	IDLE	16.2	158	97	IDLE	264
330	12.1	120	71	IDLE	15.6	155	92	IDLE	277
310	11.7	118	68	IDLE	15.0	151	87	IDLE	289
290	11.2	115	64	IDLE	14.4	147	83	IDLE	300
270	10.6	111	60	IDLE	13.6	142	77	IDLE	300
250	10.0	107	56	IDLE	12.8	137	71	IDLE	300
240	9.8	106	54	IDLE	12.4	135	69	IDLE	300
220	9.1	101	49	IDLE	11.6	129	63	IDLE	300
200	8.5	94	45	IDLE	10.7	120	57	IDLE	300
180	7.8	87	40	IDLE	9.8	110	51	IDLE	300
160	7.1	78	36	IDLE	8.9	98	45	IDLE	300
140	6.3	67	31	IDLE	7.9	84	39	IDLE	300
120	5.6	56	27	IDLE	6.9	70	33	IDLE	300
100	4.9	47	23	IDLE	6.0	58	28	IDLE	300
50	1.7	14	7	IDLE	2.1	18	9	IDLE	250
15	.0	0	0	IDLE	.0	0	0	IDLE	250

CORRECTIONS	**LOW AIR CONDITIONING**	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**
TIME	-	+ 6 %	+ 10 %	+ 0.3 %
FUEL	-	+ 30 %	+ 50 %	+ 0.5 %
DISTANCE	-	+ 5 %	+ 7 %	+ 0.5 %

R

EMERGENCY DESCENT - M.82/350KT									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%		**AIRBRAKES EXTENDED**				
WEIGHT (1000KG)	**55**				**75**				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	IAS (KT)
390	4.0	38	29	IDLE					255
370	3.8	37	27	IDLE	4.8	47	34	IDLE	267
350	3.6	36	25	IDLE	4.6	45	32	IDLE	279
330	3.5	35	24	IDLE	4.4	44	30	IDLE	292
310	3.3	33	23	IDLE	4.2	43	29	IDLE	306
290	3.1	32	21	IDLE	4.0	42	28	IDLE	319
270	3.0	31	20	IDLE	3.8	40	26	IDLE	333
250	2.8	30	19	IDLE	3.6	39	25	IDLE	347
240	2.7	30	18	IDLE	3.5	38	24	IDLE	350
220	2.5	28	17	IDLE	3.3	37	22	IDLE	350
200	2.3	27	15	IDLE	3.0	35	20	IDLE	350
180	2.1	25	14	IDLE	2.7	32	18	IDLE	350
160	1.9	22	12	IDLE	2.5	29	16	IDLE	350
140	1.6	20	10	IDLE	2.2	26	14	IDLE	350
120	1.4	17	9	IDLE	1.9	22	12	IDLE	350
100	1.2	14	7	IDLE	1.6	18	10	IDLE	350
50	.6	6	4	IDLE	.8	8	5	IDLE	350
0	.0	0	0	IDLE	.0	0	0	IDLE	350

R

EMERGENCY DESCENT - M.82/350KT									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%		**AIRBRAKES EXTENDED**				
WEIGHT (1000KG)	**45**				**65**				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	IAS (KT)
390	4.8	48	34	IDLE	6.6	66	47	IDLE	255
370	4.5	46	32	IDLE	6.2	64	44	IDLE	267
350	4.3	45	30	IDLE	5.9	62	42	IDLE	279
330	4.0	43	28	IDLE	5.6	60	40	IDLE	292
310	3.8	42	27	IDLE	5.3	59	38	IDLE	306
290	3.6	41	25	IDLE	5.1	57	35	IDLE	319
270	3.4	40	24	IDLE	4.8	56	33	IDLE	333
250	3.3	38	22	IDLE	4.6	54	32	IDLE	347
240	3.2	38	21	IDLE	4.5	53	31	IDLE	350
220	2.9	36	20	IDLE	4.1	51	28	IDLE	350
200	2.7	33	18	IDLE	3.8	47	25	IDLE	350
180	2.4	30	16	IDLE	3.4	42	22	IDLE	350
160	2.2	27	14	IDLE	3.1	38	20	IDLE	350
140	1.9	23	12	IDLE	2.7	32	17	IDLE	350
120	1.6	19	10	IDLE	2.3	26	14	IDLE	350
100	1.4	15	8	IDLE	1.9	21	12	IDLE	350
50	.7	7	4	IDLE	1.0	9	6	IDLE	350
0	.0	0	0	IDLE	.0	0	0	IDLE	350

11.0-08F0A320-214 CFM56-5B4/P SA23310000C5KG330 0 018590 0 0-1 .0 .0 .00 0 02 .820350.000 .000 0 FCOM-N0-03-05-30-003-170

R

EMERGENCY DESCENT - M.82/350KT									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%		**AIRBRAKES EXTENDED**				
WEIGHT (1000KG)	**45**				**65**				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	IAS (KT)
390	5.8	58	42	IDLE	7.9	79	57	IDLE	255
370	5.5	56	39	IDLE	7.5	77	54	IDLE	267
350	5.1	54	37	IDLE	7.1	75	51	IDLE	279
330	4.8	52	34	IDLE	6.7	73	48	IDLE	292
310	4.6	50	32	IDLE	6.4	71	45	IDLE	306
290	4.3	49	30	IDLE	6.1	69	43	IDLE	319
270	4.1	48	28	IDLE	5.8	67	40	IDLE	333
250	3.9	46	27	IDLE	5.5	65	38	IDLE	347
240	3.8	46	26	IDLE	5.3	64	37	IDLE	350
220	3.5	43	24	IDLE	4.9	61	33	IDLE	350
200	3.2	40	21	IDLE	4.5	56	30	IDLE	350
180	2.9	36	19	IDLE	4.1	51	27	IDLE	350
160	2.6	32	17	IDLE	3.6	45	23	IDLE	350
140	2.2	27	14	IDLE	3.1	38	20	IDLE	350
120	1.9	22	12	IDLE	2.7	31	17	IDLE	350
100	1.6	17	10	IDLE	2.2	24	14	IDLE	350
50	.8	8	5	IDLE	1.1	11	7	IDLE	350
0	.0	0	0	IDLE	.0	0	0	IDLE	350

11.0-08F0A319-112 CFM56-5B6/P SA23310000C5KG330 0 018590 0 0-1 .0 .0 .00 0 02 .820350.000 .000 0 FCOM-N0-03-05-30-003-180

GENERAL

In the go around configuration corresponding to the all engine procedure, the minimum steady gradient one engine inoperative required by the regulations is 2.1 % at a speed not exceeding 1.4 Vs. This requirement is also called approach climb performance by regulations.
The following pages allow to determine the go around limiting weight which satisfies the required gradient with the certified go around configurations 3 and 2.
The required gradient of 2.1 % is considered at the airport reference altitude. The power setting is «GO AROUND» thrust with the air conditioning ON. The speed is 1.23 Vs of the specified configuration. For the occasional cases where approach climb performance is found restrictive, a correction is given for an increased speed up to 1.4 Vs.

Note : Landing climb performance (2 engines running) is never limiting.

PROCEDURE

According to airport pressure altitude and temperature determine if the slats/flaps setting must be restricted as a function of the landing weight, in order to meet the go around gradient requirement of 2.1 %.
Establish the final approach configuration with one more step of flaps. If the approach is interrupted, retract the flaps by one step during the go-around.
In case of category II approach, JAR-OPS requires a regulatory approach climb gradient of 2.5 % to be maintained.
Use the tables for CAT II approach to determine the maximum approach climb limiting weight according to airport pressure altitude and temperature.

Note :
1. *If circumstances dictate, landing may be made at a weight corresponding to the maximum structural takeoff weight (refer to overweight landing procedure 3.02).*
2. *When icing conditions are predicted during the flight and TAT is 10°C or below and there is an evidence of significant ice accretion, to take into account ice formation on the non heated structure :* (R)
   - *decrease the approach climb limiting weight by 4.5 %.*
   - *in CONF FULL, the approach speed must not be lower than VREF + 5 knots and the landing distance must be multiplied by 1.1.*
     or
     in CONF 3, the approach speed must not be lower than VLS + 10 knots and the landing distance must be multiplied by 1.15.
3. *In the following tables corrections for anti ice are only valid for OAT lower than 10°C.*

APPROACH CLIMB LIMITING WEIGHT (1000 KG) ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST	Gradient : 2.1% High Air Conditioning Anti ice OFF V = 1.23 Vs	CONF 2

R

OAT (°C)	PRESSURE ALTITUDE (FT)											
	–2000	0	200	400	600	800	1000	1500	2000	5000	10000	14100
≤ 10	84.6	83.7	83.4	83.2	83.0	82.7	82.5	81.9	81.4	81.7	71.2	61.0
20	84.2	83.3	83.1	82.9	82.6	82.4	82.2	81.7	81.1	81.4	67.5	55.0
22	84.2	83.3	83.1	82.8	82.6	82.4	82.1	81.6	81.1	81.4	66.3	54.2
24	84.1	83.2	83.0	82.8	82.5	82.3	82.1	81.5	81.0	80.9	65.0	
26	84.1	83.2	82.9	82.7	82.5	82.3	82.0	81.5	81.0	80.0	64.0	
28	84.0	83.1	82.9	82.7	82.4	82.2	82.0	81.5	80.9	79.0	63.0	
30	83.9	83.1	82.8	82.6	82.4	82.1	81.9	81.4	80.9	78.1	62.0	
32	83.9	83.0	82.8	82.6	82.3	82.1	81.9	81.4	80.8	77.1	61.0	
34	83.8	83.0	82.8	82.5	82.3	82.1	81.9	81.3	80.8	76.2	60.0	
36	83.8	83.0	82.7	82.5	82.3	82.1	81.8	81.3	80.8	74.9		
38	83.7	82.9	82.7	82.5	82.3	82.0	81.8	81.3	80.8	73.4		
40	83.7	82.9	82.7	82.5	82.3	82.0	81.8	81.3	80.7	71.7		
42	83.7	82.9	82.7	82.5	82.2	82.0	81.7	80.3	78.8	70.0		
44	83.6	82.8	82.2	81.6	81.1	80.5	79.9	78.5	77.0	68.3		
46	83.6	81.0	80.4	79.8	79.3	78.7	78.1	76.7	75.6			
48	83.5	79.1	78.6	78.0	77.4	76.9	76.4	75.3	74.1			
50	81.5	77.3	76.8	76.3	75.9	75.4	75.0	73.8	72.5			
52	79.6	75.8	75.3	74.8	74.4	73.9	73.5	72.2				
54	77.7	74.2	73.8	73.3								
55	76.8	73.5										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON SUBTRACT	TOTAL ANTI ICE ON SUBTRACT	SPEED INCREASE PER 0.01 Vs ADD
1400 kg	900 kg up to 10000 ft 3600 kg above 10000 ft	1100 kg up to 5000 ft 7000 kg above 5000 ft	200 kg

GENERAL

In the go around configuration corresponding to the all engine procedure, the minimum steady gradient one engine inoperative required by the regulations is 2.1 % at a speed not exceeding 1.4 Vs. This requirement is also called approach climb performance by regulations.
The following pages allow to determine the go around limiting weight which satisfies the required gradient with the certified go around configurations 3 and 2.
The required gradient of 2.1 % is considered at the airport reference altitude. The power setting is «GO AROUND» thrust with the air conditioning ON. The speed is 1.23 Vs of the specified configuration. For the occasional cases where approach climb performance is found restrictive, a correction is given for an increased speed up to 1.4 Vs.

Note : Landing climb performance (2 engines running) is never limiting.

PROCEDURE

According to airport pressure altitude and temperature determine if the slats/flaps setting must be restricted as a function of the landing weight, in order to meet the go around gradient requirement of 2.1 %.
Establish the final approach configuration with one more step of flaps. If the approach is interrupted, retract the flaps by one step during the go-around.
In case of category II approach, JAR-OPS requires a regulatory approach climb gradient of 2.5 % to be maintained.
Use the tables for CAT II approach to determine the maximum approach climb limiting weight according to airport pressure altitude and temperature.

Note :
1. *If circumstances dictate, landing may be made at a weight corresponding to the maximum structural takeoff weight (refer to overweight landing procedure 3.02).*

R

2. *When icing conditions are predicted during the flight and TAT is 10°C or below and there is an evidence of significant ice accretion, to take into account ice formation on the non heated structure :*
   - *decrease the approach climb limiting weight by 4.5 %.*
   - *in CONF FULL, the approach speed must not be lower than VREF + 5 knots and the landing distance must be multiplied by 1.1.*
     or
     in CONF 3, the approach speed must not be lower than VLS + 10 knots and the landing distance must be multiplied by 1.15.
3. *In the following tables corrections for anti ice are only valid for OAT lower than 10°C.*

APPROACH CLIMB LIMITING WEIGHT (1000 KG) ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST	Gradient : 2.1 % High Air Conditioning Anti ice OFF V = 1.23 Vs	CONF 2

R

PRESSURE ALTITUDE (FT)												
OAT (°C)	−2000	0	200	400	600	800	1000	1500	2000	5000	8000	9200
≤10	84.6	83.7	83.4	83.2	83.0	82.7	82.5	82.0	81.4	81.7	77.0	73.2
20	84.2	83.3	83.1	82.9	82.7	82.4	82.2	81.7	81.1	81.4	75.8	70.6
22	84.2	83.3	83.1	82.8	82.6	82.4	82.1	81.6	81.1	81.4	74.9	69.4
24	84.1	83.2	83.0	82.8	82.5	82.3	82.1	81.6	81.0	80.9	73.7	68.1
26	84.1	83.2	82.9	82.7	82.5	82.3	82.0	81.5	81.0	80.0	72.5	66.9
28	84.0	83.1	82.9	82.7	82.4	82.2	82.0	81.5	80.9	79.0	71.2	65.8
30	83.9	83.1	82.8	82.6	82.4	82.2	81.9	81.4	80.9	78.1	70.0	64.7
32	83.9	83.0	82.8	82.6	82.4	82.1	81.9	81.4	80.8	77.1	68.7	63.6
34	83.8	83.0	82.8	82.5	82.3	82.1	81.9	81.4	80.8	76.2	67.3	62.4
36	83.8	83.0	82.7	82.5	82.3	82.1	81.8	81.3	80.8	74.7	66.0	61.2
38	83.8	82.9	82.7	82.5	82.3	82.0	81.8	81.3	80.8	72.9	64.6	
40	83.7	82.9	82.7	82.5	82.3	82.0	81.8	81.3	80.7	71.1		
42	83.7	82.9	82.7	82.5	82.2	82.0	81.7	80.3	78.8	69.4		
44	83.6	82.8	82.2	81.7	81.1	80.5	79.9	78.5	77.0	67.8		
46	83.6	81.0	80.4	79.8	79.3	78.7	78.1	76.7	75.5			
48	83.5	79.1	78.6	78.0	77.5	76.9	76.4	75.2	73.8			
50	81.5	77.3	76.8	76.3	75.9	75.3	74.8	73.4	72.0			
52	79.6	75.7	75.2	74.6	74.1	73.6	73.0	71.6				
54	77.7	73.9	73.4	72.9								
55	76.8	73.0										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON SUBTRACT	TOTAL ANTI ICE ON SUBTRACT	SPEED INCREASE PER 0.01 Vs ADD
1300 kg	300 kg	3400 kg	245 kg

GENERAL

In the go around configuration corresponding to the all engine procedure, the minimum steady gradient one engine inoperative required by the regulations is 2.1 % at a speed not exceeding 1.4 Vs. This requirement is also called approach climb performance by regulations.
The following graph allows to determine the go around limiting weight which satisfies the required gradient with the certified go around configurations 3 and 2.
The required gradient of 2.1 % is considered at the airport reference altitude. The power setting is «GO AROUND» thrust with the air conditioning ON. The speed is 1.23 Vs of the specified configuration. For the occasional cases where approach climb performance is found restrictive, a correction is given for an increased speed up to 1.4 Vs.

Note : Landing climb performance (2 engines running) is never limiting.

PROCEDURE

According to airport pressure altitude and temperature determine if the slats/flaps setting must be restricted as a function of the landing weight, in order to meet the go around gradient requirement of 2.1 %.
Establish the final approach configuration with one more step of flaps. If the approach is interrupted, retract the flaps by one step during the go-around.
In case of category II approach, JAR-OPS requires a regulatory approach climb gradient of 2.5 % to be maintained.
Use the tables for CAT II approach to determine the maximum approach climb limiting weight according to airport pressure altitude and temperature.

Note :
1. *If circumstances dictate, landing may be made at a weight corresponding to the maximum structural takeoff weight (refer to overweight landing procedure 3.02).*
R 2. *When icing conditions are predicted during the flight and TAT is 10°C or below and there is an evidence of significant ice accretion, to take into account ice formation on the non heated structure :*
   - *decrease the approach climb limiting weight by 7.2 %.*
   - *in CONF FULL, the approach speed must not be lower than VREF + 5 knots and the landing distance must be multiplied by 1.1.*
     or
     in CONF 3, the approach speed must not be lower than VLS + 10 knots and the landing distance must be multiplied by 1.15.
3. *In the following tables corrections for anti ice are only valid for OAT lower than 10°C.*

R

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 2

ONE ENGINE OUT ONE ENGINE OUT AT GO AROUND THRUST	Normal Air Conditioning Anti Ice OFF	Gradient : 2.1 % V = 1.23 Vs

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	**0**	**200**	**400**	**600**	**800**	**1000**	**2000**	**5000**	**9200**	**12000**	**14100**
≤10	99.3	98.4	98.0	97.6	97.1	96.7	96.2	93.9	86.1	74.1	65.7	59.3
20	98.9	98.1	97.7	97.2	96.8	96.3	95.9	93.6	85.8	70.7	61.4	55.0
22	98.8	98.0	97.6	97.2	96.7	96.3	95.8	93.5	84.8	69.7	60.3	54.2
24	98.8	97.9	97.5	97.1	96.6	96.2	95.7	93.5	83.7	68.7	59.4	53.4
26	98.7	97.9	97.5	97.0	96.6	96.1	95.7	93.4	82.7	67.5	58.6	52.5
28	98.6	97.8	97.4	97.0	96.5	96.1	95.6	91.9	81.7	66.3	57.7	
30	98.5	97.7	97.0	96.3	95.6	94.9	94.1	90.4	80.6	65.3	56.8	
32	98.5	96.2	95.5	94.7	94.0	93.2	92.4	88.8	79.2	64.2		
34	96.6	94.1	93.4	92.6	91.9	91.2	90.5	87.2	77.6	63.1		
36	94.6	92.3	91.6	90.9	90.3	89.6	88.9	85.6	75.9	62.1		
38	92.7	90.5	89.9	89.2	88.6	87.9	87.2	83.9	74.2			
40	91.0	88.8	88.1	87.4	86.8	86.1	85.4	82.1	72.5			
42	89.1	86.9	86.2	85.6	84.9	84.2	83.5	80.2	70.6			
44	87.2	84.8	84.2	83.5	82.8	82.2	81.5	78.2	68.8			
46	85.1	82.7	82.1	81.4	80.8	80.1	79.5	76.2				
48	83.2	80.8	80.2	79.5	78.9	78.2	77.6	74.4				
50	81.3	78.9	78.3	77.7	77.0	76.4	75.7	72.6				
52	79.4	77.1	76.4	75.8	75.2	74.5	73.9					
54	77.5	75.2	74.6	73.9								
55	76.6	74.2										

AIR CONDITIONING OFF ADD	**ENGINE ANTI ICE ON SUBTRACT**	**TOTAL ANTI ICE ON SUBTRACT**	**SPEED INCREASE PER 0.01 Vs ADD**
2000 kg	400 kg up to 7500 ft 2400 kg above 7500 ft	2800 kg up to 7500 ft 5100 kg above 7500 ft	200 kg

GENERAL

In the go around configuration corresponding to the all engine procedure, the minimum steady gradient one engine inoperative required by the regulations is 2.1 % at a speed not exceeding 1.4 Vs. This requirement is also called approach climb performance by regulations.
The following graph allows to determine the go around limiting weight which satisfies the required gradient with the certified go around configurations 3 and 2.
The required gradient of 2.1 % is considered at the airport reference altitude. The power setting is «GO AROUND» thrust with the air conditioning ON. The speed is 1.23 Vs of the specified configuration. For the occasional cases where approach climb performance is found restrictive, a correction is given for an increased speed up to 1.4 Vs.

Note : Landing climb performance (2 engines running) is never limiting.

PROCEDURE

According to airport pressure altitude and temperature determine if the slats/flaps setting must be restricted as a function of the landing weight, in order to meet the go around gradient requirement of 2.1 %.
Establish the final approach configuration with one more step of flaps. If the approach is interrupted, retract the flaps by one step during the go-around.
In case of category II approach, JAR-OPS requires a regulatory approach climb gradient of 2.5 % to be maintained.
Use the tables for CAT II approach to determine the maximum approach climb limiting weight according to airport pressure altitude and temperature.

Note :
1. *If circumstances dictate, landing may be made at a weight corresponding to the maximum structural takeoff weight (refer to overweight landing procedure 3.02).*
2. R *When icing conditions are predicted during the flight and TAT is 10°C or below and there is an evidence of significant ice accretion, to take into account ice formation on the non heated structure :*
   - *decrease the approach climb limiting weight by 7.2 %.*
   - *in CONF FULL, the approach speed must not be lower than VREF + 5 knots and the landing distance must be multiplied by 1.1.*
     or
     in CONF 3, the approach speed must not be lower than VLS + 10 knots and the landing distance must be multiplied by 1.15.
3. *In the following tables corrections for anti ice are only valid for OAT lower than 10°C.*

R

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 2

ONE ENGINE OUT ONE ENGINE OUT AT GO AROUND THRUST	Normal Air Conditioning Anti Ice OFF	Gradient : 2.1 % V = 1.23 Vs

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	**0**	**200**	**400**	**600**	**800**	**1000**	**1500**	**2000**	**5000**	**8000**	**12000**
≤10	70.8	70.4	70.2	70.0	69.9	69.7	69.5	69.1	68.6	65.6	61.6	57.1
20	70.5	70.2	70.0	69.8	69.6	69.4	69.3	68.8	68.4	65.4	61.5	57.0
22	70.5	70.1	69.9	69.7	69.6	69.4	69.2	68.8	68.3	65.4	61.4	56.5
24	70.4	70.1	69.9	69.7	69.5	69.3	69.2	68.7	68.3	65.3	61.4	55.1
26	70.4	70.0	69.8	69.6	69.5	69.3	69.1	68.7	68.2	65.3	61.4	53.8
28	70.3	70.0	69.8	69.6	69.4	69.3	69.1	68.6	68.2	65.3	61.4	52.4
30	70.3	69.9	69.7	69.5	69.4	69.2	69.0	68.6	68.2	65.3	60.8	51.2
32	70.3	69.9	69.7	69.5	69.4	69.2	69.0	68.6	68.1	65.3	59.7	
34	70.2	69.8	69.6	69.5	69.3	69.1	69.0	68.6	68.1	65.2	58.5	
36	70.2	69.8	69.6	69.5	69.3	69.1	69.0	68.5	68.1	64.6	57.3	
38	70.2	69.8	69.6	69.4	69.3	69.1	69.0	68.5	68.1	63.3	56.1	
40	70.1	69.8	69.6	69.4	69.3	69.1	68.9	68.5	68.0	62.0		
42	70.1	69.8	69.6	69.4	69.2	69.1	68.9	68.4	67.4	60.7		
44	70.1	69.7	69.5	69.3	69.0	68.6	68.2	67.1	66.1	59.4		
46	70.0	69.0	68.6	68.1	67.7	67.3	66.9	65.9	64.8			
48	69.3	67.8	67.4	66.9	66.5	66.1	65.7	64.7	63.7			
50	68.0	66.5	66.1	65.7	65.3	64.9	64.5	63.5	62.6			
52	66.8	65.3	64.9	64.5	64.2	63.8	63.4	62.4				
54	65.5	64.1	63.8	63.4								
55	64.9	63.5										

AIR CONDITIONING OFF ADD	**ENGINE ANTI ICE ON SUBTRACT**	**TOTAL ANTI ICE ON SUBTRACT**	**SPEED INCREASE PER 0.01 Vs ADD**
1550 kg	250 kg	800 kg	250 kg

GENERAL

In the go around configuration corresponding to the all engine procedure, the minimum steady gradient one engine inoperative required by the regulations is 2.1 % at a speed not exceeding 1.4 Vs. This requirement is also called approach climb performance by regulations.
The following graph allows to determine the go around limiting weight which satisfies the required gradient with the certified go around configurations 3 and 2.
The required gradient of 2.1 % is considered at the airport reference altitude. The power setting is «GO AROUND» thrust with the air conditioning ON. The speed is 1.23 Vs of the specified configuration. For the occasional cases where approach climb performance is found restrictive, a correction is given for an increased speed up to 1.4 Vs.

Note : Landing climb performance (2 engines running) is never limiting.

PROCEDURE

According to airport pressure altitude and temperature determine if the slats/flaps setting must be restricted as a function of the landing weight, in order to meet the go around gradient requirement of 2.1 %.
Establish the final approach configuration with one more step of flaps. If the approach is interrupted, retract the flaps by one step during the go-around.
In case of category II approach, JAR-OPS requires a regulatory approach climb gradient of 2.5 % to be maintained.
Use the tables for CAT II approach to determine the maximum approach climb limiting weight according to airport pressure altitude and temperature.

Note :
1. *If circumstances dictate, landing may be made at a weight corresponding to the maximum structural takeoff weight (refer to overweight landing procedure 3.02).*
2. R *When icing conditions are predicted during the flight and TAT is 10°C or below and there is an evidence of significant ice accretion, to take into account ice formation on the non heated structure :*
   - *decrease the approach climb limiting weight by 7.2 %.*
   - *in CONF FULL, the approach speed must not be lower than VREF + 5 knots and the landing distance must be multiplied by 1.1.*
     or
     in CONF 3, the approach speed must not be lower than VLS + 10 knots and the landing distance must be multiplied by 1.15.
3. *In the following tables corrections for anti ice are only valid for OAT lower than 10°C.*

R

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 2

ONE ENGINE OUT ONE ENGINE OUT AT GO AROUND THRUST	Normal Air Conditioning Anti Ice OFF	Gradient : 2.1 % V = 1.23 Vs

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-2000	**0**	**200**	**400**	**600**	**800**	**1000**	**2000**	**5000**	**9200**	**12000**	**14100**
≤10	99.4	98.4	98.0	97.6	97.1	96.7	96.2	93.9	86.1	74.1	65.7	59.3
20	98.9	98.1	97.7	97.2	96.8	96.3	95.9	93.6	85.8	70.7	61.4	55.0
22	98.9	98.0	97.6	97.2	96.7	96.3	95.8	93.5	84.8	69.7	60.3	54.2
24	98.8	97.9	97.5	97.1	96.6	96.2	95.7	93.5	83.7	68.7	59.4	53.4
26	98.7	97.9	97.5	97.0	96.6	96.1	95.7	93.4	82.7	67.5	58.6	52.5
28	98.6	97.8	97.4	97.0	96.5	96.1	95.6	91.9	81.7	66.3	57.7	
30	98.6	97.7	97.0	96.3	95.6	94.9	94.1	90.4	80.6	65.3	56.8	
32	98.5	96.2	95.5	94.7	94.0	93.2	92.4	88.8	79.2	64.2		
34	98.4	94.1	93.4	92.6	91.9	91.2	90.5	87.2	77.6	63.1		
36	96.6	92.3	91.6	90.9	90.3	89.6	88.9	85.6	75.9	62.1		
38	94.7	90.5	89.9	89.2	88.6	87.9	87.2	83.9	74.2			
40	92.9	88.8	88.1	87.4	86.8	86.1	85.4	82.1	72.5			
42	91.0	86.9	86.2	85.6	84.9	84.2	83.5	80.2	70.6			
44	89.1	84.8	84.2	83.5	82.8	82.2	81.5	78.2	68.8			
46	87.3	82.7	82.1	81.4	80.8	80.1	79.5	76.2				
48	85.6	80.8	80.2	79.5	78.9	78.2	77.6	74.4				
50	83.7	78.9	78.3	77.7	77.0	76.4	75.7	72.6				
52	81.7	77.1	76.4	75.8	75.2	74.5	73.9					
54	79.7	75.2	74.6	73.9								
55	78.8	74.2										

AIR CONDITIONING OFF ADD	**ENGINE ANTI ICE ON SUBTRACT**	**TOTAL ANTI ICE ON SUBTRACT**	**SPEED INCREASE PER 0.01 Vs ADD**
2100 kg	400 kg up to 7500 ft 2400 kg above 7500 ft	1200 kg up to 5000 ft 5100 kg above 5000 ft	190 kg

R

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 3

ONE ENGINE OUT ONE ENGINE OUT AT GO AROUND THRUST	Normal Air Conditioning Anti Ice OFF	Gradient : 2.1 % V = 1.23 Vs

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	**0**	**200**	**400**	**600**	**800**	**1000**	**2000**	**5000**	**9200**	**12000**	**14100**
≤10	93.6	92.9	92.5	92.0	91.6	91.2	90.7	88.6	81.0	69.7	61.8	55.8
20	93.2	92.5	92.1	91.7	91.3	90.8	90.4	88.3	80.7	66.5	57.9	52.0
22	93.2	92.4	92.0	91.6	91.2	90.8	90.4	88.2	79.9	65.7	56.9	51.2
24	93.1	92.4	92.0	91.5	91.1	90.7	90.3	88.2	78.9	64.7	56.0	50.4
26	93.0	92.3	91.9	91.5	91.1	90.7	90.2	88.1	78.0	63.5	55.2	49.6
28	93.0	92.2	91.8	91.4	91.0	90.6	90.2	86.7	77.0	62.4	54.4	
30	92.9	92.2	91.5	90.8	90.1	89.4	88.7	85.2	76.0	61.5	53.5	
32	92.8	90.6	90.0	89.3	88.6	87.9	87.2	83.7	74.6	60.5		
34	91.0	88.7	88.0	87.3	86.6	86.0	85.4	82.2	73.0	59.5		
36	89.1	87.0	86.3	85.7	85.1	84.4	83.8	80.6	71.4	58.4		
38	87.4	85.4	84.7	84.1	83.5	82.9	82.2	79.0	69.8			
40	85.7	83.7	83.1	82.4	81.8	81.2	80.5	77.4	68.2			
42	84.0	81.9	81.3	80.7	80.0	79.4	78.8	75.6	66.5			
44	82.2	80.0	79.4	78.7	78.1	77.5	76.8	73.7	64.8			
46	80.3	78.0	77.4	76.8	76.2	75.5	74.9	71.8				
48	78.5	76.2	75.6	74.9	74.3	73.7	73.1	70.1				
50	76.7	74.4	73.8	73.2	72.6	72.0	71.4	68.4				
52	74.9	72.6	72.0	71.4	70.8	70.2	69.6					
54	73.1	70.8	70.2	69.7								
55	72.1	70.0										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON SUBTRACT	TOTAL ANTI ICE ON SUBTRACT	SPEED INCREASE PER 0.01 Vs ADD
2000 kg	400 kg up to 7500 ft 2200 kg above 7500 ft	2500 kg up to 7500 ft 4700 kg above 7500 ft	120 kg

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R

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 3

ONE ENGINE OUT | Normal Air Conditioning | Gradient : 2.1 %
ONE ENGINE OUT AT GO AROUND THRUST | Anti Ice OFF | V = 1.23 Vs

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	**0**	**200**	**400**	**600**	**800**	**1000**	**1500**	**2000**	**5000**	**8000**	**12000**
≤10	68.5	68.1	67.9	67.7	67.5	67.4	67.2	66.7	66.2	63.4	59.5	55.1
20	68.2	67.8	67.6	67.4	67.3	67.1	66.9	66.5	66.0	63.2	59.4	55.0
22	68.1	67.8	67.6	67.4	67.2	67.1	66.9	66.4	66.0	63.2	59.3	54.5
24	68.1	67.7	67.5	67.3	67.2	67.0	66.8	66.4	65.9	63.1	59.3	53.2
26	68.0	67.7	67.5	67.3	67.1	67.0	66.8	66.4	65.9	63.1	59.3	51.9
28	68.0	67.6	67.4	67.2	67.1	66.9	66.8	66.3	65.9	63.1	59.3	50.7
30	67.9	67.6	67.4	67.2	67.0	66.9	66.7	66.3	65.8	63.0	58.8	49.5
32	67.9	67.6	67.4	67.2	67.0	66.9	66.7	66.3	65.8	63.0	57.6	
34	67.9	67.5	67.3	67.1	67.0	66.8	66.7	66.2	65.8	63.0	56.5	
36	67.8	67.5	67.3	67.1	67.0	66.8	66.6	66.2	65.8	62.4	55.4	
38	67.8	67.5	67.3	67.1	67.0	66.8	66.6	66.2	65.8	61.2	54.2	
40	67.8	67.5	67.3	67.1	66.9	66.8	66.6	66.2	65.7	60.0		
42	67.8	67.4	67.2	67.1	66.9	66.7	66.6	66.1	65.1	58.7		
44	67.7	67.4	67.2	67.0	66.7	66.3	65.9	64.9	63.8	57.4		
46	67.7	66.7	66.3	65.9	65.5	65.1	64.6	63.6	62.6			
48	67.0	65.5	65.1	64.7	64.3	63.9	63.5	62.5	61.6			
50	65.7	64.3	63.9	63.5	63.2	62.8	62.4	61.5	60.5			
52	64.5	63.2	62.8	62.4	62.0	61.7	61.3	60.4				
54	63.3	62.0	61.7	61.3								
55	62.7	61.5										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON SUBTRACT	TOTAL ANTI ICE ON SUBTRACT	SPEED INCREASE PER 0.01 Vs ADD
1500 kg	200 kg	800 kg	250 kg

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R

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 3

ONE ENGINE OUT ONE ENGINE OUT AT GO AROUND THRUST	Normal Air Conditioning Anti Ice OFF	Gradient : 2.1 % V = 1.23 Vs

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-2000	**0**	**200**	**400**	**600**	**800**	**1000**	**2000**	**5000**	**9200**	**12000**	**14100**
≤10	93.6	92.9	92.5	92.0	91.6	91.2	90.7	88.6	81.0	69.7	61.8	55.8
20	93.2	92.5	92.1	91.7	91.3	90.8	90.4	88.3	80.7	66.5	57.9	52.0
22	93.1	92.4	92.0	91.6	91.2	90.8	90.4	88.2	79.9	65.7	56.9	51.2
24	93.0	92.4	92.0	91.5	91.1	90.7	90.3	88.2	78.9	64.7	56.0	50.4
26	93.0	92.3	91.9	91.5	91.1	90.7	90.2	88.1	78.0	63.5	55.2	49.6
28	92.9	92.2	91.8	91.4	91.0	90.6	90.2	86.7	77.0	62.4	54.4	
30	92.8	92.2	91.5	90.8	90.1	89.4	88.7	85.2	76.0	61.5	53.5	
32	92.8	90.6	90.0	89.3	88.6	87.9	87.2	83.7	74.6	60.5		
34	92.6	88.7	88.0	87.3	86.6	86.0	85.4	82.2	73.0	59.5		
36	90.9	87.0	86.3	85.7	85.1	84.4	83.8	80.6	71.4	58.4		
38	89.2	85.4	84.7	84.1	83.5	82.9	82.2	79.0	69.8			
40	87.5	83.7	83.1	82.4	81.8	81.2	80.5	77.4	68.2			
42	85.8	81.9	81.3	80.7	80.0	79.4	78.8	75.6	66.5			
44	84.0	80.0	79.4	78.7	78.1	77.5	76.8	73.7	64.8			
46	82.3	78.0	77.4	76.8	76.2	75.5	74.9	71.8				
48	80.7	76.2	75.6	74.9	74.3	73.7	73.1	70.1				
50	78.9	74.4	73.8	73.2	72.6	72.0	71.4	68.4				
52	77.1	72.6	72.0	71.4	70.8	70.2	69.6					
54	75.2	70.8	70.2	69.7								
55	74.3	70.0										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON SUBTRACT	TOTAL ANTI ICE ON SUBTRACT	SPEED INCREASE PER 0.01 Vs ADD
1900 kg	400 kg up to 7500 ft 2200 kg above 7500 ft	1200 kg up to 5000 ft 4700 kg above 5000 ft	120 kg

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APPROACH CLIMB LIMITING WEIGHT (1000 KG) ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST	Gradient : 2.1% High Air Conditioning Anti ice OFF V = 1.23 Vs	CONF 3

R

PRESSURE ALTLTITUDE (FT)												
OAT (°C)	–2000	0	200	400	600	800	1000	1500	2000	5000	10000	14100
≤10	84.4	83.5	83.2	83.0	82.7	82.5	82.3	81.7	81.2	81.4	70.3	60.3
20	84.0	83.1	82.9	82.7	82.4	82.2	82.0	81.4	80.9	81.2	66.7	54.3
22	84.0	83.1	82.8	82.6	82.4	82.2	81.9	81.4	80.8	81.1	65.5	53.4
24	83.9	83.0	82.8	82.6	82.3	82.1	81.9	81.3	80.8	80.7	64.2	
26	83.9	83.0	82.7	82.5	82.3	82.0	81.8	81.3	80.7	79.7	63.3	
28	83.8	82.9	82.7	82.5	82.2	82.0	81.8	81.2	80.7	78.8	62.3	
30	83.7	82.9	82.6	82.4	82.2	81.9	81.7	81.2	80.7	77.8	61.3	
32	83.7	82.8	82.6	82.4	82.1	81.9	81.7	81.2	80.6	76.9	60.3	
34	83.6	82.8	82.6	82.3	82.1	81.9	81.7	81.1	80.6	76.0	59.3	
36	83.6	82.8	82.5	82.3	82.1	81.8	81.6	81.1	80.6	74.5		
38	83.5	82.7	82.5	82.3	82.1	81.8	81.6	81.1	80.6	72.7		
40	83.5	82.7	82.5	82.3	82.0	81.8	81.6	81.1	80.5	70.9		
42	83.5	82.7	82.5	82.2	82.0	81.8	81.5	80.1	78.6	69.2		
44	83.4	82.6	82.0	81.4	80.9	80.3	79.7	78.3	76.9	67.6		
46	83.4	80.8	80.2	79.6	79.1	78.5	77.9	76.6	75.2			
48	83.3	78.9	78.4	77.8	77.3	76.7	76.2	74.9	73.6			
50	81.3	77.1	76.6	76.1	75.6	75.1	74.6	73.2	71.8			
52	79.4	75.5	75.0	74.4	73.9	73.4	72.8	71.4				
54	77.5	73.8	73.2	72.7								
55	76.6	72.8										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON SUBTRACT	TOTAL ANTI ICE ON SUBTRACT	SPEED INCREASE PER 0.01 Vs ADD
1400 kg	900 kg up to 10000 ft 3600 kg above 10000 ft	1100 kg up to 5000 ft 6900 kg above 5000 ft	170 kg

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APPROACH CLIMB LIMITING WEIGHT (1000 KG) ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST	Gradient : 2.1% High Air Conditioning Anti ice OFF V = 1.23 Vs	CONF 3

R

	PRESSURE ALTITUDE (FT)										
OAT (°C)	–2000	0	200	400	600	800	1000	1500	2000	5000	8000	9200
≤10	84.4	83.5	83.2	83.0	82.7	82.5	82.3	81.7	81.2	81.4	76.7	72.8
20	84.0	83.1	82.9	82.7	82.4	82.2	82.0	81.5	80.9	81.2	75.4	70.3
22	84.0	83.1	82.9	82.6	82.4	82.2	81.9	81.4	80.8	81.1	74.5	69.1
24	83.9	83.0	82.8	82.6	82.3	82.1	81.9	81.3	80.8	80.7	73.4	67.8
26	83.9	83.0	82.7	82.5	82.3	82.0	81.8	81.3	80.7	79.7	72.2	66.6
28	83.8	82.9	82.7	82.5	82.2	82.0	81.8	81.2	80.7	78.8	70.9	65.5
30	83.7	82.9	82.6	82.4	82.2	81.9	81.7	81.2	80.7	77.8	69.7	64.4
32	83.7	82.8	82.6	82.4	82.1	81.9	81.7	81.2	80.6	76.9	68.4	63.3
34	83.6	82.8	82.6	82.3	82.1	81.9	81.7	81.1	80.6	76.0	67.1	62.1
36	83.6	82.8	82.5	82.3	82.1	81.8	81.6	81.1	80.6	74.4	65.7	61.0
38	83.6	82.7	82.5	82.3	82.1	81.8	81.6	81.1	80.6	72.6	64.3	
40	83.5	82.7	82.5	82.3	82.0	81.8	81.6	81.1	80.5	70.9		
42	83.5	82.7	82.5	82.2	82.0	81.8	81.5	80.1	78.6	69.2		
44	83.4	82.6	82.0	81.5	80.9	80.3	79.7	78.3	76.9	67.6		
46	83.4	80.8	80.2	79.6	79.1	78.5	77.9	76.6	75.2			
48	83.3	79.0	78.4	77.8	77.3	76.7	76.2	74.9	73.5			
50	81.3	77.1	76.6	76.1	75.6	75.1	74.5	73.1	71.7			
52	79.4	75.5	74.9	74.4	73.8	73.3	72.7	71.4				
54	77.5	73.7	73.1	72.6								
55	76.6	72.8										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON SUBTRACT	TOTAL ANTI ICE ON SUBTRACT	SPEED INCREASE PER 0.01 Vs ADD
1400 kg	300 kg	3400 kg	210 kg

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R

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 2

ONE ENGINE OUT ONE ENGINE OUT AT GO AROUND THRUST	Normal Air Conditioning Anti Ice OFF	Gradient : 2.5 % CAT II

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	**0**	**200**	**400**	**600**	**800**	**1000**	**2000**	**5000**	**9200**	**12000**	**14100**
≤10	96.6	95.8	95.3	94.9	94.5	94.0	93.6	91.4	83.7	72.2	64.1	57.9
20	96.2	95.4	95.0	94.6	94.1	93.7	93.3	91.1	83.5	68.9	60.0	53.8
22	96.1	95.3	94.9	94.5	94.1	93.6	93.2	91.0	82.5	68.0	58.9	53.0
24	96.1	95.3	94.9	94.4	94.0	93.6	93.1	90.9	81.6	67.1	58.1	52.2
26	96.0	95.2	94.8	94.4	94.0	93.5	93.1	90.9	80.6	65.8	57.3	51.4
28	95.9	95.1	94.7	94.3	93.9	93.5	93.0	89.5	79.6	64.7	56.4	
30	95.9	95.1	94.4	93.7	93.0	92.3	91.6	88.0	78.6	63.8	55.5	
32	95.8	93.6	92.9	92.2	91.4	90.7	90.0	86.4	77.2	62.7		
34	93.9	91.6	90.9	90.2	89.5	88.8	88.1	84.9	75.6	61.7		
36	92.1	89.8	89.1	88.5	87.9	87.2	86.6	83.4	74.0	60.6		
38	90.2	88.1	87.5	86.9	86.2	85.6	85.0	81.7	72.3			
40	88.5	86.4	85.8	85.1	84.5	83.9	83.2	80.0	70.7			
42	86.8	84.6	84.0	83.3	82.7	82.0	81.4	78.2	68.9			
44	84.9	82.6	82.0	81.3	80.7	80.1	79.4	76.2	67.1			
46	82.9	80.6	80.0	79.4	78.7	78.1	77.5	74.3				
48	81.1	78.7	78.1	77.5	76.9	76.3	75.6	72.5				
50	79.3	76.9	76.3	75.7	75.1	74.5	73.8	70.8				
52	77.4	75.1	74.5	73.9	73.3	72.7	72.1					
54	75.6	73.3	72.7	72.1								
55	74.6	72.4										

AIR CONDITIONING OFF ADD	**ENGINE ANTI ICE ON SUBTRACT**	**TOTAL ANTI ICE ON SUBTRACT**
2000 kg	400 kg up to 7500 ft 2300 kg above 7500 ft	2700 kg up to 7500 ft 4900 kg above 7500 ft

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R

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 2

ONE ENGINE OUT ONE ENGINE OUT AT GO AROUND THRUST	Normal Air Conditioning Anti Ice OFF	Gradient : 2.5 % CAT II

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	**0**	**200**	**400**	**600**	**800**	**1000**	**1500**	**2000**	**5000**	**9200**	**12000**
≤10	70.2	69.8	69.6	69.4	69.2	69.1	68.9	68.5	68.0	65.0	59.8	56.6
20	69.9	69.5	69.3	69.2	69.0	68.8	68.7	68.2	67.8	64.8	59.6	56.5
22	69.9	69.5	69.3	69.1	68.9	68.8	68.6	68.2	67.7	64.8	59.6	55.9
24	69.8	69.4	69.2	69.1	68.9	68.7	68.6	68.1	67.7	64.8	59.6	54.7
26	69.8	69.4	69.2	69.0	68.8	68.7	68.5	68.1	67.6	64.8	59.5	53.3
28	69.7	69.3	69.1	69.0	68.8	68.6	68.5	68.1	67.6	64.7	58.7	52.0
30	69.7	69.3	69.1	68.9	68.8	68.6	68.4	68.0	67.6	64.7	57.5	50.8
32	69.6	69.3	69.1	68.9	68.7	68.6	68.4	68.0	67.6	64.7	56.3	
34	69.6	69.2	69.0	68.9	68.7	68.5	68.4	68.0	67.5	64.7	55.1	
36	69.6	69.2	69.0	68.8	68.7	68.5	68.4	67.9	67.5	64.0	53.9	
38	69.5	69.2	69.0	68.8	68.7	68.5	68.4	67.9	67.5	62.8		
40	69.5	69.1	69.0	68.8	68.7	68.5	68.3	67.9	67.5	61.5		
42	69.5	69.1	68.9	68.8	68.6	68.5	68.3	67.8	66.8	60.2		
44	69.5	69.1	68.8	68.7	68.4	68.0	67.6	66.6	65.6	58.9		
46	69.4	68.4	68.0	67.6	67.2	66.7	66.3	65.3	64.3			
48	68.7	67.2	66.8	66.4	66.0	65.6	65.2	64.2	63.2			
50	67.4	66.0	65.6	65.2	64.8	64.4	64.1	63.1	62.2			
52	66.2	64.8	64.4	64.0	63.7	63.3	62.9	62.0				
54	65.0	63.6	63.3	62.9								
55	64.3	63.0										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON SUBTRACT	TOTAL ANTI ICE ON SUBTRACT
1550 kg	200 kg	700 kg

INTENTIONALLY LEFT BLANK

R

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 2

ONE ENGINE OUT	Normal Air Conditioning	Gradient : 2.5 %
ONE ENGINE OUT AT GO AROUND THRUST	Anti Ice OFF	CAT II

OAT (°C)	PRESSURE ALTITUDE (FT)										
	-2000	**0**	**200**	**400**	**600**	**800**	**1000**	**2000**	**5000**	**9200**	**12000**	**14100**
≤10	96.6	95.8	95.3	94.9	94.5	94.0	93.6	91.4	83.7	72.2	64.1	57.9
20	96.2	95.4	95.0	94.6	94.1	93.7	93.3	91.1	83.5	68.9	60.0	53.8
22	96.1	95.3	94.9	94.5	94.1	93.6	93.2	91.0	82.5	68.0	58.9	53.0
24	96.0	95.3	94.9	94.4	94.0	93.6	93.1	90.9	81.6	67.1	58.1	52.2
26	96.0	95.2	94.8	94.4	94.0	93.5	93.1	90.9	80.6	65.8	57.3	51.4
28	95.9	95.1	94.7	94.3	93.9	93.5	93.0	89.5	79.6	64.7	56.4	
30	95.8	95.1	94.4	93.7	93.0	92.3	91.6	88.0	78.6	63.8	55.5	
32	95.8	93.6	92.9	92.2	91.4	90.7	90.0	86.4	77.2	62.7		
34	95.7	91.6	90.9	90.2	89.5	88.8	88.1	84.9	75.6	61.7		
36	93.9	89.8	89.1	88.5	87.9	87.2	86.6	83.4	74.0	60.6		
38	92.2	88.1	87.5	86.9	86.2	85.6	85.0	81.7	72.3			
40	90.4	86.4	85.8	85.1	84.5	83.9	83.2	80.0	70.7			
42	88.6	84.6	84.0	83.3	82.7	82.0	81.4	78.2	68.9			
44	86.8	82.6	82.0	81.3	80.7	80.1	79.4	76.2	67.1			
46	85.1	80.6	80.0	79.4	78.7	78.1	77.5	74.3				
48	83.3	78.7	78.1	77.5	76.9	76.3	75.6	72.5				
50	81.5	76.9	76.3	75.7	75.1	74.5	73.8	70.8				
52	79.6	75.1	74.5	73.9	73.3	72.7	72.1					
54	77.7	73.3	72.7	72.1								
55	76.8	72.4										

AIR CONDITIONING OFF ADD	**ENGINE ANTI ICE ON SUBTRACT**	**TOTAL ANTI ICE ON SUBTRACT**
2000 kg	400 kg up to 7500 ft 2300 kg above 7500 ft	1200 kg up to 5000 ft 4900 kg above 5000 ft

INTENTIONALLY LEFT BLANK

APPROACH CLIMB LIMITING WEIGHT (1000 KG)	Gradient : 2.5%	CAT II
ONE ENGINE OUT	High Air Conditioning	
ONE ENGINE AT GO AROUND THRUST	Anti ice OFF	CONF 2

R

	PRESSURE ALTITUDE (FT)											
OAT (°C)	–2000	0	200	400	600	800	1000	1500	2000	5000	10000	14100
≤ 10	83.0	82.1	81.9	81.6	81.4	81.2	80.9	80.4	79.8	80.1	69.3	59.5
20	82.7	81.8	81.6	81.3	81.1	80.9	80.7	80.1	79.6	79.8	65.8	53.6
22	82.6	81.7	81.5	81.3	81.0	80.8	80.6	80.1	79.5	79.8	64.6	52.8
24	82.6	81.7	81.4	81.2	81.0	80.8	80.5	80.0	79.4	79.3	63.4	
26	82.5	81.6	81.4	81.2	80.9	80.7	80.5	80.0	79.4	78.4	62.4	
28	82.4	81.6	81.3	81.1	80.9	80.7	80.4	79.9	79.4	77.5	61.4	
30	82.4	81.5	81.3	81.1	80.8	80.6	80.4	79.9	79.3	76.7	60.5	
32	82.3	81.5	81.3	81.0	80.8	80.6	80.4	79.9	79.3	75.9	59.5	
34	82.3	81.4	81.2	81.0	80.8	80.5	80.3	79.8	79.3	74.9	58.5	
36	82.2	81.4	81.2	81.0	80.7	80.5	80.3	79.8	79.3	73.3		
38	82.2	81.4	81.2	81.0	80.7	80.5	80.3	79.8	79.3	71.6		
40	82.2	81.4	81.1	80.9	80.7	80.5	80.3	79.8	79.2	69.8		
42	82.1	81.3	81.1	80.9	80.7	80.4	80.2	78.8	77.4	68.2		
44	82.1	81.2	80.7	80.1	79.6	79.0	78.5	77.0	75.8	66.6		
46	82.0	79.5	78.9	78.4	77.8	77.3	76.8	75.5	74.1			
48	81.9	77.7	77.2	76.7	76.2	75.7	75.2	73.8	72.4			
50	80.0	76.1	75.6	75.1	74.5	74.0	73.4	72.1	70.7			
52	78.2	74.4	73.8	73.3	72.8	72.2	71.7	70.4				
54	76.4	72.6	72.1	71.6								
55	75.6	71.7										

AIR CONDITIONING OFF ADD	ENGINE ANTI ICE ON SUBTRACT	TOTAL ANTI ICE ON SUBTRACT
1400 kg	900 kg up to 10000 ft 3500 kg above 10000 ft	1000 kg up to 5000 ft 6700 kg above 5000 ft

INTENTIONALLY LEFT BLANK

APPROACH CLIMB LIMITING WEIGHT (1000 KG) ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST	Gradient : 2.5% High Air Conditioning Anti ice OFF	CAT II CONF 2

R

OAT (°C)	PRESSURE ALTITUDE (FT) –2000	0	200	400	600	800	1000	1500	2000	5000	8000	9200
≤10	83.0	82.1	81.9	81.6	81.4	81.2	80.9	80.4	79.8	80.1	75.7	71.8
20	82.7	81.8	81.6	81.3	81.1	80.9	80.7	80.1	79.6	79.8	74.3	69.3
22	82.6	81.7	81.5	81.3	81.0	80.8	80.6	80.1	79.5	79.8	73.4	68.1
24	82.6	81.7	81.4	81.2	81.0	80.8	80.5	80.0	79.5	79.3	72.4	66.9
26	82.5	81.6	81.4	81.2	80.9	80.7	80.5	80.0	79.4	78.4	71.2	65.7
28	82.4	81.6	81.3	81.1	80.9	80.7	80.4	79.9	79.4	77.5	69.9	64.6
30	82.4	81.5	81.3	81.1	80.8	80.6	80.4	79.9	79.3	76.7	68.7	63.6
32	82.3	81.5	81.3	81.0	80.8	80.6	80.4	79.9	79.3	75.9	67.5	62.5
34	82.3	81.4	81.2	81.0	80.8	80.5	80.3	79.8	79.3	74.9	66.2	61.3
36	82.2	81.4	81.2	81.0	80.7	80.5	80.3	79.8	79.3	73.3	64.8	60.2
38	82.2	81.4	81.2	81.0	80.7	80.5	80.3	79.8	79.3	71.6	63.5	
40	82.2	81.4	81.1	80.9	80.7	80.5	80.3	79.8	79.2	69.8		
42	82.1	81.3	81.1	80.9	80.7	80.4	80.2	78.8	77.4	68.2		
44	82.1	81.2	80.7	80.1	79.6	79.0	78.5	77.1	75.8	66.6		
46	82.1	79.5	78.9	78.4	77.8	77.3	76.8	75.5	74.1			
48	81.9	77.7	77.2	76.7	76.2	75.7	75.2	73.8	72.4			
50	80.1	76.1	75.6	75.1	74.5	74.0	73.4	72.1	70.7			
52	78.2	74.4	73.8	73.3	72.8	72.2	71.7	70.4				
54	76.4	72.6	72.1	71.6								
55	75.6	71.7										

AIR CONDITIONING OFF ADD 1300 kg	ENGINE ANTI ICE ON SUBTRACT 300 kg	TOTAL ANTI ICE ON SUBTRACT 3300 kg

INTENTIONALLY LEFT BLANK

R

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 3

ONE ENGINE OUT ONE ENGINE OUT AT GO AROUND THRUST	Normal Air Conditioning Anti Ice OFF	Gradient : 2.5 % CAT II

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	**0**	**200**	**400**	**600**	**800**	**1000**	**2000**	**5000**	**9200**	**12000**	**14100**
≤10	90.7	90.0	89.6	89.2	88.8	88.4	87.9	85.9	78.6	67.7	60.1	54.4
20	90.3	89.6	89.2	88.8	88.4	88.0	87.6	85.6	78.3	64.7	56.3	50.7
22	90.2	89.5	89.2	88.8	88.4	88.0	87.6	85.5	77.5	63.9	55.4	50.1
24	90.2	89.5	89.1	88.7	88.3	87.9	87.5	85.5	76.6	62.9	54.6	49.4
26	90.1	89.4	89.0	88.6	88.3	87.9	87.5	85.4	75.7	61.8	53.8	48.8
28	90.0	89.4	89.0	88.6	88.2	87.8	87.4	84.1	74.8	60.7	53.0	
30	90.0	89.3	88.7	88.0	87.4	86.7	86.0	82.6	73.8	59.8	52.1	
32	89.9	87.9	87.2	86.6	85.9	85.2	84.5	81.2	72.4	58.9		
34	88.2	86.0	85.4	84.7	84.0	83.4	82.8	79.7	70.9	57.9		
36	86.4	84.3	83.7	83.1	82.5	81.9	81.3	78.3	69.3	56.9		
38	84.8	82.8	82.2	81.6	81.0	80.4	79.8	76.7	67.8			
40	83.2	81.2	80.6	80.0	79.4	78.8	78.2	75.1	66.3			
42	81.5	79.5	78.9	78.3	77.7	77.1	76.4	73.4	64.6			
44	79.8	77.7	77.0	76.4	75.8	75.2	74.6	71.5	63.0			
46	78.0	75.7	75.1	74.5	73.9	73.3	72.7	69.7				
48	76.3	74.0	73.4	72.8	72.2	71.6	71.0	68.1				
50	74.5	72.3	71.7	71.1	70.5	69.9	69.4	66.5				
52	72.7	70.6	70.0	69.4	68.8	68.3	67.7					
54	71.0	68.9	68.3	67.7								
55	70.1	68.0										

AIR CONDITIONING OFF ADD	**ENGINE ANTI ICE ON SUBTRACT**	**TOTAL ANTI ICE ON SUBTRACT**
1800 kg	400 kg up to 7500 ft 2100 kg above 7500 ft	2500 kg up to 7500 ft 4500 kg above 7500 ft

INTENTIONALLY LEFT BLANK

R

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 3

ONE ENGINE OUT ONE ENGINE OUT AT GO AROUND THRUST	Normal Air Conditioning Anti Ice OFF	Gradient : 2.5 % CAT II

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-1000	**0**	**200**	**400**	**600**	**800**	**1000**	**1500**	**2000**	**5000**	**9200**	**12000**
≤10	66.0	65.7	65.5	65.3	65.1	65.0	64.8	64.4	63.9	61.2	56.3	53.4
20	65.8	65.4	65.2	65.1	64.9	64.7	64.6	64.1	63.7	61.1	56.2	53.3
22	65.7	65.4	65.2	65.0	64.9	64.7	64.5	64.1	63.7	61.0	56.1	52.8
24	65.7	65.3	65.1	65.0	64.8	64.6	64.5	64.1	63.6	61.0	56.1	51.6
26	65.6	65.3	65.1	64.9	64.8	64.6	64.4	64.0	63.6	61.0	56.1	50.4
28	65.6	65.2	65.1	64.9	64.7	64.6	64.4	64.0	63.5	61.0	55.3	49.2
30	65.6	65.2	65.0	64.8	64.7	64.5	64.4	63.9	63.5	60.9	54.2	48.1
32	65.5	65.2	65.0	64.8	64.7	64.5	64.3	63.9	63.5	60.9	53.2	
34	65.5	65.1	65.0	64.8	64.6	64.5	64.3	63.9	63.5	60.9	52.1	
36	65.4	65.1	64.9	64.8	64.6	64.4	64.3	63.9	63.4	60.3	51.0	
38	65.4	65.1	64.9	64.7	64.6	64.4	64.3	63.9	63.4	59.2		
40	65.4	65.1	64.9	64.7	64.6	64.4	64.3	63.9	63.4	58.0		
42	65.4	65.1	64.9	64.7	64.6	64.4	64.2	63.8	62.8	56.9		
44	65.4	65.0	64.8	64.6	64.3	64.0	63.6	62.6	61.7	55.7		
46	65.3	64.4	64.0	63.6	63.2	62.8	62.4	61.5	60.6			
48	64.6	63.3	62.9	62.5	62.1	61.8	61.4	60.5	59.6			
50	63.5	62.2	61.8	61.5	61.1	60.7	60.4	59.5	58.6			
52	62.4	61.1	60.8	60.4	60.0	59.7	59.3	58.5				
54	61.3	60.0	59.7	59.4								
55	60.7	59.5										

AIR CONDITIONING OFF ADD	**ENGINE ANTI ICE ON SUBTRACT**	**TOTAL ANTI ICE ON SUBTRACT**
1400 kg	200 kg	600 kg

INTENTIONALLY LEFT BLANK

R

APPROACH CLIMB LIMITING WEIGHT (1000 KG) - CONF 3

ONE ENGINE OUT ONE ENGINE OUT AT GO AROUND THRUST	Normal Air Conditioning Anti Ice OFF	Gradient : 2.5 % CAT II

OAT (°C)	PRESSURE ALTITUDE (FT)											
	-2000	**0**	**200**	**400**	**600**	**800**	**1000**	**2000**	**5000**	**9200**	**12000**	**14100**
≤10	90.6	90.0	89.6	89.2	88.8	88.4	87.9	85.9	78.6	67.7	60.1	54.4
20	90.2	89.6	89.2	88.8	88.4	88.0	87.6	85.6	78.3	64.7	56.3	50.7
22	90.2	89.5	89.2	88.8	88.4	88.0	87.6	85.5	77.5	63.9	55.4	50.1
24	90.1	89.5	89.1	88.7	88.3	87.9	87.5	85.5	76.6	62.9	54.6	49.4
26	90.0	89.4	89.0	88.6	88.3	87.9	87.5	85.4	75.7	61.8	53.8	48.8
28	90.0	89.4	89.0	88.6	88.2	87.8	87.4	84.1	74.8	60.7	53.0	
30	89.9	89.3	88.7	88.0	87.4	86.7	86.0	82.6	73.8	59.8	52.1	
32	89.9	87.9	87.2	86.6	85.9	85.2	84.5	81.2	72.4	58.9		
34	89.8	86.0	85.4	84.7	84.0	83.4	82.8	79.7	70.9	57.9		
36	88.1	84.3	83.7	83.1	82.5	81.9	81.3	78.3	69.3	56.9		
38	86.5	82.8	82.2	81.6	81.0	80.4	79.8	76.7	67.8			
40	84.9	81.2	80.6	80.0	79.4	78.8	78.2	75.1	66.3			
42	83.2	79.5	78.9	78.3	77.7	77.1	76.4	73.4	64.6			
44	81.6	77.7	77.0	76.4	75.8	75.2	74.6	71.5	63.0			
46	80.0	75.7	75.1	74.5	73.9	73.3	72.7	69.7				
48	78.4	74.0	73.4	72.8	72.2	71.6	71.0	68.1				
50	76.7	72.3	71.7	71.1	70.5	69.9	69.4	66.5				
52	74.9	70.6	70.0	69.4	68.8	68.3	67.7					
54	73.1	68.9	68.3	67.7								
55	72.1	68.0										

AIR CONDITIONING OFF ADD	**ENGINE ANTI ICE ON SUBTRACT**	**TOTAL ANTI ICE ON SUBTRACT**
1800 kg	400 kg up to 7500 ft 2100 kg above 7500 ft	1100 kg up to 5000 ft 4500 kg above 5000 ft

INTENTIONALLY LEFT BLANK

APPROACH CLIMB LIMITING WEIGHT (1000 KG) ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST	Gradient : 2.5% High Air Conditioning Anti ice OFF	CAT II CONF 3

R

OAT (°C)	PRESSURE ALTITUDE (FT) –2000	0	200	400	600	800	1000	1500	2000	5000	10000	14100
≤ 10	81.1	80.2	80.0	79.7	79.5	79.3	79.0	78.5	78.0	78.2	67.5	58.0
20	80.8	79.9	79.7	79.4	79.2	79.0	78.8	78.2	77.7	78.0	64.1	52.3
22	80.7	79.8	79.6	79.4	79.1	78.9	78.7	78.2	77.7	77.9	63.0	51.5
24	80.6	79.8	79.5	79.3	79.1	78.9	78.6	78.1	77.6	77.5	61.8	
26	80.6	79.7	79.5	79.3	79.0	78.8	78.6	78.1	77.6	76.6	60.9	
28	80.5	79.7	79.4	79.2	79.0	78.8	78.5	78.0	77.5	75.8	60.0	
30	80.4	79.6	79.4	79.2	79.0	78.7	78.5	78.0	77.5	74.9	59.0	
32	80.4	79.6	79.4	79.1	78.9	78.7	78.5	78.0	77.4	74.0	58.1	
34	80.4	79.5	79.3	79.1	78.9	78.7	78.4	77.9	77.4	73.0	57.1	
36	80.3	79.5	79.3	79.1	78.9	78.6	78.4	77.9	77.4	71.5		
38	80.3	79.5	79.3	79.1	78.8	78.6	78.4	77.9	77.4	69.9		
40	80.2	79.5	79.3	79.0	78.8	78.6	78.4	77.9	77.3	68.2		
42	80.2	79.5	79.2	79.0	78.8	78.5	78.3	77.0	75.7	66.6		
44	80.2	79.4	78.8	78.3	77.7	77.2	76.7	75.4	74.0	65.1		
46	80.1	77.6	77.1	76.6	76.1	75.6	75.1	73.7	72.3			
48	80.0	76.0	75.5	75.0	74.4	73.9	73.4	72.0	70.7			
50	78.2	74.3	73.8	73.3	72.8	72.2	71.7	70.4	69.1			
52	76.4	72.6	72.1	71.6	71.1	70.6	70.0	68.7				
54	74.7	70.9	70.4	69.9								
55	73.8	70.1										

AIR CONDITIONING OFF ADD 1300 kg	ENGINE ANTI ICE ON SUBTRACT 900 kg up to 10000 ft 3400 Kg above 10000 ft	TOTAL ANTI ICE ON SUBTRACT 1000 kg up to 5000 ft 6600 kg above 5000 ft

INTENTIONALLY LEFT BLANK

APPROACH CLIMB LIMITING WEIGHT (1000 KG) ONE ENGINE OUT ONE ENGINE AT GO AROUND THRUST	Gradient : 2.5% High Air Conditioning Anti ice OFF	CAT II CONF 3

R

OAT (°C)	PRESSURE ALTITUDE (FT) -2000	0	200	400	600	800	1000	1500	2000	5000	8000	9200
≤10	81.1	80.2	80.0	79.7	79.5	79.3	79.0	78.5	78.0	78.2	73.8	70.0
20	80.8	79.9	79.7	79.4	79.2	79.0	78.8	78.2	77.7	78.0	72.4	67.6
22	80.7	79.8	79.6	79.4	79.2	78.9	78.7	78.2	77.7	77.9	71.6	66.4
24	80.6	79.8	79.5	79.3	79.1	78.9	78.6	78.1	77.6	77.5	70.5	65.2
26	80.6	79.7	79.5	79.3	79.1	78.8	78.6	78.1	77.6	76.6	69.3	64.0
28	80.5	79.7	79.4	79.2	79.0	78.8	78.6	78.0	77.5	75.8	68.1	63.0
30	80.5	79.6	79.4	79.2	79.0	78.7	78.5	78.0	77.5	74.9	67.0	62.0
32	80.4	79.6	79.4	79.1	78.9	78.7	78.5	78.0	77.5	74.0	65.8	61.0
34	80.4	79.5	79.3	79.1	78.9	78.7	78.4	77.9	77.4	73.0	64.5	59.9
36	80.3	79.5	79.3	79.1	78.9	78.6	78.4	77.9	77.4	71.5	63.3	58.8
38	80.3	79.5	79.3	79.1	78.8	78.6	78.4	77.9	77.4	69.9	62.0	
40	80.2	79.5	79.3	79.0	78.8	78.6	78.4	77.9	77.3	68.2		
42	80.2	79.5	79.2	79.0	78.8	78.6	78.3	77.0	75.7	66.6		
44	80.2	79.4	78.8	78.3	77.7	77.2	76.7	75.4	74.0	65.1		
46	80.1	77.6	77.1	76.6	76.1	75.6	75.1	73.7	72.3			
48	80.0	76.0	75.5	75.0	74.5	73.9	73.4	72.0	70.7			
50	78.2	74.3	73.8	73.3	72.8	72.2	71.7	70.4	69.1			
52	76.4	72.6	72.1	71.6	71.1	70.6	70.0	68.7				
54	74.7	70.9	70.4	69.9								
55	73.8	70.1										

AIR CONDITIONING OFF ADD 1400 kg	ENGINE ANTI ICE ON SUBTRACT 300 kg	TOTAL ANTI ICE ON SUBTRACT 3200 kg

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INTRODUCTION

The alternate planning tables enable the flight crew to determine the fuel consumption and time required to cover a given air distance from go around at destination airport to landing at alternate airport.
These tables are established for :
— Go around : 100 kg or 220 lb
— Climb profile : 250KT/300KT/M.78
— Long range cruise
— Descent profile : M.78/300KT/250KT
— Approach and landing at alternate airport : 80 kg or 180 lb (4 min)
— ISA
— CG : 33 %
— Normal air conditioning
— Anti ice off

<u>Note</u> : *1. In the tables, a "*" means that a step climb of 4000 feet has been made to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree Celcius above ISA temperature apply a fuel correction of
0.015 (kg/°C/NM) × △ISA (°C) × Air Distance (NM)
or 0.033 (lb/°C/NM) × △ISA (°C) × Air Distance (NM)

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The alternate planning tables are based on a reference landing weight at destination.
The fuel consumption must be corrected when the landing weight is different from the reference landing weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1000 kg or 1000 lb below (or above) the reference weight.

R

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO-AROUND 100 KG - CLIMB 250KT/300KT/M.78 - CRUISE LONG RANGE
DESCENT M.78/300KT/250KT - VMC PROCEDURE 80 KG (4MIN)

REF. LDG WT AT DEST. = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	100	**120**	**140**	**160**	**180**	**200**	**FL100 FL120**	**FL140 FL160**	**FL180 FL200**
50	599 0.14	585 0.14					3		
100	986 0.23	955 0.23	943 0.23	937 0.23	934 0.23	937 0.22	6	5	6
150	1373 0.33	1325 0.33	1298 0.32	1276 0.31	1258 0.31	1247 0.31	8	8	8
200	1762 0.42	1697 0.42	1653 0.41	1616 0.40	1582 0.40	1559 0.40	11	10	11
250	2152 0.51	2070 0.51	2009 0.50	1957 0.49	1907 0.49	1871 0.48	14	12	13
300	2544 1.00	2443 1.00	2367 0.59	2299 0.57	2233 0.57	2184 0.57	16	15	15
350	2936 1.10	2818 1.09	2725 1.07	2641 1.06	2559 1.06	2498 1.05	19	17	18
400	3329 1.19	3193 1.18	3084 1.16	2984 1.15	2886 1.15	2813 1.14	21	19	20
450	3722 1.28	3569 1.27	3443 1.25	3328 1.23	3214 1.23	3128 1.23	24	21	23
500	4117 1.37	3946 1.36	3803 1.34	3672 1.32	3543 1.32	3445 1.31	26	24	25
550	4512 1.46	4324 1.45	4165 1.42	4017 1.41	3873 1.41	3762 1.40	29	26	28
600	4909 1.55	4703 1.54	4527 1.51	4362 1.49	4203 1.49	4080 1.48	31	28	30
650	5306 2.05	5082 2.03	4889 1.59	4708 1.58	4534 1.58	4399 1.57	34	30	33
700	5705 2.14	5463 2.11	5253 2.08	5055 2.06	4866 2.07	4719 2.05	36	32	35
750	6104 2.23	5844 2.20	5618 2.17	5403 2.15	5198 2.15	5040 2.13	38	35	38
800	6504 2.31	6227 2.29	5983 2.25	5751 2.24	5532 2.24	5362 2.22	41	37	41
850	6906 2.40	6610 2.38	6349 2.34	6099 2.32	5866 2.32	5685 2.30	43	39	43
900	7308 2.49	6994 2.46	6716 2.42	6449 2.41	6201 2.41	6008 2.39	45	41	46
950	7711 2.58	7379 2.55	7084 2.51	6799 2.50	6537 2.50	6332 2.47	47	43	49
1000	8116 3.07	7766 3.03	7453 2.59	7150 2.58	6873 2.58	6658 2.55	50	45	52
1050	8520 3.16	8153 3.12	7823 3.08	7501 3.07	7211 3.07	6984 3.04	52	47	54
1100	8925 3.25	8540 3.20	8193 3.16	7854 3.15	7549 3.15	7311 3.12	54	50	57
1150	9331 3.33	8928 3.29	8564 3.24	8206 3.24	7888 3.24	7639 3.20	57	52	60
1200	9738 3.42	9316 3.38	8935 3.33	8560 3.33	8227 3.32	7968 3.29	59	54	63

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 1 %	△FUEL = + 3 %	△FUEL = + 5.5 %

INTRODUCTION

The alternate planning tables enable the flight crew to determine the fuel consumption and time required to cover a given air distance from go around at destination airport to landing at alternate airport.
These tables are established for :
– Go around : 120 kg or 270 lb
– Climb profile : 250KT/300KT/M.78
– Long range cruise
– Descent profile : M.78/300KT/250KT
– Approach and landing at alternate airport : 100 kg or 220 lb (4 min)
– ISA
– CG : 33 %
– Normal air conditioning
– Anti ice off

Note : *1. In the tables, a "*" means that a step climb of 4000 feet has been made to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree Celcius above ISA temperature apply a fuel correction of
0.015 (kg/°C/NM) × △ISA (°C) × Air Distance (NM)
or 0.033 (lb/°C/NM) × △ISA (°C) × Air Distance (NM)

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The alternate planning tables are based on a reference landing weight at destination.
The fuel consumption must be corrected when the landing weight is different from the reference landing weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1000 kg or 1000 lb below (or above) the reference weight.

R

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO-AROUND 120 KG - CLIMB 250KT/300KT/M.78 - CRUISE LONG RANGE
DESCENT M.78/300KT/250KT - VMC PROCEDURE 100 KG (4MIN)

REF. LDG WT AT DEST. = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	120	140	160	180	200	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL120	FL140 FL160	FL180 FL200
50	686 0.13	668 0.14					3		
100	1113 0.22	1075 0.23	1060 0.23	1052 0.23	1050 0.22	1052 0.22	5	5	6
150	1541 0.31	1483 0.32	1449 0.32	1424 0.32	1408 0.31	1396 0.30	7	8	9
200	1971 0.40	1892 0.41	1839 0.41	1796 0.40	1767 0.39	1740 0.39	9	10	11
250	2401 0.49	2301 0.50	2229 0.50	2170 0.49	2126 0.48	2085 0.47	11	12	14
300	2832 0.58	2711 0.59	2620 0.58	2544 0.58	2487 0.56	2431 0.55	13	15	16
350	3264 1.07	3123 1.07	3012 1.07	2920 1.07	2848 1.05	2778 1.03	15	17	19
400	3697 1.16	3535 1.16	3405 1.16	3297 1.15	3210 1.13	3126 1.12	17	19	21
450	4130 1.25	3947 1.25	3799 1.25	3674 1.24	3574 1.21	3474 1.20	19	22	24
500	4565 1.33	4361 1.34	4193 1.34	4053 1.33	3938 1.29	3823 1.28	21	24	26
550	5000 1.42	4776 1.43	4589 1.43	4432 1.41	4303 1.38	4174 1.36	23	27	29
600	5437 1.51	5191 1.51	4985 1.51	4813 1.50	4669 1.46	4525 1.44	25	29	31
650	5874 2.00	5607 2.00	5382 2.00	5194 1.58	5036 1.54	4876 1.52	27	32	34
700	6312 2.09	6024 2.09	5780 2.09	5577 2.07	5404 2.02	5229 2.00	29	34	36
750	6750 2.17	6442 2.18	6179 2.18	5961 2.15	5773 2.10	5583 2.09	31	37	39
800	7189 2.26	6860 2.26	6578 2.26	6346 2.24	6144 2.18	5937 2.17	33	39	41
850	7629 2.35	7280 2.35	6978 2.35	6731 2.32	6514 2.26	6293 2.25	35	42	44
900	8070 2.44	7700 2.44	7380 2.44	7118 2.41	6885 2.35	6649 2.33	37	45	47
950	8511 2.52	8121 2.53	7782 2.53	7506 2.49	7257 2.43	7006 2.41	39	47	49
1000	8954 3.01	8542 3.02	8184 3.02	7895 2.57	7630 2.51	7364 2.49	41	50	52
1050	9397 3.10	8965 3.10	8588 3.10	8285 3.05	8004 2.59	7722 2.57	43	53	54
1100	9841 3.19	9388 3.19	8993 3.19	8676 3.14	8378 3.07	8082 3.05	46	56	57
1150	10286 3.27	9813 3.28	9398 3.28	9068 3.22	8754 3.15	8443 3.13	48	58	60
1200	10732 3.36	10238 3.37	9804 3.37	9461 3.30	9130 3.23	8804 3.21	50	61	62

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 1.2 %	△FUEL = + 3.5 %	△FUEL = + 7.5 %

INTRODUCTION

The alternate planning tables enable the flight crew to determine the fuel consumption and time required to cover a given air distance from go around at destination airport to landing at alternate airport.

These tables are established for :

- Go around : 80 kg or 180 lb
- Climb profile : 250KT/300KT/M.78
- Long range cruise
- Descent profile : M.78/300KT/250KT
- Approach and landing at alternate airport : 60 kg or 140 lb (4 min)
- ISA
- CG : 33 %
- Normal air conditioning
- Anti ice off

Note : 1. *In the tables, a "*" means that a step climb of 4000 feet has been made to reach the corresponding flight level.*
2. *The flight level shown on the top of each column is the final flight level.*
3. *For each degree Celcius above ISA temperature apply a fuel correction of*
0.015 (kg/°C/NM) $\times$ $\triangle$ISA (°C) $\times$ Air Distance (NM)
or 0.033 (lb/°C/NM) $\times$ $\triangle$ISA (°C) $\times$ Air Distance (NM)

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The alternate planning tables are based on a reference landing weight at destination.

The fuel consumption must be corrected when the landing weight is different from the reference landing weight.

If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1000 kg or 1000 lb below (or above) the reference weight.

R

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO-AROUND : 80 KG - CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE
DESCENT : M.78/300KT/250KT - VMC PROCEDURE : 60 KG (4MIN)

REF. LDG WT AT DEST. = 50000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	120	140	160	180	200	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL120	FL140 FL160	FL180 FL200
50	544 0.14	532 0.14					3		
100	913 0.25	887 0.25	877 0.23	869 0.23	865 0.23	864 0.22	6	5	6
150	1284 0.36	1244 0.35	1219 0.33	1195 0.32	1176 0.31	1162 0.31	9	8	8
200	1655 0.47	1602 0.44	1562 0.42	1523 0.41	1489 0.40	1460 0.40	12	10	10
250	2028 0.58	1961 0.54	1905 0.51	1851 0.50	1802 0.49	1758 0.48	16	13	12
300	2402 1.09	2321 1.04	2250 1.00	2180 0.59	2116 0.57	2057 0.57	19	15	14
350	2777 1.19	2683 1.13	2595 1.10	2510 1.07	2431 1.06	2357 1.06	22	17	17
400	3153 1.30	3046 1.23	2941 1.19	2840 1.16	2746 1.15	2657 1.14	25	20	19
450	3531 1.41	3410 1.32	3288 1.28	3172 1.25	3062 1.23	2958 1.23	28	22	21
500	3910 1.51	3776 1.41	3635 1.37	3504 1.34	3379 1.32	3260 1.32	31	25	23
550	4290 2.02	4143 1.50	3984 1.46	3837 1.42	3697 1.41	3562 1.40	34	27	25
600	4672 2.11	4509 1.59	4333 1.55	4171 1.51	4015 1.49	3864 1.49	37	29	28
650	5055 2.21	4876 2.08	4683 2.04	4505 2.00	4334 1.58	4168 1.58	40	31	30
700	5439 2.31	5244 2.17	5033 2.13	4840 2.08	4653 2.06	4472 2.06	43	34	32
750	5824 2.40	5613 2.27	5385 2.22	5175 2.17	4972 2.15	4777 2.15	46	36	34
800	6211 2.50	5982 2.36	5737 2.31	5511 2.26	5292 2.24	5083 2.24	49	38	37
850	6599 2.59	6353 2.45	6090 2.40	5848 2.34	5613 2.32	5389 2.32	52	40	39
900	6988 3.08	6725 2.54	6444 2.48	6185 2.43	5934 2.41	5697 2.41	55	43	41
950	7379 3.17	7098 3.03	6799 2.57	6523 2.51	6256 2.49	6005 2.49	58	45	43
1000	7771 3.26	7472 3.12	7154 3.06	6862 3.00	6578 2.58	6313 2.58	60	47	46
1050	8164 3.35	7846 3.20	7511 3.15	7201 3.08	6901 3.07	6623 3.06	63	49	48
1100	8559 3.44	8222 3.29	7868 3.23	7542 3.17	7225 3.15	6933 3.15	66	51	50
1150	8955 3.52	8599 3.38	8226 3.32	7882 3.25	7549 3.24	7244 3.24	68	53	53
1200	9352 4.01	8976 3.47	8585 3.40	8224 3.34	7874 3.32	7556 3.32	71	54	55

LOW AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 1 %	△FUEL = + 5 %	△FUEL = + 7 %

R

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO-AROUND 120 KG - CLIMB 250KT/300KT/M.78 - CRUISE LONG RANGE
DESCENT M.78/300KT/250KT - VMC PROCEDURE 100 KG (4MIN)

REF.LDG WT AT DEST. = 60000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 230	270	310	350	390	CORRECTION ON FUEL CONSUMPTION (LB/1000LB) FL230 FL270	FL310 FL350	FL390
150	1386 0.30	1390 0.29				9		
200	1711 0.38	1692 0.37	1693 0.36	1704 0.35		12	13	
250	2037 0.45	1994 0.44	1975 0.43	1969 0.42		14	16	12
300	2364 0.53	2296 0.51	2258 0.50	2235 0.49	2239 0.49	17	19	21
350	2691 1.01	2600 0.59	2541 0.57	2502 0.56	2499 0.55	19	22	25
400	3019 1.09	2904 1.06	2825 1.04	2770 1.03	2760 1.02	22	25	29
450	3349 1.16	3208 1.14	3110 1.11	3038 1.10	3022 1.09	25	28	33
500	3679 1.24	3514 1.21	3396 1.18	3308 1.16	3285 1.15	27	31	37
550	4010 1.32	3820 1.29	3682 1.25	3578 1.23	3549 1.22	30	34	41
600	4341 1.40	4127 1.36	3969 1.32	3849 1.30	3814 1.29	32	36	45
650	4674 1.47	4435 1.43	4257 1.39	4121 1.37	4080 1.35	35	39	49
700	5008 1.55	4743 1.51	4546 1.46	4393 1.44	4347 1.42	37	42	53
750	5342 2.02	5052 1.58	4836 1.53	4667 1.51	4615 1.49	40	45	57
800	5677 2.10	5362 2.06	5126 2.00	4941 1.57	4884 1.55	42	48	62
850	6014 2.18	5673 2.13	5418 2.07	5216 2.04	5153 2.02	45	51	66
900	6351 2.25	5985 2.20	5710 2.14	5492 2.11	5424 2.09	47	54	70
950	6689 2.33	6297 2.28	6003 2.21	5769 2.18	5697 2.15	50	58	74
1000	7027 2.40	6610 2.35	6297 2.28	6047 2.25	5970 2.22	53	61	78
1050	7366 2.48	6924 2.42	6592 2.35	6325 2.31	6245 2.29	55	64	82
1100	7706 2.55	7239 2.49	6887 2.42	6605 2.38	6520 2.35	58	67	87
1150	8047 3.03	7555 2.57	7184 2.49	6885 2.45	6797 2.42	60	70	91
1200	8389 3.10	7871 3.04	7481 2.55	7166 2.52	7075 2.49	63	73	95

ECON AIR CONDITIONING	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**
△FUEL = – 1.2 %	△FUEL = + 3.5 %	△FUEL = + 7.5 %

R

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO-AROUND : 80 KG - CLIMB : 250KT/300KT/M.78 - CRUISE : LONG RANGE
DESCENT : M.78/300KT/250KT - VMC PROCEDURE : 60 KG (4MIN)

REF. LDG WT AT DEST. = 50000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 230	270	310	350	390	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL230 FL270	FL310 FL350	FL390
150	1151 0.30	1153 0.29	1168 0.28			9	10	
200	1431 0.39	1413 0.37	1407 0.36	1411 0.35		11	12	
250	1711 0.47	1673 0.45	1647 0.44	1636 0.42	1636 0.42	14	15	15
300	1993 0.56	1934 0.53	1888 0.51	1861 0.50	1850 0.49	16	17	18
350	2275 1.04	2196 1.01	2129 0.59	2087 0.57	2065 0.55	19	20	21
400	2557 1.13	2458 1.08	2371 1.06	2314 1.04	2281 1.02	21	23	25
450	2841 1.21	2722 1.16	2613 1.14	2541 1.11	2498 1.09	24	25	28
500	3125 1.30	2986 1.24	2856 1.21	2770 1.18	2715 1.15	26	28	31
550	3410 1.38	3250 1.32	3100 1.29	2998 1.25	2932 1.22	29	30	34
600	3696 1.47	3515 1.39	3344 1.36	3227 1.32	3150 1.29	31	33	37
650	3982 1.55	3781 1.47	3589 1.44	3457 1.40	3369 1.36	34	36	40
700	4269 2.03	4048 1.55	3834 1.51	3688 1.47	3589 1.42	36	38	44
750	4557 2.12	4315 2.02	4080 1.59	3919 1.54	3809 1.49	39	41	47
800	4846 2.20	4583 2.10	4326 2.06	4151 2.01	4030 1.56	41	44	50
850	5135 2.28	4851 2.17	4573 2.14	4383 2.08	4251 2.02	44	46	54
900	5425 2.36	5120 2.25	4821 2.21	4616 2.15	4473 2.09	46	49	57
950	5716 2.45	5389 2.33	5070 2.29	4850 2.22	4696 2.16	49	52	60
1000	6007 2.53	5659 2.40	5319 2.36	5084 2.29	4919 2.23	51	55	64
1050	6299 3.01	5929 2.48	5569 2.43	5319 2.36	5144 2.29	54	57	67
1100	6592 3.09	6200 2.55	5819 2.51	5554 2.43	5369 2.36	56	60	71
1150	6886 3.17	6472 3.03	6070 2.58	5791 2.50	5595 2.43	59	63	74
1200	7181 3.25	6744 3.10	6322 3.06	6027 2.57	5821 2.49	61	66	78

LOW AIR CONDITIONING	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = − 1 %	△FUEL = + 5 %	△FUEL = + 7 %

R

ALTERNATE PLANNING FROM DESTINATION TO ALTERNATE AIRPORT
GO-AROUND 100 KG - CLIMB 250KT/300KT/M.78 - CRUISE LONG RANGE
DESCENT M.78/300KT/250KT - VMC PROCEDURE 80 KG (4MIN)

REF.LDG WT AT DEST. = 55000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG = 33.0 %		**FUEL CONSUMED (KG)** **TIME (H.MIN)**		
AIR DIST. (NM)	FLIGHT LEVEL				CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	230	**270**	**310**	**350**	**390**	**FL230 FL270**	**FL310 FL350**	**FL390**
150	1242 0.30	1248 0.29				9		
200	1538 0.38	1523 0.37	1524 0.36	1531 0.35		12	13	
250	1834 0.47	1799 0.44	1781 0.43	1773 0.42		14	16	12
300	2131 0.55	2076 0.52	2038 0.51	2016 0.49	2009 0.49	17	18	20
350	2429 1.03	2353 0.59	2297 0.58	2260 0.56	2243 0.55	19	21	23
400	2728 1.12	2630 1.07	2555 1.05	2504 1.03	2479 1.02	22	24	27
450	3027 1.20	2909 1.14	2815 1.12	2749 1.10	2715 1.09	24	27	31
500	3327 1.28	3188 1.22	3075 1.20	2994 1.17	2952 1.16	27	29	35
550	3628 1.36	3467 1.30	3336 1.27	3240 1.24	3190 1.22	29	32	39
600	3930 1.44	3747 1.37	3598 1.34	3487 1.31	3428 1.29	32	35	43
650	4232 1.52	4028 1.45	3860 1.42	3735 1.37	3668 1.36	35	38	47
700	4536 2.00	4309 1.52	4122 1.49	3983 1.44	3908 1.42	37	41	51
750	4840 2.08	4591 2.00	4386 1.56	4232 1.51	4150 1.49	40	44	55
800	5145 2.16	4873 2.07	4650 2.03	4482 1.58	4392 1.56	42	46	59
850	5450 2.24	5156 2.15	4915 2.10	4732 2.05	4636 2.02	45	49	63
900	5757 2.32	5440 2.22	5180 2.17	4983 2.12	4880 2.09	48	52	67
950	6064 2.40	5724 2.30	5446 2.25	5235 2.18	5126 2.16	50	55	71
1000	6372 2.48	6008 2.37	5713 2.32	5488 2.25	5372 2.22	53	58	75
1050	6681 2.56	6294 2.45	5981 2.39	5741 2.32	5619 2.29	55	61	79
1100	6991 3.04	6580 2.52	6249 2.46	5996 2.39	5868 2.36	58	64	83
1150	7302 3.12	6866 3.00	6518 2.53	6250 2.45	6117 2.42	61	67	87
1200	7614 3.19	7153 3.07	6788 3.00	6506 2.52	6367 2.49	63	70	91
LOW AIR CONDITIONING △FUEL = – 1 %			**ENGINE ANTI ICE ON** △FUEL = + 3 %			**TOTAL ANTI ICE ON** △FUEL = + 5.5 %		

GENERAL

R The ground distance/air distance conversion tables show the air distance for a given
R ground distance due to the influence of the wind.
R Tables are given for :
R – M.78
R – Long range speed.

M.78

R

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+ 150	+ 100	+ 50	0	– 50	– 100	– 150
10	7	8	9	**10**	11	13	15
20	15	16	18	**20**	23	26	30
30	22	25	27	**30**	34	39	45
40	30	33	36	**40**	45	51	60
50	37	41	45	**50**	56	64	75
100	75	82	90	**100**	113	129	150
200	150	164	180	**200**	225	257	300
300	225	245	270	**300**	338	386	450
400	300	327	360	**400**	450	514	600
500	375	409	450	**500**	563	643	750
1000	750	818	900	**1000**	1125	1286	1501
1500	1125	1227	1350	**1500**	1688	1929	2251
2000	1500	1636	1800	**2000**	2248	2572	3001
2500	1875	2045	2250	**2500**	2813	3215	3752
3000	2250	2454	2700	**3000**	3375	3858	4502
3500	2624	2863	3150	**3500**	3938	4501	5252
4000	2999	3272	3600	**4000**	4500	5144	6003
4500	3374	3681	4050	**4500**	5063	5787	6753
5000	3749	4090	4500	**5000**	5626	6430	7503

FLIP23 A320211 M565A1PIP 3410 03301.000011 0250300 .7800 .00000 0 0300350 0 0 77 64 43 61 18590 FCOM-N0–03–50–002–001

LONG RANGE SPEED UP TO FL270

R

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
10	7	8	9	**10**	12	14	17
20	14	16	18	**20**	23	27	33
30	21	24	26	**30**	35	41	50
40	29	32	35	**40**	46	55	67
50	36	39	44	**50**	58	68	83
100	71	79	88	**100**	115	136	167
200	143	158	176	**200**	231	273	333
300	214	237	265	**300**	346	409	500
400	286	316	353	**400**	462	545	667
500	357	395	441	**500**	577	682	833
1000	714	789	882	**1000**	1154	1364	1667
1500	1071	1184	1324	**1500**	1731	2046	2500
2000	1429	1579	1765	**2000**	2308	2727	3334
2500	1786	1974	2206	**2500**	2885	3409	4167
3000	2143	2368	2647	**3000**	3462	4091	5000
3500	2500	2763	3088	**3500**	4039	4773	5834
4000	2857	3158	3529	**4000**	4615	5455	6667
4500	3214	3553	3971	**4500**	5192	6137	7500
5000	3571	3947	4412	**5000**	5769	6818	8334

LONG RANGE SPEED ABOVE FL270

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+ 150	+ 100	+ 50	0	– 50	– 100	– 150
10	8	8	9	**10**	11	13	15
20	15	16	18	**20**	22	26	30
30	23	25	27	**30**	34	38	45
40	30	33	36	**40**	45	51	60
50	38	41	45	**50**	56	64	75
100	75	82	90	**100**	112	128	149
200	150	164	180	**200**	225	256	299
300	226	246	270	**300**	337	385	448
400	301	328	360	**400**	449	513	597
500	376	410	450	**500**	562	641	746
1000	752	820	901	**1000**	1124	1282	1493
1500	1128	1230	1351	**1500**	1685	1923	2239
2000	1504	1639	1802	**2000**	2247	2564	2985
2500	1880	2049	2252	**2500**	2809	3205	3731
3000	2256	2459	2703	**3000**	3371	3846	4478
3500	2632	2869	3153	**3500**	3933	4487	5224
4000	3008	3279	3604	**4000**	4494	5128	5970
4500	3383	3689	4054	**4500**	5056	5769	6716
5000	3759	4098	4505	**5000**	5618	6410	7463

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LONG RANGE SPEED UP TO FL270

R

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
10	7	8	9	**10**	12	14	17
20	14	16	18	**20**	23	27	33
30	21	24	26	**30**	35	41	50
40	29	32	35	**40**	46	54	66
50	36	40	44	**50**	58	68	83
100	72	79	88	**100**	115	136	166
200	143	158	177	**200**	231	272	332
300	215	237	265	**300**	346	408	498
400	286	316	353	**400**	461	544	664
500	358	395	441	**500**	576	680	830
1000	715	790	883	**1000**	1153	1361	1660
1500	1073	1186	1324	**1500**	1729	2041	2490
2000	1431	1581	1766	**2000**	2306	2721	3320
2500	1789	1976	2207	**2500**	2882	3402	4150
3000	2146	2371	2649	**3000**	3458	4082	4980
3500	2504	2767	3090	**3500**	4035	4763	5810
4000	2862	3162	3532	**4000**	4611	5443	6641
4500	3220	3557	3973	**4500**	5188	6123	7471
5000	3577	3952	4415	**5000**	5764	6804	8301

LONG RANGE SPEED ABOVE FL270

R

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
10	7	8	9	**10**	11	13	15
20	15	16	18	**20**	23	26	30
30	22	25	27	**30**	34	39	45
40	30	33	36	**40**	45	52	60
50	37	41	45	**50**	56	64	75
100	75	82	90	**100**	113	129	150
200	150	163	180	**200**	225	258	301
300	225	245	270	**300**	338	386	451
400	300	327	360	**400**	450	515	602
500	375	409	450	**500**	563	644	752
1000	749	817	900	**1000**	1126	1288	1504
1500	1124	1226	1349	**1500**	1689	1931	2256
2000	1498	1635	1799	**2000**	2251	2575	3008
2500	1873	2044	2249	**2500**	2814	3219	3760
3000	2247	2452	2699	**3000**	3377	3863	4512
3500	2622	2861	3148	**3500**	3940	4507	5264
4000	2996	3270	3598	**4000**	4503	5150	6016
4500	3371	3678	4048	**4500**	5066	5794	6767
5000	3745	4087	4498	**5000**	5629	6438	7519

LONG RANGE SPEED UP TO FL270

R

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
10	7	8	9	**10**	12	14	17
20	14	16	18	**20**	23	27	33
30	21	24	26	**30**	35	41	50
40	29	32	35	**40**	46	55	67
50	36	39	44	**50**	58	68	83
100	71	79	88	**100**	115	136	167
200	143	158	176	**200**	231	273	334
300	214	237	265	**300**	346	409	501
400	286	316	353	**400**	462	546	668
500	357	395	441	**500**	577	682	835
1000	714	789	882	**1000**	1154	1365	1669
1500	1071	1184	1323	**1500**	1731	2047	2504
2000	1428	1578	1764	**2000**	2309	2730	3339
2500	1784	1973	2205	**2500**	2886	3412	4174
3000	2141	2367	2646	**3000**	3463	4095	5008
3500	2498	2762	3087	**3500**	4040	4777	5843
4000	2855	3156	3528	**4000**	4617	5459	6678
4500	3212	3551	3969	**4500**	5194	6142	7512
5000	3569	3945	4410	**5000**	5771	6824	8347

LONG RANGE SPEED ABOVE FL270

R

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
10	8	8	9	**10**	11	13	15
20	15	16	18	**20**	22	26	30
30	23	25	27	**30**	34	38	45
40	30	33	36	**40**	45	51	60
50	38	41	45	**50**	56	64	75
100	75	82	90	**100**	112	128	149
200	150	164	180	**200**	225	257	299
300	225	246	270	**300**	337	385	448
400	301	328	360	**400**	450	513	598
500	376	410	450	**500**	562	641	747
1000	751	819	901	**1000**	1124	1283	1494
1500	1127	1229	1351	**1500**	1686	1924	2241
2000	1503	1639	1801	**2000**	2248	2566	2989
2500	1879	2048	2252	**2500**	2810	3207	3736
3000	2254	2458	2702	**3000**	3372	3849	4483
3500	2630	2868	3152	**3500**	3934	4490	5230
4000	3006	3277	3603	**4000**	4496	5132	5977
4500	3381	3687	4053	**4500**	5058	5773	6724
5000	3757	4097	4503	**5000**	5620	6415	7471

06.00 CONTENTS

INTRODUCTION

This chapter provides the single engine performance data to be used for the conduct and monitoring of the flight following an engine failure.
The diversion strategy (descent and cruise speed schedules) shall be selected, and specified in the operator's routes specifications, as a function of the prevailing operational factors (e.g. obstacles clearance requirements and/or ETOPS operation).

FLIGHT PREPARATION

In readiness for a possible engine failure occurring during the flight, any flight shall be planned so as to comply with any of the following requirements, as applicable :
· obstacle clearance,
· oxygen,
· maximum diversion distance (ETOPS operation).
The following FCOM sections provide flight preparation and fuel planning information :
· 2.05.10 thru 2.05.60, for Standard Fuel Planning,
· 2.04.40, for Extended Range Operation (ETOPS) and associated fuel requirements.

STRATEGY

Depending on the prevailing operational constraints, the most appropriate diversion strategy shall be selected, out of the following options :

	STANDARD STRATEGY	OBSTACLE STRATEGY	FIXED SPEED STRATEGIES	
			320 KT	VMO
DESCENT TO CEILING	. M.78/300KT . MCT	. Green Dot Speed . MCT	. M.78/320KT . MCT	. M.80/350KT . MCT
CRUISE	LR ceiling LR speed	– Obstacle not cleared: Maintain Green Dot Speed at MCT – Obstacle cleared : Revert to standard strategy	FL per 2.04.40 MCT/320KT	FL per 2.04.40 MCT/350KT
DESCENT TO LANDING	IDLE/M.78/300KT/250KT			
Approx increase in fuel consumption compared with both engines operative	+ 33 %			

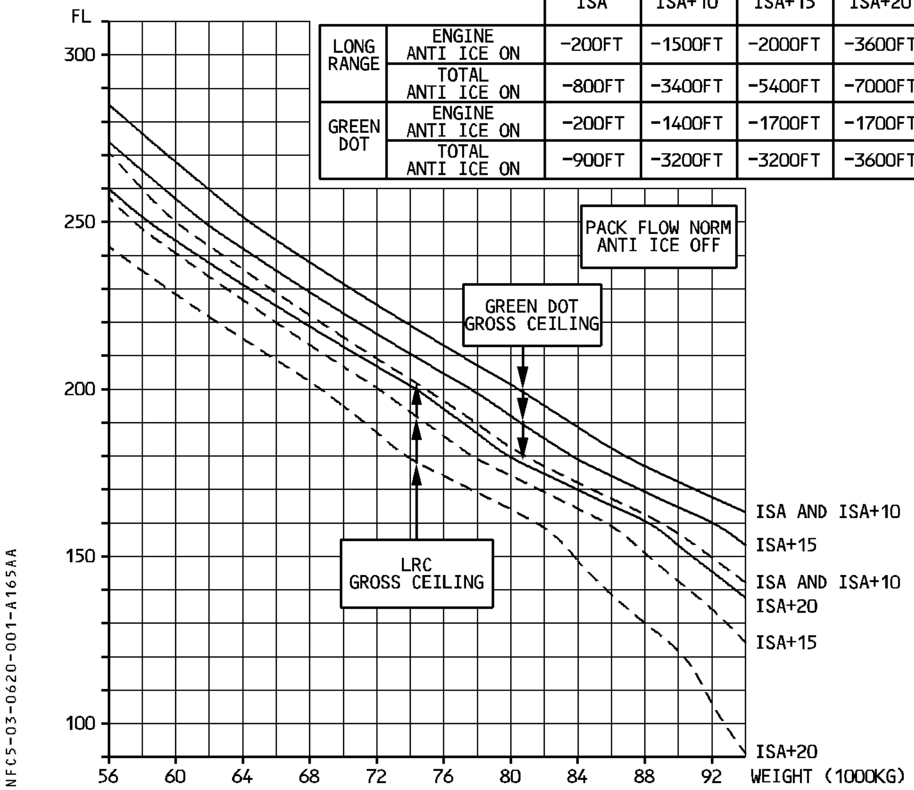
For ETOPS operations, any of the above diversion strategies can be used provided that the selected strategy and speed schedule is used in :

- establishing the area of operation (maximum diversion distance), as described in Section 2.04.40,
- calculating the diversion fuel requirements for the single engine ETOPS critical scenario, as provided in section 2.04.40,
- demonstrating the applicable obstacle clearance requirements (net flight path and net ceiling).

During the diversion, the flight crew is expected to use the planned speed schedule. However, based on the evaluation of the actual situation, the pilot in command has the authority to deviate from this planned one engine inoperative speed.

GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS

		ISA	ISA+10	ISA+15	ISA+20
LONG RANGE	ENGINE ANTI ICE ON	-200FT	-1500FT	-2000FT	-3600FT
	TOTAL ANTI ICE ON	-800FT	-3400FT	-5400FT	-7000FT
GREEN DOT	ENGINE ANTI ICE ON	-200FT	-1400FT	-1700FT	-1700FT
	TOTAL ANTI ICE ON	-900FT	-3200FT	-3200FT	-3600FT



R *Note : 1. For weights above 85000 KG, one engine ceilings at Long Range speed may be*
R *overestimated by FMS Legacy. In this case, ceiling values provided in the above*
R *graph should be retained.*

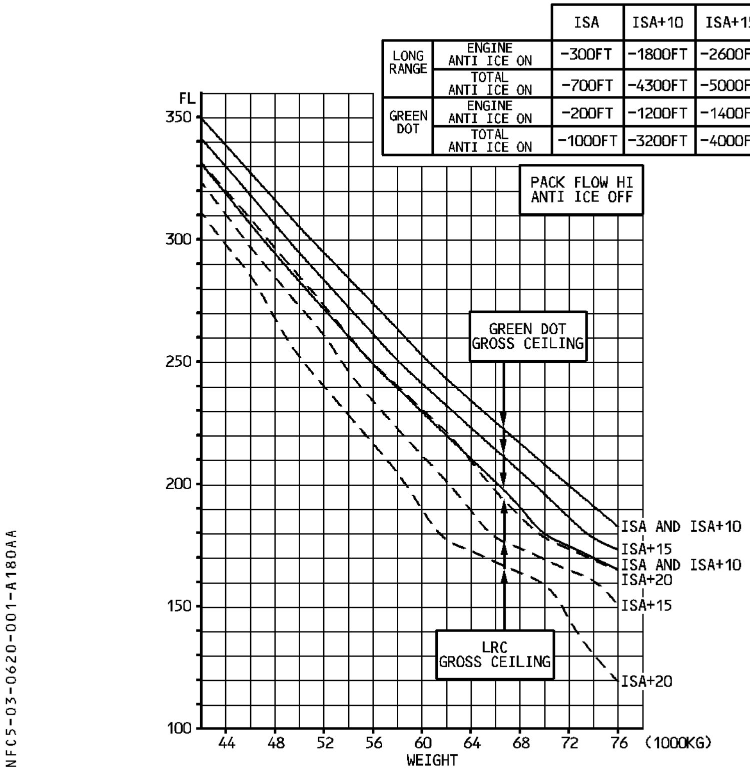
2. If severe icing conditions are encountered, ice formation may build up on non heated structure and therefore the ceiling will be reduced by 2400 feet.

NET CEILING AT GREEN DOT SPEED

To obtain the net ceiling at green dot speed, apply the following corrections to the gross ceiling at green dot speed :

	WEIGHT (1000 KG)									
	56	60	64	68	72	76	80	84	88	92
≤ISA+10	–4500FT	–4300FT	–4100FT	–4100FT	–4400FT	–4300FT	–4400FT	–4800FT	–5300FT	–6400FT
ISA+20	–3900FT	–3700FT	–4000FT	–4300FT	–4200FT	–4700FT	–5000FT	–6000FT	–7100FT	–7600FT

GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS



Note : If severe icing conditions are encountered, ice formation may build up on non
R *heated structure and therefore the ceiling will be reduced by :*
R *· 4000 feet for aircraft weight below or equal to 60000 kg*
R *· 7500 feet for aircraft weight above or equal to 75000 kg*
R *· linear interpolation must be applied between the two aircraft weights*

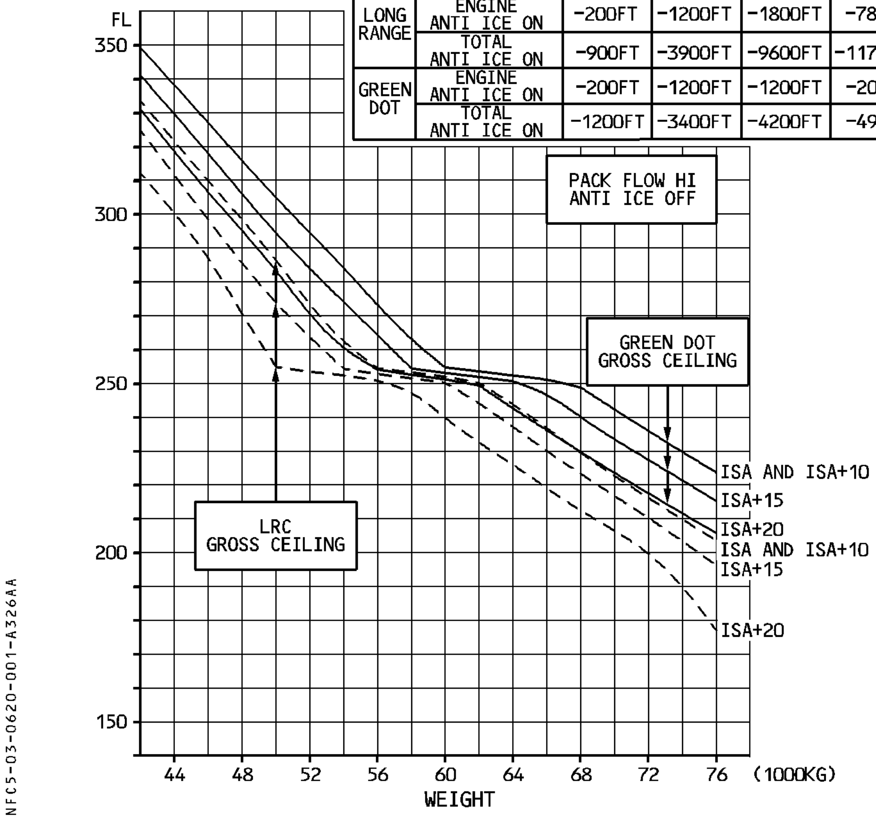
NET CEILING AT GREEN DOT SPEED

To obtain the net ceiling at green dot speed, apply the following corrections to the gross ceiling at green dot speed :

	WEIGHT (1000 KG)								
	44	48	52	56	60	64	68	72	76
≤ISA+10	– 5100 FT	– 5400 FT	– 5600 FT	– 5700 FT	– 5600 FT	– 5600 FT	– 5000 FT	– 4800 FT	–5000 FT
ISA + 20	– 5500 FT	– 5600 FT	– 5700 FT	– 5900 FT	– 5600 FT	– 4900 FT	– 5000 FT	– 5800 FT	–7100 FT

GROSS CEILINGS AT LONG RANGE AND GREEN DOT SPEEDS

		ISA	ISA+10	ISA+15	ISA+20
LONG RANGE	ENGINE ANTI ICE ON	-200FT	-1200FT	-1800FT	-7800FT
	TOTAL ANTI ICE ON	-900FT	-3900FT	-9600FT	-11700FT
GREEN DOT	ENGINE ANTI ICE ON	-200FT	-1200FT	-1200FT	-2000FT
	TOTAL ANTI ICE ON	-1200FT	-3400FT	-4200FT	-4900FT



Note : If severe icing conditions are encountered, ice formation may build up on non heated structure and therefore the ceiling will be reduced by 2000 feet.

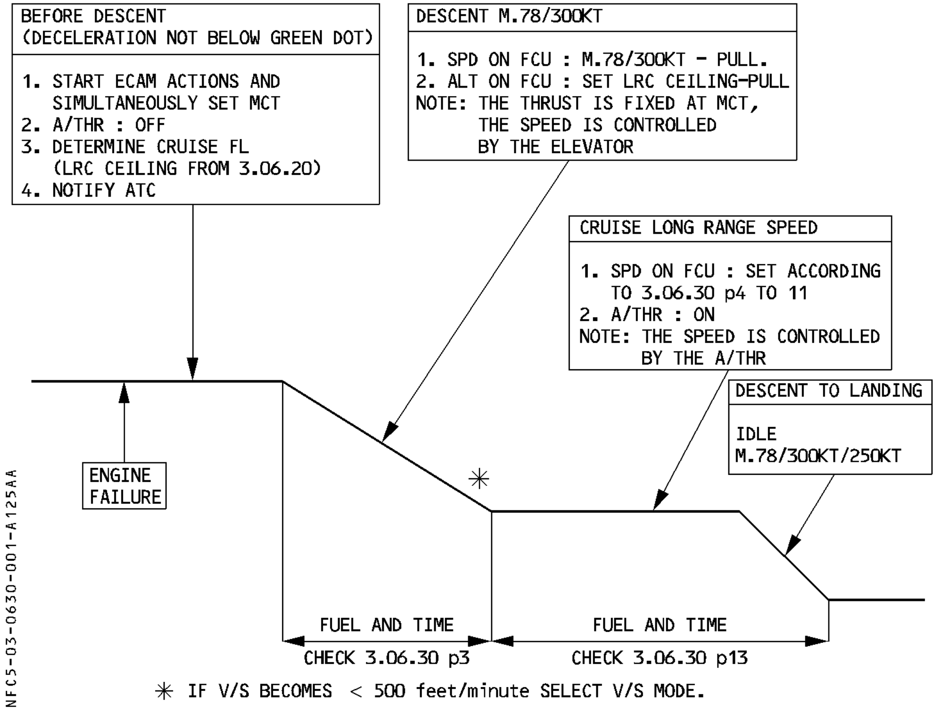
NET CEILING AT GREEN DOT SPEED

To obtain the net ceiling at green dot speed, apply the following corrections to the gross ceiling at green dot speed :

	WEIGHT (1000 KG)							
	48	**52**	**56**	**60**	**64**	**68**	**72**	**76**
≤ISA+10	– 5800 FT	– 4200 FT	– 2700 FT	– 2400 FT	– 3600 FT	– 4700 FT	– 5100 FT	– 6100 FT
ISA+20	– 4200 FT	– 2800 FT	– 2600 FT	– 3800 FT	– 4500 FT	– 6300 FT	– 10100 FT	– 11800 FT

PROCEDURE

Unless a specific procedure has been established before dispatch (ETOPS, mountainous areas) the recommended procedure is as follows :



EXAMPLE

Given :

GW at engine failure = 80 000 kg
FL at engine failure = 310
Temperature = ISA
Distance to diversion airport = 540 NM
No wind

Find :

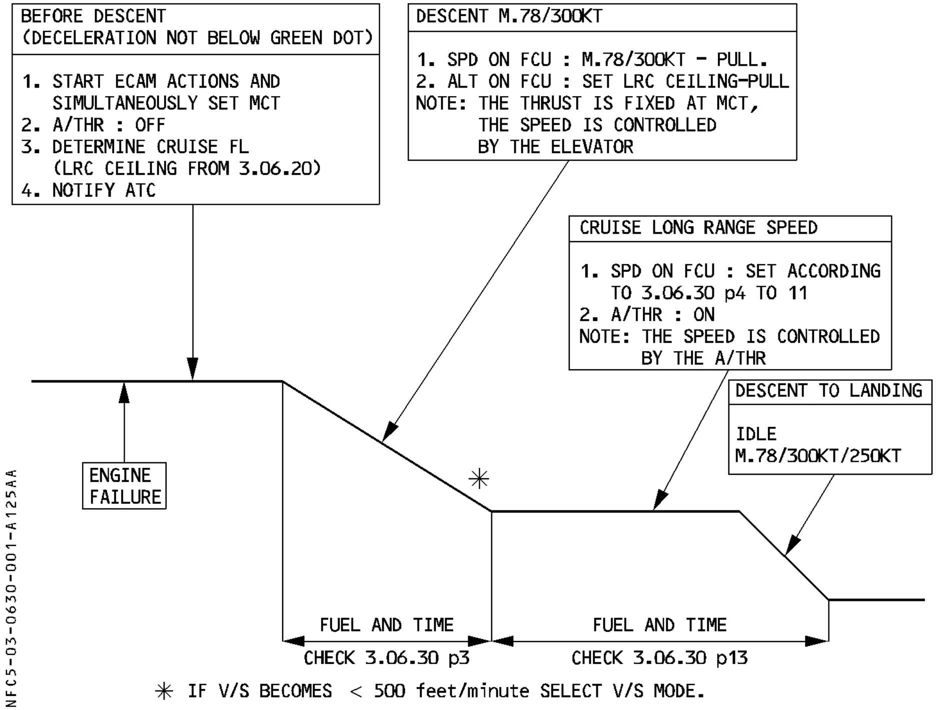
LRC ceiling : (see 3.06.20 p1) FL183
R Descent to cruise level : (FL180) Distance = 229 – 98 = 131 NM
R (see 3.06.30 p3) Fuel = 1396 – 652 = 744 kg
R Time = 34.7 – 16.0 = 18.7 min
R Cruise at long range speed (FL180) to landing
(Weight = 80 000 – 744 = 79 256 kg : Distance = 540 – 131 = 409 NM)
Determine on (3.06.30 p13) time and fuel consumption at ISA conditions and for a
R reference weight of 60 000 kg. Interpolate the remaining air distance of 409 NM at FL180.
R Fuel : 2593 kg
R Time : 1 h 23 min
Correction due to actual in-cruise weight
R $\triangle$Fuel = + 25 kg per 1000 kg above reference weight
R $\triangle$Fuel = + 25 kg × (79.3 – 60) ~ 483 kg

Result :

R Total Fuel = 744 + 2593 + 483 = 3820 kg
R Time = 1 h 23 min + 19 min = 1 h 42 min

PROCEDURE

Unless a specific procedure has been established before dispatch (ETOPS, mountainous areas) the recommended procedure is as follows :



EXAMPLE

Given :

GW at engine failure = 70 000 kg
FL at engine failure = 310
Temperature = ISA
Distance to diversion airport = 540 NM
No wind

Find :

LRC ceiling : (see 3.06.20 p1) FL220
Descent to cruise level : (FL220) Distance = 231 – 151 = 80 NM
(see 3.06.30 p3) Fuel = 1274 – 896 = 378 kg
Time = 35 – 24 = 11 min

Cruise at long range speed (FL220) to landing
(Weight = 70 000 – 378 = 69 622 kg : Distance = 540 – 80 = 460 NM)
Determine on (3.06.30 p13) time and fuel consumption at ISA conditions and for a reference weight of 55 000 kg. Interpolate the remaining air distance of 460 NM at FL220.

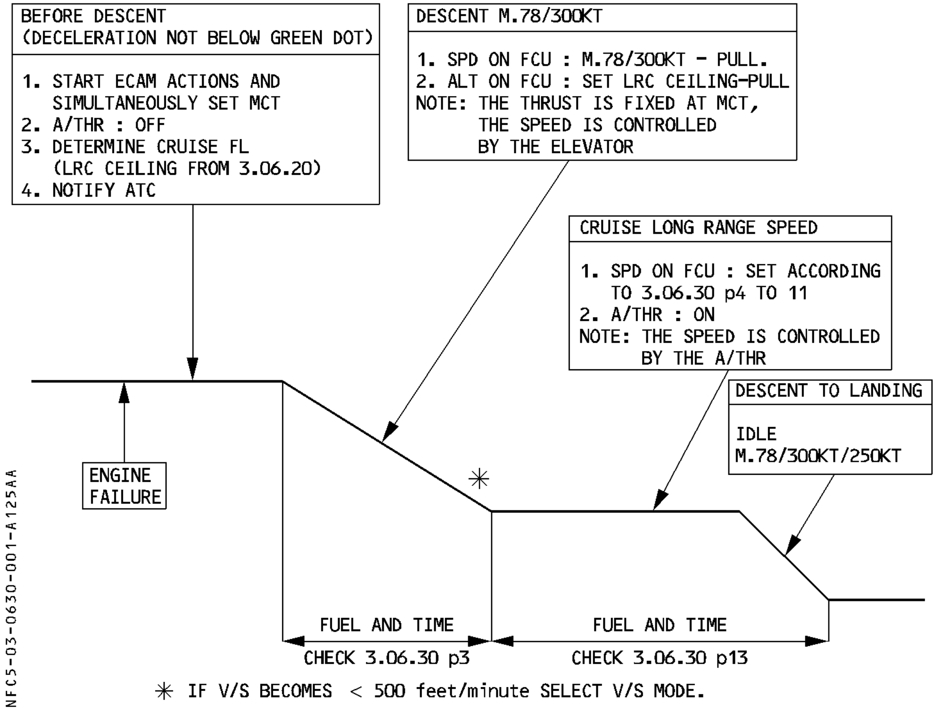
R Fuel : 2482 kg
R Time : 1 h 29 min
Correction due to actual in-cruise weight
R △Fuel = + 25 kg per 1000 kg above reference weight
R △Fuel = + 25 kg × (69.7 – 55) ~ 368 kg

Result :

R Total Fuel = 378 + 2482 + 368 = 3228 kg
R Time = 1 h 29 min + 11 min = 1 h 40 min

PROCEDURE

Unless a specific procedure has been established before dispatch (ETOPS, mountainous areas) the recommended procedure is as follows :



EXAMPLE

Given :

GW at engine failure = 70 000 kg
FL at engine failure = 310
Temperature = ISA
Distance to diversion airport = 540 NM
No wind

Find :

LRC ceiling : (see 3.06.20 p1) FL179
R Descent to cruise level : (FL170) Distance = 234 – 85 = 149 NM
R (see 3.06.30 p3) Fuel = 1264 – 506 = 758 kg
R Time = 35.4 – 14.0 = 21.4 min

Cruise at long range speed (FL170) to landing
R (Weight = 70 000 – 758 = 69 242 kg : Distance = 540 – 149 = 391 NM)
Determine on (3.06.30 p13) time and fuel consumption at ISA conditions and for a
R reference weight of 55 000 kg. Interpolate the remaining air distance of 391 NM at FL170.
R Fuel : 2283 kg
R Time : 1 h 20 min
Correction due to actual in-cruise weight
R $\triangle$Fuel = + 20 kg per 1000 kg above reference weight
R $\triangle$Fuel = + 20 kg × (69.2 – 55) = 284 kg

Result :

R Total Fuel = 758 + 2283 + 284 = 3325 kg
R Time = 1 h 20 min + 22 min = 1 h 42 min

R

DESCENT - M.78/300KT - 1 ENGINE OUT									
MAX. CONTINUOUS THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%		**MINIMUM RATE OF DESCENT 500FT/MIN**				
WEIGHT (1000KG)	70				90				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	41.6	1564	280	MCT					241
370	40.1	1526	270	MCT					252
350	38.6	1484	258	MCT					264
330	37.0	1437	246	MCT	35.2	1444	233	MCT	277
310	35.5	1389	235	MCT	33.9	1403	223	MCT	289
290	34.0	1337	223	MCT	32.5	1356	212	MCT	300
270	31.7	1260	206	MCT	30.4	1283	197	MCT	300
250	29.2	1164	187	MCT	28.1	1197	180	MCT	300
230	26.0	1038	165	MCT	25.4	1091	161	MCT	300
220	24.0	956	151	V/S	23.8	1024	150	MCT	300
210	22.0	873	137	V/S	22.0	943	137	MCT	300
200	20.0	790	124	V/S	20.0	854	124	V/S	300
190	18.0	709	111	V/S	18.0	764	111	V/S	300
180	16.0	628	98	V/S	16.0	676	98	V/S	300
170	14.0	547	85	V/S	14.0	589	85	V/S	300
160	12.0	468	72	V/S	12.0	503	72	V/S	300
150	10.0	388	60	V/S	10.0	417	60	V/S	300
140	8.0	310	47	V/S	8.0	332	47	V/S	300
100	.0	0	0	V/S	.0	0	0	V/S	300

CORRECTIONS	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**
TIME	– 0.5 %	– 1.5 %	–
FUEL	+ 3 %	+ 5 %	+ 0.3 %
DISTANCE	– 0.5 %	– 1.5 %	+ 0.3 %

11.0-08F0A321-211 CFM56-5B3/P SA23200010C6KG330 0 018590 0 0 3 .0 .0 500.00 0 02 .780300.000 .000 0 FCOM-G0-03-06-30-003-165

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

N1 (%) **MACH**
KG/H **IAS (KT)**
NM/1000KG **TAS (KT)**

WEIGHT (1000KG)	FL100		FL120		FL140		FL160		FL180		FL200	
64	83.5	.492	84.5	.502	85.7	.515	87.0	.529	88.0	.541	88.9	.548
	2427	272	2380	268	2352	264	2337	262	2312	257	2277	250
	129.4	314	133.7	318	137.7	324	141.4	330	144.8	335	147.7	336
66	84.3	.497	85.1	.505	86.5	.521	87.5	.533	88.7	.546	89.7	.553
	2490	275	2434	270	2424	268	2398	264	2386	260	2358	253
	127.4	317	131.6	320	135.2	328	138.7	333	141.8	338	144.0	340
68	84.8	.501	85.8	.511	87.2	.527	88.1	.538	89.2	.548	90.6	.560
	2548	277	2502	272	2497	271	2465	266	2443	261	2452	256
	125.5	320	129.3	324	132.7	331	136.1	335	138.9	339	140.2	344
70	85.3	.504	86.5	.517	87.7	.531	88.7	.543	89.7	.548	91.3	.564
	2604	279	2575	276	2560	273	2538	269	2495	261	2535	258
	123.6	322	127.1	327	130.4	334	133.5	339	136.1	340	136.6	346
72	85.8	.507	87.2	.523	88.2	.534	89.4	.548	90.4	.554	92.2	.572
	2658	281	2649	279	2620	275	2612	271	2581	264	2646	262
	121.7	324	125.0	331	128.2	336	130.9	342	132.9	343	132.8	351
74	86.5	.512	87.9	.528	88.8	.538	89.9	.549	91.2	.560	93.3	.580
	2730	284	2722	282	2688	277	2669	272	2676	267	2754	266
	119.8	327	122.9	335	125.9	338	128.4	343	129.6	347	129.3	356
76	87.2	.518	88.3	.531	89.4	.543	90.3	.549	91.9	.564	93.9	.579
	2804	287	2785	284	2761	279	2719	272	2759	269	2812	265
	117.9	331	120.9	337	123.7	341	126.0	343	126.5	349	126.5	356
78	87.8	.523	88.8	.535	90.0	.548	90.9	.553	92.7	.572	94.0	.567
	2879	290	2847	285	2836	282	2800	274	2872	273	2806	260
	116.0	334	119.0	339	121.5	344	123.3	345	123.3	354	124.1	348
80	88.4	.528	89.3	.538	90.4	.550	91.7	.560	93.7	.579	94.2	.548
	2951	293	2915	288	2896	283	2900	277	2981	276	2799	251
	114.2	337	117.0	341	119.3	346	120.5	350	120.2	358	120.4	337
82	88.9	.531	89.9	.543	90.8	.550	92.3	.564	94.1	.576		
	3014	295	2989	290	2949	283	2985	279	3020	274		
	112.5	339	115.1	344	117.3	346	117.9	352	118.0	357		
84	89.3	.534	90.4	.547	91.3	.551	93.0	.569	94.2	.564		
	3076	296	3063	292	3011	284	3084	282	3015	269		
	110.9	341	113.2	347	115.1	347	115.2	355	115.9	349		
86	89.8	.537	90.9	.550	92.1	.559	93.9	.576	94.4	.547		
	3142	298	3132	294	3118	288	3196	286	3007	260		
	109.2	343	111.3	349	112.6	351	112.5	359	112.7	339		
88	90.3	.541	91.3	.551	92.7	.563	94.8	.583				
	3215	300	3185	294	3208	290	3306	289				
	107.5	346	109.5	349	110.3	354	110.0	364				
90	90.8	.545	91.7	.551	93.3	.566	95.4	.583				
	3289	302	3236	294	3295	292	3375	289				
	105.9	348	107.8	349	108.1	356	107.8	364				
92	91.3	.549	92.3	.555	94.0	.573	95.5	.573				
	3363	305	3325	297	3407	295	3368	284				
	104.3	351	105.8	352	105.7	360	106.2	358				

ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A321-211 CFM56-5B3/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 0 FCOM-G0-03-06-30-004-165

R

DESCENT - M.78/300KT - 1 ENGINE OUT									
MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF			ISA CG=33.0%		MINIMUM RATE OF DESCENT 500FT/MIN				
WEIGHT (1000KG)	50				70				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	41.6	1408	280	MCT					241
370	39.8	1372	267	MCT	39.4	1386	264	MCT	252
350	38.1	1330	255	MCT	38.0	1353	253	MCT	264
330	36.5	1288	243	MCT	36.5	1315	243	MCT	277
310	35.1	1246	231	MCT	35.0	1274	231	MCT	289
290	33.6	1201	220	MCT	33.5	1226	219	MCT	300
270	31.5	1134	205	MCT	31.3	1156	203	MCT	300
250	29.1	1052	187	MCT	28.8	1072	185	MCT	300
230	26.0	942	165	MCT	25.9	967	164	MCT	300
220	24.0	867	151	V/S	24.0	896	151	V/S	300
210	22.0	793	137	V/S	22.0	818	137	V/S	300
200	20.0	719	124	V/S	20.0	741	124	V/S	300
190	18.0	645	111	V/S	18.0	665	111	V/S	300
180	16.0	572	98	V/S	16.0	589	98	V/S	300
170	14.0	499	85	V/S	14.0	514	85	V/S	300
160	12.0	427	72	V/S	12.0	439	72	V/S	300
150	10.0	355	60	V/S	10.0	365	60	V/S	300
140	8.0	283	47	V/S	8.0	291	47	V/S	300
100	.0	0	0	V/S	.0	0	0	V/S	300

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	– 0.3 %	– 1.5 %	–
FUEL	+ 2 %	+ 4 %	+ 0.3 %
DISTANCE	– 0.5 %	– 1.5 %	+ 0.2 %

11.0-08F0A320-214 CFM56-5B4/P SA23200010C6KG330 0 018590 0 0 3 .0 .0 500.00 0 02 .780300.000 .000 0 FCOM-N0-03-06-30-003-200

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL120**		**FL140**		**FL160**		**FL180**		**FL200**	
50	75.5	.453	77.4	.472	78.9	.487	80.3	.500	81.8	.516	82.7	.525
	1891	251	1888	251	1867	250	1842	247	1824	245	1783	240
	153.0	289	158.3	299	163.9	306	169.6	312	175.1	319	180.8	322
52	76.7	.463	78.5	.480	79.7	.492	81.3	.508	82.5	.520	83.6	.532
	1967	256	1959	256	1924	253	1908	251	1876	247	1852	243
	150.1	295	155.3	304	160.9	309	166.1	317	171.5	322	176.6	327
54	77.8	.471	79.3	.486	80.7	.499	82.2	.515	83.1	.524	84.5	.540
	2041	261	2021	259	1991	256	1973	254	1929	249	1924	247
	147.4	301	152.5	308	157.8	314	162.8	321	168.1	324	172.5	332
56	78.9	.479	80.1	.492	81.6	.507	82.9	.519	83.9	.530	85.4	.547
	2112	265	2078	262	2059	260	2029	257	1998	252	1995	250
	144.9	306	149.9	311	154.7	319	159.7	324	164.4	328	168.6	336
58	79.7	.485	80.9	.498	82.5	.513	83.5	.523	84.7	.537	86.0	.552
	2175	268	2141	265	2126	264	2081	258	2068	256	2057	253
	142.4	310	147.3	315	151.9	323	156.7	326	160.9	333	164.9	339
60	80.4	.490	81.8	.504	83.3	.519	84.2	.528	85.6	.545	86.7	.556
	2233	271	2209	269	2187	266	2145	261	2141	259	2119	255
	140.1	313	144.6	320	149.1	326	153.7	330	157.5	337	161.3	342
62	81.1	.495	82.7	.511	83.8	.522	84.9	.534	86.3	.550	87.3	.561
	2292	274	2277	272	2239	268	2214	264	2209	262	2183	256
	137.9	316	142.1	324	146.5	328	150.6	333	154.3	341	157.7	344
64	82.0	.502	83.5	.517	84.4	.525	85.7	.541	86.9	.555	88.1	.567
	2363	278	2343	276	2293	270	2289	268	2272	264	2259	259
	135.5	320	139.7	327	144.0	330	147.6	338	151.1	343	154.1	348
66	82.8	.508	84.1	.520	85.1	.531	86.5	.548	87.5	.558	88.7	.570
	2431	281	2399	278	2362	273	2362	271	2334	266	2325	261
	133.3	324	137.4	330	141.3	334	144.7	342	148.1	346	150.6	350
68	83.6	.514	84.6	.523	85.8	.537	87.1	.552	88.1	.562	89.2	.571
	2499	284	2453	279	2433	276	2426	273	2401	268	2383	261
	131.2	328	135.2	332	138.7	338	142.0	344	145.0	348	147.2	351
70	84.3	.519	85.1	.527	86.5	.543	87.6	.556	88.8	.569	90.2	.581
	2563	287	2510	281	2506	279	2488	275	2481	271	2492	266
	129.1	331	133.0	334	136.2	341	139.4	347	141.9	352	143.1	357
72	84.8	.522	85.8	.532	87.2	.549	88.2	.559	89.4	.571	91.1	.588
	2619	289	2582	284	2580	282	2553	277	2544	272	2595	270
	127.1	333	130.7	337	133.7	345	136.7	349	139.0	353	139.3	361
74	85.3	.524	86.5	.538	87.7	.553	88.8	.563	89.9	.572	92.0	.595
	2672	291	2655	287	2645	284	2618	279	2602	273	2697	273
	125.3	335	128.4	341	131.4	348	134.2	351	136.1	354	135.6	366
76	85.8	.528	87.1	.544	88.2	.556	89.4	.568	90.8	.580	93.1	.606
	2731	293	2729	291	2707	286	2697	282	2710	277	2821	278
	123.4	337	126.3	345	129.2	350	131.5	355	132.6	359	132.0	372
78	86.4	.533	87.8	.549	88.8	.559	90.0	.572	91.6	.588	93.7	.607
	2802	295	2802	293	2772	288	2767	283	2817	281	2883	279
	121.4	340	124.2	348	126.9	352	128.9	357	129.3	364	129.3	373

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 3.5 %	△FUEL = + 7 %

R

DESCENT - M.78/300KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF			ISA CG=33.0%		**MINIMUM RATE OF DESCENT 500FT/MIN**				
WEIGHT (1000KG)	**50**				**70**				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	42.5	1422	287	MCT					241
370	40.7	1384	274	MCT	39.8	1379	267	MCT	252
350	38.9	1341	260	MCT	38.4	1345	257	MCT	264
330	37.3	1297	248	MCT	36.9	1307	245	MCT	277
310	35.7	1252	236	MCT	35.4	1264	234	MCT	289
290	34.1	1204	224	MCT	33.7	1214	221	MCT	300
270	31.9	1134	208	MCT	31.5	1141	204	MCT	300
250	29.3	1045	188	MCT	28.8	1053	185	MCT	300
230	26.0	927	165	MCT	25.8	944	163	MCT	300
220	24.0	855	151	V/S	24.0	878	151	MCT	300
210	22.0	781	137	V/S	22.0	804	137	V/S	300
200	20.0	709	124	V/S	20.0	728	124	V/S	300
190	18.0	637	111	V/S	18.0	654	111	V/S	300
180	16.0	565	98	V/S	16.0	579	98	V/S	300
170	14.0	494	85	V/S	14.0	506	85	V/S	300
160	12.0	422	72	V/S	12.0	433	72	V/S	300
150	10.0	351	60	V/S	10.0	360	60	V/S	300
140	8.0	281	47	V/S	8.0	287	47	V/S	300
100	.0	0	0	V/S	.0	0	0	V/S	300

CORRECTIONS	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**
TIME	– 0.5 %	– 2 %	–
FUEL	+ 2 %	+ 5 %	+ 0.3 %
DISTANCE	– 0.8 %	– 2.5 %	+ 0.2 %

11.0-08F0A319-112 CFM56-5B6/P SA23200010C6KG330 0 018590 0 0 3 .0 .0 500.00 0 02 .780300.000 .000 0 FCOM-N0-03-06-30-003-240

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA
CG=33.0%

N1 (%) — **MACH**
KG/H — **IAS (KT)**
NM/1000KG — **TAS (KT)**

WEIGHT (1000KG)	FL100		FL120		FL140		FL160		FL180		FL200	
48	74.1	.438	76.0	.458	78.1	.480	79.5	.495	81.1	.513	82.1	.523
	1798	242	1805	244	1816	246	1792	244	1779	244	1740	239
	155.4	279	160.7	290	166.4	302	172.5	309	178.5	318	184.8	322
50	75.2	.447	77.4	.470	79.1	.489	80.5	.504	82.0	.519	82.8	.528
	1872	247	1889	250	1884	251	1862	249	1839	247	1792	241
	152.4	285	157.6	298	163.1	307	169.0	315	174.9	322	181.0	324
52	76.5	.458	78.7	.481	80.0	.495	81.5	.512	82.6	.523	83.7	.536
	1957	253	1970	256	1944	254	1928	253	1890	249	1862	245
	149.5	293	154.6	305	160.2	311	165.7	320	171.5	324	176.8	329
54	77.8	.469	79.6	.488	80.9	.503	82.5	.519	83.2	.527	84.6	.544
	2041	260	2039	260	2012	258	1992	257	1940	250	1935	249
	146.8	300	151.8	310	157.2	316	162.6	324	168.2	326	172.8	334
56	79.0	.480	80.4	.495	81.9	.511	83.0	.523	84.0	.534	85.4	.552
	2124	265	2100	264	2081	262	2044	258	2008	254	2004	252
	144.2	306	149.3	313	154.4	321	159.6	326	164.7	331	169.1	339
58	79.9	.487	81.2	.501	82.8	.518	83.6	.526	84.9	.541	86.1	.556
	2193	269	2164	267	2147	266	2095	260	2080	258	2063	254
	141.8	311	146.7	318	151.6	326	156.8	328	161.2	335	165.5	341
60	80.7	.493	82.1	.508	83.4	.522	84.3	.531	85.7	.549	86.7	.560
	2256	273	2233	271	2203	268	2156	263	2153	261	2123	256
	139.5	315	144.2	322	149.0	328	153.8	332	157.9	340	162.0	344
62	81.4	.498	83.0	.515	84.0	.525	85.1	.538	86.4	.554	87.3	.564
	2317	276	2301	275	2255	270	2228	266	2217	264	2188	258
	137.4	318	141.8	326	146.5	330	150.8	336	154.8	343	158.4	347
64	82.3	.505	83.7	.521	84.5	.528	85.8	.546	86.9	.558	88.1	.571
	2386	280	2364	278	2306	272	2302	270	2276	266	2265	261
	135.2	323	139.6	330	144.1	332	147.9	340	151.8	345	154.8	351
66	83.1	.512	84.2	.524	85.2	.534	86.6	.552	87.5	.562	88.7	.573
	2457	284	2418	280	2375	275	2373	273	2340	268	2325	263
	133.0	327	137.3	332	141.5	336	145.2	344	148.7	348	151.5	352
68	83.8	.518	84.7	.527	85.9	.541	87.1	.556	88.1	.567	88.7	.562
	2524	287	2469	281	2447	278	2434	275	2407	270	2316	257
	131.0	331	135.2	334	139.0	340	142.5	347	145.7	351	149.2	346
70	84.5	.522	85.2	.530	86.6	.547	87.7	.559	88.7	.570	88.7	.547
	2585	289	2525	283	2520	281	2493	277	2469	272	2305	250
	129.0	333	133.1	336	136.5	344	140.0	349	142.9	353	145.7	336
72	84.9	.525	85.9	.536	87.3	.553	88.2	.563	88.7	.561	88.7	.512
	2638	291	2596	286	2592	285	2558	279	2460	267	2283	233
	127.1	335	130.9	340	134.2	348	137.4	351	141.1	347	137.8	314
74	85.4	.528	86.6	.542	87.8	.556	88.8	.567	88.7	.548		
	2687	292	2669	290	2652	286	2625	281	2450	261		
	125.4	337	128.7	344	131.9	350	134.8	354	138.5	339		

ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A319-112 CFM56-5B6/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 0 FCOM-N0-03-06-30-004-240

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**N1 (%) MACH** **KG/H IAS (KT)** **NM/1000KG TAS (KT)**

WEIGHT (1000KG)	FL210	FL220	FL230	FL240	FL250	FL260
64	89.8 .557 2297 249 148.2 341	90.5 .563 2309 247 148.4 343	91.7 .575 2355 248 148.1 349	92.5 .575 2337 243 148.7 348	92.3 .545 2211 225 148.4 328	
66	90.6 .561 2383 252 144.2 344	91.5 .572 2419 251 144.0 348	92.9 .582 2454 251 143.8 353	92.6 .558 2327 235 145.0 337		
68	91.4 .568 2479 255 140.2 347	92.7 .580 2526 255 139.8 353	92.9 .568 2446 245 141.0 345			
70	92.5 .576 2587 259 136.2 352	93.3 .576 2567 253 136.8 351	93.1 .548 2435 235 136.5 332			
72	93.6 .583 2690 262 132.6 357	93.4 .562 2559 247 133.7 342				
74	93.6 .571 2684 256 130.3 350					
76	93.8 .555 2676 249 126.8 339					
78						
80						
82						
84						
86						
88						
90						
92						

ENGINE ANTI ICE ON △FUEL = + 2.5 %	**TOTAL ANTI ICE ON** △FUEL = + 5 %

11.0-08F0A321-211 CFM56-5B3/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 0 FCOM-G0-03-06-30-005-165

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

N1 (%) / MACH
KG/H / IAS (KT)
NM/1000KG / TAS (KT)

WEIGHT (1000KG)	FL100		FL120		FL140		FL160		FL180		FL200	
64	85.0	.490	86.1	.501	87.3	.513	88.6	.528	89.7	.540	90.6	.546
	2472	271	2431	267	2400	264	2389	261	2368	257	2329	250
	128.8	319	133.0	323	137.0	329	140.6	336	144.0	341	146.9	342
66	85.8	.496	86.7	.504	88.1	.520	89.1	.532	90.4	.546	91.5	.552
	2541	274	2487	269	2478	267	2450	263	2444	260	2417	252
	126.8	322	130.9	325	134.4	333	138.0	338	141.0	345	143.1	346
68	86.3	.499	87.4	.510	88.8	.526	89.7	.536	90.9	.547	92.3	.559
	2599	276	2558	272	2551	270	2520	265	2501	260	2513	256
	124.8	324	128.6	329	132.0	337	135.3	341	138.1	345	139.2	350
70	86.8	.502	88.1	.516	89.3	.530	90.4	.541	91.3	.547	93.1	.564
	2656	278	2634	275	2617	272	2595	268	2552	260	2605	258
	122.9	327	126.4	333	129.7	339	132.7	344	135.3	345	135.6	353
72	87.4	.505	88.8	.522	89.8	.533	91.1	.547	92.2	.553	94.0	.572
	2712	280	2709	278	2680	274	2672	271	2647	263	2720	262
	121.1	328	124.2	337	127.4	342	130.1	348	131.9	349	131.8	358
74	88.0	.511	89.5	.527	90.4	.537	91.5	.548	92.9	.559	95.1	.579
	2788	283	2782	281	2753	276	2729	271	2742	266	2828	265
	119.1	332	122.2	340	125.1	344	127.6	348	128.7	353	128.3	363
76	88.7	.516	90.0	.530	91.0	.542	92.0	.547	93.6	.563	95.7	.577
	2864	286	2848	283	2828	279	2781	271	2831	268	2878	264
	117.2	336	120.2	342	122.9	347	125.2	348	125.6	356	125.6	361
78	89.4	.522	90.4	.533	91.6	.547	92.7	.553	94.5	.571	95.8	.564
	2942	289	2911	285	2904	281	2871	274	2944	272	2872	258
	115.3	339	118.2	344	120.7	350	122.5	352	122.4	360	123.1	353
80	90.0	.527	91.0	.537	92.1	.548	93.4	.559	95.4	.577	95.9	.544
	3016	292	2982	287	2964	282	2973	277	3053	275	2865	249
	113.5	342	116.3	347	118.5	351	119.7	356	119.3	364	119.0	341
82	90.5	.530	91.5	.542	92.5	.549	94.1	.563	95.9	.574		
	3083	294	3058	289	3018	282	3061	279	3091	273		
	111.8	345	114.3	350	116.5	352	117.0	358	117.1	362		
84	90.9	.533	92.1	.546	93.0	.551	94.8	.569	96.0	.561		
	3148	296	3135	292	3090	284	3169	282	3085	267		
	110.1	347	112.4	353	114.3	353	114.3	362	114.9	354		
86	91.4	.537	92.6	.549	93.8	.558	95.7	.575	96.1	.544		
	3217	298	3204	293	3198	287	3279	285	3077	259		
	108.5	349	110.6	354	111.8	358	111.6	366	111.5	343		
88	92.0	.541	93.0	.549	94.4	.562	96.6	.581				
	3293	300	3259	293	3287	289	3388	288				
	106.8	352	108.8	355	109.5	360	109.1	370				
90	92.5	.545	93.3	.549	95.0	.566	97.2	.581				
	3369	302	3311	293	3380	291	3454	288				
	105.1	354	107.0	354	107.2	362	107.1	370				
92	93.0	.549	94.0	.555	95.8	.572	97.2	.571				
	3448	304	3411	296	3494	295	3446	283				
	103.5	357	105.0	358	104.9	367	105.4	363				

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A321-211 CFM56-5B3/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 10 FCOM-G0-03-06-30-006-165

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF							ISA CG=33.0%		**N1 (%) KG/H NM/1000KG**			**MACH IAS (KT) TAS (KT)**
WEIGHT (1000KG)	**FL210**		**FL220**		**FL230**		**FL240**		**FL250**		**FL260**	
50	83.3	.533	84.1	.541	84.7	.549	85.2	.554	85.8	.560	86.5	.567
	1778	238	1777	237	1771	236	1759	233	1750	231	1752	229
	183.3	326	185.6	330	188.0	333	190.4	335	192.5	337	194.1	340
52	84.3	.541	85.0	.548	85.5	.554	86.0	.559	86.7	.567	87.2	.568
	1851	242	1846	241	1833	238	1821	235	1825	234	1807	230
	178.8	331	181.1	334	183.4	336	185.4	338	187.0	341	188.5	341
54	85.2	.548	85.7	.553	86.2	.558	86.9	.566	87.4	.568	88.4	.580
	1920	246	1907	243	1896	240	1898	239	1880	235	1912	235
	174.6	335	176.8	337	178.8	339	180.4	342	181.8	342	181.8	348
56	85.9	.553	86.4	.558	87.0	.565	87.6	.569	88.4	.577	88.6	.568
	1983	248	1970	245	1969	243	1958	240	1975	238	1917	229
	170.7	338	172.6	340	174.2	343	175.5	344	175.9	347	177.5	340
58	86.5	.557	87.1	.564	87.7	.569	88.5	.574	89.5	.586	88.5	.539
	2045	250	2041	248	2035	245	2039	242	2075	242	1899	217
	166.8	341	168.3	344	169.7	345	170.3	347	170.1	353	170.2	323
60	87.2	.562	87.9	.569	88.4	.571	89.5	.585	90.6	.595		
	2112	252	2112	250	2100	246	2144	247	2178	246		
	162.9	344	164.2	347	165.2	347	164.9	353	164.5	358		
62	88.0	.569	88.5	.570	89.6	.583	90.6	.593	92.1	.610		
	2190	255	2169	251	2211	251	2243	250	2302	253		
	159.0	348	160.2	347	160.0	354	159.7	358	159.3	367		
64	88.6	.570	89.5	.579	90.5	.590	91.8	.605	92.4	.601		
	2247	256	2270	255	2306	254	2362	256	2323	249		
	155.2	349	155.5	353	155.2	358	154.8	366	155.7	362		
66	89.4	.575	90.4	.587	91.5	.599	92.6	.605	92.6	.582		
	2327	258	2371	259	2413	258	2422	256	2315	241		
	151.2	352	150.9	358	150.6	363	151.0	366	151.3	350		
68	90.3	.584	91.4	.595	92.7	.609	92.9	.594				
	2434	263	2473	262	2523	263	2434	251				
	146.9	358	146.6	363	146.5	370	147.5	359				
70	91.2	.591	92.6	.606	93.1	.601	93.0	.569				
	2529	266	2595	267	2547	260	2418	240				
	142.9	362	142.4	370	143.3	365	142.3	344				
72	92.2	.599	93.2	.605	93.3	.585						
	2638	269	2648	267	2543	252						
	138.9	366	139.3	369	139.7	355						
74	93.3	.609	93.5	.597	93.5	.554						
	2752	274	2666	263	2524	238						
	135.4	373	136.4	364	133.1	336						
76	93.6	.603	93.6	.577								
	2778	271	2656	254								
	132.7	369	132.3	351								
78	93.9	.591										
	2784	265										
	129.8	361										
ENGINE ANTI ICE ON ΔFUEL = + 3.5 %							**TOTAL ANTI ICE ON** ΔFUEL = + 7 %					

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA+10
CG=33.0%

N1 (%) **MACH**
KG/H **IAS (KT)**
NM/1000KG **TAS (KT)**

WEIGHT (1000KG)	FL100		FL120		FL140		FL160		FL180		FL200	
50	76.8	.451	78.8	.470	80.4	.485	81.8	.499	83.4	.514	84.3	.523
	1921	249	1921	250	1904	249	1879	246	1862	244	1821	239
	152.7	293	157.9	303	163.3	311	169.0	317	174.4	325	180.0	328
52	78.0	.461	79.9	.478	81.2	.490	82.8	.507	84.0	.519	85.2	.531
	2000	255	1994	255	1960	252	1949	250	1917	246	1893	243
	149.8	300	154.9	309	160.3	314	165.4	322	170.8	327	175.8	333
54	79.2	.470	80.8	.485	82.2	.498	83.8	.514	84.7	.523	86.1	.539
	2076	260	2059	258	2030	256	2016	254	1973	248	1967	246
	147.0	305	152.0	313	157.1	319	162.1	327	167.3	330	171.6	338
56	80.3	.478	81.6	.490	83.1	.505	84.5	.518	85.6	.530	87.0	.546
	2152	264	2117	261	2101	259	2073	256	2044	252	2041	250
	144.4	311	149.3	316	154.1	324	159.0	330	163.6	335	167.7	342
58	81.1	.484	82.4	.496	84.1	.512	85.1	.521	86.4	.537	87.7	.551
	2217	268	2185	265	2170	263	2126	258	2117	255	2107	252
	141.9	315	146.6	320	151.2	328	156.0	332	160.1	339	164.0	345
60	81.9	.489	83.4	.503	84.8	.517	85.8	.527	87.3	.544	88.4	.555
	2279	271	2257	269	2233	266	2193	261	2193	259	2170	254
	139.5	318	144.0	325	148.4	331	152.9	335	156.6	343	160.4	348
62	82.6	.494	84.2	.510	85.4	.521	86.5	.533	88.0	.549	89.0	.560
	2339	273	2327	272	2289	268	2265	264	2261	261	2237	256
	137.2	321	141.4	329	145.8	334	149.8	339	153.4	347	156.8	351
64	83.5	.501	85.1	.516	85.9	.524	87.3	.540	88.6	.553	89.8	.566
	2412	277	2394	275	2344	269	2339	267	2325	263	2317	259
	134.9	325	139.0	333	143.3	336	146.8	343	150.3	349	153.1	355
66	84.3	.506	85.6	.519	86.7	.530	88.1	.547	89.2	.557	90.4	.569
	2481	280	2452	277	2418	273	2416	271	2390	265	2382	260
	132.7	329	136.7	335	140.6	340	143.9	348	147.2	352	149.6	356
68	85.1	.512	86.2	.522	87.4	.536	88.7	.551	89.8	.561	91.0	.570
	2551	284	2507	279	2490	276	2483	273	2459	267	2445	261
	130.5	333	134.5	337	137.9	344	141.2	350	144.1	354	146.2	357
70	85.8	.517	86.7	.526	88.1	.542	89.3	.555	90.5	.567	92.0	.580
	2618	287	2568	281	2566	279	2547	275	2540	270	2559	266
	128.5	336	132.2	340	135.4	347	138.5	353	141.0	358	142.1	363
72	86.3	.520	87.4	.532	88.9	.548	89.9	.558	91.1	.570	92.9	.587
	2675	288	2640	284	2641	282	2613	277	2604	271	2662	269
	126.5	338	129.9	343	132.9	351	135.9	355	138.1	360	138.2	368
74	86.8	.523	88.1	.537	89.4	.552	90.5	.562	91.6	.571	93.8	.594
	2731	290	2715	287	2708	284	2684	279	2665	272	2768	273
	124.6	340	127.7	347	130.6	354	133.3	358	135.2	360	134.5	372
76	87.4	.527	88.7	.543	89.9	.555	91.1	.568	92.5	.580	94.8	.604
	2794	292	2791	290	2772	286	2765	281	2781	276	2888	277
	122.6	343	125.5	350	128.4	356	130.6	361	131.6	366	131.0	378
78	88.0	.532	89.4	.548	90.4	.558	91.7	.570	93.4	.587	95.5	.605
	2867	295	2866	293	2838	287	2833	283	2888	280	2958	278
	120.7	346	123.4	354	126.1	358	128.1	363	128.3	371	128.2	379

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 3.5 %	△FUEL = + 7 %

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA
CG=33.0%

N1 (%) — MACH
KG/H — IAS (KT)
NM/1000KG — TAS (KT)

WEIGHT (1000KG)	FL210		FL220		FL230		FL240		FL250		FL260	
48	82.5	.528	83.2	.536	84.0	.546	84.5	.553	85.0	.558	85.6	.564
	1718	236	1713	235	1713	235	1704	233	1690	230	1685	228
	188.0	323	190.7	327	193.3	331	196.0	334	198.6	336	200.8	338
50	83.5	.536	84.2	.546	84.8	.553	85.3	.557	85.8	.563	86.5	.571
	1788	240	1787	239	1778	238	1762	235	1755	233	1756	231
	183.5	328	186.0	332	188.6	335	191.1	337	193.3	339	195.0	342
52	84.4	.545	85.0	.552	85.5	.557	86.0	.563	86.7	.571	87.2	.572
	1861	244	1853	243	1837	240	1827	237	1830	236	1810	231
	179.2	334	181.7	337	184.1	338	186.2	340	187.9	344	189.6	343
54	85.3	.552	85.7	.557	86.2	.562	86.9	.570	87.4	.573	88.4	.585
	1929	247	1912	245	1900	242	1902	241	1886	237	1916	237
	175.2	338	177.5	339	179.6	341	181.2	345	182.8	345	183.1	351
56	85.9	.557	86.4	.562	87.0	.569	87.6	.573	88.4	.582	88.6	.573
	1989	250	1975	247	1974	245	1963	242	1977	240	1922	232
	171.3	341	173.3	342	175.0	345	176.5	346	177.1	350	178.7	343
58	86.5	.561	87.2	.568	87.8	.573	88.4	.579	88.5	.568	88.5	.546
	2048	251	2046	250	2039	247	2040	244	1973	234	1904	220
	167.5	343	169.1	346	170.6	348	171.5	350	173.2	342	171.9	327
60	87.3	.566	87.9	.573	88.4	.575	88.5	.567	88.5	.540		
	2118	254	2118	252	2101	248	2042	239	1955	222		
	163.6	346	165.0	349	166.2	349	167.7	343	166.2	325		
62	88.1	.573	88.5	.575	88.6	.566	88.5	.542				
	2195	257	2175	253	2112	244	2025	228				
	159.8	351	161.1	350	162.6	344	161.8	328				
64	88.6	.575	88.6	.565	88.6	.544						
	2252	258	2182	248	2097	234						
	156.1	352	157.9	344	157.5	330						
66	88.7	.564	88.6	.546								
	2249	253	2168	240								
	153.4	345	153.5	333								
68	88.7	.547										
	2237	245										
	149.5	334										
70	88.7	.547										
	2207	222										
	137.7	304										
72												
74												

ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A319-112 CFM56-5B6/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 0 FCOM-N0-03-06-30-005-240

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF	ISA+10 CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL120**		**FL140**		**FL160**		**FL180**		**FL200**	
48	75.4	.436	77.3	.456	79.5	.478	81.0	.493	82.6	.511	83.7	.521
	1827	241	1833	242	1846	245	1825	243	1812	242	1774	238
	155.2	283	160.4	294	166.0	306	171.9	314	177.9	322	184.1	327
50	76.5	.445	78.7	.467	80.5	.487	82.1	.503	83.5	.518	84.4	.526
	1903	246	1919	249	1917	250	1898	248	1876	246	1830	240
	152.1	289	157.2	302	162.7	312	168.4	320	174.2	327	180.2	330
52	77.8	.455	80.0	.478	81.4	.493	83.1	.511	84.2	.522	85.3	.534
	1985	252	2000	255	1980	253	1968	252	1930	248	1902	244
	149.1	296	154.2	308	159.7	316	165.1	325	170.7	329	176.0	335
54	79.1	.467	80.9	.486	82.4	.501	84.0	.518	84.8	.526	86.2	.543
	2072	258	2071	259	2051	257	2034	256	1983	250	1977	248
	146.4	303	151.4	313	156.6	321	161.9	329	167.4	332	172.0	340
56	80.4	.477	81.8	.493	83.4	.509	84.6	.521	85.7	.533	87.1	.550
	2158	264	2138	263	2121	261	2087	258	2055	254	2050	252
	143.8	310	148.7	318	153.7	326	158.9	332	163.8	337	168.2	345
58	81.3	.485	82.7	.500	84.3	.516	85.2	.525	86.5	.541	87.8	.555
	2230	268	2207	267	2190	265	2139	259	2129	257	2112	254
	141.3	315	146.2	323	151.0	331	156.0	334	160.4	341	164.6	348
60	82.1	.491	83.6	.507	85.0	.520	85.9	.530	87.4	.548	88.4	.559
	2300	272	2279	271	2248	267	2204	262	2203	261	2175	256
	138.9	319	143.6	327	148.3	334	153.1	337	157.1	346	161.0	350
62	82.9	.497	84.5	.514	85.5	.524	86.7	.537	88.0	.553	89.1	.564
	2362	275	2348	274	2302	269	2276	266	2268	263	2243	258
	136.8	323	141.2	332	145.8	336	150.0	342	153.9	349	157.5	353
64	83.8	.504	85.3	.519	86.1	.527	87.5	.544	88.6	.557	89.8	.571
	2435	279	2414	277	2356	271	2352	269	2330	265	2323	261
	134.5	328	138.9	335	143.4	338	147.1	346	150.9	352	153.9	357
66	84.6	.510	85.8	.523	86.8	.534	88.2	.551	89.2	.561	90.3	.571
	2505	283	2469	279	2429	274	2427	273	2395	267	2374	261
	132.4	332	136.6	337	140.7	342	144.4	350	147.8	354	150.7	358
68	85.4	.516	86.3	.525	87.5	.540	88.8	.555	89.8	.566	90.3	.560
	2574	286	2522	281	2504	278	2491	275	2466	269	2364	256
	130.3	336	134.5	339	138.2	346	141.7	353	144.8	357	148.3	351
70	86.0	.521	86.8	.529	88.2	.546	89.3	.558	90.3	.568	90.3	.543
	2637	289	2581	283	2580	281	2552	276	2522	270	2352	248
	128.4	339	132.4	342	135.7	350	139.1	355	142.1	358	144.6	340
72	86.5	.524	87.5	.535	88.9	.552	89.9	.562	90.3	.558	90.3	.500
	2692	290	2654	286	2652	284	2619	278	2513	266	2324	228
	126.5	341	130.1	345	133.4	354	136.5	358	140.2	352	134.8	313
74	86.9	.527	88.2	.541	89.4	.555	90.5	.566	90.3	.545		
	2747	292	2728	289	2714	286	2690	281	2500	259		
	124.6	342	128.0	349	131.1	356	133.9	360	137.5	344		

ENGINE ANTI ICE ON △FUEL = + 2.5 %	**TOTAL ANTI ICE ON** △FUEL = + 5 %

11.0-08F0A319-112 CFM56-5B6/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 10 FCOM-N0-03-06-30-006-240

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+10
CG=33.0%

N1 (%) / MACH
KG/H / IAS (KT)
NM/1000KG / TAS (KT)

WEIGHT (1000KG)	FL210		FL220		FL230		FL240		FL250		FL260
64	91.5 2352 147.3	.555 249 346	92.3 2369 147.4	.562 247 349	93.5 2417 147.0	.574 247 355	94.3 2391 147.8	.573 242 353	94.1 2264 146.9	.541 223 333	
66	92.3 2440 143.2	.560 251 349	93.3 2483 142.9	.571 251 355	94.6 2509 142.9	.579 250 359	94.4 2381 143.9	.555 234 343			
68	93.2 2545 139.1	.567 255 354	94.5 2591 138.8	.579 255 360	94.7 2501 140.0	.566 243 350					
70	94.3 2657 135.2	.576 258 359	95.0 2624 135.9	.574 252 357	94.8 2490 135.2	.544 234 337					
72	95.3 2752 131.7	.581 261 362	95.1 2616 132.6	.558 245 347							
74	95.4 2746 129.3	.569 255 355									
76	95.5 2738 125.6	.551 247 344									
78											
80											
82											
84											
86											
88											
90											
92											

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A321-211 CFM56-5B3/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 10 FCOM-G0-03-06-30-007-165

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+15 CG=33.0%	**N1 (%) KG/H NM/1000KG**	**MACH IAS (KT) TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL120**		**FL140**		**FL160**		**FL180**		**FL200**	
64	85.7	.489	86.9	.500	88.1	.513	89.4	.527	90.5	.540	91.5	.545
	2496	271	2456	267	2428	263	2415	261	2396	257	2355	249
	128.5	321	132.7	326	136.6	332	140.2	339	143.5	344	146.4	345
66	86.5	.495	87.4	.503	88.9	.519	90.0	.531	91.2	.545	92.3	.552
	2567	274	2511	268	2504	267	2480	263	2473	259	2448	252
	126.5	325	130.5	328	134.1	336	137.5	341	140.5	347	142.6	349
68	87.1	.499	88.1	.509	89.6	.525	90.6	.536	91.7	.546	93.2	.558
	2627	276	2586	272	2578	270	2551	265	2530	260	2544	255
	124.5	327	128.2	332	131.6	339	134.9	344	137.6	348	138.7	353
70	87.6	.502	88.9	.515	90.1	.529	91.2	.541	92.2	.546	94.0	.563
	2684	278	2663	275	2645	272	2627	268	2584	260	2639	258
	122.6	329	126.0	336	129.3	342	132.2	347	134.8	348	135.0	356
72	88.1	.505	89.6	.521	90.7	.532	91.9	.546	93.0	.553	94.9	.572
	2743	280	2741	278	2710	274	2704	270	2682	263	2754	262
	120.7	331	123.9	339	127.0	344	129.7	351	131.5	353	131.3	362
74	88.8	.510	90.2	.526	91.3	.537	92.4	.547	93.8	.559	95.1	.562
	2820	283	2814	281	2785	276	2760	271	2777	266	2756	257
	118.7	335	121.8	343	124.7	347	127.2	351	128.2	356	129.0	355
76	89.5	.516	90.8	.530	91.9	.542	92.8	.547	94.5	.563	95.1	.546
	2897	286	2880	283	2862	279	2813	271	2870	268	2748	250
	116.8	338	119.8	345	122.5	350	124.8	351	125.1	359	125.7	345
78	90.2	.521	91.2	.533	92.5	.547	93.5	.552	95.2	.568		
	2974	289	2945	285	2940	281	2907	274	2965	271		
	115.0	342	117.8	347	120.3	354	122.0	355	122.1	362		
80	90.8	.526	91.8	.537	92.9	.548	94.3	.559	95.3	.558		
	3048	292	3019	287	2999	282	3008	277	2962	266		
	113.2	345	115.9	350	118.1	354	119.2	359	120.1	356		
82	91.3	.530	92.4	.541	93.3	.548	94.9	.562	95.4	.543		
	3117	294	3095	289	3053	282	3097	279	2955	258		
	111.4	347	113.9	353	116.1	354	116.6	361	117.1	346		
84	91.7	.533	92.9	.546	93.9	.551	95.7	.569				
	3182	295	3172	292	3130	283	3209	282				
	109.8	349	112.0	355	113.8	356	113.8	365				
86	92.2	.536	93.4	.548	94.7	.558	96.5	.574				
	3255	297	3239	293	3240	287	3309	284				
	108.1	352	110.2	357	111.4	361	111.3	368				
88	92.8	.540	93.8	.548	95.3	.562	96.5	.564				
	3331	300	3294	293	3330	289	3302	279				
	106.4	354	108.4	357	109.1	363	109.7	362				
90	93.3	.545	94.2	.548	95.9	.566	96.6	.551				
	3410	302	3349	293	3429	292	3293	273				
	104.8	357	106.7	357	106.8	366	107.4	354				
92	93.8	.549	94.9	.554	96.2	.563	96.7	.524				
	3491	304	3454	296	3462	290	3275	259				
	103.1	360	104.6	361	105.1	364	102.7	336				

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
ΔFUEL = + 2.5 %	ΔFUEL = + 5 %

11.0-08F0A321-211 CFM56-5B3/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 15 FCOM-G0-03-06-30-008-165

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF	ISA+10 CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	FL210		FL220		FL230		FL240		FL250		FL260	
50	85.0	.532	85.8	.540	86.4	.548	87.0	.554	87.5	.559	88.2	.566
	1818	238	1818	237	1814	236	1804	233	1795	231	1794	229
	182.4	332	184.8	336	187.1	339	189.4	342	191.4	344	193.0	346
52	86.0	.540	86.6	.547	87.2	.553	87.7	.558	88.5	.566	89.0	.567
	1892	242	1888	240	1877	238	1868	235	1870	234	1852	229
	178.0	337	180.2	340	182.5	342	184.4	344	186.0	348	187.4	347
54	86.8	.547	87.4	.552	87.9	.557	88.6	.566	89.1	.567	90.2	.579
	1964	245	1952	242	1940	240	1946	239	1928	234	1963	234
	173.8	341	176.0	343	177.9	345	179.4	349	180.8	348	180.6	355
56	87.6	.552	88.1	.557	88.8	.564	89.3	.567	90.3	.577	90.3	.565
	2030	247	2016	245	2017	243	2005	239	2030	239	1962	228
	169.8	345	171.7	346	173.2	349	174.6	350	174.7	355	176.3	346
58	88.2	.556	88.9	.563	89.5	.567	90.2	.574	91.3	.586	90.3	.536
	2092	249	2089	247	2082	244	2091	242	2130	242	1944	216
	165.9	347	167.4	350	168.7	351	169.3	354	168.9	360	168.8	328
60	88.9	.561	89.6	.567	90.2	.571	91.3	.583	92.4	.595		
	2163	252	2162	249	2153	246	2196	246	2237	246		
	162.0	350	163.2	353	164.1	353	163.8	360	163.4	365		
62	89.7	.568	90.2	.568	91.3	.581	92.3	.591	93.9	.608		
	2241	255	2219	250	2263	250	2300	250	2362	252		
	158.0	354	159.2	353	159.0	360	158.6	365	158.2	374		
64	90.3	.569	91.2	.578	92.3	.589	93.6	.603	94.2	.599		
	2301	255	2328	254	2365	254	2420	255	2382	248		
	154.3	355	154.4	359	154.1	365	153.6	372	154.6	368		
66	91.1	.574	92.2	.586	93.3	.597	94.4	.604	94.3	.579		
	2388	258	2432	258	2476	258	2484	255	2369	239		
	150.1	358	149.9	364	149.5	370	149.9	372	150.0	356		
68	92.1	.584	93.2	.594	94.5	.607	94.6	.591				
	2498	262	2538	262	2586	262	2490	250				
	145.8	364	145.5	369	145.4	376	146.4	364				
70	93.0	.591	94.4	.606	94.9	.599	94.8	.565				
	2599	265	2666	267	2610	259	2474	238				
	141.8	369	141.3	377	142.2	371	141.0	349				
72	94.0	.599	95.0	.604	95.0	.581						
	2710	269	2715	266	2600	250						
	137.8	374	138.3	376	138.4	360						
74	95.1	.608	95.2	.593	95.3	.543						
	2822	273	2727	261	2579	233						
	134.4	379	135.3	369	130.3	336						
76	95.4	.601	95.4	.572								
	2850	270	2717	252								
	131.6	375	131.0	356								
78	95.6	.587										
	2850	264										
	128.7	367										

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 3.5 %	△FUEL = + 7 %

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF	ISA+15 CG=33.0%	**N1 (%)** **MACH** **KG/H** **IAS (KT)** **NM/1000KG** **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL120**		**FL140**		**FL160**		**FL180**		**FL200**	
50	77.5	.451	79.5	.469	81.1	.485	82.5	.498	84.1	.514	85.1	.523
	1939	249	1938	250	1923	249	1897	246	1881	244	1842	239
	152.5	296	157.6	306	163.0	313	168.6	320	174.0	327	179.6	331
52	78.7	.460	80.6	.478	81.9	.490	83.6	.506	84.8	.518	86.0	.531
	2018	254	2013	254	1980	251	1969	250	1938	246	1914	242
	149.5	302	154.6	311	160.0	317	165.1	325	170.4	330	175.3	336
54	79.9	.469	81.5	.484	82.9	.498	84.6	.513	85.5	.522	86.9	.538
	2094	259	2078	258	2052	255	2038	254	1993	248	1988	246
	146.8	307	151.7	315	156.8	322	161.7	330	166.9	333	171.2	340
56	81.0	.477	82.3	.489	83.9	.505	85.3	.518	86.4	.529	87.8	.546
	2171	264	2137	261	2124	259	2096	256	2067	252	2063	249
	144.1	313	149.0	318	153.7	326	158.5	332	163.2	337	167.3	345
58	81.8	.483	83.2	.496	84.8	.511	85.9	.521	87.2	.536	88.5	.551
	2238	267	2207	264	2192	263	2151	258	2141	255	2131	252
	141.6	317	146.3	323	150.8	331	155.5	335	159.6	342	163.5	348
60	82.6	.488	84.1	.503	85.6	.516	86.6	.527	88.1	.543	89.2	.555
	2301	270	2280	268	2255	265	2219	260	2217	259	2196	254
	139.2	320	143.6	328	148.1	334	152.4	338	156.2	346	159.9	351
62	83.4	.493	85.0	.509	86.2	.520	87.4	.533	88.8	.549	89.9	.559
	2363	273	2351	272	2312	267	2292	264	2288	261	2263	256
	136.9	324	141.1	332	145.4	336	149.4	342	152.9	350	156.3	354
64	84.3	.500	85.9	.515	86.7	.524	88.2	.540	89.4	.553	90.6	.566
	2437	277	2421	275	2370	269	2367	267	2354	263	2344	259
	134.6	328	138.6	336	142.9	339	146.4	346	149.8	353	152.6	358
66	85.1	.506	86.4	.519	87.5	.530	88.9	.546	90.0	.557	91.3	.568
	2509	280	2479	277	2444	272	2442	270	2419	265	2410	260
	132.3	332	136.3	338	140.2	343	143.5	350	146.7	355	149.1	359
68	85.9	.512	86.9	.522	88.2	.536	89.6	.551	90.7	.561	91.9	.570
	2579	283	2535	279	2519	275	2511	273	2490	267	2475	261
	130.2	336	134.1	340	137.5	346	140.7	353	143.7	358	145.7	360
70	86.6	.517	87.5	.526	88.9	.542	90.1	.554	91.4	.567	92.9	.580
	2646	286	2598	281	2596	279	2577	274	2571	270	2594	266
	128.1	339	131.8	342	135.0	350	138.1	356	140.6	361	141.5	367
72	87.1	.520	88.2	.531	89.7	.548	90.7	.558	91.9	.569	93.8	.587
	2703	288	2672	284	2672	282	2644	276	2635	271	2698	269
	126.1	341	129.5	346	132.5	354	135.4	358	137.6	363	137.7	371
74	87.6	.522	88.9	.537	90.2	.552	91.3	.562	92.5	.570	94.7	.594
	2759	290	2746	287	2740	284	2716	278	2698	272	2806	273
	124.2	343	127.3	350	130.2	357	132.8	361	134.7	363	134.0	376
76	88.1	.526	89.5	.542	90.7	.555	92.0	.567	93.4	.579	95.2	.593
	2823	292	2822	290	2805	286	2798	281	2816	276	2862	272
	122.3	345	125.1	353	127.9	359	130.2	364	131.1	369	131.1	375
78	88.8	.532	90.2	.548	91.3	.558	92.5	.570	94.2	.587	95.3	.580
	2899	295	2899	293	2873	287	2867	282	2924	280	2855	266
	120.3	349	123.0	357	125.6	361	127.6	366	127.8	374	128.5	367

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 3.5 %	△FUEL = + 7 %

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF	ISA+10 CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	FL210		FL220		FL230		FL240		FL250		FL260	
48	84.2	.527	84.9	.535	85.7	.545	86.3	.552	86.7	.557	87.4	.563
	1756	236	1754	235	1754	234	1746	233	1732	230	1726	228
	187.2	329	189.8	333	192.4	338	195.0	341	197.6	342	199.8	345
50	85.1	.535	85.9	.544	86.5	.552	87.0	.557	87.6	.563	88.3	.570
	1827	239	1828	239	1821	237	1806	235	1799	232	1798	230
	182.7	334	185.2	338	187.7	342	190.1	343	192.2	346	193.9	349
52	86.1	.543	86.7	.551	87.2	.556	87.8	.562	88.5	.570	88.9	.571
	1902	243	1895	242	1880	239	1872	237	1876	236	1855	231
	178.4	339	180.8	343	183.2	344	185.2	347	186.8	350	188.4	350
54	86.9	.551	87.4	.555	87.9	.561	88.7	.570	89.2	.572	90.2	.585
	1972	247	1956	244	1944	241	1950	240	1933	236	1967	237
	174.3	344	176.6	345	178.6	347	180.2	351	181.8	351	181.9	358
56	87.6	.555	88.1	.560	88.8	.568	89.3	.572	90.2	.581	90.3	.570
	2034	249	2020	246	2022	245	2010	241	2028	240	1966	231
	170.4	347	172.4	348	174.0	352	175.5	353	176.0	357	177.5	349
58	88.3	.560	88.9	.567	89.5	.572	90.2	.578	90.2	.565	90.3	.542
	2099	251	2096	249	2087	246	2092	244	2017	233	1948	219
	166.5	349	168.2	352	169.6	354	170.4	356	172.1	347	170.3	332
60	89.0	.565	89.6	.572	90.2	.575	90.3	.564	90.2	.535		
	2168	253	2167	251	2154	248	2087	238	1998	220		
	162.7	353	164.1	356	165.2	356	166.7	348	164.4	328		
62	89.8	.572	90.2	.573	90.3	.563	90.2	.537				
	2246	257	2225	252	2156	242	2069	226				
	158.9	357	160.1	356	161.7	349	160.2	331				
64	90.3	.573	90.3	.562	90.3	.540						
	2305	257	2226	247	2140	232						
	155.2	358	156.9	349	156.1	334						
66	90.3	.561	90.3	.541								
	2296	251	2211	237								
	152.5	350	152.1	336								
68	90.3	.542										
	2282	243										
	148.2	338										
70												
72												
74												

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A319-112 CFM56-5B6/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 10 FCOM-N0-03-06-30-007-240

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF							ISA+15 CG=33.0%		**N1 (%)** **KG/H** **NM/1000KG**		**MACH** **IAS (KT)** **TAS (KT)**	
WEIGHT (1000KG)	**FL100**		**FL120**		**FL140**		**FL160**		**FL180**		**FL200**	
48	76.0	.435	77.9	.454	80.2	.477	81.7	.492	83.3	.509	84.4	.521
	1842	240	1846	242	1860	244	1842	243	1829	242	1793	238
	155.0	285	160.2	296	165.7	308	171.6	316	177.6	325	183.7	329
50	77.2	.444	79.4	.466	81.2	.485	82.8	.502	84.3	.517	85.2	.526
	1919	245	1934	248	1932	249	1916	248	1894	245	1851	240
	151.9	291	157.0	304	162.4	314	168.1	322	173.8	329	179.7	333
52	78.4	.454	80.7	.477	82.2	.493	83.8	.510	85.0	.521	86.1	.534
	2000	251	2017	254	2000	253	1987	252	1949	247	1923	244
	148.9	298	154.0	311	159.3	319	164.7	327	170.3	332	175.5	338
54	79.8	.465	81.6	.485	83.2	.501	84.8	.517	85.6	.525	87.0	.542
	2089	257	2089	258	2073	257	2055	255	2004	249	1998	248
	146.2	305	151.1	316	156.3	324	161.5	332	167.0	335	171.6	343
56	81.1	.476	82.5	.492	84.2	.508	85.4	.521	86.5	.532	87.9	.549
	2175	263	2158	262	2143	261	2110	257	2077	253	2072	251
	143.5	312	148.4	320	153.4	329	158.5	334	163.4	339	167.7	348
58	82.0	.484	83.5	.499	85.1	.515	86.0	.524	87.3	.540	88.6	.554
	2249	268	2228	266	2212	265	2163	259	2151	257	2136	253
	141.0	317	145.8	325	150.6	333	155.6	337	159.9	344	164.1	351
60	82.9	.491	84.4	.506	85.7	.520	86.7	.530	88.2	.548	89.2	.558
	2322	272	2301	270	2271	267	2230	262	2229	261	2201	255
	138.6	322	143.3	330	148.0	336	152.6	340	156.6	349	160.5	353
62	83.6	.496	85.3	.513	86.3	.523	87.5	.537	88.8	.553	89.9	.563
	2387	275	2373	274	2326	269	2303	265	2296	263	2270	258
	136.4	326	140.8	334	145.4	338	149.6	344	153.4	352	157.0	356
64	84.5	.503	86.0	.519	86.8	.527	88.3	.543	89.4	.556	90.0	.556
	2460	279	2440	277	2382	271	2378	269	2358	265	2272	254
	134.2	330	138.5	338	143.0	341	146.7	349	150.4	355	154.6	351
66	85.3	.510	86.6	.522	87.6	.533	89.0	.550	89.9	.557	90.0	.542
	2532	282	2495	279	2456	274	2454	272	2406	265	2262	248
	132.0	334	136.3	340	140.3	345	143.9	353	147.7	355	151.7	343
68	86.1	.516	87.1	.525	88.3	.539	89.6	.554	89.9	.548	90.0	.520
	2602	286	2549	280	2530	277	2518	274	2399	261	2245	237
	130.0	338	134.1	342	137.8	349	141.2	356	145.7	350	146.5	329
70	86.7	.520	87.6	.529	89.1	.546	90.1	.558	89.9	.536		
	2663	288	2611	282	2609	281	2582	276	2390	255		
	128.0	341	132.0	345	135.3	353	138.7	358	142.9	341		
72	87.2	.523	88.3	.534	89.7	.551	90.7	.562	89.9	.516		
	2720	290	2683	285	2683	284	2650	278	2376	245		
	126.1	343	129.7	348	132.9	357	136.0	361	138.3	329		
74	87.7	.525	89.0	.540	90.2	.555	91.3	.566				
	2773	291	2760	289	2747	286	2723	280				
	124.3	345	127.5	352	130.7	359	133.4	363				
ENGINE ANTI ICE ON △FUEL = + 2.5 %							**TOTAL ANTI ICE ON** △FUEL = + 5 %					

11.0-08F0A319-112 CFM56-5B6/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 15 FCOM-N0-03-06-30-008-240

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

N1 (%) / **MACH**
KG/H / **IAS (KT)**
NM/1000KG / **TAS (KT)**

WEIGHT (1000KG)	FL210		FL220		FL230		FL240		FL250	FL260
64	92.4 2382 146.8	.555 249 350	93.2 2399 146.9	.561 247 352	93.9 2393 147.4	.564 243 353	93.6 2263 147.0	.534 225 333		
66	93.2 2469 142.7	.559 251 352	94.2 2513 142.4	.570 251 358	93.9 2383 143.7	.548 235 343				
68	94.1 2578 138.6	.567 254 357	94.3 2506 139.7	.558 245 350						
70	94.6 2632 135.5	.566 254 356	94.4 2495 135.4	.538 236 338						
72	94.7 2624 132.5	.552 247 348								
74	94.9 2611 126.8	.525 235 331								
76										
78										
80										
82										
84										
86										
88										
90										
92										

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A321-211 CFM56-5B3/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 15 FCOM-G0-03-06-30-009-165

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

N1 (%) / **MACH**
KG/H / **IAS (KT)**
NM/1000KG / **TAS (KT)**

WEIGHT (1000KG)	FL100		FL120		FL140		FL160		FL180		FL200	
64	86.4	.488	87.6	.499	88.9	.512	90.2	.527	91.3	.539	92.3	.544
	2518	270	2479	266	2455	263	2443	261	2423	256	2382	249
	128.2	323	132.3	328	136.2	334	139.7	341	143.1	347	145.9	348
66	87.3	.494	88.2	.503	89.7	.519	90.8	.531	92.0	.545	93.2	.551
	2593	274	2537	268	2533	266	2509	263	2502	259	2478	252
	126.1	327	130.2	330	133.6	339	137.1	344	140.1	350	142.1	352
68	87.8	.498	88.9	.508	90.4	.524	91.4	.536	92.5	.546	94.0	.557
	2652	276	2612	271	2607	269	2583	265	2559	260	2575	255
	124.2	329	127.9	334	131.2	342	134.4	347	137.1	351	138.2	356
70	88.4	.501	89.7	.514	90.9	.528	92.1	.541	93.0	.546	94.3	.553
	2713	277	2691	275	2674	271	2659	268	2613	260	2606	253
	122.2	332	125.6	338	128.9	345	131.8	350	134.3	351	135.4	353
72	88.9	.504	90.4	.521	91.5	.532	92.7	.546	93.9	.553	94.4	.539
	2773	279	2771	278	2741	273	2737	270	2716	263	2602	246
	120.4	334	123.5	342	126.6	347	129.2	354	131.0	356	132.3	344
74	89.6	.510	91.0	.526	92.1	.537	93.2	.546	94.6	.557	94.5	.513
	2852	282	2845	281	2817	276	2792	270	2800	265	2596	234
	118.3	337	121.4	345	124.3	350	126.8	354	127.9	358	126.1	327
76	90.3	.516	91.5	.529	92.7	.541	93.6	.546	94.6	.547		
	2930	286	2913	283	2894	278	2845	270	2796	260		
	116.4	341	119.4	348	122.0	353	124.4	354	125.7	352		
78	91.0	.521	92.1	.532	93.3	.546	94.4	.552	94.6	.532		
	3009	289	2979	284	2974	281	2944	273	2789	253		
	114.6	345	117.4	350	119.8	356	121.5	358	122.7	342		
80	91.6	.526	92.6	.537	93.7	.547	95.1	.558				
	3083	291	3054	287	3032	281	3045	276				
	112.8	348	115.5	353	117.7	357	118.8	362				
82	92.1	.529	93.2	.541	94.2	.547	95.7	.560				
	3152	293	3133	289	3087	281	3122	278				
	111.1	350	113.5	356	115.7	357	116.3	363				
84	92.5	.532	93.8	.546	94.8	.551	95.7	.551				
	3217	295	3211	291	3169	283	3118	273				
	109.4	352	111.6	358	113.4	359	114.5	357				
86	93.0	.536	94.2	.548	95.4	.556	95.8	.538				
	3291	297	3278	293	3266	286	3113	266				
	107.7	354	109.8	360	111.1	363	112.0	349				
88	93.6	.540	94.6	.548	95.5	.548	95.9	.510				
	3370	299	3332	293	3263	282	3105	252				
	106.0	357	108.0	360	109.6	358	106.4	330				
90	94.1	.544	95.0	.548	95.5	.538						
	3450	302	3389	293	3260	276						
	104.4	360	106.3	360	107.6	351						
92	94.6	.548	95.2	.543	95.6	.522						
	3529	304	3407	290	3256	268						
	102.8	363	104.8	357	104.6	340						

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A321-211 CFM56-5B3/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 20 FCOM-G0-03-06-30-010-165

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA+15
CG=33.0%

N1 (%) **MACH**
KG/H **IAS (KT)**
NM/1000KG **TAS (KT)**

WEIGHT (1000KG)	FL210		FL220		FL230		FL240		FL250		FL260	
50	85.8	.531	86.6	.540	87.3	.548	87.8	.553	88.4	.559	89.1	.565
	1840	238	1840	237	1836	235	1824	233	1817	230	1814	228
	182.0	335	184.3	339	186.6	343	188.8	344	190.9	347	192.5	349
52	86.8	.539	87.5	.547	88.0	.553	88.6	.558	89.3	.565	89.8	.566
	1914	241	1910	240	1901	238	1891	235	1892	233	1875	229
	177.5	340	179.7	343	181.9	346	183.9	348	185.4	351	186.8	350
54	87.7	.546	88.2	.552	88.8	.557	89.5	.566	90.0	.566	89.9	.552
	1986	245	1976	242	1965	240	1970	238	1950	234	1874	223
	173.3	344	175.4	347	177.3	349	178.8	352	180.2	351	182.0	341
56	88.4	.552	88.9	.556	89.6	.564	90.2	.567	91.1	.577	89.9	.518
	2053	247	2040	244	2043	243	2029	239	2056	238	1853	208
	169.3	348	171.2	349	172.7	353	174.0	353	174.1	358	172.7	320
58	89.1	.556	89.7	.562	90.3	.567	91.1	.574	92.2	.585		
	2118	249	2115	247	2108	244	2120	242	2158	242		
	165.4	350	166.9	353	168.2	354	168.6	357	168.3	363		
60	89.8	.561	90.4	.567	91.1	.570	92.2	.583	93.3	.594		
	2189	251	2187	249	2181	246	2226	246	2266	246		
	161.4	353	162.7	356	163.5	357	163.2	363	162.8	369		
62	90.6	.567	91.0	.568	92.2	.581	93.3	.591	93.5	.581		
	2268	254	2245	249	2292	250	2332	250	2265	240		
	157.5	357	158.7	356	158.4	363	158.0	368	159.2	360		
64	91.1	.568	92.1	.578	93.1	.588	93.8	.589	93.5	.556		
	2326	255	2359	254	2394	254	2380	249	2249	230		
	153.8	358	153.8	363	153.6	368	154.1	367	153.5	345		
66	92.0	.574	93.1	.586	94.1	.595	93.9	.570				
	2418	258	2463	258	2497	257	2369	241				
	149.6	362	149.3	368	149.1	372	150.0	355				
68	93.0	.583	94.1	.594	94.2	.581	94.0	.535				
	2530	262	2571	261	2488	250	2349	225				
	145.3	368	144.9	373	146.0	363	141.9	333				
70	93.9	.590	94.5	.590	94.3	.559						
	2633	265	2611	260	2476	241						
	141.3	372	141.7	370	141.3	350						
72	94.8	.597	94.6	.573								
	2737	268	2602	252								
	137.4	376	138.4	360								
74	94.9	.585	94.7	.548								
	2730	263	2589	241								
	134.9	368	133.0	344								
76	95.0	.566										
	2721	254										
	131.2	357										
78	95.2	.529										
	2705	237										
	123.3	334										

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
ΔFUEL = + 3.5 %	ΔFUEL = + 7 %

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF	ISA+20 CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL120**		**FL140**		**FL160**		**FL180**		**FL200**	
50	78.2	.450	80.2	.468	81.8	.484	83.3	.498	84.9	.513	85.9	.523
	1957	249	1957	249	1940	248	1916	246	1901	244	1864	239
	152.2	298	157.3	308	162.7	316	168.2	322	173.6	330	179.1	334
52	79.4	.459	81.3	.477	82.6	.489	84.3	.506	85.6	.517	86.8	.530
	2036	254	2032	254	1999	251	1989	250	1958	246	1937	242
	149.3	304	154.3	313	159.6	319	164.7	328	169.9	333	174.8	339
54	80.5	.468	82.2	.483	83.7	.497	85.4	.513	86.3	.521	87.8	.538
	2113	259	2098	258	2075	255	2060	253	2015	248	2012	246
	146.5	309	151.4	318	156.4	324	161.3	332	166.4	335	170.7	343
56	81.7	.476	83.0	.488	84.7	.504	86.0	.517	87.1	.529	88.6	.545
	2190	263	2158	260	2147	259	2118	255	2090	251	2087	249
	143.8	315	148.7	321	153.3	329	158.1	335	162.7	340	166.8	348
58	82.6	.482	83.9	.495	85.6	.511	86.6	.521	88.0	.536	89.4	.550
	2260	267	2229	264	2217	262	2175	257	2165	255	2155	252
	141.3	319	145.9	325	150.4	333	155.1	337	159.2	345	163.0	351
60	83.3	.487	84.9	.502	86.3	.516	87.4	.526	88.9	.543	90.0	.554
	2322	270	2303	268	2280	265	2244	260	2243	258	2222	254
	138.9	323	143.3	330	147.6	337	152.0	341	155.7	349	159.4	354
62	84.1	.493	85.8	.509	86.9	.519	88.2	.533	89.6	.548	90.7	.559
	2388	273	2375	271	2337	267	2318	264	2314	261	2290	256
	136.6	326	140.7	334	145.0	339	148.9	345	152.4	353	155.8	357
64	85.0	.500	86.6	.515	87.5	.523	89.0	.539	90.2	.553	91.5	.565
	2464	277	2446	275	2396	269	2396	267	2381	263	2372	259
	134.2	331	138.2	338	142.4	341	145.9	350	149.3	356	152.1	361
66	85.8	.506	87.2	.518	88.3	.529	89.8	.546	90.8	.557	92.1	.567
	2537	280	2505	276	2471	272	2472	270	2449	265	2437	260
	131.9	335	135.9	340	139.7	345	143.0	354	146.2	358	148.6	362
68	86.6	.511	87.7	.521	89.0	.535	90.4	.550	91.5	.561	92.7	.569
	2607	283	2563	278	2546	275	2541	272	2520	267	2506	261
	129.8	338	133.7	343	137.1	349	140.3	356	143.2	361	145.1	364
70	87.4	.516	88.3	.525	89.7	.541	90.9	.554	92.2	.567	93.7	.580
	2674	286	2627	280	2624	278	2607	274	2604	270	2626	266
	127.7	342	131.4	345	134.5	353	137.6	359	140.1	365	141.0	370
72	87.9	.519	89.0	.531	90.4	.547	91.5	.557	92.8	.569	94.5	.584
	2732	288	2703	284	2701	281	2675	276	2668	271	2715	268
	125.7	343	129.1	349	132.1	357	135.0	361	137.1	366	137.4	373
74	88.3	.522	89.7	.536	91.0	.551	92.1	.562	93.3	.570	94.6	.573
	2789	289	2779	287	2772	284	2750	278	2735	272	2711	262
	123.8	345	126.9	353	129.7	360	132.3	364	134.1	367	134.8	366
76	88.9	.526	90.4	.542	91.5	.555	92.8	.567	93.9	.572	94.6	.556
	2856	291	2857	290	2839	285	2832	281	2803	272	2706	254
	121.9	348	124.7	356	127.5	362	129.7	367	131.2	368	131.1	355
78	89.5	.531	91.0	.547	92.1	.558	93.3	.569	94.0	.561	94.8	.528
	2930	294	2934	292	2909	287	2900	282	2801	267	2700	241
	119.9	351	122.6	360	125.2	364	127.2	369	128.8	361	124.8	337

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 3.5 %	△FUEL = + 7 %

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF	ISA+15 CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL210**		**FL220**		**FL230**		**FL240**		**FL250**		**FL260**	
48	85.0	.526	85.7	.535	86.5	.545	87.1	.551	87.6	.556	88.2	.562
	1778	236	1775	235	1775	234	1766	232	1752	229	1745	227
	186.7	332	189.3	336	191.9	341	194.5	344	197.0	345	199.2	348
50	85.9	.535	86.7	.544	87.3	.551	87.8	.556	88.4	.562	89.1	.569
	1849	239	1849	239	1843	237	1828	234	1821	232	1820	230
	182.2	337	184.7	341	187.1	345	189.6	347	191.7	349	193.4	352
52	86.9	.543	87.5	.551	88.1	.556	88.6	.562	89.3	.570	89.8	.571
	1924	243	1918	242	1905	239	1896	237	1898	235	1877	231
	177.9	342	180.3	346	182.6	348	184.7	350	186.3	353	187.9	353
54	87.7	.550	88.2	.555	88.8	.561	89.5	.570	89.8	.567	89.9	.556
	1994	246	1979	244	1969	241	1975	240	1937	234	1877	225
	173.8	347	176.1	349	178.1	351	179.7	355	181.7	352	183.2	344
56	88.4	.555	88.9	.560	89.6	.568	89.9	.565	89.8	.550	89.9	.521
	2057	249	2045	246	2047	245	2003	238	1926	227	1855	210
	169.9	350	171.9	352	173.5	355	175.8	352	177.3	341	173.5	322
58	89.1	.559	89.7	.566	89.9	.563	89.9	.549	89.8	.511		
	2122	251	2120	249	2069	242	1992	231	1902	210		
	166.0	352	167.7	356	170.2	352	171.7	342	166.6	317		
60	89.8	.565	90.0	.561	89.9	.548	89.8	.514				
	2194	253	2137	246	2058	236	1970	216				
	162.2	356	164.7	352	166.5	343	162.5	320				
62	90.0	.558	89.9	.547	89.9	.516						
	2205	250	2125	240	2038	221						
	159.6	352	161.4	343	158.5	323						
64	90.0	.544	89.9	.519								
	2193	244	2106	227								
	156.4	343	154.7	326								
66	90.0	.521										
	2175	233										
	150.8	328										
68												
70												
72												
74												

ENGINE ANTI ICE ON △FUEL = + 2.5 %	**TOTAL ANTI ICE ON** △FUEL = + 5 %

11.0-08F0A319-112 CFM56-5B6/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 15 FCOM-N0-03-06-30-009-240

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA+20
CG=33.0%

N1 (%) MACH
KG/H IAS (KT)
NM/1000KG TAS (KT)

WEIGHT (1000KG)	**FL100**		**FL120**		**FL140**		**FL160**		**FL180**		**FL200**	
48	76.7	.434	78.5	.452	80.9	.475	82.4	.491	84.1	.509	85.2	.520
	1857	240	1858	241	1875	244	1858	242	1849	242	1814	237
	154.8	287	159.9	297	165.5	310	171.3	318	177.1	328	183.2	332
50	77.9	.443	80.0	.465	81.9	.484	83.5	.501	85.1	.516	86.0	.526
	1935	245	1950	248	1948	248	1934	247	1914	245	1873	240
	151.6	293	156.7	306	162.1	316	167.7	324	173.4	332	179.2	336
52	79.1	.453	81.4	.476	82.9	.492	84.6	.509	85.7	.520	86.9	.533
	2016	250	2035	254	2019	252	2006	251	1969	247	1945	244
	148.7	300	153.7	313	159.0	321	164.3	330	169.9	334	175.1	341
54	80.4	.464	82.3	.484	84.0	.500	85.5	.516	86.4	.524	87.9	.541
	2106	257	2108	258	2094	257	2075	255	2023	249	2021	247
	145.9	307	150.8	318	155.9	326	161.1	334	166.5	337	171.1	346
56	81.7	.475	83.3	.491	84.9	.508	86.2	.520	87.2	.532	88.7	.549
	2193	263	2179	262	2165	261	2131	257	2099	253	2095	251
	143.3	314	148.1	323	153.0	331	158.1	337	162.9	342	167.2	350
58	82.6	.482	84.2	.498	85.9	.515	86.7	.524	88.1	.539	89.4	.554
	2267	267	2250	266	2236	264	2186	259	2175	256	2161	253
	140.7	319	145.5	327	150.2	336	155.2	339	159.4	347	163.6	354
60	83.6	.490	85.1	.505	86.5	.519	87.5	.530	89.0	.547	89.6	.550
	2344	271	2323	269	2295	267	2256	262	2253	260	2181	251
	138.3	324	142.9	332	147.5	339	152.1	343	156.1	352	160.9	351
62	84.4	.496	86.0	.512	87.0	.522	88.3	.536	89.4	.547	89.6	.538
	2409	274	2395	273	2350	268	2329	265	2292	260	2173	246
	136.1	328	140.5	336	145.0	341	149.1	347	153.5	352	158.2	344
64	85.3	.503	86.8	.518	87.6	.526	89.1	.543	89.4	.538	89.6	.522
	2486	278	2463	276	2406	270	2407	269	2287	256	2161	238
	133.8	333	138.1	340	142.6	343	146.2	352	151.3	346	154.1	333
66	86.1	.509	87.3	.521	88.3	.532	89.8	.550	89.4	.526	89.5	.487
	2558	282	2520	278	2482	274	2482	272	2280	250	2144	222
	131.7	337	135.9	342	139.9	347	143.4	356	148.5	339	144.9	311
68	86.9	.515	87.8	.524	89.1	.539	90.4	.554	89.4	.509		
	2628	285	2575	280	2559	277	2548	274	2271	242		
	129.6	341	133.7	344	137.3	351	140.8	359	144.2	327		
70	87.5	.519	88.4	.529	89.8	.545	91.0	.557	89.4	.476		
	2692	288	2641	282	2637	280	2613	276	2263	225		
	127.6	344	131.5	347	134.9	356	138.2	361	135.2	306		
72	88.0	.522	89.1	.534	90.5	.551	91.0	.549				
	2748	289	2714	285	2713	283	2606	272				
	125.7	345	129.3	351	132.5	359	136.6	356				
74	88.5	.525	89.8	.540	90.7	.547	90.9	.539				
	2803	291	2792	289	2730	282	2598	267				
	123.9	347	127.1	355	130.8	357	134.5	349				

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2.5 %	△FUEL = + 5 %

11.0-08F0A319-112 CFM56-5B6/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 20 FCOM-N0-03-06-30-010-240

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS NORMAL AIR CONDITIONING ANTI-ICING OFF				ISA+20 CG=33.0%	**N1 (%) MACH** **KG/H IAS (KT)** **NM/1000KG TAS (KT)**	
WEIGHT (1000KG)	**FL210**	**FL220**	**FL230**	**FL240**	**FL250**	**FL260**
64	93.2 .554 2411 248 146.2 353	93.5 .548 2358 241 147.4 348	93.1 .513 2229 220 145.5 324			
66	93.9 .556 2482 249 142.5 354	93.5 .532 2352 233 143.4 337				
68	93.9 .544 2477 243 139.6 346					
70	94.0 .524 2471 234 134.8 333					
72						
74						
76						
78						
80						
82						
84						
86						
88						
90						
92						
ENGINE ANTI ICE ON △FUEL = + 2.5 %				**TOTAL ANTI ICE ON** △FUEL = + 5 %		

11.0-08F0A321-211 CFM56-5B3/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 20 FCOM-G0-03-06-30-011-165

IN CRUISE QUICK CHECK AT LONG RANGE SPEED

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and time required to cover a given air distance from any moment in cruise to landing, with one engine inoperative.
These tables are established for :
- Cruise Mach number : long range
- Descent profile : M.78/250kt/300kt
- Approach and landing : 140 kg or 340 lb – 6 minute IMC
- ISA
- CG = 33 %
- Normal air conditioning
- Anti ice OFF

Note : *1. In the tables, the asterisk (*) means that a step climb of 4000 feet must be flown to reach the corresponding flight level.*
2. The flight level shown on top of each column is the final flight level.
3. For each degree Celsius above ISA temperature apply a fuel correction of 0.015 (kg/°C/NM) × △ ISA (°C) × air distance (NM) or 0.033 (lb/°C/NM) × △ ISA (°C) × air distance (NM).

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The in cruise quick check tables are based on a reference initial weight.
A correction on the fuel consumption has to be made, when the actual initial weight is different from the reference initial weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1000 kg or 1000 lb below (or above) the reference initial weight (see example 3.06.30 p2).

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA+20
CG=33.0%

N1 (%) — **MACH**
KG/H — **IAS (KT)**
NM/1000KG — **TAS (KT)**

WEIGHT (1000KG)	FL210		FL220		FL230		FL240		FL250		FL260	
50	86.6	.531	87.4	.540	88.1	.547	88.6	.552	89.2	.558	89.5	.556
	1863	238	1862	237	1857	235	1846	233	1838	230	1799	225
	181.5	338	183.7	342	186.0	345	188.3	348	190.3	350	193.1	347
52	87.6	.539	88.3	.547	88.9	.552	89.4	.558	90.1	.564	89.5	.539
	1937	241	1934	240	1923	238	1914	235	1913	233	1787	217
	177.0	343	179.2	347	181.3	349	183.3	351	184.9	354	188.3	336
54	88.5	.546	89.0	.552	89.6	.557	90.4	.565	90.8	.565	89.5	.500
	2010	245	2000	242	1990	240	1993	238	1972	233	1764	201
	172.8	347	174.9	350	176.8	352	178.2	355	179.7	354	177.0	312
56	89.2	.551	89.8	.556	90.5	.564	91.0	.566	92.0	.576		
	2076	247	2066	244	2069	243	2052	239	2083	238		
	168.8	351	170.6	353	172.1	356	173.4	356	173.5	361		
58	89.9	.555	90.6	.562	91.2	.566	92.0	.574	92.6	.574		
	2142	249	2142	247	2133	244	2149	242	2131	237		
	164.9	353	166.4	356	167.6	358	168.0	361	168.7	360		
60	90.6	.560	91.3	.566	92.0	.571	93.0	.580	92.6	.554		
	2215	251	2212	249	2212	246	2242	245	2121	229		
	160.9	356	162.2	359	162.9	360	162.8	365	163.8	347		
62	91.4	.566	91.9	.567	93.1	.580	93.0	.565	92.7	.489		
	2294	254	2273	249	2323	250	2234	238	2095	201		
	157.0	360	158.1	359	157.8	366	159.2	356	146.4	307		
64	92.0	.567	93.0	.578	93.4	.574	93.1	.540				
	2354	254	2388	254	2350	247	2223	227				
	153.3	361	153.3	366	154.2	362	152.9	340				
66	92.9	.574	93.7	.581	93.4	.555						
	2449	258	2469	256	2341	239						
	149.0	365	149.1	368	149.8	351						
68	93.9	.582	93.8	.567	93.6	.517						
	2560	262	2463	249	2327	222						
	144.8	371	146.0	360	140.3	327						
70	94.2	.576	93.9	.546								
	2587	259	2455	240								
	141.7	367	141.1	346								
72	94.2	.561										
	2582	252										
	138.3	357										
74	94.3	.537										
	2574	241										
	132.8	342										
76												
78												

ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = + 3.5 %	△FUEL = + 7 %

IN CRUISE QUICK CHECK AT LONG RANGE SPEED

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and time required to cover a given air distance from any moment in cruise to landing, with one engine inoperative.
These tables are established for :
- Cruise Mach number : long range
- Descent profile : M.78/300kt/250kt
- Approach and landing : 120 kg or 270 lb – 6 minute IMC
- ISA
- CG = 33 %
- Pack Flow HI
- Anti ice OFF

Note : 1. In the tables, the asterisk (*) means that a step climb of 4000 feet must be flown to reach the corresponding flight level.
2. The flight level shown on top of each column is the final flight level.
3. For each degree Celsius above ISA temperature apply a fuel correction of 0.015 (kg/°C/NM) × △ ISA (°C) × air distance (NM) or 0.033 (lb/°C/NM) × △ ISA (°C) × air distance (NM).

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The in cruise quick check tables are based on a reference initial weight.
A correction on the fuel consumption has to be made, when the actual initial weight is different from the reference initial weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1000 kg or 1000 lb below (or above) the reference initial weight (see example 3.06.30 p2).

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF	ISA+20 CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL210**		**FL220**		**FL230**		**FL240**		**FL250**		**FL260**	
48	85.8	.526	86.5	.534	87.3	.544	87.9	.551	88.4	.556	89.0	.562
	1798	235	1794	234	1794	234	1785	232	1773	229	1766	227
	186.2	335	188.8	339	191.4	343	194.0	346	196.5	348	198.6	351
50	86.7	.534	87.5	.544	88.2	.551	88.7	.556	89.3	.562	89.5	.560
	1870	239	1871	239	1863	237	1850	234	1842	232	1801	226
	181.7	340	184.1	345	186.6	348	189.0	350	191.1	352	194.1	350
52	87.7	.543	88.4	.550	88.9	.556	89.5	.561	89.4	.553	89.5	.543
	1947	243	1941	242	1927	239	1918	237	1848	228	1789	219
	177.4	345	179.7	349	182.0	351	184.1	353	187.5	346	189.4	339
54	88.6	.550	89.1	.555	89.6	.559	89.5	.550	89.4	.534	89.5	.501
	2018	246	2004	244	1986	240	1912	232	1835	220	1765	201
	173.3	350	175.5	352	177.7	353	180.9	346	182.3	335	177.1	313
56	89.2	.554	89.6	.556	89.5	.547	89.5	.531	89.4	.481		
	2080	248	2051	244	1977	235	1899	223	1809	197		
	169.4	352	171.8	352	174.7	345	176.0	334	166.7	301		
58	89.6	.553	89.6	.544	89.5	.529	89.4	.484				
	2116	248	2042	239	1964	227	1875	203				
	166.2	352	168.9	345	170.0	334	162.5	305				
60	89.6	.541	89.5	.527	89.5	.485						
	2108	242	2030	231	1942	208						
	163.4	344	164.4	334	157.8	306						
62	89.6	.524	89.5	.486								
	2096	234	2009	212								
	159.1	334	153.3	308								
64	89.5	.487										
	2077	217										
	149.1	310										
66												
68												
70												
72												
74												

ENGINE ANTI ICE ON △FUEL = + 2.5 %	**TOTAL ANTI ICE ON** △FUEL = + 5 %

11.0-08F0A319-112 CFM56-5B6/P SA12200010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 20 FCOM-N0-03-06-30-011-240

IN CRUISE QUICK CHECK AT LONG RANGE SPEED

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and time required to cover a given air distance from any moment in cruise to landing, with one engine inoperative.
These tables are established for :
- Cruise Mach number : long range
- Descent profile : M.78/300kt/250kt
- Approach and landing : 110 kg or 240 lb – 6 minute IMC
- ISA
- CG = 33 %
- Pack Flow HI
- Anti ice OFF

Note : *1. In the tables, the asterisk (*) means that a step climb of 4000 feet must be flown to reach the corresponding flight level.*
2. The flight level shown on top of each column is the final flight level.
3. For each degree Celsius above ISA temperature apply a fuel correction of 0.015 (kg/°C/NM) × △ ISA (°C) × air distance (NM) or 0.033 (lb/°C/NM) × △ ISA (°C) × air distance (NM).

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The in cruise quick check tables are based on a reference initial weight.
A correction on the fuel consumption has to be made, when the actual initial weight is different from the reference initial weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1000 kg or 1000 lb below (or above) the reference initial weight (see example 3.06.30 p2).

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	220	240	250	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL220	FL240 FL250
200	1513 0.46	1305 0.44	1172 0.43	1129 0.42	1100 0.41	1087 0.41	9	9	10
250	1882 0.56	1647 0.54	1492 0.52	1443 0.51	1413 0.50	1400 0.50	12	13	15
300	2250 1.06	1987 1.03	1811 1.01	1756 1.00	1725 0.59	1713 0.59	16	16	20
350	2617 1.16	2326 1.13	2129 1.10	2068 1.09	2035 1.08	2023 1.07	19	20	25
400	2983 1.26	2664 1.22	2446 1.19	2378 1.18	2343 1.17	2333 1.16	22	24	29
450	3347 1.36	3001 1.32	2761 1.28	2687 1.27	2650 1.26	2640 1.25	25	27	34
500	3710 1.46	3337 1.41	3076 1.37	2995 1.36	2956 1.35	2947 1.33	28	31	38
550	4072 1.56	3672 1.51	3389 1.46	3302 1.45	3260 1.44	3252 1.42	31	35	43
600	4433 2.06	4006 2.00	3701 1.55	3608 1.54	3563 1.53	3555 1.51	34	38	47
650	4793 2.17	4339 2.10	4013 2.05	3913 2.03	3864 2.01	3856 2.00	37	42	51
700	5152 2.27	4671 2.20	4323 2.14	4217 2.13	4164 2.10	4156 2.09	40	45	56
750	5509 2.37	5002 2.29	4632 2.23	4519 2.22	4462 2.19	4454 2.18	43	49	60
800	5866 2.48	5332 2.39	4940 2.32	4821 2.31	4759 2.28	4751 2.27	46	52	64
850	6221 2.58	5661 2.48	5247 2.41	5122 2.40	5055 2.37	5047 2.35	49	56	68
900	6576 3.08	5989 2.58	5553 2.51	5421 2.49	5350 2.46	5341 2.44	52	59	72
950	6929 3.19	6316 3.08	5858 3.00	5720 2.58	5643 2.55	5634 2.53	55	62	76
1000	7281 3.29	6642 3.17	6163 3.09	6017 3.07	5935 3.04	5925 3.02	58	66	80
1050	7632 3.40	6968 3.27	6466 3.18	6314 3.16	6226 3.13	6216 3.11	61	69	84
1100	7981 3.51	7292 3.37	6768 3.28	6610 3.25	6515 3.22	6505 3.20	64	73	87
1150	8330 4.01	7615 3.46	7069 3.37	6904 3.34	6803 3.32	6792 3.29	67	76	91
1200	8677 4.12	7937 3.56	7369 3.46	7198 3.43	7090 3.41	7079 3.38	70	79	94
1250	9024 4.23	8259 4.06	7669 3.55	7490 3.52	7376 3.50	7364 3.47	73	82	98
1300	9369 4.34	8579 4.16	7967 4.05	7780 4.01	7659 3.59	7647 3.56	76	86	101
1350	9713 4.45	8898 4.25	8264 4.14	8069 4.10	7942 4.08	7929 4.05	79	89	104
1400	10057 4.55	9217 4.35	8560 4.23	8358 4.19	8223 4.17	8209 4.14	82	92	108

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 3 %	△FUEL = + 6 %

FLIP23D A321-211 CFM56-5B3/P SA3610 03301.001011 0300250 .7801 .00100 140 0300350 60 0 100100 40100 18590 FCOM-G0-03-06-30-013-165

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 55000 KG PACK FLOW HI ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	100	**150**	**200**	**220**	**240**	**250**	**FL100 FL150**	**FL200 FL220**	**FL240 FL250**
200	1379 0.45	1188 0.44	1061 0.42	1017 0.42	978 0.41	960 0.41	9	7	8
250	1718 0.56	1500 0.54	1352 0.52	1301 0.51	1256 0.50	1236 0.50	12	11	12
300	2055 1.06	1811 1.03	1641 1.01	1583 1.00	1534 0.59	1511 0.59	15	14	16
350	2391 1.16	2121 1.13	1930 1.10	1865 1.09	1810 1.08	1785 1.08	18	17	20
400	2727 1.26	2430 1.22	2217 1.19	2146 1.18	2085 1.17	2058 1.17	21	21	24
450	3061 1.36	2738 1.32	2504 1.28	2426 1.27	2359 1.25	2330 1.25	24	24	28
500	3394 1.46	3046 1.41	2790 1.37	2705 1.35	2632 1.34	2602 1.34	27	27	32
550	3727 1.56	3352 1.51	3075 1.46	2983 1.44	2904 1.43	2872 1.43	30	30	36
600	4058 2.06	3658 2.00	3358 1.55	3260 1.53	3174 1.52	3141 1.52	33	34	39
650	4388 2.17	3962 2.10	3641 2.05	3537 2.02	3444 2.01	3409 2.00	36	37	43
700	4718 2.27	4266 2.20	3924 2.14	3812 2.11	3713 2.10	3676 2.09	39	40	47
750	5046 2.37	4568 2.29	4205 2.23	4087 2.20	3981 2.19	3942 2.18	41	43	50
800	5373 2.48	4870 2.39	4485 2.32	4360 2.29	4248 2.28	4207 2.27	44	46	54
850	5700 2.58	5171 2.49	4764 2.42	4633 2.38	4514 2.37	4471 2.36	47	49	57
900	6025 3.08	5471 2.59	5042 2.51	4905 2.47	4779 2.46	4734 2.44	50	53	60
950	6350 3.19	5769 3.08	5320 3.00	5175 2.57	5044 2.55	4996 2.53	53	56	64
1000	6673 3.29	6068 3.18	5596 3.10	5445 3.06	5307 3.04	5257 3.02	56	59	67
1050	6995 3.40	6365 3.28	5872 3.19	5715 3.15	5569 3.13	5518 3.11	59	62	70
1100	7316 3.51	6661 3.38	6147 3.28	5983 3.24	5830 3.22	5777 3.20	62	65	74
1150	7636 4.01	6956 3.48	6421 3.38	6250 3.33	6091 3.31	6035 3.29	65	68	77
1200	7955 4.12	7251 3.58	6694 3.47	6517 3.42	6350 3.40	6293 3.37	68	71	80
1250	8273 4.22	7544 4.07	6966 3.56	6782 3.51	6609 3.49	6549 3.46	71	74	83
1300	8590 4.33	7837 4.17	7237 4.06	7047 4.00	6868 3.58	6804 3.55	74	77	86
1350	8906 4.44	8129 4.27	7507 4.15	7311 4.10	7125 4.07	7058 4.04	76	80	89
1400	9222 4.55	8420 4.37	7777 4.25	7574 4.19	7382 4.16	7312 4.13	79	83	92

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2.5 %	△FUEL = + 5 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.001011 0250300 .7801 .00100 120 0300350 55 0 100100 40100 18590 FCOM-N0-03-06-30-013-200

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 55000 KG
PACK FLOW HI
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	220	240	250	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL220	FL240 FL250
200	1375 0.46	1180 0.44	1047 0.42	1002 0.42	963 0.41	945 0.41	8	7	7
250	1715 0.56	1493 0.53	1337 0.51	1285 0.51	1240 0.50	1220 0.50	11	10	11
300	2053 1.06	1804 1.03	1626 1.00	1566 0.59	1516 0.59	1494 0.58	14	14	15
350	2391 1.16	2115 1.12	1914 1.09	1847 1.08	1791 1.07	1767 1.07	17	17	19
400	2728 1.26	2426 1.22	2202 1.18	2127 1.17	2065 1.16	2039 1.16	20	20	22
450	3063 1.36	2735 1.31	2488 1.27	2406 1.26	2338 1.25	2310 1.25	23	23	26
500	3398 1.47	3043 1.40	2773 1.36	2684 1.35	2610 1.34	2579 1.33	26	26	29
550	3732 1.57	3350 1.50	3058 1.46	2962 1.44	2881 1.42	2848 1.42	29	29	33
600	4065 2.07	3657 2.00	3341 1.55	3238 1.53	3151 1.51	3116 1.51	32	33	36
650	4396 2.18	3963 2.09	3624 2.04	3513 2.02	3420 2.00	3383 1.59	35	36	40
700	4727 2.28	4268 2.19	3906 2.13	3788 2.11	3688 2.09	3648 2.08	38	39	43
750	5057 2.39	4572 2.28	4187 2.22	4062 2.20	3955 2.18	3913 2.17	41	42	47
800	5385 2.49	4874 2.38	4467 2.31	4334 2.29	4222 2.27	4177 2.26	44	45	50
850	5713 3.00	5176 2.48	4746 2.41	4606 2.37	4487 2.36	4440 2.35	47	48	53
900	6039 3.10	5477 2.57	5024 2.50	4877 2.46	4751 2.44	4702 2.43	50	51	57
950	6365 3.21	5777 3.07	5301 2.59	5147 2.56	5014 2.53	4963 2.52	53	54	60
1000	6689 3.32	6077 3.17	5577 3.08	5417 3.05	5277 3.02	5222 3.01	56	57	63
1050	7013 3.42	6375 3.26	5852 3.18	5685 3.14	5538 3.11	5482 3.10	59	60	67
1100	7336 3.53	6673 3.36	6127 3.27	5952 3.23	5799 3.20	5740 3.19	62	63	70
1150	7658 4.04	6970 3.46	6400 3.36	6219 3.32	6059 3.29	5997 3.27	65	66	73
1200	7978 4.15	7266 3.56	6673 3.46	6485 3.41	6318 3.38	6253 3.36	67	69	76
1250	8298 4.26	7561 4.06	6945 3.55	6750 3.50	6577 3.47	6509 3.45	70	72	80
1300	8617 4.37	7855 4.16	7216 4.05	7015 3.59	6834 3.56	6764 3.54	73	75	83
1350	8935 4.48	8149 4.25	7486 4.14	7278 4.08	7091 4.05	7017 4.03	76	77	86
1400	9253 4.59	8442 4.35	7756 4.23	7541 4.17	7346 4.14	7270 4.12	79	80	89

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
ΔFUEL = + 2.5 %	ΔFUEL = + 5 %

FLIP23D A319–112 CFM56–5B6/P SA3610 02201.001.011 0300250 .7801 .00100 110 0300350 55 0 *** 20 20 20 18590 FCOM-N0-03-06-30-013-240

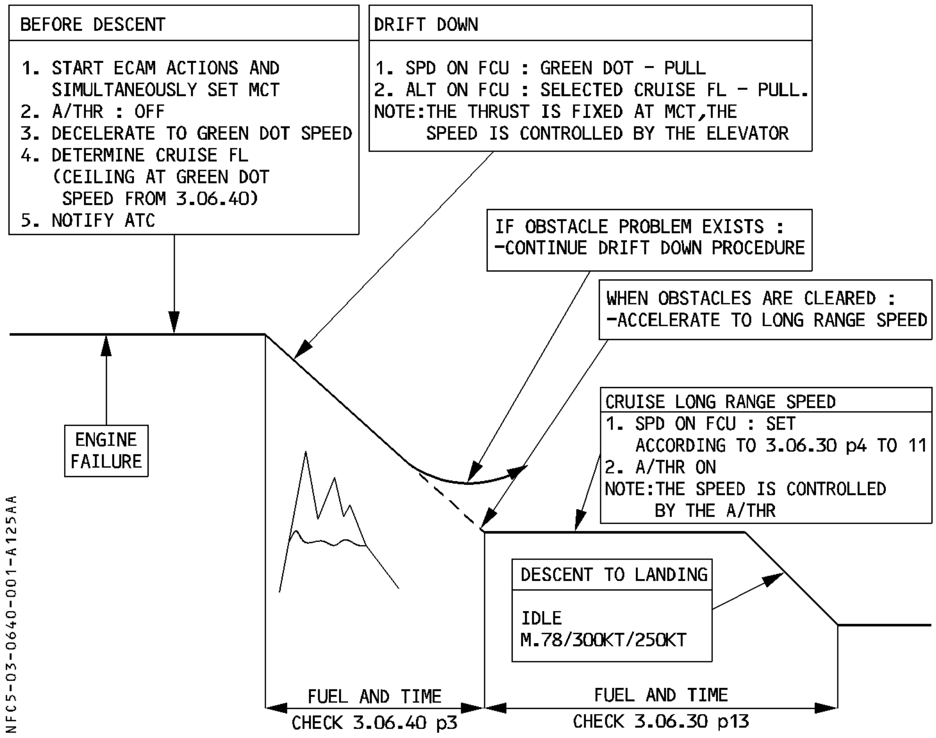
PROCEDURE

In order to maintain the highest possible level, the drift down procedure must be adopted. This requires maximum continuous thrust on the remaining engine at green dot speed.

- If, having reached drift down ceiling altitude, an obstacle problem remains, the drift down procedure must be maintained so as to fly an ascending cruise profile.
- If, after drift down, no obstacle problem remains, the speed should be allowed to increase to long range speed and maintained. The subsequent cruise should be made using either the long range speed by adjusting it as a function of aircraft weight or by maintaining the initial cruise speed.

Note : Due to the fact that the long range speed is higher than the green dot speed, the cruise will be made at an altitude lower than the drift down ceiling.

R



EXAMPLE

Given :

GW at engine failure = 72000 kg
FL at engine failure = 350
Temperature = ISA
Distance to destination airport = 1500 NM
No wind

Find :

Level off (drift down ceiling) : 23200 ft
(see 3.06.40 p3)
Distance : 315 NM
Fuel : 2100 kg
Time : 57 min
R LRC ceiling : (see 3.06.20 p1) FL209
Cruise at long range speed (FL200) to landing
(weight = 72000 – 2100 = 69900 : Distance = 1500 – 315 = 1185 NM)
Determine on (3.06.30 p13) time and fuel consumption at ISA conditions for a reference weight of 60000 kg. Interpolate the remaining air distance of 1185 NM at FL200.
Fuel : 7279 kg
Time : 3 h 44 min
Correction due to actual in-cruise weight
$\triangle$Fuel = + 79 kg per 1000 kg above reference weight
$\triangle$Fuel = + 79 kg × (69.9 – 60) ~ 783 kg

Result :

Total Fuel = 7279 + 783 + 2100 = 10162 kg
Time = 3 h 44 min + 57 min = 4 h 41 min

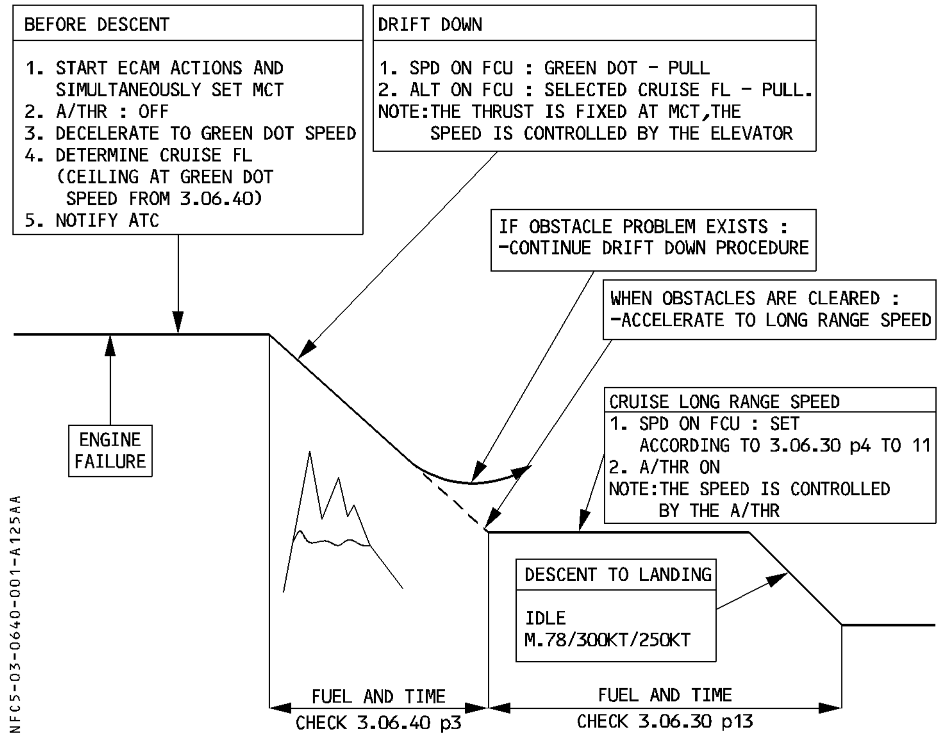
PROCEDURE

In order to maintain the highest possible level, the drift down procedure must be adopted. This requires maximum continuous thrust on the remaining engine at green dot speed.

- If, having reached drift down ceiling altitude, an obstacle problem remains, the drift down procedure must be maintained so as to fly an ascending cruise profile.
- If, after drift down, no obstacle problem remains, the speed should be allowed to increase to long range speed and maintained. The subsequent cruise should be made using either the long range speed by adjusting it as a function of aircraft weight or by maintaining the initial cruise speed.

Note : Due to the fact that the long range speed is higher than the green dot speed, the cruise will be made at an altitude lower than the drift down ceiling.

R



EXAMPLE

Given :

GW at engine failure = 62000 kg
FL at engine failure = 350
Temperature = ISA
Distance to destination airport = 1500 NM
No wind

Find :

Level off (drift down ceiling) : 25400 ft
(see 3.06.40 p3)
R Distance : 267 NM
R Fuel : 1400 kg
R Time : 48 min
LRC ceiling : (see 3.06.20 p1) FL250
Cruise at long range speed (FL250) to landing
R (weight = 62000 – 1400 = 60600 kg : Distance = 1500 – 267 = 1233 NM)
Determine on (3.06.30 p13) time and fuel consumption at ISA conditions for a reference
R weight of 55000 kg. Interpolate the remaining air distance of 1233 NM at FL250.
R Fuel : 6462 kg
R Time : 3 h 42 min
Correction due to actual in-cruise weight
R △Fuel = + 82 kg per 1000 kg above reference weight
R △Fuel = + 82 kg × (60.6 – 55) = 459 kg

Result :

R Total Fuel = 6462 + 459 + 1400 = 8321 kg
R Time = 3 h 42 min + 48 min = 4 h 30 min

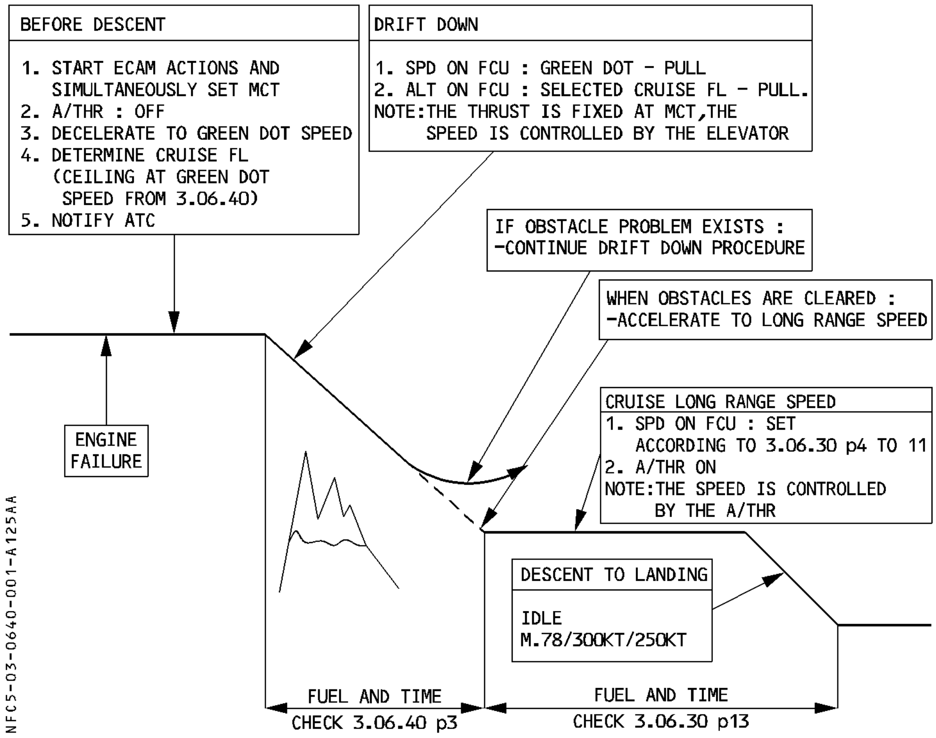
PROCEDURE

In order to maintain the highest possible level, the drift down procedure must be adopted. This requires maximum continuous thrust on the remaining engine at green dot speed.

- If, having reached drift down ceiling altitude, an obstacle problem remains, the drift down procedure must be maintained so as to fly an ascending cruise profile.
- If, after drift down, no obstacle problem remains, the speed should be allowed to increase to long range speed and maintained. The subsequent cruise should be made using either the long range speed by adjusting it as a function of aircraft weight or by maintaining the initial cruise speed.

Note : Due to the fact that the long range speed is higher than the green dot speed, the cruise will be made at an altitude lower than the drift down ceiling.

R



EXAMPLE

Given :

GW at engine failure = 62000 kg
FL at engine failure = 350
Temperature = ISA
Distance to destination airport = 1500 NM
No wind

Find :

Level off (drift down ceiling) : 25300 ft
(see 3.06.40 p3)
Distance : 356 NM
Fuel : 2000 kg
Time : 1 h 05 min
LRC ceiling : (see 3.06.20 p1) FL222
R Cruise at long range speed (FL220) to landing
(weight = 62000 – 2000 = 60000 kg : Distance = 1500 – 356 = 1144 NM)
Determine on (3.06.30 p13) time and fuel consumption at ISA conditions for a reference
R weight of 55000 kg. Interpolate the remaining air distance of 1144 NM at FL220.
R Fuel : 6187 kg
R Time : 3 h 30 min
Correction due to actual in-cruise weight
$\triangle$Fuel = + 66 kg per 1000 kg above reference weight
$\triangle$Fuel = + 66 kg × (60 – 55) = 330 kg

Result :

R Total Fuel = 6187 + 330 + 2000 = 8517 kg
R Time = 3 h 30 min + 1 h 05 min = 4 h 35 min

R

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**DISTANCE (NM) TIME (MIN)** **INITIAL SPEED(KT) FUEL(1000KG)** **LEVEL OFF (FT)**

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 230	250	270	290	310	330	350	370	390
64			174 33 213 1.2 25600	230 44 215 1.5 25800	266 50 217 1.7 25800	292 54 219 1.8 25900	313 57 221 1.9 25900	332 60 223 2.0 26000	348 63 225 2.0 26000
66		93 18 214 .7 24700	197 38 216 1.4 24900	244 46 218 1.6 25000	274 51 220 1.8 25100	299 55 222 1.9 25100	319 58 224 2.0 25200	336 61 226 2.1 25200	352 63 228 2.1 25200
68		139 27 217 1.0 24100	206 39 219 1.4 24300	244 46 221 1.7 24400	272 51 223 1.8 24400	295 54 225 1.9 24400	314 57 227 2.0 24500	331 60 229 2.1 24500	346 62 231 2.1 24500
70		165 32 220 1.2 23600	217 41 222 1.5 23700	249 47 224 1.7 23700	275 51 226 1.9 23800	294 54 228 2.0 23800	312 57 230 2.0 23800	330 60 232 2.1 23800	345 62 234 2.2 23900
72	73 14 221 .6 22700	183 35 223 1.4 23000	226 43 225 1.6 23100	255 48 227 1.8 23100	278 52 229 1.9 23100	296 54 231 2.0 23200	315 57 233 2.1 23200	331 60 235 2.2 23200	345 62 237 2.2 23200
74	132 25 224 1.0 22200	199 38 226 1.5 22400	234 44 228 1.7 22500	260 49 230 1.9 22500	282 52 232 2.0 22500	302 55 234 2.1 22600	317 58 236 2.2 22600	332 60 238 2.2 22600	
76	159 30 227 1.3 21700	211 40 229 1.6 21800	243 46 231 1.8 21900	266 49 233 2.0 21900	287 53 235 2.1 22000	303 55 237 2.1 22000	320 58 239 2.2 22000	335 60 241 2.3 22000	
78	179 34 230 1.5 21200	221 42 232 1.8 21300	250 47 234 1.9 21300	272 50 236 2.0 21300	291 53 238 2.1 21400	307 56 240 2.2 21400	322 58 242 2.3 21400	336 60 244 2.3 21400	
80	194 37 233 1.6 20600	231 43 235 1.9 20700	255 48 237 2.0 20700	277 51 239 2.1 20800	295 54 241 2.2 20800	311 57 243 2.3 20800	326 59 245 2.4 20800	339 60 247 2.4 20900	
82	207 39 236 1.7 20100	239 45 238 2.0 20200	262 49 240 2.1 20200	282 52 242 2.2 20200	299 55 244 2.3 20200	314 57 246 2.4 20300	329 59 248 2.4 20300		
84	222 42 239 1.9 19500	251 47 241 2.1 19600	273 51 243 2.2 19600	291 54 245 2.3 19600	308 56 247 2.4 19700	322 58 249 2.5 19700	335 60 251 2.5 19700		
86	237 44 242 2.1 18900	263 49 244 2.2 19000	283 52 246 2.3 19000	301 55 248 2.4 19000	316 57 250 2.5 19100	331 60 252 2.6 19100	344 62 254 2.6 19100		
88	248 46 245 2.2 18300	272 50 247 2.3 18400	291 54 249 2.5 18400	309 56 251 2.5 18400	323 59 253 2.6 18500	338 61 255 2.7 18500	351 62 257 2.7 18500		
90	250 47 248 2.2 17800	273 50 250 2.4 17800	293 54 252 2.5 17800	310 56 254 2.6 17900	326 59 256 2.7 17900	340 61 258 2.7 17900			
92	248 46 251 2.2 17300	270 49 253 2.4 17300	288 52 255 2.5 17400	303 55 257 2.6 17400	318 57 259 2.6 17400	332 59 261 2.7 17400			

CORRECTIONS	**DISTANCE**	**TIME**	**FUEL**	**LEVEL OFF**
ENGINE ANTI ICE ON	+ 2 %	–	+ 6 %	– 100 FT
TOTAL ANTI ICE ON	+ 2 %	+ 2 %	+ 6 %	– 700 FT

11.0-08F0A321-211 CFM56-5B3/P SA23500010C6KG330 0 18590 0 0 3 .0 .0 .00 0 02 1.000 1.000 .000 0 FCOM-N0-03-06-40-003-165

R

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+10 CG=33.0%	**DISTANCE (NM) TIME (MIN)** **INITIAL SPEED(KT) FUEL(1000KG)** **LEVEL OFF (FT)**

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 230	250	270	290	310	330	350	370	390
64			181 34 213 1.2 25600	238 44 215 1.6 25700	274 50 217 1.8 25800	301 55 219 1.9 25900	323 58 221 2.0 25900	342 61 223 2.1 25900	359 63 225 2.1 26000
66		99 19 214 .7 24600	203 38 216 1.4 24900	252 46 218 1.7 25000	284 52 220 1.9 25100	308 56 222 2.0 25100	329 59 224 2.1 25100	347 62 226 2.1 25200	364 64 228 2.2 25200
68		145 27 217 1.1 24100	212 40 219 1.5 24200	252 46 221 1.7 24300	281 51 223 1.9 24400	304 55 225 2.0 24400	324 58 227 2.1 24400	342 61 229 2.1 24500	358 63 231 2.2 24500
70		171 32 220 1.3 23500	223 41 222 1.6 23600	257 47 224 1.8 23700	283 52 226 1.9 23700	305 55 228 2.0 23800	323 58 230 2.1 23800	341 60 232 2.2 23800	357 63 234 2.2 23800
72	91 17 221 .7 22700	191 36 223 1.4 22900	233 43 225 1.7 23000	264 48 227 1.9 23100	287 52 229 2.0 23100	308 55 231 2.1 23100	326 58 233 2.2 23200	341 60 235 2.2 23200	357 62 237 2.3 23200
74	138 26 224 1.1 22200	206 38 226 1.6 22400	242 45 228 1.8 22400	270 49 230 2.0 22500	292 53 232 2.1 22500	310 56 234 2.2 22500	327 58 236 2.2 22600	343 60 238 2.3 22600	
76	166 31 227 1.3 21700	217 40 229 1.7 21800	250 46 231 1.9 21800	275 50 233 2.0 21900	296 53 235 2.1 21900	313 56 237 2.2 21900	331 59 239 2.3 22000	346 61 241 2.4 22000	
78	185 35 230 1.5 21100	228 42 232 1.8 21200	256 47 234 2.0 21300	280 51 236 2.1 21300	301 54 238 2.2 21300	318 57 240 2.3 21400	334 59 242 2.4 21400	350 61 244 2.4 21400	
80	199 37 233 1.7 20600	237 44 235 1.9 20700	264 48 237 2.1 20700	286 52 239 2.2 20700	305 55 241 2.3 20800	321 57 243 2.4 20800	337 59 245 2.4 20800	351 61 247 2.5 20800	
82	213 39 236 1.8 20000	246 45 238 2.0 20100	271 49 240 2.2 20100	290 52 242 2.3 20200	309 55 244 2.4 20200	324 58 246 2.4 20200	339 60 248 2.5 20200		
84	231 43 239 2.0 19500	258 47 241 2.2 19500	282 51 243 2.3 19600	301 54 245 2.4 19600	318 57 247 2.5 19600	333 59 249 2.6 19600	347 61 251 2.6 19700		
86	243 45 242 2.1 18900	270 49 244 2.3 18900	291 53 246 2.4 19000	310 56 248 2.5 19000	327 58 250 2.6 19000	342 60 252 2.7 19000	356 62 254 2.7 19100		
88	256 47 245 2.3 18300	279 51 247 2.4 18300	301 54 249 2.6 18400	318 57 251 2.6 18400	334 59 253 2.7 18400	348 61 255 2.8 18400	361 63 257 2.8 18500		
90	256 47 248 2.3 17700	280 51 250 2.5 17800	300 54 252 2.6 17800	317 56 254 2.7 17800	334 59 256 2.8 17800	349 61 258 2.8 17900			
92	254 46 251 2.3 17300	277 50 253 2.5 17300	296 53 255 2.6 17300	313 55 257 2.7 17300	328 58 259 2.7 17400	341 59 261 2.8 17400			

CORRECTIONS	**DISTANCE**	**TIME**	**FUEL**	**LEVEL OFF**
ENGINE ANTI ICE ON	+ 2 %	–	+ 6 %	– 100 FT
TOTAL ANTI ICE ON	+ 2 %	+ 2 %	+ 6 %	– 700 FT

11.0-08F0A321-211 CFM56-5B3/P SA23500010C6KG330 0 18590 0 0 3 .0 .0 .00 0 02 1.000 1.000 .000 10 FCOM-N0-03-06-40-004-165

R

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA CG=33.0%	**DISTANCE (NM) TIME (MIN)** **INITIAL SPEED(KT) FUEL(1000KG)** **LEVEL OFF (FT)**

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 230	250	270	290	310	330	350	370	390
50					83 16 196 .4 30700	205 38 198 1.0 31000	253 47 200 1.2 31200	284 52 202 1.3 31200	308 56 204 1.4 31300
52					170 32 200 .9 29900	237 44 202 1.2 30000	273 51 204 1.3 30100	301 55 206 1.5 30200	322 58 208 1.5 30200
54				102 20 202 .6 28700	207 39 204 1.1 29000	255 48 206 1.3 29100	287 53 208 1.5 29200	311 57 210 1.5 29200	331 60 212 1.6 29200
56				174 33 206 1.0 27800	238 45 208 1.3 28000	276 51 210 1.5 28100	304 56 212 1.6 28200	324 59 214 1.6 28200	345 62 216 1.7 28200
58			111 21 208 .6 26600	215 41 210 1.2 26900	262 49 212 1.5 27000	294 55 214 1.6 27100	320 59 216 1.7 27200	339 62 218 1.8 27200	358 65 220 1.8 27200
60			179 34 212 1.1 25800	244 46 214 1.4 26000	283 53 216 1.6 26100	311 58 218 1.7 26100	334 61 220 1.8 26200	353 64 222 1.9 26200	369 67 224 1.9 26300
62			101 19 216 .6 25300	176 33 218 1.0 25400	220 41 220 1.2 25400	240 44 222 1.3 25400	267 48 224 1.4 25400	302 54 226 1.6 25400	321 57 228 1.7 25400
64			72 13 220 .4 25200	117 21 222 .7 25200	149 27 224 .8 25200	175 31 226 .9 25300	197 35 228 1.0 25300	216 37 230 1.1 25300	233 40 232 1.2 25300
66			61 11 224 .4 25100	98 18 226 .6 25100	126 22 228 .7 25100	149 26 230 .8 25100	169 29 232 .9 25100	187 32 234 .9 25100	203 34 236 1.0 25100
68		26 5 226 .2 24900	62 11 228 .4 25000	94 17 230 .5 25000	120 21 232 .7 25000	141 24 234 .8 25000	153 26 236 .8 25000	170 28 238 .8 25000	185 30 240 .9 25000
70		119 21 230 .8 24500	158 28 232 1.1 24600	182 32 234 1.2 24600	205 36 236 1.3 24600	222 39 238 1.3 24700	238 41 240 1.4 24700	253 43 242 1.4 24700	
72		153 27 234 1.1 23900	190 34 236 1.3 24000	214 38 238 1.4 24000	234 41 240 1.5 24100	252 44 242 1.6 24100	268 46 244 1.6 24100	284 48 246 1.7 24100	
74		178 32 238 1.3 23400	210 37 240 1.5 23400	232 41 242 1.6 23500	253 44 244 1.7 23500	270 47 246 1.7 23500	286 49 248 1.8 23500	300 51 250 1.8 23500	
76	106 19 240 .8 22600	196 35 242 1.4 22800	223 39 244 1.6 22900	246 43 246 1.7 22900	264 46 248 1.8 22900	280 48 250 1.8 22900	295 50 252 1.9 23000	311 52 254 1.9 23000	
78	145 26 244 1.1 22100	209 37 246 1.6 22300	236 41 248 1.7 22300	256 44 250 1.8 22300	274 47 252 1.9 22300	291 50 254 1.9 22400	306 52 256 2.0 22400		

CORRECTIONS	**DISTANCE**	**TIME**	**FUEL**	**LEVEL OFF**
ENGINE ANTI ICE ON	+ 3 %	+ 3 %	+ 7 %	− 100 FT
TOTAL ANTI ICE ON	+ 8 %	+ 8 %	+ 10 %	− 700 FT

R

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA+10 CG=33.0%	**DISTANCE (NM) TIME (MIN)** **INITIAL SPEED(KT) FUEL(1000KG)** **LEVEL OFF (FT)**

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 230	250	270	290	310	330	350	370	390
50					103 19 196 .5 30700	213 39 198 1.1 31000	260 47 200 1.3 31100	292 52 202 1.4 31200	317 56 204 1.5 31200
52					177 33 200 .9 29800	245 45 202 1.2 30000	283 51 204 1.4 30100	309 55 206 1.5 30100	333 59 208 1.6 30200
54				110 21 202 .6 28600	215 40 204 1.1 28900	263 48 206 1.4 29000	295 53 208 1.5 29100	320 57 210 1.6 29200	342 61 212 1.7 29200
56				180 34 206 1.0 27800	245 45 208 1.3 28000	284 52 210 1.5 28100	311 56 212 1.6 28100	334 60 214 1.7 28200	355 63 216 1.8 28200
58			118 22 208 .7 26600	221 41 210 1.3 26900	270 50 212 1.5 27000	302 55 214 1.7 27100	329 59 216 1.8 27200	348 62 218 1.8 27200	368 65 220 1.9 27200
60			185 35 212 1.1 25800	251 47 214 1.5 26000	291 53 216 1.7 26100	320 58 218 1.8 26100	343 62 220 1.9 26200	363 65 222 2.0 26200	381 67 224 2.0 26200
62			103 19 216 .6 25300	183 33 218 1.1 25400	225 41 220 1.3 25400	257 46 222 1.4 25400	274 48 224 1.5 25400	299 52 226 1.6 25400	331 58 228 1.7 25400
64			74 13 220 .4 25200	120 21 222 .7 25200	154 27 224 .9 25200	180 31 226 1.0 25200	203 35 228 1.1 25300	223 38 230 1.1 25300	241 40 232 1.2 25300
66			63 11 224 .4 25100	101 18 226 .6 25100	130 23 228 .7 25100	154 26 230 .8 25100	175 30 232 .9 25100	194 32 234 1.0 25100	211 35 236 1.0 25100
68		40 7 226 .3 24900	93 16 228 .6 25000	98 17 230 .6 25000	124 21 232 .7 25000	146 25 234 .8 25000	166 28 236 .9 25000	184 30 238 .9 25000	200 32 240 1.0 25000
70		125 22 230 .9 24500	166 29 232 1.1 24500	192 33 234 1.2 24600	213 37 236 1.3 24600	232 40 238 1.4 24600	249 42 240 1.5 24600	264 44 242 1.5 24700	
72		162 28 234 1.2 23900	197 34 236 1.4 24000	222 39 238 1.5 24000	244 42 240 1.6 24000	262 45 242 1.6 24100	279 47 244 1.7 24100	295 49 246 1.8 24100	
74	11 2 236 .1 22900	185 32 238 1.3 23300	215 37 240 1.5 23400	239 41 242 1.6 23400	261 44 244 1.7 23500	279 47 246 1.8 23500	296 50 248 1.9 23500	309 51 250 1.9 23500	
76	93 16 240 .7 22500	202 35 242 1.5 22800	230 40 244 1.6 22800	254 43 246 1.8 22800	274 46 248 1.8 22900	291 49 250 1.9 22900	307 51 252 2.0 22900	321 53 254 2.0 22900	
78	111 19 244 .8 22000	217 37 246 1.6 22200	244 42 248 1.8 22200	265 45 250 1.9 22300	283 48 252 1.9 22300	300 50 254 2.0 22300	316 52 256 2.1 22300		

CORRECTIONS	**DISTANCE**	**TIME**	**FUEL**	**LEVEL OFF**
ENGINE ANTI ICE ON	+ 3 %	+ 3 %	+ 7 %	– 100 FT
TOTAL ANTI ICE ON	+ 8 %	+ 8 %	+ 10 %	– 700 FT

R

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA CG=33.0%	**DISTANCE (NM) TIME (MIN)** **INITIAL SPEED(KT) FUEL(1000KG)** **LEVEL OFF (FT)**

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 230	250	270	290	310	330	350	370	390
48						159 30 194 .8 32100	231 43 196 1.1 32300	269 49 198 1.2 32400	296 54 200 1.3 32400
50					80 15 196 .4 30800	208 39 198 1.0 31200	257 48 200 1.2 31300	288 53 202 1.4 31300	314 57 204 1.4 31400
52					171 32 200 .9 30000	242 45 202 1.2 30200	280 52 204 1.4 30300	308 56 206 1.5 30300	330 60 208 1.6 30300
54				84 16 202 .5 28700	211 40 204 1.1 29100	260 48 206 1.3 29200	292 54 208 1.5 29300	317 58 210 1.6 29300	338 61 212 1.6 29300
56				173 33 206 1.0 27900	242 45 208 1.3 28100	280 52 210 1.5 28200	310 57 212 1.6 28300	333 61 214 1.7 28300	353 64 216 1.7 28400
58			103 20 208 .6 26700	216 41 210 1.2 27000	267 50 212 1.5 27200	300 56 214 1.6 27200	326 60 216 1.7 27300	348 63 218 1.8 27300	366 66 220 1.9 27400
60			180 34 212 1.1 25900	250 47 214 1.4 26100	289 54 216 1.6 26200	318 59 218 1.8 26300	341 63 220 1.9 26300	360 66 222 1.9 26300	379 68 224 2.0 26400
62		105 20 214 .7 24700	222 42 216 1.3 25000	274 52 218 1.6 25100	309 58 220 1.8 25200	335 62 222 1.9 25300	356 65 224 2.0 25300	376 68 226 2.1 25400	392 71 228 2.1 25400
64		170 33 218 1.1 24000	242 46 220 1.5 24100	285 54 222 1.7 24200	315 59 224 1.9 24300	340 63 226 2.0 24400	360 66 228 2.0 24400	379 69 230 2.1 24400	395 71 232 2.2 24400
66	75 14 220 .5 22800	208 40 222 1.3 23200	261 49 224 1.6 23300	297 56 226 1.8 23400	324 60 228 2.0 23500	347 64 230 2.0 23500	366 67 232 2.1 23500	384 69 234 2.2 23600	400 72 236 2.2 23600
68	155 30 224 1.0 22200	234 45 226 1.5 22400	278 52 228 1.8 22500	309 58 230 1.9 22600	333 62 232 2.0 22600	355 65 234 2.1 22700	373 68 236 2.2 22700	390 70 238 2.3 22700	405 72 240 2.3 22800
70	196 38 228 1.3 21500	255 48 230 1.7 21600	292 55 232 1.9 21700	320 59 234 2.0 21800	343 63 236 2.2 21800	363 66 238 2.2 21900	381 69 240 2.3 21900	396 71 242 2.3 21900	
72	227 43 232 1.6 20700	274 52 234 1.9 20800	306 57 236 2.0 20900	331 61 238 2.2 21000	352 65 240 2.2 21000	372 68 242 2.3 21000	389 70 244 2.4 21100	404 72 246 2.4 21100	
74	251 48 236 1.8 19900	291 55 238 2.0 20000	320 60 240 2.2 20100	344 63 242 2.3 20200	364 67 244 2.4 20200	382 69 246 2.4 20200	396 71 248 2.5 20300	412 74 250 2.5 20300	

CORRECTIONS	DISTANCE	TIME	FUEL	LEVEL OFF
ENGINE ANTI ICE ON	+ 2 %	+ 2 %	+ 7 %	– 100 ft
TOTAL ANTI ICE ON	+ 7 %	+ 6 %	+ 10 %	– 600 ft

11.0-08F0A319-112 CFM56-5B6/P SA23500010C6KG330 0 018590 0 0 3 .0 .0 .00 0 02 1.000 1.000 .000 0 FCOM-N0-03-06-40-003-240

R

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA+10 CG=33.0%	**DISTANCE (NM)** **TIME (MIN)** **INITIAL SPEED(KT)** **FUEL(1000KG)** **LEVEL OFF (FT)**

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 230	250	270	290	310	330	350	370	390
48						168 31 194 .8 32100	240 43 196 1.1 32200	279 50 198 1.3 32300	304 54 200 1.4 32400
50					84 16 196 .4 30700	217 40 198 1.1 31100	266 48 200 1.3 31200	299 54 202 1.4 31300	324 58 204 1.5 31300
52					178 Z33 200 .9 29900	249 45 202 1.3 30100	288 52 204 1.4 30200	318 57 206 1.5 30300	341 60 208 1.6 30300
54				103 19 202 .6 28700	219 40 204 1.2 29000	268 49 206 1.4 29100	301 54 208 1.5 29200	328 59 210 1.6 29300	349 62 212 1.7 29300
56				180 33 206 1.0 27900	248 46 208 1.4 28100	290 53 210 1.5 28200	319 58 212 1.7 28200	343 61 214 1.7 28300	363 64 216 1.8 28300
58			110 21 208 .7 26700	224 42 210 1.3 27000	274 50 212 1.5 27100	309 56 214 1.7 27200	335 60 216 1.8 27300	358 64 218 1.9 27300	377 67 220 1.9 27300
60			185 35 212 1.1 25900	255 47 214 1.5 26100	296 54 216 1.7 26200	328 59 218 1.8 26200	351 63 220 1.9 26300	372 66 222 2.0 26300	391 69 224 2.0 26400
62		114 22 214 .7 24600	232 43 216 1.4 24900	284 52 218 1.7 25100	318 58 220 1.8 25200	346 63 222 2.0 25200	368 66 224 2.1 25300	388 69 226 2.1 25300	405 71 228 2.2 25400
64		178 33 218 1.1 23900	251 47 220 1.6 24100	294 54 222 1.8 24200	325 59 224 1.9 24300	351 63 226 2.0 24300	372 67 228 2.1 24400	391 70 230 2.2 24400	407 72 232 2.2 24400
66	88 17 220 .6 22800	214 40 222 1.4 23100	269 50 224 1.7 23300	307 56 226 1.9 23400	335 61 228 2.0 23400	358 65 230 2.1 23500	378 68 232 2.2 23500	397 70 234 2.3 23500	413 72 236 2.3 23500
68	164 31 224 1.1 22100	243 45 226 1.6 22400	287 53 228 1.8 22500	319 58 230 2.0 22500	345 63 232 2.1 22600	367 66 234 2.2 22600	386 69 236 2.3 22700	402 71 238 2.3 22700	419 73 240 2.4 22700
70	206 39 228 1.4 21400	265 49 230 1.8 21600	302 56 232 2.0 21600	332 60 234 2.1 21700	356 64 236 2.2 21800	376 67 238 2.3 21800	395 70 240 2.4 21800	411 72 242 2.4 21800	
72	236 44 232 1.6 20600	284 53 234 1.9 20800	315 58 236 2.1 20800	343 62 238 2.2 20900	365 66 240 2.3 20900	386 69 242 2.4 21000	403 71 244 2.5 21000	419 74 246 2.5 21000	
74	258 48 236 1.8 19900	300 55 238 2.1 20000	330 60 240 2.2 20000	355 64 242 2.4 20100	376 67 244 2.4 20100	394 70 246 2.5 20200	412 73 248 2.6 20200	428 75 250 2.6 20200	

CORRECTIONS	DISTANCE	TIME	FUEL	LEVEL OFF
ENGINE ANTI ICE ON	+ 2 %	+ 2 %	+ 7 %	– 100 ft
TOTAL ANTI ICE ON	+ 7 %	+ 6 %	+ 10 %	– 600 ft

11.0-08F0A319-112 CFM56-5B6/P SA23500010C6KG330 0 018590 0 0 3 .0 .0 .00 0 02 1.000 1.000 .000 10 FCOM-N0-03-06-40-004-240

R

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+15 CG=33.0%	**DISTANCE (NM) TIME (MIN)** **INITIAL SPEED(KT) FUEL(1000KG)** **LEVEL OFF (FT)**

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 230	250	270	290	310	330	350	370	390
64		119 23 211 .8 24400	206 39 213 1.4 24600	249 46 215 1.6 24700	281 52 217 1.8 24800	306 56 219 1.9 24800	327 59 221 2.0 24800	346 62 223 2.1 24900	362 64 225 2.1 24900
66		156 30 214 1.1 23900	216 41 216 1.5 24000	252 47 218 1.7 24100	281 52 220 1.8 24100	303 55 222 1.9 24100	323 58 224 2.0 24200	341 61 226 2.1 24200	357 63 228 2.1 24200
68	30 6 215 .2 22900	178 34 217 1.3 23300	226 42 219 1.6 23400	258 48 221 1.7 23400	283 52 223 1.9 23500	305 55 225 2.0 23500	324 58 227 2.0 23500	341 61 229 2.1 23500	356 63 231 2.2 23600
70	115 22 218 .9 22500	195 37 220 1.4 22700	235 44 222 1.7 22800	265 49 224 1.8 22800	288 53 226 1.9 22800	308 56 228 2.0 22900	325 58 230 2.1 22900	342 61 232 2.2 22900	357 63 234 2.2 22900
72	150 29 221 1.2 22000	209 39 223 1.6 22100	244 45 225 1.8 22200	271 50 227 1.9 22200	292 53 229 2.0 22200	311 56 231 2.1 22300	328 59 233 2.2 22300	344 61 235 2.2 22300	
74	172 33 224 1.3 21400	219 41 226 1.7 21500	251 46 228 1.9 21600	275 51 230 2.0 21600	296 54 232 2.1 21600	314 57 234 2.2 21700	330 59 236 2.2 21700	346 61 238 2.3 21700	
76	190 36 227 1.5 20900	230 43 229 1.8 20900	257 48 231 1.9 21000	281 51 233 2.1 21000	299 54 235 2.1 21100	316 57 237 2.2 21100	333 59 239 2.3 21100	347 61 241 2.3 21100	
78	203 38 230 1.7 20300	238 44 232 1.9 20400	264 49 234 2.0 20400	285 52 236 2.1 20500	303 55 238 2.2 20500	320 57 240 2.3 20500	336 60 242 2.4 20500	350 62 244 2.4 20500	
80	219 41 233 1.8 19800	250 46 235 2.0 19800	271 50 237 2.1 19900	292 53 239 2.2 19900	307 55 241 2.3 19900	323 58 243 2.4 20000	338 60 245 2.4 20000		
82	236 44 236 2.0 19100	265 49 238 2.2 19200	287 53 240 2.3 19300	305 55 242 2.4 19300	322 58 244 2.5 19300	337 60 246 2.5 19300	352 62 248 2.6 19300		
84	251 47 239 2.1 18500	277 51 241 2.3 18600	297 54 243 2.4 18600	315 57 245 2.5 18600	331 59 247 2.6 18700	346 62 249 2.6 18700	360 63 251 2.7 18700		
86	259 48 242 2.2 17900	287 53 244 2.4 18000	307 56 246 2.5 18000	324 58 248 2.6 18000	339 61 250 2.7 18000	354 63 252 2.8 18100			
88	254 47 245 2.2 17400	277 50 247 2.4 17500	297 54 249 2.5 17500	314 56 251 2.6 17500	329 58 253 2.6 17500	344 61 255 2.7 17500			
90	255 47 248 2.3 17000	277 50 250 2.4 17000	295 53 252 2.5 17000	312 56 254 2.6 17000	326 58 256 2.6 17000	340 60 258 2.7 17100			
92	259 47 251 2.3 16500	280 50 253 2.5 16500	296 53 255 2.5 16500	313 55 257 2.6 16600	327 57 259 2.7 16600	340 59 261 2.7 16600			

CORRECTIONS	**DISTANCE**	**TIME**	**FUEL**	**LEVEL OFF**
ENGINE ANTI ICE ON	+ 2 %	–	+ 6 %	– 100 FT
TOTAL ANTI ICE ON	+ 2 %	+ 2 %	+ 6 %	– 700 FT

11.0-08F0A321-211 CFM56-5B3/P SA23500010C6KG330 0 18590 0 0 3 .0 .0 .00 0 02 1.000 1.000 .000 15 FCOM-N0-03-06-40-005-165

R

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+20 CG=33.0%	**DISTANCE (NM) TIME (MIN)** **INITIAL SPEED(KT) FUEL(1000KG)** **LEVEL OFF (FT)**

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 230	250	270	290	310	330	350	370	390
64		167 32 211 1.1 23400	217 41 213 1.4 23500	251 47 215 1.6 23600	276 51 217 1.7 23600	299 55 219 1.8 23700	318 58 221 1.9 23700	336 61 223 1.9 23700	351 63 225 2.0 23700
66	95 18 212 .7 22700	185 35 214 1.3 22900	226 43 216 1.5 22900	257 48 218 1.7 23000	281 52 220 1.8 23000	301 55 222 1.9 23000	319 58 224 1.9 23100	335 60 226 2.0 23100	352 63 228 2.0 23100
68	137 26 215 1.0 22100	199 38 217 1.4 22300	235 44 219 1.6 22300	262 49 221 1.7 22400	284 53 223 1.9 22400	304 56 225 1.9 22400	321 58 227 2.0 22400	337 60 229 2.1 22500	
70	162 31 218 1.2 21600	210 40 220 1.5 21700	242 45 222 1.7 21700	267 50 224 1.8 21800	288 53 226 1.9 21800	306 56 228 2.0 21800	323 58 230 2.1 21800	338 60 232 2.1 21900	
72	180 34 221 1.4 21000	221 42 223 1.6 21100	249 47 225 1.8 21200	272 50 227 1.9 21200	291 54 229 2.0 21200	309 56 231 2.1 21200	324 58 233 2.1 21300	340 61 235 2.2 21300	
74	194 37 224 1.5 20500	229 43 226 1.7 20600	255 48 228 1.9 20600	277 51 230 2.0 20600	296 54 232 2.1 20700	312 57 234 2.1 20700	328 59 236 2.2 20700	342 61 238 2.2 20700	
76	205 39 227 1.6 20000	237 44 229 1.8 20000	260 48 231 1.9 20000	280 51 233 2.0 20100	299 55 235 2.1 20100	315 57 237 2.2 20100	330 59 239 2.2 20100		
78	232 44 230 1.9 19300	259 48 232 2.0 19400	281 52 234 2.1 19400	299 55 236 2.2 19400	316 58 238 2.3 19500	331 60 240 2.4 19500	345 62 242 2.4 19500		
80	249 47 233 2.0 18600	274 51 235 2.2 18700	295 55 237 2.3 18700	313 57 239 2.4 18800	328 60 241 2.4 18800	344 62 243 2.5 18800	358 64 245 2.6 18800		
82	263 49 236 2.2 18000	287 53 238 2.3 18000	307 57 240 2.4 18100	324 59 242 2.5 18100	339 61 244 2.6 18100	354 64 246 2.6 18100			
84	251 47 239 2.1 17500	275 51 241 2.2 17500	293 54 243 2.3 17500	311 57 245 2.4 17500	327 59 247 2.5 17500	342 61 249 2.6 17600			
86	251 46 242 2.1 17000	273 50 244 2.3 17000	291 53 246 2.4 17000	307 55 248 2.4 17100	323 58 250 2.5 17100	337 60 252 2.5 17100			
88	254 47 245 2.2 16500	274 50 247 2.3 16500	291 53 249 2.4 16600	307 55 251 2.5 16600	322 57 253 2.5 16600				
90	257 47 248 2.2 16100	276 50 250 2.4 16100	293 53 252 2.4 16100	308 55 254 2.5 16100	322 57 256 2.6 16100				
92	287 52 251 2.6 15500	305 55 253 2.7 15500	319 57 255 2.7 15600	334 59 257 2.8 15600	346 61 259 2.8 15600				

CORRECTIONS	DISTANCE	TIME	FUEL	LEVEL OFF
ENGINE ANTI ICE ON	+ 2 %	–	+ 6 %	– 100 FT
TOTAL ANTI ICE ON	+ 2 %	+ 2 %	+ 6 %	– 700 FT

11.0-08F0A321-211 CFM56-5B3/P SA23500010C6KG330 0 18590 0 0 3 .0 .0 .00 0 02 1.000 1.000 .000 20 FCOM-N0-03-06-40-006-165

R

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA+15 CG=33.0%	**DISTANCE (NM) TIME (MIN)** **INITIAL SPEED(KT) FUEL(1000KG)** **LEVEL OFF (FT)**

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL **230**	**250**	**270**	**290**	**310**	**330**	**350**	**370**	**390**
50					179 33 196 .9 29900	249 46 198 1.2 30100	288 53 200 1.4 30200	317 57 202 1.5 30200	339 61 204 1.6 30300
52				115 22 198 .6 28600	220 41 200 1.1 28900	270 50 202 1.4 29000	304 55 204 1.5 29100	329 59 206 1.6 29200	350 63 208 1.6 29200
54				188 35 202 1.0 27700	252 47 204 1.3 27900	293 54 206 1.5 28000	321 59 208 1.6 28100	345 62 210 1.7 28100	364 65 212 1.8 28100
56			132 25 204 .8 26500	230 43 206 1.3 26800	279 52 208 1.5 26900	312 57 210 1.7 27000	338 62 212 1.8 27000	358 65 214 1.8 27100	379 68 216 1.9 27100
58			196 37 208 1.1 25600	259 49 210 1.5 25800	299 55 212 1.7 25900	327 60 214 1.8 26000	352 64 216 1.9 26000	372 67 218 1.9 26000	390 70 220 2.0 26100
60			97 18 212 .6 25300	175 32 214 1.0 25300	198 36 216 1.1 25300	231 41 218 1.2 25300	275 49 220 1.4 25400	296 52 222 1.5 25400	317 56 224 1.6 25400
62			73 13 216 .4 25200	118 21 218 .7 25200	174 31 220 1.0 25200	202 36 222 1.1 25200	222 39 224 1.2 25200	220 38 226 1.1 25200	238 40 228 1.1 25200
64			62 11 220 .4 25000	99 18 222 .5 25100	128 22 224 .7 25100	152 26 226 .8 25100	173 29 228 .9 25100	191 32 230 .9 25100	208 34 232 1.0 25100
66		72 13 222 .5 24800	126 23 224 .8 24900	149 26 226 .9 24900	167 29 228 1.0 24900	182 31 230 1.0 24900	194 33 232 1.0 24900	209 35 234 1.1 25000	225 37 236 1.1 25000
68		140 25 226 1.0 24300	179 32 228 1.2 24300	205 36 230 1.3 24400	227 40 232 1.4 24400	246 42 234 1.5 24400	263 45 236 1.5 24400	278 47 238 1.6 24500	
70		170 30 230 1.2 23700	204 36 232 1.4 23700	229 40 234 1.5 23800	249 43 236 1.6 23800	269 46 238 1.6 23800	286 49 240 1.7 23900	302 51 242 1.8 23900	
72	63 11 232 .5 22800	192 34 234 1.3 23100	221 39 236 1.5 23200	246 43 238 1.6 23200	266 46 240 1.7 23200	284 48 242 1.8 23200	300 51 244 1.8 23300	316 53 246 1.9 23300	
74	132 23 236 1.0 22400	208 36 238 1.5 22500	234 41 240 1.6 22600	256 44 242 1.7 22600	277 47 244 1.8 22600	295 50 246 1.9 22700	311 52 248 1.9 22700	326 54 250 2.0 22700	
76	162 28 240 1.2 21800	221 39 242 1.6 22000	246 43 244 1.7 22000	268 46 246 1.8 22000	284 48 248 1.9 22000	303 51 250 2.0 22100	319 53 252 2.0 22100		
78	186 32 244 1.4 21300	233 40 246 1.7 21400	256 44 248 1.8 21400	276 47 250 1.9 21500	293 50 252 2.0 21500	309 52 254 2.0 21500	326 54 256 2.1 21500		

CORRECTIONS	**DISTANCE**	**TIME**	**FUEL**	**LEVEL OFF**
ENGINE ANTI ICE ON	+ 3 %	+ 3 %	+ 7 %	– 100 FT
TOTAL ANTI ICE ON	+ 8 %	+ 8 %	+ 10 %	– 700 FT

R

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA+20 CG=33.0%	**DISTANCE (NM) TIME (MIN)** **INITIAL SPEED(KT) FUEL(1000KG)** **LEVEL OFF (FT)**

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 230	250	270	290	310	330	350	370	390
50				119 23 194 .6 28600	224 42 196 1.1 28900	273 51 198 1.3 29000	307 57 200 1.5 29100	333 61 202 1.5 29100	354 64 204 1.6 29200
52				191 36 198 1.0 27700	255 48 200 1.3 27900	295 55 202 1.5 27900	324 60 204 1.6 28000	348 63 206 1.7 28100	368 66 208 1.7 28100
54			138 27 200 .8 26400	231 44 202 1.2 26700	280 53 204 1.5 26800	314 58 206 1.6 26900	339 62 208 1.7 26900	362 66 210 1.8 27000	381 69 212 1.8 27000
56			200 38 204 1.1 25500	262 50 206 1.4 25700	301 56 208 1.6 25800	330 61 210 1.7 25800	353 65 212 1.8 25900	374 68 214 1.9 25900	392 71 216 1.9 26000
58			96 18 208 .5 25200	152 28 210 .8 25300	212 39 212 1.1 25300	243 44 214 1.3 25300	268 48 216 1.4 25300	291 52 218 1.4 25300	309 54 220 1.5 25300
60			74 14 212 .4 25100	118 21 214 .6 25100	150 27 216 .8 25100	176 31 218 .9 25100	198 35 220 1.0 25100	218 38 222 1.0 25100	236 40 224 1.1 25100
62		26 5 214 .2 24900	64 12 216 .4 25000	100 18 218 .5 25000	128 23 220 .7 25000	152 26 222 .8 25000	173 30 224 .8 25000	191 32 226 .9 25000	208 35 228 .9 25000
64		121 22 218 .8 24500	165 30 220 1.0 24500	194 35 222 1.2 24600	214 38 224 1.2 24600	234 41 226 1.3 24600	253 44 228 1.4 24700	268 46 230 1.4 24700	
66		159 29 222 1.1 23900	197 35 224 1.2 24000	223 40 226 1.4 24000	245 43 228 1.5 24000	265 46 230 1.5 24100	281 49 232 1.6 24100	299 51 234 1.6 24100	
68	11 2 224 .1 22900	183 33 226 1.2 23300	216 39 228 1.4 23400	240 43 230 1.5 23400	260 46 232 1.6 23400	281 49 234 1.7 23500	296 51 236 1.7 23500	313 53 238 1.8 23500	
70	92 17 228 .7 22500	201 36 230 1.4 22700	230 41 232 1.5 22800	253 45 234 1.6 22800	273 48 236 1.7 22800	291 50 238 1.8 22900	308 53 240 1.8 22900	323 55 242 1.9 22900	
72	153 27 232 1.1 22000	215 38 234 1.5 22100	242 43 236 1.6 22200	263 46 238 1.7 22200	282 49 240 1.8 22200	298 51 242 1.9 22300	316 54 244 1.9 22300		
74	177 31 236 1.3 21500	227 40 238 1.6 21600	251 44 240 1.7 21600	272 47 242 1.8 21600	289 50 244 1.9 21700	307 52 246 1.9 21700	324 55 248 2.0 21700		
76	195 34 240 1.4 20900	237 41 242 1.7 21000	260 45 244 1.8 21100	279 48 246 1.9 21100	297 51 248 2.0 21100	314 53 250 2.0 21100	328 55 252 2.1 21100		
78	210 37 244 1.6 20400	245 43 246 1.8 20500	267 46 248 1.9 20500	287 49 250 2.0 20500	303 51 252 2.0 20500	320 54 254 2.1 20600	335 56 256 2.1 20600		

CORRECTIONS	**DISTANCE**	**TIME**	**FUEL**	**LEVEL OFF**
ENGINE ANTI ICE ON	+ 3 %	+ 3 %	+ 7 %	– 100 FT
TOTAL ANTI ICE ON	+ 8 %	+ 8 %	+ 10 %	– 700 FT

R

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA+15 CG=33.0%	**DISTANCE (NM)** **TIME (MIN)** **INITIAL SPEED(KT)** **FUEL(1000KG)** **LEVEL OFF (FT)**

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 230	250	270	290	310	330	350	370	390
48					76 14 192 .4 30800	214 39 194 1.0 31200	266 48 196 1.2 31400	301 54 198 1.4 31400	326 58 200 1.4 31500
50					182 34 196 .9 29900	254 47 198 1.2 30100	295 54 200 1.4 30300	324 58 202 1.5 30300	347 62 204 1.6 30400
52				110 21 198 .6 28700	225 42 200 1.2 29000	278 51 202 1.4 29100	312 57 204 1.5 29200	338 61 206 1.6 29200	360 64 208 1.7 29300
54				190 36 202 1.0 27800	258 48 204 1.4 28000	300 55 206 1.5 28100	329 60 208 1.7 28100	353 64 210 1.7 28200	372 66 212 1.8 28200
56			130 25 204 .7 26500	234 44 206 1.3 26800	286 53 208 1.5 27000	320 59 210 1.7 27100	347 63 212 1.8 27100	369 67 214 1.9 27200	388 69 216 1.9 27200
58			198 38 208 1.2 25700	266 50 210 1.5 25900	305 56 212 1.7 26000	335 62 214 1.8 26000	361 66 216 1.9 26100	382 69 218 2.0 26100	401 72 220 2.0 26200
60		132 25 210 .8 24500	234 44 212 1.4 24700	288 54 214 1.7 24900	324 60 216 1.8 25000	352 65 218 1.9 25000	376 68 220 2.0 25100	396 71 222 2.1 25100	413 74 224 2.2 25100
62		188 36 214 1.2 23700	255 48 216 1.5 23900	298 55 218 1.8 24000	328 60 220 1.9 24100	353 65 222 2.0 24100	375 68 224 2.1 24100	395 71 226 2.1 24200	412 73 228 2.2 24200
64	114 22 216 .7 22600	222 42 218 1.4 22900	274 51 220 1.7 23100	310 58 222 1.9 23100	337 62 224 2.0 23200	361 66 226 2.1 23200	380 69 228 2.1 23300	400 71 230 2.2 23300	416 74 232 2.3 23300
66	177 34 220 1.2 21900	248 47 222 1.6 22100	289 54 224 1.8 22200	321 59 226 2.0 22300	348 64 228 2.1 22300	370 67 230 2.2 22400	388 70 232 2.2 22400	406 72 234 2.3 22400	422 75 236 2.3 22500
68	215 41 224 1.4 21200	270 51 226 1.8 21300	306 57 228 1.9 21400	334 62 230 2.1 21400	358 65 232 2.2 21500	379 69 234 2.3 21500	397 71 236 2.3 21600	414 74 238 2.4 21600	
70	245 46 228 1.7 20400	289 54 230 1.9 20500	322 60 232 2.1 20600	348 64 234 2.2 20600	369 67 236 2.3 20700	388 70 238 2.4 20700	405 72 240 2.4 20700	422 75 242 2.5 20700	
72	269 51 232 1.9 19500	308 58 234 2.1 19600	337 62 236 2.2 19700	360 66 238 2.3 19700	380 69 240 2.4 19800	400 72 242 2.5 19800	416 74 244 2.5 19800	433 77 246 2.6 19900	
74	292 55 236 2.1 18600	325 60 238 2.2 18700	352 65 240 2.4 18800	374 68 242 2.5 18800	394 71 244 2.6 18900	412 74 246 2.6 18900	429 76 248 2.7 18900	444 78 250 2.7 19000	

CORRECTIONS	**DISTANCE**	**TIME**	**FUEL**	**LEVEL OFF**
ENGINE ANTI ICE ON	+ 2 %	+ 2 %	+ 7 %	– 100 ft
TOTAL ANTI ICE ON	+ 7 %	+ 6 %	+ 10 %	– 600 ft

11.0-08F0A319-112 CFM56-5B6/P SA23500010C6KG330 0 018590 0 0 3 .0 .0 .00 0 02 1.000 1.000 .000 15 FCOM-N0-03-06-40-005-240

R

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA+20 CG=33.0%	**DISTANCE (NM) TIME (MIN)** **INITIAL SPEED(KT) FUEL(1000KG)** **LEVEL OFF (FT)**

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 230	250	270	290	310	330	350	370	390
48					183 35 192 .9 29900	257 48 194 1.2 30100	299 55 196 1.4 30200	328 60 198 1.5 30300	350 63 200 1.5 30300
50				119 23 194 .6 28600	229 43 196 1.1 28900	281 52 198 1.4 29100	316 58 200 1.5 29100	342 62 202 1.6 29200	363 66 204 1.6 29200
52				194 37 198 1.0 27700	261 49 200 1.3 27900	303 56 202 1.5 28000	333 61 204 1.6 28100	357 65 206 1.7 28100	377 68 208 1.8 28100
54			140 27 200 .8 26400	236 45 202 1.3 26700	288 54 204 1.5 26900	323 60 206 1.6 26900	348 64 208 1.7 27000	371 68 210 1.8 27000	389 70 212 1.9 27100
56		18 4 202 .1 24900	204 39 204 1.1 25500	268 51 206 1.5 25700	309 58 208 1.7 25800	340 63 210 1.8 25900	364 67 212 1.9 25900	385 70 214 1.9 26000	403 73 216 2.0 26000
58		145 28 206 .9 24300	239 46 208 1.4 24600	290 55 210 1.6 24700	325 61 212 1.8 24800	353 65 214 1.9 24800	377 69 216 2.0 24900	397 72 218 2.0 24900	417 75 220 2.1 24900
60	2 0 208 .0 22900	197 38 210 1.2 23500	260 50 212 1.5 23700	301 57 214 1.7 23800	331 62 216 1.9 23800	357 66 218 2.0 23900	379 69 220 2.0 23900	396 72 222 2.1 24000	415 75 224 2.1 24000
62	139 27 212 .9 22400	232 44 214 1.4 22700	281 53 216 1.7 22800	315 59 218 1.8 22900	343 64 220 2.0 22900	365 67 222 2.1 23000	386 71 224 2.1 23000	404 73 226 2.2 23000	421 75 228 2.2 23100
64	194 38 216 1.3 21600	258 49 218 1.6 21800	298 56 220 1.8 21900	329 62 222 2.0 22000	354 66 224 2.1 22000	375 69 226 2.2 22100	395 72 228 2.2 22100	411 74 230 2.3 22100	
66	230 44 220 1.5 20800	280 53 222 1.8 20900	315 59 224 2.0 21000	342 64 226 2.1 21100	365 68 228 2.2 21100	386 71 230 2.3 21200	404 73 232 2.3 21200	420 76 234 2.4 21200	
68	257 49 224 1.7 19900	299 57 226 2.0 20000	329 62 228 2.1 20100	354 66 230 2.2 20200	377 70 232 2.3 20200	396 73 234 2.4 20300	414 75 236 2.4 20300	430 77 238 2.5 20300	
70	286 55 228 2.0 19000	322 61 230 2.1 19100	350 66 232 2.3 19200	373 69 234 2.4 19200	393 72 236 2.5 19300	412 75 238 2.5 19300	428 77 240 2.6 19300	443 80 242 2.6 19400	
72	310 59 232 2.1 18000	341 64 234 2.3 18100	367 69 236 2.4 18200	388 72 238 2.5 18300	408 75 240 2.6 18300	426 78 242 2.7 18300	442 80 244 2.7 18400		
74	273 51 236 1.9 17400	305 57 238 2.1 17500	331 61 240 2.2 17500	353 65 242 2.3 17500	374 68 244 2.4 17600	392 71 246 2.5 17600	408 73 248 2.5 17600		

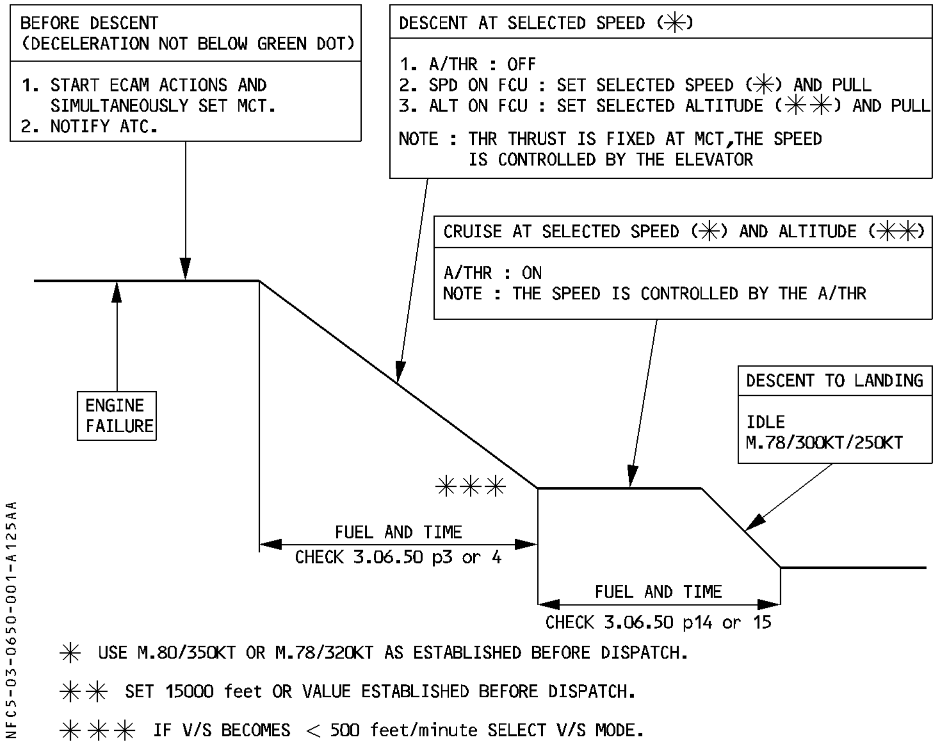
CORRECTIONS	**DISTANCE**	**TIME**	**FUEL**	**LEVEL OFF**
ENGINE ANTI ICE ON	+ 2 %	+ 2 %	+ 7 %	– 100 ft
TOTAL ANTI ICE ON	+ 7 %	+ 6 %	+ 10 %	– 600 ft

11.0-08F0A319-112 CFM56-5B6/P SA23500010C6KG330 0 018590 0 0 3 .0 .0 .00 0 02 1.000 1.000 .000 20 FCOM-N0-03-06-40-006-240

– For LONG RANGE CRUISE table (Refer to 3.06.30 p4 to 11)
– For IN CRUISE QUICK CHECK (Refer to 3.06.30 p12)

PROCEDURE

This section provides single engine performance data for two fixed speed diversion strategies (fixed descent and cruise speed schedules) recommended for ETOPS operation, provided that the requirements set forth in section 3.06.10, GENERAL, are complied with.



✳ USE M.80/350KT OR M.78/320KT AS ESTABLISHED BEFORE DISPATCH.

✳✳ SET 15000 feet OR VALUE ESTABLISHED BEFORE DISPATCH.

✳✳✳ IF V/S BECOMES < 500 feet/minute SELECT V/S MODE.

EXAMPLE

Given :

R	GW at engine failure	= 70000 kg
R	FL at engine failure	= 330
	Temperature	= ISA
	Distance to diversion airport	= 500 NM
	Speed selected before dispatch	= 350 KT
	Cruise level for diversion Selected before dispatch	= FL180

Find :

R Descent to cruise level : Distance = 188 – 104 = 84 NM
R (See 3.06.50 p3) Fuel = 1268 – 828 = 440 kg
R Time = 25.4 – 14.7 = 10.7 min

Cruise
R Weight = 90000 – 440 = 89560 kg
R Distance = 500 – 84 = 416 NM

Determine (3.06.50 p14) time and fuel consumption at ISA conditions for a reference weight of 60000 kg

Interpolate the remaining distance of 416 NM at FL180

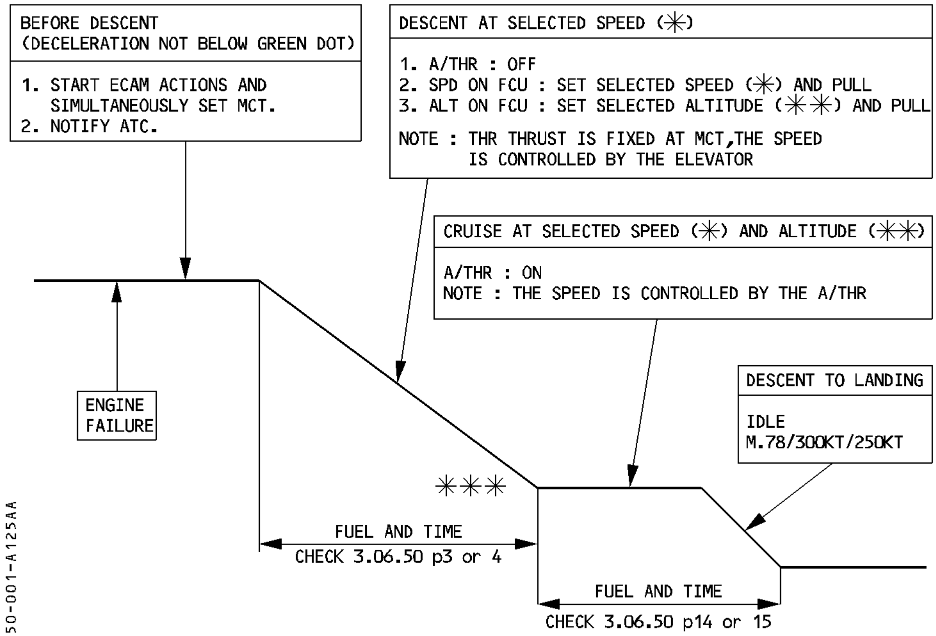
R Fuel = 3043 kg
R Time = 1 h 12 min
R Correction due to actual in-cruise weight :
R $\triangle$Fuel = + 3 kg per 1000 kg above reference weight
R $\triangle$Fuel = + 3 kg × (89.6 – 60) ~ 89 kg

Result :

R Total Fuel = 3043 + 440 + 89 = 3572 kg
R Time = 1 h 12 min + 11 min = 1 h 23 min

PROCEDURE

This section provides single engine performance data for two fixed speed diversion strategies (fixed descent and cruise speed schedules) recommended for ETOPS operation, provided that the requirements set forth in section 3.06.10, GENERAL, are complied with.



✳ USE M.80/350KT OR M.78/320KT AS ESTABLISHED BEFORE DISPATCH.

✳✳ SET 15000 feet OR VALUE ESTABLISHED BEFORE DISPATCH.

✳✳✳ IF V/S BECOMES < 500 feet/minute SELECT V/S MODE.

EXAMPLE

Given :

GW at engine failure = 70000 kg
FL at engine failure = 350
Temperature = ISA
Distance to diversion airport = 500 NM
Speed selected before dispatch = 350 KT
Cruise level for diversion
Selected before dispatch = FL180

Find :

R Descent to cruise level : Distance = 178 – 92 = 86 NM
R (See 3.06.50 p3) Fuel = 1030 – 651 = 379 kg
R Time = 24.1 – 13.1 = 11 min

Cruise

R Weight = 70000 – 379 = 69621 kg
R Distance = 500 – 86 = 414 NM

Determine (3.06.50 p14) time and fuel consumption at ISA conditions for a reference weight of 55000 kg

R Interpolate the remaining distance of 414 NM at FL180
R Fuel = 2804 kg
R Time = 1 h 11 min

Correction due to actual in-cruise weight : no correction here

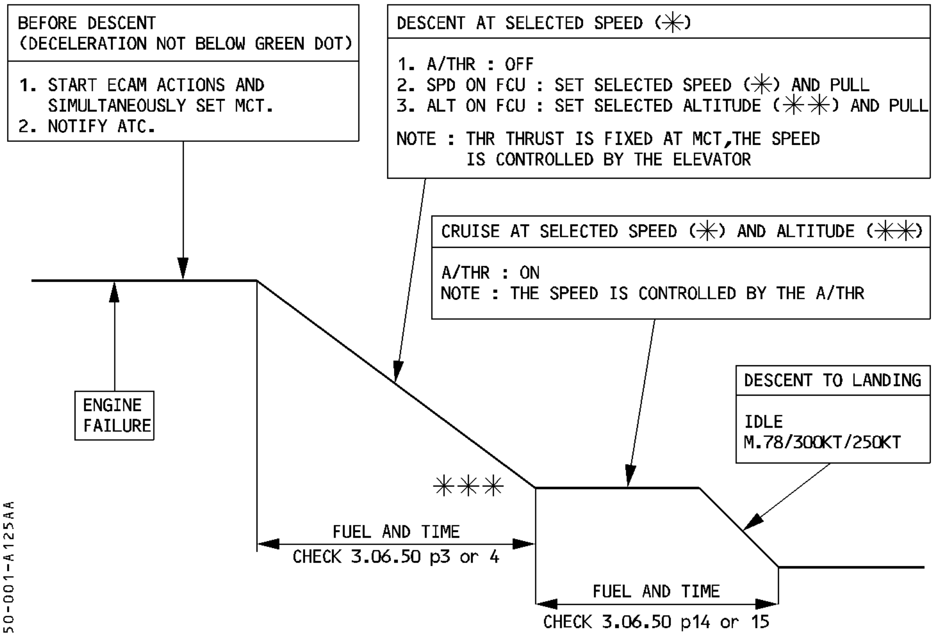
R △Fuel = + 3 kg per 1000 kg above reference weight
R △Fuel = + 3 kg × (69.6 – 55) ~ 44 kg

Result :

R Total Fuel = 2804 + 44 + 379 = 3227 kg
R Time = 1h11 min + 11 min = 1 h 22 min

PROCEDURE

This section provides single engine performance data for two fixed speed diversion strategies (fixed descent and cruise speed schedules) recommended for ETOPS operation, provided that the requirements set forth in section 3.06.10, GENERAL, are complied with.



* USE M.80/350KT OR M.78/320KT AS ESTABLISHED BEFORE DISPATCH.

** SET 15000 feet OR VALUE ESTABLISHED BEFORE DISPATCH.

*** IF V/S BECOMES < 500 feet/minute SELECT V/S MODE.

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EXAMPLE

Given :

GW at engine failure = 70000 kg
FL at engine failure = 350
Temperature = ISA
Distance to diversion airport = 500 NM
Speed selected before dispatch = 350 KT
Cruise level for diversion
Selected before dispatch = FL180

Find :

R Descent to cruise level : Distance = 184 – 94 = 90 NM
R (See 3.06.50 p3) Fuel = 1047 – 651 = 396 kg
R Time = 24.8 – 13.3 = 11.5 min

Cruise

R Weight = 70000 – 396 = 69604 kg
R Distance = 500 – 90 = 410 NM

Determine (3.06.50 p14) time and fuel consumption at ISA conditions for a reference weight of 55000 kg

R Interpolate the remaining distance of 410 NM at FL180
R Fuel = 2561 kg
R Time = 1 h 13 min

Correction due to actual in-cruise weight : no correction here

R ΔFuel = + 2 kg per 1000 kg above reference weight
R ΔFuel = + 2 kg × (69.6 – 55) ~ 29 kg

Result :

R Total Fuel = 2561 + 29 + 396 = 2986 kg
R Time = 1h13 min + 12 min = 1 h 25 min

R

DESCENT - M.80/350KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF	ISA CG=33.0%	MINIMUM RATE OF DESCENT 500FT/MIN

WEIGHT (1000KG)	70				90				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	29.1	1360	216	MCT					248
370	27.8	1329	206	MCT					260
350	26.5	1291	196	MCT					272
330	25.2	1252	186	MCT	25.4	1268	188	MCT	284
310	23.9	1212	176	MCT	24.3	1232	179	MCT	297
290	22.7	1172	167	MCT	23.1	1195	170	MCT	311
270	21.6	1132	158	MCT	22.0	1155	161	MCT	324
250	20.6	1092	149	MCT	20.9	1114	152	MCT	338
230	19.5	1049	141	MCT	19.8	1067	143	MCT	350
220	18.8	1017	135	MCT	18.9	1032	136	MCT	350
210	17.9	979	128	MCT	18.0	990	129	MCT	350
200	17.0	935	121	MCT	17.0	942	121	MCT	350
190	15.9	884	113	MCT	15.9	888	113	MCT	350
180	14.8	826	104	MCT	14.7	828	104	MCT	350
170	13.5	758	95	MCT	13.4	757	94	MCT	350
160	11.9	671	83	MCT	11.8	672	82	MCT	350
150	10.0	563	69	V/S	10.0	569	69	MCT	350
140	8.0	448	55	V/S	8.0	455	55	V/S	350
100	.0	0	0	V/S	.0	0	0	V/S	350

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	– 0.5 %	– 1.6 %	–
FUEL	+ 2.4 %	+ 5 %	+ 0.3 %
DISTANCE	– 0.7 %	– 1.2 %	+ 0.3 %

R

DESCENT - M.78/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF	ISA CG=33.0%	**MINIMUM RATE OF DESCENT 500FT/MIN**

WEIGHT (1000KG)	**70**				**90**				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	37.4	1544	262	MCT					241
370	35.9	1506	251	MCT					252
350	34.4	1463	240	MCT					264
330	32.8	1417	228	MCT	31.9	1417	221	MCT	277
310	31.3	1369	216	MCT	30.6	1376	211	MCT	289
290	29.8	1321	205	MCT	29.2	1332	201	MCT	302
270	28.5	1273	195	MCT	27.9	1285	190	MCT	315
250	26.8	1209	182	MCT	26.2	1221	177	MCT	320
230	24.6	1120	165	MCT	24.0	1133	161	MCT	320
220	23.3	1065	155	MCT	22.7	1080	151	MCT	320
210	21.8	998	145	MCT	21.3	1018	141	MCT	320
200	20.0	916	132	MCT	19.8	945	130	MCT	320
190	18.0	822	118	V/S	18.0	860	118	MCT	320
180	16.0	728	104	V/S	16.0	763	104	V/S	320
170	14.0	634	90	V/S	14.0	664	90	V/S	320
160	12.0	542	77	V/S	12.0	567	77	V/S	320
150	10.0	450	64	V/S	10.0	470	64	V/S	320
140	8.0	359	50	V/S	8.0	375	50	V/S	320
100	.0	0	0	V/S	.0	0	0	V/S	320

CORRECTIONS	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**
TIME	– 0.3 %	– 0.5 %	–
FUEL	+ 2.5 %	+ 5 %	+ 0.3 %
DISTANCE	– 0.4 %	– 0.7 %	+ 0.3 %

R

DESCENT - M.80/350KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF	ISA CG=33.0%	MINIMUM RATE OF DESCENT 500FT/MIN

WEIGHT (1000KG)	50				70				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	24.8	1011	183	MCT					248
370	23.3	980	172	MCT	25.3	1060	188	MCT	260
350	21.9	946	162	MCT	24.1	1030	178	MCT	272
330	20.6	911	151	MCT	22.8	998	169	MCT	284
310	19.4	876	142	MCT	21.6	962	159	MCT	297
290	18.3	842	133	MCT	20.4	924	149	MCT	311
270	17.3	809	126	MCT	19.2	886	140	MCT	324
250	16.4	778	119	MCT	18.1	849	131	MCT	338
230	15.6	749	112	MCT	17.1	811	123	MCT	350
220	15.1	728	108	MCT	16.4	785	118	MCT	350
210	14.5	705	103	MCT	15.6	756	112	MCT	350
200	13.8	679	98	MCT	14.8	724	105	MCT	350
190	13.2	651	93	MCT	14.0	689	99	MCT	350
180	12.4	620	87	MCT	13.1	651	92	MCT	350
170	11.5	582	81	MCT	12.1	607	84	MCT	350
160	10.5	534	73	MCT	10.9	551	76	MCT	350
150	9.2	473	64	MCT	9.4	483	65	MCT	350
140	7.8	399	53	MCT	7.8	402	54	MCT	350
100	.0	0	0	V/S	.0	0	0	V/S	350

CORRECTIONS	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**
TIME	– 1.5 %	– 4.5 %	–
FUEL	+ 0.5 %	–	+ 0.3 %
DISTANCE	– 1.5 %	– 5 %	+ 0.3 %

11.0-08F0A320-214 CFM56-5B4/P SA23200010C6KG330 0 018590 0 0 3 .0 .0 500.00 0 02 .800350.000 .000 0 FCOM-N0-03-06-50-003-200

R

DESCENT - M.78/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF			ISA CG=33.0%		**MINIMUM RATE OF DESCENT 500FT/MIN**				
WEIGHT (1000KG)	**50**				**70**				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	35.7	1327	250	MCT					241
370	34.0	1290	237	MCT	34.4	1315	240	MCT	252
350	32.3	1249	224	MCT	33.0	1282	230	MCT	264
330	30.7	1207	212	MCT	31.6	1244	219	MCT	277
310	29.2	1164	201	MCT	30.1	1202	208	MCT	289
290	27.8	1123	191	MCT	28.6	1158	197	MCT	302
270	26.6	1082	181	MCT	27.2	1113	186	MCT	315
250	25.2	1032	170	MCT	25.6	1056	173	MCT	320
230	23.3	966	156	MCT	23.5	981	157	MCT	320
220	22.3	927	148	MCT	22.3	938	149	MCT	320
210	21.1	882	140	MCT	21.1	890	140	MCT	320
200	19.7	828	130	MCT	19.7	834	130	MCT	320
190	18.0	755	118	V/S	18.0	763	118	MCT	320
180	16.0	669	104	V/S	16.0	678	104	V/S	320
170	14.0	584	90	V/S	14.0	591	90	V/S	320
160	12.0	499	77	V/S	12.0	505	77	V/S	320
150	10.0	415	64	V/S	10.0	420	64	V/S	320
140	8.0	332	50	V/S	8.0	335	50	V/S	320
100	.0	0	0	V/S	.0	0	0	V/S	320

CORRECTIONS	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**
TIME	− 0.6 %	− 3 %	−
FUEL	+ 1.5 %	+ 5 %	+ 0.3 %
DISTANCE	− 0.8 %	− 2.5 %	+ 0.3 %

11.0-08F0A320-214 CFM56-5B4/P SA23200010C6KG330 0 018590 0 0 3 .0 .0 500.00 0 02 .780320.000 .000 0 FCOM-N0-03-06-50-004-200

R

DESCENT - M.80/350KT - 1 ENGINE OUT									
MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF			ISA CG=33.0%		**MINIMUM RATE OF DESCENT 500FT/MIN**				
WEIGHT (1000KG)	**50**				**70**				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	25.7	1033	190	MCT					248
370	24.2	1001	179	MCT	26.1	1076	193	MCT	260
350	22.7	965	168	MCT	24.8	1047	184	MCT	272
330	21.3	929	157	MCT	23.5	1013	174	MCT	284
310	20.1	892	147	MCT	22.2	976	164	MCT	297
290	18.9	856	138	MCT	20.9	938	154	MCT	311
270	17.9	822	130	MCT	19.7	898	144	MCT	324
250	17.0	790	123	MCT	18.6	859	135	MCT	338
230	16.1	758	116	MCT	17.6	820	127	MCT	350
220	15.6	737	111	MCT	16.8	792	121	MCT	350
210	14.9	712	106	MCT	16.0	762	115	MCT	350
200	14.2	685	101	MCT	15.2	728	108	MCT	350
190	13.5	655	95	MCT	14.3	692	101	MCT	350
180	12.7	622	89	MCT	13.3	651	94	MCT	350
170	11.8	581	82	MCT	12.2	604	86	MCT	350
160	10.6	528	74	MCT	10.9	544	76	MCT	350
150	9.3	463	64	MCT	9.4	472	65	MCT	350
140	7.7	389	53	MCT	7.8	392	54	MCT	350
100	.0	0	0	V/S	.0	0	0	V/S	350

CORRECTIONS	**ENGINE ANTI ICE ON**	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**
TIME	– 1.5 %	– 5 %	–
FUEL	+ 0.5 %	– 1 %	+ 0.3 %
DISTANCE	– 1.5 %	– 5 %	+ 0.3 %

11.0-08F0A319-112 CFM56-5B6/P SA23200010C6KG330 0 018590 0 0 3 .0 .0 500.00 0 02 .800350.000 .000 0 FCOM-N0-03-06-50-003-240

R

DESCENT - M.78/320KT - 1 ENGINE OUT									
MAX. CONTINUOUS THRUST LIMITS PACK FLOW HI ANTI-ICING OFF			ISA CG=33.0%		**MINIMUM RATE OF DESCENT 500FT/MIN**				
WEIGHT (1000KG)	**50**				**70**				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	TIME (MIN)	FUEL (KG)	DIST. (NM)	MODE	IAS (KT)
390	36.5	1332	256	MCT					241
370	34.7	1293	242	MCT	34.8	1305	243	MCT	252
350	32.9	1250	229	MCT	33.4	1271	233	MCT	264
330	31.2	1206	216	MCT	31.9	1233	221	MCT	277
310	29.6	1161	204	MCT	30.3	1190	210	MCT	289
290	28.2	1117	193	MCT	28.8	1144	198	MCT	302
270	26.9	1074	183	MCT	27.4	1097	187	MCT	315
250	25.4	1022	171	MCT	25.6	1037	173	MCT	320
230	23.4	951	157	MCT	23.4	958	157	MCT	320
220	22.3	909	148	MCT	22.2	912	148	MCT	320
210	21.0	860	139	MCT	20.9	861	138	MCT	320
200	19.6	803	129	MCT	19.4	804	128	MCT	320
190	17.9	736	117	MCT	17.8	738	116	MCT	320
180	16.0	657	104	V/S	16.0	663	104	MCT	320
170	14.0	574	90	V/S	14.0	580	90	V/S	320
160	12.0	491	77	V/S	12.0	495	77	V/S	320
150	10.0	408	64	V/S	10.0	412	64	V/S	320
140	8.0	326	50	V/S	8.0	329	50	V/S	320
100	.0	0	0	V/S	.0	0	0	V/S	320

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	– 1 %	– 3 %	–
FUEL	+ 2 %	+ 4 %	+ 0.3 %
DISTANCE	– 1 %	– 3 %	+ 0.3 %

11.0-08F0A319-112 CFM56-5B6/P SA23200010C6KG330 0 018590 0 0 3 .0 .0 500.00 0 02 .780320.000 .000 0 FCOM-N0-03-06-50-004-240

R

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **MACH** **KG/H** **IAS (KT)** **NM/1000KG** **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
64	93.9	.626	94.7	.641	94.8	.641	93.7	.628	93.6	.622	93.0	.604
	3851	348	3469	325	3373	319	3034	301	2822	286	2580	266
	103.7	399	115.7	401	118.7	400	128.2	389	135.4	382	142.8	368
66	93.9	.625	94.7	.639	94.8	.639	93.7	.625	93.6	.617	93.1	.597
	3852	347	3470	324	3373	318	3034	299	2822	283	2578	263
	103.5	399	115.3	400	118.3	399	127.5	387	134.3	379	141.0	364
68	94.0	.623	94.7	.637	94.8	.637	93.8	.621	93.7	.611	93.2	.587
	3853	347	3470	323	3374	317	3034	297	2822	281	2573	259
	103.2	398	114.9	399	117.8	397	126.8	385	133.0	375	139.1	358
70	94.0	.622	94.8	.634	94.9	.634	93.8	.617	93.7	.605	93.3	.576
	3854	346	3471	322	3375	316	3034	295	2822	278	2567	253
	103.0	397	114.5	397	117.3	396	125.9	382	131.6	371	136.8	351
72	94.0	.620	94.8	.632	94.9	.631	93.8	.612	93.8	.597	93.4	.562
	3856	345	3472	320	3376	314	3034	292	2821	274	2559	247
	102.7	396	114.0	396	116.7	394	124.9	379	130.1	367	133.7	342
74	94.0	.619	94.8	.629	95.0	.628	93.9	.606	93.9	.589		
	3857	344	3472	319	3377	312	3034	290	2816	270		
	102.4	395	113.5	394	116.1	392	123.7	375	128.5	362		
76	94.0	.617	94.9	.626	95.0	.625	94.0	.600	93.9	.579		
	3858	343	3473	317	3378	311	3034	286	2812	265		
	102.1	394	112.9	392	115.4	390	122.4	371	126.5	356		
78	94.0	.615	94.9	.622	95.1	.621	94.0	.593	94.0	.567		
	3859	342	3474	315	3379	308	3030	283	2806	260		
	101.7	393	112.2	390	114.6	387	121.2	367	124.1	348		
80	94.1	.613	95.0	.619	95.1	.616	94.1	.585	94.2	.548		
	3861	341	3476	313	3381	306	3025	279	2799	251		
	101.4	391	111.5	388	113.7	384	119.7	362	120.4	337		
82	94.1	.611	95.0	.614	95.2	.611	94.1	.576				
	3863	340	3477	311	3383	304	3020	274				
	101.0	390	110.7	385	112.7	381	118.0	357				
84	94.1	.609	95.1	.610	95.3	.606	94.2	.564				
	3865	339	3479	309	3385	301	3015	269				
	100.6	389	109.8	382	111.6	378	115.9	349				
86	94.1	.606	95.1	.604	95.3	.599	94.4	.547				
	3868	337	3481	306	3387	297	3007	260				
	100.1	387	108.8	379	110.4	374	112.7	339				
88	94.2	.603	95.2	.599	95.4	.592						
	3871	335	3482	303	3381	294						
	99.5	385	107.7	375	109.2	369						
90	94.2	.600	95.2	.592	95.4	.583						
	3874	334	3476	299	3375	289						
	99.0	383	106.7	371	107.8	364						
92	94.2	.597	95.3	.584	95.5	.573						
	3871	332	3469	295	3368	284						
	98.4	381	105.4	366	106.2	358						

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2 %	△FUEL = + 3 %

11.0-08F0A321-211 CFM56-5B3/P SA12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 01100.000 .000 .000 0 FCOM-N0-03-06-50-005-165

R

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+10 CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
64	95.5	.624	96.4	.639	96.5	.640	95.4	.627	95.3	.620	94.8	.602
	3930	347	3550	324	3454	319	3106	300	2889	285	2640	265
	103.3	406	115.0	408	117.9	407	127.4	396	134.5	389	141.9	375
66	95.6	.623	96.4	.637	96.6	.638	95.5	.623	95.4	.615	94.9	.594
	3931	346	3550	323	3455	318	3106	298	2889	282	2636	262
	103.0	405	114.6	407	117.5	406	126.7	394	133.4	385	140.2	370
68	95.6	.621	96.5	.635	96.6	.636	95.5	.620	95.4	.609	94.9	.585
	3932	346	3551	322	3456	316	3106	296	2889	280	2631	257
	102.8	404	114.2	406	117.0	404	125.9	391	132.1	382	138.2	364
70	95.6	.620	96.5	.633	96.6	.633	95.5	.615	95.5	.603	95.0	.574
	3933	345	3552	321	3457	315	3106	294	2889	277	2624	252
	102.5	403	113.8	404	116.5	403	125.0	388	130.7	378	135.9	357
72	95.6	.618	96.5	.630	96.7	.630	95.6	.610	95.5	.595	95.1	.558
	3934	344	3553	320	3457	313	3106	291	2887	273	2616	245
	102.2	402	113.3	403	115.9	401	124.0	385	129.2	373	132.6	347
74	95.6	.617	96.6	.628	96.7	.627	95.6	.604	95.6	.587		
	3935	343	3554	318	3459	312	3106	289	2882	269		
	101.9	401	112.8	401	115.3	399	122.9	382	127.6	368		
76	95.6	.615	96.6	.625	96.8	.623	95.7	.598	95.7	.577		
	3936	342	3555	317	3460	310	3105	286	2878	264		
	101.6	400	112.2	399	114.6	396	121.6	378	125.6	361		
78	95.7	.613	96.6	.621	96.8	.619	95.7	.591	95.8	.564		
	3937	341	3556	315	3461	308	3101	282	2872	258		
	101.3	399	111.5	397	113.8	394	120.4	373	123.1	353		
80	95.7	.611	96.7	.617	96.9	.615	95.8	.583	95.9	.544		
	3939	340	3558	313	3463	305	3096	278	2865	249		
	100.9	397	110.8	394	112.9	391	118.9	368	119.0	341		
82	95.7	.609	96.7	.613	96.9	.609	95.9	.574				
	3941	339	3560	310	3465	303	3091	273				
	100.5	396	109.9	391	111.9	388	117.1	362				
84	95.7	.607	96.8	.608	97.0	.604	96.0	.561				
	3943	337	3562	308	3467	300	3085	267				
	100.1	395	109.0	388	110.8	384	114.9	354				
86	95.8	.604	96.9	.603	97.1	.597	96.1	.544				
	3946	336	3564	305	3467	297	3077	259				
	99.6	393	108.0	385	109.6	380	111.5	343				
88	95.8	.601	96.9	.597	97.1	.590						
	3949	334	3562	302	3461	293						
	99.0	391	107.0	381	108.4	375						
90	95.8	.598	97.0	.590	97.2	.581						
	3948	332	3556	298	3454	288						
	98.5	389	105.9	377	107.1	370						
92	95.8	.595	97.0	.582	97.2	.571						
	3944	330	3549	294	3446	283						
	98.0	387	104.7	372	105.4	363						

ENGINE ANTI ICE ON △FUEL = + 2 %	**TOTAL ANTI ICE ON** △FUEL = + 3 %

11.0-08F0A321-211 CFM56-5B3/P SA12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 01100.000 .000 .000 10 FCOM-N0-03-06-50-006-165

R

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA
CG=33.0%

N1 (%) / KG/H / NM/1000KG — MACH / IAS (KT) / TAS (KT)

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	89.6	.609	91.3	.641	91.4	.645	91.1	.644	91.3	.649	91.1	.647
	3249	338	3072	325	3010	321	2798	308	2663	299	2480	286
	119.6	389	130.7	402	133.7	403	142.5	399	149.7	399	158.9	394
52	89.6	.608	91.3	.640	91.5	.644	91.2	.643	91.4	.647	91.2	.645
	3251	338	3076	325	3015	321	2804	308	2673	298	2490	285
	119.3	388	130.3	401	133.3	402	141.9	398	148.7	398	157.8	393
54	89.6	.607	91.3	.639	91.5	.642	91.2	.641	91.5	.645	91.3	.642
	3252	337	3080	324	3019	320	2811	307	2683	297	2500	284
	119.1	387	129.9	400	132.8	401	141.2	397	147.8	397	156.5	391
56	89.6	.605	91.4	.637	91.6	.641	91.3	.639	91.6	.644	91.5	.640
	3254	337	3084	323	3024	319	2820	306	2694	296	2512	283
	118.8	386	129.4	399	132.2	400	140.4	396	146.8	395	155.2	390
58	89.6	.604	91.4	.636	91.6	.639	91.4	.638	91.8	.642	91.6	.637
	3255	336	3088	322	3029	318	2828	305	2705	295	2525	281
	118.4	386	128.9	398	131.7	399	139.6	395	145.7	394	153.8	388
60	89.6	.603	91.5	.634	91.7	.637	91.5	.636	91.9	.639	91.8	.634
	3257	335	3093	321	3035	317	2836	304	2717	294	2539	280
	118.1	385	128.4	397	131.1	398	138.8	394	144.6	393	152.2	386
62	89.7	.601	91.5	.632	91.7	.636	91.6	.634	92.0	.637	91.9	.630
	3259	334	3098	320	3041	316	2845	303	2731	293	2554	278
	117.7	384	127.8	396	130.4	397	137.9	392	143.3	391	150.4	384
64	89.7	.600	91.6	.630	91.8	.634	91.7	.631	92.2	.634	92.1	.627
	3260	333	3104	319	3047	315	2856	302	2745	292	2571	277
	117.4	383	127.2	395	129.8	395	136.9	391	142.0	390	148.6	382
66	89.7	.598	91.6	.628	91.9	.631	91.8	.629	92.3	.632	92.3	.622
	3258	332	3109	318	3054	314	2868	301	2761	291	2587	275
	117.1	381	126.5	393	129.1	394	135.8	389	140.5	388	146.6	379
68	89.7	.595	91.7	.626	91.9	.629	91.9	.626	92.5	.629	92.6	.617
	3257	331	3116	317	3061	313	2881	300	2779	289	2605	272
	116.7	380	125.9	392	128.3	393	134.6	388	139.0	386	144.4	376
70	89.7	.593	91.7	.624	92.0	.627	92.0	.623	92.7	.625	92.9	.612
	3255	330	3122	316	3068	312	2896	298	2797	287	2625	270
	116.3	379	125.1	391	127.5	391	133.3	386	137.3	384	142.1	373
72	89.7	.591	91.8	.621	92.1	.624	92.2	.620	92.9	.621	93.2	.605
	3253	328	3129	315	3077	310	2911	297	2817	286	2648	267
	115.9	377	124.4	389	126.6	390	131.9	384	135.5	382	139.3	369
74	89.7	.588	91.9	.619	92.2	.621	92.4	.617	93.1	.617	93.5	.597
	3251	327	3137	313	3086	309	2928	295	2836	283	2666	263
	115.5	376	123.5	387	125.6	388	130.4	382	133.6	379	136.4	364
76	89.7	.586	92.0	.616	92.3	.618	92.5	.613	93.4	.612	93.6	.577
	3249	325	3145	312	3097	307	2946	293	2857	281	2656	254
	115.1	374	122.6	386	124.6	386	128.8	380	131.6	376	132.3	351
78	89.7	.583	92.0	.612	92.4	.615	92.7	.609	93.7	.607		
	3246	324	3154	310	3109	305	2967	291	2883	279		
	114.6	372	121.6	384	123.3	383	127.1	377	129.3	373		

ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = + 1.5 %	△FUEL = + 4 %

R

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA+10 CG=33.0%	**N1 (%)** **MACH** **KG/H** **IAS (KT)** **NM/1000KG** **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL150**		**FL160**		**FL180**		**FL200**		**FL220**	
50	91.2	.607	93.0	.640	93.2	.644	92.8	.643	93.1	.648	92.9	.646
	3317	338	3146	325	3085	321	2868	308	2731	298	2543	286
	119.0	395	129.9	409	132.9	410	141.6	406	148.7	406	157.9	401
52	91.2	.606	93.0	.639	93.2	.643	92.9	.642	93.2	.646	93.0	.643
	3319	337	3150	324	3089	320	2874	307	2741	298	2553	285
	118.7	394	129.5	408	132.4	409	141.0	405	147.7	405	156.7	400
54	91.2	.605	93.0	.638	93.2	.642	93.0	.640	93.3	.645	93.1	.641
	3320	336	3154	323	3094	319	2882	306	2751	297	2564	283
	118.5	393	129.1	407	131.9	408	140.2	404	146.8	404	155.5	399
56	91.2	.604	93.1	.636	93.3	.640	93.1	.638	93.4	.643	93.2	.639
	3322	336	3158	323	3099	319	2890	306	2762	296	2575	282
	118.2	393	128.6	406	131.4	407	139.5	403	145.8	403	154.2	397
58	91.2	.602	93.1	.635	93.3	.638	93.1	.637	93.5	.641	93.4	.636
	3323	335	3163	322	3104	318	2898	305	2774	295	2589	281
	117.9	392	128.1	405	130.8	406	138.7	402	144.7	401	152.7	395
60	91.2	.601	93.2	.633	93.4	.637	93.2	.635	93.6	.638	93.5	.633
	3325	334	3168	321	3110	317	2907	304	2787	294	2603	280
	117.5	391	127.5	404	130.2	405	137.8	401	143.6	400	151.1	393
62	91.2	.600	93.2	.631	93.5	.635	93.3	.633	93.8	.636	93.7	.629
	3326	333	3173	320	3116	316	2917	303	2800	293	2619	278
	117.2	390	127.0	403	129.6	404	136.9	399	142.3	399	149.4	391
64	91.2	.598	93.3	.629	93.5	.633	93.4	.630	93.9	.633	93.9	.625
	3325	332	3179	319	3122	315	2928	302	2815	291	2636	276
	116.9	389	126.4	402	128.9	402	135.9	398	141.0	397	147.5	389
66	91.2	.596	93.3	.627	93.6	.631	93.5	.628	94.1	.631	94.1	.621
	3323	331	3185	318	3129	314	2941	300	2832	290	2652	274
	116.6	387	125.7	400	128.2	401	134.8	396	139.5	395	145.6	386
68	91.2	.594	93.4	.625	93.7	.628	93.7	.625	94.3	.627	94.4	.616
	3322	330	3191	317	3136	313	2954	299	2850	289	2671	272
	116.2	386	125.0	399	127.4	400	133.6	395	138.0	393	143.4	383
70	91.2	.591	93.4	.623	93.7	.626	93.8	.622	94.5	.624	94.7	.610
	3320	329	3198	316	3144	311	2969	298	2869	287	2691	269
	115.8	385	124.3	398	126.6	398	132.4	393	136.3	391	141.0	380
72	91.2	.589	93.5	.620	93.8	.623	93.9	.619	94.7	.620	95.0	.604
	3318	327	3205	314	3153	310	2985	296	2888	285	2715	266
	115.4	383	123.6	396	125.7	396	131.0	391	134.5	389	138.3	376
74	91.2	.587	93.6	.618	93.9	.620	94.1	.616	94.9	.616	95.2	.593
	3316	326	3213	313	3163	308	3002	294	2909	283	2727	261
	115.0	381	122.7	394	124.7	395	129.5	389	132.6	386	135.3	369
76	91.2	.584	93.7	.615	94.0	.617	94.3	.612	95.2	.611	95.4	.572
	3314	324	3222	311	3174	307	3021	292	2932	281	2717	252
	114.5	380	121.8	392	123.6	392	127.9	386	130.6	383	131.0	356
78	91.2	.581	93.8	.611	94.1	.613	94.5	.608	95.5	.605		
	3312	323	3232	310	3187	305	3042	290	2958	278		
	114.0	378	120.8	390	122.4	390	126.1	384	128.2	379		

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
$\triangle$FUEL = + 1.5 %	$\triangle$FUEL = + 4 %

R

CRUISE - MCT/341KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL150**		**FL160**		**FL180**		**FL200**		**FL220**	
48	89.6	.614	90.0	.631	90.0	.635	88.7	.620	88.6	.622	88.6	.622
	3242	341	2891	320	2823	316	2500	296	2353	286	2215	275
	120.9	392	136.8	396	140.3	396	153.5	384	162.3	382	171.3	379
50	89.6	.613	90.0	.630	90.0	.633	88.7	.617	88.6	.618	88.6	.619
	3243	341	2891	319	2823	315	2500	295	2352	284	2213	273
	120.6	391	136.5	395	139.9	395	152.9	382	161.5	380	170.3	377
52	89.6	.612	90.0	.628	90.0	.631	88.7	.614	88.6	.615	88.6	.614
	3245	340	2892	318	2823	314	2499	294	2351	283	2212	271
	120.4	391	136.1	393	139.5	394	152.2	380	160.7	378	169.2	374
54	89.6	.611	90.0	.626	90.1	.629	88.7	.611	88.7	.611	88.6	.609
	3246	340	2892	317	2823	313	2499	292	2350	281	2211	269
	120.1	390	135.6	392	139.0	392	151.5	379	159.8	376	167.9	371
56	89.6	.609	90.0	.624	90.1	.627	88.7	.608	88.7	.607	88.7	.603
	3248	339	2892	316	2823	312	2498	291	2349	279	2209	266
	119.8	389	135.2	391	138.6	391	150.8	377	158.8	373	166.4	368
58	89.6	.608	90.0	.622	90.1	.624	88.7	.605	88.7	.603	88.7	.596
	3250	338	2893	315	2823	310	2497	289	2347	277	2205	263
	119.4	388	134.7	390	138.0	390	150.0	374	157.7	370	164.7	363
60	89.6	.607	90.0	.620	90.1	.622	88.7	.601	88.7	.597	88.7	.588
	3252	337	2893	314	2822	309	2497	287	2344	274	2198	259
	119.1	387	134.2	388	137.4	388	149.0	372	156.4	367	162.9	358
62	89.6	.605	90.0	.617	90.1	.619	88.7	.596	88.7	.590	88.7	.578
	3254	336	2893	313	2822	308	2493	285	2338	270	2191	254
	118.7	386	133.6	387	136.8	386	148.1	369	155.0	362	160.7	352
64	89.6	.604	90.0	.614	90.1	.616	88.7	.591	88.7	.582	88.6	.565
	3256	335	2894	311	2822	306	2488	282	2331	267	2182	248
	118.3	385	133.0	385	136.2	384	147.1	366	153.4	358	157.9	344
66	89.6	.602	90.1	.612	90.1	.613	88.7	.585	88.7	.573	88.6	.546
	3258	335	2894	310	2822	304	2482	279	2325	263	2168	240
	117.9	384	132.4	383	135.5	382	145.8	362	151.5	352	153.5	333
68	89.7	.600	90.1	.608	90.2	.609	88.7	.578	88.7	.562		
	3260	333	2894	308	2822	302	2475	275	2316	257		
	117.5	383	131.7	381	134.7	380	144.5	358	149.2	346		
70	89.7	.598	90.1	.605	90.2	.605	88.7	.570	88.7	.547		
	3259	332	2894	306	2822	300	2469	272	2305	250		
	117.1	382	130.9	379	133.7	377	142.9	353	145.7	336		
72	89.7	.596	90.1	.601	90.2	.600	88.7	.561	88.7	.512		
	3257	331	2895	304	2822	298	2460	267	2283	233		
	116.7	380	130.1	377	132.7	374	141.1	347	137.8	314		
74	89.7	.593	90.1	.596	90.2	.594	88.7	.548				
	3255	330	2891	302	2816	295	2450	261				
	116.3	379	129.2	374	131.6	371	138.5	339				

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 1.5 %	△FUEL = + 3.5 %

11.0-08F0A319-112 CFM56-5B6/P SA12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 1100.000 .000 .000 0 FCOM-N0-03-06-50-005-240

R

CRUISE - MCT/340KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA+10 CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL150**		**FL160**		**FL180**		**FL200**		**FL220**	
48	91.1	.612	91.6	.630	91.7	.634	90.3	.618	90.3	.620	90.3	.621
	3310	340	2958	320	2890	315	2557	296	2406	285	2263	274
	120.3	398	136.0	402	139.5	403	152.6	390	161.5	388	170.5	386
50	91.1	.611	91.6	.629	91.7	.632	90.4	.616	90.3	.617	90.3	.617
	3311	340	2959	319	2890	314	2556	294	2405	283	2262	272
	120.0	397	135.7	401	139.1	402	152.1	389	160.7	386	169.5	384
52	91.1	.610	91.6	.627	91.7	.630	90.4	.613	90.3	.613	90.3	.612
	3313	339	2959	318	2890	313	2556	293	2404	282	2261	270
	119.8	397	135.3	400	138.7	401	151.4	387	159.9	384	168.4	381
54	91.1	.609	91.6	.625	91.7	.628	90.4	.610	90.3	.610	90.3	.607
	3314	339	2960	317	2889	312	2555	291	2402	280	2259	268
	119.5	396	134.8	399	138.2	399	150.7	385	159.0	382	167.1	378
56	91.2	.608	91.7	.623	91.7	.626	90.4	.607	90.3	.605	90.3	.601
	3316	338	2960	316	2889	311	2555	290	2401	278	2258	265
	119.2	395	134.4	398	137.7	398	150.0	383	158.0	379	165.6	374
58	91.2	.606	91.7	.621	91.8	.623	90.4	.603	90.3	.601	90.3	.594
	3318	337	2960	315	2889	310	2554	288	2399	276	2252	261
	118.8	394	133.9	396	137.2	396	149.2	381	156.9	376	163.9	369
60	91.2	.605	91.7	.618	91.8	.620	90.4	.599	90.3	.595	90.3	.585
	3320	336	2961	313	2889	308	2552	286	2394	273	2244	257
	118.5	393	133.4	395	136.6	395	148.2	378	155.6	373	162.1	364
62	91.2	.604	91.7	.616	91.8	.618	90.4	.595	90.3	.588	90.3	.575
	3322	335	2961	312	2889	307	2548	284	2388	269	2236	253
	118.1	392	132.8	393	136.0	393	147.4	375	154.2	368	159.9	358
64	91.2	.602	91.7	.613	91.8	.615	90.4	.589	90.3	.580	90.3	.562
	3324	335	2962	311	2888	305	2542	281	2381	266	2226	247
	117.7	391	132.2	392	135.4	391	146.3	372	152.6	363	156.9	349
66	91.2	.600	91.7	.610	91.8	.611	90.4	.583	90.3	.571	90.3	.541
	3326	334	2962	309	2888	304	2536	278	2374	261	2211	237
	117.3	390	131.6	390	134.6	389	145.1	368	150.7	358	152.1	336
68	91.2	.598	91.7	.607	91.8	.608	90.4	.576	90.3	.560		
	3325	332	2962	307	2888	302	2529	274	2364	256		
	117.0	389	130.9	388	133.8	386	143.7	363	148.3	351		
70	91.2	.596	91.8	.604	91.8	.603	90.3	.568	90.3	.543		
	3323	331	2962	306	2888	300	2522	270	2352	248		
	116.6	387	130.1	385	132.9	384	142.1	358	144.6	340		
72	91.2	.594	91.8	.600	91.9	.598	90.3	.558	90.3	.500		
	3321	330	2962	304	2886	297	2513	266	2324	228		
	116.2	386	129.3	383	131.9	381	140.2	352	134.8	313		
74	91.2	.591	91.8	.595	91.9	.592	90.3	.545				
	3320	328	2956	301	2879	294	2500	259				
	115.8	384	128.4	380	130.9	377	137.5	344				

ENGINE ANTI ICE ON △FUEL = + 1.5 %	**TOTAL ANTI ICE ON** △FUEL = + 3.5 %

11.0-08F0A319-112 CFM56-5B6/P SA12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 1100.000 .000 .000 10 FCOM-N0-03-06-50-006-240

R

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

N1 (%) / **MACH**
KG/H / **IAS (KT)**
NM/1000KG / **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
64	95.0	.608	95.9	.623	96.0	.624	95.0	.610	94.8	.601	94.2	.580
	3747	338	3382	316	3304	310	2974	291	2772	276	2518	255
	106.4	399	118.6	401	121.3	401	130.7	389	137.3	380	144.6	364
66	95.1	.606	95.9	.621	96.1	.622	95.0	.606	94.9	.596	94.2	.570
	3748	337	3384	314	3306	309	2975	289	2771	273	2513	251
	106.1	398	118.1	400	120.8	399	129.7	386	136.0	377	142.4	358
68	95.1	.605	96.0	.618	96.1	.619	95.1	.601	94.9	.589	94.3	.558
	3749	336	3387	313	3308	308	2977	287	2769	270	2506	245
	105.8	397	117.6	398	120.2	398	128.7	383	134.6	373	139.7	350
70	95.1	.603	96.0	.616	96.1	.616	95.1	.596	94.9	.582	94.4	.538
	3751	335	3389	312	3311	306	2975	284	2767	267	2495	236
	105.5	396	117.1	397	119.5	396	127.7	380	133.0	368	135.4	338
72	95.1	.601	96.0	.613	96.2	.613	95.1	.590	95.0	.573		
	3752	334	3392	310	3314	305	2973	282	2762	262		
	105.1	394	116.4	395	118.7	394	126.5	376	131.2	362		
74	95.1	.599	96.1	.609	96.2	.609	95.2	.584	95.1	.562		
	3752	333	3395	309	3318	303	2971	278	2756	257		
	104.8	393	115.7	393	117.9	391	125.3	372	129.0	355		
76	95.1	.597	96.1	.606	96.3	.605	95.2	.576	95.1	.546		
	3750	332	3399	307	3322	301	2968	275	2748	250		
	104.5	392	114.9	390	116.9	388	123.8	367	125.7	345		
78	95.1	.595	96.2	.602	96.3	.600	95.2	.568				
	3749	331	3403	305	3327	298	2965	271				
	104.2	390	114.0	388	115.9	386	122.1	362				
80	95.1	.593	96.2	.597	96.4	.595	95.3	.558				
	3747	329	3403	302	3325	295	2962	266				
	103.8	389	113.1	385	114.9	382	120.1	356				
82	95.2	.590	96.2	.592	96.4	.589	95.4	.543				
	3745	328	3401	300	3321	292	2955	258				
	103.4	387	112.2	382	113.9	378	117.1	346				
84	95.2	.587	96.2	.587	96.4	.582						
	3742	326	3398	297	3315	289						
	102.9	385	111.2	378	112.7	374						
86	95.2	.584	96.3	.580	96.5	.574						
	3740	324	3396	293	3309	284						
	102.4	383	110.1	374	111.3	368						
88	95.2	.580	96.3	.573	96.5	.564						
	3737	322	3393	290	3302	279						
	101.8	381	108.8	369	109.7	362						
90	95.2	.576	96.4	.565	96.6	.551						
	3734	320	3390	285	3293	273						
	101.2	378	107.3	364	107.4	354						
92	95.2	.572	96.4	.554	96.7	.524						
	3731	318	3384	280	3275	259						
	100.6	375	105.4	357	102.7	336						

ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = + 2 %	△FUEL = + 3 %

11.0-08F0A321-211 CFM56-5B3/P SA12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 01100.000 .000 .000 15 FCOM-N0-03-06-50-007-165

R

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+20
CG=33.0%

N1 (%) — **MACH**
KG/H — **IAS (KT)**
NM/1000KG — **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
64	94.5 3555 109.9	.591 328 391	95.4 3215 122.4	.605 306 393	95.5 3139 125.2	.607 301 393	94.5 2819 134.6	.590 281 379	94.2 2616 141.2	.578 265 369	93.5 2358 147.4	.548 241 348
66	94.5 3554 109.7	.589 327 390	95.4 3217 121.8	.603 305 392	95.5 3142 124.5	.604 300 391	94.5 2815 133.6	.585 279 376	94.2 2613 139.6	.571 262 365	93.5 2352 143.4	.532 233 337
68	94.5 3554 109.4	.587 326 389	95.4 3218 121.2	.600 304 390	95.6 3145 123.7	.600 298 389	94.5 2812 132.4	.579 276 372	94.3 2610 137.7	.563 258 359		
70	94.5 3553 109.0	.585 325 387	95.4 3216 120.6	.596 302 388	95.6 3142 123.0	.596 296 386	94.5 2809 131.2	.573 273 368	94.3 2606 135.4	.553 253 353		
72	94.5 3552 108.7	.584 324 386	95.5 3213 119.9	.593 300 385	95.6 3140 122.1	.592 294 383	94.5 2805 129.7	.565 269 364	94.4 2602 132.3	.539 246 344		
74	94.5 3551 108.3	.581 323 385	95.5 3210 119.2	.588 298 383	95.6 3137 121.2	.587 291 380	94.6 2800 127.9	.557 265 358	94.5 2596 126.1	.513 234 327		
76	94.5 3551 107.9	.579 322 383	95.5 3207 118.3	.584 295 379	95.6 3133 120.2	.581 288 377	94.6 2796 125.7	.547 260 352				
78	94.5 3550 107.5	.576 320 381	95.5 3205 117.3	.578 292 376	95.6 3130 119.1	.575 285 373	94.6 2789 122.7	.532 253 342				
80	94.6 3548 107.0	.574 318 380	95.5 3202 116.3	.573 289 372	95.7 3126 117.8	.568 282 368						
82	94.6 3547 106.4	.570 317 377	95.6 3199 115.0	.566 286 368	95.7 3122 116.3	.560 278 363						
84	94.6 3546 105.8	.567 315 375	95.6 3196 113.6	.558 282 363	95.7 3118 114.5	.551 273 357						
86	94.6 3545 105.1	.563 313 373	95.6 3192 112.0	.550 277 357	95.8 3113 112.0	.538 266 349						
88	94.6 3543 104.4	.559 310 370	95.7 3188 109.8	.538 271 350	95.9 3105 106.4	.510 252 330						
90	94.7 3541 103.6	.554 308 367	95.7 3182 106.1	.519 262 338								
92	94.7 3540 102.7	.549 305 363										

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 3 %

11.0-08F0A321-211 CFM56-5B3/P SA12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 01100.000 .000 .000 20 FCOM-N0-03-06-50-008-165

R

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+15
CG=33.0%

N1 (%) / **MACH**
KG/H / **IAS (KT)**
NM/1000KG / **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	90.7	.592	92.7	.626	93.0	.631	92.8	.632	93.2	.637	92.9	.634
	3170	329	3028	318	2976	314	2792	302	2665	293	2474	280
	122.5	388	133.3	404	136.1	405	144.3	403	151.3	403	161.0	398
52	90.7	.591	92.8	.625	93.0	.630	92.9	.630	93.2	.636	93.0	.632
	3169	328	3032	317	2980	313	2799	302	2674	292	2484	279
	122.3	388	132.8	403	135.6	404	143.5	402	150.4	402	159.7	397
54	90.7	.590	92.8	.624	93.0	.628	93.0	.629	93.3	.634	93.1	.629
	3168	327	3037	316	2985	312	2808	301	2684	292	2495	278
	122.1	387	132.3	402	135.1	403	142.7	401	149.4	401	158.3	395
56	90.7	.588	92.8	.622	93.1	.626	93.1	.627	93.5	.632	93.2	.626
	3167	327	3041	315	2990	311	2816	300	2694	291	2508	276
	121.8	386	131.8	401	134.4	402	141.9	400	148.3	400	156.8	393
58	90.7	.586	92.9	.620	93.1	.624	93.2	.625	93.6	.629	93.4	.623
	3165	326	3046	314	2996	310	2825	299	2706	289	2521	275
	121.5	385	131.2	400	133.8	401	141.0	398	147.1	398	155.1	391
60	90.7	.585	92.9	.618	93.2	.622	93.3	.623	93.7	.627	93.6	.619
	3164	325	3051	313	3002	309	2835	298	2720	288	2536	273
	121.2	383	130.6	398	133.1	400	140.0	397	145.8	397	153.3	389
62	90.7	.583	93.0	.616	93.3	.620	93.4	.621	93.8	.624	93.8	.615
	3162	324	3057	312	3009	308	2846	297	2735	287	2553	271
	120.9	382	129.9	397	132.4	398	139.0	396	144.4	395	151.3	386
64	90.7	.581	93.0	.614	93.3	.618	93.5	.618	94.0	.621	94.0	.611
	3160	322	3063	311	3016	307	2857	296	2751	286	2572	269
	120.5	381	129.2	396	131.6	397	137.9	394	142.9	393	149.1	384
66	90.7	.578	93.1	.612	93.4	.616	93.6	.616	94.2	.618	94.2	.606
	3158	321	3070	310	3023	306	2870	294	2768	284	2592	267
	120.1	379	128.5	394	130.7	395	136.7	392	141.2	391	146.7	380
68	90.7	.576	93.2	.610	93.5	.613	93.7	.613	94.4	.614	94.4	.601
	3156	320	3077	309	3032	305	2883	293	2787	282	2615	265
	119.7	378	127.7	393	129.9	394	135.5	390	139.4	389	144.2	377
70	90.7	.573	93.2	.607	93.6	.610	93.9	.610	94.6	.611	94.5	.590
	3154	318	3084	307	3041	303	2898	291	2808	280	2611	260
	119.2	376	126.8	391	128.9	392	134.1	388	137.5	386	141.7	370
72	90.7	.571	93.3	.604	93.7	.607	94.0	.606	94.8	.606	94.6	.573
	3152	317	3093	306	3050	302	2916	289	2831	278	2602	252
	118.7	374	125.8	389	127.8	390	132.4	386	135.5	384	138.4	360
74	90.7	.568	93.4	.601	93.8	.604	94.2	.602	95.0	.602	94.7	.548
	3150	315	3102	304	3061	300	2935	287	2856	276	2589	241
	118.2	372	124.8	387	126.6	388	130.7	384	133.2	381	133.0	344
76	90.7	.564	93.4	.597	93.9	.600	94.3	.597	95.2	.593		
	3147	313	3103	302	3073	298	2946	285	2862	272		
	117.6	370	123.9	385	125.4	385	129.1	380	131.1	375		
78	90.7	.561	93.5	.592	93.9	.595	94.4	.590	95.3	.580		
	3144	311	3102	300	3072	295	2948	281	2855	266		
	117.0	368	123.0	382	124.3	382	127.5	376	128.5	367		

ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = + 1.5 %	△FUEL = + 4 %

R

CRUISE - MCT/VMO - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+20
CG=33.0%

N1 (%) — **MACH**
KG/H — **IAS (KT)**
NM/1000KG — **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	90.1	.577	92.5	.612	92.7	.617	92.8	.620	93.1	.626	92.8	.621
	3029	321	2912	310	2864	307	2712	297	2595	288	2402	274
	126.1	382	136.6	398	139.5	400	147.2	399	154.0	400	163.9	394
52	90.1	.576	92.5	.610	92.8	.615	92.9	.619	93.2	.624	92.9	.619
	3028	320	2916	309	2869	306	2720	296	2604	287	2411	273
	125.8	381	136.1	397	138.9	399	146.3	398	153.0	398	162.6	392
54	90.1	.574	92.5	.609	92.8	.613	93.0	.617	93.3	.622	93.0	.616
	3027	319	2921	308	2874	305	2729	295	2615	286	2422	272
	125.5	380	135.5	396	138.3	397	145.4	397	151.8	397	161.1	390
56	90.1	.573	92.6	.607	92.9	.612	93.0	.615	93.5	.620	93.2	.612
	3026	318	2926	307	2880	304	2738	294	2626	285	2434	270
	125.2	379	134.9	395	137.6	396	144.4	395	150.7	396	159.4	388
58	90.1	.571	92.6	.605	92.9	.610	93.1	.613	93.6	.617	93.3	.608
	3025	317	2932	306	2886	303	2749	293	2637	284	2447	268
	124.9	378	134.2	393	136.8	395	143.4	394	149.4	394	157.6	386
60	90.1	.569	92.7	.603	93.0	.607	93.2	.610	93.7	.614	93.5	.604
	3023	316	2938	305	2892	302	2759	292	2650	282	2463	266
	124.5	376	133.4	392	136.1	394	142.3	393	148.0	392	155.5	383
62	90.1	.567	92.7	.601	93.0	.605	93.4	.608	93.9	.611	93.7	.599
	3022	314	2944	304	2899	300	2771	290	2665	281	2478	264
	124.1	375	132.7	391	135.2	392	141.1	391	146.5	390	153.3	380
64	90.1	.564	92.8	.598	93.1	.603	93.5	.605	94.0	.608	93.7	.591
	3020	313	2945	303	2906	299	2784	289	2680	279	2474	260
	123.6	373	132.0	389	134.4	390	139.8	389	144.9	388	151.5	375
66	90.1	.562	92.8	.595	93.2	.600	93.6	.602	94.2	.604	93.7	.581
	3018	312	2943	301	2913	298	2798	288	2699	277	2469	256
	123.1	372	131.4	387	133.4	389	138.4	387	143.0	386	149.1	368
68	90.1	.559	92.8	.591	93.2	.596	93.7	.598	94.4	.600	93.8	.567
	3017	310	2941	299	2911	296	2808	286	2720	275	2463	249
	122.6	370	130.7	385	132.7	386	137.1	385	140.9	383	146.0	360
70	90.1	.556	92.8	.588	93.2	.592	93.8	.593	94.5	.593	93.9	.546
	3014	308	2939	297	2909	294	2807	283	2718	272	2455	240
	122.0	368	130.0	382	131.8	383	135.9	382	139.3	379	141.1	346
72	90.1	.553	92.8	.583	93.2	.587	93.8	.587	94.5	.584		
	3012	307	2937	295	2907	291	2805	280	2715	268		
	121.4	366	129.1	379	130.8	380	134.6	378	137.4	373		
74	90.1	.549	92.8	.579	93.3	.582	93.8	.580	94.6	.573		
	3010	305	2935	292	2905	289	2804	277	2711	262		
	120.7	363	128.2	376	129.8	377	133.1	373	134.8	366		
76	90.1	.545	92.9	.573	93.3	.576	93.9	.572	94.6	.556		
	3007	302	2932	290	2903	286	2803	272	2706	254		
	119.9	361	127.1	373	128.5	373	131.2	368	131.1	355		
78	90.1	.540	92.9	.567	93.3	.569	94.0	.561	94.8	.528		
	3005	300	2929	287	2901	282	2801	267	2700	241		
	119.0	358	126.0	369	127.1	369	128.8	361	124.8	337		

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
ΔFUEL = + 1.5 %	ΔFUEL = + 4 %

R

CRUISE - MCT/332KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+15
CG=33.0%

N1 (%) / **MACH**
KG/H / **IAS (KT)**
NM/1000KG / **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
48	90.7	.597	91.3	.614	91.4	.617	89.9	.601	90.0	.604	90.0	.604
	3175	332	2829	311	2764	307	2440	287	2311	277	2171	266
	123.4	392	139.8	396	143.3	396	156.9	383	165.2	382	174.5	379
50	90.7	.596	91.3	.612	91.4	.615	89.9	.598	90.0	.600	90.0	.599
	3174	331	2830	310	2765	306	2438	285	2311	275	2170	264
	123.2	391	139.4	394	142.9	395	156.2	381	164.3	380	173.4	376
52	90.7	.595	91.3	.610	91.4	.613	89.9	.595	90.0	.596	90.0	.594
	3172	330	2832	309	2766	305	2435	284	2308	274	2165	261
	123.0	390	138.9	393	142.3	394	155.6	379	163.5	377	172.2	373
54	90.7	.593	91.3	.608	91.4	.611	89.9	.591	90.0	.592	90.0	.587
	3171	330	2833	308	2767	303	2432	282	2304	271	2159	258
	122.7	389	138.4	392	141.8	392	154.9	377	162.5	374	170.8	369
56	90.7	.592	91.3	.606	91.4	.608	89.9	.587	90.0	.587	90.0	.579
	3170	329	2834	307	2768	302	2429	280	2299	269	2152	255
	122.4	388	137.8	391	141.1	391	154.0	374	161.4	371	169.0	364
58	90.7	.590	91.3	.604	91.4	.606	89.9	.583	90.0	.580	90.0	.571
	3168	328	2836	306	2769	301	2426	278	2293	266	2145	251
	122.1	387	137.2	389	140.5	389	153.1	371	160.1	367	167.1	358
60	90.7	.588	91.3	.601	91.4	.603	89.9	.578	90.0	.573	90.0	.561
	3167	327	2837	304	2770	299	2421	275	2287	263	2137	246
	121.8	386	136.6	387	139.8	387	152.0	368	158.5	363	164.7	352
62	90.7	.586	91.3	.598	91.5	.600	89.9	.572	90.0	.565	89.9	.547
	3165	326	2836	303	2771	298	2417	273	2280	259	2125	240
	121.5	384	136.0	386	139.0	385	150.8	364	156.8	357	161.4	343
64	90.7	.584	91.3	.595	91.5	.596	89.9	.565	90.0	.556	89.9	.519
	3163	324	2833	301	2767	296	2411	269	2272	254	2106	227
	121.1	383	135.4	383	138.4	383	149.3	360	154.6	351	154.7	326
66	90.7	.582	91.3	.591	91.5	.592	89.9	.557	90.0	.542		
	3161	323	2830	299	2763	294	2406	265	2262	248		
	120.7	382	134.7	381	137.6	380	147.7	355	151.7	343		
68	90.7	.579	91.3	.587	91.5	.587	89.9	.548	90.0	.520		
	3159	322	2826	297	2758	291	2399	261	2245	237		
	120.3	380	133.9	378	136.7	377	145.7	350	146.5	329		
70	90.7	.577	91.3	.583	91.4	.582	89.9	.536				
	3157	320	2821	295	2752	288	2390	255				
	119.9	378	133.1	375	135.7	373	142.9	341				
72	90.7	.574	91.3	.577	91.4	.575	89.9	.516				
	3155	319	2816	292	2746	285	2376	245				
	119.4	377	132.1	372	134.5	369	138.3	329				
74	90.7	.571	91.3	.571	91.4	.568						
	3152	317	2810	289	2739	282						
	118.8	375	130.9	368	133.2	365						

ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = + 1.5 %	△FUEL = + 3.5 %

11.0-08F0A319-112 CFM56-5B6/P SA12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 1100.000 .000 .000 15 FCOM-N0-03-06-50-007-240

R

CRUISE - MCT/323KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+20
CG=33.0%

N1 (%) **MACH**
KG/H **IAS (KT)**
NM/1000KG **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
48	90.1	.581	90.9	.598	91.0	.601	89.4	.582	89.7	.587	89.6	.585
	3032	323	2710	303	2650	299	2312	277	2210	269	2073	258
	126.9	385	143.5	389	147.0	390	161.8	374	169.5	375	178.9	371
50	90.1	.580	90.9	.596	91.0	.599	89.4	.578	89.7	.583	89.6	.580
	3031	322	2708	302	2651	298	2310	276	2207	267	2069	255
	126.6	384	143.1	388	146.5	388	161.0	372	168.6	372	177.5	367
52	90.1	.579	90.9	.594	91.0	.597	89.4	.575	89.7	.578	89.6	.573
	3030	321	2706	300	2648	296	2308	274	2203	265	2064	252
	126.3	383	142.7	386	146.0	387	160.2	370	167.5	369	175.9	363
54	90.1	.577	90.9	.591	91.0	.594	89.4	.571	89.7	.572	89.6	.565
	3029	320	2704	299	2646	295	2305	272	2199	262	2058	248
	126.0	382	142.2	384	145.5	385	159.2	367	166.3	366	174.0	358
56	90.1	.575	90.9	.589	91.0	.591	89.4	.566	89.7	.566	89.6	.556
	3028	319	2702	298	2643	293	2303	270	2193	259	2051	244
	125.7	381	141.6	383	144.9	383	158.1	364	164.7	361	171.8	352
58	90.1	.573	90.9	.586	91.0	.588	89.4	.561	89.6	.558	89.6	.544
	3027	318	2699	296	2640	292	2300	267	2188	255	2042	239
	125.3	379	141.1	381	144.3	381	156.8	361	163.0	357	168.9	345
60	90.1	.571	90.9	.582	91.0	.584	89.4	.554	89.6	.550	89.5	.527
	3025	317	2697	295	2636	290	2296	264	2181	251	2030	231
	125.0	378	140.4	379	143.5	378	155.3	356	160.9	351	164.4	334
62	90.1	.569	90.9	.579	91.0	.580	89.4	.547	89.6	.538	89.5	.486
	3024	316	2694	293	2633	288	2292	260	2173	246	2009	212
	124.6	377	139.7	376	142.7	376	153.5	352	158.2	344	153.3	308
64	90.1	.567	90.9	.575	91.0	.575	89.4	.538	89.6	.522		
	3022	315	2690	291	2628	285	2287	256	2161	238		
	124.1	375	138.9	374	141.8	373	151.3	346	154.1	333		
66	90.1	.564	90.8	.570	91.0	.570	89.4	.526	89.5	.487		
	3020	313	2687	288	2624	283	2280	250	2144	222		
	123.6	373	138.0	371	140.8	369	148.5	339	144.9	311		
68	90.1	.562	90.8	.565	91.0	.564	89.4	.509				
	3018	312	2682	285	2618	279	2271	242				
	123.1	372	137.0	367	139.6	365	144.2	327				
70	90.1	.559	90.8	.559	91.0	.557	89.4	.476				
	3016	310	2677	282	2613	276	2263	225				
	122.5	370	135.8	364	138.2	361	135.2	306				
72	90.1	.555	90.8	.552	91.0	.549						
	3014	308	2672	279	2606	272						
	121.9	367	134.4	359	136.6	356						
74	90.1	.552	90.8	.545	90.9	.539						
	3012	306	2666	275	2598	267						
	121.2	365	132.8	354	134.5	349						

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 1.5 %	△FUEL = + 3.5 %

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R

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG=33.0%

N1 (%) **MACH**
KG/H **IAS (KT)**
NM/1000KG **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
64	89.9	.576	93.9	.631	94.8	.641	93.7	.628	93.6	.622	93.0	.604
	3193	320	3349	320	3373	319	3034	301	2822	286	2580	266
	115.2	368	118.0	395	118.7	400	128.2	389	135.4	382	142.8	368
66	90.1	.576	94.1	.631	94.8	.639	93.7	.625	93.6	.617	93.1	.597
	3215	320	3376	320	3373	318	3034	299	2822	283	2578	263
	114.4	368	117.1	395	118.3	399	127.5	387	134.3	379	141.0	364
68	90.2	.576	94.3	.631	94.8	.637	93.8	.621	93.7	.611	93.2	.587
	3238	320	3404	320	3374	317	3034	297	2822	281	2573	259
	113.6	368	116.2	395	117.8	397	126.8	385	133.0	375	139.1	358
70	90.4	.576	94.5	.631	94.9	.634	93.8	.617	93.7	.605	93.3	.576
	3261	320	3432	320	3375	316	3034	295	2822	278	2567	253
	112.8	368	115.2	395	117.3	396	125.9	382	131.6	371	136.8	351
72	90.6	.576	94.7	.631	94.9	.631	93.8	.612	93.8	.597	93.4	.562
	3285	320	3463	320	3376	314	3034	292	2821	274	2559	247
	112.0	368	114.1	395	116.7	394	124.9	379	130.1	367	133.7	342
74	90.7	.576	94.8	.629	95.0	.628	93.9	.606	93.9	.589		
	3311	320	3472	319	3377	312	3034	290	2816	270		
	111.1	368	113.5	394	116.1	392	123.7	375	128.5	362		
76	90.9	.576	94.9	.626	95.0	.625	94.0	.600	93.9	.579		
	3339	320	3473	317	3378	311	3034	286	2812	265		
	110.2	368	112.9	392	115.4	390	122.4	371	126.5	356		
78	91.1	.576	94.9	.622	95.1	.621	94.0	.593	94.0	.567		
	3370	320	3474	315	3379	308	3030	283	2806	260		
	109.2	368	112.2	390	114.6	387	121.2	367	124.1	348		
80	91.4	.576	95.0	.619	95.1	.616	94.1	.585	94.2	.548		
	3401	320	3476	313	3381	306	3025	279	2799	251		
	108.2	368	111.5	388	113.7	384	119.7	362	120.4	337		
82	91.6	.576	95.0	.614	95.2	.611	94.1	.576				
	3434	320	3477	311	3383	304	3020	274				
	107.1	368	110.7	385	112.7	381	118.0	357				
84	91.8	.576	95.1	.610	95.3	.606	94.2	.564				
	3470	320	3479	309	3385	301	3015	269				
	106.0	368	109.8	382	111.6	378	115.9	349				
86	92.1	.576	95.1	.604	95.3	.599	94.4	.547				
	3509	320	3481	306	3387	297	3007	260				
	104.8	368	108.8	379	110.4	374	112.7	339				
88	92.3	.576	95.2	.599	95.4	.592						
	3549	320	3482	303	3381	294						
	103.7	368	107.7	375	109.2	369						
90	92.6	.576	95.2	.592	95.4	.583						
	3591	320	3476	299	3375	289						
	102.5	368	106.7	371	107.8	364						
92	92.9	.576	95.3	.584	95.5	.573						
	3633	320	3469	295	3368	284						
	101.3	368	105.4	366	106.2	358						

ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = + 2 %	△FUEL = + 3 %

11.0-08F0A321-211 CFM56-5B3/P SA12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 01100.000 .000 .000 0 FCOM-N0-03-06-50-009-165

R

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF								ISA+10 CG=33.0%		**N1 (%) KG/H NM/1000KG**		**MACH IAS (KT) TAS (KT)**
WEIGHT (1000KG)	**FL100**		**FL150**		**FL160**		**FL180**		**FL200**		**FL220**	
64	91.6 3278 114.3	.576 320 375	95.7 3442 117.0	.631 320 403	96.5 3454 117.9	.640 319 407	95.4 3106 127.4	.627 300 396	95.3 2889 134.5	.620 285 389	94.8 2640 141.9	.602 265 375
66	91.8 3300 113.5	.576 320 375	95.9 3470 116.1	.631 320 403	96.6 3455 117.5	.638 318 406	95.5 3106 126.7	.623 298 394	95.4 2889 133.4	.615 282 385	94.9 2636 140.2	.594 262 370
68	91.9 3323 112.7	.576 320 375	96.1 3498 115.2	.631 320 403	96.6 3456 117.0	.636 316 404	95.5 3106 125.9	.620 296 391	95.4 2889 132.1	.609 280 382	94.9 2631 138.2	.585 257 364
70	92.1 3347 111.9	.576 320 375	96.3 3528 114.2	.631 320 403	96.6 3457 116.5	.633 315 403	95.5 3106 125.0	.615 294 388	95.5 2889 130.7	.603 277 378	95.0 2624 135.9	.574 252 357
72	92.3 3372 111.1	.576 320 375	96.5 3553 113.3	.630 320 403	96.7 3457 115.9	.630 313 401	95.6 3106 124.0	.610 291 385	95.5 2887 129.2	.595 273 373	95.1 2616 132.6	.558 245 347
74	92.4 3399 110.3	.576 320 375	96.6 3554 112.8	.628 318 401	96.7 3459 115.3	.627 312 399	95.6 3106 122.9	.604 289 382	95.6 2882 127.6	.587 269 368		
76	92.6 3427 109.3	.576 320 375	96.6 3555 112.2	.625 317 399	96.8 3460 114.6	.623 310 396	95.7 3105 121.6	.598 286 378	95.7 2878 125.6	.577 264 361		
78	92.9 3459 108.3	.576 320 375	96.6 3556 111.5	.621 315 397	96.8 3461 113.8	.619 308 394	95.7 3101 120.4	.591 282 373	95.8 2872 123.1	.564 258 353		
80	93.1 3491 107.3	.576 320 375	96.7 3558 110.8	.617 313 394	96.9 3463 112.9	.615 305 391	95.8 3096 118.9	.583 278 368	95.9 2865 119.0	.544 249 341		
82	93.3 3524 106.3	.576 320 375	96.7 3560 109.9	.613 310 391	96.9 3465 111.9	.609 303 388	95.9 3091 117.1	.574 273 362				
84	93.6 3563 105.2	.576 320 375	96.8 3562 109.0	.608 308 388	97.0 3467 110.8	.604 300 384	96.0 3085 114.9	.561 267 354				
86	93.8 3603 104.0	.576 320 375	96.9 3564 108.0	.603 305 385	97.1 3467 109.6	.597 297 380	96.1 3077 111.5	.544 259 343				
88	94.1 3645 102.8	.576 320 375	96.9 3562 107.0	.597 302 381	97.1 3461 108.4	.590 293 375						
90	94.3 3687 101.6	.576 320 375	97.0 3556 105.9	.590 298 377	97.2 3454 107.1	.581 288 370						
92	94.6 3731 100.4	.576 320 375	97.0 3549 104.7	.582 294 372	97.2 3446 105.4	.571 283 363						
ENGINE ANTI ICE ON △FUEL = + 2 %								**TOTAL ANTI ICE ON** △FUEL = + 3 %				

11.0-08F0A321-211 CFM56-5B3/P SA12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 01100.000 .000 .000 10 FCOM-N0-03-06-50-010-165

R

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL150**		**FL160**		**FL180**		**FL200**		**FL220**	
50	86.7	.576	90.5	.631	91.2	.643	91.1	.644	91.3	.649	91.1	.647
	2868	320	2958	320	2984	320	2798	308	2663	299	2480	286
	128.3	368	133.6	395	134.4	401	142.5	399	149.7	399	158.9	394
52	86.8	.576	90.6	.631	91.4	.643	91.2	.643	91.4	.647	91.2	.645
	2883	320	2976	320	3004	320	2804	308	2673	298	2490	285
	127.6	368	132.8	395	133.5	401	141.9	398	148.7	398	157.8	393
54	87.0	.576	90.7	.631	91.5	.642	91.2	.641	91.5	.645	91.3	.642
	2899	320	2996	320	3019	320	2811	307	2683	297	2500	284
	126.9	368	132.0	395	132.8	401	141.2	397	147.8	397	156.5	391
56	87.1	.576	90.9	.631	91.6	.641	91.3	.639	91.6	.644	91.5	.640
	2917	320	3017	320	3024	319	2820	306	2694	296	2512	283
	126.1	368	131.0	395	132.2	400	140.4	396	146.8	395	155.2	390
58	87.3	.576	91.1	.631	91.6	.639	91.4	.638	91.8	.642	91.6	.637
	2934	320	3039	320	3029	318	2828	305	2705	295	2525	281
	125.4	368	130.1	395	131.7	399	139.6	395	145.7	394	153.8	388
60	87.4	.576	91.3	.631	91.7	.637	91.5	.636	91.9	.639	91.8	.634
	2954	320	3064	320	3035	317	2836	304	2717	294	2539	280
	124.5	368	129.0	395	131.1	398	138.8	394	144.6	393	152.2	386
62	87.6	.576	91.4	.631	91.7	.636	91.6	.634	92.0	.637	91.9	.630
	2975	320	3089	320	3041	316	2845	303	2731	293	2554	278
	123.7	368	128.0	395	130.4	397	137.9	392	143.3	391	150.4	384
64	87.8	.576	91.6	.630	91.8	.634	91.7	.631	92.2	.634	92.1	.627
	2997	320	3104	319	3047	315	2856	302	2745	292	2571	277
	122.8	368	127.2	395	129.8	395	136.9	391	142.0	390	148.6	382
66	88.0	.576	91.6	.628	91.9	.631	91.8	.629	92.3	.632	92.3	.622
	3019	320	3109	318	3054	314	2868	301	2761	291	2587	275
	121.8	368	126.5	393	129.1	394	135.8	389	140.5	388	146.6	379
68	88.2	.576	91.7	.626	91.9	.629	91.9	.626	92.5	.629	92.6	.617
	3043	320	3116	317	3061	313	2881	300	2779	289	2605	272
	120.9	368	125.9	392	128.3	393	134.6	388	139.0	386	144.4	376
70	88.4	.576	91.7	.624	92.0	.627	92.0	.623	92.7	.625	92.9	.612
	3067	320	3122	316	3068	312	2896	298	2797	287	2625	270
	120.0	368	125.1	391	127.5	391	133.3	386	137.3	384	142.1	373
72	88.6	.576	91.8	.621	92.1	.624	92.2	.620	92.9	.621	93.2	.605
	3092	320	3129	315	3077	310	2911	297	2817	286	2648	267
	119.0	368	124.4	389	126.6	390	131.9	384	135.5	382	139.3	369
74	88.8	.576	91.9	.619	92.2	.621	92.4	.617	93.1	.617	93.5	.597
	3119	320	3137	313	3086	309	2928	295	2836	283	2666	263
	118.0	368	123.5	387	125.6	388	130.4	382	133.6	379	136.4	364
76	89.0	.576	92.0	.616	92.3	.618	92.5	.613	93.4	.612	93.6	.577
	3148	320	3145	312	3097	307	2946	293	2857	281	2656	254
	116.9	368	122.6	386	124.6	386	128.8	380	131.6	376	132.3	351
78	89.2	.576	92.0	.612	92.4	.615	92.7	.609	93.7	.607		
	3178	320	3154	310	3109	305	2967	291	2883	279		
	115.8	368	121.6	384	123.3	383	127.1	377	129.3	373		

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2 %	△FUEL = + 5 %

R

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA+10 CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL150**		**FL160**		**FL180**		**FL200**		**FL220**	
50	88.4	.576	92.2	.631	93.0	.643	92.8	.643	93.1	.648	92.9	.646
	2942	320	3039	320	3067	320	2868	308	2731	298	2543	286
	127.4	375	132.6	403	133.3	409	141.6	406	148.7	406	157.9	401
52	88.5	.576	92.3	.631	93.2	.643	92.9	.642	93.2	.646	93.0	.643
	2958	320	3058	320	3087	320	2874	307	2741	298	2553	285
	126.7	375	131.8	403	132.4	409	141.0	405	147.7	405	156.7	400
54	88.6	.576	92.5	.631	93.2	.642	93.0	.640	93.3	.645	93.1	.641
	2974	320	3079	320	3094	319	2882	306	2751	297	2564	283
	126.0	375	130.9	403	131.9	408	140.2	404	146.8	404	155.5	399
56	88.8	.576	92.7	.631	93.3	.640	93.1	.638	93.4	.643	93.2	.639
	2992	320	3100	320	3099	319	2890	306	2762	296	2575	282
	125.2	375	130.0	403	131.4	407	139.5	403	145.8	403	154.2	397
58	88.9	.576	92.8	.631	93.3	.638	93.1	.637	93.5	.641	93.4	.636
	3010	320	3123	320	3104	318	2898	305	2774	295	2589	281
	124.5	375	129.0	403	130.8	406	138.7	402	144.7	401	152.7	395
60	89.1	.576	93.0	.631	93.4	.637	93.2	.635	93.6	.638	93.5	.633
	3031	320	3148	320	3110	317	2907	304	2787	294	2603	280
	123.6	375	128.0	403	130.2	405	137.8	401	143.6	400	151.1	393
62	89.3	.576	93.2	.631	93.5	.635	93.3	.633	93.8	.636	93.7	.629
	3052	320	3173	320	3116	316	2917	303	2800	293	2619	278
	122.8	375	127.0	403	129.6	404	136.9	399	142.3	399	149.4	391
64	89.5	.576	93.3	.629	93.5	.633	93.4	.630	93.9	.633	93.9	.625
	3074	320	3179	319	3122	315	2928	302	2815	291	2636	276
	121.9	375	126.4	402	128.9	402	135.9	398	141.0	397	147.5	389
66	89.7	.576	93.3	.627	93.6	.631	93.5	.628	94.1	.631	94.1	.621
	3098	320	3185	318	3129	314	2941	300	2832	290	2652	274
	121.0	375	125.7	400	128.2	401	134.8	396	139.5	395	145.6	386
68	89.9	.576	93.4	.625	93.7	.628	93.7	.625	94.3	.627	94.4	.616
	3122	320	3191	317	3136	313	2954	299	2850	289	2671	272
	120.0	375	125.0	399	127.4	400	133.6	395	138.0	393	143.4	383
70	90.1	.576	93.4	.623	93.7	.626	93.8	.622	94.5	.624	94.7	.610
	3147	320	3198	316	3144	311	2969	298	2869	287	2691	269
	119.1	375	124.3	398	126.6	398	132.4	393	136.3	391	141.0	380
72	90.3	.576	93.5	.620	93.8	.623	93.9	.619	94.7	.620	95.0	.604
	3173	320	3205	314	3153	310	2985	296	2888	285	2715	266
	118.1	375	123.6	396	125.7	396	131.0	391	134.5	389	138.3	376
74	90.5	.576	93.6	.618	93.9	.620	94.1	.616	94.9	.616	95.2	.593
	3201	320	3213	313	3163	308	3002	294	2909	283	2727	261
	117.0	375	122.7	394	124.7	395	129.5	389	132.6	386	135.3	369
76	90.7	.576	93.7	.615	94.0	.617	94.3	.612	95.2	.611	95.4	.572
	3231	320	3222	311	3174	307	3021	292	2932	281	2717	252
	116.0	375	121.8	392	123.6	392	127.9	386	130.6	383	131.0	356
78	90.9	.576	93.8	.611	94.1	.613	94.5	.608	95.5	.605		
	3262	320	3232	310	3187	305	3042	290	2958	278		
	114.9	375	120.8	390	122.4	390	126.1	384	128.2	379		

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2 %	△FUEL = + 5 %

R

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST PACK FLOW HI ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL150**		**FL160**		**FL180**		**FL200**		**FL220**	
48	86.4	.576	89.9	.631	90.0	.635	88.7	.620	88.6	.622	88.6	.622
	2828	320	2887	320	2823	316	2500	296	2353	286	2215	275
	130.1	368	136.9	395	140.3	396	153.5	384	162.3	382	171.3	379
50	86.5	.576	90.0	.630	90.0	.633	88.7	.617	88.6	.618	88.6	.619
	2841	320	2891	319	2823	315	2500	295	2352	284	2213	273
	129.5	368	136.5	395	139.9	395	152.9	382	161.5	380	170.3	377
52	86.6	.576	90.0	.628	90.0	.631	88.7	.614	88.6	.615	88.6	.614
	2857	320	2892	318	2823	314	2499	294	2351	283	2212	271
	128.8	368	136.1	393	139.5	394	152.2	380	160.7	378	169.2	374
54	86.7	.576	90.0	.626	90.1	.629	88.7	.611	88.7	.611	88.6	.609
	2873	320	2892	317	2823	313	2499	292	2350	281	2211	269
	128.1	368	135.6	392	139.0	392	151.5	379	159.8	376	167.9	371
56	86.9	.576	90.0	.624	90.1	.627	88.7	.608	88.7	.607	88.7	.603
	2890	320	2892	316	2823	312	2498	291	2349	279	2209	266
	127.3	368	135.2	391	138.6	391	150.8	377	158.8	373	166.4	368
58	87.0	.576	90.0	.622	90.1	.624	88.7	.605	88.7	.603	88.7	.596
	2908	320	2893	315	2823	310	2497	289	2347	277	2205	263
	126.5	368	134.7	390	138.0	390	150.0	374	157.7	370	164.7	363
60	87.2	.576	90.0	.620	90.1	.622	88.7	.601	88.7	.597	88.7	.588
	2926	320	2893	314	2822	309	2497	287	2344	274	2198	259
	125.7	368	134.2	388	137.4	388	149.0	372	156.4	367	162.9	358
62	87.4	.576	90.0	.617	90.1	.619	88.7	.596	88.7	.590	88.7	.578
	2946	320	2893	313	2822	308	2493	285	2338	270	2191	254
	124.9	368	133.6	387	136.8	386	148.1	369	155.0	362	160.7	352
64	87.5	.576	90.0	.614	90.1	.616	88.7	.591	88.7	.582	88.6	.565
	2967	320	2894	311	2822	306	2488	282	2331	267	2182	248
	124.0	368	133.0	385	136.2	384	147.1	366	153.4	358	157.9	344
66	87.7	.576	90.1	.612	90.1	.613	88.7	.585	88.7	.573	88.6	.546
	2988	320	2894	310	2822	304	2482	279	2325	263	2168	240
	123.1	368	132.4	383	135.5	382	145.8	362	151.5	352	153.5	333
68	87.9	.576	90.1	.608	90.2	.609	88.7	.578	88.7	.562		
	3010	320	2894	308	2822	302	2475	275	2316	257		
	122.2	368	131.7	381	134.7	380	144.5	358	149.2	346		
70	88.1	.576	90.1	.605	90.2	.605	88.7	.570	88.7	.547		
	3033	320	2894	306	2822	300	2469	272	2305	250		
	121.3	368	130.9	379	133.7	377	142.9	353	145.7	336		
72	88.3	.576	90.1	.601	90.2	.600	88.7	.561	88.7	.512		
	3057	320	2895	304	2822	298	2460	267	2283	233		
	120.3	368	130.1	377	132.7	374	141.1	347	137.8	314		
74	88.5	.576	90.1	.596	90.2	.594	88.7	.548				
	3083	320	2891	302	2816	295	2450	261				
	119.3	368	129.2	374	131.6	371	138.5	339				

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2 %	△FUEL = + 4 %

11.0-08F0A319-112 CFM56-5B6/P SA12300010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 1100.000 .000 .000 0 FCOM-N0-03-06-50-009-240

R

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+10
CG=33.0%

N1 (%) / **MACH**
KG/H / **IAS (KT)**
NM/1000KG / **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL150**		**FL160**		**FL180**		**FL200**		**FL220**	
48	88.0	.576	91.6	.630	91.7	.634	90.3	.618	90.3	.620	90.3	.621
	2901	320	2958	320	2890	315	2557	296	2406	285	2263	274
	129.2	375	136.0	402	139.5	403	152.6	390	161.5	388	170.5	386
50	88.1	.576	91.6	.629	91.7	.632	90.4	.616	90.3	.617	90.3	.617
	2915	320	2959	319	2890	314	2556	294	2405	283	2262	272
	128.6	375	135.7	401	139.1	402	152.1	389	160.7	386	169.5	384
52	88.3	.576	91.6	.627	91.7	.630	90.4	.613	90.3	.613	90.3	.612
	2931	320	2959	318	2890	313	2556	293	2404	282	2261	270
	127.9	375	135.3	400	138.7	401	151.4	387	159.9	384	168.4	381
54	88.4	.576	91.6	.625	91.7	.628	90.4	.610	90.3	.610	90.3	.607
	2947	320	2960	317	2889	312	2555	291	2402	280	2259	268
	127.1	375	134.8	399	138.2	399	150.7	385	159.0	382	167.1	378
56	88.6	.576	91.7	.623	91.7	.626	90.4	.607	90.3	.605	90.3	.601
	2965	320	2960	316	2889	311	2555	290	2401	278	2258	265
	126.4	375	134.4	398	137.7	398	150.0	383	158.0	379	165.6	374
58	88.7	.576	91.7	.621	91.8	.623	90.4	.603	90.3	.601	90.3	.594
	2983	320	2960	315	2889	310	2554	288	2399	276	2252	261
	125.6	375	133.9	396	137.2	396	149.2	381	156.9	376	163.9	369
60	88.9	.576	91.7	.618	91.8	.620	90.4	.599	90.3	.595	90.3	.585
	3002	320	2961	313	2889	308	2552	286	2394	273	2244	257
	124.8	375	133.4	395	136.6	395	148.2	378	155.6	373	162.1	364
62	89.0	.576	91.7	.616	91.8	.618	90.4	.595	90.3	.588	90.3	.575
	3022	320	2961	312	2889	307	2548	284	2388	269	2236	253
	124.0	375	132.8	393	136.0	393	147.4	375	154.2	368	159.9	358
64	89.2	.576	91.7	.613	91.8	.615	90.4	.589	90.3	.580	90.3	.562
	3044	320	2962	311	2888	305	2542	281	2381	266	2226	247
	123.1	375	132.2	392	135.4	391	146.3	372	152.6	363	156.9	349
66	89.4	.576	91.7	.610	91.8	.611	90.4	.583	90.3	.571	90.3	.541
	3066	320	2962	309	2888	304	2536	278	2374	261	2211	237
	122.2	375	131.6	390	134.6	389	145.1	368	150.7	358	152.1	336
68	89.6	.576	91.7	.607	91.8	.608	90.4	.576	90.3	.560		
	3088	320	2962	307	2888	302	2529	274	2364	256		
	121.3	375	130.9	388	133.8	386	143.7	363	148.3	351		
70	89.8	.576	91.8	.604	91.8	.603	90.3	.568	90.3	.543		
	3112	320	2962	306	2888	300	2522	270	2352	248		
	120.4	375	130.1	385	132.9	384	142.1	358	144.6	340		
72	90.0	.576	91.8	.600	91.9	.598	90.3	.558	90.3	.500		
	3137	320	2962	304	2886	297	2513	266	2324	228		
	119.5	375	129.3	383	131.9	381	140.2	352	134.8	313		
74	90.2	.576	91.8	.595	91.9	.592	90.3	.545				
	3163	320	2956	301	2879	294	2500	259				
	118.5	375	128.4	380	130.9	377	137.5	344				

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2 %	△FUEL = + 4 %

11.0-08F0A319-112 CFM56-5B6/P SA12300010C6KG330 0 018590 0 0 3 1.0 .0 .00 0 1100.000 .000 .000 10 FCOM-N0-03-06-50-010-240

R

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA+15
CG=33.0%

N1 (%) / **MACH**
KG/H / **IAS (KT)**
NM/1000KG / **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
64	92.5	.576	95.9	.623	96.0	.624	95.0	.610	94.8	.601	94.2	.580
	3321	320	3382	316	3304	310	2974	291	2772	276	2518	255
	113.8	378	118.6	401	121.3	401	130.7	389	137.3	380	144.6	364
66	92.6	.576	95.9	.621	96.1	.622	95.0	.606	94.9	.596	94.2	.570
	3343	320	3384	314	3306	309	2975	289	2771	273	2513	251
	113.1	378	118.1	400	120.8	399	129.7	386	136.0	377	142.4	358
68	92.8	.576	96.0	.618	96.1	.619	95.1	.601	94.9	.589	94.3	.558
	3366	320	3387	313	3308	308	2977	287	2769	270	2506	245
	112.3	378	117.6	398	120.2	398	128.7	383	134.6	373	139.7	350
70	92.9	.576	96.0	.616	96.1	.616	95.1	.596	94.9	.582	94.4	.538
	3391	320	3389	312	3311	306	2975	284	2767	267	2495	236
	111.5	378	117.1	397	119.5	396	127.7	380	133.0	368	135.4	338
72	93.1	.576	96.0	.613	96.2	.613	95.1	.590	95.0	.573		
	3416	320	3392	310	3314	305	2973	282	2762	262		
	110.7	378	116.4	395	118.7	394	126.5	376	131.2	362		
74	93.3	.576	96.1	.609	96.2	.609	95.2	.584	95.1	.562		
	3442	320	3395	309	3318	303	2971	278	2756	257		
	109.8	378	115.7	393	117.9	391	125.3	372	129.0	355		
76	93.5	.576	96.1	.606	96.3	.605	95.2	.576	95.1	.546		
	3472	320	3399	307	3322	301	2968	275	2748	250		
	108.9	378	114.9	390	116.9	388	123.8	367	125.7	345		
78	93.7	.576	96.2	.602	96.3	.600	95.2	.568				
	3503	320	3403	305	3327	298	2965	271				
	107.9	378	114.0	388	115.9	386	122.1	362				
80	93.9	.576	96.2	.597	96.4	.595	95.3	.558				
	3536	320	3403	302	3325	295	2962	266				
	106.9	378	113.1	385	114.9	382	120.1	356				
82	94.2	.576	96.2	.592	96.4	.589	95.4	.543				
	3570	320	3401	300	3321	292	2955	258				
	105.9	378	112.2	382	113.9	378	117.1	346				
84	94.4	.576	96.2	.587	96.4	.582						
	3610	320	3398	297	3315	289						
	104.7	378	111.2	378	112.7	374						
86	94.7	.576	96.3	.580	96.5	.574						
	3651	320	3396	293	3309	284						
	103.6	378	110.1	374	111.3	368						
88	94.9	.576	96.3	.573	96.5	.564						
	3693	320	3393	290	3302	279						
	102.4	378	108.8	369	109.7	362						
90	95.2	.576	96.4	.565	96.6	.551						
	3734	320	3390	285	3293	273						
	101.2	378	107.3	364	107.4	354						
92	95.2	.572	96.4	.554	96.7	.524						
	3731	318	3384	280	3275	259						
	100.6	375	105.4	357	102.7	336						

ENGINE ANTI ICE ON
△FUEL = + 2 %

TOTAL ANTI ICE ON
△FUEL = + 3 %

11.0-08F0A321-211 CFM56-5B3/P SA12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 01100.000 .000 .000 15 FCOM-N0-03-06-50-011-165

R

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA+20 CG=33.0%	**N1 (%)** **KG/H** **NM/1000KG**	**MACH** **IAS (KT)** **TAS (KT)**

WEIGHT (1000KG)	**FL100**		**FL150**		**FL160**		**FL180**		**FL200**		**FL220**	
64	93.3	.576	95.4	.605	95.5	.607	94.5	.590	94.2	.578	93.5	.548
	3363	320	3215	306	3139	301	2819	281	2616	265	2358	241
	113.4	381	122.4	393	125.2	393	134.6	379	141.2	369	147.4	348
66	93.4	.576	95.4	.603	95.5	.604	94.5	.585	94.2	.571	93.5	.532
	3386	320	3217	305	3142	300	2815	279	2613	262	2352	233
	112.6	381	121.8	392	124.5	391	133.6	376	139.6	365	143.4	337
68	93.6	.576	95.4	.600	95.6	.600	94.5	.579	94.3	.563		
	3410	320	3218	304	3145	298	2812	276	2610	258		
	111.8	381	121.2	390	123.7	389	132.4	372	137.7	359		
70	93.8	.576	95.4	.596	95.6	.596	94.5	.573	94.3	.553		
	3434	320	3216	302	3142	296	2809	273	2606	253		
	111.1	381	120.6	388	123.0	386	131.2	368	135.4	353		
72	93.9	.576	95.5	.593	95.6	.592	94.5	.565	94.4	.539		
	3460	320	3213	300	3140	294	2805	269	2602	246		
	110.2	381	119.9	385	122.1	383	129.7	364	132.3	344		
74	94.1	.576	95.5	.588	95.6	.587	94.6	.557	94.5	.513		
	3487	320	3210	298	3137	291	2800	265	2596	234		
	109.4	381	119.2	383	121.2	380	127.9	358	126.1	327		
76	94.3	.576	95.5	.584	95.6	.581	94.6	.547				
	3516	320	3207	295	3133	288	2796	260				
	108.5	381	118.3	379	120.2	377	125.7	352				
78	94.5	.576	95.5	.578	95.6	.575	94.6	.532				
	3548	320	3205	292	3130	285	2789	253				
	107.5	381	117.3	376	119.1	373	122.7	342				
80	94.6	.574	95.5	.573	95.7	.568						
	3548	318	3202	289	3126	282						
	107.0	380	116.3	372	117.8	368						
82	94.6	.570	95.6	.566	95.7	.560						
	3547	317	3199	286	3122	278						
	106.4	377	115.0	368	116.3	363						
84	94.6	.567	95.6	.558	95.7	.551						
	3546	315	3196	282	3118	273						
	105.8	375	113.6	363	114.5	357						
86	94.6	.563	95.6	.550	95.8	.538						
	3545	313	3192	277	3113	266						
	105.1	373	112.0	357	112.0	349						
88	94.6	.559	95.7	.538	95.9	.510						
	3543	310	3188	271	3105	252						
	104.4	370	109.8	350	106.4	330						
90	94.7	.554	95.7	.519								
	3541	308	3182	262								
	103.6	367	106.1	338								
92	94.7	.549										
	3540	305										
	102.7	363										

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2 %	△FUEL = + 3 %

11.0-08F0A321-211 CFM56-5B3/P SA12300010C6KG330 0 018590 0 0 3 1.3 .0 .00 0 01100.000 .000 .000 20 FCOM-N0-03-06-50-012-165

R

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+15
CG=33.0%

N1 (%) — **MACH**
KG/H — **IAS (KT)**
NM/1000KG — **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	89.2	.576	92.7	.626	93.0	.631	92.8	.632	93.2	.637	92.9	.634
	2979	320	3028	318	2976	314	2792	302	2665	293	2474	280
	126.9	378	133.3	404	136.1	405	144.3	403	151.3	403	161.0	398
52	89.3	.576	92.8	.625	93.0	.630	92.9	.630	93.2	.636	93.0	.632
	2995	320	3032	317	2980	313	2799	302	2674	292	2484	279
	126.2	378	132.8	403	135.6	404	143.5	402	150.4	402	159.7	397
54	89.5	.576	92.8	.624	93.0	.628	93.0	.629	93.3	.634	93.1	.629
	3012	320	3037	316	2985	312	2808	301	2684	292	2495	278
	125.5	378	132.3	402	135.1	403	142.7	401	149.4	401	158.3	395
56	89.6	.576	92.8	.622	93.1	.626	93.1	.627	93.5	.632	93.2	.626
	3030	320	3041	315	2990	311	2816	300	2694	291	2508	276
	124.8	378	131.8	401	134.4	402	141.9	400	148.3	400	156.8	393
58	89.8	.576	92.9	.620	93.1	.624	93.2	.625	93.6	.629	93.4	.623
	3049	320	3046	314	2996	310	2825	299	2706	289	2521	275
	124.0	378	131.2	400	133.8	401	141.0	398	147.1	398	155.1	391
60	89.9	.576	92.9	.618	93.2	.622	93.3	.623	93.7	.627	93.6	.619
	3069	320	3051	313	3002	309	2835	298	2720	288	2536	273
	123.2	378	130.6	398	133.1	400	140.0	397	145.8	397	153.3	389
62	90.1	.576	93.0	.616	93.3	.620	93.4	.621	93.8	.624	93.8	.615
	3091	320	3057	312	3009	308	2846	297	2735	287	2553	271
	122.3	378	129.9	397	132.4	398	139.0	396	144.4	395	151.3	386
64	90.3	.576	93.0	.614	93.3	.618	93.5	.618	94.0	.621	94.0	.611
	3114	320	3063	311	3016	307	2857	296	2751	286	2572	269
	121.4	378	129.2	396	131.6	397	137.9	394	142.9	393	149.1	384
66	90.5	.576	93.1	.612	93.4	.616	93.6	.616	94.2	.618	94.2	.606
	3137	320	3070	310	3023	306	2870	294	2768	284	2592	267
	120.5	378	128.5	394	130.7	395	136.7	392	141.2	391	146.7	380
68	90.7	.576	93.2	.610	93.5	.613	93.7	.613	94.4	.614	94.4	.601
	3156	320	3077	309	3032	305	2883	293	2787	282	2615	265
	119.7	378	127.7	393	129.9	394	135.5	390	139.4	389	144.2	377
70	90.7	.573	93.2	.607	93.6	.610	93.9	.610	94.6	.611	94.5	.590
	3154	318	3084	307	3041	303	2898	291	2808	280	2611	260
	119.2	376	126.8	391	128.9	392	134.1	388	137.5	386	141.7	370
72	90.7	.571	93.3	.604	93.7	.607	94.0	.606	94.8	.606	94.6	.573
	3152	317	3093	306	3050	302	2916	289	2831	278	2602	252
	118.7	374	125.8	389	127.8	390	132.4	386	135.5	384	138.4	360
74	90.7	.568	93.4	.601	93.8	.604	94.2	.602	95.0	.602	94.7	.548
	3150	315	3102	304	3061	300	2935	287	2856	276	2589	241
	118.2	372	124.8	387	126.6	388	130.7	384	133.2	381	133.0	344
76	90.7	.564	93.4	.597	93.9	.600	94.3	.597	95.2	.593		
	3147	313	3103	302	3073	298	2946	285	2862	272		
	117.6	370	123.9	385	125.4	385	129.1	380	131.1	375		
78	90.7	.561	93.5	.592	93.9	.595	94.4	.590	95.3	.580		
	3144	311	3102	300	3072	295	2948	281	2855	266		
	117.0	368	123.0	382	124.3	382	127.5	376	128.5	367		

ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = + 2 %	△FUEL = + 5 %

R

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+20
CG=33.0%

N1 (%) — **MACH**
KG/H — **IAS (KT)**
NM/1000KG — **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
50	90.0	.576	92.5	.612	92.7	.617	92.8	.620	93.1	.626	92.8	.621
	3017	320	2912	310	2864	307	2712	297	2595	288	2402	274
	126.4	381	136.6	398	139.5	400	147.2	399	154.0	400	163.9	394
52	90.1	.576	92.5	.610	92.8	.615	92.9	.619	93.2	.624	92.9	.619
	3028	320	2916	309	2869	306	2720	296	2604	287	2411	273
	125.8	381	136.1	397	138.9	399	146.3	398	153.0	398	162.6	392
54	90.1	.574	92.5	.609	92.8	.613	93.0	.617	93.3	.622	93.0	.616
	3027	319	2921	308	2874	305	2729	295	2615	286	2422	272
	125.5	380	135.5	396	138.3	397	145.4	397	151.8	397	161.1	390
56	90.1	.573	92.6	.607	92.9	.612	93.0	.615	93.5	.620	93.2	.612
	3026	318	2926	307	2880	304	2738	294	2626	285	2434	270
	125.2	379	134.9	395	137.6	396	144.4	395	150.7	396	159.4	388
58	90.1	.571	92.6	.605	92.9	.610	93.1	.613	93.6	.617	93.3	.608
	3025	317	2932	306	2886	303	2749	293	2637	284	2447	268
	124.9	378	134.2	393	136.8	395	143.4	394	149.4	394	157.6	386
60	90.1	.569	92.7	.603	93.0	.607	93.2	.610	93.7	.614	93.5	.604
	3023	316	2938	305	2892	302	2759	292	2650	282	2463	266
	124.5	376	133.4	392	136.1	394	142.3	393	148.0	392	155.5	383
62	90.1	.567	92.7	.601	93.0	.605	93.4	.608	93.9	.611	93.7	.599
	3022	314	2944	304	2899	300	2771	290	2665	281	2478	264
	124.1	375	132.7	391	135.2	392	141.1	391	146.5	390	153.3	380
64	90.1	.564	92.8	.598	93.1	.603	93.5	.605	94.0	.608	93.7	.591
	3020	313	2945	303	2906	299	2784	289	2680	279	2474	260
	123.6	373	132.0	389	134.4	390	139.8	389	144.9	388	151.5	375
66	90.1	.562	92.8	.595	93.2	.600	93.6	.602	94.2	.604	93.7	.581
	3018	312	2943	301	2913	298	2798	288	2699	277	2469	256
	123.1	372	131.4	387	133.4	389	138.4	387	143.0	386	149.1	368
68	90.1	.559	92.8	.591	93.2	.596	93.7	.598	94.4	.600	93.8	.567
	3017	310	2941	299	2911	296	2808	286	2720	275	2463	249
	122.6	370	130.7	385	132.7	386	137.1	385	140.9	383	146.0	360
70	90.1	.556	92.8	.588	93.2	.592	93.8	.593	94.5	.593	93.9	.546
	3014	308	2939	297	2909	294	2807	283	2718	272	2455	240
	122.0	368	130.0	382	131.8	383	135.9	382	139.3	379	141.1	346
72	90.1	.553	92.8	.583	93.2	.587	93.8	.587	94.5	.584		
	3012	307	2937	295	2907	291	2805	280	2715	268		
	121.4	366	129.1	379	130.8	380	134.6	378	137.4	373		
74	90.1	.549	92.8	.579	93.3	.582	93.8	.580	94.6	.573		
	3010	305	2935	292	2905	289	2804	277	2711	262		
	120.7	363	128.2	376	129.8	377	133.1	373	134.8	366		
76	90.1	.545	92.9	.573	93.3	.576	93.9	.572	94.6	.556		
	3007	302	2932	290	2903	286	2803	272	2706	254		
	119.9	361	127.1	373	128.5	373	131.2	368	131.1	355		
78	90.1	.540	92.9	.567	93.3	.569	94.0	.561	94.8	.528		
	3005	300	2929	287	2901	282	2801	267	2700	241		
	119.0	358	126.0	369	127.1	369	128.8	361	124.8	337		

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2 %	△FUEL = + 5 %

R

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+15
CG=33.0%

N1 (%) **MACH**
KG/H **IAS (KT)**
NM/1000KG **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
48	88.8	.576	91.3	.614	91.4	.617	89.9	.601	90.0	.604	90.0	.604
	2938	320	2829	311	2764	307	2440	287	2311	277	2171	266
	128.7	378	139.8	396	143.3	396	156.9	383	165.2	382	174.5	379
50	89.0	.576	91.3	.612	91.4	.615	89.9	.598	90.0	.600	90.0	.599
	2952	320	2830	310	2765	306	2438	285	2311	275	2170	264
	128.1	378	139.4	394	142.9	395	156.2	381	164.3	380	173.4	376
52	89.1	.576	91.3	.610	91.4	.613	89.9	.595	90.0	.596	90.0	.594
	2968	320	2832	309	2766	305	2435	284	2308	274	2165	261
	127.4	378	138.9	393	142.3	394	155.6	379	163.5	377	172.2	373
54	89.2	.576	91.3	.608	91.4	.611	89.9	.591	90.0	.592	90.0	.587
	2985	320	2833	308	2767	303	2432	282	2304	271	2159	258
	126.6	378	138.4	392	141.8	392	154.9	377	162.5	374	170.8	369
56	89.4	.576	91.3	.606	91.4	.608	89.9	.587	90.0	.587	90.0	.579
	3003	320	2834	307	2768	302	2429	280	2299	269	2152	255
	125.9	378	137.8	391	141.1	391	154.0	374	161.4	371	169.0	364
58	89.5	.576	91.3	.604	91.4	.606	89.9	.583	90.0	.580	90.0	.571
	3021	320	2836	306	2769	301	2426	278	2293	266	2145	251
	125.1	378	137.2	389	140.5	389	153.1	371	160.1	367	167.1	358
60	89.7	.576	91.3	.601	91.4	.603	89.9	.578	90.0	.573	90.0	.561
	3041	320	2837	304	2770	299	2421	275	2287	263	2137	246
	124.3	378	136.6	387	139.8	387	152.0	368	158.5	363	164.7	352
62	89.9	.576	91.3	.598	91.5	.600	89.9	.572	90.0	.565	89.9	.547
	3061	320	2836	303	2771	298	2417	273	2280	259	2125	240
	123.5	378	136.0	386	139.0	385	150.8	364	156.8	357	161.4	343
64	90.1	.576	91.3	.595	91.5	.596	89.9	.565	90.0	.556	89.9	.519
	3083	320	2833	301	2767	296	2411	269	2272	254	2106	227
	122.6	378	135.4	383	138.4	383	149.3	360	154.6	351	154.7	326
66	90.2	.576	91.3	.591	91.5	.592	89.9	.557	90.0	.542		
	3105	320	2830	299	2763	294	2406	265	2262	248		
	121.8	378	134.7	381	137.6	380	147.7	355	151.7	343		
68	90.4	.576	91.3	.587	91.5	.587	89.9	.548	90.0	.520		
	3128	320	2826	297	2758	291	2399	261	2245	237		
	120.9	378	133.9	378	136.7	377	145.7	350	146.5	329		
70	90.6	.576	91.3	.583	91.4	.582	89.9	.536				
	3151	320	2821	295	2752	288	2390	255				
	120.0	378	133.1	375	135.7	373	142.9	341				
72	90.7	.574	91.3	.577	91.4	.575	89.9	.516				
	3155	319	2816	292	2746	285	2376	245				
	119.4	377	132.1	372	134.5	369	138.3	329				
74	90.7	.571	91.3	.571	91.4	.568						
	3152	317	2810	289	2739	282						
	118.8	375	130.9	368	133.2	365						

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2 %	△FUEL = + 4 %

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R

CRUISE - MCT/320KT - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA+20
CG=33.0%

N1 (%) / **KG/H** / **NM/1000KG** — **MACH** / **IAS (KT)** / **TAS (KT)**

WEIGHT (1000KG)	FL100		FL150		FL160		FL180		FL200		FL220	
48	89.6	.576	90.9	.598	91.0	.601	89.4	.582	89.7	.587	89.6	.585
	2975	320	2710	303	2650	299	2312	277	2210	269	2073	258
	128.2	381	143.5	389	147.0	390	161.8	374	169.5	375	178.9	371
50	89.8	.576	90.9	.596	91.0	.599	89.4	.578	89.7	.583	89.6	.580
	2989	320	2708	302	2651	298	2310	276	2207	267	2069	255
	127.6	381	143.1	388	146.5	388	161.0	372	168.6	372	177.5	367
52	89.9	.576	90.9	.594	91.0	.597	89.4	.575	89.7	.578	89.6	.573
	3006	320	2706	300	2648	296	2308	274	2203	265	2064	252
	126.9	381	142.7	386	146.0	387	160.2	370	167.5	369	175.9	363
54	90.1	.576	90.9	.591	91.0	.594	89.4	.571	89.7	.572	89.6	.565
	3023	320	2704	299	2646	295	2305	272	2199	262	2058	248
	126.2	381	142.2	384	145.5	385	159.2	367	166.3	366	174.0	358
56	90.1	.575	90.9	.589	91.0	.591	89.4	.566	89.7	.566	89.6	.556
	3028	319	2702	298	2643	293	2303	270	2193	259	2051	244
	125.7	381	141.6	383	144.9	383	158.1	364	164.7	361	171.8	352
58	90.1	.573	90.9	.586	91.0	.588	89.4	.561	89.6	.558	89.6	.544
	3027	318	2699	296	2640	292	2300	267	2188	255	2042	239
	125.3	379	141.1	381	144.3	381	156.8	361	163.0	357	168.9	345
60	90.1	.571	90.9	.582	91.0	.584	89.4	.554	89.6	.550	89.5	.527
	3025	317	2697	295	2636	290	2296	264	2181	251	2030	231
	125.0	378	140.4	379	143.5	378	155.3	356	160.9	351	164.4	334
62	90.1	.569	90.9	.579	91.0	.580	89.4	.547	89.6	.538	89.5	.486
	3024	316	2694	293	2633	288	2292	260	2173	246	2009	212
	124.6	377	139.7	376	142.7	376	153.5	352	158.2	344	153.3	308
64	90.1	.567	90.9	.575	91.0	.575	89.4	.538	89.6	.522		
	3022	315	2690	291	2628	285	2287	256	2161	238		
	124.1	375	138.9	374	141.8	373	151.3	346	154.1	333		
66	90.1	.564	90.8	.570	91.0	.570	89.4	.526	89.5	.487		
	3020	313	2687	288	2624	283	2280	250	2144	222		
	123.6	373	138.0	371	140.8	369	148.5	339	144.9	311		
68	90.1	.562	90.8	.565	91.0	.564	89.4	.509				
	3018	312	2682	285	2618	279	2271	242				
	123.1	372	137.0	367	139.6	365	144.2	327				
70	90.1	.559	90.8	.559	91.0	.557	89.4	.476				
	3016	310	2677	282	2613	276	2263	225				
	122.5	370	135.8	364	138.2	361	135.2	306				
72	90.1	.555	90.8	.552	91.0	.549						
	3014	308	2672	279	2606	272						
	121.9	367	134.4	359	136.6	356						
74	90.1	.552	90.8	.545	90.9	.539						
	3012	306	2666	275	2598	267						
	121.2	365	132.8	354	134.5	349						

ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = + 2 %	△FUEL = + 4 %

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GENERAL

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and the time required to cover a given air distance from any moment in cruise to landing with one engine inoperative.
These tables are established for :
- Cruise speed : MCT/VMO, MCT/320 KT.
- Descent profile : M.78/300KT/250KT
- Approach and landing : 120 kg or 270 lb – 6 minute IMC
- ISA
- CG = 33 %
- Pack flow HI
- Anti ice OFF

Note : 1. In the tables, the asterisk "" means that a step climb of 4000 feet has been made to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree celsius above ISA apply a fuel correction of
0.015 (kg/°C/NM) × △ISA (°C) × Air Distance (NM)
or 0.033 (lb/°C/NM) × △ISA (°C) × Air Distance (NM)

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The in cruise quick check tables are based on a reference initial weight.
The fuel consumption must be corrected when the actual weight is different from the reference initial weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1000 kg or 1000 lb below (or above) the reference weight (see example 3.06.50 p 2).

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : MCT/VMO - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	160	180	200	220	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL160 FL180	FL200 FL220
200	1648 0.38	1399 0.38	1357 0.38	1257 0.38	1180 0.38	1098 0.38	0	0	0
250	2069 0.45	1785 0.45	1735 0.45	1612 0.46	1520 0.46	1418 0.46	0	0	1
300	2489 0.53	2171 0.53	2112 0.53	1967 0.53	1859 0.53	1738 0.54	1	1	2
350	2909 1.01	2556 1.00	2489 1.00	2322 1.01	2198 1.01	2058 1.01	1	2	4
400	3329 1.08	2941 1.08	2866 1.08	2676 1.08	2536 1.08	2378 1.09	2	2	5
450	3749 1.16	3326 1.15	3242 1.15	3030 1.16	2874 1.16	2697 1.17	2	3	6
500	4169 1.24	3711 1.23	3619 1.23	3383 1.23	3211 1.23	3015 1.24	3	4	7
550	4589 1.32	4095 1.30	3995 1.30	3737 1.31	3549 1.31	3333 1.32	3	5	8
600	5008 1.39	4479 1.38	4371 1.38	4090 1.38	3885 1.38	3651 1.39	4	5	9
650	5427 1.47	4863 1.45	4746 1.45	4442 1.46	4222 1.46	3968 1.47	4	6	10
700	5846 1.55	5247 1.53	5122 1.52	4795 1.53	4558 1.54	4286 1.55	5	7	11
750	6265 2.03	5631 2.00	5497 2.00	5147 2.01	4894 2.01	4602 2.02	5	7	12
800	6683 2.10	6014 2.08	5872 2.07	5499 2.08	5230 2.09	4919 2.10	6	8	13
850	7102 2.18	6397 2.15	6246 2.15	5851 2.16	5565 2.16	5235 2.18	6	9	14
900	7520 2.26	6780 2.22	6621 2.22	6202 2.23	5899 2.24	5550 2.25	7	9	15
950	7938 2.33	7162 2.30	6995 2.30	6553 2.31	6234 2.31	5865 2.33	7	10	16
1000	8356 2.41	7545 2.37	7369 2.37	6904 2.38	6568 2.39	6180 2.40	7	11	17
1050	8773 2.49	7927 2.45	7743 2.44	7254 2.46	6902 2.46	6495 2.48	8	11	18
1100	9191 2.56	8309 2.52	8116 2.52	7605 2.53	7235 2.54	6809 2.56	8	12	19
1150	9608 3.04	8690 3.00	8489 2.59	7955 3.01	7568 3.01	7123 3.03	9	13	20
1200	10025 3.12	9072 3.07	8862 3.07	8305 3.08	7901 3.09	7436 3.11	9	13	21
1250	10442 3.19	9454 3.14	9235 3.14	8654 3.16	8233 3.16	7750 3.18	10	14	22
1300	10859 3.27	9835 3.22	9608 3.22	9004 3.23	8565 3.24	8063 3.26	10	14	23
1350	11275 3.35	10216 3.29	9980 3.29	9353 3.31	8897 3.31	8375 3.33	12	15	24
1400	11692 3.43	10597 3.37	10352 3.36	9701 3.38	9228 3.39	8687 3.41	12	16	25

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2.5 %	△FUEL = + 5 %

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GENERAL

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and the time required to cover a given air distance from any moment in cruise to landing with one engine inoperative.
These tables are established for :
- Cruise speed : MCT/VMO, MCT/320 KT.
- Descent profile : M.78/300KT/250KT
- Approach and landing : 140 kg or 310 lb – 6 minute IMC
- ISA
- CG = 33 %
- Normal Air Conditioning
- Anti ice OFF

Note : 1. *In the tables, the asterisk "*" means that a step climb of 4000 feet has been made to reach the corresponding flight level.*
2. *The flight level shown on the top of each column is the final flight level.*
3. *For each degree celsius above ISA apply a fuel correction of*
0.015 (kg/°C/NM) × △ISA (°C) × Air Distance (NM)
or 0.033 (lb/°C/NM) × △ISA (°C) × Air Distance (NM)

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The in cruise quick check tables are based on a reference initial weight.
The fuel consumption must be corrected when the actual weight is different from the reference initial weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1000 kg or 1000 lb below (or above) the reference weight.

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : MCT/VMO - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	150	160	180	200	220	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL160 FL180	FL200 FL220
200	1885 0.37	1560 0.38	1508 0.38	1374 0.38	1275 0.39	1180 0.39	0	0	2
250	2366 0.44	1990 0.45	1927 0.45	1761 0.46	1640 0.46	1523 0.47	1	0	3
300	2843 0.51	2420 0.52	2346 0.53	2147 0.54	2005 0.54	1865 0.55	1	1	5
350	3322 0.59	2849 1.00	2764 1.00	2533 1.01	2369 1.02	2206 1.03	2	2	7
400	3800 1.06	3278 1.07	3182 1.07	2919 1.09	2732 1.09	2547 1.11	3	3	8
450	4278 1.14	3707 1.15	3600 1.15	3305 1.16	3096 1.17	2888 1.19	3	3	9
500	4756 1.21	4136 1.22	4018 1.22	3690 1.24	3459 1.25	3228 1.27	4	4	11
550	5233 1.29	4564 1.29	4436 1.30	4075 1.31	3822 1.32	3568 1.34	5	5	12
600	5709 1.36	4992 1.37	4853 1.37	4460 1.39	4184 1.40	3907 1.42	5	5	13
650	6185 1.44	5420 1.44	5270 1.44	4845 1.47	4547 1.48	4246 1.50	6	6	14
700	6661 1.51	5848 1.52	5687 1.52	5229 1.54	4909 1.55	4584 1.58	7	7	15
750	7136 1.59	6275 1.59	6103 1.59	5613 2.02	5270 2.03	4923 2.06	7	7	17
800	7611 2.06	6702 2.06	6520 2.06	5997 2.09	5632 2.11	5260 2.14	8	8	18
850	8085 2.14	7129 2.14	6936 2.14	6380 2.17	5993 2.18	5598 2.22	9	9	19
900	8559 2.21	7556 2.21	7352 2.21	6763 2.24	6354 2.26	5935 2.29	9	9	20
950	9033 2.29	7983 2.28	7768 2.29	7146 2.32	6714 2.34	6271 2.37	10	10	21
1000	9506 2.36	8409 2.36	8184 2.36	7529 2.39	7075 2.41	6607 2.45	10	10	22
1050	9979 2.43	8835 2.43	8599 2.43	7912 2.47	7435 2.49	6943 2.53	11	11	23
1100	10451 2.51	9261 2.50	9014 2.51	8294 2.55	7795 2.57	7278 3.00	12	11	23
1150	10923 2.58	9687 2.58	9429 2.58	8676 3.02	8155 3.04	7614 3.08	12	12	24
1200	11394 3.06	10112 3.05	9844 3.05	9058 3.10	8514 3.12	7949 3.16	13	13	25
1250	11865 3.13	10538 3.12	10258 3.13	9439 3.17	8873 3.19	8283 3.24	13	13	26
1300	12336 3.21	10963 3.20	10672 3.20	9821 3.25	9232 3.27	8618 3.31	14	14	27
1350	12807 3.28	11388 3.27	11086 3.27	10202 3.32	9590 3.35	8952 3.39	15	14	28
1400	13276 3.36	11812 3.34	11500 3.35	10582 3.40	9949 3.42	9285 3.47	15	15	28

ENGINE ANTI ICE ON △ FUEL = + 3 %	**TOTAL ANTI ICE ON** △ FUEL = + 6 %

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GENERAL

The following in cruise quick check tables allow the flight crew to determine the fuel consumption and the time required to cover a given air distance from any moment in cruise to landing with one engine inoperative.
These tables are established for :
- Cruise speed : MCT/VMO, MCT/320 KT.
- Descent profile : M.78/300KT/250KT
- Approach and landing : 110 kg or 240 lb – 6 minute IMC
- ISA
- CG = 33 %
- Pack flow HI
- Anti ice OFF

Note : *1. In the tables, the asterisk "*" means that a step climb of 4000 feet has been made to reach the corresponding flight level.*
2. The flight level shown on the top of each column is the final flight level.
3. For each degree celsius above ISA apply a fuel correction of
0.015 (kg/°C/NM) × △ISA (°C) × Air Distance (NM)
or 0.033 (lb/°C/NM) × △ISA (°C) × Air Distance (NM)

CORRECTION FOR DEVIATION FROM REFERENCE WEIGHT

The in cruise quick check tables are based on a reference initial weight.
The fuel consumption must be corrected when the actual weight is different from the reference initial weight.
If it is lower (or greater) than the reference weight, subtract (or add) the value given in the correction part of the table per 1000 kg or 1000 lb below (or above) the reference weight (see example 3.06.50 p 2).

R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : MCT/VMO - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 55000 KG PACK FLOW HI ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	100	**150**	**160**	**180**	**200**	**220**	**FL100 FL150**	**FL160 FL180**	**FL200 FL220**
200	1626 0.37	1337 0.38	1293 0.38	1172 0.39	1093 0.39	1024 0.40	0	0	0
250	2043 0.45	1706 0.46	1653 0.46	1503 0.47	1407 0.47	1323 0.48	0	0	1
300	2459 0.53	2076 0.54	2014 0.54	1834 0.55	1721 0.55	1621 0.56	0	1	2
350	2876 1.00	2445 1.01	2374 1.01	2164 1.03	2034 1.03	1919 1.04	1	1	3
400	3292 1.08	2814 1.09	2734 1.09	2495 1.11	2347 1.11	2217 1.12	1	2	4
450	3708 1.16	3183 1.16	3094 1.16	2825 1.19	2660 1.19	2515 1.20	2	2	5
500	4124 1.23	3551 1.24	3453 1.24	3154 1.27	2973 1.27	2812 1.28	2	3	6
550	4540 1.31	3920 1.32	3813 1.32	3484 1.34	3285 1.35	3109 1.36	3	4	7
600	4956 1.39	4288 1.39	4172 1.39	3813 1.42	3597 1.43	3405 1.44	3	4	8
650	5371 1.46	4656 1.47	4531 1.47	4142 1.50	3909 1.51	3702 1.52	4	5	9
700	5786 1.54	5024 1.55	4889 1.54	4471 1.58	4220 1.59	3997 2.00	4	5	10
750	6202 2.02	5391 2.02	5248 2.02	4799 2.06	4531 2.07	4293 2.08	5	6	10
800	6617 2.09	5759 2.10	5606 2.10	5128 2.14	4842 2.15	4588 2.16	5	7	11
850	7031 2.17	6126 2.17	5965 2.17	5456 2.22	5153 2.23	4883 2.24	6	7	12
900	7446 2.25	6493 2.25	6323 2.25	5784 2.29	5463 2.30	5178 2.32	6	8	13
950	7861 2.32	6860 2.32	6681 2.32	6112 2.37	5774 2.38	5472 2.40	6	8	14
1000	8275 2.40	7227 2.40	7038 2.40	6439 2.45	6084 2.46	5766 2.48	7	9	15
1050	8689 2.48	7593 2.48	7396 2.48	6766 2.53	6394 2.54	6060 2.56	7	9	15
1100	9103 2.55	7960 2.55	7753 2.55	7094 3.01	6704 3.02	6354 3.04	8	10	16
1150	9517 3.03	8326 3.03	8110 3.03	7420 3.09	7013 3.10	6648 3.11	8	10	17
1200	9930 3.11	8692 3.10	8467 3.10	7747 3.16	7322 3.18	6941 3.19	8	11	18
1250	10344 3.18	9057 3.18	8824 3.18	8074 3.24	7631 3.25	7234 3.27	9	11	18
1300	10757 3.26	9423 3.25	9181 3.25	8400 3.32	7940 3.33	7526 3.35	9	12	19
1350	11170 3.33	9788 3.33	9537 3.33	8726 3.40	8248 3.41	7818 3.43	9	12	20
1400	11583 3.41	10154 3.40	9893 3.40	9051 3.48	8557 3.49	8110 3.51	10	13	20

ENGINE ANTI ICE ON △ FUEL = + 2 %	**TOTAL ANTI ICE ON** △ FUEL = + 5 %

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R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : MCT/320KT - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 140 KG (6MIN)

REF. INITIAL WEIGHT = 60000 KG NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL						CORRECTION ON FUEL CONSUMPTION (KG/1000KG)		
	100	**150**	**160**	**180**	**200**	**220**	**FL100 FL150**	**FL160 FL180**	**FL200 FL220**
200	1695 0.39	1520 0.38	1498 0.38	1374 0.38	1275 0.39	1180 0.39	2	0	2
250	2122 0.47	1936 0.46	1913 0.45	1761 0.46	1640 0.46	1523 0.47	4	1	3
300	2549 0.55	2351 0.53	2328 0.53	2147 0.54	2005 0.54	1865 0.55	5	2	5
350	2975 1.03	2766 1.01	2741 1.00	2533 1.01	2369 1.02	2206 1.03	7	3	7
400	3401 1.12	3181 1.08	3155 1.08	2919 1.09	2732 1.09	2547 1.11	8	4	8
450	3826 1.20	3595 1.16	3567 1.15	3305 1.16	3096 1.17	2888 1.19	10	6	9
500	4250 1.28	4008 1.24	3979 1.23	3690 1.24	3459 1.25	3228 1.27	11	7	11
550	4674 1.36	4420 1.31	4391 1.30	4075 1.31	3822 1.32	3568 1.34	12	8	12
600	5097 1.44	4832 1.39	4802 1.38	4460 1.39	4184 1.40	3907 1.42	14	9	13
650	5520 1.52	5244 1.46	5212 1.45	4845 1.47	4547 1.48	4246 1.50	15	9	14
700	5943 2.01	5655 1.54	5622 1.53	5229 1.54	4909 1.55	4584 1.58	16	10	15
750	6365 2.09	6065 2.02	6031 2.00	5613 2.02	5270 2.03	4923 2.06	18	11	17
800	6786 2.17	6475 2.09	6440 2.07	5997 2.09	5632 2.11	5260 2.14	19	12	18
850	7207 2.25	6884 2.17	6848 2.15	6380 2.17	5993 2.18	5598 2.22	20	13	19
900	7627 2.33	7293 2.24	7256 2.22	6763 2.24	6354 2.26	5935 2.29	21	14	20
950	8047 2.41	7701 2.32	7663 2.30	7146 2.32	6714 2.34	6271 2.37	23	15	21
1000	8467 2.49	8109 2.39	8070 2.37	7529 2.39	7075 2.41	6607 2.45	24	16	22
1050	8886 2.58	8516 2.47	8476 2.45	7912 2.47	7435 2.49	6943 2.53	25	17	23
1100	9304 3.06	8922 2.55	8882 2.52	8294 2.55	7795 2.57	7278 3.00	26	18	23
1150	9722 3.14	9328 3.02	9287 3.00	8676 3.02	8155 3.04	7614 3.08	27	19	24
1200	10140 3.22	9734 3.10	9691 3.07	9058 3.10	8514 3.12	7949 3.16	29	20	25
1250	10557 3.30	10139 3.17	10095 3.15	9439 3.17	8873 3.19	8283 3.24	30	21	26
1300	10973 3.38	10543 3.25	10499 3.22	9821 3.25	9232 3.27	8618 3.31	31	21	27
1350	11389 3.46	10947 3.33	10902 3.30	10202 3.32	9590 3.35	8952 3.39	32	22	28
1400	11805 3.55	11350 3.40	11304 3.37	10582 3.40	9949 3.42	9285 3.47	33	23	28

ENGINE ANTI ICE ON △ FUEL = + 3 %	**TOTAL ANTI ICE ON** △ FUEL = + 6 %

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R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : MCT/320KT - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 120 KG (6MIN)

REF. INITIAL WEIGHT = 55000 KG
NORMAL AIR CONDITIONING
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	160	180	200	220	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL160 FL180	FL200 FL220
200	1556 0.39	1381 0.38	1358 0.38	1257 0.38	1180 0.38	1098 0.38	2	0	0
250	1950 0.47	1760 0.46	1737 0.45	1612 0.46	1520 0.46	1418 0.46	3	1	1
300	2344 0.55	2139 0.53	2115 0.53	1967 0.53	1859 0.53	1738 0.54	4	1	2
350	2737 1.03	2518 1.01	2493 1.00	2322 1.01	2198 1.01	2058 1.01	5	2	4
400	3130 1.12	2896 1.08	2870 1.08	2676 1.08	2536 1.08	2378 1.09	6	3	5
450	3523 1.20	3274 1.16	3248 1.15	3030 1.16	2874 1.16	2697 1.17	7	4	6
500	3915 1.28	3651 1.24	3618 1.23	3383 1.23	3211 1.23	3015 1.24	8	5	7
550	4306 1.36	4028 1.31	3993 1.30	3737 1.31	3549 1.31	3333 1.32	9	6	8
600	4698 1.44	4404 1.39	4368 1.38	4090 1.38	3885 1.38	3651 1.39	10	7	9
650	5089 1.52	4780 1.46	4742 1.45	4442 1.46	4222 1.46	3968 1.47	11	8	10
700	5479 2.01	5156 1.54	5116 1.53	4795 1.53	4558 1.54	4286 1.55	12	9	11
750	5869 2.09	5531 2.02	5489 2.00	5147 2.01	4894 2.01	4602 2.02	13	10	12
800	6258 2.17	5906 2.09	5862 2.07	5499 2.08	5230 2.09	4919 2.10	14	11	13
850	6648 2.25	6280 2.17	6234 2.15	5851 2.16	5565 2.16	5235 2.18	15	11	14
900	7036 2.33	6654 2.24	6606 2.22	6202 2.23	5899 2.24	5550 2.25	16	12	15
950	7425 2.41	7027 2.32	6977 2.30	6553 2.31	6234 2.31	5865 2.33	17	13	16
1000	7813 2.49	7400 2.39	7348 2.37	6904 2.38	6568 2.39	6180 2.40	18	14	17
1050	8201 2.58	7773 2.47	7719 2.45	7254 2.46	6902 2.46	6495 2.48	19	15	18
1100	8588 3.06	8145 2.55	8089 2.52	7605 2.53	7235 2.54	6809 2.56	20	16	19
1150	8975 3.14	8517 3.02	8459 3.00	7955 3.01	7568 3.01	7123 3.03	21	17	20
1200	9361 3.22	8889 3.10	8828 3.07	8305 3.08	7901 3.09	7436 3.11	22	18	21
1250	9748 3.30	9260 3.17	9197 3.15	8654 3.16	8233 3.16	7750 3.18	23	19	22
1300	10134 3.38	9631 3.25	9565 3.22	9004 3.23	8565 3.24	8063 3.26	25	20	23
1350	10519 3.46	10001 3.32	9933 3.30	9353 3.31	8897 3.31	8375 3.33	26	21	24
1400	10905 3.55	10371 3.40	10301 3.37	9701 3.38	9228 3.39	8687 3.41	28	22	25

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2.5 %	△FUEL = + 6 %

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R

IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - ONE ENGINE FAILURE
CRUISE : MCT/320KT - DESCENT : M.78/300KT/250KT
IMC PROCEDURE : 110 KG (6MIN)

REF. INITIAL WEIGHT = 55000 KG PACK FLOW HI ANTI-ICING OFF	ISA CG = 33.0 %	**FUEL CONSUMED (KG)** **TIME (H.MIN)**

AIR DIST. (NM)	FLIGHT LEVEL 100	150	160	180	200	220	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL160 FL180	FL200 FL220
200	1534 0.39	1337 0.38	1293 0.38	1172 0.39	1093 0.39	1024 0.40	0	0	0
250	1924 0.47	1706 0.46	1653 0.46	1503 0.47	1407 0.47	1323 0.48	1	0	1
300	2315 0.55	2076 0.54	2014 0.54	1834 0.55	1721 0.55	1621 0.56	2	1	2
350	2704 1.03	2445 1.01	2374 1.01	2164 1.03	2034 1.03	1919 1.04	3	1	3
400	3094 1.12	2814 1.09	2734 1.09	2495 1.11	2347 1.11	2217 1.12	3	2	4
450	3483 1.20	3183 1.16	3094 1.16	2825 1.19	2660 1.19	2515 1.20	4	2	5
500	3871 1.28	3551 1.24	3453 1.24	3154 1.27	2973 1.27	2812 1.28	5	3	6
550	4259 1.36	3920 1.32	3813 1.32	3484 1.34	3285 1.35	3109 1.36	6	4	7
600	4647 1.44	4288 1.39	4172 1.39	3813 1.42	3597 1.43	3405 1.44	7	4	8
650	5034 1.52	4656 1.47	4531 1.47	4142 1.50	3909 1.51	3702 1.52	8	5	9
700	5421 2.01	5024 1.55	4889 1.54	4471 1.58	4220 1.59	3997 2.00	9	5	10
750	5807 2.09	5392 2.02	5248 2.02	4799 2.06	4531 2.07	4293 2.08	9	6	10
800	6194 2.17	5761 2.10	5606 2.10	5128 2.14	4842 2.15	4588 2.16	10	7	11
850	6579 2.25	6129 2.17	5965 2.17	5456 2.22	5153 2.23	4883 2.24	11	7	12
900	6965 2.33	6497 2.25	6323 2.25	5784 2.29	5463 2.30	5178 2.32	12	8	13
950	7349 2.41	6865 2.33	6681 2.32	6112 2.37	5774 2.38	5472 2.40	13	8	14
1000	7734 2.49	7233 2.40	7038 2.40	6439 2.45	6084 2.46	5766 2.48	14	9	15
1050	8118 2.58	7601 2.48	7396 2.48	6766 2.53	6394 2.54	6060 2.56	14	9	15
1100	8502 3.06	7968 2.55	7753 2.55	7094 3.01	6704 3.02	6354 3.04	15	10	16
1150	8885 3.14	8336 3.03	8110 3.03	7420 3.09	7013 3.10	6648 3.11	16	10	17
1200	9268 3.22	8703 3.11	8467 3.10	7747 3.16	7322 3.18	6941 3.19	17	11	18
1250	9651 3.30	9071 3.18	8824 3.18	8074 3.24	7631 3.25	7234 3.27	18	11	18
1300	10033 3.38	9438 3.26	9181 3.25	8400 3.32	7940 3.33	7526 3.35	18	12	19
1350	10416 3.46	9805 3.33	9537 3.33	8726 3.40	8248 3.41	7818 3.43	19	12	20
1400	10798 3.55	10172 3.41	9893 3.40	9051 3.48	8557 3.49	8110 3.51	20	13	20

ENGINE ANTI ICE ON △ FUEL = + 2 %	**TOTAL ANTI ICE ON** △ FUEL = + 5 %

FLIP23D A319–112 CFM56–5B6/P SA3611 03301.001011 0250300 .7800 .00100 110 0300350 55 0 *** 20 20 20 18590 FCOM-N0-03-06-50-015-240

HOLDING

R

RACE TRACK HOLDING PATTERN - GREEN DOT SPEED - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS CLEAN CONFIGURATION NORMAL AIR CONDITIONING ANTI-ICING OFF	ISA CG=33.0%	**N1 (%)** **FF (KG/H)**

WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
64	69.6 2144	72.6 2135	77.5 2134	79.5 2140	81.5 2149	83.2 2162	84.9 2187	86.5 2238
66	70.6 2209	73.5 2202	78.6 2204	80.5 2213	82.4 2222	84.0 2239	85.7 2275	87.3 2331
68	71.4 2275	74.4 2269	79.5 2277	81.4 2287	83.2 2299	84.9 2320	86.5 2368	88.2 2434
70	72.2 2343	75.3 2338	80.4 2350	82.4 2359	84.0 2376	85.7 2404	87.3 2461	89.2 2546
72	73.0 2410	76.3 2408	81.3 2423	83.2 2434	84.8 2453	86.4 2494	88.1 2554	90.0 2665
74	73.9 2478	77.2 2478	82.2 2497	83.9 2511	85.5 2535	87.2 2588	88.9 2659	90.9 2797
76	74.7 2546	78.1 2548	83.0 2569	84.6 2588	86.3 2619	87.9 2680	89.7 2773	91.8 2928
78	75.5 2614	79.1 2619	83.8 2645	85.4 2665	87.0 2709	88.6 2774	90.5 2889	92.9 3060
80	76.3 2684	79.9 2690	84.5 2722	86.1 2747	87.7 2803	89.4 2875	91.3 3018	94.1 3194
82	77.2 2755	80.7 2764	85.1 2800	86.8 2832	88.4 2895	90.1 2990	92.1 3148	
84	78.0 2825	81.4 2838	85.8 2877	87.5 2920	89.0 2989	90.9 3104	93.1 3280	
86	78.8 2896	82.2 2912	86.5 2958	88.1 3015	89.7 3087	91.6 3225	94.1 3410	
88	79.7 2967	83.0 2987	87.2 3043	88.7 3107	90.4 3198	92.4 3356		
90	80.5 3039	83.7 3060	87.8 3130	89.3 3199	91.1 3313	93.2 3487		
92	81.2 3112	84.4 3134	88.4 3222	89.9 3295	91.8 3426	94.1 3618		

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**	**PER 1° ABOVE ISA**
$\triangle$FF = + 3.5 %	$\triangle$FF = + 6 %	$\triangle$FF = + 0.3 %

11.0-08F0A321-211 CFM56-5B3/P SA14300010C6KG330 0 018590 0 0 3 1.0 180.0 30.00 0 01 1.000 .000 .000 0 FCOM-N0-03-06-55-001-165

HOLDING

R

RACE TRACK HOLDING PATTERN - GREEN DOT SPEED - 1 ENGINE OUT								
MAX. CRUISE THRUST LIMITS CLEAN CONFIGURATION PACK FLOW HI ANTI-ICING OFF					ISA CG=33.0%		**N1 (%)** **FF (KG/H)**	
WEIGHT (1000KG)	**FL 15**	**FL 50**	**FL100**	**FL120**	**FL140**	**FL160**	**FL180**	**FL200**
48	61.2 1573	63.7 1562	68.1 1553	69.7 1549	71.4 1545	73.2 1544	75.1 1544	77.1 1549
50	62.2 1637	64.8 1626	69.2 1617	70.8 1613	72.5 1610	74.4 1610	76.4 1611	78.2 1618
52	63.1 1701	65.9 1691	70.2 1681	71.9 1677	73.7 1676	75.6 1677	77.5 1682	79.4 1687
54	64.1 1766	67.0 1758	71.2 1745	73.0 1742	74.8 1742	76.8 1744	78.6 1751	80.6 1757
56	65.1 1831	68.1 1823	72.3 1810	74.0 1808	75.9 1809	77.8 1815	79.7 1820	81.5 1830
58	66.1 1896	69.2 1885	73.3 1875	75.1 1875	77.1 1877	78.9 1884	80.8 1890	82.4 1906
60	67.1 1963	70.2 1949	74.3 1941	76.1 1943	78.1 1947	79.9 1953	81.7 1963	83.4 1982
62	68.1 2027	71.0 2014	75.3 2009	77.2 2011	79.0 2017	80.9 2024	82.6 2038	84.3 2066
64	69.1 2090	71.9 2079	76.3 2077	78.2 2081	80.0 2087	81.9 2095	83.4 2114	85.2 2153
66	70.1 2153	72.8 2145	77.2 2146	79.1 2150	80.9 2158	82.7 2170	84.3 2193	
68	70.9 2217	73.7 2211	78.2 2215	80.0 2220	81.8 2229	83.5 2246	85.2 2278	
70	71.7 2284	74.6 2278	79.1 2283	80.8 2291	82.7 2302	84.3 2322		
72	72.5 2350	75.4 2346	79.9 2354	81.7 2363	83.4 2377	85.1 2402		
74	73.3 2417	76.3 2416	80.7 2426	82.6 2436	84.2 2454			
76	74.1 2486	77.1 2486	81.6 2499	83.4 2510	85.0 2531			
ENGINE ANTI ICE ON △FF = + 3 %			**TOTAL ANTI ICE ON** △FF = + 6 %			**PER 1° ABOVE ISA** △FF = + 0.3 %		

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HOLDING

R

RACE TRACK HOLDING PATTERN - GREEN DOT SPEED - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS CLEAN CONFIGURATION PACK FLOW HI ANTI-ICING OFF	ISA CG=33.0%	N1 (%) FF (KG/H)

WEIGHT (1000KG)	FL 15	FL 50	FL100	FL120	FL140	FL160	FL180	FL200
46	60.2 1511	62.6 1498	66.8 1490	68.6 1488	70.2 1484	72.0 1481	73.9 1481	75.9 1483
48	61.2 1574	63.7 1563	68.2 1556	69.7 1552	71.4 1548	73.2 1547	75.2 1548	77.1 1553
50	62.2 1638	64.8 1628	69.2 1620	70.8 1616	72.6 1613	74.5 1614	76.5 1616	78.3 1622
52	63.2 1703	65.9 1694	70.3 1684	71.9 1680	73.7 1679	75.7 1680	77.6 1686	79.5 1692
54	64.2 1768	67.1 1760	71.3 1748	73.0 1745	74.9 1746	76.9 1748	78.7 1756	80.6 1762
56	65.2 1833	68.2 1826	72.3 1813	74.1 1812	76.0 1814	77.9 1819	79.8 1825	81.6 1836
58	66.1 1898	69.3 1888	73.4 1879	75.2 1879	77.1 1882	78.9 1888	80.9 1895	82.5 1912
60	67.1 1966	70.2 1952	74.4 1945	76.2 1947	78.1 1952	80.0 1958	81.8 1968	83.4 1989
62	68.2 2030	71.1 2017	75.4 2013	77.3 2016	79.1 2022	81.0 2029	82.7 2044	84.4 2071
64	69.2 2093	72.0 2083	76.3 2082	78.3 2086	80.0 2093	81.9 2101	83.5 2121	85.2 2156
66	70.2 2157	72.9 2149	77.3 2151	79.2 2156	81.0 2164	82.8 2176	84.4 2198	86.0 2243
68	71.0 2222	73.8 2216	78.3 2221	80.1 2227	81.9 2235	83.6 2253	85.3 2282	86.9 2330
70	71.8 2289	74.7 2284	79.2 2290	81.0 2298	82.8 2309	84.4 2328	86.0 2368	87.7 2422
72	72.6 2356	75.5 2352	80.0 2362	81.8 2371	83.6 2385	85.2 2406	86.8 2456	88.6 2526
74	73.4 2423	76.4 2422	80.9 2434	82.7 2444	84.3 2461	86.0 2492	87.5 2545	

ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
ΔFF = + 3 %	ΔFF = + 6.5 %	ΔFF = + 0.3 %

DESCENT TO LANDING

R

DESCENT - M.78/300KT/250KT - 1 ENGINE OUT									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%						
WEIGHT (1000KG)	**70**				**90**				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	IAS (KT)
390	16.5	83	100	IDLE					241
370	15.8	80	95	IDLE					252
350	15.1	78	90	IDLE					264
330	14.5	76	85	IDLE	16.0	83	95	IDLE	277
310	14.0	73	81	IDLE	15.4	81	90	IDLE	289
290	13.4	71	77	IDLE	14.7	78	85	IDLE	300
270	12.7	68	71	IDLE	13.9	75	79	IDLE	300
250	11.9	65	66	IDLE	13.1	72	73	IDLE	300
240	11.5	64	63	IDLE	12.6	70	70	IDLE	300
220	10.8	61	58	IDLE	11.8	66	64	IDLE	300
200	10.0	57	53	IDLE	10.9	62	58	IDLE	300
180	9.2	53	47	IDLE	10.0	58	52	IDLE	300
160	8.4	49	42	IDLE	9.0	53	46	IDLE	300
140	7.6	44	37	IDLE	8.1	47	40	IDLE	300
120	6.7	38	32	IDLE	7.1	40	34	IDLE	300
100	5.9	32	27	IDLE	6.1	33	28	IDLE	300
50	2.1	10	9	IDLE	2.2	10	10	IDLE	250
15	.0	0	0	IDLE	.0	0	0	IDLE	250

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	+ 3.5 %	+ 6 %	+ 0.25 %
FUEL	+ 38 %	+ 74 %	+ 0.5 %
DISTANCE	+ 3 %	+ 7 %	+ 0.5 %

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DESCENT TO LANDING

R

DESCENT - M.78/300KT/250KT - 1 ENGINE OUT									
IDLE THRUST NORMAL AIR CONDITIONING ANTI-ICING OFF			ISA CG=33.0%						
WEIGHT (1000KG)	**50**				**70**				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	IAS (KT)
390	14.1	66	85	IDLE					241
370	13.5	64	80	IDLE	16.5	79	99	IDLE	252
350	12.9	62	76	IDLE	15.8	77	94	IDLE	264
330	12.4	61	72	IDLE	15.2	75	90	IDLE	277
310	11.9	59	69	IDLE	14.6	73	85	IDLE	289
290	11.4	58	65	IDLE	14.1	71	81	IDLE	300
270	10.9	56	61	IDLE	13.3	69	75	IDLE	300
250	10.3	54	56	IDLE	12.5	66	69	IDLE	300
240	9.9	53	54	IDLE	12.1	65	67	IDLE	300
220	9.3	51	50	IDLE	11.3	62	61	IDLE	300
200	8.7	48	45	IDLE	10.5	58	55	IDLE	300
180	8.0	44	41	IDLE	9.6	53	50	IDLE	300
160	7.3	39	37	IDLE	8.8	48	44	IDLE	300
140	6.6	34	32	IDLE	7.9	41	39	IDLE	300
120	5.9	29	28	IDLE	7.0	35	33	IDLE	300
100	5.2	25	24	IDLE	6.0	29	28	IDLE	300
50	1.9	8	8	IDLE	2.2	9	9	IDLE	250
15	.0	0	0	IDLE	.0	0	0	IDLE	250

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	+ 2.5 %	+ 3 %	+ 0.2 %
FUEL	+ 22 %	+ 38 %	+ 0.5 %
DISTANCE	+ 2.5 %	+ 3 %	+ 0.5 %

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DESCENT TO LANDING

R

DESCENT - M.78/300KT/250KT - 1 ENGINE OUT									
IDLE THRUST PACK FLOW HI ANTI-ICING OFF		ISA CG=33.0%							
WEIGHT (1000KG)	50				70				
FL	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	TIME (MIN)	FUEL (KG)	DIST. (NM)	N1	IAS (KT)
390	14.2	72	86	IDLE					241
370	13.6	69	81	IDLE	16.7	86	100	IDLE	252
350	13.0	68	77	IDLE	16.0	83	95	IDLE	264
330	12.5	66	73	IDLE	15.4	81	91	IDLE	277
310	12.0	64	69	IDLE	14.8	79	86	IDLE	289
290	11.5	63	66	IDLE	14.2	77	82	IDLE	300
270	10.9	60	61	IDLE	13.4	75	76	IDLE	300
250	10.3	58	57	IDLE	12.6	72	70	IDLE	300
240	10.0	57	54	IDLE	12.2	70	67	IDLE	300
220	9.3	54	50	IDLE	11.4	67	62	IDLE	300
200	8.7	51	45	IDLE	10.6	62	56	IDLE	300
180	8.0	47	41	IDLE	9.7	57	50	IDLE	300
160	7.3	42	37	IDLE	8.8	51	44	IDLE	300
140	6.5	36	32	IDLE	7.9	44	39	IDLE	300
120	5.8	30	28	IDLE	6.9	36	33	IDLE	300
100	5.1	25	23	IDLE	6.0	30	28	IDLE	300
50	1.8	7	8	IDLE	2.1	9	9	IDLE	250
15	.0	0	0	IDLE	.0	0	0	IDLE	250

CORRECTIONS	ENGINE ANTI ICE ON	TOTAL ANTI ICE ON	PER 1° ABOVE ISA
TIME	+ 3 %	+ 4 %	+ 0.3 %
FUEL	+ 25 %	+ 39 %	+ 0.4 %
DISTANCE	+ 3 %	+ 3 %	+ 0.5 %

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GENERAL

The ground distance/air distance conversion tables are used to calculate the air distance for a given ground distance due to the influence of the wind.
Tables are given for :
– LONG RANGE SPEED
– FIXED SPEEDS

LONG RANGE SPEED

R

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
10	7	8	9	**10**	11	13	15
20	15	16	18	**20**	23	26	31
30	22	24	27	**30**	34	39	46
40	30	32	36	**40**	45	52	61
50	37	41	45	**50**	57	65	77
60	44	49	54	**60**	68	78	92
70	52	57	63	**70**	79	91	108
80	59	65	72	**80**	91	104	123
90	67	73	81	**90**	102	117	138
100	74	81	90	**100**	113	130	154
200	148	162	179	**200**	226	261	307
300	222	243	269	**300**	340	391	461
400	296	324	358	**400**	453	521	615
500	371	406	448	**500**	566	652	768
600	445	487	537	**600**	679	782	922
700	519	568	627	**700**	792	913	1076
800	593	649	717	**800**	905	1043	1230
900	667	730	806	**900**	1019	1173	1383
1000	741	811	896	**1000**	1132	1304	1537
1100	815	892	985	**1100**	1245	1434	1691
1200	889	973	1075	**1200**	1358	1564	1844
1300	963	1054	1164	**1300**	1471	1695	1998
1400	1038	1136	1254	**1400**	1585	1825	2152
1500	1112	1217	1344	**1500**	1698	1955	2305
1600	1186	1298	1433	**1600**	1811	2086	2459
1700	1260	1379	1523	**1700**	1924	2216	2613
1800	1334	1460	1612	**1800**	2037	2346	2766
1900	1408	1541	1702	**1900**	2150	2477	2920
2000	1482	1622	1791	**2000**	2264	2607	3074

GENERAL

The ground distance/air distance conversion tables are used to calculate the air distance for a given ground distance due to the influence of the wind.
Tables are given for :
– LONG RANGE SPEED
– FIXED SPEEDS

LONG RANGE SPEED

R

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
10	7	8	9	**10**	11	13	16
20	15	16	18	**20**	23	26	31
30	22	24	27	**30**	34	39	47
40	29	32	36	**40**	45	53	62
50	37	40	45	**50**	57	66	78
60	44	48	54	**60**	68	79	93
70	52	57	63	**70**	79	92	109
80	59	65	71	**80**	91	105	124
90	66	73	80	**90**	102	118	140
100	74	81	89	**100**	114	131	156
200	147	162	179	**200**	227	263	311
300	221	242	268	**300**	341	394	467
400	295	323	357	**400**	454	525	622
500	368	404	447	**500**	568	656	778
600	442	485	536	**600**	681	788	933
700	516	565	626	**700**	795	919	1089
800	589	646	715	**800**	908	1050	1244
900	663	727	804	**900**	1022	1181	1400
1000	737	808	894	**1000**	1135	1313	1556
1100	811	888	983	**1100**	1249	1444	1711
1200	884	969	1072	**1200**	1362	1575	1867
1300	958	1050	1162	**1300**	1476	1706	2022
1400	1032	1131	1251	**1400**	1589	1838	2178
1500	1105	1212	1340	**1500**	1703	1969	2333
1600	1179	1292	1430	**1600**	1816	2100	2489
1700	1253	1373	1519	**1700**	1930	2231	2644
1800	1326	1454	1609	**1800**	2043	2363	2800
1900	1400	1535	1698	**1900**	2157	2494	2956
2000	1474	1615	1787	**2000**	2270	2625	3111

GENERAL

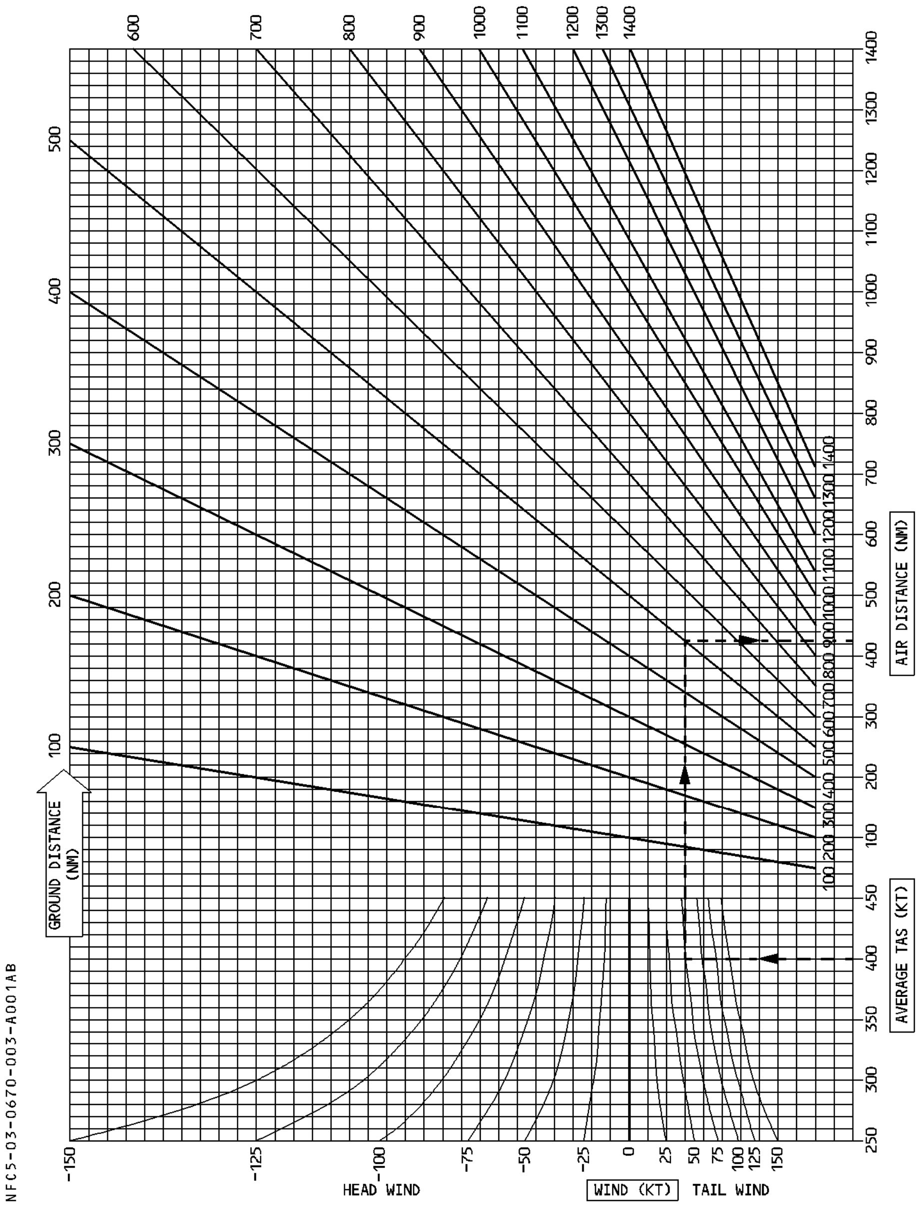
The ground distance/air distance conversion tables are used to calculate the air distance for a given ground distance due to the influence of the wind.
Tables are given for :
- LONG RANGE SPEED
- FIXED SPEEDS

LONG RANGE SPEED

R

GROUND DIST. (NM)	AIR DISTANCE (NM)						
	TAIL WIND		WIND COMPONENTS (KT)				HEAD WIND
	+150	+100	+ 50	0	–50	–100	–150
10	7	8	9	**10**	11	13	15
20	15	16	18	**20**	23	26	31
30	22	24	27	**30**	34	39	46
40	30	32	36	**40**	45	52	62
50	37	41	45	**50**	57	65	77
60	44	49	54	**60**	68	78	93
70	52	57	63	**70**	79	91	108
80	59	65	72	**80**	91	104	123
90	67	73	81	**90**	102	118	139
100	74	81	90	**100**	113	131	154
200	148	162	179	**200**	227	261	308
300	222	243	269	**300**	340	392	463
400	296	324	358	**400**	453	522	617
500	370	405	448	**500**	566	653	771
600	444	486	537	**600**	680	784	925
700	518	567	627	**700**	793	914	1080
800	592	648	716	**800**	906	1045	1234
900	666	729	806	**900**	1019	1176	1388
1000	740	810	895	**1000**	1133	1306	1542
1100	814	891	985	**1100**	1246	1437	1696
1200	888	972	1074	**1200**	1359	1567	1851
1300	962	1053	1164	**1300**	1473	1698	2005
1400	1036	1134	1253	**1400**	1586	1829	2159
1500	1110	1215	1343	**1500**	1699	1959	2313
1600	1184	1296	1432	**1600**	1812	2090	2468
1700	1258	1377	1522	**1700**	1926	2220	2622
1800	1332	1458	1611	**1800**	2039	2351	2776
1900	1406	1539	1701	**1900**	2152	2482	2930
2000	1480	1620	1790	**2000**	2266	2612	3085

FIXED SPEEDS



Pages

DEFINITION

Operations Engineering Bulletins (OEB) supplement the information and procedures contained in the different sections of the FCOM. OEB's are issued if there is a need for fast transmission of technical and/or procedural information having an operational impact to all flight crews concerned.
They are the result of continuous monitoring of the in-service performance of the aircraft fleet.
If compliance with an OEB has been identified as having a significant impact on aircraft operation, based on all information available at the time of issuance of this OEB, this OEB is printed on orange coloured paper. Associated with this OEB, a temporary revision of the Quick Reference Handbook (QRH) sets forth the correct related procedure.
However, the recommendations contained in all outstanding OEB's should also be reviewed with the highest attention.
Although the OEB's are not approved by the Airworthiness Authorities, the content might be subject to incorporation into the approved Airplane Flight Manual (AFM) or issuance of a Consigne de Navigabilité (CN)/Airworthiness Directive (AD).

DISTRIBUTION

Operating Engineering Bulletins are distributed to all identified holders of a FCOM and to those who need fast information concerning new or revised operational issues. Responsible persons within the operators organization are requested to ensure fast and complete distribution to all flight crews concerned.
R OEB's are filed in numerical order in FCOM chapter 7
This chapter contains a STATUS LIST and a LIST OF APPLICABLE OEB's (PER ATA CHAPTER) which are updated and re-issued with each normal FCOM revision.

COMPLIANCE

Airbus Industrie recommends that all flight crews review on a regular basis all applicable OEB's and strictly adhere to the contained information, procedures and warnings.

N°	TITLE
"To be filled by the operator, if needed"	

N°	TITLE
"To be filled by the operator, if needed"	